

OCD Hobbs

FORM APPROVED
OMB No. 1004-0137
Expires: January 31, 2018

[H]
P/P

UNITED STATES
DEPARTMENT OF THE INTERIOR
BUREAU OF LAND MANAGEMENT
APPLICATION FOR PERMIT TO DRILL OR REENTER

HOBBSS
JAN 16 2019
RECEIVED

1a. Type of work: ☒ DRILL ☐ REENTER		5. Lease Serial No. NMLC0029406B
1b. Type of Well: ☒ Oil Well ☐ Gas Well ☐ Other		6. Indian, Allottee or Tribe Name
1c. Type of Completion: ☐ Hydraulic Fracturing ☒ Single Zone ☐ Multiple Zone		7. If Unit or CA Agreement, Name and No.
2. Name of Operator COG OPERATING LLC (229137)		8. Lease Name and Well No. ZEPP0 5 FEDERAL COM 27H (317782)
3a. Address 600 West Illinois Ave Midland TX 79701	3b. Phone No. (include area code) (432)683-7443	9. API Well No. 30-025-45504
4. Location of Well (Report location clearly and in accordance with any State requirements. *) At surface SENE / 2300 FNL / 1120 FEL / LAT 32.8646101 / LONG -103.783271 At proposed prod. zone SESE / 10 FSL / 990 FEL / LAT 32.8419404 / LONG -103.783271		10. Field and Pool, or Exploratory MALJAMAR / YESO, WEST 44500
11. Sec., T. R. M. or Blk. and Survey or Area SEC 5 / T17S / R32E / NMP		
14. Distance in miles and direction from nearest town or post office* 1.4 miles		12. County or Parish LEA
13. State NM		
15. Distance from proposed* location to nearest property or lease line, ft. (Also to nearest drig. unit line, if any) 10 feet	16. No of acres in lease 1606.8	17. Spacing Unit dedicated to this well 240
18. Distance from proposed location* to nearest well, drilling, completed, applied for, on this lease, ft. 20 feet	19. Proposed Depth 6300 feet / 14291 feet	20. BLM/BIA Bond No. in file FED: NMB000215
21. Elevations (Show whether DF, KDB, RT, GL, etc.) 4113 feet	22. Approximate date work will start* 01/02/2019	23. Estimated duration 20 days
24. Attachments		

The following, completed in accordance with the requirements of Onshore Oil and Gas Order No. 1, and the Hydraulic Fracturing rule per 43 CFR 3162.3-3 (as applicable)

- | | |
|--|---|
| 1. Well plat certified by a registered surveyor. | 4. Bond to cover the operations unless covered by an existing bond on file (see Item 20 above). |
| 2. A Drilling Plan. | 5. Operator certification. |
| 3. A Surface Use Plan (if the location is on National Forest System Lands, the SUPO must be filed with the appropriate Forest Service Office). | 6. Such other site specific information and/or plans as may be requested by the BLM. |

25. Signature (Electronic Submission)	Name (Printed/Typed) Robyn Odom / Ph: (432)685-4385	Date 03/06/2018
Title Regulatory Analyst		
Approved by (Signature) (Electronic Submission)	Name (Printed/Typed) Christopher Walls / Ph: (575)234-2234	Date 10/19/2018
Title Petroleum Engineer		

Application approval does not warrant or certify that the applicant holds legal or equitable title to those rights in the subject lease which would entitle the applicant to conduct operations thereon.

Conditions of approval, if any, are attached.

Title 18 U.S.C. Section 1001 and Title 43 U.S.C. Section 1212, make it a crime for any person knowingly and willfully to make to any department or agency of the United States any false, fictitious or fraudulent statements or representations as to any matter within its jurisdiction.

GCP Rec 11/16/19

APPROVED WITH CONDITIONS

KZ
01/12/19

Don't be
silly

INSTRUCTIONS

GENERAL: This form is designed for submitting proposals to perform certain well operations, as indicated on Federal and Indian lands and leases for action by appropriate Federal agencies, pursuant to applicable Federal laws and regulations. Any necessary special instructions concerning the use of this form and the number of copies to be submitted, particularly with regard to local, area, or regional procedures and practices, either are shown below or will be issued by, or may be obtained from local Federal offices.

ITEM 1: If the proposal is to redrill to the same reservoir at a different subsurface location or to a new reservoir, use this form with appropriate notations. Consult applicable Federal regulations concerning subsequent work proposals or reports on the well.

ITEM 4: Locations on Federal or Indian land should be described in accordance with Federal requirements. Consult local Federal offices for specific instructions.

ITEM 14: Needed only when location of well cannot readily be found by road from the land or lease description. A plat, or plats, separate or on the reverse side, showing the roads to, and the surveyed location of, the well, and any other required information, should be furnished when required by Federal agency offices.

ITEMS 15 AND 18: If well is to be, or has been directionally drilled, give distances for subsurface location of hole in any present or objective productive zone.

ITEM 22: Consult applicable Federal regulations, or appropriate officials, concerning approval of the proposal before operations are started.

ITEM 24: If the proposal will involve hydraulic fracturing operations, you must comply with 43 CFR 3162.3-3, including providing information about the protection of usable water. Operators should provide the best available information about all formations containing water and their depths. This information could include data and interpretation of resistivity logs run on nearby wells. Information may also be obtained from state or tribal regulatory agencies and from local BLM offices.

NOTICES

The Privacy Act of 1974 and regulation in 43 CFR 2.48(d) provide that you be furnished the following information in connection with information required by this application.

AUTHORITY: 30 U.S.C. 181 et seq., 25 U.S.C. 396; 43 CFR 3160

PRINCIPAL PURPOSES: The information will be used to: (1) process and evaluate your application for a permit to drill a new oil, gas, or service well or to reenter a plugged and abandoned well; and (2) document, for administrative use, information for the management, disposal and use of National Resource Lands and resources including (a) analyzing your proposal to discover and extract the Federal or Indian resources encountered; (b) reviewing procedures and equipment and the projected impact on the land involved; and (c) evaluating the effects of the proposed operation on the surface and subsurface water and other environmental impacts.

ROUTINE USE: Information from the record and/or the record will be transferred to appropriate Federal, State, and local or foreign agencies, when relevant to civil, criminal or regulatory investigations or prosecution, in connection with congressional inquiries and for regulatory responsibilities.

EFFECT OF NOT PROVIDING INFORMATION: Filing of this application and disclosure of the information is mandatory only if you elect to initiate a drilling or reentry operation on an oil and gas lease.

The Paperwork Reduction Act of 1995 requires us to inform you that:

The BLM connects this information to an evaluation of the technical, safety, and environmental factors involved with drilling for oil and/or gas on Federal and Indian oil and gas leases. This information will be used to analyze and approve applications. Response to this request is mandatory only if the operator elects to initiate drilling or reentry operations on an oil and gas lease. The BLM would like you to know that you do not have to respond to this or any other Federal agency-sponsored information collection unless it displays a currently valid OMB control number.

BURDEN HOURS STATEMENT: Public reporting burden for this form is estimated to average 8 hours per response, including the time for reviewing instructions, gathering and maintaining data, and completing and reviewing the form. Direct comments regarding the burden estimate or any other aspect of this form to U.S. Department of the Interior, Bureau of Land Management (1004-0137), Bureau Information Connection Clearance Officer (WO-630), 1849 C Street, N.W., Mail Stop 401 LS, Washington, D.C. 20240.

Additional Operator Remarks

Location of Well

1. SHL: SENE / 2300 FNL / 1120 FEL / TWSP: 17S / RANGE: 32E / SECTION: 5 / LAT: 32.8646101 / LONG: -103.783271 (TVD: 0 feet, MD: 0 feet)

PPP: NESE / 2540 FSL / 990 FEL / TWSP: 17S / RANGE: 32E / SECTION: 5 / LAT: 32.863367 / LONG: -103.7836 (TVD: 6211 feet, MD: 6400 feet)

BHL: SESE / 10 FSL / 990 FEL / TWSP: 17S / RANGE: 32E / SECTION: 8 / LAT: 32.8419404 / LONG: -103.783271 (TVD: 6300 feet, MD: 14291 feet)

BLM Point of Contact

Name: Judith Yeager

Title: Legal Instruments Examiner

Phone: 5752345936

Email: jyeager@blm.gov

Review and Appeal Rights

A person contesting a decision shall request a State Director review. This request must be filed within 20 working days of receipt of the Notice with the appropriate State Director (see 43 CFR 3165.3). The State Director review decision may be appealed to the Interior Board of Land Appeals, 801 North Quincy Street, Suite 300, Arlington, VA 22203 (see 43 CFR 3165.4). Contact the above listed Bureau of Land Management office for further information.

PECOS DISTRICT DRILLING CONDITIONS OF APPROVAL

OPERATOR'S NAME:	COG Operating LLC
LEASE NO.:	NMLC0029406B
WELL NAME & NO.:	Zeppo 5 Federal Com 27H
SURFACE HOLE FOOTAGE:	2490'/N & 1250'/E
BOTTOM HOLE FOOTAGE:	10'/S & 990'/E
LOCATION:	Section 5, T.17 S., R.32 E., NMPM
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 1060'. 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 5743' (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.

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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**

OPERATOR'S NAME:	COG OPERATING LLC
LEASE NO.:	NMLC029406B
WELL NAME & NO.:	27H – ZEPP0 5 FEDERAL COM
SURFACE HOLE FOOTAGE:	2300'/N & 1120'/E
BOTTOM HOLE FOOTAGE:	10'/S & 990'/E
LOCATION:	Section 5., T17S., R.32E., NMP
COUNTY:	LEA County, New Mexico

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

- ☐ **General Provisions**
- ☐ **Permit Expiration**
- ☐ **Archaeology, Paleontology, and Historical Sites**
- ☐ **Noxious Weeds**
- ☒ **Special Requirements**
 - Lesser Prairie-Chicken Timing Stipulations
 - Below Ground-level Abandoned Well Marker
 - Watershed
- ☐ **Construction**
 - Notification
 - Topsoil
 - Closed Loop System
 - Federal Mineral Material Pits
 - Well Pads
 - Roads
- ☐ **Road Section Diagram**
- ☒ **Production (Post Drilling)**
 - Well Structures & Facilities
 - Pipelines
- ☐ **Interim Reclamation**
- ☐ **Final Abandonment & Reclamation**

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

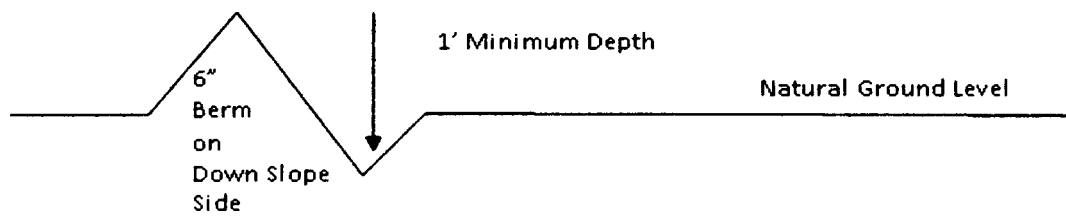
Vehicle turnouts shall be constructed on the road. Turnouts shall be intervisible with interval spacing distance less than 1000 feet. Turnouts shall conform to Figure 1; cross section and plans for typical road construction.

Drainage

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

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

Cross Section of a Typical Lead-off Ditch



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

Formula for Spacing Interval of Lead-off Ditches

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

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

Cattle guards

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

Fence Requirement

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

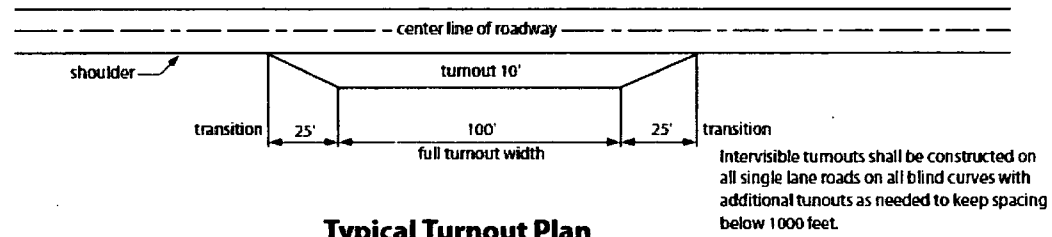
Public Access

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

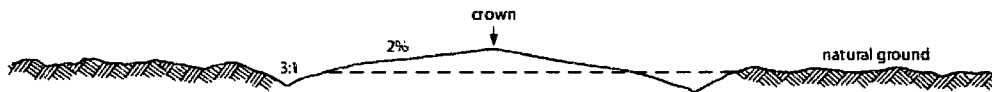
Construction Steps

1. Salvage topsoil
2. Construct road

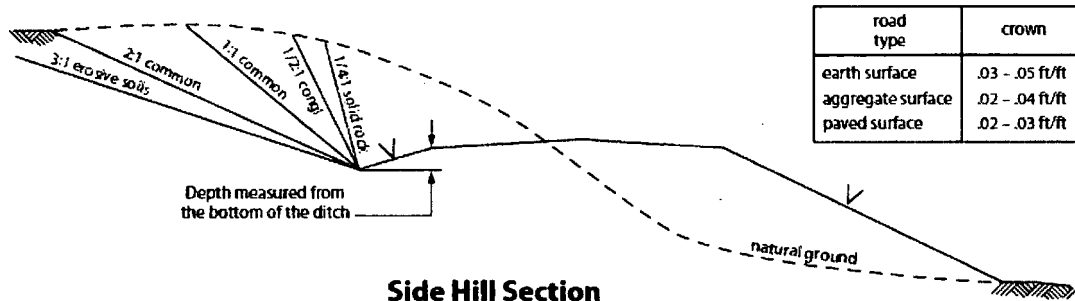
3. Redistribute topsoil
4. Revegetate slopes



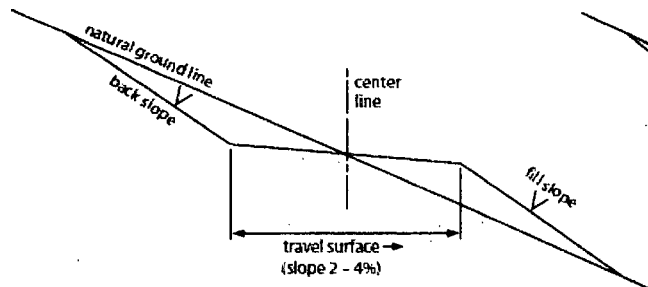
Typical Turnout Plan



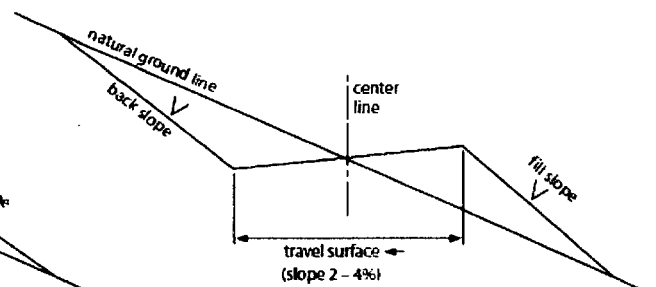
Level Ground Section



Side Hill Section



Typical Outsloped Section



Typical Insloped Section

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

VII. PRODUCTION (POST DRILLING)

A. WELL STRUCTURES & FACILITIES

Placement of Production Facilities

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

Exclosure Netting (Open-top Tanks)

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

Chemical and Fuel Secondary Containment and Exclosure Screening

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

Open-Vent Exhaust Stack Exclosures

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

Containment Structures

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

Painting Requirement

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

B. PIPELINES

STANDARD STIPULATIONS FOR SURFACE INSTALLED PIPELINES

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

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

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

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

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

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

c. Acts of God.

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

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

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

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

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

writing by the Authorized Officer.

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

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

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

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

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

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

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

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

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

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

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

18. Special Stipulations:

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

VIII. INTERIM RECLAMATION

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

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

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

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

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

IX. FINAL ABANDONMENT & RECLAMATION

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

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

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

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

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

Seed Mixture for LPC Sand/Shinnery Sites

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

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

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

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

*Pounds of pure live seed:

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



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

Operator Certification Data Report

10/22/2018

Operator Certification

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

NAME: Robyn Odom

Signed on: 03/06/2018

Title: Regulatory Analyst

Street Address: 600 W Illinois Ave

City: Midland

State: TX

Zip: 79701

Phone: (432)685-4385

Email address: rodom@concho.com

Field Representative

Representative Name:

Street Address:

City:

State:

Zip:

Phone:

Email address:



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

Application Data Report

10/22/2018

APD ID: 10400027567

Submission Date: 03/06/2018

Operator Name: COG OPERATING LLC

Well Name: ZEPP0 5 FEDERAL COM

Well Number: 27H

Well Type: OIL WELL

Well Work Type: Drill



[Show Final Text](#)

Section 1 - General

APD ID: 10400027567

Tie to previous NOS? 10400005156

Submission Date: 03/06/2018

BLM Office: CARLSBAD

User: Robyn Odom

Title: Regulatory Analyst

Federal/Indian APD: FED

Is the first lease penetrated for production Federal or Indian? FED

Lease number: NMLC0029406B

Lease Acres: 1606.8

Surface access agreement in place?

Allotted?

Reservation:

Agreement in place? NO

Federal or Indian agreement:

Agreement number:

Agreement name:

Keep application confidential? NO

Permitting Agent? NO

APD Operator: COG OPERATING LLC

Operator letter of designation:

Operator Info

Operator Organization Name: COG OPERATING LLC

Operator Address: 600 West Illinois Ave

Zip: 79701

Operator PO Box:

Operator City: Midland

State: TX

Operator Phone: (432)683-7443

Operator Internet Address: RODOM@CONCHO.COM

Section 2 - Well Information

Well in Master Development Plan? NO

Mater Development Plan name:

Well in Master SUPO? NO

Master SUPO name:

Well in Master Drilling Plan? NO

Master Drilling Plan name:

Well Name: ZEPP0 5 FEDERAL COM

Well Number: 27H

Well API Number:

Field/Pool or Exploratory? Field and Pool

Field Name: MALJAMAR

Pool Name: YESO, WEST

Is the proposed well in an area containing other mineral resources? NATURAL GAS,OIL

Operator Name: COG OPERATING LLC

Well Name: ZEPP0 5 FEDERAL COM

Well Number: 27H

Describe other minerals:

Is the proposed well in a Helium production area? N

Use Existing Well Pad? NO

New surface disturbance?

Type of Well Pad: MULTIPLE WELL

Multiple Well Pad Name:

Number: 7

ZEPP0 5 FEDERAL COM

Well Class: HORIZONTAL

Number of Legs: 1

Well Work Type: Drill

Well Type: OIL WELL

Describe Well Type:

Well sub-Type: INFILL

Describe sub-type:

Distance to town: 1.4 Miles

Distance to lease line: 10 FT

Reservoir well spacing assigned acres Measurement: 240 Acres

Well plat: Zeppo_5_Federal_Com_27H_C102_20180801112709.pdf

Section 3 - Well Location Table

Survey Type: RECTANGULAR

Describe Survey Type:

Datum: NAD83

Vertical Datum: NAVD88

Survey number:

	NS-Foot	NS Indicator	EW-Foot	EW Indicator	Twsp	Range	Section	Aliquot/Lot/Tract	Latitude	Longitude	County	State	Meridian	Lease Type	Lease Number	Elevation	MD	TVD
SHL Leg #1	230	N112	112	FEL	17S	32E	5	Aliquot SENE	32.46101	103.7632	LEA	NEW MEXI CO	NEW MEXI CO	F	NMLC0 029406 B	411	0	0
KOP Leg #1	230	N112	112	FEL	17S	32E	5	Aliquot SENE	32.46101	103.7632	LEA	NEW MEXI CO	NEW MEXI CO	F	NMLC0 029406 B	411	0	0
PPP Leg #1	234	N112	112	FEL	17S	32E	5	Aliquot NESE	32.46101	103.7632	LEA	NEW MEXI CO	NEW MEXI CO	F	NMLC0 029406 B	411	0	0

Operator Name: COG OPERATING LLC

Well Name: ZEPP0 5 FEDERAL COM

Well Number: 27H

	NS-Foot	NS Indicator	EW-Foot	EW Indicator	Twsp	Range	Section	Aliquot/Lot/Tract	Latitude	Longitude	County	State	Meridian	Lease Type	Lease Number	Elevation	MD	TVD
EXIT Leg #1	150	FEL	590	FEL	17S	32E	8	Aliquot SESE	32.8410 04	103.7332 71	LEA	NEW MEXI CO	NEW MEXI CO	F	NMLC0 064149	218 7	91 0	32 0
BHL Leg #1	150	FEL	590	FEL	17S	32E	8	Aliquot SESE	32.8410 04	103.7332 71	LEA	NEW MEXI CO	NEW MEXI CO	F	NMLC0 064149	218 7	91 0	32 0

Operator Name: COG OPERATING LLC

Well Name: ZEPP0 5 FEDERAL COM

Well Number: 27H

operationally checked each 24 hour period. Blind rams will be operationally checked on each trip out of the hole. These checks will be noted on the daily tour sheets. Other accessories to the BOP equipment will include a Kelly cock and floor safety valve (inside BOP) and choke lines and choke manifold.

Choke Diagram Attachment:

2M_Choke_Schematic_20180221122907.pdf

BOP Diagram Attachment:

2M_ANNULAR_BOP_20180221122914.pdf

Section 3 - Casing

Casing ID	String Type	Hole Size	Csg Size	Condition	Standard	Tapered String	Top Set MD	Bottom Set MD	Top Set TVD	Bottom Set TVD	Top Set MSL	Bottom Set MSL	Calculated casing length MD	Grade	Weight	Joint Type	Collapse SF	Burst SF	Joint SF Type	Joint SF	Body SF Type	Body SF
1	SURFACE	17.5	13.375	NEW	API	N	0	920	0	920			920	H-40	48	STC	1.79	3.28	DRY	8.4	DRY	14.1
2	INTERMEDIATE	12.25	9.625	NEW	API	N	0	2220	0	2220			2220	J-55	40	LTC	2.47	1.44	DRY	6.1	DRY	7.4
3	PRODUCTION	8.75	7.0	NEW	API	N	0	5719	0	5719			5719	L-80	29	LTC	3.1	1.24	DRY	3.69	DRY	4.21
4	PRODUCTION	8.75	5.5	NEW	API	N	5719	6532	5719	6230			813	L-80	17	LTC	2.21	1.24	DRY	4.18	DRY	4.89
5	PRODUCTION	7.875	6.625	NEW	API	N	6532	14291	6230	6300			7759	L-80	17	LTC	2.21	1.24	DRY	4.18	DRY	4.89

Casing Attachments

Operator Name: COG OPERATING LLC

Well Name: ZEPP0 5 FEDERAL COM

Well Number: 27H

Casing Attachments

Casing ID: 1 **String Type:** SURFACE

Inspection Document:

Spec Document:

Tapered String Spec:

Casing Design Assumptions and Worksheet(s):

Casing_Design_Attachment_20180306141446.pdf

Casing ID: 2 **String Type:** INTERMEDIATE

Inspection Document:

Spec Document:

Tapered String Spec:

Casing Design Assumptions and Worksheet(s):

Casing_Design_Attachment_20180306141554.pdf

Casing ID: 3 **String Type:** PRODUCTION

Inspection Document:

Spec Document:

Tapered String Spec:

Casing Design Assumptions and Worksheet(s):

Casing_Design_Attachment_20180306141704.pdf

Operator Name: COG OPERATING LLC

Well Name: ZEPP0 5 FEDERAL COM

Well Number: 27H

Casing Attachments

Casing ID: 4 String Type: PRODUCTION

Inspection Document:

Spec Document:

Tapered String Spec:

Casing Design Assumptions and Worksheet(s):

Casing_Design_Attachement_20180306141907.pdf

Casing ID: 5 String Type: PRODUCTION

Inspection Document:

Spec Document:

Tapered String Spec:

Casing Design Assumptions and Worksheet(s):

Casing_Design_Attachement_20180306142012.pdf

Section 4 - Cement

String Type	Lead/Tail	Stage Tool Depth	Top MD	Bottom MD	Quantity(sx)	Yield	Density	Cu Ft	Excess%	Cement type	Additives
SURFACE	Lead		0	571	550	1.75	13.5	962.5	92	Class C	4%Gel+2% CaCl2+0.25pps CF
SURFACE	Tail			571	200	1.32	14.8	264		Class C	2% CaCl2+0.25pps CF
INTERMEDIATE	Lead		0	571	425	2.45	11.8	1041.25	136	50:50:10 C:Poz:Gel	5%Salt+5pps LCM+0.25pps CF
INTERMEDIATE	Tail			571	200	1.32	14.8	264		Class C	2% CaCl2
PRODUCTION	Lead		0	571	600	2.01	12.5	1206	167	35:65:6 C:Poz:Gel	5%Salt+5pps LCM+0.2%SMS+1%FL-

Operator Name: COG OPERATING LLC

Well Name: ZEPP0 5 FEDERAL COM

Well Number: 27H

String Type	Lead/Tail	Stage Tool Depth	Top MD	Bottom MD	Quantity(sx)	Yield	Density	Cu Ft	Excess%	Cement type	Additives
											Ba-58+0.3%FL-52A+0.125pps CF
PRODUCTION	Tail				400	1.37	14	548		50:50:2 C:Poz:Gel	5%salt+3pps LCM+0.6%SMS+1%FL-25+1%Ba-58+0.125pps
PRODUCTION	Lead		5719		0	0	0	0		Isolation Packers	See attached Production Cement Breakdown

PRODUCTION	Lead		5719		0	0	0	0	0	Isolation Packers	See attached Production Cement Breakdown
------------	------	--	------	--	---	---	---	---	---	-------------------	--

Section 5 - Circulating Medium

Mud System Type: Closed

Will an air or gas system be Used? NO

Description of the equipment for the circulating system in accordance with Onshore Order #2:

Diagram of the equipment for the circulating system in accordance with Onshore Order #2:

Describe what will be on location to control well or mitigate other conditions: Sufficient mud materials to maintain mud properties and meet minimum lost circulation and weight increase requirements will be kept on location at all times.

Describe the mud monitoring system utilized: PVT/Pason/Visual Monitoring

Circulating Medium Table

Top Depth	Bottom Depth	Mud Type	Min Weight (lbs/gal)	Max Weight (lbs/gal)	Density (lbs/cu ft)	Gel Strength (lbs/100 sqft)	PH	Viscosity (CP)	Salinity (ppm)	Filtration (cc)	Additional Characteristics
0	920	WATER-BASED MUD	8.6	8.8							
6532	1429 1	WATER-BASED MUD	8.5	9.2							

Operator Name: COG OPERATING LLC

Well Name: ZEPP0 5 FEDERAL COM

Well Number: 27H

Top Depth	Bottom Depth	Mud Type	Min Weight (lbs/gal)	Max Weight (lbs/gal)	Density (lbs/cu ft)	Gel Strength (lbs/100 sqft)	PH	Viscosity (CP)	Salinity (ppm)	Filtration (cc)	Additional Characteristics
0	6532	SALT SATURATED	10	10.2							

Section 6 - Test, Logging, Coring

List of production tests including testing procedures, equipment and safety measures:

Interval Perforating, Fracture stimulating, Flowback testing

List of open and cased hole logs run in the well:

CNL,MUDLOG

Coring operation description for the well:

N/A

Section 7 - Pressure

Anticipated Bottom Hole Pressure: 2741

Anticipated Surface Pressure: 1034

Anticipated Bottom Hole Temperature(F): 117

Anticipated abnormal pressures, temperatures, or potential geologic hazards? NO

Describe:

Contingency Plans geohazards description:

Contingency Plans geohazards attachment:

Hydrogen Sulfide drilling operations plan required? YES

Hydrogen sulfide drilling operations plan:

H2S_Plan_20180221123314.pdf

Zeppo_5_Federal_Com_27H_H2S_Schematic_20180221123324.pdf

Operator Name: COG OPERATING LLC

Well Name: ZEPPO 5 FEDERAL COM

Well Number: 27H

Section 8 - Other Information

Proposed horizontal/directional/multi-lateral plan submission:

Zeppo_5_Federal_Com_27H__Plan_1_07_25_18_20180801113933.pdf

Zeppo_5_Federal_Com_27H__Plan_1_07_25_18_AC_Report_20180801113945.pdf

Other proposed operations facets description:

7" to be run from surface to kickoff point and changed over to 5 ½" with DV Tool and ECP at kickoff point. 5 ½" casing will be run from kickoff point to TD and isolation packers set throughout curve and lateral. 7" to be cemented from kickoff point to surface.

Other proposed operations facets attachment:

Zeppo_5_Federal_Com_27H_Production_Cement_Breakdown_20180306141202.pdf

Zeppo_5_Federal_Com_27H_Contingent_Multi_Stage_Cmt_Plan_20180306141210.pdf

Zeppo_5_Federal_Com_27H_GCP_20180801114005.pdf

Closed_Loop_Schematic_20180801114021.pdf

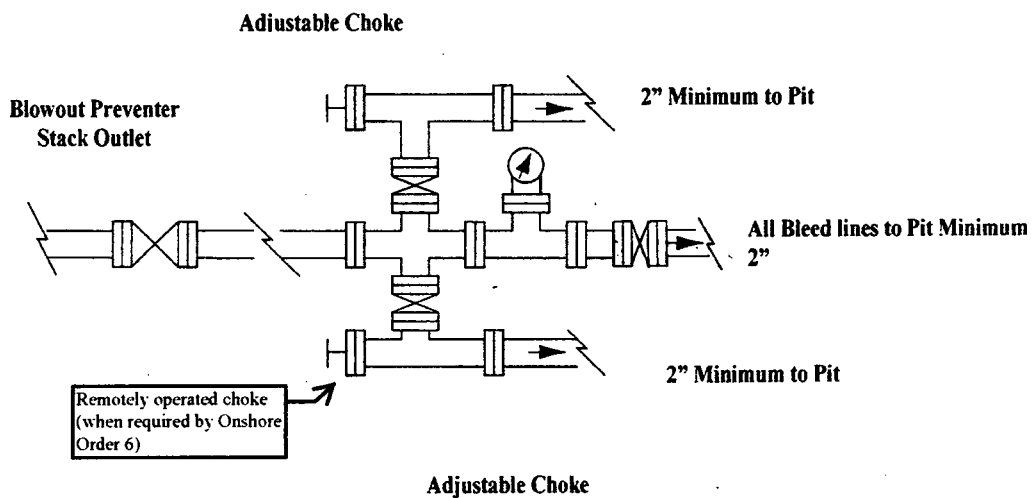
Other Variance attachment:

COG Operating LLC

Exhibit #9

Choke Schematic

Choke Manifold Requirement (2000 psi WP)

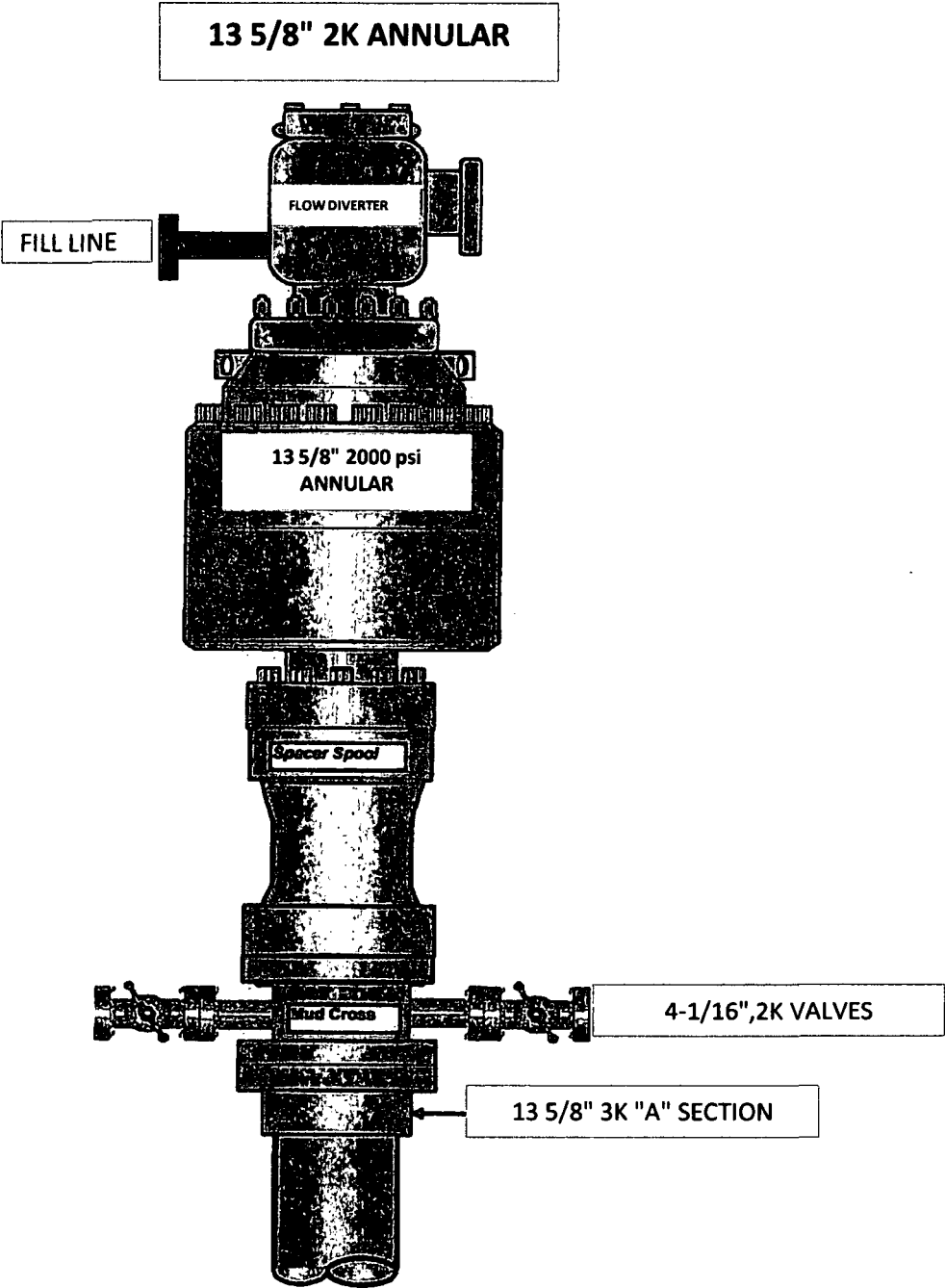


NOTES REGARDING THE BLOWOUT PREVENTERS

Master Drilling Plan Eddy County, New Mexico

1. Drilling nipple to be so constructed that it can be removed without use of a welder through rotary table opening, with minimum I.D. equal to preventer bore.
2. Wear ring to be properly installed in head.
3. Blow out preventer and all fittings must be in good condition, 2000 psi WP minimum.
4. All fittings to be flanged.
5. Safety valve must be available on rig floor at all times with proper connections, valve to be full 2000 psi WP minimum.
6. All choke and fill lines to be securely anchored especially ends of choke lines.
7. Equipment through which bit must pass shall be at least as large as the diameter of the casing being drilled through.
8. Kelly cock on Kelly.
9. Extension wrenches and hands wheels to be properly installed.
10. Blow out preventer control to be located as close to driller's position as feasible.
11. Blow out preventer closing equipment to include minimum 40-gallon accumulator, two independent sources of pump power on each closing unit installation all API specifications.

Exhibit #10



Casing Program

	Collapse SF	Burst SF	Tension SF
BLM Minimum Safety Factor	1.125	1	1.6 Dry 1.8 Wet

All casing strings will be tested in accordance with Onshore Oil and Gas Order #2 III.B.1.h

Assumed 9.0ppg MW equivalent pore pressure from 9 5/8" shoe to deepest TVD in wellbore.

BLM standard formulas were used on all SF calculations.

Casing design does meet and/or exceed BLM's minimum standards.

The pipe will be kept at a minimum 1/3 fluid fill to avoid approaching the collapse pressure rating of the casing.

This well is not located within the Capitan Reef.

This well is not located in the SOPA or in the R-111-P.

This well is not located in a high or critical Cave/Karst area.

This is not a walking operation.

We will not be pre-setting casing.

All completion intervals are planned to be fracture stimulated.

Casing Program

	Collapse SF	Burst SF	Tension SF
BLM Minimum Safety Factor	1.125	1	1.6 Dry 1.8 Wet

All casing strings will be tested in accordance with Onshore Oil and Gas Order #2 III.B.1.h

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This is not a walking operation.

We will not be pre-setting casing.

All completion intervals are planned to be fracture stimulated.

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 and 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 will 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

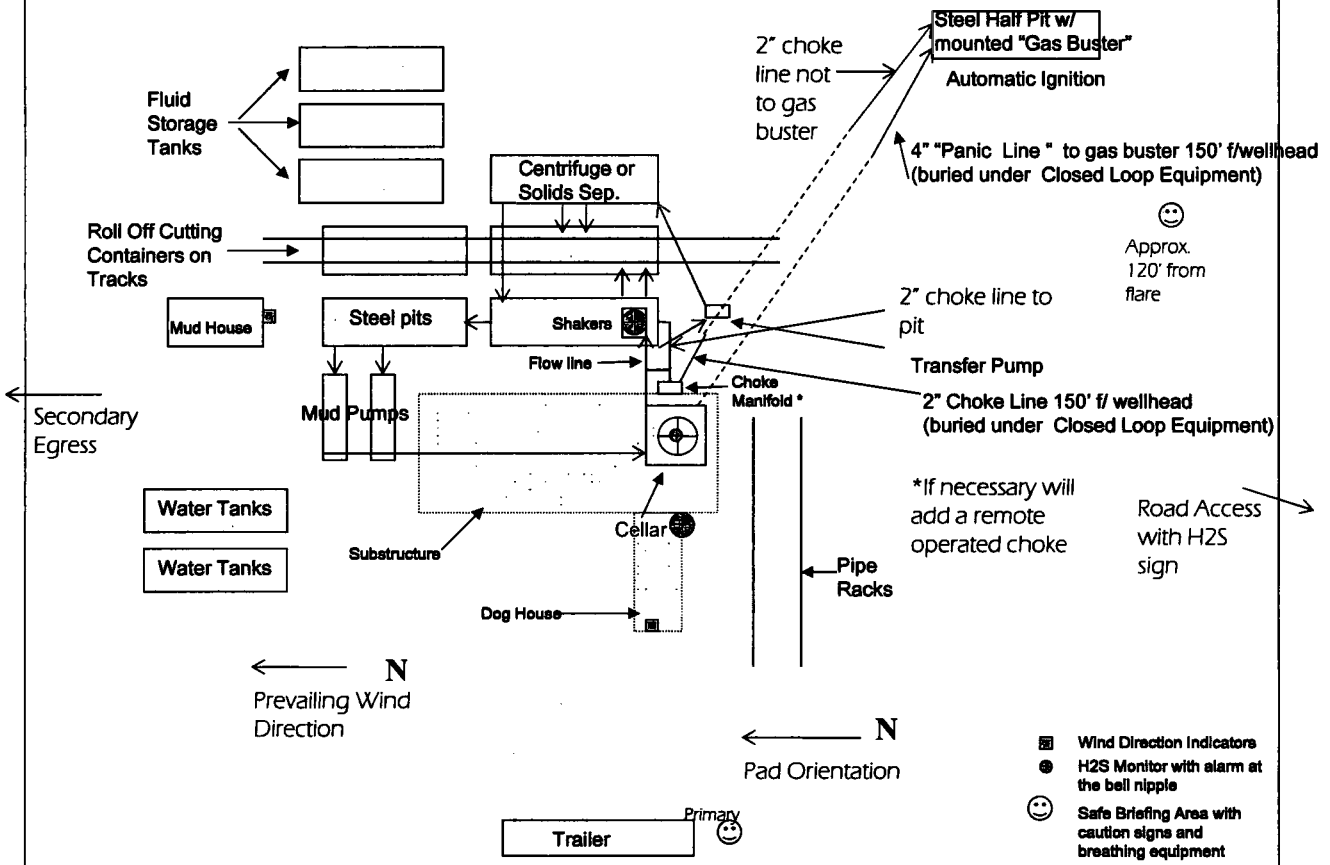
EDDY COUNTY EMERGENCY NUMBERS

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 #27H - H2S Safety Equipment Diagram





Project: Lea County, NM (NAD27 NME)
Site: Zeppo 5 Federal COM
Well: 27H
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: 48322.6nT
Dip Angle: 60.80°
Date: 7/24/2018
Model: MVHD

RKB @ 4130.00usft (Double K 7)

4113.00

WELL DETAILS

				4113.00		
+N/-S	+E/-W	Northing	Easting	Latitude	Longitude	
0.00	0.00	678653.40	688916.60	32° 51' 52.16947 N	103° 46' 59.56091 W	

DESIGN TARGET DETAILS

Name	TVD	+N/-S	+E/-W	Northing	Easting	Latitude	Longitude
BHL - Zeppo 5 Federal Com 27H	6299.90	-8246.90	179.90	670406.50	689096.50	32° 50' 30.55775 N	103° 46' 57.95581 W

SECTION DETAILS

Sec	MD	Inc	Azi	TVD	+N/-S	+E/-W	Dleg	TFace	VSec	Target	Annotation
1	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00		
2	5742.56	0.00	0.00	5742.56	0.00	0.00	0.00	0.00	0.00		KOP, Begin 12.00°/100' Build
3	6487.64	89.41	162.70	6220.00	-451.17	140.52	12.00	162.70	454.13		LP, Hold 89.41° Inc, Begin 4.00°/100' Turn
4	6995.12	89.41	183.00	6225.28	-952.04	203.35	4.00	90.11	956.25		Hold 183.00° Azm
5	7695.12	89.41	183.00	6232.49	-1651.04	166.72	0.00	0.00	1654.29		Begin 4.00°/100' Turn
6	7773.44	89.41	179.87	6233.29	-1729.33	164.76	4.00	-89.93	1732.51		Hold 179.87° Azm
7	14291.37	89.41	179.87	6299.90	-8246.90	179.90	0.00	0.00	8246.86	BHL - Zeppo 5 Federal Com 27H	TD at 14291.37

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 27H, Grid North

Latitude: 32° 51' 52.16947 N
Longitude: 103° 46' 59.56091 W

Grid East: 668916.60

Grid North: 678653.40

Scale Factor: 1.000

Geomagnetic Model: MVHD

Sample Date: 24-Jul-18

Magnetic Declination: 7.02°

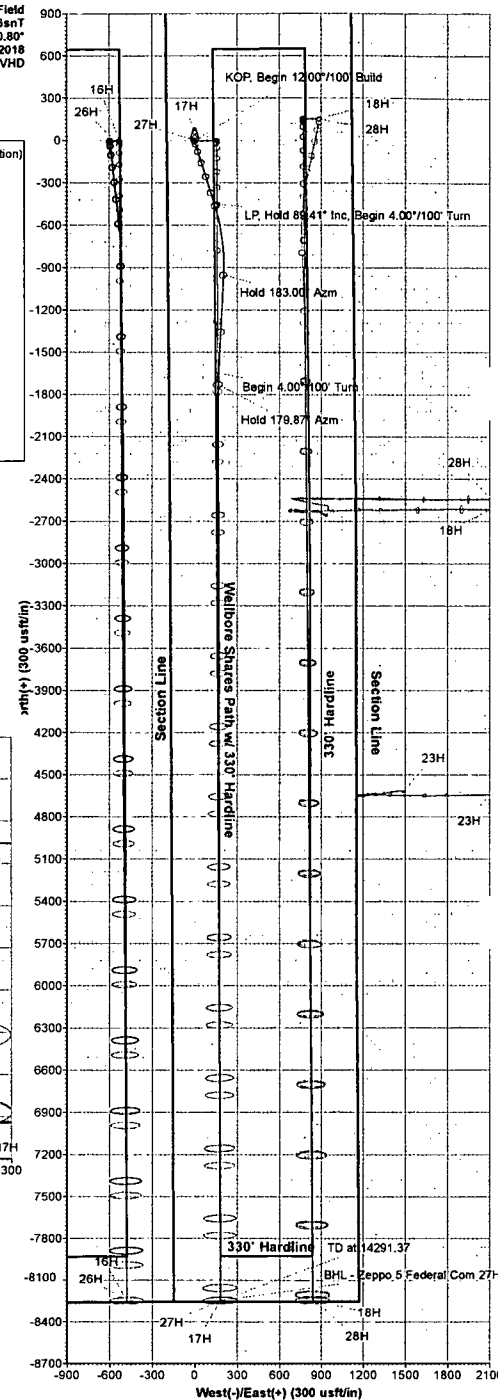
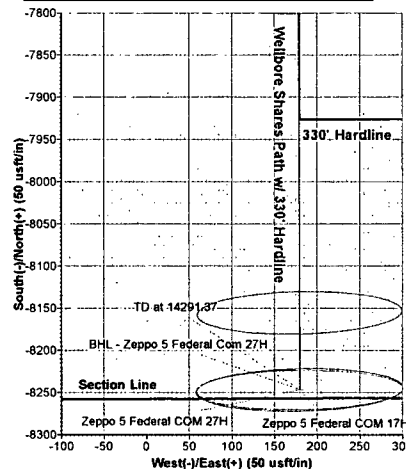
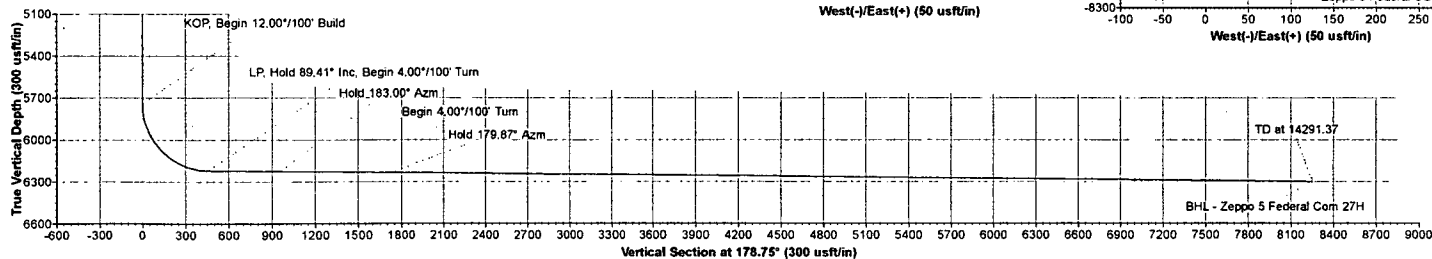
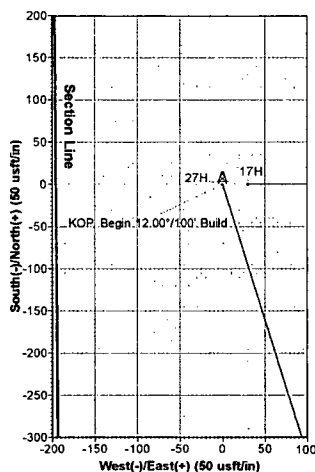
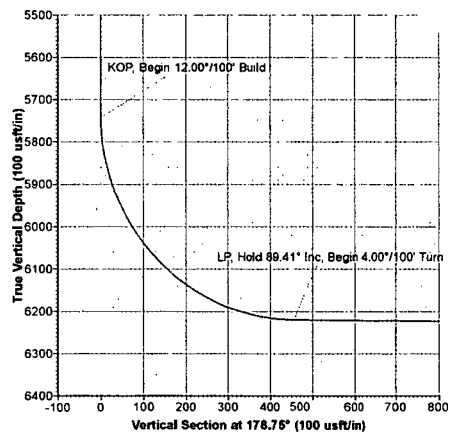
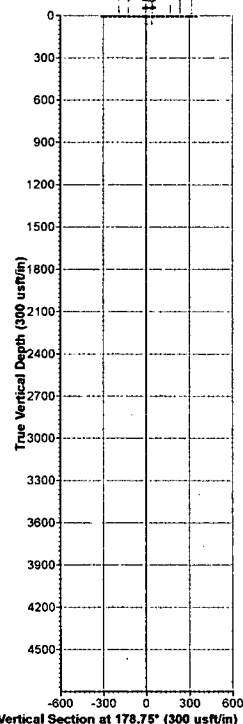
Dip Angle from Horizontal: 60.80°

Magnetic Field Strength: 48322.6469846nT

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
- 17H, OH, Plan 1 07-25-18 V0
- 23H, OH, Surveys V0
- 16H, OH, Plan 2 07-25-18 V0
- Plan 1 07-25-18





COG Operating LLC

Lea County, NM (NAD27 NME)

Zeppo 5 Federal COM

27H

OH

Plan: Plan 1 07-25-18

Standard Planning Report

25 July, 2018



Database: USA Compass
Company: COG Operating LLC
Project: Lea County, NM (NAD27 NME)
Site: Zeppo 5 Federal COM
Well: 27H
Wellbore: OH
Design: Plan 1 07-25-18

Local Co-ordinate Reference: Well 27H
TVD Reference: RKB @ 4130.00usft (Double K 7)
MD Reference: RKB @ 4130.00usft (Double K 7)
North Reference: Grid
Survey Calculation Method: Minimum Curvature

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

Well	27H		
Well Position	+N/-S	192.30 usft	Northing: 678,653.40 usft
	+E/-W	653.80 usft	Easting: 668,916.60 usft
Position Uncertainty	0.00 usft	Wellhead Elevation:	Latitude: 32° 51' 52.16947 N
			Longitude: 103° 46' 59.56091 W
			Ground Level: 4,113.00 usft

Wellbore	OH		
Magnetics	Model Name	Sample Date	Declination
	MVHD	7/24/2018	(°)
			Dip Angle
			(°)
			Field Strength
			(nT)
			48,322.64698464

Design	Plan 1 07-25-18		
Audit Notes:			
Version:	Phase:	PROTOTYPE	Tie On Depth: 0.00
Vertical Section:	Depth From (TVD)	+N/-S	+E/-W
	(usft)	(usft)	(usft)
	0.00	0.00	0.00
			Direction
			(°)
			178.75

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	
5,742.56	0.00	0.00	5,742.56	0.00	0.00	0.00	0.00	0.00	0.00	
6,487.64	89.41	162.70	6,220.00	-451.17	140.52	12.00	12.00	0.00	162.70	
6,995.12	89.41	183.00	6,225.28	-952.04	203.35	4.00	0.00	4.00	90.11	
7,695.12	89.41	183.00	6,232.49	-1,651.04	166.72	0.00	0.00	0.00	0.00	
7,773.44	89.41	179.87	6,233.29	-1,729.33	164.76	4.00	0.01	-4.00	-89.93	
14,291.37	89.41	179.87	6,299.90	-8,246.90	179.90	0.00	0.00	0.00	0.00	BHL - Zeppo 5 Fed

Database: USA Compass
Company: COG Operating LLC
Project: Lea County, NM (NAD27 NME)
Site: Zeppo 5 Federal COM
Well: 27H
Wellbore: OH
Design: Plan 1 07-25-18

Local Co-ordinate Reference: Well 27H
TVD Reference: RKB @ 4130.00usft (Double K 7)
MD Reference: RKB @ 4130.00usft (Double K 7)
North Reference: Grid
Survey Calculation Method: Minimum Curvature

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
5,742.56	0.00	0.00	5,742.56	0.00	0.00	0.00	0.00	0.00	0.00
KOP, Begin 12.00°/100' Build									
5,800.00	6.89	162.70	5,799.86	-3.29	1.03	3.32	12.00	12.00	0.00
5,900.00	18.89	162.70	5,897.16	-24.56	7.65	24.72	12.00	12.00	0.00
6,000.00	30.89	162.70	5,987.71	-64.67	20.14	65.10	12.00	12.00	0.00
6,100.00	42.89	162.70	6,067.54	-121.89	37.96	122.68	12.00	12.00	0.00
6,200.00	54.89	162.70	6,133.16	-193.69	60.33	194.96	12.00	12.00	0.00
6,300.00	66.89	162.70	6,181.72	-276.96	86.26	278.77	12.00	12.00	0.00
6,400.00	78.89	162.70	6,211.08	-368.04	114.63	370.46	12.00	12.00	0.00
6,487.64	89.41	162.70	6,220.00	-451.17	140.52	454.13	12.00	12.00	0.00
LP, Hold 89.41° Inc, Begin 4.00°/100' Turn									
6,500.00	89.41	163.19	6,220.13	-462.98	144.15	466.02	4.00	-0.01	4.00
6,600.00	89.40	167.19	6,221.16	-559.64	169.69	563.21	4.00	-0.01	4.00
6,700.00	89.40	171.19	6,222.21	-657.84	188.44	661.79	4.00	0.00	4.00
6,800.00	89.40	175.19	6,223.25	-757.11	200.28	761.30	4.00	0.00	4.00
6,900.00	89.40	179.20	6,224.30	-856.96	205.18	861.24	4.00	0.00	4.00
6,995.12	89.41	183.00	6,225.28	-952.04	203.35	956.25	4.00	0.01	4.00
Hold 183.00° Azm									
7,000.00	89.41	183.00	6,225.33	-956.92	203.10	961.12	0.00	0.00	0.00
7,100.00	89.41	183.00	6,226.36	-1,056.78	197.87	1,060.84	0.00	0.00	0.00
7,200.00	89.41	183.00	6,227.39	-1,156.63	192.63	1,160.56	0.00	0.00	0.00
7,300.00	89.41	183.00	6,228.42	-1,256.49	187.40	1,260.28	0.00	0.00	0.00
7,400.00	89.41	183.00	6,229.45	-1,356.35	182.17	1,360.00	0.00	0.00	0.00
7,500.00	89.41	183.00	6,230.48	-1,456.21	176.93	1,459.72	0.00	0.00	0.00
7,600.00	89.41	183.00	6,231.51	-1,556.06	171.70	1,559.44	0.00	0.00	0.00
7,695.12	89.41	183.00	6,232.49	-1,651.04	166.72	1,654.29	0.00	0.00	0.00
Begin 4.00°/100' Turn									
7,700.00	89.41	182.80	6,232.54	-1,655.92	166.47	1,659.16	4.00	0.00	-4.00
7,773.44	89.41	179.87	6,233.29	-1,729.33	164.76	1,732.51	4.00	0.01	-4.00
Hold 179.87° Azm									
7,800.00	89.41	179.87	6,233.56	-1,755.89	164.82	1,759.07	0.00	0.00	0.00
7,900.00	89.41	179.87	6,234.59	-1,855.88	165.06	1,859.04	0.00	0.00	0.00
8,000.00	89.41	179.87	6,235.61	-1,955.88	165.29	1,959.02	0.00	0.00	0.00
8,100.00	89.41	179.87	6,236.63	-2,055.87	165.52	2,058.99	0.00	0.00	0.00
8,200.00	89.41	179.87	6,237.65	-2,155.87	165.75	2,158.97	0.00	0.00	0.00
8,300.00	89.41	179.87	6,238.67	-2,255.86	165.99	2,258.94	0.00	0.00	0.00
8,400.00	89.41	179.87	6,239.70	-2,355.86	166.22	2,358.92	0.00	0.00	0.00
8,500.00	89.41	179.87	6,240.72	-2,455.85	166.45	2,458.90	0.00	0.00	0.00
8,600.00	89.41	179.87	6,241.74	-2,555.84	166.68	2,558.87	0.00	0.00	0.00
8,700.00	89.41	179.87	6,242.76	-2,655.84	166.91	2,658.85	0.00	0.00	0.00
8,800.00	89.41	179.87	6,243.78	-2,755.83	167.15	2,758.82	0.00	0.00	0.00
8,900.00	89.41	179.87	6,244.80	-2,855.83	167.38	2,858.80	0.00	0.00	0.00
9,000.00	89.41	179.87	6,245.83	-2,955.82	167.61	2,958.77	0.00	0.00	0.00
9,100.00	89.41	179.87	6,246.85	-3,055.82	167.84	3,058.75	0.00	0.00	0.00
9,200.00	89.41	179.87	6,247.87	-3,155.81	168.08	3,158.73	0.00	0.00	0.00
9,300.00	89.41	179.87	6,248.89	-3,255.81	168.31	3,258.70	0.00	0.00	0.00
9,400.00	89.41	179.87	6,249.91	-3,355.80	168.54	3,358.68	0.00	0.00	0.00
9,500.00	89.41	179.87	6,250.94	-3,455.79	168.77	3,458.65	0.00	0.00	0.00
9,600.00	89.41	179.87	6,251.96	-3,555.79	169.00	3,558.63	0.00	0.00	0.00
9,700.00	89.41	179.87	6,252.98	-3,655.78	169.24	3,658.61	0.00	0.00	0.00
9,800.00	89.41	179.87	6,254.00	-3,755.78	169.47	3,758.58	0.00	0.00	0.00
9,900.00	89.41	179.87	6,255.02	-3,855.77	169.70	3,858.56	0.00	0.00	0.00
10,000.00	89.41	179.87	6,256.05	-3,955.77	169.93	3,958.53	0.00	0.00	0.00



Planning Report



Database: USA Compass
Company: COG Operating LLC
Project: Lea County, NM (NAD27 NME)
Site: Zeppo 5 Federal COM
Well: 27H
Wellbore: OH
Design: Plan 1 07-25-18

Local Co-ordinate Reference: Well 27H
TVD Reference: RKB @ 4130.00usft (Double K 7)
MD Reference: RKB @ 4130.00usft (Double K 7)
North Reference: Grid
Survey Calculation Method: Minimum Curvature

Planned Survey

Measured Depth (usft)	Inclination (°)	Azimuth (°)	Vertical Depth (usft)	+N/-S (usft)	+E/-W (usft)	Vertical Section (usft)	Dogleg Rate (°/100usft)	Build Rate (°/100usft)	Turn Rate (°/100usft)
10,100.00	89.41	179.87	6,257.07	-4,055.76	170.17	4,058.51	0.00	0.00	0.00
10,200.00	89.41	179.87	6,258.09	-4,155.76	170.40	4,158.48	0.00	0.00	0.00
10,300.00	89.41	179.87	6,259.11	-4,255.75	170.63	4,258.46	0.00	0.00	0.00
10,400.00	89.41	179.87	6,260.13	-4,355.75	170.86	4,358.44	0.00	0.00	0.00
10,500.00	89.41	179.87	6,261.16	-4,455.74	171.09	4,458.41	0.00	0.00	0.00
10,600.00	89.41	179.87	6,262.18	-4,555.73	171.33	4,558.39	0.00	0.00	0.00
10,700.00	89.41	179.87	6,263.20	-4,655.73	171.56	4,658.36	0.00	0.00	0.00
10,800.00	89.41	179.87	6,264.22	-4,755.72	171.79	4,758.34	0.00	0.00	0.00
10,900.00	89.41	179.87	6,265.24	-4,855.72	172.02	4,858.31	0.00	0.00	0.00
11,000.00	89.41	179.87	6,266.27	-4,955.71	172.26	4,958.29	0.00	0.00	0.00
11,100.00	89.41	179.87	6,267.29	-5,055.71	172.49	5,058.27	0.00	0.00	0.00
11,200.00	89.41	179.87	6,268.31	-5,155.70	172.72	5,158.24	0.00	0.00	0.00
11,300.00	89.41	179.87	6,269.33	-5,255.70	172.95	5,258.22	0.00	0.00	0.00
11,400.00	89.41	179.87	6,270.35	-5,355.69	173.18	5,358.19	0.00	0.00	0.00
11,500.00	89.41	179.87	6,271.37	-5,455.69	173.42	5,458.17	0.00	0.00	0.00
11,600.00	89.41	179.87	6,272.40	-5,555.68	173.65	5,558.15	0.00	0.00	0.00
11,700.00	89.41	179.87	6,273.42	-5,655.67	173.88	5,658.12	0.00	0.00	0.00
11,800.00	89.41	179.87	6,274.44	-5,755.67	174.11	5,758.10	0.00	0.00	0.00
11,900.00	89.41	179.87	6,275.46	-5,855.66	174.35	5,858.07	0.00	0.00	0.00
12,000.00	89.41	179.87	6,276.48	-5,955.66	174.58	5,958.05	0.00	0.00	0.00
12,100.00	89.41	179.87	6,277.51	-6,055.65	174.81	6,058.02	0.00	0.00	0.00
12,200.00	89.41	179.87	6,278.53	-6,155.65	175.04	6,158.00	0.00	0.00	0.00
12,300.00	89.41	179.87	6,279.55	-6,255.64	175.28	6,257.98	0.00	0.00	0.00
12,400.00	89.41	179.87	6,280.57	-6,355.64	175.51	6,357.95	0.00	0.00	0.00
12,500.00	89.41	179.87	6,281.59	-6,455.63	175.74	6,457.93	0.00	0.00	0.00
12,600.00	89.41	179.87	6,282.62	-6,555.62	175.97	6,557.90	0.00	0.00	0.00
12,700.00	89.41	179.87	6,283.64	-6,655.62	176.20	6,657.88	0.00	0.00	0.00
12,800.00	89.41	179.87	6,284.66	-6,755.61	176.44	6,757.85	0.00	0.00	0.00
12,900.00	89.41	179.87	6,285.68	-6,855.61	176.67	6,857.83	0.00	0.00	0.00
13,000.00	89.41	179.87	6,286.70	-6,955.60	176.90	6,957.81	0.00	0.00	0.00
13,100.00	89.41	179.87	6,287.73	-7,055.60	177.13	7,057.78	0.00	0.00	0.00
13,200.00	89.41	179.87	6,288.75	-7,155.59	177.37	7,157.76	0.00	0.00	0.00
13,300.00	89.41	179.87	6,289.77	-7,255.59	177.60	7,257.73	0.00	0.00	0.00
13,400.00	89.41	179.87	6,290.79	-7,355.58	177.83	7,357.71	0.00	0.00	0.00
13,500.00	89.41	179.87	6,291.81	-7,455.58	178.06	7,457.69	0.00	0.00	0.00
13,600.00	89.41	179.87	6,292.83	-7,555.57	178.29	7,557.66	0.00	0.00	0.00
13,700.00	89.41	179.87	6,293.86	-7,655.56	178.53	7,657.64	0.00	0.00	0.00
13,800.00	89.41	179.87	6,294.88	-7,755.56	178.76	7,757.61	0.00	0.00	0.00
13,900.00	89.41	179.87	6,295.90	-7,855.55	178.99	7,857.59	0.00	0.00	0.00
14,000.00	89.41	179.87	6,296.92	-7,955.55	179.22	7,957.56	0.00	0.00	0.00
14,100.00	89.41	179.87	6,297.94	-8,055.54	179.46	8,057.54	0.00	0.00	0.00
14,200.00	89.41	179.87	6,298.97	-8,155.54	179.69	8,157.52	0.00	0.00	0.00
14,291.37	89.41	179.87	6,299.90	-8,246.90	179.90	8,248.86	0.00	0.00	0.00

TD at 14291.37



Planning Report



Database: USA Compass
Company: COG Operating LLC
Project: Lea County, NM (NAD27 NME)
Site: Zeppo 5 Federal COM
Well: 27H
Wellbore: OH
Design: Plan 1 07-25-18

Local Co-ordinate Reference: Well 27H
TVD Reference: RKB @ 4130.00usft (Double K 7)
MD Reference: RKB @ 4130.00usft (Double K 7)
North Reference: Grid
Survey Calculation Method: Minimum Curvature

Design Targets

Target Name

- hit/miss target	Dip Angle (°)	Dip Dir. (°)	TVD (usft)	+N/-S (usft)	+E/-W (usft)	Northing (usft)	Easting (usft)	Latitude	Longitude
- Shape									
BHL - Zeppo 5 Federal	0.00	0.00	6,299.90	-8,246.90	179.90	670,406.50	669,096.50	32° 50' 30.55775 N	03° 46' 57.95581 W
- plan hits target center									
- Point									

Plan Annotations

Measured Depth (usft)	Vertical Depth (usft)	Local Coordinates		Comment
		+N/-S (usft)	+E/-W (usft)	
5,742.56	5,742.56	0.00	0.00	KOP, Begin 12.00°/100' Build
6,487.64	6,220.00	-451.17	140.52	LP, Hold 89.41° Inc, Begin 4.00°/100' Turn
6,995.12	6,225.28	-952.04	203.35	Hold 183.00° Azm
7,695.12	6,232.49	-1,651.04	166.72	Begin 4.00°/100' Turn
7,773.44	6,233.29	-1,729.33	164.76	Hold 179.87° Azm
14,291.37	6,299.90	-8,246.90	179.90	TD at 14291.37



COG Operating LLC

Lea County, NM (NAD27 NME)

Zeppo 5 Federal COM

27H

OH

Plan 1 07-25-18

Anticollision Report

25 July, 2018





Anticollision Report



Company: COG Operating LLC
Project: Lea County, NM (NAD27 NME)
Reference Site: Zeppo 5 Federal COM
Site Error: 0.00 usft
Reference Well: 27H
Well Error: 0.00 usft
Reference Wellbore: OH
Reference Design: Plan 1 07-25-18

Local Co-ordinate Reference: Well 27H
TVD Reference: RKB @ 4130.00usft (Double K 7)
MD Reference: RKB @ 4130.00usft (Double K 7)
North Reference: Grid
Survey Calculation Method: Minimum Curvature
Output errors are at: 2.00 sigma
Database: USA Compass
Offset TVD Reference: Offset Datum

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

Survey Tool Program Date 7/25/2018

From (usft)	To (usft)	Survey (Wellbore)	Tool Name	Description
0.00	14,290.94	Plan 1 07-25-18 (OH)	MWD+HDGM	OWSG Rev.2 MWD + HDGM

Summary

Site Name	Reference Measured Depth (usft)	Offset Measured Depth (usft)	Distance Between Centres (usft)	Distance Between Ellipses (usft)	Separation Factor	Warning
Offset Well - Wellbore - Design						
Shovel Head Federal Com						
18H - OH / 62984 - Surveys (Double K 7)	8,667.22	5,609.96	966.67	911.06	17.383	CC, ES
18H - OH / 62984 - Surveys (Double K 7)	8,900.00	5,611.68	994.30	935.73	16.978	SF
28H - OH / 62985 - Plan 3 07-22-18	8,577.42	5,922.05	666.58	618.27	13.798	CC, ES
28H - OH / 62985 - Plan 3 07-22-18	8,700.00	5,922.64	677.76	627.91	13.598	SF
28H - OH / 62985 - Surveys (Double K 7)	8,584.98	5,906.00	699.59	647.96	13.549	CC
28H - OH / 62985 - Surveys (Double K 7)	8,600.00	5,906.00	699.75	647.93	13.504	ES
28H - OH / 62985 - Surveys (Double K 7)	8,700.00	5,906.00	708.98	655.91	13.359	SF
Sneed 9 Federal Com						
23H - OH - Surveys	10,692.38	5,922.00	1,069.01	987.45	13.106	CC
23H - OH - Surveys	10,700.00	5,922.00	1,069.04	987.37	13.090	ES
23H - OH - Surveys	10,900.00	5,922.00	1,088.99	1,004.55	12.898	SF
Zeppo 5 Federal COM						
16H - OH - Plan 2 07-25-18	5,276.56	5,271.59	529.90	492.52	14.175	CC
16H - OH - Plan 2 07-25-18	5,400.00	5,390.00	530.45	492.25	13.885	ES
16H - OH - Plan 2 07-25-18	14,291.37	13,757.91	836.86	594.20	3.449	SF
17H - OH - Plan 1 07-25-18	916.33	917.33	30.00	23.85	4.875	CC
17H - OH - Plan 1 07-25-18	1,000.00	1,000.99	30.00	23.25	4.442	ES
17H - OH - Plan 1 07-25-18	14,291.37	13,768.60	500.20	257.49	2.061	SF
18H - OH - Plan 2 07-25-18	6,866.69	6,512.49	745.07	695.33	14.979	CC
18H - OH - Plan 2 07-25-18	14,291.37	13,949.84	833.66	589.10	3.409	ES, SF
26H - OH - Plan 2 07-25-18	1,000.00	994.00	559.90	553.18	83.214	CC
26H - OH - Plan 2 07-25-18	14,291.37	14,161.64	669.71	426.65	2.755	ES, SF
28H - OH - Plan 2 07-25-18	6,908.61	6,956.06	582.98	531.37	11.295	CC
28H - OH - Plan 2 07-25-18	14,291.37	14,337.32	668.62	423.51	2.728	ES, SF

Offset Design Shovel Head Federal Com - 18H - OH / 62984 - Surveys (Double K 7)											
Survey Program: 100-NS-GYRO-MS, 4600-MWD+HDGM											
Reference Offset Semi Major Axis											
Measured Depth (usft)	Vertical Depth (usft)	Measured Depth (usft)	Vertical Depth (usft)	Reference (usft)	Offset (usft)	Highside Tooface (")	Offset Wellbore Centre +N/-S (usft)	Offset Wellbore Centre +E/-W (usft)	Distance Between Centres (usft)	Distance Between Ellipses (usft)	Minimum Separation (usft)
0.00	0.00	0.00	0.00	0.00	0.00	160.34	-2,646.56	945.65	2,810.52		
100.00	100.00	77.75	77.75	0.15	0.09	160.34	-2,646.59	945.51	2,810.42	2,810.18	0.23
126.19	126.19	103.19	103.19	0.24	0.12	160.34	-2,646.62	945.41	2,810.41	2,810.05	0.36
											7,788.169

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



Anticollision Report



Company: COG Operating LLC
 Project: Lea County, NM (NAD27 NME)
 Reference Site: Zeppo 5 Federal COM
 Site Error: 0.00 usft
 Reference Well: 27H
 Well Error: 0.00 usft
 Reference Wellbore OH
 Reference Design: Plan 1 07-25-18

Local Co-ordinate Reference: Well 27H
 TVD Reference: RKB @ 4130.00usft (Double K 7)
 MD Reference: RKB @ 4130.00usft (Double K 7)
 North Reference: Grid
 Survey Calculation Method: Minimum Curvature
 Output errors are at 2.00 sigma
 Database: USA Compass
 Offset TVD Reference: Offset 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, 4800-MWD+HDGM													Offset Well Error: 0.00 usft
Reference		Offset		Semi Major Axis		Distance							
Measured Depth (usft)	Vertical Depth (usft)	Measured Depth (usft)	Vertical Depth (usft)	Reference (usft)	Offset (usft)	Highside Toolface (°)	Offset Wellbore Centre +N/-S (usft)	Offset Wellbore Centre +E/-W (usft)	Between Centres (usft)	Between Ellipses (usft)	Minimum Separation (usft)	Separation Factor	Warning
200.00	200.00	170.81	170.80	0.51	0.27	160.35	-2,646.84	945.29	2,810.58	2,809.80	0.78	3,594.281	
300.00	300.00	274.38	274.38	0.87	0.52	160.35	-2,647.02	945.15	2,810.70	2,809.31	1.39	2,021.762	
400.00	400.00	380.18	380.17	1.22	0.77	160.35	-2,647.03	944.98	2,810.65	2,808.66	2.00	1,407.939	
500.00	500.00	480.67	480.67	1.58	1.01	160.36	-2,647.00	944.75	2,810.54	2,807.95	2.59	1,083.150	
591.87	591.87	568.87	568.87	1.91	1.21	160.36	-2,646.93	944.58	2,810.42	2,807.30	3.12	900.569	
600.00	600.00	575.00	575.00	1.94	1.22	160.36	-2,646.94	944.56	2,810.42	2,807.26	3.16	888.339	
700.00	700.00	674.50	674.50	2.30	1.47	160.37	-2,647.24	944.14	2,810.57	2,806.80	3.77	745.969	
800.00	800.00	770.07	770.06	2.66	1.71	160.38	-2,647.56	943.77	2,810.75	2,806.38	4.37	643.899	
900.00	900.00	869.44	869.44	3.02	1.94	160.39	-2,647.95	943.55	2,811.04	2,806.08	4.96	566.986	
1,000.00	1,000.00	968.29	968.28	3.38	2.19	160.40	-2,648.32	943.25	2,811.30	2,805.74	5.56	505.255	
1,100.00	1,100.00	1,067.97	1,067.96	3.73	2.44	160.40	-2,648.78	942.96	2,811.64	2,805.47	6.17	455.674	
1,200.00	1,200.00	1,168.74	1,168.73	4.09	2.69	160.41	-2,649.19	942.66	2,811.92	2,805.13	6.79	414.402	
1,300.00	1,300.00	1,269.12	1,269.10	4.45	2.95	160.42	-2,649.70	942.32	2,812.28	2,804.88	7.40	380.022	
1,400.00	1,400.00	1,362.57	1,362.56	4.81	3.19	160.43	-2,650.11	941.95	2,812.57	2,804.57	8.00	351.510	
1,500.00	1,500.00	1,462.08	1,462.07	5.17	3.43	160.44	-2,650.78	941.71	2,813.13	2,804.53	8.60	327.057	
1,600.00	1,600.00	1,562.20	1,562.18	5.53	3.68	160.45	-2,651.48	941.44	2,813.69	2,804.48	9.21	305.548	
1,700.00	1,700.00	1,660.90	1,660.87	5.88	3.93	160.46	-2,652.22	941.11	2,814.28	2,804.47	9.82	286.679	
1,800.00	1,800.00	1,758.73	1,758.71	6.24	4.18	160.48	-2,653.01	940.76	2,814.93	2,804.51	10.42	270.036	
1,900.00	1,900.00	1,855.23	1,855.20	6.60	4.43	160.49	-2,653.86	940.37	2,815.62	2,804.59	11.03	255.272	
2,000.00	2,000.00	1,957.88	1,957.84	6.96	4.69	160.50	-2,654.82	940.08	2,816.41	2,804.77	11.64	241.857	
2,100.00	2,100.00	2,052.74	2,052.70	7.32	4.90	160.51	-2,655.59	940.08	2,817.17	2,804.95	12.22	230.495	
2,200.00	2,200.00	2,153.10	2,153.06	7.68	5.13	160.51	-2,656.55	940.20	2,818.12	2,805.31	12.80	220.117	
2,300.00	2,300.00	2,255.40	2,255.35	8.04	5.36	160.51	-2,657.51	940.33	2,819.05	2,805.66	13.39	210.516	
2,400.00	2,400.00	2,342.95	2,342.89	8.39	5.55	160.52	-2,658.41	940.52	2,820.09	2,806.14	13.94	202.236	
2,500.00	2,500.00	2,438.61	2,438.55	8.75	5.76	160.52	-2,659.55	940.88	2,821.33	2,806.83	14.51	194.462	
2,600.00	2,600.00	2,908.96	2,908.47	9.11	6.62	161.06	-2,644.57	907.27	2,815.22	2,799.49	15.73	179.014	
2,700.00	2,700.00	2,984.94	2,981.64	9.47	6.73	161.20	-2,638.45	898.10	2,803.71	2,787.51	16.20	173.081	
2,800.00	2,800.00	3,036.37	3,032.67	9.83	6.81	161.28	-2,634.97	892.78	2,793.83	2,777.19	16.64	167.923	
2,900.00	2,900.00	3,084.01	3,079.98	10.19	6.89	161.36	-2,632.37	887.82	2,785.46	2,768.38	17.08	163.097	
3,000.00	3,000.00	3,132.18	3,127.87	10.54	6.99	161.45	-2,630.99	882.80	2,779.25	2,761.71	17.53	158.513	
3,100.00	3,100.00	3,209.49	3,204.74	10.90	7.15	161.60	-2,629.64	874.74	2,774.26	2,756.20	18.06	153.635	
3,200.00	3,200.00	3,300.00	3,294.78	11.26	7.35	161.77	-2,628.40	865.59	2,769.76	2,751.15	18.62	148.784	
3,300.00	3,300.00	3,381.37	3,375.73	11.62	7.54	161.93	-2,627.66	857.37	2,765.76	2,746.60	19.16	144.348	
3,400.00	3,400.00	3,464.80	3,458.64	11.98	7.74	162.12	-2,628.01	848.06	2,762.66	2,742.94	19.72	140.090	
3,500.00	3,500.00	3,554.88	3,548.12	12.34	7.96	162.33	-2,628.76	837.68	2,759.92	2,739.62	20.30	135.946	
3,600.00	3,600.00	3,652.69	3,645.32	12.70	8.21	162.54	-2,629.67	826.87	2,757.45	2,736.55	20.90	131.910	
3,700.00	3,700.00	3,764.46	3,756.40	13.05	8.49	162.80	-2,630.45	814.43	2,754.79	2,733.25	21.54	127.879	
3,800.00	3,800.00	3,874.36	3,865.50	13.41	8.77	163.06	-2,631.08	801.22	2,751.79	2,729.61	22.18	124.079	
3,900.00	3,900.00	3,984.70	3,974.88	13.77	9.05	163.35	-2,631.53	786.79	2,748.37	2,725.56	22.82	120.455	
4,000.00	4,000.00	4,120.10	4,108.91	14.13	9.39	163.74	-2,631.50	767.52	2,744.32	2,720.80	23.52	116.675	
4,100.00	4,100.00	4,238.39	4,226.11	14.49	9.69	164.05	-2,629.85	751.68	2,739.23	2,715.05	24.18	113.308	
4,200.00	4,200.00	4,325.00	4,311.94	14.85	9.90	164.27	-2,628.16	740.18	2,733.73	2,708.98	24.75	110.458	
4,300.00	4,300.00	4,390.32	4,376.85	15.20	10.07	164.41	-2,627.42	732.92	2,729.56	2,704.29	25.27	108.010	
4,400.00	4,400.00	4,497.91	4,483.82	15.56	10.34	164.64	-2,626.42	721.40	2,725.79	2,699.89	25.90	105.237	
4,500.00	4,500.00	4,575.00	4,560.45	15.92	10.53	164.80	-2,625.42	713.09	2,721.82	2,695.36	26.45	102.890	
4,600.00	4,600.00	4,674.32	4,659.22	16.28	10.66	165.01	-2,624.42	702.69	2,718.11	2,691.17	26.94	100.893	
4,700.00	4,700.00	4,747.05	4,731.62	16.64	10.75	165.15	-2,624.39	695.72	2,715.59	2,688.20	27.39	99.134	
4,800.00	4,800.00	4,834.82	4,819.05	17.00	10.81	165.31	-2,624.90	688.07	2,713.91	2,686.10	27.80	97.609	
4,900.00	4,900.00	4,917.19	4,901.25	17.36	10.83	165.42	-2,625.27	682.88	2,712.74	2,684.56	28.18	96.253	
5,000.00	5,000.00	5,033.53	5,017.49	17.71	10.87	165.52	-2,625.22	678.17	2,711.70	2,683.12	28.58	94.869	
5,100.00	5,100.00	5,134.84	5,118.78	18.07	10.92	165.54	-2,623.93	676.56	2,710.07	2,681.08	28.99	93.479	
5,173.36	5,173.36	5,166.46	5,150.36	18.34	10.93	165.52	-2,623.35	677.68	2,709.47	2,680.20	29.27	92.568	

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

Company: COG Operating LLC
Project: Lea County, NM (NAD27 NME)
Reference Site: Zeppo 5 Federal COM
Site Error: 0.00 usft
Reference Well: 27H
Well Error: 0.00 usft
Reference Wellbore: OH
Reference Design: Plan 1 07-25-18

Local Co-ordinate Reference: Well 27H
TVD Reference: RKB @ 4130.00usft (Double K 7)
MD Reference: RKB @ 4130.00usft (Double K 7)
North Reference: Grid
Survey Calculation Method: Minimum Curvature
Output errors are at 2.00 sigma
Database: USA Compass
Offset TVD Reference: Offset 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	Offset	Semi Major Axis		Distance		Minimum Separation		Separation Factor		Warning				
Measured Depth (usft)	Vertical Depth (usft)	Measured Depth (usft)	Vertical Depth (usft)	Reference (usft)	Offset (usft)	Highside Toolface (°)	Offset Wellbore Centre +N/-S (usft)	Offset Wellbore Centre +E/-W (usft)	Between Centres (usft)	Between Ellipses (usft)	Minimum Separation (usft)	Separation Factor		
5,200.00	5,200.00	5,181.00	5,164.87	18.43	10.94	165.49	-2,623.15	678.72	2,709.56	2,680.19	29.37	92.247		
5,300.00	5,300.00	5,213.00	5,196.67	18.79	10.96	165.42	-2,622.85	682.21	2,711.31	2,681.56	29.75	91.141		
5,400.00	5,400.00	5,259.28	5,242.23	19.15	10.99	165.25	-2,622.56	690.31	2,715.23	2,685.10	30.13	90.106		
5,500.00	5,500.00	5,307.00	5,288.36	19.51	11.02	165.00	-2,622.28	702.43	2,721.27	2,690.75	30.52	89.153		
5,600.00	5,600.00	5,338.00	5,317.68	19.86	11.04	164.80	-2,622.14	712.48	2,729.55	2,698.65	30.91	88.317		
5,700.00	5,700.00	5,370.00	5,347.27	20.22	11.07	164.55	-2,622.19	724.64	2,740.38	2,709.09	31.29	87.568		
5,800.00	5,799.86	5,402.00	5,376.02	20.56	11.11	1.55	-2,622.47	738.69	2,750.44	2,718.77	31.67	86.847		
5,900.00	5,897.16	5,433.00	5,403.09	20.88	11.15	1.28	-2,622.98	753.77	2,744.15	2,712.12	32.03	85.670		
6,000.00	5,987.71	5,464.00	5,429.56	21.18	11.20	1.01	-2,623.70	769.89	2,719.77	2,687.38	32.38	83.987		
6,100.00	6,067.54	5,483.05	5,445.56	21.49	11.24	0.88	-2,624.29	780.23	2,678.02	2,645.29	32.73	81.834		
6,200.00	6,133.16	5,506.61	5,465.05	21.81	11.29	0.67	-2,625.29	793.41	2,620.35	2,587.25	33.10	79.158		
6,300.00	6,181.72	5,534.69	5,487.76	22.18	11.36	0.28	-2,626.55	809.88	2,548.41	2,514.86	33.54	75.973		
6,400.00	6,211.08	5,561.87	5,509.01	22.61	11.44	-0.41	-2,627.53	826.78	2,464.46	2,430.41	34.05	72.384		
6,500.00	6,220.13	5,583.00	5,524.99	23.08	11.51	-3.35	-2,628.00	840.61	2,371.53	2,336.94	34.59	68.558		
6,600.00	6,221.16	5,583.00	5,524.99	23.63	11.51	-15.72	-2,628.00	840.61	2,276.27	2,241.14	35.14	64.779		
6,700.00	6,222.21	5,600.49	5,537.84	24.25	11.58	-27.44	-2,628.25	852.47	2,181.94	2,146.11	35.83	60.900		
6,800.00	6,223.25	5,605.65	5,541.58	24.91	11.60	-36.20	-2,628.31	856.03	2,089.32	2,052.80	36.52	57.217		
6,900.00	6,224.30	5,608.29	5,543.47	25.61	11.62	-42.87	-2,628.34	857.86	1,999.12	1,961.89	37.23	53.699		
7,000.00	6,225.33	5,608.44	5,543.58	26.34	11.62	-47.66	-2,628.34	857.97	1,912.18	1,874.23	37.96	50.379		
7,100.00	6,226.36	5,607.51	5,542.91	27.10	11.61	-47.61	-2,628.33	857.32	1,827.80	1,789.08	38.71	47.213		
7,200.00	6,227.39	5,606.60	5,542.26	27.92	11.61	-47.56	-2,628.32	856.69	1,745.06	1,705.54	39.53	44.150		
7,300.00	6,228.42	5,605.72	5,541.63	28.78	11.60	-47.51	-2,628.31	856.08	1,664.22	1,623.84	40.39	41.207		
7,400.00	6,229.45	5,604.87	5,541.01	29.69	11.60	-47.46	-2,628.30	855.49	1,585.57	1,544.28	41.29	38.398		
7,500.00	6,230.48	5,604.04	5,540.41	30.64	11.60	-47.41	-2,628.29	854.91	1,509.44	1,467.20	42.24	35.735		
7,600.00	6,231.51	5,603.23	5,539.83	31.63	11.59	-47.37	-2,628.28	854.35	1,436.25	1,393.02	43.22	33.228		
7,700.00	6,232.54	5,602.45	5,539.26	32.65	11.59	-47.20	-2,628.27	853.81	1,366.45	1,322.20	44.24	30.887		
7,800.00	6,233.56	5,602.78	5,539.50	33.72	11.59	-45.30	-2,628.28	854.05	1,298.62	1,253.31	45.31	28.661		
7,900.00	6,234.59	5,603.68	5,540.15	34.82	11.60	-45.36	-2,628.29	854.67	1,234.09	1,187.67	46.42	26.586		
8,000.00	6,235.61	5,604.56	5,540.79	35.95	11.60	-45.41	-2,628.30	855.27	1,174.55	1,127.00	47.55	24.699		
8,100.00	6,236.63	5,605.42	5,541.41	37.11	11.60	-45.46	-2,628.31	855.87	1,120.78	1,072.07	48.71	23.009		
8,200.00	6,237.65	5,606.26	5,542.01	38.28	11.61	-45.51	-2,628.31	856.45	1,073.64	1,023.76	49.89	21.521		
8,300.00	6,238.67	5,607.08	5,542.61	39.47	11.61	-45.56	-2,628.32	857.02	1,034.06	982.98	51.08	20.242		
8,400.00	6,239.70	5,607.89	5,543.18	40.68	11.61	-45.61	-2,628.33	857.58	1,002.92	950.62	52.30	19.177		
8,500.00	6,240.72	5,608.68	5,543.75	41.91	11.62	-45.65	-2,628.34	858.13	981.02	927.50	53.52	18.328		
8,600.00	6,241.74	5,609.45	5,544.31	43.15	11.62	-45.70	-2,628.35	858.67	969.00	914.24	54.77	17.693		
8,667.22	6,242.43	5,609.96	5,544.67	43.99	11.62	-45.73	-2,628.35	859.03	966.67	911.06	55.61	17.383 CC, ES		
8,700.00	6,242.76	5,610.21	5,544.85	44.40	11.62	-45.74	-2,628.35	859.20	967.22	911.20	56.02	17.265		
8,800.00	6,243.78	5,610.95	5,545.38	45.66	11.63	-45.79	-2,628.36	859.72	975.74	918.46	57.29	17.032		
8,900.00	6,244.80	5,611.68	5,545.90	46.94	11.63	-45.83	-2,628.37	860.23	994.30	935.73	58.56	16.978 SF		
9,000.00	6,245.83	5,612.39	5,546.41	48.22	11.63	-45.87	-2,628.37	860.73	1,022.34	962.48	59.85	17.081		
9,100.00	6,246.85	5,613.09	5,546.91	49.51	11.64	-45.91	-2,628.38	861.22	1,059.11	997.96	61.15	17.320		
9,200.00	6,247.87	5,613.77	5,547.39	50.82	11.64	-45.95	-2,628.39	861.70	1,103.75	1,041.29	62.45	17.673		
9,300.00	6,248.89	5,614.45	5,547.87	52.13	11.64	-45.99	-2,628.39	862.17	1,155.34	1,091.57	63.77	18.118		
9,400.00	6,249.91	5,615.11	5,548.34	53.44	11.64	-46.03	-2,628.40	862.63	1,212.99	1,147.90	65.09	18.637		
9,500.00	6,250.94	5,615.75	5,548.80	54.77	11.65	-46.07	-2,628.40	863.09	1,275.88	1,209.47	66.41	19.211		
9,600.00	6,251.96	5,616.39	5,549.25	56.10	11.65	-46.11	-2,628.41	863.54	1,343.28	1,275.54	67.75	19.828		
9,700.00	6,252.98	5,617.01	5,549.69	57.43	11.65	-46.15	-2,628.41	863.98	1,414.55	1,345.46	69.09	20.475		
9,800.00	6,254.00	5,617.62	5,550.13	58.77	11.65	-46.18	-2,628.42	864.41	1,489.12	1,418.69	70.43	21.143		
9,900.00	6,255.02	5,618.22	5,550.55	60.12	11.66	-46.22	-2,628.42	864.83	1,566.52	1,494.75	71.78	21.824		
10,000.00	6,256.05	5,618.81	5,550.97	61.47	11.66	-46.25	-2,628.43	865.25	1,646.37	1,573.23	73.13	22.512		
10,100.00	6,257.07	5,619.39	5,551.38	62.83	11.66	-46.29	-2,628.43	865.66	1,728.31	1,653.82	74.49	23.201		
10,200.00	6,258.09	5,619.96	5,551.78	64.19	11.66	-46.32	-2,628.44	866.06	1,812.06	1,736.21	75.85	23.889		

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



Anticollision Report



Company: COG Operating LLC
Project: Lea County, NM (NAD27 NME)
Reference Site: Zeppo 5 Federal COM
Site Error: 0.00 usft
Reference Well: 27H
Well Error: 0.00 usft
Reference Wellbore: OH
Reference Design: Plan 1 07-25-18

Local Co-ordinate Reference: Well 27H
TVD Reference: RKB @ 4130.00usft (Double K 7)
MD Reference: RKB @ 4130.00usft (Double K 7)
North Reference: Grid
Survey Calculation Method: Minimum Curvature
Output errors are at
Database: USA Compass
Offset TVD Reference: Offset 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, 4800-MWD+HDCM													Offset Well Error:	0.00 usft
Reference		Offset		Semi Major Axis		Highside Toolface (°)	Distance			Minimum Separation (usft)	Separation Factor	Warning		
Measured Depth (usft)	Vertical Depth (usft)	Measured Depth (usft)	Vertical Depth (usft)	Reference (usft)	Offset (usft)	Offset Wellbore Centre +N/-S (usft)	+E/-W (usft)	Between Centres (usft)	Between Ellipses (usft)					
10,300.00	6,259.11	5,620.52	5,552.18	65.55	11.67	-46.35	-2,628.44	866.46	1,897.39	1,820.17	77.22	24.571		
10,400.00	6,260.13	5,621.07	5,552.56	66.92	11.67	-46.39	-2,628.44	866.85	1,984.09	1,905.50	78.59	25.246		
10,500.00	6,261.16	5,621.61	5,552.94	68.29	11.67	-46.42	-2,628.45	867.23	2,071.98	1,992.02	79.96	25.912		
10,600.00	6,262.18	5,622.14	5,553.32	69.67	11.67	-46.45	-2,628.45	867.61	2,160.93	2,079.59	81.34	26.567		
10,700.00	6,263.20	5,622.67	5,553.68	71.04	11.68	-46.48	-2,628.45	867.98	2,250.81	2,168.09	82.72	27.210		
10,800.00	6,264.22	5,623.18	5,554.04	72.42	11.68	-46.51	-2,628.46	868.35	2,341.51	2,257.41	84.10	27.841		
10,900.00	6,265.24	5,623.68	5,554.40	73.81	11.68	-46.54	-2,628.46	868.71	2,432.93	2,347.45	85.49	28.459		
11,000.00	6,266.27	5,624.18	5,554.75	75.19	11.68	-46.57	-2,628.46	869.06	2,525.01	2,438.13	86.88	29.065		
11,100.00	6,267.29	5,624.67	5,555.09	76.58	11.68	-46.60	-2,628.47	869.41	2,617.67	2,529.40	88.27	29.657		
11,200.00	6,268.31	5,646.00	5,569.78	77.97	11.78	-47.86	-2,628.54	884.88	2,711.10	2,621.35	89.75	30.208		
11,300.00	6,269.33	5,646.00	5,569.78	79.36	11.78	-47.86	-2,628.54	884.88	2,804.73	2,713.59	91.14	30.774		
11,400.00	6,270.35	5,646.00	5,569.78	80.76	11.78	-47.86	-2,628.54	884.88	2,898.78	2,806.25	92.53	31.327		
11,500.00	6,271.37	5,646.00	5,569.78	82.16	11.78	-47.86	-2,628.54	884.88	2,993.23	2,899.30	93.93	31.866		
11,600.00	6,272.40	5,646.00	5,569.78	83.55	11.78	-47.86	-2,628.54	884.88	3,088.02	2,992.69	95.33	32.393		
11,700.00	6,273.42	5,646.00	5,569.78	84.95	11.78	-47.86	-2,628.54	884.88	3,183.13	3,086.40	96.73	32.907		
11,800.00	6,274.44	5,646.00	5,569.78	86.36	11.78	-47.86	-2,628.54	884.88	3,278.53	3,180.40	98.13	33.410		
11,900.00	6,275.46	5,646.00	5,569.78	87.76	11.78	-47.86	-2,628.54	884.88	3,374.20	3,274.66	99.54	33.900		
12,000.00	6,276.48	5,646.00	5,569.78	89.17	11.78	-47.86	-2,628.54	884.88	3,470.11	3,369.17	100.94	34.378		
12,100.00	6,277.51	5,646.00	5,569.78	90.57	11.78	-47.86	-2,628.54	884.88	3,566.25	3,463.90	102.35	34.845		
12,200.00	6,278.53	5,646.00	5,569.78	91.98	11.78	-47.86	-2,628.54	884.88	3,662.59	3,558.84	103.75	35.300		
12,300.00	6,279.55	5,646.00	5,569.78	93.39	11.78	-47.86	-2,628.54	884.88	3,759.13	3,653.96	105.16	35.745		
12,400.00	6,280.57	5,646.00	5,569.78	94.80	11.78	-47.86	-2,628.54	884.88	3,855.84	3,749.26	106.57	36.180		
12,500.00	6,281.59	5,646.00	5,569.78	96.21	11.78	-47.86	-2,628.54	884.88	3,952.71	3,844.73	107.99	36.604		
12,600.00	6,282.62	5,646.00	5,569.78	97.62	11.78	-47.86	-2,628.54	884.88	4,049.74	3,940.34	109.40	37.018		
12,700.00	6,283.64	5,646.00	5,569.78	99.04	11.78	-47.86	-2,628.54	884.88	4,146.91	4,036.10	110.81	37.423		
12,800.00	6,284.66	5,646.00	5,569.78	100.45	11.78	-47.86	-2,628.54	884.88	4,244.21	4,131.98	112.23	37.818		
12,900.00	6,285.68	5,646.00	5,569.78	101.87	11.78	-47.86	-2,628.54	884.88	4,341.63	4,227.99	113.64	38.204		
13,000.00	6,286.70	5,646.00	5,569.78	103.29	11.78	-47.86	-2,628.54	884.88	4,439.17	4,324.11	115.06	38.581		
13,100.00	6,287.73	5,646.00	5,569.78	104.70	11.78	-47.86	-2,628.54	884.88	4,536.81	4,420.33	116.48	38.949		
13,200.00	6,288.75	5,646.00	5,569.78	106.12	11.78	-47.86	-2,628.54	884.88	4,634.56	4,516.66	117.90	39.310		
13,300.00	6,289.77	5,646.00	5,569.78	107.54	11.78	-47.86	-2,628.54	884.88	4,732.40	4,613.08	119.32	39.662		
13,400.00	6,290.79	5,646.00	5,569.78	108.96	11.78	-47.86	-2,628.54	884.88	4,830.32	4,709.58	120.74	40.006		
13,500.00	6,291.81	5,646.00	5,569.78	110.38	11.78	-47.86	-2,628.54	884.88	4,928.33	4,806.17	122.16	40.343		
13,600.00	6,292.83	5,646.00	5,569.78	111.81	11.78	-47.86	-2,628.54	884.88	5,026.42	4,902.84	123.58	40.673		
13,700.00	6,293.86	5,646.00	5,569.78	113.23	11.78	-47.86	-2,628.54	884.88	5,124.59	4,999.58	125.01	40.995		
13,800.00	6,294.88	5,646.00	5,569.78	114.65	11.78	-47.86	-2,628.54	884.88	5,222.82	5,096.39	126.43	41.310		
13,900.00	6,295.90	5,646.00	5,569.78	116.08	11.78	-47.86	-2,628.54	884.88	5,321.12	5,193.26	127.85	41.619		
14,000.00	6,296.92	5,646.00	5,569.78	117.50	11.78	-47.86	-2,628.54	884.88	5,419.48	5,290.20	129.28	41.921		
14,100.00	6,297.94	5,646.00	5,569.78	118.93	11.78	-47.86	-2,628.54	884.88	5,517.90	5,387.19	130.70	42.217		
14,200.00	6,298.97	5,646.00	5,569.78	120.35	11.78	-47.86	-2,628.54	884.88	5,616.37	5,484.24	132.13	42.506		
14,291.37	6,299.90	5,646.00	5,569.78	121.46	11.78	-47.86	-2,628.54	884.88	5,706.40	5,573.16	133.24	42.828		

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



Anticollision Report



Company: COG Operating LLC
Project: Lea County, NM (NAD27 NME)
Reference Site: Zeppo 5 Federal COM
Site Error: 0.00 usft
Reference Well: 27H
Well Error: 0.00 usft
Reference Wellbore OH
Reference Design: Plan 1 07-25-18

Local Co-ordinate Reference: Well 27H
TVD Reference: RKB @ 4130.00usft (Double K 7)
MD Reference: RKB @ 4130.00usft (Double K 7)
North Reference: Grid
Survey Calculation Method: Minimum Curvature
Output errors are at 2.00 sigma
Database: USA Compass
Offset TVD Reference: Offset 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		Offset		Semi Major Axis		Highside Toolface (°)	Distance		Minimum Separation (usft)	Separation Factor	Warning		
Measured Depth (usft)	Vertical Depth (usft)	Measured Depth (usft)	Vertical Depth (usft)	Reference (usft)	Offset (usft)		Offset Wellbore Centre +N/-S (usft)	+E/-W (usft)					
0.00	0.00	5,400.00	5,381.80	0.00	0.00	164.51	-2,544.08	704.93	6,015.08				
100.00	100.00	5,400.00	5,381.80	0.15	0.00	164.51	-2,544.08	704.93	5,925.38	5,925.24	0.15	N/A	
200.00	200.00	5,400.00	5,381.80	0.51	0.00	164.51	-2,544.08	704.93	5,836.03	5,835.52	0.51	N/A	
300.00	300.00	5,400.00	5,381.80	0.87	0.00	164.51	-2,544.08	704.93	5,747.02	5,746.16	0.87	6,636.982	
400.00	400.00	5,400.00	5,381.80	1.22	0.00	164.51	-2,544.08	704.93	5,658.38	5,657.16	1.22	4,621.425	
500.00	500.00	5,400.00	5,381.80	1.58	0.00	164.51	-2,544.08	704.93	5,570.13	5,568.55	1.58	3,519.046	
600.00	600.00	5,400.00	5,381.80	1.94	0.00	164.51	-2,544.08	704.93	5,482.28	5,480.34	1.94	2,823.990	
700.00	700.00	5,400.00	5,381.80	2.30	0.00	164.51	-2,544.08	704.93	5,394.85	5,392.55	2.30	2,345.796	
800.00	800.00	5,400.00	5,381.80	2.66	0.00	164.51	-2,544.08	704.93	5,307.87	5,305.21	2.66	1,996.740	
900.00	900.00	5,400.00	5,381.80	3.02	0.00	164.51	-2,544.08	704.93	5,221.35	5,218.33	3.02	1,730.793	
1,000.00	1,000.00	5,400.00	5,381.80	3.38	0.00	164.51	-2,544.08	704.93	5,135.32	5,131.95	3.38	1,521.482	
1,100.00	1,100.00	5,400.00	5,381.80	3.73	0.00	164.51	-2,544.08	704.93	5,049.81	5,046.08	3.73	1,352.501	
1,200.00	1,200.00	5,400.00	5,381.80	4.09	0.00	164.51	-2,544.08	704.93	4,964.84	4,960.75	4.09	1,213.258	
1,300.00	1,300.00	5,400.00	5,381.80	4.45	0.00	164.51	-2,544.08	704.93	4,880.44	4,875.99	4.45	1,096.573	
1,400.00	1,400.00	5,400.00	5,381.80	4.81	0.00	164.51	-2,544.08	704.93	4,796.63	4,791.82	4.81	997.409	
1,500.00	1,500.00	5,400.00	5,381.80	5.17	0.00	164.51	-2,544.08	704.93	4,713.46	4,708.30	5.17	912.124	
1,600.00	1,600.00	5,400.00	5,381.80	5.53	0.00	164.51	-2,544.08	704.93	4,630.96	4,625.43	5.53	838.025	
1,700.00	1,700.00	5,400.00	5,381.80	5.88	0.00	164.51	-2,544.08	704.93	4,549.16	4,543.27	5.88	773.073	
1,800.00	1,800.00	5,400.00	5,381.80	6.24	0.00	164.51	-2,544.08	704.93	4,468.09	4,461.85	6.24	715.698	
1,900.00	1,900.00	5,400.00	5,381.80	6.60	0.00	164.51	-2,544.08	704.93	4,387.81	4,381.21	6.60	664.674	
2,000.00	2,000.00	5,400.00	5,381.80	6.96	0.00	164.51	-2,544.08	704.93	4,308.36	4,301.40	6.96	619.023	
2,100.00	2,100.00	5,400.00	5,381.80	7.32	0.00	164.51	-2,544.08	704.93	4,229.77	4,222.45	7.32	577.964	
2,200.00	2,200.00	5,400.00	5,381.80	7.68	0.00	164.51	-2,544.08	704.93	4,152.11	4,144.43	7.68	540.860	
2,300.00	2,300.00	5,400.00	5,381.80	8.04	0.00	164.51	-2,544.08	704.93	4,075.42	4,067.38	8.04	507.187	
2,400.00	2,400.00	5,400.00	5,381.80	8.39	0.00	164.51	-2,544.08	704.93	3,999.76	3,991.37	8.39	476.513	
2,500.00	2,500.00	5,400.00	5,381.80	8.75	0.00	164.51	-2,544.08	704.93	3,925.19	3,916.44	8.75	448.476	
2,600.00	2,600.00	5,400.00	5,381.80	9.11	0.00	164.51	-2,544.08	704.93	3,851.77	3,842.66	9.11	422.772	
2,700.00	2,700.00	5,400.00	5,381.80	9.47	0.00	164.51	-2,544.08	704.93	3,779.58	3,770.11	9.47	399.143	
2,800.00	2,800.00	5,400.00	5,381.80	9.83	0.00	164.51	-2,544.08	704.93	3,708.67	3,698.84	9.83	377.369	
2,900.00	2,900.00	5,400.00	5,381.80	10.19	0.00	164.51	-2,544.08	704.93	3,639.13	3,628.95	10.19	357.262	
3,000.00	3,000.00	5,400.00	5,381.80	10.54	0.00	164.51	-2,544.08	704.93	3,571.04	3,560.50	10.54	338.659	
3,100.00	3,100.00	5,400.00	5,381.80	10.90	0.00	164.51	-2,544.08	704.93	3,504.48	3,493.57	10.90	321.420	
3,200.00	3,200.00	5,400.00	5,381.80	11.26	0.00	164.51	-2,544.08	704.93	3,439.54	3,428.27	11.26	305.422	
3,300.00	3,300.00	5,400.00	5,381.80	11.62	0.00	164.51	-2,544.08	704.93	3,376.31	3,364.69	11.62	290.559	
3,400.00	3,400.00	5,400.00	5,381.80	11.98	0.00	164.51	-2,544.08	704.93	3,314.89	3,302.91	11.98	276.736	
3,500.00	3,500.00	5,400.00	5,381.80	12.34	0.00	164.51	-2,544.08	704.93	3,255.38	3,243.05	12.34	263.872	
3,600.00	3,600.00	5,400.00	5,381.80	12.70	0.00	164.51	-2,544.08	704.93	3,197.90	3,185.20	12.70	251.893	
3,700.00	3,700.00	5,400.00	5,381.80	13.05	0.00	164.51	-2,544.08	704.93	3,142.55	3,129.49	13.05	240.736	
3,800.00	3,800.00	5,400.00	5,381.80	13.41	0.00	164.51	-2,544.08	704.93	3,089.44	3,076.03	13.41	230.342	
3,900.00	3,900.00	5,400.00	5,381.80	13.77	0.00	164.51	-2,544.08	704.93	3,038.70	3,024.93	13.77	220.661	
4,000.00	4,000.00	5,400.00	5,381.80	14.13	0.00	164.51	-2,544.08	704.93	2,990.44	2,976.31	14.13	211.647	
4,100.00	4,100.00	5,400.00	5,381.80	14.49	0.00	164.51	-2,544.08	704.93	2,944.79	2,930.30	14.49	203.259	
4,200.00	4,200.00	5,400.00	5,381.80	14.85	0.00	164.51	-2,544.08	704.93	2,901.86	2,887.02	14.85	195.460	
4,300.00	4,300.00	5,400.00	5,381.80	15.20	0.00	164.51	-2,544.08	704.93	2,861.79	2,846.59	15.20	188.217	
4,400.00	4,400.00	5,400.00	5,381.80	15.56	0.00	164.51	-2,544.08	704.93	2,824.69	2,809.13	15.56	181.498	
4,500.00	4,500.00	5,400.00	5,381.80	15.92	0.00	164.51	-2,544.08	704.93	2,790.68	2,774.76	15.92	175.275	
4,600.00	4,600.00	5,400.00	5,381.80	16.28	0.00	164.51	-2,544.08	704.93	2,759.88	2,743.60	16.28	169.524	
4,700.00	4,700.00	5,400.00	5,381.80	16.64	0.00	164.51	-2,544.08	704.93	2,732.40	2,715.76	16.64	164.220	
4,800.00	4,800.00	5,400.00	5,381.80	17.00	0.00	164.51	-2,544.08	704.93	2,708.33	2,691.33	17.00	159.340	
4,900.00	4,900.00	5,400.00	5,381.80	17.36	0.00	164.51	-2,544.08	704.93	2,687.76	2,670.41	17.36	154.864	
5,000.00	5,000.00	5,400.00	5,381.80	17.71	0.00	164.51	-2,544.08	704.93	2,670.79	2,653.08	17.71	150.772	
5,100.00	5,100.00	5,400.00	5,381.80	18.07	0.00	164.51	-2,544.08	704.93	2,657.47	2,639.40	18.07	147.045	

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



Anticollision Report



Company: COG Operating LLC
Project: Lea County, NM (NAD27 NME)
Reference Site: Zeppo 5 Federal COM
Site Error: 0.00 usft
Reference Well: 27H
Well Error: 0.00 usft
Reference Wellbore: OH
Reference Design: Plan 1 07-25-18

Local Co-ordinate Reference: Well 27H
TVD Reference: RKB @ 4130.00usft (Double K 7)
MD Reference: RKB @ 4130.00usft (Double K 7)
North Reference: Grid
Survey Calculation Method: Minimum Curvature
Output errors are at 2.00 sigma
Database: USA Compass
Offset TVD Reference: Offset 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		Offset		Semi Major Axis		Highside Toolface (°)	Distance		Between Centres (usft)	Between Ellipses (usft)	Minimum Separation (usft)	Separation Factor	Warning	
Measured Depth (usft)	Vertical Depth (usft)	Measured Depth (usft)	Vertical Depth (usft)	Reference (usft)	Offset (usft)		Offset Wellbore Centre +N/-S (usft)	+E/-W (usft)						
5,200.00	5,200.00	5,400.00	5,381.80	18.43	0.00	164.51	-2,544.08	704.93	2,647.87	2,629.44	18.43	143.664		
5,300.00	5,300.00	5,437.54	5,419.09	18.79	0.21	164.60	-2,543.15	700.72	2,641.75	2,622.75	19.00	139.038		
5,400.00	5,400.00	5,536.87	5,517.77	19.15	0.58	164.82	-2,540.71	689.56	2,636.39	2,616.66	19.73	133.646		
5,500.00	5,500.00	5,600.00	5,580.48	19.51	0.61	164.96	-2,539.16	682.49	2,631.32	2,611.21	20.12	130.811		
5,600.00	5,600.00	5,650.00	5,630.37	19.86	0.63	165.01	-2,538.04	679.71	2,628.02	2,607.52	20.50	128.204		
5,700.00	5,700.00	5,700.00	5,680.30	20.22	0.64	164.96	-2,537.09	681.71	2,627.09	2,606.22	20.86	125.923		
5,800.00	5,799.86	5,731.62	5,711.69	20.56	0.63	2.19	-2,536.59	685.45	2,624.93	2,603.30	21.63	121.348		
5,900.00	5,897.16	5,769.89	5,749.29	20.88	0.63	2.13	-2,536.09	692.50	2,606.23	2,583.31	22.92	113.733		
6,000.00	5,987.71	5,800.00	5,778.45	21.18	0.62	2.14	-2,535.78	699.98	2,569.68	2,545.51	24.17	106.321		
6,100.00	6,067.54	5,850.00	5,825.77	21.49	0.61	2.03	-2,535.42	716.08	2,516.52	2,491.17	25.34	99.292		
6,200.00	6,133.16	5,850.00	5,825.77	21.81	0.61	2.47	-2,535.42	716.08	2,448.38	2,422.03	26.35	92.906		
6,300.00	6,181.72	5,900.00	5,871.33	22.18	0.60	2.44	-2,535.27	736.63	2,367.60	2,340.33	27.27	86.825		
6,400.00	6,211.08	5,900.00	5,871.33	22.61	0.60	3.89	-2,535.27	736.63	2,276.86	2,248.89	27.97	81.406		
6,500.00	6,220.13	5,900.00	5,871.33	23.08	0.60	5.25	-2,535.27	736.63	2,179.81	2,151.31	28.50	76.492		
6,600.00	6,221.16	5,914.66	5,884.30	23.63	0.60	-19.94	-2,535.26	743.47	2,081.07	2,052.00	29.06	71.603		
6,700.00	6,222.21	5,918.83	5,887.95	24.25	0.60	-38.43	-2,535.27	745.49	1,982.91	1,953.22	29.69	66.797		
6,800.00	6,223.25	5,921.70	5,890.44	24.91	0.60	-50.28	-2,535.27	746.89	1,885.90	1,855.54	30.36	62.128		
6,900.00	6,224.30	5,923.15	5,891.71	25.61	0.60	-57.77	-2,535.27	747.60	1,790.75	1,759.69	31.06	57.657		
7,000.00	6,225.33	5,923.13	5,891.70	26.34	0.60	-62.46	-2,535.27	747.59	1,698.28	1,666.50	31.79	53.428		
7,100.00	6,226.36	5,922.45	5,891.10	27.10	0.60	-62.41	-2,535.27	747.26	1,607.88	1,575.33	32.55	49.401		
7,200.00	6,227.39	5,921.77	5,890.51	27.92	0.60	-62.35	-2,535.27	746.92	1,518.68	1,485.32	33.36	45.521		
7,300.00	6,228.42	5,921.09	5,889.91	28.78	0.60	-62.30	-2,535.27	746.59	1,430.91	1,396.69	34.23	41.808		
7,400.00	6,229.45	5,920.41	5,889.32	29.69	0.60	-62.24	-2,535.27	746.25	1,344.85	1,309.71	35.13	38.277		
7,500.00	6,230.48	5,919.73	5,888.73	30.64	0.60	-62.19	-2,535.27	745.92	1,260.84	1,224.76	36.08	34.942		
7,600.00	6,231.51	5,919.05	5,888.13	31.63	0.60	-62.13	-2,535.27	745.59	1,179.34	1,142.27	37.07	31.813		
7,700.00	6,232.54	5,918.37	5,887.54	32.65	0.60	-61.97	-2,535.27	745.26	1,100.88	1,062.78	38.09	28.902		
7,800.00	6,233.56	5,918.43	5,887.60	33.72	0.60	-60.24	-2,535.27	745.29	1,024.05	984.89	39.16	26.152		
7,900.00	6,234.59	5,918.89	5,888.00	34.82	0.60	-60.27	-2,535.27	745.51	950.37	910.11	40.26	23.603		
8,000.00	6,235.61	5,919.35	5,888.39	35.95	0.60	-60.31	-2,535.27	745.74	881.89	840.49	41.40	21.304		
8,100.00	6,236.63	5,919.81	5,888.80	37.11	0.60	-60.35	-2,535.27	745.96	819.91	777.36	42.55	19.269		
8,200.00	6,237.65	5,920.27	5,889.20	38.28	0.60	-60.39	-2,535.27	746.19	766.01	722.28	43.72	17.519		
8,300.00	6,238.67	5,920.74	5,889.61	39.47	0.60	-60.43	-2,535.27	746.42	722.00	677.09	44.92	16.074		
8,400.00	6,239.70	5,921.21	5,890.02	40.68	0.60	-60.47	-2,535.27	746.65	689.79	643.66	46.13	14.954		
8,500.00	6,240.72	5,921.68	5,890.43	41.91	0.60	-60.51	-2,535.27	746.88	671.06	623.71	47.35	14.172		
8,577.42	6,241.51	5,922.05	5,890.75	42.87	0.60	-60.55	-2,535.27	747.06	666.58	618.27	48.31	13.798 CC, ES		
8,600.00	6,241.74	5,922.16	5,890.85	43.15	0.60	-60.56	-2,535.27	747.11	666.96	618.37	48.59	13.726		
8,700.00	6,242.76	5,922.64	5,891.26	44.40	0.60	-60.60	-2,535.27	747.35	677.76	627.91	49.84	13.598 SF		
8,800.00	6,243.78	5,923.12	5,891.68	45.66	0.60	-60.64	-2,535.27	747.59	702.76	651.65	51.11	13.751		
8,900.00	6,244.80	5,923.61	5,892.11	46.94	0.60	-60.68	-2,535.27	747.83	740.53	688.14	52.38	14.137		
9,000.00	6,245.83	5,924.10	5,892.53	48.22	0.60	-60.72	-2,535.27	748.07	789.23	735.57	53.67	14.706		
9,100.00	6,246.85	5,924.59	5,892.96	49.51	0.60	-60.76	-2,535.27	748.31	847.00	792.04	54.96	15.411		
9,200.00	6,247.87	5,925.08	5,893.39	50.82	0.60	-60.81	-2,535.27	748.56	912.09	855.83	56.26	16.211		
9,300.00	6,248.89	5,925.58	5,893.82	52.13	0.60	-60.85	-2,535.27	748.81	983.07	925.49	57.57	17.075		
9,400.00	6,249.91	5,926.09	5,894.26	53.44	0.60	-60.89	-2,535.27	749.06	1,058.74	999.85	58.89	17.978		
9,500.00	6,250.94	5,926.59	5,894.70	54.77	0.60	-60.94	-2,535.27	749.31	1,138.17	1,077.95	60.22	18.901		
9,600.00	6,251.96	5,927.10	5,895.14	56.10	0.60	-60.98	-2,535.27	749.57	1,220.63	1,159.08	61.55	19.832		
9,700.00	6,252.98	5,927.62	5,895.59	57.43	0.60	-61.02	-2,535.27	749.82	1,305.54	1,242.66	62.88	20.761		
9,800.00	6,254.00	5,928.13	5,896.03	58.77	0.60	-61.07	-2,535.28	750.08	1,392.46	1,328.23	64.23	21.680		
9,900.00	6,255.02	5,928.66	5,896.48	60.12	0.60	-61.11	-2,535.28	750.35	1,481.03	1,415.45	65.57	22.586		
10,000.00	6,256.05	5,929.18	5,896.94	61.47	0.60	-61.16	-2,535.28	750.61	1,570.97	1,504.04	66.93	23.473		
10,100.00	6,257.07	5,929.71	5,897.39	62.83	0.60	-61.20	-2,535.28	750.88	1,662.06	1,593.78	68.28	24.341		
10,200.00	6,258.09	5,930.24	5,897.85	64.19	0.60	-61.25	-2,535.28	751.14	1,754.12	1,684.48	69.64	25.187		

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



Anticollision Report



Company: COG Operating LLC
Project: Lea County, NM (NAD27 NME)
Reference Site: Zeppo 5 Federal COM
Site Error: 0.00 usft
Reference Well: 27H
Well Error: 0.00 usft
Reference Wellbore: OH
Reference Design: Plan 1 07-25-18

Local Co-ordinate Reference: Well 27H
TVD Reference: RKB @ 4130.00usft (Double K 7)
MD Reference: RKB @ 4130.00usft (Double K 7)
North Reference: Grid
Survey Calculation Method: Minimum Curvature
Output errors are at: 2.00 sigma
Database: USA Compass
Offset TVD Reference: Offset Datum

Offset Design Shovel Head Federal Corn - 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		Offset		Semi Major Axis		Distance							
Measured Depth (usft)	Vertical Depth (usft)	Measured Depth (usft)	Vertical Depth (usft)	Reference (usft)	Offset (usft)	Highside Tooface (")	Offset Wellbore +N/-S (usft)	Centre +E/-W (usft)	Between Centres (usft)	Between Ellipses (usft)	Minimum Separation (usft)	Separation Factor	Warning
10,300.00	6,259.11	5,930.78	5,898.31	65.55	0.60	-61.30	-2,535.28	751.42	1,847.01	1,776.00	71.01	26.011	
10,400.00	6,260.13	5,931.32	5,898.78	66.92	0.60	-61.34	-2,535.28	751.69	1,940.60	1,868.23	72.38	26.812	
10,500.00	6,261.16	5,931.86	5,899.25	68.29	0.60	-61.39	-2,535.28	751.96	2,034.80	1,961.06	73.75	27.591	
10,600.00	6,262.18	5,932.41	5,899.72	69.67	0.60	-61.44	-2,535.28	752.24	2,129.54	2,054.41	75.12	28.347	
10,700.00	6,263.20	5,932.96	5,900.19	71.04	0.60	-61.48	-2,535.28	752.52	2,224.73	2,148.23	76.50	29.081	
10,800.00	6,264.22	5,933.51	5,900.67	72.42	0.60	-61.53	-2,535.28	752.81	2,320.32	2,242.44	77.88	29.792	
10,900.00	6,265.24	5,934.07	5,901.15	73.81	0.60	-61.58	-2,535.28	753.09	2,416.28	2,337.01	79.27	30.483	
11,000.00	6,266.27	5,934.64	5,901.64	75.19	0.60	-61.63	-2,535.29	753.38	2,512.55	2,431.89	80.65	31.152	
11,100.00	6,267.29	5,935.20	5,902.12	76.58	0.60	-61.68	-2,535.29	753.67	2,608.09	2,527.05	82.04	31.802	
11,200.00	6,268.31	5,935.78	5,902.61	77.97	0.60	-61.73	-2,535.29	753.97	2,705.89	2,622.46	83.43	32.432	
11,300.00	6,269.33	5,936.35	5,903.11	79.36	0.60	-61.77	-2,535.29	754.26	2,802.92	2,718.09	84.83	33.043	
11,400.00	6,270.35	5,936.93	5,903.61	80.76	0.60	-61.82	-2,535.29	754.56	2,900.14	2,813.92	86.22	33.636	
11,500.00	6,271.37	5,950.00	5,914.71	82.16	0.60	-62.94	-2,535.32	761.45	2,997.60	2,909.97	87.64	34.205	
11,600.00	6,272.40	5,950.00	5,914.71	83.55	0.60	-62.94	-2,535.32	761.45	3,095.17	3,006.13	89.03	34.764	
11,700.00	6,273.42	5,950.00	5,914.71	84.95	0.60	-62.94	-2,535.32	761.45	3,192.89	3,102.45	90.43	35.306	
11,800.00	6,274.44	5,950.00	5,914.71	86.36	0.60	-62.94	-2,535.32	761.45	3,290.74	3,198.90	91.84	35.833	
11,900.00	6,275.46	5,950.00	5,914.71	87.76	0.60	-62.94	-2,535.32	761.45	3,388.72	3,295.48	93.24	36.344	
12,000.00	6,276.48	5,950.00	5,914.71	89.17	0.60	-62.94	-2,535.32	761.45	3,486.81	3,392.17	94.64	36.841	
12,100.00	6,277.51	5,950.00	5,914.71	90.57	0.60	-62.94	-2,535.32	761.45	3,585.01	3,488.96	96.05	37.324	
12,200.00	6,278.53	5,950.00	5,914.71	91.98	0.60	-62.94	-2,535.32	761.45	3,683.31	3,585.85	97.46	37.793	
12,300.00	6,279.55	5,950.00	5,914.71	93.39	0.60	-62.94	-2,535.32	761.45	3,781.69	3,682.83	98.87	38.250	
12,400.00	6,280.57	5,950.00	5,914.71	94.80	0.60	-62.94	-2,535.32	761.45	3,880.16	3,779.88	100.28	38.694	
12,500.00	6,281.59	5,950.00	5,914.71	96.21	0.60	-62.94	-2,535.32	761.45	3,978.71	3,877.02	101.69	39.126	
12,600.00	6,282.62	5,950.00	5,914.71	97.62	0.60	-62.94	-2,535.32	761.45	4,077.32	3,974.22	103.10	39.546	
12,700.00	6,283.64	5,950.00	5,914.71	99.04	0.60	-62.94	-2,535.32	761.45	4,176.00	4,071.49	104.52	39.955	
12,800.00	6,284.66	5,950.00	5,914.71	100.45	0.60	-62.94	-2,535.32	761.45	4,274.75	4,168.81	105.93	40.353	
12,900.00	6,285.68	5,950.00	5,914.71	101.87	0.60	-62.94	-2,535.32	761.45	4,373.55	4,266.20	107.35	40.741	
13,000.00	6,286.70	5,950.00	5,914.71	103.29	0.60	-62.94	-2,535.32	761.45	4,472.40	4,363.63	108.77	41.119	
13,100.00	6,287.73	5,950.00	5,914.71	104.70	0.60	-62.94	-2,535.32	761.45	4,571.30	4,461.12	110.18	41.488	
13,200.00	6,288.75	5,950.00	5,914.71	106.12	0.60	-62.94	-2,535.32	761.45	4,670.25	4,558.65	111.60	41.847	
13,300.00	6,289.77	5,950.00	5,914.71	107.54	0.60	-62.94	-2,535.32	761.45	4,769.25	4,656.22	113.02	42.197	
13,400.00	6,290.79	5,950.00	5,914.71	108.96	0.60	-62.94	-2,535.32	761.45	4,868.28	4,753.84	114.44	42.539	
13,500.00	6,291.81	5,950.00	5,914.71	110.38	0.60	-62.94	-2,535.32	761.45	4,967.35	4,851.49	115.86	42.872	
13,600.00	6,292.83	5,950.00	5,914.71	111.81	0.60	-62.94	-2,535.32	761.45	5,066.46	4,949.18	117.29	43.197	
13,700.00	6,293.86	5,950.00	5,914.71	113.23	0.60	-62.94	-2,535.32	761.45	5,165.61	5,046.90	118.71	43.515	
13,800.00	6,294.88	5,950.00	5,914.71	114.65	0.60	-62.94	-2,535.32	761.45	5,264.78	5,144.65	120.13	43.824	
13,900.00	6,295.90	5,950.00	5,914.71	116.08	0.60	-62.94	-2,535.32	761.45	5,363.99	5,242.43	121.56	44.127	
14,000.00	6,296.92	5,950.00	5,914.71	117.50	0.60	-62.94	-2,535.32	761.45	5,463.23	5,340.24	122.98	44.423	
14,100.00	6,297.94	5,950.00	5,914.71	118.93	0.60	-62.94	-2,535.32	761.45	5,562.49	5,438.08	124.41	44.712	
14,200.00	6,298.97	5,950.00	5,914.71	120.35	0.60	-62.94	-2,535.32	761.45	5,661.78	5,535.94	125.83	44.994	
14,291.37	6,299.90	5,950.00	5,914.71	121.46	0.60	-62.94	-2,535.32	761.45	5,752.52	5,625.58	126.94	45.316	



Anticollision Report



Company: COG Operating LLC
Project: Lea County, NM (NAD27 NME)
Reference Site: Zeppo 5 Federal COM
Site Error: 0.00 usft
Reference Well: 27H
Well Error: 0.00 usft
Reference Wellbore OH
Reference Design: Plan 1 07-25-18

Local Co-ordinate Reference: Well 27H
TVD Reference: RKB @ 4130.00usft (Double K 7)
MD Reference: RKB @ 4130.00usft (Double K 7)
North Reference: Grid
Survey Calculation Method: Minimum Curvature
Output errors are at 2.00 sigma
Database: USA Compass
Offset TVD Reference: Offset 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		Offset		Semi Major Axis		Highside Toolface (°)	Distance		Minimum Separation (usft)	Separation Factor	Warning
Measured Depth (usft)	Vertical Depth (usft)	Measured Depth (usft)	Vertical Depth (usft)	Reference (usft)	Offset (usft)		Offset Wellbore Centre +N-S (usft)	+E-W (usft)			
0.00	0.00	0.00	0.00	0.00	0.00	160.15	-2,616.60	944.70	2,782.01		
100.00	100.00	101.42	101.42	0.15	0.08	160.15	-2,616.25	944.37	2,781.58	2,781.35	0.22 N/A
138.95	138.95	115.96	115.95	0.29	0.08	160.15	-2,616.19	944.36	2,781.41	2,781.04	0.37 7,468.474
200.00	200.00	152.06	152.06	0.51	0.10	160.15	-2,616.29	944.72	2,781.74	2,781.14	0.60 4,601.236
300.00	300.00	273.90	273.89	0.87	0.23	160.12	-2,616.35	946.12	2,782.16	2,781.07	1.09 2,549.038
400.00	400.00	361.16	361.14	1.22	0.33	160.11	-2,616.41	946.79	2,782.49	2,780.94	1.56 1,788.379
500.00	500.00	466.08	466.06	1.58	0.46	160.09	-2,616.66	947.95	2,783.10	2,781.06	2.05 1,360.786
600.00	600.00	572.62	572.60	1.94	0.60	160.06	-2,616.58	949.03	2,783.38	2,780.83	2.54 1,095.286
700.00	700.00	669.91	669.88	2.30	0.72	160.06	-2,616.58	949.50	2,783.54	2,780.51	3.02 920.447
800.00	800.00	771.89	771.86	2.66	0.83	160.05	-2,616.83	949.71	2,783.84	2,780.35	3.49 798.399
900.00	900.00	864.68	864.64	3.02	0.93	160.05	-2,617.14	949.98	2,784.25	2,780.30	3.95 705.131
1,000.00	1,000.00	967.23	967.20	3.38	1.04	160.05	-2,617.58	950.22	2,784.73	2,780.32	4.41 631.167
1,100.00	1,100.00	1,070.94	1,070.90	3.73	1.13	160.05	-2,617.90	950.31	2,785.05	2,780.19	4.86 572.673
1,200.00	1,200.00	1,178.29	1,178.25	4.09	1.19	160.05	-2,618.13	950.21	2,785.23	2,779.95	5.28 527.573
1,300.00	1,300.00	1,277.94	1,277.91	4.45	1.18	160.06	-2,618.19	949.90	2,785.18	2,779.54	5.63 494.317
1,400.00	1,400.00	1,382.32	1,382.29	4.81	1.18	160.06	-2,618.15	949.67	2,785.07	2,779.08	5.99 464.981
1,500.00	1,500.00	1,479.94	1,479.91	5.17	1.19	160.07	-2,618.11	949.28	2,784.90	2,778.54	6.36 437.921
1,600.00	1,600.00	1,583.85	1,583.82	5.53	1.22	160.08	-2,618.09	948.94	2,784.77	2,778.02	6.74 412.938
1,684.67	1,684.67	1,661.71	1,661.67	5.83	1.24	160.08	-2,617.99	948.86	2,784.64	2,777.57	7.07 394.008
1,700.00	1,700.00	1,675.00	1,674.97	5.88	1.25	160.08	-2,618.00	948.86	2,784.65	2,777.52	7.13 390.498
1,800.00	1,800.00	1,768.83	1,768.79	6.24	1.34	160.08	-2,618.24	948.85	2,784.88	2,777.30	7.58 367.271
1,900.00	1,900.00	1,878.23	1,878.19	6.60	1.43	160.09	-2,618.51	948.60	2,785.04	2,777.01	8.03 346.738
2,000.00	2,000.00	1,980.49	1,980.46	6.96	1.49	160.09	-2,618.52	948.41	2,784.99	2,776.54	8.45 329.664
2,082.50	2,082.50	2,059.54	2,059.50	7.26	1.52	160.09	-2,618.46	948.45	2,784.94	2,776.16	8.78 317.192
2,100.00	2,100.00	2,075.00	2,074.96	7.32	1.53	160.09	-2,618.46	948.46	2,784.95	2,776.10	8.85 314.610
2,200.00	2,200.00	2,178.80	2,178.77	7.68	1.63	160.09	-2,618.64	948.41	2,785.10	2,775.79	9.31 299.194
2,300.00	2,300.00	2,277.27	2,277.23	8.04	1.68	160.09	-2,618.48	948.30	2,784.91	2,775.20	9.71 286.801
2,301.28	2,301.28	2,278.32	2,278.28	8.04	1.68	160.09	-2,618.48	948.31	2,784.91	2,775.20	9.72 286.640
2,400.00	2,400.00	2,389.54	2,389.51	8.39	1.77	160.09	-2,618.53	948.20	2,784.95	2,774.80	10.16 274.132
2,500.00	2,500.00	2,482.76	2,482.72	8.75	1.80	160.09	-2,618.29	948.15	2,784.69	2,774.13	10.55 263.902
2,600.00	2,600.00	2,595.67	2,595.63	9.11	1.85	160.09	-2,617.82	947.90	2,784.21	2,773.25	10.96 254.089
2,700.00	2,700.00	2,686.25	2,686.21	9.47	1.89	160.09	-2,617.32	947.98	2,783.72	2,772.36	11.36 245.053
2,800.00	2,800.00	2,789.80	2,789.75	9.83	1.95	160.09	-2,616.71	947.80	2,783.10	2,771.33	11.77 236.362
2,900.00	2,900.00	2,896.36	2,896.32	10.19	2.01	160.09	-2,616.24	947.59	2,782.62	2,770.42	12.20 228.107
3,000.00	3,000.00	2,987.11	2,987.06	10.54	2.07	160.09	-2,615.68	947.59	2,782.05	2,769.43	12.62 220.483
3,100.00	3,100.00	3,083.42	3,083.37	10.90	2.14	160.08	-2,615.16	947.55	2,781.54	2,768.49	13.05 213.215
3,200.00	3,200.00	3,310.95	3,310.66	11.26	2.32	159.96	-2,607.14	951.09	2,778.42	2,764.83	13.58 204.540
3,300.00	3,300.00	3,470.74	3,470.12	11.62	2.46	159.92	-2,597.16	949.27	2,771.94	2,757.86	14.08 196.883
3,400.00	3,400.00	3,594.06	3,592.93	11.98	2.56	160.04	-2,590.56	940.65	2,764.50	2,749.96	14.54 190.143
3,500.00	3,500.00	3,715.58	3,713.04	12.34	2.66	160.36	-2,585.87	923.00	2,755.79	2,740.80	14.99 183.802
3,600.00	3,600.00	3,811.89	3,807.56	12.70	2.73	160.71	-2,583.97	904.64	2,747.44	2,732.01	15.43 178.075
3,700.00	3,700.00	3,915.00	3,908.81	13.05	2.82	161.07	-2,581.61	885.28	2,739.01	2,723.13	15.87 172.549
3,800.00	3,800.00	4,025.00	4,016.94	13.41	2.92	161.45	-2,578.26	865.39	2,730.18	2,713.86	16.33 167.194
3,900.00	3,900.00	4,109.01	4,099.81	13.77	2.99	161.70	-2,575.66	851.82	2,722.00	2,705.23	16.76 162.366
4,000.00	4,000.00	4,208.73	4,198.35	14.13	3.09	161.97	-2,571.91	836.96	2,713.71	2,696.49	17.22 157.618
4,100.00	4,100.00	4,279.47	4,268.39	14.49	3.16	162.15	-2,569.51	827.33	2,706.20	2,688.55	17.64 153.385
4,200.00	4,200.00	4,381.76	4,369.71	14.85	3.26	162.41	-2,566.10	813.75	2,698.93	2,680.83	18.10 149.101
4,300.00	4,300.00	4,431.03	4,418.59	15.20	3.30	162.52	-2,564.88	807.69	2,692.77	2,674.27	18.51 145.491
4,400.00	4,400.00	4,531.68	4,518.55	15.56	3.40	162.75	-2,563.29	796.03	2,687.77	2,668.81	18.97 141.719
4,500.00	4,500.00	4,639.21	4,625.32	15.92	3.51	162.99	-2,561.16	783.46	2,682.42	2,662.99	19.43 138.040
4,600.00	4,600.00	4,719.48	4,705.19	16.28	3.59	163.14	-2,559.24	775.80	2,677.32	2,657.44	19.87 134.719
4,700.00	4,700.00	4,816.11	4,801.40	16.64	3.69	163.30	-2,557.03	766.97	2,672.48	2,652.15	20.33 131.437

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

Company: COG Operating LLC
Project: Lea County, NM (NAD27 NME)
Reference Site: Zeppo 5 Federal COM
Site Error: 0.00 usft
Reference Well: 27H
Well Error: 0.00 usft
Reference Wellbore: OH
Reference Design: Plan 1 07-25-18

Local Co-ordinate Reference: Well 27H
TVD Reference: RKB @ 4130.00usft (Double K 7)
MD Reference: RKB @ 4130.00usft (Double K 7)
North Reference: Grid
Survey Calculation Method: Minimum Curvature
Output errors are at 2.00 sigma
Database: USA Compass
Offset TVD Reference: Offset 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		Offset		Semi Major Axis		Highside Toolface (°)	Distance		Minimum Separation (usft)	Separation Factor	Warning		
Measured Depth (usft)	Vertical Depth (usft)	Measured Depth (usft)	Vertical Depth (usft)	Reference (usft)	Offset (usft)		Offset Wellbore Centre +N/-S (usft)	+E/-W (usft)					
4,800.00	4,800.00	4,925.00	4,909.82	17.00	3.81	163.49	-2,554.38	757.27	2,667.57	2,646.77	20.81	128.207	
4,900.00	4,900.00	5,017.33	5,001.69	17.36	3.91	163.66	-2,552.37	748.31	2,662.73	2,641.47	21.26	125.223	
5,000.00	5,000.00	5,125.00	5,108.65	17.71	4.02	163.90	-2,550.39	736.07	2,657.75	2,636.01	21.74	122.263	
5,100.00	5,100.00	5,242.18	5,225.04	18.07	4.15	164.16	-2,548.01	722.70	2,652.65	2,630.42	22.22	119.360	
5,200.00	5,200.00	5,305.00	5,287.43	18.43	4.22	164.30	-2,546.40	715.60	2,647.34	2,624.69	22.65	116.872	
5,300.00	5,300.00	5,393.34	5,375.34	18.79	4.26	164.47	-2,544.59	707.13	2,642.85	2,619.80	23.05	114.677	
5,400.00	5,400.00	5,459.89	5,441.74	19.15	4.28	164.56	-2,543.70	702.68	2,639.76	2,616.33	23.43	112.659	
5,500.00	5,500.00	5,526.63	5,508.41	19.51	4.31	164.61	-2,543.21	699.87	2,637.94	2,614.12	23.82	110.759	
5,600.00	5,600.00	5,622.00	5,603.77	19.86	4.35	164.64	-2,543.22	698.76	2,637.61	2,613.39	24.21	108.928	
5,626.77	5,626.77	5,622.00	5,603.77	19.96	4.35	164.64	-2,543.22	698.76	2,637.47	2,613.16	24.31	108.492	
5,700.00	5,700.00	5,654.00	5,635.75	20.22	4.37	164.62	-2,543.33	699.72	2,638.15	2,613.56	24.59	107.279	
5,800.00	5,799.86	5,717.00	5,698.27	20.56	4.42	1.77	-2,542.74	707.09	2,636.95	2,611.89	25.06	105.232	
5,900.00	5,897.16	5,749.00	5,729.49	20.88	4.45	1.69	-2,541.91	714.02	2,618.58	2,592.72	25.86	101.274	
6,000.00	5,987.71	5,780.00	5,759.17	21.18	4.50	1.62	-2,541.21	722.92	2,582.51	2,555.55	26.96	95.801	
6,100.00	6,067.54	5,812.00	5,789.22	21.49	4.55	1.56	-2,541.00	733.91	2,530.14	2,501.99	28.15	89.882	
6,200.00	6,133.16	5,823.29	5,799.70	21.81	4.57	1.76	-2,541.09	738.12	2,462.94	2,433.67	29.27	84.143	
6,300.00	6,181.72	5,843.00	5,817.82	22.18	4.61	2.02	-2,541.47	745.87	2,383.13	2,352.85	30.28	78.715	
6,400.00	6,211.08	5,843.00	5,817.82	22.61	4.61	3.13	-2,541.47	745.87	2,293.32	2,262.25	31.08	73.791	
6,500.00	6,220.13	5,863.82	5,836.64	23.08	4.65	2.48	-2,541.99	754.74	2,196.60	2,164.90	31.70	69.298	
6,600.00	6,221.16	5,870.24	5,842.37	23.63	4.66	-19.54	-2,542.15	757.64	2,098.24	2,065.98	32.25	65.053	
6,700.00	6,222.21	5,875.49	5,847.02	24.25	4.67	-36.57	-2,542.27	760.07	2,000.47	1,967.59	32.88	60.848	
6,800.00	6,223.25	5,879.40	5,850.47	24.91	4.68	-48.03	-2,542.36	761.91	1,903.92	1,870.37	33.55	56.753	
6,900.00	6,224.30	5,881.86	5,852.63	25.61	4.68	-55.56	-2,542.42	763.08	1,809.30	1,775.05	34.25	52.823	
7,000.00	6,225.33	5,882.82	5,853.47	26.34	4.68	-60.42	-2,542.44	763.55	1,717.46	1,682.48	34.98	49.098	
7,100.00	6,226.36	5,883.10	5,853.72	27.10	4.68	-60.44	-2,542.44	763.68	1,627.76	1,592.02	35.74	45.541	
7,200.00	6,227.39	5,883.38	5,853.96	27.92	4.68	-60.46	-2,542.45	763.81	1,539.33	1,502.77	36.56	42.106	
7,300.00	6,228.42	5,883.65	5,854.20	28.78	4.68	-60.48	-2,542.46	763.94	1,452.40	1,414.98	37.42	38.810	
7,400.00	6,229.45	5,883.91	5,854.43	29.69	4.69	-60.50	-2,542.46	764.07	1,367.26	1,328.93	38.33	35.667	
7,500.00	6,230.48	5,884.18	5,854.66	30.64	4.69	-60.52	-2,542.47	764.20	1,284.26	1,244.98	39.28	32.691	
7,600.00	6,231.51	5,884.43	5,854.88	31.63	4.69	-60.54	-2,542.47	764.32	1,203.85	1,163.58	40.27	29.893	
7,700.00	6,232.54	5,884.69	5,855.10	32.65	4.69	-60.45	-2,542.48	764.45	1,126.58	1,085.29	41.29	27.282	
7,800.00	6,233.56	5,885.66	5,855.95	33.72	4.69	-58.78	-2,542.50	764.92	1,051.01	1,008.65	42.36	24.810	
7,900.00	6,234.59	5,886.99	5,857.12	34.82	4.69	-58.89	-2,542.53	765.57	978.65	935.18	43.47	22.513	
8,000.00	6,235.61	5,906.00	5,873.50	35.95	4.73	-60.44	-2,542.94	775.20	911.94	867.31	44.63	20.435	
8,100.00	6,236.63	5,906.00	5,873.50	37.11	4.73	-60.44	-2,542.94	775.20	851.25	805.47	45.78	18.594	
8,200.00	6,237.65	5,906.00	5,873.50	38.28	4.73	-60.44	-2,542.94	775.20	798.52	751.57	46.95	17.006	
8,300.00	6,238.67	5,906.00	5,873.50	39.47	4.73	-60.44	-2,542.94	775.20	755.41	707.26	48.15	15.690	
8,400.00	6,239.70	5,906.00	5,873.50	40.68	4.73	-60.44	-2,542.94	775.20	723.63	674.28	49.36	14.662	
8,500.00	6,240.72	5,906.00	5,873.50	41.91	4.73	-60.44	-2,542.94	775.20	704.73	654.15	50.58	13.933	
8,584.98	6,241.59	5,906.00	5,873.50	42.96	4.73	-60.44	-2,542.94	775.20	699.59	647.96	51.63	13.549 CC	
8,600.00	6,241.74	5,906.00	5,873.50	43.15	4.73	-60.44	-2,542.94	775.20	699.75	647.93	51.82	13.504 ES	
8,700.00	6,242.76	5,906.00	5,873.50	44.40	4.73	-60.44	-2,542.94	775.20	708.98	655.91	53.07	13.359 SF	
8,800.00	6,243.78	5,906.00	5,873.50	45.66	4.73	-60.44	-2,542.94	775.20	731.89	677.56	54.33	13.470	
8,900.00	6,244.80	5,906.00	5,873.50	46.94	4.73	-60.44	-2,542.94	775.20	767.25	711.64	55.61	13.797	
9,000.00	6,245.83	5,906.00	5,873.50	48.22	4.73	-60.44	-2,542.94	775.20	813.43	756.54	56.89	14.298	
9,100.00	6,246.85	5,906.00	5,873.50	49.51	4.73	-60.44	-2,542.94	775.20	868.72	810.53	58.19	14.930	
9,200.00	6,247.87	5,906.00	5,873.50	50.82	4.73	-60.44	-2,542.94	775.20	931.49	872.00	59.49	15.659	
9,300.00	6,248.89	5,906.00	5,873.50	52.13	4.73	-60.44	-2,542.94	775.20	1,000.34	939.54	60.80	16.454	
9,400.00	6,249.91	5,906.00	5,873.50	53.44	4.73	-60.44	-2,542.94	775.20	1,074.10	1,011.98	62.11	17.292	
9,500.00	6,250.94	5,906.00	5,873.50	54.77	4.73	-60.44	-2,542.94	775.20	1,151.82	1,088.38	63.44	18.156	
9,600.00	6,251.96	5,906.00	5,873.50	56.10	4.73	-60.44	-2,542.94	775.20	1,232.76	1,167.99	64.77	19.033	
9,700.00	6,252.98	5,906.00	5,873.50	57.43	4.73	-60.44	-2,542.94	775.20	1,316.32	1,250.21	66.11	19.912	

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



Anticollision Report



Company: COG Operating LLC
Project: Lea County, NM (NAD27 NME)
Reference Site: Zeppo 5 Federal COM
Site Error: 0.00 usft
Reference Well: 27H
Well Error: 0.00 usft
Reference Wellbore: OH
Reference Design: Plan 1 07-25-18

Local Co-ordinate Reference: Well 27H
TVD Reference: RKB @ 4130.00usft (Double K 7)
MD Reference: RKB @ 4130.00usft (Double K 7)
North Reference: Grid
Survey Calculation Method: Minimum Curvature
Output errors are at 2.00 sigma
Database: USA Compass
Offset TVD Reference: Offset 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		Offset		Semi Major Axis		Highside Toolface (°)	Distance		Between Centres (usft)	Between Ellipses (usft)	Minimum Separation (usft)	Separation Factor	Warning	
Measured Depth (usft)	Vertical Depth (usft)	Measured Depth (usft)	Vertical Depth (usft)	Reference (usft)	Offset (usft)		Offset Wellbore Centre +N/-S (usft)	+E/-W (usft)						
9,800.00	6,254.00	5,906.00	5,873.50	58.77	4.73	-60.44	-2,542.94	775.20	1,402.04	1,334.59	67.45	20.787		
9,900.00	6,255.02	5,906.00	5,873.50	60.12	4.73	-60.44	-2,542.94	775.20	1,489.53	1,420.74	68.79	21.652		
10,000.00	6,256.05	5,906.00	5,873.50	61.47	4.73	-60.44	-2,542.94	775.20	1,578.52	1,508.37	70.15	22.504		
10,100.00	6,257.07	5,906.00	5,873.50	62.83	4.73	-60.44	-2,542.94	775.20	1,668.75	1,597.25	71.50	23.339		
10,200.00	6,258.09	5,906.00	5,873.50	64.19	4.73	-60.44	-2,542.94	775.20	1,760.03	1,687.17	72.86	24.156		
10,300.00	6,259.11	5,906.00	5,873.50	65.55	4.73	-60.44	-2,542.94	775.20	1,852.22	1,778.00	74.23	24.954		
10,400.00	6,260.13	5,906.00	5,873.50	66.92	4.73	-60.44	-2,542.94	775.20	1,945.18	1,869.59	75.59	25.732		
10,500.00	6,261.16	5,906.00	5,873.50	68.29	4.73	-60.44	-2,542.94	775.20	2,038.81	1,961.84	76.96	26.490		
10,600.00	6,262.18	5,906.00	5,873.50	69.67	4.73	-60.44	-2,542.94	775.20	2,133.01	2,054.67	78.34	27.228		
10,700.00	6,263.20	5,906.00	5,873.50	71.04	4.73	-60.44	-2,542.94	775.20	2,227.72	2,148.00	79.72	27.946		
10,800.00	6,264.22	5,906.00	5,873.50	72.42	4.73	-60.44	-2,542.94	775.20	2,322.87	2,241.78	81.10	28.643		
10,900.00	6,265.24	5,906.00	5,873.50	73.81	4.73	-60.44	-2,542.94	775.20	2,418.42	2,335.94	82.48	29.321		
11,000.00	6,266.27	5,906.00	5,873.50	75.19	4.73	-60.44	-2,542.94	775.20	2,514.31	2,430.44	83.87	29.980		
11,100.00	6,267.29	5,906.00	5,873.50	76.58	4.73	-60.44	-2,542.94	775.20	2,610.51	2,525.26	85.25	30.621		
11,200.00	6,268.31	5,906.00	5,873.50	77.97	4.73	-60.44	-2,542.94	775.20	2,706.98	2,620.34	86.64	31.243		
11,300.00	6,269.33	5,906.00	5,873.50	79.36	4.73	-60.44	-2,542.94	775.20	2,803.71	2,715.67	88.04	31.847		
11,400.00	6,270.35	5,906.00	5,873.50	80.76	4.73	-60.44	-2,542.94	775.20	2,900.65	2,811.22	89.43	32.434		
11,500.00	6,271.37	5,927.23	5,891.35	82.16	4.79	-62.17	-2,543.32	786.68	2,997.57	2,906.72	90.85	32.994		
11,600.00	6,272.40	5,928.07	5,892.04	83.55	4.79	-62.24	-2,543.33	787.15	3,094.88	3,002.63	92.25	33.548		
11,700.00	6,273.42	5,928.89	5,892.73	84.95	4.79	-62.31	-2,543.35	787.61	3,192.36	3,098.71	93.65	34.087		
11,800.00	6,274.44	5,929.71	5,893.40	86.36	4.80	-62.38	-2,543.36	788.07	3,289.99	3,194.94	95.06	34.611		
11,900.00	6,275.46	5,930.51	5,894.07	87.76	4.80	-62.44	-2,543.37	788.52	3,387.76	3,291.30	96.46	35.121		
12,000.00	6,276.48	5,931.30	5,894.72	89.17	4.80	-62.50	-2,543.38	788.96	3,485.66	3,387.79	97.87	35.616		
12,100.00	6,277.51	5,932.07	5,895.36	90.57	4.80	-62.57	-2,543.39	789.40	3,583.67	3,484.39	99.27	36.099		
12,200.00	6,278.53	5,932.84	5,895.99	91.98	4.80	-62.63	-2,543.40	789.83	3,681.78	3,581.10	100.68	36.568		
12,300.00	6,279.55	5,933.59	5,896.61	93.39	4.81	-62.69	-2,543.42	790.26	3,780.00	3,677.90	102.09	37.025		
12,400.00	6,280.57	5,934.34	5,897.22	94.80	4.81	-62.75	-2,543.43	790.68	3,878.30	3,774.80	103.50	37.470		
12,500.00	6,281.59	5,935.07	5,897.83	96.21	4.81	-62.81	-2,543.44	791.10	3,976.69	3,871.78	104.92	37.903		
12,600.00	6,282.62	5,935.79	5,898.42	97.62	4.81	-62.87	-2,543.45	791.51	4,075.16	3,968.83	106.33	38.325		
12,700.00	6,283.64	5,936.50	5,899.00	99.04	4.82	-62.93	-2,543.46	791.91	4,173.70	4,065.95	107.75	38.737		
12,800.00	6,284.66	5,937.20	5,899.57	100.45	4.82	-62.98	-2,543.46	792.31	4,272.31	4,163.15	109.16	39.137		
12,900.00	6,285.68	5,937.89	5,900.14	101.87	4.82	-63.04	-2,543.47	792.71	4,370.98	4,260.40	110.58	39.528		
13,000.00	6,286.70	5,938.57	5,900.70	103.29	4.82	-63.09	-2,543.48	793.10	4,469.71	4,357.71	112.00	39.909		
13,100.00	6,287.73	5,939.24	5,901.25	104.70	4.82	-63.15	-2,543.49	793.49	4,568.49	4,455.08	113.42	40.281		
13,200.00	6,288.75	5,939.90	5,901.79	106.12	4.83	-63.20	-2,543.50	793.87	4,667.33	4,552.49	114.83	40.644		
13,300.00	6,289.77	5,940.55	5,902.32	107.54	4.83	-63.25	-2,543.51	794.24	4,766.21	4,649.95	116.26	40.998		
13,400.00	6,290.79	5,941.19	5,902.84	108.96	4.83	-63.30	-2,543.52	794.61	4,865.14	4,747.46	117.68	41.343		
13,500.00	6,291.81	5,941.83	5,903.36	110.38	4.83	-63.36	-2,543.52	794.98	4,964.11	4,845.01	119.10	41.681		
13,600.00	6,292.83	5,942.45	5,903.87	111.81	4.83	-63.41	-2,543.53	795.34	5,063.12	4,942.60	120.52	42.010		
13,700.00	6,293.86	5,943.07	5,904.37	113.23	4.83	-63.46	-2,543.54	795.70	5,162.17	5,040.23	121.95	42.332		
13,800.00	6,294.88	5,943.68	5,904.86	114.65	4.84	-63.50	-2,543.55	796.06	5,261.26	5,137.89	123.37	42.646		
13,900.00	6,295.90	5,944.28	5,905.35	116.08	4.84	-63.55	-2,543.55	796.40	5,360.38	5,235.58	124.79	42.954		
14,000.00	6,296.92	5,944.87	5,905.83	117.50	4.84	-63.60	-2,543.56	796.75	5,459.53	5,333.31	126.22	43.254		
14,100.00	6,297.94	5,945.45	5,906.30	118.93	4.84	-63.65	-2,543.57	797.09	5,558.71	5,431.06	127.65	43.548		
14,200.00	6,298.97	5,946.03	5,906.77	120.35	4.84	-63.69	-2,543.57	797.43	5,657.92	5,528.85	129.07	43.835		
14,291.37	6,299.90	5,969.00	5,925.09	121.46	4.91	-65.52	-2,543.77	811.29	5,748.75	5,618.54	130.21	44.150		

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



Anticollision Report



Company: COG Operating LLC
Project: Lea County, NM (NAD27 NME)
Reference Site: Zeppo 5 Federal COM
Site Error: 0.00 usft
Reference Well: 27H
Well Error: 0.00 usft
Reference Wellbore OH
Reference Design: Plan 1 07-25-18

Local Co-ordinate Reference: Well 27H
TVD Reference: RKB @ 4130.00usft (Double K 7)
MD Reference: RKB @ 4130.00usft (Double K 7)
North Reference: Grid
Survey Calculation Method: Minimum Curvature
Output errors are at 2.00 sigma
Database: USA Compass
Offset TVD Reference: Offset 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		Offset		Semi Major Axis		Highside Tooface (")	Distance		Minimum Separation (usft)	Separation Factor	Warning	
Measured Depth (usft)	Vertical Depth (usft)	Measured Depth (usft)	Vertical Depth (usft)	Reference (usft)	Offset (usft)		Offset Wellbore Centre +N/-S (usft)	+E/-W (usft)				
0.00	0.00	0.00	0.00	0.00	0.00	162.24	-4,624.30	1,480.70	4,855.68			
100.00	100.00	47.65	47.65	0.15	0.05	162.24	-4,624.37	1,480.82	4,855.72	0.20	N/A	
200.00	200.00	141.00	141.00	0.51	0.21	162.24	-4,624.78	1,481.62	4,856.39	0.72	6,742.222	
300.00	300.00	248.97	248.96	0.87	0.49	162.23	-4,624.81	1,482.54	4,856.66	1.35	3,595.041	
400.00	400.00	332.67	332.66	1.22	0.70	162.22	-4,625.16	1,483.13	4,857.26	1.92	2,526.604	
500.00	500.00	436.69	436.68	1.58	0.97	162.21	-4,625.70	1,483.95	4,858.00	2.55	1,905.085	
600.00	600.00	558.28	558.26	1.94	1.28	162.21	-4,626.09	1,484.42	4,858.43	3.22	1,509.706	
700.00	700.00	675.07	675.05	2.30	1.52	162.21	-4,626.04	1,484.61	4,858.44	3.82	1,273.200	
800.00	800.00	777.32	777.30	2.66	1.66	162.21	-4,625.82	1,484.67	4,858.24	4.32	1,124.620	
900.00	900.00	892.95	892.93	3.02	1.80	162.21	-4,625.45	1,484.60	4,857.93	4.82	1,007.993	
1,000.00	1,000.00	995.39	995.37	3.38	1.91	162.21	-4,624.95	1,484.31	4,857.38	5.29	918.525	
1,100.00	1,100.00	1,103.32	1,103.30	3.73	2.09	162.21	-4,624.26	1,484.21	4,856.74	5.82	834.569	
1,200.00	1,200.00	1,195.99	1,195.96	4.09	2.30	162.20	-4,623.55	1,484.46	4,856.09	6.39	760.152	
1,300.00	1,300.00	1,293.74	1,293.71	4.45	2.54	162.19	-4,622.81	1,485.00	4,855.54	6.99	695.039	
1,400.00	1,400.00	1,389.21	1,389.17	4.81	2.78	162.18	-4,622.10	1,485.71	4,855.06	7.59	640.003	
1,500.00	1,500.00	1,486.85	1,486.81	5.17	3.03	162.17	-4,621.45	1,486.40	4,854.65	8.19	592.471	
1,600.00	1,600.00	1,584.79	1,584.75	5.53	3.28	162.16	-4,620.91	1,486.91	4,854.28	8.80	551.446	
1,700.00	1,700.00	1,679.82	1,679.77	5.88	3.52	162.16	-4,620.47	1,487.35	4,853.98	9.41	516.058	
1,800.00	1,800.00	1,776.58	1,776.53	6.24	3.77	162.15	-4,620.04	1,488.05	4,853.78	10.01	484.684	
1,900.00	1,900.00	1,882.73	1,882.67	6.60	4.05	162.13	-4,619.37	1,489.37	4,853.56	10.65	455.852	
2,000.00	2,000.00	1,985.26	1,985.17	6.96	4.31	162.11	-4,618.42	1,491.20	4,853.22	11.27	430.560	
2,100.00	2,100.00	2,076.11	2,076.00	7.32	4.55	162.08	-4,617.49	1,493.26	4,852.95	11.87	408.999	
2,151.87	2,151.87	2,120.00	2,119.87	7.50	4.66	162.06	-4,617.04	1,494.49	4,852.89	12.16	398.927	
2,200.00	2,200.00	2,160.08	2,159.93	7.68	4.71	162.05	-4,616.67	1,495.70	4,852.92	12.39	391.678	
2,300.00	2,300.00	2,239.12	2,238.93	8.04	4.82	162.02	-4,616.21	1,498.11	4,853.30	12.85	377.617	
2,400.00	2,400.00	2,318.93	2,318.71	8.39	4.91	161.99	-4,616.09	1,500.60	4,854.12	13.31	364.798	
2,500.00	2,500.00	2,524.83	2,524.47	8.75	4.95	162.03	-4,616.08	1,497.00	4,853.08	13.70	354.116	
2,600.00	2,600.00	2,639.29	2,638.74	9.11	4.99	162.11	-4,616.64	1,490.54	4,851.82	14.10	344.072	
2,700.00	2,700.00	2,824.48	2,823.47	9.47	5.08	162.25	-4,616.59	1,477.56	4,849.77	14.55	333.262	
2,800.00	2,800.00	2,917.98	2,916.64	9.83	5.15	162.34	-4,616.06	1,469.74	4,846.67	14.98	323.594	
2,900.00	2,900.00	3,009.00	3,007.25	10.19	5.23	162.44	-4,615.89	1,461.07	4,843.61	15.41	314.239	
3,000.00	3,000.00	3,090.29	3,088.11	10.54	5.31	162.53	-4,616.17	1,452.70	4,840.85	15.85	305.419	
3,100.00	3,100.00	3,161.00	3,158.46	10.90	5.38	162.61	-4,616.77	1,445.67	4,838.66	16.28	297.225	
3,200.00	3,200.00	3,236.76	3,233.87	11.26	5.46	162.70	-4,617.79	1,438.41	4,837.08	16.72	289.288	
3,300.00	3,300.00	3,318.56	3,315.27	11.62	5.56	162.79	-4,619.25	1,430.47	4,835.91	17.18	281.512	
3,400.00	3,400.00	3,429.81	3,425.89	11.98	5.71	162.93	-4,621.85	1,418.95	4,835.10	17.69	273.311	
3,500.00	3,500.00	3,557.92	3,553.05	12.34	5.90	163.12	-4,624.19	1,403.56	4,833.26	18.24	264.958	
3,600.00	3,600.00	3,650.05	3,644.59	12.70	6.04	163.24	-4,625.72	1,393.27	4,831.60	18.74	257.833	
3,700.00	3,700.00	3,740.80	3,734.81	13.05	6.19	163.35	-4,627.22	1,383.57	4,830.11	19.24	250.990	
3,800.00	3,800.00	3,837.09	3,830.54	13.41	6.36	163.48	-4,628.95	1,373.32	4,828.78	19.77	244.234	
3,900.00	3,900.00	3,929.58	3,922.48	13.77	6.53	163.59	-4,630.69	1,363.48	4,827.56	20.30	237.808	
4,000.00	4,000.00	4,026.08	4,018.43	14.13	6.71	163.72	-4,632.59	1,353.33	4,826.49	20.84	231.617	
4,100.00	4,100.00	4,124.38	4,116.18	14.49	6.90	163.84	-4,634.54	1,343.08	4,825.46	21.38	225.666	
4,200.00	4,200.00	4,305.26	4,295.74	14.85	7.27	164.09	-4,637.46	1,321.56	4,823.78	22.12	218.099	
4,300.00	4,300.00	4,489.02	4,477.94	15.20	7.67	164.37	-4,637.22	1,297.71	4,819.95	22.88	210.690	
4,400.00	4,400.00	4,597.96	4,585.99	15.56	7.92	164.52	-4,636.06	1,283.89	4,815.49	23.48	205.100	
4,500.00	4,500.00	4,659.74	4,647.27	15.92	8.06	164.61	-4,635.51	1,276.03	4,811.27	23.98	200.625	
4,600.00	4,600.00	4,715.00	4,702.06	16.28	8.19	164.69	-4,635.69	1,268.83	4,808.07	24.47	196.476	
4,700.00	4,700.00	4,766.49	4,753.13	16.64	8.31	164.77	-4,636.32	1,262.32	4,805.85	24.95	192.597	
4,800.00	4,800.00	4,831.69	4,817.89	17.00	8.47	164.86	-4,637.47	1,254.84	4,804.50	25.47	188.669	
4,900.00	4,900.00	4,922.86	4,908.48	17.36	8.68	164.98	-4,639.30	1,244.78	4,803.57	26.04	184.501	
5,000.00	5,000.00	5,020.94	5,005.92	17.71	8.91	165.11	-4,641.46	1,233.77	4,802.79	26.63	180.380	

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



Anticollision Report



Company: COG Operating LLC
Project: Lea County, NM (NAD27 NME)
Reference Site: Zeppo 5 Federal COM
Site Error: 0.00 usft
Reference Well: 27H
Well Error: 0.00 usft
Reference Wellbore OH
Reference Design: Plan 1 07-25-18

Local Co-ordinate Reference: Well 27H
TVD Reference: RKB @ 4130.00usft (Double K 7)
MD Reference: RKB @ 4130.00usft (Double K 7)
North Reference: Grid
Survey Calculation Method: Minimum Curvature
Output errors are at 2.00 sigma
Database: USA Compass
Offset TVD Reference: Offset 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		Offset		Semi Major Axis		Highside Toolface (°)	Distance		Minimum Separation (usft)	Separation Factor	Warning		
Measured Depth (usft)	Vertical Depth (usft)	Measured Depth (usft)	Vertical Depth (usft)	Reference (usft)	Offset (usft)		Offset Wellbore Centre +N/-S (usft)	+E/-W (usft)					
5,100.00	5,100.00	5,143.41	5,127.81	18.07	9.19	165.26	-4,643.29	1,222.02	4,801.77	4,774.51	27.26	176.154	
5,200.00	5,200.00	5,235.62	5,219.65	18.43	9.39	165.35	-4,644.23	1,213.74	4,800.49	4,772.67	27.82	172.565	
5,300.00	5,300.00	5,314.08	5,297.79	18.79	9.56	165.44	-4,645.39	1,206.82	4,799.68	4,771.33	28.35	169.291	
5,400.00	5,400.00	5,407.18	5,390.50	19.15	9.77	165.54	-4,647.03	1,198.49	4,799.14	4,770.22	28.92	165.939	
5,500.00	5,500.00	5,498.90	5,481.85	19.51	9.98	165.64	-4,648.70	1,190.52	4,798.74	4,769.25	29.49	162.743	
5,600.00	5,600.00	5,588.75	5,571.34	19.86	10.18	165.73	-4,650.61	1,182.64	4,798.63	4,768.58	30.05	159.703	
5,700.00	5,700.00	5,762.60	5,744.88	20.22	10.53	165.85	-4,651.76	1,172.77	4,797.94	4,767.19	30.75	156.031	
5,800.00	5,799.86	5,827.00	5,809.25	20.56	10.62	3.17	-4,650.72	1,172.88	4,793.07	4,761.88	31.18	153.712	
5,900.00	5,897.16	5,859.00	5,841.10	20.88	10.64	3.30	-4,650.05	1,175.81	4,770.79	4,739.26	31.52	151.345	
6,000.00	5,987.71	5,859.00	5,841.10	21.18	10.64	3.62	-4,650.05	1,175.81	4,730.16	4,698.34	31.82	148.641	
6,100.00	6,067.54	5,890.00	5,871.64	21.49	10.64	4.14	-4,649.60	1,181.07	4,672.66	4,640.53	32.13	145.439	
6,200.00	6,133.16	5,907.03	5,888.23	21.81	10.63	5.10	-4,649.36	1,184.92	4,600.33	4,567.88	32.45	141.780	
6,300.00	6,181.72	5,941.93	5,921.69	22.18	10.61	6.97	-4,648.62	1,194.77	4,515.77	4,482.98	32.79	137.718	
6,400.00	6,211.08	5,964.18	5,942.63	22.61	10.58	12.22	-4,647.81	1,202.25	4,422.13	4,388.94	33.19	133.238	
6,500.00	6,220.13	5,970.02	5,948.07	23.08	10.57	34.42	-4,647.58	1,204.35	4,323.49	4,289.83	33.66	128.453	
6,600.00	6,221.16	5,972.54	5,950.42	23.63	10.57	-20.16	-4,647.49	1,205.28	4,223.73	4,189.53	34.20	123.492	
6,700.00	6,222.21	5,974.12	5,951.88	24.25	10.57	-54.54	-4,647.42	1,205.86	4,124.16	4,089.35	34.82	118.457	
6,800.00	6,223.25	5,974.69	5,952.41	24.91	10.57	-67.50	-4,647.40	1,206.07	4,025.30	3,989.82	35.48	113.451	
6,900.00	6,224.30	5,974.24	5,951.99	25.61	10.57	-73.54	-4,647.42	1,205.90	3,927.69	3,891.51	36.18	108.553	
7,000.00	6,225.33	5,972.76	5,950.62	26.34	10.57	-78.80	-4,647.48	1,205.36	3,831.93	3,795.02	36.91	103.815	
7,100.00	6,226.36	5,970.86	5,948.85	27.10	10.57	-76.71	-4,647.55	1,204.66	3,737.32	3,699.65	37.68	99.198	
7,200.00	6,227.39	5,968.97	5,947.10	27.92	10.58	-76.62	-4,647.63	1,203.97	3,643.00	3,604.51	38.49	94.640	
7,300.00	6,228.42	5,967.11	5,945.37	28.78	10.58	-76.54	-4,647.70	1,203.30	3,548.99	3,509.63	39.36	90.167	
7,400.00	6,229.45	5,965.28	5,943.66	29.69	10.58	-76.45	-4,647.77	1,202.64	3,455.32	3,415.05	40.27	85.799	
7,500.00	6,230.48	5,954.00	5,933.09	30.64	10.59	-75.93	-4,648.20	1,198.71	3,362.04	3,320.80	41.24	81.531	
7,600.00	6,231.51	5,954.00	5,933.09	31.63	10.59	-75.93	-4,648.20	1,198.71	3,269.11	3,226.88	42.22	77.423	
7,700.00	6,232.54	5,954.00	5,933.09	32.65	10.59	-75.81	-4,648.20	1,198.71	3,176.60	3,133.36	43.24	73.456	
7,800.00	6,233.56	5,954.00	5,933.09	33.72	10.59	-73.82	-4,648.20	1,198.71	3,083.26	3,038.95	44.31	69.581	
7,900.00	6,234.59	5,954.00	5,933.09	34.82	10.59	-73.82	-4,648.20	1,198.71	2,989.67	2,944.25	45.42	65.826	
8,000.00	6,235.61	5,954.00	5,933.09	35.95	10.59	-73.82	-4,648.20	1,198.71	2,896.51	2,849.96	46.55	62.225	
8,100.00	6,236.63	5,954.00	5,933.09	37.11	10.59	-73.82	-4,648.20	1,198.71	2,803.82	2,756.12	47.70	58.777	
8,200.00	6,237.65	5,954.00	5,933.09	38.28	10.59	-73.82	-4,648.20	1,198.71	2,711.65	2,662.77	48.88	55.480	
8,300.00	6,238.67	5,954.00	5,933.09	39.47	10.59	-73.82	-4,648.20	1,198.71	2,620.05	2,569.98	50.07	52.330	
8,400.00	6,239.70	5,954.00	5,933.09	40.68	10.59	-73.82	-4,648.20	1,198.71	2,529.09	2,477.82	51.28	49.322	
8,500.00	6,240.72	5,954.00	5,933.09	41.91	10.59	-73.82	-4,648.20	1,198.71	2,438.84	2,386.34	52.50	46.452	
8,600.00	6,241.74	5,954.00	5,933.09	43.15	10.59	-73.82	-4,648.20	1,198.71	2,349.38	2,295.64	53.74	43.717	
8,700.00	6,242.76	5,954.00	5,933.09	44.40	10.59	-73.82	-4,648.20	1,198.71	2,260.80	2,205.81	54.99	41.111	
8,800.00	6,243.78	5,954.00	5,933.09	45.66	10.59	-73.82	-4,648.20	1,198.71	2,173.22	2,116.96	56.26	38.631	
8,900.00	6,244.80	5,945.15	5,924.74	46.94	10.60	-73.35	-4,648.51	1,195.79	2,086.71	2,029.17	57.54	36.267	
9,000.00	6,245.83	5,944.08	5,923.73	48.22	10.60	-73.29	-4,648.55	1,195.45	2,001.48	1,942.66	58.82	34.025	
9,100.00	6,246.85	5,943.07	5,922.78	49.51	10.60	-73.23	-4,648.58	1,195.13	1,917.69	1,857.57	60.12	31.899	
9,200.00	6,247.87	5,942.12	5,921.87	50.82	10.61	-73.18	-4,648.61	1,194.83	1,835.51	1,774.09	61.42	29.884	
9,300.00	6,248.89	5,941.22	5,921.02	52.13	10.61	-73.14	-4,648.64	1,194.54	1,755.19	1,692.46	62.73	27.979	
9,400.00	6,249.91	5,940.37	5,920.21	53.44	10.61	-73.09	-4,648.66	1,194.28	1,676.98	1,612.93	64.05	26.183	
9,500.00	6,250.94	5,939.56	5,919.45	54.77	10.61	-73.05	-4,648.69	1,194.02	1,601.20	1,535.82	65.37	24.493	
9,600.00	6,251.96	5,938.80	5,918.72	56.10	10.61	-73.01	-4,648.71	1,193.79	1,528.20	1,461.50	66.71	22.910	
9,700.00	6,252.98	5,938.07	5,918.02	57.43	10.61	-72.97	-4,648.73	1,193.56	1,458.41	1,390.37	68.04	21.434	
9,800.00	6,254.00	5,937.37	5,917.36	58.77	10.61	-72.93	-4,648.75	1,193.35	1,392.31	1,322.93	69.38	20.067	
9,900.00	6,255.02	5,936.71	5,916.73	60.12	10.61	-72.89	-4,648.77	1,193.14	1,330.45	1,259.72	70.73	18.810	
10,000.00	6,256.05	5,936.07	5,916.13	61.47	10.61	-72.86	-4,648.79	1,192.95	1,273.44	1,201.36	72.08	17.666	
10,100.00	6,257.07	5,935.47	5,915.55	62.83	10.61	-72.83	-4,648.80	1,192.76	1,221.97	1,148.53	73.44	16.639	
10,200.00	6,258.09	5,934.89	5,915.00	64.19	10.61	-72.80	-4,648.82	1,192.59	1,176.76	1,101.96	74.80	15.732	

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

Company: COG Operating LLC
Project: Lea County, NM (NAD27 NME)
Reference Site: Zeppo 5 Federal COM
Site Error: 0.00 usft
Reference Well: 27H
Well Error: 0.00 usft
Reference Wellbore: OH
Reference Design: Plan 1 07-25-18

Local Co-ordinate Reference: Well 27H
TVD Reference: RKB @ 4130.00usft (Double K 7)
MD Reference: RKB @ 4130.00usft (Double K 7)
North Reference: Grid
Survey Calculation Method: Minimum Curvature
Output errors are at 2.00 sigma
Database: USA Compass
Offset TVD Reference: Offset 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	Offset	Semi Major Axis		Distance									
Measured Depth (usft)	Vertical Depth (usft)	Measured Depth (usft)	Vertical Depth (usft)	Reference (usft)	Offset (usft)	Highside Tooffset (")	Offset Wellbore Centre +N/-S (usft)	Offset Wellbore Centre +E/-W (usft)	Between Centres (usft)	Between Ellipses (usft)	Minimum Separation (usft)	Separation Factor	Warning
10,300.00	6,259.11	5,934.34	5,914.47	65.55	10.61	-72.77	-4,648.83	1,192.42	1,138.56	1,062.39	76.17	14.948	
10,400.00	6,260.13	5,933.80	5,913.96	66.92	10.61	-72.74	-4,648.85	1,192.26	1,108.09	1,030.56	77.53	14.292	
10,500.00	6,261.16	5,933.29	5,913.48	68.29	10.61	-72.71	-4,648.86	1,192.11	1,086.01	1,007.10	78.91	13.763	
10,600.00	6,262.18	5,932.81	5,913.01	69.67	10.61	-72.68	-4,648.87	1,191.96	1,072.83	992.55	80.28	13.363	
10,692.38	6,263.12	5,922.00	5,902.67	70.94	10.62	-72.11	-4,649.11	1,188.84	1,069.01	987.45	81.56	13.106 CC	
10,700.00	6,263.20	5,922.00	5,902.67	71.04	10.62	-72.11	-4,649.11	1,188.84	1,069.04	987.37	81.67	13.090 ES	
10,800.00	6,264.22	5,922.00	5,902.67	72.42	10.62	-72.11	-4,649.11	1,188.84	1,074.42	991.37	83.05	12.937	
10,900.00	6,265.24	5,922.00	5,902.67	73.81	10.62	-72.11	-4,649.11	1,188.84	1,088.99	1,004.55	84.43	12.898 SF	
11,000.00	6,266.27	5,922.00	5,902.67	75.19	10.62	-72.11	-4,649.11	1,188.84	1,112.39	1,026.57	85.82	12.962	
11,100.00	6,267.29	5,922.00	5,902.67	76.58	10.62	-72.11	-4,649.11	1,188.84	1,144.09	1,056.88	87.21	13.119	
11,200.00	6,268.31	5,922.00	5,902.67	77.97	10.62	-72.11	-4,649.11	1,188.84	1,183.41	1,094.81	88.60	13.357	
11,300.00	6,269.33	5,922.00	5,902.67	79.36	10.62	-72.11	-4,649.11	1,188.84	1,229.63	1,139.64	89.99	13.664	
11,400.00	6,270.35	5,922.00	5,902.67	80.76	10.62	-72.11	-4,649.11	1,188.84	1,281.99	1,190.61	91.38	14.029	
11,500.00	6,271.37	5,922.00	5,902.67	82.16	10.62	-72.11	-4,649.11	1,188.84	1,339.79	1,247.01	92.78	14.440	
11,600.00	6,272.40	5,922.00	5,902.67	83.55	10.62	-72.11	-4,649.11	1,188.84	1,402.34	1,308.16	94.18	14.890	
11,700.00	6,273.42	5,922.00	5,902.67	84.95	10.62	-72.11	-4,649.11	1,188.84	1,469.04	1,373.46	95.58	15.370	
11,800.00	6,274.44	5,922.00	5,902.67	86.36	10.62	-72.11	-4,649.11	1,188.84	1,539.35	1,442.37	96.98	15.873	
11,900.00	6,275.46	5,922.00	5,902.67	87.76	10.62	-72.11	-4,649.11	1,188.84	1,612.80	1,514.42	98.38	16.393	
12,000.00	6,276.48	5,922.00	5,902.67	89.17	10.62	-72.11	-4,649.11	1,188.84	1,688.98	1,589.19	99.79	16.925	
12,100.00	6,277.51	5,922.00	5,902.67	90.57	10.62	-72.11	-4,649.11	1,188.84	1,767.53	1,666.34	101.20	17.466	
12,200.00	6,278.53	5,922.00	5,902.67	91.98	10.62	-72.11	-4,649.11	1,188.84	1,848.16	1,745.56	102.60	18.013	
12,300.00	6,279.55	5,922.00	5,902.67	93.39	10.62	-72.11	-4,649.11	1,188.84	1,930.60	1,826.59	104.01	18.561	
12,400.00	6,280.57	5,922.00	5,902.67	94.80	10.62	-72.11	-4,649.11	1,188.84	2,014.63	1,909.21	105.42	19.110	
12,500.00	6,281.59	5,922.00	5,902.67	96.21	10.62	-72.11	-4,649.11	1,188.84	2,100.06	1,993.23	106.84	19.657	
12,600.00	6,282.62	5,922.00	5,902.67	97.62	10.62	-72.11	-4,649.11	1,188.84	2,186.73	2,078.48	108.25	20.201	
12,700.00	6,283.64	5,922.00	5,902.67	99.04	10.62	-72.11	-4,649.11	1,188.84	2,274.49	2,164.83	109.66	20.741	
12,800.00	6,284.66	5,922.00	5,902.67	100.45	10.62	-72.11	-4,649.11	1,188.84	2,363.23	2,252.15	111.08	21.275	
12,900.00	6,285.68	5,922.00	5,902.67	101.87	10.62	-72.11	-4,649.11	1,188.84	2,452.83	2,340.33	112.49	21.804	
13,000.00	6,286.70	5,922.00	5,902.67	103.29	10.62	-72.11	-4,649.11	1,188.84	2,543.20	2,429.29	113.91	22.326	
13,100.00	6,287.73	5,922.00	5,902.67	104.70	10.62	-72.11	-4,649.11	1,188.84	2,634.28	2,518.95	115.33	22.841	
13,200.00	6,288.75	5,922.00	5,902.67	106.12	10.62	-72.11	-4,649.11	1,188.84	2,725.97	2,609.23	116.75	23.349	
13,300.00	6,289.77	5,922.00	5,902.67	107.54	10.62	-72.11	-4,649.11	1,188.84	2,818.24	2,700.07	118.17	23.850	
13,400.00	6,290.79	5,922.00	5,902.67	108.96	10.62	-72.11	-4,649.11	1,188.84	2,911.01	2,791.42	119.59	24.342	
13,500.00	6,291.81	5,922.00	5,902.67	110.38	10.62	-72.11	-4,649.11	1,188.84	3,004.25	2,883.24	121.01	24.827	
13,600.00	6,292.83	5,922.00	5,902.67	111.81	10.62	-72.11	-4,649.11	1,188.84	3,097.91	2,975.48	122.43	25.303	
13,700.00	6,293.86	5,922.00	5,902.67	113.23	10.62	-72.11	-4,649.11	1,188.84	3,191.95	3,068.10	123.85	25.772	
13,800.00	6,294.88	5,922.00	5,902.67	114.65	10.62	-72.11	-4,649.11	1,188.84	3,286.35	3,161.07	125.28	26.232	
13,900.00	6,295.90	5,922.00	5,902.67	116.08	10.62	-72.11	-4,649.11	1,188.84	3,381.06	3,254.36	126.70	26.685	
14,000.00	6,296.92	5,922.00	5,902.67	117.50	10.62	-72.11	-4,649.11	1,188.84	3,476.08	3,347.95	128.13	27.130	
14,100.00	6,297.94	5,922.00	5,902.67	118.93	10.62	-72.11	-4,649.11	1,188.84	3,571.36	3,441.81	129.55	27.567	
14,200.00	6,298.97	5,922.00	5,902.67	120.35	10.62	-72.11	-4,649.11	1,188.84	3,666.90	3,535.92	130.98	27.996	
14,291.37	6,299.90	5,922.00	5,902.67	121.46	10.62	-72.11	-4,649.11	1,188.84	3,754.40	3,622.31	132.09	28.423	



Anticollision Report



Company: COG Operating LLC
Project: Lea County, NM (NAD27 NME)
Reference Site: Zeppo 5 Federal COM
Site Error: 0.00 usft
Reference Well: 27H
Well Error: 0.00 usft
Reference Wellbore OH
Reference Design: Plan 1 07-25-18

Local Co-ordinate Reference: Well 27H
TVD Reference: RKB @ 4130.00usft (Double K 7)
MD Reference: RKB @ 4130.00usft (Double K 7)
North Reference: Grid
Survey Calculation Method: Minimum Curvature
Output errors are at 2.00 sigma
Database: USA Compass
Offset TVD Reference: Offset 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		Offset		Semi Major Axis		Highside Toolface (°)	Offset Wellbore Centre		Distance		Minimum Separation (usft)	Separation Factor	Warning
Measured Depth (usft)	Vertical Depth (usft)	Measured Depth (usft)	Vertical Depth (usft)	Reference (usft)	Offset (usft)		+N/-S (usft)	+E/-W (usft)	Between Centres (usft)	Between Ellipses (usft)			
0.00	0.00	0.00	0.00	0.00	0.00	-90.22	-2.00	-529.90	529.93				
100.00	100.00	95.00	95.00	0.15	0.14	-90.22	-2.00	-529.90	529.90	529.61	0.29	1,826.666	
200.00	200.00	195.00	195.00	0.51	0.49	-90.22	-2.00	-529.90	529.90	528.91	1.00	531.738	
300.00	300.00	295.00	295.00	0.87	0.85	-90.22	-2.00	-529.90	529.90	528.19	1.71	309.253	
400.00	400.00	395.00	395.00	1.22	1.21	-90.22	-2.00	-529.90	529.90	527.47	2.43	218.028	
500.00	500.00	495.00	495.00	1.58	1.56	-90.22	-2.00	-529.90	529.90	526.76	3.15	168.363	
600.00	600.00	595.00	595.00	1.94	1.92	-90.22	-2.00	-529.90	529.90	526.04	3.86	137.127	
700.00	700.00	695.00	695.00	2.30	2.28	-90.22	-2.00	-529.90	529.90	525.32	4.58	115.668	
800.00	800.00	795.00	795.00	2.66	2.64	-90.22	-2.00	-529.90	529.90	524.61	5.30	100.016	
900.00	900.00	895.00	895.00	3.02	3.00	-90.22	-2.00	-529.90	529.90	523.89	6.02	88.095	
1,000.00	1,000.00	995.00	995.00	3.38	3.36	-90.22	-2.00	-529.90	529.90	523.17	6.73	78.713	
1,100.00	1,100.00	1,095.00	1,095.00	3.73	3.72	-90.22	-2.00	-529.90	529.90	522.45	7.45	71.137	
1,200.00	1,200.00	1,195.00	1,195.00	4.09	4.07	-90.22	-2.00	-529.90	529.90	521.74	8.17	64.892	
1,300.00	1,300.00	1,295.00	1,295.00	4.45	4.43	-90.22	-2.00	-529.90	529.90	521.02	8.88	59.654	
1,400.00	1,400.00	1,395.00	1,395.00	4.81	4.79	-90.22	-2.00	-529.90	529.90	520.30	9.60	55.199	
1,500.00	1,500.00	1,495.00	1,495.00	5.17	5.15	-90.22	-2.00	-529.90	529.90	519.59	10.32	51.363	
1,600.00	1,600.00	1,595.00	1,595.00	5.53	5.51	-90.22	-2.00	-529.90	529.90	518.87	11.03	48.026	
1,700.00	1,700.00	1,695.00	1,695.00	5.88	5.87	-90.22	-2.00	-529.90	529.90	518.15	11.75	45.096	
1,800.00	1,800.00	1,795.00	1,795.00	6.24	6.22	-90.22	-2.00	-529.90	529.90	517.44	12.47	42.502	
1,900.00	1,900.00	1,895.00	1,895.00	6.60	6.58	-90.22	-2.00	-529.90	529.90	516.72	13.18	40.191	
2,000.00	2,000.00	1,995.00	1,995.00	6.96	6.94	-90.22	-2.00	-529.90	529.90	516.00	13.90	38.118	
2,100.00	2,100.00	2,095.00	2,095.00	7.32	7.30	-90.22	-2.00	-529.90	529.90	515.29	14.62	36.249	
2,200.00	2,200.00	2,195.00	2,195.00	7.68	7.66	-90.22	-2.00	-529.90	529.90	514.57	15.34	34.554	
2,300.00	2,300.00	2,295.00	2,295.00	8.04	8.02	-90.22	-2.00	-529.90	529.90	513.85	16.05	33.011	
2,400.00	2,400.00	2,395.00	2,395.00	8.39	8.38	-90.22	-2.00	-529.90	529.90	513.13	16.77	31.600	
2,500.00	2,500.00	2,495.00	2,495.00	8.75	8.73	-90.22	-2.00	-529.90	529.90	512.42	17.49	30.304	
2,600.00	2,600.00	2,595.00	2,595.00	9.11	9.09	-90.22	-2.00	-529.90	529.90	511.70	18.20	29.110	
2,700.00	2,700.00	2,695.00	2,695.00	9.47	9.45	-90.22	-2.00	-529.90	529.90	510.98	18.92	28.007	
2,800.00	2,800.00	2,795.00	2,795.00	9.83	9.81	-90.22	-2.00	-529.90	529.90	510.27	19.64	26.985	
2,900.00	2,900.00	2,895.00	2,895.00	10.19	10.17	-90.22	-2.00	-529.90	529.90	509.55	20.35	26.034	
3,000.00	3,000.00	2,995.00	2,995.00	10.54	10.53	-90.22	-2.00	-529.90	529.90	508.83	21.07	25.149	
3,100.00	3,100.00	3,095.00	3,095.00	10.90	10.88	-90.22	-2.00	-529.90	529.90	508.12	21.79	24.321	
3,200.00	3,200.00	3,195.00	3,195.00	11.26	11.24	-90.22	-2.00	-529.90	529.90	507.40	22.50	23.546	
3,300.00	3,300.00	3,295.00	3,295.00	11.62	11.60	-90.22	-2.00	-529.90	529.90	506.68	23.22	22.819	
3,400.00	3,400.00	3,395.00	3,395.00	11.98	11.96	-90.22	-2.00	-529.90	529.90	505.97	23.94	22.136	
3,500.00	3,500.00	3,495.00	3,495.00	12.34	12.32	-90.22	-2.00	-529.90	529.90	505.25	24.66	21.492	
3,600.00	3,600.00	3,595.00	3,595.00	12.70	12.68	-90.22	-2.00	-529.90	529.90	504.53	25.37	20.885	
3,700.00	3,700.00	3,695.00	3,695.00	13.05	13.04	-90.22	-2.00	-529.90	529.90	503.81	26.09	20.311	
3,800.00	3,800.00	3,795.00	3,795.00	13.41	13.39	-90.22	-2.00	-529.90	529.90	503.10	26.81	19.768	
3,900.00	3,900.00	3,895.00	3,895.00	13.77	13.75	-90.22	-2.00	-529.90	529.90	502.38	27.52	19.253	
4,000.00	4,000.00	3,995.00	3,995.00	14.13	14.11	-90.22	-2.00	-529.90	529.90	501.66	28.24	18.764	
4,100.00	4,100.00	4,095.00	4,095.00	14.49	14.47	-90.22	-2.00	-529.90	529.90	500.95	28.96	18.299	
4,200.00	4,200.00	4,195.00	4,195.00	14.85	14.83	-90.22	-2.00	-529.90	529.90	500.23	29.67	17.857	
4,300.00	4,300.00	4,295.00	4,295.00	15.20	15.19	-90.22	-2.00	-529.90	529.90	499.51	30.39	17.436	
4,400.00	4,400.00	4,395.00	4,395.00	15.56	15.55	-90.22	-2.00	-529.90	529.90	498.80	31.11	17.034	
4,500.00	4,500.00	4,495.00	4,495.00	15.92	15.90	-90.22	-2.00	-529.90	529.90	498.08	31.83	16.650	
4,600.00	4,600.00	4,595.00	4,595.00	16.28	16.26	-90.22	-2.00	-529.90	529.90	497.36	32.54	16.284	
4,700.00	4,700.00	4,695.00	4,695.00	16.64	16.62	-90.22	-2.00	-529.90	529.90	496.64	33.26	15.933	
4,800.00	4,800.00	4,795.00	4,795.00	17.00	16.98	-90.22	-2.00	-529.90	529.90	495.93	33.98	15.596	
4,900.00	4,900.00	4,895.00	4,895.00	17.36	17.34	-90.22	-2.00	-529.90	529.90	495.21	34.69	15.274	
5,000.00	5,000.00	4,995.00	4,995.00	17.71	17.70	-90.22	-2.00	-529.90	529.90	494.49	35.41	14.965	
5,100.00	5,100.00	5,095.00	5,095.00	18.07	18.05	-90.22	-2.00	-529.90	529.90	493.78	36.13	14.668	

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

Company: COG Operating LLC
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Reference Well: 27H
Well Error: 0.00 usft
Reference Wellbore: OH
Reference Design: Plan 1 07-25-18

Local Co-ordinate Reference: Well 27H
TVD Reference: RKB @ 4130.00usft (Double K 7)
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North Reference: Grid
Survey Calculation Method: Minimum Curvature
Output errors are at 2.00 sigma
Database: USA Compass
Offset TVD Reference: Offset 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		Offset		Semi Major Axis		Highside Tooface (")	Distance		Minimum Separation (usft)	Separation Factor	Warning		
Measured Depth (usft)	Vertical Depth (usft)	Measured Depth (usft)	Vertical Depth (usft)	Reference (usft)	Offset (usft)		Offset Wellbore Centre +N/-S (usft)	+E/-W (usft)					
5,200.00	5,200.00	5,195.00	5,195.00	18.43	18.41	-90.22	-2.00	-529.90	529.90	493.06	14.382		
5,276.56	5,276.56	5,271.59	5,271.56	18.71	18.68	-90.35	-3.21	-529.89	529.90	492.52	14.175 CC		
5,300.00	5,300.00	5,294.87	5,294.73	18.79	18.75	-90.59	-5.44	-529.88	529.91	492.36	14.115		
5,400.00	5,400.00	5,390.00	5,387.42	19.15	19.06	-92.82	-26.13	-529.75	530.45	492.25	13.885 ES		
5,500.00	5,500.00	5,475.00	5,465.33	19.51	19.31	-96.45	-59.83	-529.55	533.74	494.93	13.751		
5,600.00	5,600.00	5,544.97	5,524.16	19.86	19.51	-100.45	-97.59	-529.32	542.88	503.50	13.786		
5,700.00	5,700.00	5,600.00	5,566.18	20.22	19.68	-104.12	-133.09	-529.11	560.59	520.68	14.048		
5,800.00	5,799.86	5,650.00	5,600.59	20.56	19.84	87.50	-169.33	-528.89	588.32	547.91	14.561		
5,900.00	5,897.16	5,700.00	5,631.01	20.88	20.01	79.97	-208.98	-528.65	624.36	583.47	15.269		
6,000.00	5,987.71	5,750.00	5,657.13	21.18	20.18	72.71	-251.59	-528.39	664.70	623.33	16.069		
6,100.00	6,067.54	5,793.95	5,676.30	21.49	20.34	66.42	-291.12	-528.15	705.90	664.07	16.875		
6,200.00	6,133.16	5,841.04	5,692.71	21.81	20.53	61.09	-335.24	-527.88	745.41	703.07	17.604		
6,300.00	6,181.72	5,887.97	5,704.67	22.18	20.72	56.95	-380.59	-527.60	781.28	738.38	18.210		
6,400.00	6,211.08	5,934.76	5,712.10	22.61	20.92	53.96	-426.78	-527.32	812.14	768.62	18.658		
6,500.00	6,220.13	5,983.55	5,715.00	23.08	21.13	52.36	-475.46	-527.03	837.11	792.90	18.932		
6,600.00	6,221.16	6,076.15	5,715.78	23.63	21.60	53.77	-568.05	-526.47	857.38	812.15	18.956		
6,700.00	6,222.21	6,174.47	5,716.60	24.25	22.16	54.76	-666.36	-525.87	872.31	825.90	18.795		
6,800.00	6,223.25	6,273.82	5,717.43	24.91	22.81	55.35	-765.70	-525.27	881.66	833.94	18.474		
6,900.00	6,224.30	6,373.70	5,718.27	25.61	23.53	55.54	-865.59	-524.66	885.31	836.16	18.013		
7,000.00	6,225.33	6,473.65	5,719.11	26.34	24.32	55.34	-965.53	-524.06	883.21	832.55	17.433		
7,100.00	6,226.36	6,573.48	5,719.94	27.10	25.17	55.12	-1,065.35	-523.45	878.52	826.25	16.807		
7,200.00	6,227.39	6,673.31	5,720.78	27.92	26.07	54.89	-1,165.17	-522.85	873.84	819.86	16.186		
7,300.00	6,228.42	6,773.14	5,721.62	28.78	27.02	54.66	-1,265.00	-522.24	869.18	813.38	15.577		
7,400.00	6,229.45	6,872.96	5,722.45	29.69	28.01	54.42	-1,364.82	-521.64	864.53	806.83	14.984		
7,500.00	6,230.48	6,972.79	5,723.29	30.64	29.04	54.19	-1,464.64	-521.03	859.90	800.22	14.409		
7,600.00	6,231.51	7,072.62	5,724.12	31.63	30.10	53.95	-1,564.47	-520.43	855.28	793.55	13.855		
7,700.00	6,232.54	7,172.45	5,724.96	32.65	31.19	53.71	-1,664.29	-519.82	850.68	786.84	13.324		
7,800.00	6,233.56	7,272.41	5,725.80	33.72	32.32	53.68	-1,764.25	-519.22	848.97	782.94	12.856		
7,900.00	6,234.59	7,372.41	5,726.64	34.82	33.47	53.66	-1,864.24	-518.61	848.78	780.49	12.428		
8,000.00	6,235.61	7,472.41	5,727.47	35.95	34.64	53.63	-1,964.23	-518.00	848.59	777.99	12.020		
8,100.00	6,236.63	7,572.41	5,728.31	37.11	35.84	53.61	-2,064.23	-517.40	848.40	775.45	11.631		
8,200.00	6,237.65	7,672.41	5,729.15	38.28	37.05	53.58	-2,164.22	-516.79	848.20	772.88	11.260		
8,300.00	6,238.67	7,772.41	5,729.99	39.47	38.28	53.56	-2,264.22	-516.19	848.01	770.26	10.907		
8,400.00	6,239.70	7,872.41	5,730.82	40.68	39.52	53.53	-2,364.21	-515.58	847.82	767.62	10.571		
8,500.00	6,240.72	7,972.41	5,731.66	41.91	40.78	53.51	-2,464.20	-514.97	847.63	764.95	10.251		
8,600.00	6,241.74	8,072.41	5,732.50	43.15	42.05	53.48	-2,564.20	-514.37	847.44	762.25	9.947		
8,700.00	6,242.76	8,172.40	5,733.34	44.40	43.33	53.46	-2,664.19	-513.76	847.25	759.52	9.658		
8,800.00	6,243.78	8,272.40	5,734.18	45.66	44.62	53.43	-2,764.19	-513.15	847.06	756.78	9.382		
8,900.00	6,244.80	8,372.40	5,735.01	46.94	45.92	53.41	-2,864.18	-512.55	846.87	754.01	9.120		
9,000.00	6,245.83	8,472.40	5,735.85	48.22	47.23	53.38	-2,964.17	-511.94	846.68	751.22	8.870		
9,100.00	6,246.85	8,572.40	5,736.69	49.51	48.55	53.36	-3,064.17	-511.34	846.49	748.42	8.632		
9,200.00	6,247.87	8,672.40	5,737.53	50.82	49.88	53.33	-3,164.16	-510.73	846.30	745.60	8.405		
9,300.00	6,248.89	8,772.40	5,738.36	52.13	51.21	53.31	-3,264.15	-510.12	846.11	742.77	8.188		
9,400.00	6,249.91	8,872.40	5,739.20	53.44	52.55	53.28	-3,364.15	-509.52	845.92	739.93	7.981		
9,500.00	6,250.94	8,972.40	5,740.04	54.77	53.89	53.26	-3,464.14	-508.91	845.73	737.07	7.783		
9,600.00	6,251.96	9,072.40	5,740.88	56.10	55.25	53.23	-3,564.14	-508.30	845.54	734.20	7.594		
9,700.00	6,252.98	9,172.40	5,741.72	57.43	56.60	53.21	-3,664.13	-507.70	845.35	731.32	7.413		
9,800.00	6,254.00	9,272.40	5,742.55	58.77	57.96	53.18	-3,764.12	-507.09	845.16	728.42	7.240		
9,900.00	6,255.02	9,372.39	5,743.39	60.12	59.33	53.16	-3,864.12	-506.49	844.97	725.52	7.074		
10,000.00	6,256.05	9,472.39	5,744.23	61.47	60.69	53.13	-3,964.11	-505.88	844.78	722.62	6.915		
10,100.00	6,257.07	9,572.39	5,745.07	62.83	62.07	53.11	-4,064.10	-505.27	844.59	719.70	6.762		
10,200.00	6,258.09	9,672.39	5,745.90	64.19	63.44	53.08	-4,164.10	-504.67	844.41	716.77	6.616		

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



Anticollision Report



Company: COG Operating LLC
Project: Lea County, NM (NAD27 NME)
Reference Site: Zeppo 5 Federal COM
Site Error: 0.00 usft
Reference Well: 27H
Well Error: 0.00 usft
Reference Wellbore OH
Reference Design: Plan 1 07-25-18

Local Co-ordinate Reference: Well 27H
TVD Reference: RKB @ 4130.00usft (Double K 7)
MD Reference: RKB @ 4130.00usft (Double K 7)
North Reference: Grid
Survey Calculation Method: Minimum Curvature
Output errors are at 2.00 sigma
Database: USA Compass
Offset TVD Reference: Offset 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		Offset		Semi Major Axis		Highside Toolface (°)	Distance		Between Centres (usft)	Between Ellipses (usft)	Minimum Separation (usft)	Separation Factor	Warning
Measured Depth (usft)	Vertical Depth (usft)	Measured Depth (usft)	Vertical Depth (usft)	Reference (usft)	Offset (usft)		Offset Wellbore Centre +N/-S (usft)	+E/-W (usft)					
10,300.00	6,259.11	9,772.39	5,746.74	65.55	64.82	53.06	-4,264.09	-504.06	844.22	713.84	130.37	6.475	
10,400.00	6,260.13	9,872.39	5,747.58	66.92	66.20	53.03	-4,364.09	-503.45	844.03	710.90	133.13	6.340	
10,500.00	6,261.16	9,972.39	5,748.42	68.29	67.59	53.00	-4,464.08	-502.85	843.84	707.96	135.88	6.210	
10,600.00	6,262.18	10,072.39	5,749.25	69.67	68.98	52.98	-4,564.07	-502.24	843.65	705.01	138.64	6.085	
10,700.00	6,263.20	10,172.39	5,750.09	71.04	70.37	52.95	-4,664.07	-501.64	843.47	702.05	141.41	5.965	
10,800.00	6,264.22	10,272.39	5,750.93	72.42	71.76	52.93	-4,764.06	-501.03	843.28	699.09	144.19	5.849	
10,900.00	6,265.24	10,372.39	5,751.77	73.81	73.16	52.90	-4,864.05	-500.42	843.09	696.13	146.96	5.737	
11,000.00	6,266.27	10,472.38	5,752.61	75.19	74.55	52.88	-4,964.05	-499.82	842.90	693.16	149.75	5.629	
11,100.00	6,267.29	10,572.38	5,753.44	76.58	75.95	52.85	-5,064.04	-499.21	842.72	690.18	152.54	5.525	
11,200.00	6,268.31	10,672.38	5,754.28	77.97	77.36	52.83	-5,164.04	-498.61	842.53	687.20	155.33	5.424	
11,300.00	6,269.33	10,772.38	5,755.12	79.36	78.76	52.80	-5,264.03	-498.00	842.34	684.22	158.12	5.327	
11,400.00	6,270.35	10,872.38	5,755.96	80.76	80.16	52.78	-5,364.02	-497.39	842.16	681.23	160.92	5.233	
11,500.00	6,271.37	10,972.38	5,756.79	82.16	81.57	52.75	-5,464.02	-496.79	841.97	678.24	163.73	5.143	
11,600.00	6,272.40	11,072.38	5,757.63	83.55	82.98	52.73	-5,564.01	-496.18	841.78	675.25	166.53	5.055	
11,700.00	6,273.42	11,172.38	5,758.47	84.95	84.39	52.70	-5,664.00	-495.57	841.60	672.25	169.34	4.970	
11,800.00	6,274.44	11,272.38	5,759.31	86.36	85.80	52.68	-5,764.00	-494.97	841.41	669.25	172.16	4.887	
11,900.00	6,275.46	11,372.38	5,760.15	87.76	87.21	52.65	-5,863.99	-494.36	841.23	666.25	174.97	4.808	
12,000.00	6,276.48	11,472.38	5,760.98	89.17	88.63	52.62	-5,963.99	-493.76	841.04	663.25	177.79	4.730	
12,100.00	6,277.51	11,572.38	5,761.82	90.57	90.04	52.60	-6,063.98	-493.15	840.86	660.24	180.61	4.656	
12,200.00	6,278.53	11,672.37	5,762.66	91.98	91.46	52.57	-6,163.97	-492.54	840.67	657.23	183.44	4.583	
12,300.00	6,279.55	11,772.37	5,763.50	93.39	92.88	52.55	-6,263.97	-491.94	840.49	654.22	186.27	4.512	
12,400.00	6,280.57	11,872.37	5,764.33	94.80	94.30	52.52	-6,363.96	-491.33	840.30	651.21	189.10	4.444	
12,500.00	6,281.59	11,972.37	5,765.17	96.21	95.72	52.50	-6,463.96	-490.72	840.12	648.19	191.93	4.377	
12,600.00	6,282.62	12,072.37	5,766.01	97.62	97.14	52.47	-6,563.95	-490.12	839.93	645.17	194.76	4.313	
12,700.00	6,283.64	12,172.37	5,766.85	99.04	98.56	52.45	-6,663.94	-489.51	839.75	642.15	197.60	4.250	
12,800.00	6,284.66	12,272.37	5,767.69	100.45	99.98	52.42	-6,763.94	-488.91	839.56	639.13	200.43	4.189	
12,900.00	6,285.68	12,372.37	5,768.52	101.87	101.40	52.39	-6,863.93	-488.30	839.38	636.11	203.27	4.129	
13,000.00	6,286.70	12,472.37	5,769.36	103.29	102.83	52.37	-6,963.92	-487.69	839.20	633.08	206.11	4.072	
13,100.00	6,287.73	12,572.37	5,770.20	104.70	104.25	52.34	-7,063.92	-487.09	839.01	630.06	208.96	4.015	
13,200.00	6,288.75	12,672.37	5,771.04	106.12	105.68	52.32	-7,163.91	-486.48	838.83	627.03	211.80	3.960	
13,300.00	6,289.77	12,772.36	5,771.87	107.54	107.10	52.29	-7,263.91	-485.87	838.65	624.00	214.65	3.907	
13,400.00	6,290.79	12,872.36	5,772.71	108.96	108.53	52.27	-7,363.90	-485.27	838.46	620.97	217.49	3.855	
13,500.00	6,291.81	12,972.36	5,773.55	110.38	109.96	52.24	-7,463.89	-484.66	838.28	617.94	220.34	3.804	
13,600.00	6,292.83	13,072.36	5,774.39	111.81	111.39	52.22	-7,563.89	-484.06	838.10	614.90	223.19	3.755	
13,700.00	6,293.86	13,172.36	5,775.22	113.23	112.82	52.19	-7,663.88	-483.45	837.91	611.87	226.05	3.707	
13,800.00	6,294.88	13,272.36	5,776.06	114.65	114.24	52.16	-7,763.87	-482.84	837.73	608.83	228.90	3.660	
13,900.00	6,295.90	13,372.36	5,776.90	116.08	115.67	52.14	-7,863.87	-482.24	837.55	605.80	231.75	3.614	
14,000.00	6,296.92	13,472.36	5,777.74	117.50	117.11	52.11	-7,963.86	-481.63	837.37	602.76	234.61	3.569	
14,100.00	6,297.94	13,572.36	5,778.58	118.93	118.54	52.09	-8,063.86	-481.02	837.19	599.72	237.46	3.526	
14,200.00	6,298.97	13,672.36	5,779.41	120.35	119.97	52.06	-8,163.85	-480.42	837.00	596.68	240.32	3.483	
14,287.72	6,299.86	13,757.91	5,780.13	121.42	121.19	52.04	-8,249.40	-479.90	836.85	594.23	242.61	3.449	
14,291.37	6,299.90	13,757.91	5,780.13	121.46	121.19	52.04	-8,249.40	-479.90	836.86	594.20	242.66	3.449 SF	

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



Anticollision Report



Company: COG Operating LLC
Project: Lea County, NM (NAD27 NME)
Reference Site: Zeppo 5 Federal COM
Site Error: 0.00 usft
Reference Well: 27H
Well Error: 0.00 usft
Reference Wellbore: OH
Reference Design: Plan 1 07-25-18

Local Co-ordinate Reference: Well 27H
TVD Reference: RKB @ 4130.00usft (Double K 7)
MD Reference: RKB @ 4130.00usft (Double K 7)
North Reference: Grid
Survey Calculation Method: Minimum Curvature
Output errors are at 2.00 sigma
Database: USA Compass
Offset TVD Reference: Offset Datum

Offset Design Zeppo 5 Federal COM - 17H - OH - Plan 1 07-25-18													Offset Site Error:	0.00 usft
Survey Program: 0-MWD+HDGM													Offset Well Error:	0.00 usft
Reference		Offset		Semi Major Axis		Highside Tooface (")	Offset Wellbore Centre		Distance		Minimum Separation (usft)	Separation Factor	Warning	
Measured Depth (usft)	Vertical Depth (usft)	Measured Depth (usft)	Vertical Depth (usft)	Reference (usft)	Offset (usft)		+N/-S (usft)	+E/-W (usft)	Between Centres (usft)	Between Ellipses (usft)				
0.00	0.00	1.00	1.00	0.00	0.00	89.99	0.00	30.00	30.00					
100.00	100.00	101.00	101.00	0.15	0.15	89.99	0.00	30.00	30.00	29.70	0.30	99.629		
200.00	200.00	201.00	201.00	0.51	0.51	89.99	0.00	30.00	30.00	28.98	1.02	29.468		
300.00	300.00	301.00	301.00	0.87	0.87	89.99	0.00	30.00	30.00	28.26	1.74	17.291		
400.00	400.00	401.00	401.00	1.22	1.23	89.99	0.00	30.00	30.00	27.55	2.45	12.235		
500.00	500.00	501.00	501.00	1.58	1.59	89.99	0.00	30.00	30.00	26.83	3.17	9.467		
600.00	600.00	601.00	601.00	1.94	1.94	89.99	0.00	30.00	30.00	26.11	3.89	7.720		
700.00	700.00	701.00	701.00	2.30	2.30	89.99	0.00	30.00	30.00	25.40	4.60	6.518		
800.00	800.00	801.00	801.00	2.66	2.66	89.99	0.00	30.00	30.00	24.68	5.32	5.639		
900.00	900.00	901.00	901.00	3.02	3.02	89.99	0.00	30.00	30.00	23.96	6.04	4.970		
916.33	916.33	917.33	917.33	3.08	3.08	89.99	0.00	30.00	30.00	23.85	6.15	4.875 CC		
1,000.00	1,000.00	1,000.99	1,000.99	3.38	3.38	89.99	0.00	30.00	30.00	23.25	6.75	4.442 ES		
1,100.00	1,100.00	1,100.00	1,099.99	3.73	3.72	89.99	0.00	31.31	31.33	23.87	7.46	4.200		
1,200.00	1,200.00	1,199.25	1,199.16	4.09	4.07	89.99	0.00	35.20	35.24	27.08	8.16	4.320		
1,300.00	1,300.00	1,298.05	1,297.75	4.45	4.41	89.99	0.00	41.62	41.75	32.89	8.86	4.711		
1,400.00	1,400.00	1,397.28	1,396.62	4.81	4.76	90.00	0.00	50.11	50.30	40.73	9.57	5.255		
1,500.00	1,500.00	1,496.90	1,495.86	5.17	5.12	90.00	0.00	58.79	59.02	48.73	10.29	5.738		
1,600.00	1,600.00	1,596.52	1,595.10	5.53	5.48	90.00	0.00	67.47	67.73	56.73	11.00	6.156		
1,700.00	1,700.00	1,696.14	1,694.34	5.88	5.84	90.00	0.00	76.16	76.45	64.72	11.72	6.522		
1,800.00	1,800.00	1,795.76	1,793.58	6.24	6.20	90.00	0.00	84.84	85.16	72.72	12.44	6.844		
1,900.00	1,900.00	1,895.38	1,892.82	6.60	6.56	90.00	0.00	93.52	93.88	80.71	13.17	7.130		
2,000.00	2,000.00	1,995.00	1,992.06	6.96	6.93	90.00	0.00	102.20	102.59	88.70	13.89	7.386		
2,100.00	2,100.00	2,094.62	2,091.30	7.32	7.30	90.00	0.00	110.89	111.31	96.69	14.61	7.616		
2,200.00	2,200.00	2,194.24	2,190.54	7.68	7.66	90.00	0.00	119.57	120.02	104.68	15.34	7.824		
2,300.00	2,300.00	2,293.86	2,289.78	8.04	8.03	90.00	0.00	128.25	128.74	112.67	16.07	8.012		
2,400.00	2,400.00	2,393.48	2,389.02	8.39	8.40	90.00	0.00	136.93	137.46	120.66	16.80	8.184		
2,500.00	2,500.00	2,494.08	2,489.25	8.75	8.77	90.00	0.00	145.61	146.09	128.56	17.53	8.335		
2,600.00	2,600.00	2,597.92	2,592.85	9.11	9.16	90.00	0.00	152.56	152.78	134.51	18.27	8.364		
2,700.00	2,700.00	2,702.07	2,696.91	9.47	9.53	90.00	0.00	156.69	156.75	137.75	19.00	8.250		
2,800.00	2,800.00	2,806.16	2,801.00	9.83	9.89	90.00	0.00	157.99	157.99	138.27	19.72	8.011		
2,900.00	2,900.00	2,906.16	2,901.00	10.19	10.24	90.00	0.00	157.99	157.99	137.56	20.43	7.734		
3,000.00	3,000.00	3,006.16	3,001.00	10.54	10.59	90.00	0.00	157.99	157.99	136.86	21.13	7.476		
3,100.00	3,100.00	3,106.16	3,101.00	10.90	10.94	90.00	0.00	157.99	157.99	136.15	21.84	7.234		
3,200.00	3,200.00	3,206.16	3,201.00	11.26	11.29	90.00	0.00	157.99	157.99	135.44	22.55	7.007		
3,300.00	3,300.00	3,306.16	3,301.00	11.62	11.64	90.00	0.00	157.99	157.99	134.74	23.26	6.794		
3,400.00	3,400.00	3,406.16	3,401.00	11.98	11.99	90.00	0.00	157.99	157.99	134.03	23.96	6.593		
3,500.00	3,500.00	3,506.16	3,501.00	12.34	12.34	90.00	0.00	157.99	157.99	133.32	24.67	6.404		
3,600.00	3,600.00	3,606.16	3,601.00	12.70	12.69	90.00	0.00	157.99	157.99	132.61	25.38	6.225		
3,700.00	3,700.00	3,706.16	3,701.00	13.05	13.04	90.00	0.00	157.99	157.99	131.90	26.09	6.055		
3,800.00	3,800.00	3,806.16	3,801.00	13.41	13.39	90.00	0.00	157.99	157.99	131.19	26.80	5.895		
3,900.00	3,900.00	3,906.16	3,901.00	13.77	13.74	90.00	0.00	157.99	157.99	130.48	27.51	5.743		
4,000.00	4,000.00	4,006.16	4,001.00	14.13	14.09	90.00	0.00	157.99	157.99	129.77	28.22	5.598		
4,100.00	4,100.00	4,106.16	4,101.00	14.49	14.45	90.00	0.00	157.99	157.99	129.06	28.93	5.460		
4,200.00	4,200.00	4,206.16	4,201.00	14.85	14.80	90.00	0.00	157.99	157.99	128.35	29.65	5.329		
4,300.00	4,300.00	4,306.16	4,301.00	15.20	15.15	90.00	0.00	157.99	157.99	127.63	30.36	5.204		
4,400.00	4,400.00	4,406.16	4,401.00	15.56	15.51	90.00	0.00	157.99	157.99	126.92	31.07	5.085		
4,500.00	4,500.00	4,506.16	4,501.00	15.92	15.86	90.00	0.00	157.99	157.99	126.21	31.78	4.971		
4,600.00	4,600.00	4,606.16	4,601.00	16.28	16.21	90.00	0.00	157.99	157.99	125.50	32.49	4.862		
4,700.00	4,700.00	4,706.16	4,701.00	16.64	16.57	90.00	0.00	157.99	157.99	124.79	33.21	4.758		
4,800.00	4,800.00	4,806.16	4,801.00	17.00	16.92	90.00	0.00	157.99	157.99	124.07	33.92	4.658		
4,900.00	4,900.00	4,906.16	4,901.00	17.36	17.28	90.00	0.00	157.99	157.99	123.36	34.63	4.562		
5,000.00	5,000.00	5,006.16	5,001.00	17.71	17.63	90.00	0.00	157.99	157.99	122.65	35.34	4.470		

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

Company: COG Operating LLC
Project: Lea County, NM (NAD27 NME)
Reference Site: Zeppo 5 Federal COM
Site Error: 0.00 usft
Reference Well: 27H
Well Error: 0.00 usft
Reference Wellbore: OH
Reference Design: Plan 1 07-25-18

Local Co-ordinate Reference: Well 27H
TVD Reference: RKB @ 4130.00usft (Double K 7)
MD Reference: RKB @ 4130.00usft (Double K 7)
North Reference: Grid
Survey Calculation Method: Minimum Curvature
Output errors are at
Database: USA Compass
Offset TVD Reference: Offset Datum

Offset Design Zeppo 5 Federal COM - 17H - OH - Plan 1 07-25-18													Offset Site Error:	0.00 usft
Survey Program: 0-MWD+HDGM													Offset Well Error:	0.00 usft
Reference	Offset	Semi Major Axis	Distance		Warning									
Measured Depth (usft)	Vertical Depth (usft)	Measured Depth (usft)	Vertical Depth (usft)	Reference (usft)	Offset (usft)	Highside Toolface (°)	Offset Wellbore Centre +N/-S (usft)	+E/-W (usft)	Between Centres (usft)	Between Ellipses (usft)	Minimum Separation (usft)	Separation Factor		
5,100.00	5,100.00	5,106.16	5,101.00	18.07	17.99	90.00	0.00	157.99	157.99	121.93	36.06	4.382		
5,200.00	5,200.00	5,206.16	5,201.00	18.43	18.34	90.00	0.00	157.99	157.99	121.22	36.77	4.297		
5,201.03	5,201.03	5,207.19	5,202.03	18.43	18.34	90.00	0.00	157.99	157.99	121.21	36.78	4.296		
5,300.00	5,300.00	5,305.84	5,300.54	18.79	18.68	91.24	-3.41	158.00	158.04	120.57	37.47	4.218		
5,400.00	5,400.00	5,400.68	5,392.96	19.15	18.99	98.62	-23.97	158.06	160.07	121.93	38.14	4.197		
5,500.00	5,500.00	5,484.66	5,470.01	19.51	19.25	109.86	-57.11	158.14	170.97	132.21	38.76	4.411		
5,600.00	5,600.00	5,555.35	5,529.54	19.86	19.46	121.01	-95.12	158.24	197.98	158.65	39.32	5.035		
5,700.00	5,700.00	5,613.29	5,573.72	20.22	19.62	129.93	-132.55	158.34	242.57	202.72	39.85	6.088		
5,800.00	5,799.86	5,661.92	5,607.08	20.56	19.77	-24.18	-167.90	158.44	299.04	258.71	40.33	7.414		
5,900.00	5,897.16	5,709.54	5,636.10	20.88	19.93	-17.23	-205.64	158.54	352.47	311.66	40.81	8.637		
6,000.00	5,987.71	5,757.00	5,661.13	21.18	20.10	-12.54	-245.93	158.65	399.18	357.90	41.28	9.670		
6,100.00	6,067.54	5,800.00	5,680.26	21.49	20.26	-9.41	-284.42	158.75	437.91	396.16	41.75	10.490		
6,200.00	6,133.16	5,850.00	5,698.05	21.81	20.46	-6.76	-331.13	158.87	467.76	425.48	42.27	11.065		
6,300.00	6,181.72	5,900.00	5,710.85	22.18	20.67	-4.63	-379.44	159.00	488.31	445.46	42.85	11.396		
6,400.00	6,211.08	5,950.00	5,718.54	22.61	20.89	-2.81	-428.82	159.13	499.26	455.76	43.49	11.479		
6,500.00	6,220.13	5,993.83	5,721.00	23.08	21.09	-1.34	-472.56	159.25	500.45	456.28	44.17	11.330		
6,552.75	6,220.67	6,040.14	5,721.47	23.37	21.32	0.05	-518.87	159.37	500.23	455.53	44.69	11.193		
6,600.00	6,221.16	6,086.06	5,721.95	23.63	21.56	1.27	-564.79	159.49	500.35	455.16	45.19	11.072		
6,700.00	6,222.21	6,184.32	5,722.95	24.25	22.13	3.33	-663.04	159.75	501.10	454.72	46.39	10.803		
6,800.00	6,223.25	6,283.63	5,723.97	24.91	22.79	4.64	-762.35	160.02	501.93	454.22	47.70	10.522		
6,900.00	6,224.30	6,383.50	5,724.99	25.61	23.52	5.14	-862.21	160.28	502.34	453.20	49.14	10.224		
7,000.00	6,225.33	6,483.45	5,726.02	26.34	24.32	4.82	-962.16	160.55	502.15	451.49	50.66	9.912		
7,100.00	6,226.36	6,583.30	5,727.04	27.10	25.17	4.20	-1,062.00	160.81	501.72	449.44	52.27	9.598		
7,200.00	6,227.39	6,683.15	5,728.07	27.92	26.08	3.57	-1,161.85	161.08	501.35	447.35	54.00	9.285		
7,300.00	6,228.42	6,783.00	5,729.09	28.78	27.03	2.95	-1,261.69	161.34	501.04	445.22	55.82	8.977		
7,400.00	6,229.45	6,882.85	5,730.11	29.69	28.03	2.32	-1,361.53	161.61	500.79	443.06	57.72	8.676		
7,500.00	6,230.48	6,982.70	5,731.14	30.64	29.06	1.69	-1,461.38	161.87	500.60	440.89	59.71	8.384		
7,600.00	6,231.51	7,082.54	5,732.16	31.63	30.13	1.06	-1,561.22	162.14	500.47	438.70	61.76	8.103		
7,700.00	6,232.54	7,182.39	5,733.18	32.65	31.23	0.44	-1,661.06	162.40	500.40	436.52	63.88	7.833		
7,800.00	6,233.56	7,282.36	5,734.21	33.72	32.36	0.25	-1,761.02	162.67	500.39	434.31	66.08	7.573		
7,900.00	6,234.59	7,382.36	5,735.23	34.82	33.51	0.24	-1,861.02	162.94	500.38	432.05	68.34	7.322		
8,000.00	6,235.61	7,482.36	5,736.26	35.95	34.69	0.24	-1,961.01	163.20	500.38	429.74	70.64	7.083		
8,100.00	6,236.63	7,582.36	5,737.28	37.11	35.88	0.24	-2,061.01	163.47	500.38	427.38	72.99	6.855		
8,200.00	6,237.65	7,682.36	5,738.31	38.28	37.10	0.23	-2,161.00	163.73	500.37	424.99	75.38	6.638		
8,300.00	6,238.67	7,782.36	5,739.33	39.47	38.33	0.23	-2,261.00	164.00	500.37	422.57	77.80	6.431		
8,400.00	6,239.70	7,882.36	5,740.36	40.68	39.57	0.23	-2,360.99	164.26	500.37	420.11	80.26	6.234		
8,500.00	6,240.72	7,982.36	5,741.38	41.91	40.83	0.22	-2,460.98	164.53	500.36	417.62	82.74	6.047		
8,600.00	6,241.74	8,082.36	5,742.41	43.15	42.11	0.22	-2,560.98	164.80	500.36	415.11	85.25	5.869		
8,700.00	6,242.76	8,182.36	5,743.43	44.40	43.39	0.21	-2,660.97	165.06	500.36	412.57	87.79	5.700		
8,800.00	6,243.78	8,282.36	5,744.46	45.66	44.68	0.21	-2,760.97	165.33	500.35	410.01	90.34	5.538		
8,900.00	6,244.80	8,382.36	5,745.49	46.94	45.98	0.21	-2,860.96	165.59	500.35	407.43	92.92	5.385		
9,000.00	6,245.83	8,482.36	5,746.51	48.22	47.30	0.20	-2,960.96	165.86	500.35	404.83	95.52	5.238		
9,100.00	6,246.85	8,582.36	5,747.54	49.51	48.61	0.20	-3,060.95	166.12	500.34	402.21	98.13	5.099		
9,200.00	6,247.87	8,682.36	5,748.56	50.82	49.94	0.19	-3,160.94	166.39	500.34	399.58	100.76	4.966		
9,300.00	6,248.89	8,782.36	5,749.59	52.13	51.27	0.19	-3,260.94	166.65	500.34	396.94	103.40	4.839		
9,400.00	6,249.91	8,882.36	5,750.61	53.44	52.61	0.19	-3,360.93	166.92	500.33	394.28	106.06	4.718		
9,500.00	6,250.94	8,982.36	5,751.64	54.77	53.96	0.18	-3,460.93	167.19	500.33	391.60	108.73	4.602		
9,600.00	6,251.96	9,082.36	5,752.66	56.10	55.31	0.18	-3,560.92	167.45	500.33	388.92	111.41	4.491		
9,700.00	6,252.98	9,182.36	5,753.69	57.43	56.67	0.18	-3,660.92	167.72	500.32	386.22	114.10	4.385		
9,800.00	6,254.00	9,282.36	5,754.71	58.77	58.03	0.17	-3,760.91	167.98	500.32	383.52	116.80	4.284		
9,900.00	6,255.02	9,382.36	5,755.74	60.12	59.39	0.17	-3,860.91	168.25	500.32	380.80	119.51	4.186		
10,000.00	6,256.05	9,482.36	5,756.76	61.47	60.76	0.16	-3,960.90	168.51	500.31	378.08	122.23	4.093		

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



Anticollision Report



Company: COG Operating LLC
Project: Lea County, NM (NAD27 NME)
Reference Site: Zeppo 5 Federal COM
Site Error: 0.00 usft
Reference Well: 27H
Well Error: 0.00 usft
Reference Wellbore: OH
Reference Design: Plan 1 07-25-18

Local Co-ordinate Reference: Well 27H
TVD Reference: RKB @ 4130.00usft (Double K 7)
MD Reference: RKB @ 4130.00usft (Double K 7)
North Reference: Grid
Survey Calculation Method: Minimum Curvature
Output errors are at 2.00 sigma
Database: USA Compass
Offset TVD Reference: Offset Datum

Offset Design Zeppo 5 Federal COM - 17H - OH - Plan 1 07-25-18												Offset Site Error:	0.00 usft
Survey Program: 0-MWD+HDGM												Offset Well Error:	0.00 usft
Reference		Offset		Semi Major Axis		Highside Toothface (")	Distance		Minimum Separation (usft)	Separation Factor	Warning		
Measured Depth (usft)	Vertical Depth (usft)	Measured Depth (usft)	Vertical Depth (usft)	Reference (usft)	Offset (usft)		Offset Wellbore Centre +N-S (usft)	+E-W (usft)					
10,100.00	6,257.07	9,582.36	5,757.79	62.83	62.13	0.16	-4,060.89	168.78	500.31	375.35	124.96	4.004	
10,200.00	6,258.09	9,682.36	5,758.81	64.19	63.51	0.16	-4,160.89	169.05	500.31	372.61	127.70	3.918	
10,300.00	6,259.11	9,782.36	5,759.84	65.55	64.89	0.15	-4,260.88	169.31	500.30	369.86	130.44	3.835	
10,400.00	6,260.13	9,882.36	5,760.86	66.92	66.27	0.15	-4,360.88	169.58	500.30	367.11	133.19	3.756	
10,500.00	6,261.16	9,982.36	5,761.89	68.29	67.66	0.14	-4,460.87	169.84	500.30	364.35	135.95	3.680	
10,600.00	6,262.18	10,082.36	5,762.91	69.67	69.04	0.14	-4,560.87	170.11	500.29	361.58	138.71	3.607	
10,700.00	6,263.20	10,182.36	5,763.94	71.04	70.43	0.14	-4,660.86	170.37	500.29	358.81	141.48	3.536	
10,800.00	6,264.22	10,282.36	5,764.96	72.42	71.83	0.13	-4,760.86	170.64	500.29	356.04	144.25	3.468	
10,900.00	6,265.24	10,382.36	5,765.99	73.81	73.22	0.13	-4,860.85	170.90	500.28	353.25	147.03	3.403	
11,000.00	6,266.27	10,482.36	5,767.01	75.19	74.62	0.13	-4,960.84	171.17	500.28	350.47	149.81	3.339	
11,100.00	6,267.29	10,582.36	5,768.04	76.58	76.02	0.12	-5,060.84	171.44	500.28	347.68	152.60	3.278	
11,200.00	6,268.31	10,682.36	5,769.06	77.97	77.42	0.12	-5,160.83	171.70	500.27	344.88	155.39	3.219	
11,300.00	6,269.33	10,782.36	5,770.09	79.36	78.82	0.11	-5,260.83	171.97	500.27	342.08	158.19	3.163	
11,400.00	6,270.35	10,882.36	5,771.11	80.76	80.23	0.11	-5,360.82	172.23	500.27	339.28	160.99	3.108	
11,500.00	6,271.37	10,982.36	5,772.14	82.16	81.63	0.11	-5,460.82	172.50	500.26	336.47	163.79	3.054	
11,600.00	6,272.40	11,082.36	5,773.16	83.55	83.04	0.10	-5,560.81	172.76	500.26	333.66	166.60	3.003	
11,700.00	6,273.42	11,182.36	5,774.19	84.95	84.45	0.10	-5,660.80	173.03	500.26	330.85	169.41	2.953	
11,800.00	6,274.44	11,282.36	5,775.21	86.36	85.86	0.10	-5,760.80	173.30	500.25	328.04	172.22	2.905	
11,900.00	6,275.46	11,382.36	5,776.24	87.76	87.27	0.09	-5,860.79	173.56	500.25	325.22	175.03	2.858	
12,000.00	6,276.48	11,482.36	5,777.26	89.17	88.69	0.09	-5,960.79	173.83	500.25	322.39	177.85	2.813	
12,100.00	6,277.51	11,582.36	5,778.29	90.57	90.10	0.08	-6,060.78	174.09	500.24	319.57	180.67	2.769	
12,200.00	6,278.53	11,682.36	5,779.31	91.98	91.52	0.08	-6,160.78	174.36	500.24	316.74	183.50	2.726	
12,300.00	6,279.55	11,782.36	5,780.34	93.39	92.93	0.08	-6,260.77	174.62	500.24	313.91	186.32	2.685	
12,400.00	6,280.57	11,882.36	5,781.36	94.80	94.35	0.07	-6,360.77	174.89	500.23	311.08	189.15	2.645	
12,500.00	6,281.59	11,982.36	5,782.39	96.21	95.77	0.07	-6,460.76	175.16	500.23	308.25	191.98	2.606	
12,600.00	6,282.62	12,082.36	5,783.41	97.62	97.19	0.06	-6,560.75	175.42	500.23	305.41	194.82	2.568	
12,700.00	6,283.64	12,182.36	5,784.44	99.04	98.61	0.06	-6,660.75	175.69	500.22	302.57	197.65	2.531	
12,800.00	6,284.66	12,282.36	5,785.46	100.45	100.03	0.06	-6,760.74	175.95	500.22	299.73	200.49	2.495	
12,900.00	6,285.68	12,382.36	5,786.49	101.87	101.46	0.05	-6,860.74	176.22	500.22	296.89	203.33	2.460	
13,000.00	6,286.70	12,482.36	5,787.51	103.29	102.88	0.05	-6,960.73	176.48	500.22	294.05	206.17	2.426	
13,100.00	6,287.73	12,582.36	5,788.54	104.70	104.30	0.05	-7,060.73	176.75	500.21	291.20	209.01	2.393	
13,200.00	6,288.75	12,682.36	5,789.56	106.12	105.73	0.04	-7,160.72	177.01	500.21	288.36	211.85	2.361	
13,300.00	6,289.77	12,782.36	5,790.59	107.54	107.15	0.04	-7,260.71	177.28	500.21	285.51	214.70	2.330	
13,400.00	6,290.79	12,882.36	5,791.62	108.96	108.58	0.03	-7,360.71	177.55	500.20	282.66	217.54	2.299	
13,500.00	6,291.81	12,982.36	5,792.64	110.38	110.01	0.03	-7,460.70	177.81	500.20	279.81	220.39	2.270	
13,600.00	6,292.83	13,082.36	5,793.67	111.81	111.44	0.03	-7,560.70	178.08	500.20	276.95	223.24	2.241	
13,700.00	6,293.86	13,182.36	5,794.69	113.23	112.86	0.02	-7,660.69	178.34	500.19	274.10	226.09	2.212	
13,800.00	6,294.88	13,282.36	5,795.72	114.65	114.29	0.02	-7,760.69	178.61	500.19	271.24	228.95	2.185	
13,900.00	6,295.90	13,382.36	5,796.74	116.08	115.72	0.01	-7,860.68	178.87	500.19	268.39	231.80	2.158	
14,000.00	6,296.92	13,482.36	5,797.77	117.50	117.15	0.01	-7,960.68	179.14	500.18	265.53	234.65	2.132	
14,100.00	6,297.94	13,582.36	5,798.79	118.93	118.58	0.01	-8,060.67	179.41	500.18	262.67	237.51	2.106	
14,200.00	6,298.97	13,682.36	5,799.82	120.35	120.01	0.00	-8,160.66	179.67	500.18	259.81	240.37	2.081	
14,286.26	6,299.85	13,768.60	5,800.70	121.40	121.25	0.00	-8,246.90	179.90	500.17	257.53	242.65	2.061	
14,291.37	6,299.90	13,768.60	5,800.70	121.46	121.25	0.00	-8,246.90	179.90	500.20	257.49	242.71	2.061 SF	

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



Anticollision Report



Company: COG Operating LLC
Project: Lea County, NM (NAD27 NME)
Reference Site: Zeppo 5 Federal COM
Site Error: 0.00 usft
Reference Well: 27H
Well Error: 0.00 usft
Reference Wellbore: OH
Reference Design: Plan 1 07-25-18

Local Co-ordinate Reference: Well 27H
TVD Reference: RKB @ 4130.00usft (Double K 7)
MD Reference: RKB @ 4130.00usft (Double K 7)
North Reference: Grid
Survey Calculation Method: Minimum Curvature
Output errors are at 2.00 sigma
Database: USA Compass
Offset TVD Reference: Offset 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		Offset		Semi Major Axis		Highside Toolface (°)	Distance				Minimum Separation (usft)	Separation Factor	Warning
Measured Depth (usft)	Vertical Depth (usft)	Measured Depth (usft)	Vertical Depth (usft)	Reference (usft)	Offset (usft)		Offset Wellbore Centre +N/-S (usft)	+E/-W (usft)	Between Centres (usft)	Between Ellipses (usft)			
0.00	0.00	14.00	14.00	0.00	0.02	80.24	152.90	889.00	902.05				
100.00	100.00	114.00	114.00	0.15	0.20	80.24	152.90	889.00	902.05	901.71	0.35	2,594.210	
200.00	200.00	214.00	214.00	0.51	0.56	80.24	152.90	889.00	902.05	900.99	1.06	847.268	
300.00	300.00	314.00	314.00	0.87	0.92	80.24	152.90	889.00	902.05	900.27	1.78	506.315	
400.00	400.00	414.00	414.00	1.22	1.27	80.24	152.90	889.00	902.05	899.55	2.50	361.031	
500.00	500.00	514.00	514.00	1.58	1.63	80.24	152.90	889.00	902.05	898.84	3.22	280.534	
600.00	600.00	614.00	614.00	1.94	1.99	80.24	152.90	889.00	902.05	898.12	3.93	229.388	
700.00	700.00	714.00	714.00	2.30	2.35	80.24	152.90	889.00	902.05	897.40	4.65	194.016	
800.00	800.00	814.00	814.00	2.66	2.71	80.24	152.90	889.00	902.05	896.69	5.37	168.095	
900.00	900.00	914.00	914.00	3.02	3.07	80.24	152.90	889.00	902.05	895.97	6.08	148.284	
1,000.00	1,000.00	1,014.00	1,014.00	3.38	3.43	80.24	152.90	889.00	902.05	895.25	6.80	132.651	
1,100.00	1,100.00	1,114.00	1,114.00	3.73	3.78	80.24	152.90	889.00	902.05	894.54	7.52	119.999	
1,200.00	1,200.00	1,214.00	1,214.00	4.09	4.14	80.24	152.90	889.00	902.05	893.82	8.23	109.551	
1,300.00	1,300.00	1,314.00	1,314.00	4.45	4.50	80.24	152.90	889.00	902.05	893.10	8.95	100.776	
1,400.00	1,400.00	1,414.00	1,414.00	4.81	4.86	80.24	152.90	889.00	902.05	892.38	9.67	93.303	
1,500.00	1,500.00	1,514.00	1,514.00	5.17	5.22	80.24	152.90	889.00	902.05	891.67	10.38	86.862	
1,600.00	1,600.00	1,614.00	1,614.00	5.53	5.58	80.24	152.90	889.00	902.05	890.95	11.10	81.252	
1,700.00	1,700.00	1,714.00	1,714.00	5.88	5.93	80.24	152.90	889.00	902.05	890.23	11.82	76.324	
1,800.00	1,800.00	1,814.00	1,814.00	6.24	6.29	80.24	152.90	889.00	902.05	889.52	12.54	71.958	
1,900.00	1,900.00	1,914.00	1,914.00	6.60	6.65	80.24	152.90	889.00	902.05	888.80	13.25	68.066	
2,000.00	2,000.00	2,014.00	2,014.00	6.96	7.01	80.24	152.90	889.00	902.05	888.08	13.97	64.572	
2,100.00	2,100.00	2,114.00	2,114.00	7.32	7.37	80.24	152.90	889.00	902.05	887.37	14.69	61.420	
2,200.00	2,200.00	2,214.00	2,214.00	7.68	7.73	80.24	152.90	889.00	902.05	886.65	15.40	58.561	
2,300.00	2,300.00	2,314.00	2,314.00	8.04	8.09	80.24	152.90	889.00	902.05	885.93	16.12	55.957	
2,400.00	2,400.00	2,414.00	2,414.00	8.39	8.44	80.24	152.90	889.00	902.05	885.22	16.84	53.574	
2,500.00	2,500.00	2,514.00	2,514.00	8.75	8.80	80.24	152.90	889.00	902.05	884.50	17.55	51.386	
2,600.00	2,600.00	2,614.00	2,614.00	9.11	9.16	80.24	152.90	889.00	902.05	883.78	18.27	49.370	
2,700.00	2,700.00	2,714.00	2,714.00	9.47	9.52	80.24	152.90	889.00	902.05	883.06	18.99	47.506	
2,800.00	2,800.00	2,814.00	2,814.00	9.83	9.88	80.24	152.90	889.00	902.05	882.35	19.71	45.777	
2,900.00	2,900.00	2,914.00	2,914.00	10.19	10.24	80.24	152.90	889.00	902.05	881.63	20.42	44.170	
3,000.00	3,000.00	3,014.00	3,014.00	10.54	10.59	80.24	152.90	889.00	902.05	880.91	21.14	42.672	
3,100.00	3,100.00	3,114.00	3,114.00	10.90	10.95	80.24	152.90	889.00	902.05	880.20	21.86	41.273	
3,200.00	3,200.00	3,214.00	3,214.00	11.26	11.31	80.24	152.90	889.00	902.05	879.48	22.57	39.962	
3,300.00	3,300.00	3,314.00	3,314.00	11.62	11.67	80.24	152.90	889.00	902.05	878.76	23.29	38.732	
3,400.00	3,400.00	3,414.00	3,414.00	11.98	12.03	80.24	152.90	889.00	902.05	878.05	24.01	37.575	
3,500.00	3,500.00	3,514.00	3,514.00	12.34	12.39	80.24	152.90	889.00	902.05	877.33	24.72	36.485	
3,600.00	3,600.00	3,614.00	3,614.00	12.70	12.75	80.24	152.90	889.00	902.05	876.61	25.44	35.457	
3,700.00	3,700.00	3,714.00	3,714.00	13.05	13.10	80.24	152.90	889.00	902.05	875.90	26.16	34.485	
3,800.00	3,800.00	3,814.00	3,814.00	13.41	13.46	80.24	152.90	889.00	902.05	875.18	26.87	33.565	
3,900.00	3,900.00	3,914.00	3,914.00	13.77	13.82	80.24	152.90	889.00	902.05	874.46	27.59	32.693	
4,000.00	4,000.00	4,014.00	4,014.00	14.13	14.18	80.24	152.90	889.00	902.05	873.74	28.31	31.865	
4,100.00	4,100.00	4,114.00	4,114.00	14.49	14.54	80.24	152.90	889.00	902.05	873.03	29.03	31.078	
4,200.00	4,200.00	4,214.00	4,214.00	14.85	14.90	80.24	152.90	889.00	902.05	872.31	29.74	30.329	
4,300.00	4,300.00	4,314.00	4,314.00	15.20	15.25	80.24	152.90	889.00	902.05	871.59	30.46	29.615	
4,400.00	4,400.00	4,414.00	4,414.00	15.56	15.61	80.24	152.90	889.00	902.05	870.88	31.18	28.934	
4,500.00	4,500.00	4,514.00	4,514.00	15.92	15.97	80.24	152.90	889.00	902.05	870.16	31.89	28.284	
4,600.00	4,600.00	4,614.00	4,614.00	16.28	16.33	80.24	152.90	889.00	902.05	869.44	32.61	27.662	
4,700.00	4,700.00	4,714.00	4,714.00	16.64	16.69	80.24	152.90	889.00	902.05	868.73	33.33	27.067	
4,800.00	4,800.00	4,814.00	4,814.00	17.00	17.05	80.24	152.90	889.00	902.05	868.01	34.04	26.497	
4,900.00	4,900.00	4,914.00	4,914.00	17.36	17.41	80.24	152.90	889.00	902.05	867.29	34.76	25.950	
5,000.00	5,000.00	5,014.00	5,014.00	17.71	17.76	80.24	152.90	889.00	902.05	866.57	35.48	25.426	
5,100.00	5,100.00	5,114.00	5,114.00	18.07	18.12	80.24	152.90	889.00	902.05	865.86	36.19	24.922	

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



Anticollision Report



Company: COG Operating LLC
Project: Lea County, NM (NAD27 NME)
Reference Site: Zeppo 5 Federal COM
Site Error: 0.00 usft
Reference Well: 27H
Well Error: 0.00 usft
Reference Wellbore: OH
Reference Design: Plan 1 07-25-18

Local Co-ordinate Reference: Well 27H
TVD Reference: RKB @ 4130.00usft (Double K 7)
MD Reference: RKB @ 4130.00usft (Double K 7)
North Reference: Grid
Survey Calculation Method: Minimum Curvature
Output errors are at 2.00 sigma
Database: USA Compass
Offset TVD Reference: Offset 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		Offset		Semi Major Axis		Distance							
Measured Depth (usft)	Vertical Depth (usft)	Measured Depth (usft)	Vertical Depth (usft)	Reference (usft)	Offset (usft)	Highside Toolface (°)	Offset Wellbore Centre +N/-S (usft)	Offset Wellbore Centre +E/-W (usft)	Between Centres (usft)	Between Ellipses (usft)	Minimum Separation (usft)	Separation Factor	Warning
5,200.00	5,200.00	5,214.00	5,214.00	18.43	18.48	80.24	152.90	889.00	902.05	865.14	36.91	24.438	
5,300.00	5,300.00	5,419.45	5,416.85	18.79	19.16	81.69	129.16	883.95	899.24	861.29	37.95	23.695	
5,400.00	5,400.00	5,648.74	5,609.22	19.15	19.85	89.26	11.10	858.86	880.84	841.84	39.00	22.586	
5,500.00	5,500.00	5,766.25	5,679.90	19.51	20.24	95.47	-80.36	839.42	859.42	819.67	39.75	21.622	
5,600.00	5,600.00	5,830.04	5,708.05	19.86	20.48	99.35	-136.30	827.53	843.94	803.60	40.34	20.921	
5,700.00	5,700.00	5,868.79	5,721.33	20.22	20.63	101.84	-171.89	819.96	837.82	796.97	40.85	20.511	
5,717.80	5,717.80	5,874.26	5,722.97	20.28	20.65	-60.51	-177.00	818.88	837.74	796.81	40.93	20.468	
5,800.00	5,799.86	5,896.93	5,729.11	20.56	20.74	-58.80	-198.34	814.34	840.66	799.36	41.30	20.355	
5,900.00	5,897.16	5,925.00	5,735.26	20.88	20.85	-56.68	-225.13	808.65	844.25	802.52	41.74	20.229	
6,000.00	5,987.71	5,962.23	5,740.93	21.18	21.01	-54.28	-261.11	801.00	846.36	804.17	42.19	20.059	
6,100.00	6,067.54	6,000.00	5,743.73	21.49	21.17	-52.26	-297.95	793.17	845.84	803.18	42.66	19.827	
6,200.00	6,133.16	6,039.68	5,744.21	21.81	21.36	-50.67	-336.80	785.17	841.57	798.40	43.18	19.492	
6,300.00	6,181.72	6,100.00	5,744.67	22.18	21.65	-49.04	-396.25	774.98	831.87	788.03	43.84	18.977	
6,400.00	6,211.08	6,150.43	5,745.06	22.61	21.93	-48.97	-446.25	768.39	814.82	770.28	44.54	18.294	
6,500.00	6,220.13	6,200.00	5,745.45	23.08	22.21	-49.94	-495.58	763.64	789.71	744.42	45.29	17.436	
6,600.00	6,221.16	6,281.05	5,746.07	23.63	22.71	-49.35	-576.52	759.55	766.43	720.09	46.34	16.538	
6,700.00	6,222.21	6,350.96	5,746.61	24.25	23.17	-49.11	-646.41	759.70	752.45	705.03	47.42	15.868	
6,800.00	6,223.25	6,445.83	5,747.34	24.91	23.85	-48.90	-741.23	762.96	746.24	697.47	48.77	15.302	
6,866.69	6,223.95	6,512.49	5,747.85	25.38	24.36	-48.87	-807.85	765.29	745.07	695.33	49.74	14.979 CC	
6,900.00	6,224.30	6,545.80	5,748.11	25.61	24.63	-48.88	-841.13	766.45	745.36	695.12	50.24	14.835	
7,000.00	6,225.33	6,645.62	5,748.87	26.34	25.47	-49.08	-940.89	769.93	749.74	697.93	51.81	14.472	
7,100.00	6,226.36	6,745.24	5,749.64	27.10	26.35	-49.50	-1,040.45	773.41	756.52	703.06	53.46	14.152	
7,200.00	6,227.39	6,844.86	5,750.40	27.92	27.29	-49.91	-1,140.00	776.89	763.35	708.14	55.21	13.826	
7,300.00	6,228.42	6,944.48	5,751.17	28.78	28.27	-50.31	-1,239.56	780.36	770.21	713.15	57.06	13.499	
7,400.00	6,229.45	7,044.10	5,751.93	29.69	29.30	-50.70	-1,339.11	783.84	777.11	718.12	58.99	13.174	
7,500.00	6,230.48	7,160.22	5,752.82	30.64	30.53	-51.11	-1,455.19	786.86	783.42	722.25	61.17	12.808	
7,600.00	6,231.51	7,260.04	5,753.58	31.63	31.62	-51.37	-1,555.00	787.64	788.28	725.02	63.25	12.462	
7,700.00	6,232.54	7,359.86	5,754.34	32.65	32.75	-51.63	-1,654.82	788.42	793.14	727.75	65.40	12.128	
7,800.00	6,233.56	7,459.82	5,755.10	33.72	33.90	-51.74	-1,754.77	789.20	795.21	727.60	67.61	11.761	
7,900.00	6,234.59	7,559.81	5,755.86	34.82	35.07	-51.75	-1,854.76	789.98	795.81	725.91	69.89	11.386	
8,000.00	6,235.61	7,659.81	5,756.62	35.95	36.26	-51.76	-1,954.75	790.76	796.40	724.18	72.22	11.028	
8,100.00	6,236.63	7,759.81	5,757.38	37.11	37.47	-51.77	-2,054.74	791.54	796.99	722.41	74.58	10.686	
8,200.00	6,237.65	7,859.81	5,758.14	38.28	38.70	-51.78	-2,154.73	792.32	797.58	720.60	76.98	10.360	
8,300.00	6,238.67	7,959.81	5,758.90	39.47	39.94	-51.79	-2,254.73	793.10	798.17	718.75	79.42	10.050	
8,400.00	6,239.70	8,059.81	5,759.67	40.68	41.20	-51.80	-2,354.72	793.88	798.76	716.88	81.88	9.755	
8,500.00	6,240.72	8,159.80	5,760.43	41.91	42.47	-51.80	-2,454.71	794.66	799.36	714.98	84.38	9.473	
8,600.00	6,241.74	8,259.80	5,761.19	43.15	43.75	-51.81	-2,554.70	795.44	799.95	713.05	86.90	9.206	
8,700.00	6,242.76	8,359.80	5,761.95	44.40	45.04	-51.82	-2,654.70	796.22	800.54	711.10	89.44	8.950	
8,800.00	6,243.78	8,459.80	5,762.71	45.66	46.34	-51.83	-2,754.69	797.00	801.13	709.13	92.01	8.707	
8,900.00	6,244.80	8,559.80	5,763.47	46.94	47.65	-51.84	-2,854.68	797.78	801.72	707.13	94.59	8.476	
9,000.00	6,245.83	8,659.79	5,764.23	48.22	48.97	-51.85	-2,954.67	798.55	802.31	705.12	97.19	8.255	
9,100.00	6,246.85	8,759.79	5,764.99	49.51	50.30	-51.86	-3,054.67	799.33	802.91	703.10	99.81	8.044	
9,200.00	6,247.87	8,859.79	5,765.75	50.82	51.63	-51.87	-3,154.66	800.11	803.50	701.05	102.44	7.843	
9,300.00	6,248.89	8,959.79	5,766.51	52.13	52.97	-51.88	-3,254.65	800.89	804.09	699.00	105.09	7.651	
9,400.00	6,249.91	9,059.79	5,767.27	53.44	54.31	-51.89	-3,354.64	801.67	804.68	696.93	107.75	7.468	
9,500.00	6,250.94	9,159.79	5,768.03	54.77	55.66	-51.90	-3,454.63	802.45	805.27	694.85	110.43	7.292	
9,600.00	6,251.96	9,259.78	5,768.79	56.10	57.02	-51.91	-3,554.63	803.23	805.87	692.75	113.11	7.124	
9,700.00	6,252.98	9,359.78	5,769.55	57.43	58.38	-51.92	-3,654.62	804.01	806.46	690.65	115.81	6.964	
9,800.00	6,254.00	9,459.78	5,770.31	58.77	59.74	-51.93	-3,754.61	804.79	807.05	688.54	118.51	6.810	
9,900.00	6,255.02	9,559.78	5,771.08	60.12	61.11	-51.94	-3,854.60	805.57	807.64	686.41	121.23	6.662	
10,000.00	6,256.05	9,659.78	5,771.84	61.47	62.48	-51.95	-3,954.60	806.35	808.23	684.28	123.95	6.521	
10,100.00	6,257.07	9,759.77	5,772.60	62.83	63.86	-51.96	-4,054.59	807.13	808.83	682.14	126.68	6.385	

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



Anticollision Report



Company: COG Operating LLC
Project: Lea County, NM (NAD27 NME)
Reference Site: Zeppo 5 Federal COM
Site Error: 0.00 usft
Reference Well: 27H
Well Error: 0.00 usft
Reference Wellbore: OH
Reference Design: Plan 1 07-25-18

Local Co-ordinate Reference: Well 27H
TVD Reference: RKB @ 4130.00usft (Double K 7)
MD Reference: RKB @ 4130.00usft (Double K 7)
North Reference: Grid
Survey Calculation Method: Minimum Curvature
Output errors are at: 2.00 sigma
Database: USA Compass
Offset TVD Reference: Offset 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		Offset		Semi Major Axis		Highside Toolface (°)	Distance		Between Centres (usft)	Between Ellipses (usft)	Minimum Separation (usft)	Separation Factor	Warning
Measured Depth (usft)	Vertical Depth (usft)	Measured Depth (usft)	Vertical Depth (usft)	Reference (usft)	Offset (usft)		Offset Wellbore Centre +N/-S (usft)	+E/-W (usft)					
10,200.00	6,258.09	9,859.77	5,773.36	64.19	65.23	-51.96	-4,154.58	807.91	809.42	680.00	129.42	6.254	
10,300.00	6,259.11	9,959.77	5,774.12	65.55	66.62	-51.97	-4,254.57	808.69	810.01	677.84	132.17	6.129	
10,400.00	6,260.13	10,059.77	5,774.88	66.92	68.00	-51.98	-4,354.56	809.47	810.60	675.68	134.92	6.008	
10,500.00	6,261.16	10,159.77	5,775.64	68.29	69.39	-51.99	-4,454.56	810.25	811.19	673.51	137.68	5.892	
10,600.00	6,262.18	10,259.77	5,776.40	69.67	70.78	-52.00	-4,554.55	811.03	811.79	671.34	140.45	5.780	
10,700.00	6,263.20	10,359.76	5,777.16	71.04	72.17	-52.01	-4,654.54	811.81	812.38	669.16	143.22	5.672	
10,800.00	6,264.22	10,459.76	5,777.92	72.42	73.57	-52.02	-4,754.53	812.59	812.97	666.98	145.99	5.569	
10,900.00	6,265.24	10,559.76	5,778.68	73.81	74.96	-52.03	-4,854.53	813.37	813.56	664.79	148.77	5.469	
11,000.00	6,266.27	10,659.76	5,779.44	75.19	76.36	-52.04	-4,954.52	814.15	814.16	662.60	151.56	5.372	
11,100.00	6,267.29	10,759.76	5,780.20	76.58	77.76	-52.05	-5,054.51	814.93	814.75	660.40	154.35	5.279	
11,200.00	6,268.31	10,859.75	5,780.96	77.97	79.17	-52.06	-5,154.50	815.71	815.34	658.20	157.14	5.189	
11,300.00	6,269.33	10,959.75	5,781.72	79.36	80.57	-52.07	-5,254.49	816.49	815.93	656.00	159.94	5.102	
11,400.00	6,270.35	11,059.75	5,782.49	80.76	81.98	-52.08	-5,354.49	817.27	816.53	653.79	162.74	5.017	
11,500.00	6,271.37	11,159.75	5,783.25	82.16	83.39	-52.08	-5,454.48	818.05	817.12	651.57	165.54	4.936	
11,600.00	6,272.40	11,259.75	5,784.01	83.55	84.80	-52.09	-5,554.47	818.83	817.71	649.36	168.35	4.857	
11,700.00	6,273.42	11,359.74	5,784.77	84.95	86.21	-52.10	-5,654.46	819.61	818.30	647.14	171.16	4.781	
11,800.00	6,274.44	11,459.74	5,785.53	86.36	87.62	-52.11	-5,754.46	820.39	818.89	644.92	173.98	4.707	
11,900.00	6,275.46	11,559.74	5,786.29	87.76	89.03	-52.12	-5,854.45	821.17	819.49	642.69	176.79	4.635	
12,000.00	6,276.48	11,659.74	5,787.05	89.17	90.45	-52.13	-5,954.44	821.94	820.08	640.47	179.61	4.566	
12,100.00	6,277.51	11,759.74	5,787.81	90.57	91.87	-52.14	-6,054.43	822.72	820.67	638.23	182.44	4.498	
12,200.00	6,278.53	11,859.74	5,788.57	91.98	93.28	-52.15	-6,154.42	823.50	821.26	636.00	185.26	4.433	
12,300.00	6,279.55	11,959.73	5,789.33	93.39	94.70	-52.16	-6,254.42	824.28	821.86	633.77	188.09	4.369	
12,400.00	6,280.57	12,059.73	5,790.09	94.80	96.12	-52.17	-6,354.41	825.06	822.45	631.53	190.92	4.308	
12,500.00	6,281.59	12,159.73	5,790.85	96.21	97.54	-52.18	-6,454.40	825.84	823.04	629.29	193.75	4.248	
12,600.00	6,282.62	12,259.73	5,791.61	97.62	98.96	-52.18	-6,554.39	826.62	823.64	627.05	196.59	4.190	
12,700.00	6,283.64	12,359.73	5,792.37	99.04	100.39	-52.19	-6,654.39	827.40	824.23	624.80	199.42	4.133	
12,800.00	6,284.66	12,459.72	5,793.14	100.45	101.81	-52.20	-6,754.38	828.18	824.82	622.56	202.26	4.078	
12,900.00	6,285.68	12,559.72	5,793.90	101.87	103.23	-52.21	-6,854.37	828.96	825.41	620.31	205.10	4.024	
13,000.00	6,286.70	12,659.72	5,794.66	103.29	104.66	-52.22	-6,954.36	829.74	826.01	618.06	207.94	3.972	
13,100.00	6,287.73	12,759.72	5,795.42	104.70	106.08	-52.23	-7,054.35	830.52	826.60	615.81	210.79	3.921	
13,200.00	6,288.75	12,859.72	5,796.18	106.12	107.51	-52.24	-7,154.35	831.30	827.19	613.56	213.63	3.872	
13,300.00	6,289.77	12,959.72	5,796.94	107.54	108.94	-52.25	-7,254.34	832.08	827.78	611.31	216.48	3.824	
13,400.00	6,290.79	13,059.71	5,797.70	108.96	110.36	-52.26	-7,354.33	832.86	828.38	609.05	219.33	3.777	
13,500.00	6,291.81	13,159.71	5,798.46	110.38	111.79	-52.26	-7,454.32	833.64	828.97	606.79	222.18	3.731	
13,600.00	6,292.83	13,259.71	5,799.22	111.81	113.22	-52.27	-7,554.32	834.42	829.56	604.53	225.03	3.686	
13,700.00	6,293.86	13,359.71	5,799.98	113.23	114.65	-52.28	-7,654.31	835.20	830.16	602.28	227.88	3.643	
13,800.00	6,294.88	13,459.71	5,800.74	114.65	116.08	-52.29	-7,754.30	835.98	830.75	600.01	230.73	3.600	
13,900.00	6,295.90	13,559.70	5,801.50	116.08	117.51	-52.30	-7,854.29	836.76	831.34	597.75	233.59	3.559	
14,000.00	6,296.92	13,659.70	5,802.26	117.50	118.94	-52.31	-7,954.28	837.54	831.93	595.49	236.44	3.519	
14,100.00	6,297.94	13,759.70	5,803.02	118.93	120.37	-52.32	-8,054.28	838.32	832.53	593.22	239.30	3.479	
14,200.00	6,298.97	13,859.70	5,803.78	120.35	121.81	-52.33	-8,154.27	839.10	833.12	590.96	242.16	3.440	
14,291.37	6,299.90	13,949.84	5,804.47	121.46	123.10	-52.33	-8,244.40	839.80	833.66	589.10	244.56	3.409 ES, SF	

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

Company: COG Operating LLC
Project: Lea County, NM (NAD27 NME)
Reference Site: Zeppo 5 Federal COM
Site Error: 0.00 usft
Reference Well: 27H
Well Error: 0.00 usft
Reference Wellbore: OH
Reference Design: Plan 1 07-25-18

Local Co-ordinate Reference: Well 27H
TVD Reference: RKB @ 4130.00usft (Double K 7)
MD Reference: RKB @ 4130.00usft (Double K 7)
North Reference: Grid
Survey Calculation Method: Minimum Curvature
Output errors are at: 2.00 sigma
Database: USA Compass
Offset TVD Reference: Offset 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		Offset		Semi Major Axis		Highside Toolface (°)	Distance		Between Centres (usft)	Between Ellipses (usft)	Minimum Separation (usft)	Separation Factor	Warning
Measured Depth (usft)	Vertical Depth (usft)	Measured Depth (usft)	Vertical Depth (usft)	Reference (usft)	Offset (usft)		Offset Wellbore Centre +N/-S (usft)	Offset Wellbore Centre +E/-W (usft)					
0.00	0.00	0.00	0.00	0.00	0.00	-90.20	-2.00	-559.90	559.94				
100.00	100.00	94.00	94.00	0.15	0.14	-90.20	-2.00	-559.90	559.90	559.61	0.29	1,940.029	
200.00	200.00	194.00	194.00	0.51	0.49	-90.20	-2.00	-559.90	559.90	558.91	0.99	563.870	
300.00	300.00	294.00	294.00	0.87	0.84	-90.20	-2.00	-559.90	559.90	558.19	1.71	327.446	
400.00	400.00	394.00	394.00	1.22	1.20	-90.20	-2.00	-559.90	559.90	557.48	2.43	230.712	
500.00	500.00	494.00	494.00	1.58	1.56	-90.20	-2.00	-559.90	559.90	556.76	3.14	178.098	
600.00	600.00	594.00	594.00	1.94	1.92	-90.20	-2.00	-559.90	559.90	556.04	3.86	145.025	
700.00	700.00	694.00	694.00	2.30	2.28	-90.20	-2.00	-559.90	559.90	555.33	4.58	122.312	
800.00	800.00	794.00	794.00	2.66	2.64	-90.20	-2.00	-559.90	559.90	554.61	5.29	105.749	
900.00	900.00	894.00	894.00	3.02	3.00	-90.20	-2.00	-559.90	559.90	553.89	6.01	93.138	
1,000.00	1,000.00	994.00	994.00	3.38	3.35	-90.20	-2.00	-559.90	559.90	553.18	6.73	83.214 CC	
1,100.00	1,100.00	1,081.97	1,081.96	3.73	3.66	-90.20	-2.00	-560.78	560.91	553.52	7.40	75.847	
1,200.00	1,200.00	1,169.09	1,169.03	4.09	3.96	-90.20	-2.00	-563.64	564.20	556.14	8.06	70.043	
1,300.00	1,300.00	1,264.39	1,264.21	4.45	4.29	-90.20	-2.00	-568.50	569.29	560.54	8.74	65.104	
1,400.00	1,400.00	1,364.25	1,363.93	4.81	4.64	-90.20	-2.00	-573.73	574.52	565.07	9.45	60.782	
1,500.00	1,500.00	1,464.11	1,463.66	5.17	5.00	-90.20	-2.00	-578.96	579.76	569.59	10.16	57.049	
1,600.00	1,600.00	1,563.97	1,563.38	5.53	5.35	-90.20	-2.00	-584.18	584.99	574.11	10.87	53.794	
1,700.00	1,700.00	1,663.84	1,663.11	5.88	5.70	-90.19	-2.00	-589.41	590.22	578.63	11.59	50.934	
1,800.00	1,800.00	1,775.45	1,774.61	6.24	6.10	-90.19	-2.00	-594.51	594.83	582.48	12.34	48.189	
1,900.00	1,900.00	1,893.92	1,893.05	6.60	6.52	-90.19	-2.00	-596.53	596.54	583.41	13.12	45.461	
2,000.00	2,000.00	1,994.87	1,994.00	6.96	6.88	-90.19	-2.00	-596.54	596.54	582.70	13.84	43.108	
2,100.00	2,100.00	2,094.87	2,094.00	7.32	7.23	-90.19	-2.00	-596.54	596.54	581.99	14.55	40.996	
2,200.00	2,200.00	2,194.87	2,194.00	7.68	7.59	-90.19	-2.00	-596.54	596.54	581.28	15.26	39.080	
2,300.00	2,300.00	2,294.87	2,294.00	8.04	7.94	-90.19	-2.00	-596.54	596.54	580.56	15.98	37.334	
2,400.00	2,400.00	2,394.87	2,394.00	8.39	8.30	-90.19	-2.00	-596.54	596.54	579.85	16.69	35.737	
2,500.00	2,500.00	2,494.87	2,494.00	8.75	8.65	-90.19	-2.00	-596.54	596.54	579.13	17.41	34.270	
2,600.00	2,600.00	2,594.87	2,594.00	9.11	9.01	-90.19	-2.00	-596.54	596.54	578.42	18.12	32.919	
2,700.00	2,700.00	2,694.87	2,694.00	9.47	9.37	-90.19	-2.00	-596.54	596.54	577.70	18.84	31.670	
2,800.00	2,800.00	2,794.87	2,794.00	9.83	9.72	-90.19	-2.00	-596.54	596.54	576.99	19.55	30.512	
2,900.00	2,900.00	2,894.87	2,894.00	10.19	10.08	-90.19	-2.00	-596.54	596.54	576.27	20.27	29.435	
3,000.00	3,000.00	2,994.87	2,994.00	10.54	10.44	-90.19	-2.00	-596.54	596.54	575.56	20.98	28.432	
3,100.00	3,100.00	3,094.87	3,094.00	10.90	10.79	-90.19	-2.00	-596.54	596.54	574.84	21.70	27.495	
3,200.00	3,200.00	3,194.87	3,194.00	11.26	11.15	-90.19	-2.00	-596.54	596.54	574.13	22.41	26.617	
3,300.00	3,300.00	3,294.87	3,294.00	11.62	11.51	-90.19	-2.00	-596.54	596.54	573.41	23.13	25.794	
3,400.00	3,400.00	3,394.87	3,394.00	11.98	11.86	-90.19	-2.00	-596.54	596.54	572.70	23.84	25.020	
3,500.00	3,500.00	3,494.87	3,494.00	12.34	12.22	-90.19	-2.00	-596.54	596.54	571.98	24.56	24.291	
3,600.00	3,600.00	3,594.87	3,594.00	12.70	12.58	-90.19	-2.00	-596.54	596.54	571.27	25.27	23.603	
3,700.00	3,700.00	3,694.87	3,694.00	13.05	12.94	-90.19	-2.00	-596.54	596.54	570.55	25.99	22.953	
3,800.00	3,800.00	3,794.87	3,794.00	13.41	13.29	-90.19	-2.00	-596.54	596.54	569.83	26.71	22.337	
3,900.00	3,900.00	3,894.87	3,894.00	13.77	13.65	-90.19	-2.00	-596.54	596.54	569.12	27.42	21.754	
4,000.00	4,000.00	3,994.87	3,994.00	14.13	14.01	-90.19	-2.00	-596.54	596.54	568.40	28.14	21.201	
4,100.00	4,100.00	4,094.87	4,094.00	14.49	14.37	-90.19	-2.00	-596.54	596.54	567.69	28.85	20.675	
4,200.00	4,200.00	4,194.87	4,194.00	14.85	14.72	-90.19	-2.00	-596.54	596.54	566.97	29.57	20.174	
4,300.00	4,300.00	4,294.87	4,294.00	15.20	15.08	-90.19	-2.00	-596.54	596.54	566.25	30.29	19.697	
4,400.00	4,400.00	4,394.87	4,394.00	15.56	15.44	-90.19	-2.00	-596.54	596.54	565.54	31.00	19.242	
4,500.00	4,500.00	4,494.87	4,494.00	15.92	15.80	-90.19	-2.00	-596.54	596.54	564.82	31.72	18.807	
4,600.00	4,600.00	4,594.87	4,594.00	16.28	16.15	-90.19	-2.00	-596.54	596.54	564.11	32.43	18.392	
4,700.00	4,700.00	4,694.87	4,694.00	16.64	16.51	-90.19	-2.00	-596.54	596.54	563.39	33.15	17.995	
4,800.00	4,800.00	4,794.87	4,794.00	17.00	16.87	-90.19	-2.00	-596.54	596.54	562.67	33.87	17.614	
4,900.00	4,900.00	4,894.87	4,894.00	17.36	17.23	-90.19	-2.00	-596.54	596.54	561.96	34.58	17.249	
5,000.00	5,000.00	4,994.87	4,994.00	17.71	17.59	-90.19	-2.00	-596.54	596.54	561.24	35.30	16.899	
5,100.00	5,100.00	5,094.87	5,094.00	18.07	17.94	-90.19	-2.00	-596.54	596.54	560.52	36.02	16.563	

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



Anticollision Report



Company: COG Operating LLC
Project: Lea County, NM (NAD27 NME)
Reference Site: Zeppo 5 Federal COM
Site Error: 0.00 usft
Reference Well: 27H
Well Error: 0.00 usft
Reference Wellbore: OH
Reference Design: Plan 1 07-25-18

Local Co-ordinate Reference: Well 27H
TVD Reference: RKB @ 4130.00usft (Double K 7)
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North Reference: Grid
Survey Calculation Method: Minimum Curvature
Output errors are at 2.00 sigma
Database: USA Compass
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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		Offset		Semi Major Axis			Distance								Warning
Measured Depth (usft)	Vertical Depth (usft)	Measured Depth (usft)	Vertical Depth (usft)	Reference (usft)	Offset (usft)	Highside Toolface (°)	Offset Wellbore Centre +N/-S (usft)	+E/-W (usft)	Between Centres (usft)	Between Ellipses (usft)	Minimum Separation (usft)	Separation Factor			
5,200.00	5,200.00	5,194.87	5,194.00	18.43	18.30	-90.19	-2.00	-596.54	596.54	559.81	36.73	16.240			
5,300.00	5,300.00	5,294.87	5,294.00	18.79	18.66	-90.19	-2.00	-596.54	596.54	559.09	37.45	15.930			
5,400.00	5,400.00	5,394.87	5,394.00	19.15	19.02	-90.19	-2.00	-596.54	596.54	558.38	38.17	15.631			
5,500.00	5,500.00	5,494.87	5,494.00	19.51	19.38	-90.19	-2.00	-596.54	596.54	557.66	38.88	15.343			
5,600.00	5,600.00	5,594.87	5,594.00	19.86	19.73	-90.19	-2.00	-596.54	596.54	556.94	39.60	15.065			
5,700.00	5,700.00	5,702.77	5,701.70	20.22	20.10	-90.62	-6.44	-596.07	596.16	555.83	40.32	14.784			
5,785.29	5,785.14	5,796.21	5,792.43	20.51	20.40	105.06	-28.02	-593.80	595.73	554.81	40.91	14.561			
5,800.00	5,799.86	5,810.91	5,806.25	20.56	20.45	104.48	-33.00	-593.28	595.18	554.17	41.01	14.513			
5,900.00	5,897.16	5,912.53	5,896.69	20.88	20.74	101.65	-78.66	-588.48	598.60	556.98	41.62	14.382			
6,000.00	5,987.71	6,008.63	5,971.48	21.18	21.02	98.39	-138.43	-582.20	606.93	564.72	42.21	14.380			
6,100.00	6,067.54	6,100.00	6,030.09	21.49	21.32	94.86	-207.96	-574.89	619.67	576.86	42.81	14.476			
6,200.00	6,133.16	6,187.64	6,072.83	21.81	21.63	91.22	-283.91	-566.91	636.02	592.57	43.44	14.640			
6,300.00	6,181.72	6,272.25	6,100.19	22.18	21.96	87.62	-363.41	-558.55	654.95	610.81	44.14	14.838			
6,400.00	6,211.08	6,354.64	6,112.89	22.61	22.30	84.23	-444.28	-550.05	675.36	630.45	44.91	15.038			
6,500.00	6,220.13	6,446.67	6,114.53	23.08	22.74	81.73	-535.77	-540.44	695.61	649.79	45.82	15.181			
6,600.00	6,221.16	6,545.47	6,115.36	23.63	23.27	81.94	-634.03	-530.11	710.79	663.89	46.90	15.156			
6,700.00	6,222.21	6,621.28	6,115.99	24.25	23.73	82.02	-709.50	-522.98	720.30	672.32	47.98	15.013			
6,800.00	6,223.25	6,700.00	6,116.65	24.91	24.25	82.07	-788.13	-519.53	727.47	678.32	49.16	14.799			
6,900.00	6,224.30	6,773.53	6,117.27	25.61	24.77	82.06	-861.65	-519.06	731.26	680.88	50.38	14.515			
7,000.00	6,225.33	6,873.47	6,118.11	26.34	25.53	81.97	-961.59	-518.53	728.70	676.84	51.87	14.049			
7,100.00	6,226.36	6,973.31	6,118.94	27.10	26.34	81.89	-1,061.42	-518.00	723.03	669.58	53.44	13.529			
7,200.00	6,227.39	7,073.14	6,119.78	27.92	27.21	81.81	-1,161.25	-517.47	717.35	662.22	55.13	13.012			
7,300.00	6,228.42	7,172.97	6,120.61	28.78	28.13	81.73	-1,261.08	-516.94	711.67	654.76	56.91	12.506			
7,400.00	6,229.45	7,272.81	6,121.45	29.69	29.09	81.65	-1,360.90	-516.41	706.00	647.22	58.78	12.011			
7,500.00	6,230.48	7,372.64	6,122.29	30.64	30.08	81.56	-1,460.73	-515.88	700.32	639.60	60.73	11.532			
7,600.00	6,231.51	7,472.47	6,123.12	31.63	31.12	81.48	-1,560.56	-515.35	694.65	631.90	62.75	11.070			
7,700.00	6,232.54	7,572.31	6,123.96	32.65	32.19	81.39	-1,660.39	-514.82	688.99	624.15	64.84	10.627			
7,800.00	6,233.56	7,672.27	6,124.79	33.72	33.28	81.39	-1,760.35	-514.29	686.86	619.86	67.00	10.252			
7,900.00	6,234.59	7,772.27	6,125.63	34.82	34.41	81.37	-1,860.34	-513.76	686.60	617.37	69.23	9.918			
8,000.00	6,235.61	7,872.27	6,126.47	35.95	35.55	81.36	-1,960.34	-513.23	686.33	614.82	71.51	9.598			
8,100.00	6,236.63	7,972.27	6,127.31	37.11	36.72	81.34	-2,060.33	-512.70	686.06	612.23	73.83	9.292			
8,200.00	6,237.65	8,072.27	6,128.14	38.28	37.91	81.32	-2,160.33	-512.17	685.80	609.60	76.19	9.001			
8,300.00	6,238.67	8,172.27	6,128.98	39.47	39.12	81.30	-2,260.32	-511.64	685.53	606.94	78.59	8.723			
8,400.00	6,239.70	8,272.27	6,129.82	40.68	40.34	81.28	-2,360.31	-511.11	685.26	604.24	81.02	8.458			
8,500.00	6,240.72	8,372.27	6,130.66	41.91	41.58	81.26	-2,460.31	-510.58	685.00	601.51	83.49	8.205			
8,600.00	6,241.74	8,472.27	6,131.49	43.15	42.83	81.24	-2,560.30	-510.05	684.73	598.76	85.97	7.964			
8,700.00	6,242.76	8,572.26	6,132.33	44.40	44.09	81.22	-2,660.30	-509.52	684.47	595.98	88.49	7.735			
8,800.00	6,243.78	8,672.26	6,133.17	45.66	45.37	81.20	-2,760.29	-508.99	684.20	593.17	91.03	7.516			
8,900.00	6,244.80	8,772.26	6,134.00	46.94	46.65	81.18	-2,860.29	-508.46	683.93	590.35	93.59	7.308			
9,000.00	6,245.83	8,872.26	6,134.84	48.22	47.95	81.16	-2,960.28	-507.93	683.67	587.50	96.17	7.109			
9,100.00	6,246.85	8,972.26	6,135.68	49.51	49.25	81.15	-3,060.28	-507.40	683.40	584.64	98.76	6.920			
9,200.00	6,247.87	9,072.26	6,136.52	50.82	50.56	81.13	-3,160.27	-506.87	683.14	581.76	101.38	6.739			
9,300.00	6,248.89	9,172.26	6,137.35	52.13	51.88	81.11	-3,260.27	-506.34	682.87	578.87	104.00	6.566			
9,400.00	6,249.91	9,272.26	6,138.19	53.44	53.20	81.09	-3,360.26	-505.81	682.60	575.96	106.65	6.401			
9,500.00	6,250.94	9,372.26	6,139.03	54.77	54.54	81.07	-3,460.25	-505.28	682.34	573.04	109.30	6.243			
9,600.00	6,251.96	9,472.26	6,139.87	56.10	55.88	81.05	-3,560.25	-504.75	682.07	570.10	111.97	6.091			
9,700.00	6,252.98	9,572.26	6,140.70	57.43	57.22	81.03	-3,660.24	-504.22	681.81	567.16	114.65	5.947			
9,800.00	6,254.00	9,672.26	6,141.54	58.77	58.57	81.01	-3,760.24	-503.69	681.54	564.20	117.34	5.808			
9,900.00	6,255.02	9,772.26	6,142.38	60.12	59.92	80.99	-3,860.23	-503.16	681.28	561.23	120.04	5.675			
10,000.00	6,256.05	9,872.26	6,143.21	61.47	61.28	80.97	-3,960.23	-502.63	681.01	558.26	122.75	5.548			
10,100.00	6,257.07	9,972.26	6,144.05	62.83	62.64	80.95	-4,060.22	-502.10	680.75	555.28	125.47	5.425			
10,200.00	6,258.09	10,072.26	6,144.89	64.19	64.01	80.93	-4,160.22	-501.57	680.48	552.28	128.20	5.308			

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

Company: COG Operating LLC
Project: Lea County, NM (NAD27 NME)
Reference Site: Zeppo 5 Federal COM
Site Error: 0.00 usft
Reference Well: 27H
Well Error: 0.00 usft
Reference Wellbore: OH
Reference Design: Plan 1 07-25-18

Local Co-ordinate Reference: Well 27H
TVD Reference: RKB @ 4130.00usft (Double K 7)
MD Reference: RKB @ 4130.00usft (Double K 7)
North Reference: Grid
Survey Calculation Method: Minimum Curvature
Output errors are at 2.00 sigma
Database: USA Compass
Offset TVD Reference: Offset 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		Offset		Semi Major Axis		Highside Toolface (°)	Distance		Minimum Separation (usft)	Separation Factor	Warning		
Measured Depth (usft)	Vertical Depth (usft)	Measured Depth (usft)	Vertical Depth (usft)	Reference (usft)	Offset (usft)		Offset Wellbore Centre +N-S (usft)	+E-W (usft)					
10,300.00	6,259.11	10,172.26	6,145.73	65.55	65.38	80.91	-4,260.21	-501.04	680.22	549.28	130.93	5.195	
10,400.00	6,260.13	10,272.25	6,146.56	66.92	66.75	80.90	-4,360.20	-500.51	679.95	546.28	133.67	5.087	
10,500.00	6,261.16	10,372.25	6,147.40	68.29	68.13	80.88	-4,460.20	-499.98	679.69	543.27	136.42	4.982	
10,600.00	6,262.18	10,472.25	6,148.24	69.67	69.51	80.86	-4,560.19	-499.45	679.42	540.25	139.18	4.882	
10,700.00	6,263.20	10,572.25	6,149.08	71.04	70.89	80.84	-4,660.19	-498.92	679.16	537.22	141.94	4.785	
10,800.00	6,264.22	10,672.25	6,149.91	72.42	72.28	80.82	-4,760.18	-498.39	678.89	534.19	144.70	4.692	
10,900.00	6,265.24	10,772.25	6,150.75	73.81	73.67	80.80	-4,860.18	-497.86	678.63	531.16	147.47	4.602	
11,000.00	6,266.27	10,872.25	6,151.59	75.19	75.06	80.78	-4,960.17	-497.33	678.37	528.12	150.25	4.515	
11,100.00	6,267.29	10,972.25	6,152.43	76.58	76.45	80.76	-5,060.17	-496.80	678.10	525.07	153.03	4.431	
11,200.00	6,268.31	11,072.25	6,153.26	77.97	77.85	80.74	-5,160.16	-496.27	677.84	522.02	155.82	4.350	
11,300.00	6,269.33	11,172.25	6,154.10	79.36	79.24	80.72	-5,260.15	-495.74	677.57	518.97	158.61	4.272	
11,400.00	6,270.35	11,272.25	6,154.94	80.76	80.64	80.70	-5,360.15	-495.21	677.31	515.91	161.40	4.196	
11,500.00	6,271.37	11,372.25	6,155.77	82.16	82.04	80.68	-5,460.14	-494.68	677.05	512.85	164.20	4.123	
11,600.00	6,272.40	11,472.25	6,156.61	83.55	83.44	80.66	-5,560.14	-494.15	676.78	509.78	167.00	4.053	
11,700.00	6,273.42	11,572.25	6,157.45	84.95	84.85	80.64	-5,660.13	-493.62	676.52	506.71	169.80	3.984	
11,800.00	6,274.44	11,672.25	6,158.29	86.36	86.25	80.62	-5,760.13	-493.09	676.25	503.64	172.61	3.918	
11,900.00	6,275.46	11,772.25	6,159.12	87.76	87.66	80.60	-5,860.12	-492.56	675.99	500.57	175.42	3.854	
12,000.00	6,276.48	11,872.24	6,159.96	89.17	89.07	80.58	-5,960.12	-492.03	675.73	497.49	178.24	3.791	
12,100.00	6,277.51	11,972.24	6,160.80	90.57	90.48	80.56	-6,060.11	-491.50	675.46	494.41	181.05	3.731	
12,200.00	6,278.53	12,072.24	6,161.64	91.98	91.89	80.55	-6,160.11	-490.97	675.20	491.33	183.87	3.672	
12,300.00	6,279.55	12,172.24	6,162.47	93.39	93.31	80.53	-6,260.10	-490.44	674.94	488.24	186.69	3.615	
12,400.00	6,280.57	12,272.24	6,163.31	94.80	94.72	80.51	-6,360.09	-489.91	674.67	485.15	189.52	3.560	
12,500.00	6,281.59	12,372.24	6,164.15	96.21	96.13	80.49	-6,460.09	-489.38	674.41	482.06	192.35	3.506	
12,600.00	6,282.62	12,472.24	6,164.98	97.62	97.55	80.47	-6,560.08	-488.85	674.15	478.97	195.17	3.454	
12,700.00	6,283.64	12,572.24	6,165.82	99.04	98.97	80.45	-6,660.08	-488.32	673.88	475.88	198.01	3.403	
12,800.00	6,284.66	12,672.24	6,166.66	100.45	100.39	80.43	-6,760.07	-487.79	673.62	472.78	200.84	3.354	
12,900.00	6,285.68	12,772.24	6,167.50	101.87	101.80	80.41	-6,860.07	-487.26	673.36	469.68	203.67	3.306	
13,000.00	6,286.70	12,872.24	6,168.33	103.29	103.22	80.39	-6,960.06	-486.73	673.10	466.58	206.51	3.259	
13,100.00	6,287.73	12,972.24	6,169.17	104.70	104.65	80.37	-7,060.06	-486.20	672.83	463.48	209.35	3.214	
13,200.00	6,288.75	13,072.24	6,170.01	106.12	106.07	80.35	-7,160.05	-485.67	672.57	460.38	212.19	3.170	
13,300.00	6,289.77	13,172.24	6,170.85	107.54	107.49	80.33	-7,260.04	-485.14	672.31	457.27	215.03	3.127	
13,400.00	6,290.79	13,272.24	6,171.68	108.96	108.91	80.31	-7,360.04	-484.61	672.05	454.17	217.88	3.085	
13,500.00	6,291.81	13,372.24	6,172.52	110.38	110.34	80.29	-7,460.03	-484.08	671.78	451.06	220.72	3.044	
13,600.00	6,292.83	13,472.23	6,173.36	111.81	111.76	80.27	-7,560.03	-483.55	671.52	447.95	223.57	3.004	
13,700.00	6,293.86	13,572.23	6,174.19	113.23	113.19	80.25	-7,660.02	-483.02	671.26	444.84	226.42	2.965	
13,800.00	6,294.88	13,672.23	6,175.03	114.65	114.61	80.23	-7,760.02	-482.49	671.00	441.73	229.27	2.927	
13,900.00	6,295.90	13,772.23	6,175.87	116.08	116.04	80.21	-7,860.01	-481.96	670.73	438.62	232.12	2.890	
14,000.00	6,296.92	13,872.23	6,176.71	117.50	117.47	80.19	-7,960.01	-481.43	670.47	435.50	234.97	2.853	
14,100.00	6,297.94	13,972.23	6,177.54	118.93	118.90	80.17	-8,060.00	-480.90	670.21	432.39	237.83	2.818	
14,200.00	6,298.97	14,072.23	6,178.38	120.35	120.33	80.15	-8,159.99	-480.37	669.95	429.27	240.68	2.784	
14,288.88	6,299.87	14,161.11	6,179.13	121.43	121.60	80.13	-8,248.87	-479.90	669.72	426.69	243.03	2.756	
14,291.37	6,299.90	14,161.64	6,179.13	121.46	121.60	80.13	-8,249.40	-479.90	669.71	426.65	243.07	2.755 ES, SF	



Anticollision Report



Company: COG Operating LLC
Project: Lea County, NM (NAD27 NME)
Reference Site: Zeppo 5 Federal COM
Site Error: 0.00 usft
Reference Well: 27H
Well Error: 0.00 usft
Reference Wellbore: OH
Reference Design: Plan 1 07-25-18

Local Co-ordinate Reference: Well 27H
TVD Reference: RKB @ 4130.00usft (Double K 7)
MD Reference: RKB @ 4130.00usft (Double K 7)
North Reference: Grid
Survey Calculation Method: Minimum Curvature
Output errors are at 2.00 sigma
Database: USA Compass
Offset TVD Reference: Offset 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		Offset		Semi Major Axis		Highside Toolface (")	Distance				Warning		
Measured Depth (usft)	Vertical Depth (usft)	Measured Depth (usft)	Vertical Depth (usft)	Reference (usft)	Offset (usft)		Offset Wellbore Centre +N/-S (usft)	+E/-W (usft)	Between Centres (usft)	Between Ellipses (usft)		Minimum Separation (usft)	Separation Factor
0.00	0.00	13.00	13.00	0.00	0.02	79.91	152.90	858.90	872.40				
100.00	100.00	113.00	113.00	0.15	0.20	79.91	152.90	858.90	872.40	872.06	0.34	2,535.076	
200.00	200.00	213.00	213.00	0.51	0.55	79.91	152.90	858.90	872.40	871.34	1.06	822.187	
300.00	300.00	313.00	313.00	0.87	0.91	79.91	152.90	858.90	872.40	870.63	1.78	490.660	
400.00	400.00	413.00	413.00	1.22	1.27	79.91	152.90	858.90	872.40	869.91	2.49	349.666	
500.00	500.00	513.00	513.00	1.58	1.63	79.91	152.90	858.90	872.40	869.19	3.21	271.616	
600.00	600.00	613.00	613.00	1.94	1.99	79.91	152.90	858.90	872.40	868.47	3.93	222.051	
700.00	700.00	713.00	713.00	2.30	2.35	79.91	152.90	858.90	872.40	867.76	4.65	187.784	
800.00	800.00	813.00	813.00	2.66	2.70	79.91	152.90	858.90	872.40	867.04	5.36	162.679	
900.00	900.00	913.00	913.00	3.02	3.06	79.91	152.90	858.90	872.40	866.32	6.08	143.495	
1,000.00	1,000.00	1,016.77	1,016.77	3.38	3.43	79.91	152.90	858.86	872.38	865.57	6.81	128.127	
1,100.00	1,100.00	1,145.71	1,145.67	3.73	3.88	79.87	152.90	856.12	870.28	862.67	7.62	114.270	
1,200.00	1,200.00	1,274.32	1,274.08	4.09	4.33	79.79	152.90	849.05	864.87	856.45	8.42	102.704	
1,300.00	1,300.00	1,387.09	1,386.46	4.45	4.73	79.68	152.90	839.68	856.64	847.47	9.18	93.345	
1,400.00	1,400.00	1,486.71	1,485.70	4.81	5.08	79.57	152.90	831.00	848.07	838.18	9.89	85.738	
1,500.00	1,500.00	1,586.33	1,584.94	5.17	5.44	79.47	152.90	822.31	839.50	828.89	10.61	79.134	
1,600.00	1,600.00	1,685.95	1,684.18	5.53	5.80	79.36	152.90	813.63	830.93	819.60	11.33	73.352	
1,700.00	1,700.00	1,785.57	1,783.42	5.88	6.16	79.24	152.90	804.95	822.36	810.31	12.05	68.250	
1,800.00	1,800.00	1,885.19	1,882.66	6.24	6.53	79.13	152.90	796.27	813.80	801.03	12.77	63.717	
1,900.00	1,900.00	1,983.33	1,980.44	6.60	6.89	79.02	152.90	787.71	805.24	791.75	13.49	59.688	
2,000.00	2,000.00	2,067.24	2,064.09	6.96	7.20	78.93	152.90	781.32	797.78	783.62	14.16	56.357	
2,100.00	2,100.00	2,150.15	2,146.89	7.32	7.50	78.86	152.90	776.81	792.44	777.62	14.81	53.492	
2,200.00	2,200.00	2,233.23	2,229.91	7.68	7.79	78.83	152.90	774.09	789.23	773.76	15.47	51.019	
2,300.00	2,300.00	2,316.67	2,313.35	8.04	8.09	78.81	152.90	773.18	788.15	772.03	16.12	48.885	
2,333.45	2,333.45	2,349.77	2,346.45	8.16	8.20	78.81	152.90	773.18	788.15	771.79	16.36	48.181	
2,400.00	2,400.00	2,416.32	2,413.00	8.39	8.44	78.81	152.90	773.18	788.15	771.32	16.83	46.832	
2,500.00	2,500.00	2,516.32	2,513.00	8.75	8.79	78.81	152.90	773.18	788.15	770.61	17.54	44.939	
2,600.00	2,600.00	2,616.32	2,613.00	9.11	9.14	78.81	152.90	773.18	788.15	769.90	18.25	43.192	
2,700.00	2,700.00	2,716.32	2,713.00	9.47	9.49	78.81	152.90	773.18	788.15	769.19	18.96	41.575	
2,800.00	2,800.00	2,816.32	2,813.00	9.83	9.84	78.81	152.90	773.18	788.15	768.48	19.67	40.073	
2,900.00	2,900.00	2,916.32	2,913.00	10.19	10.19	78.81	152.90	773.18	788.15	767.77	20.38	38.675	
3,000.00	3,000.00	3,016.32	3,013.00	10.54	10.55	78.81	152.90	773.18	788.15	767.06	21.09	37.371	
3,100.00	3,100.00	3,116.32	3,113.00	10.90	10.90	78.81	152.90	773.18	788.15	766.35	21.80	36.151	
3,200.00	3,200.00	3,216.32	3,213.00	11.26	11.25	78.81	152.90	773.18	788.15	765.64	22.51	35.007	
3,300.00	3,300.00	3,316.32	3,313.00	11.62	11.61	78.81	152.90	773.18	788.15	764.93	23.23	33.934	
3,400.00	3,400.00	3,416.32	3,413.00	11.98	11.96	78.81	152.90	773.18	788.15	764.21	23.94	32.924	
3,500.00	3,500.00	3,516.32	3,513.00	12.34	12.31	78.81	152.90	773.18	788.15	763.50	24.65	31.972	
3,600.00	3,600.00	3,616.32	3,613.00	12.70	12.67	78.81	152.90	773.18	788.15	762.79	25.36	31.073	
3,700.00	3,700.00	3,716.32	3,713.00	13.05	13.02	78.81	152.90	773.18	788.15	762.07	26.08	30.223	
3,800.00	3,800.00	3,816.32	3,813.00	13.41	13.38	78.81	152.90	773.18	788.15	761.36	26.79	29.418	
3,900.00	3,900.00	3,916.32	3,913.00	13.77	13.73	78.81	152.90	773.18	788.15	760.65	27.51	28.655	
4,000.00	4,000.00	4,016.32	4,013.00	14.13	14.09	78.81	152.90	773.18	788.15	759.93	28.22	27.930	
4,100.00	4,100.00	4,116.32	4,113.00	14.49	14.45	78.81	152.90	773.18	788.15	759.22	28.93	27.241	
4,200.00	4,200.00	4,216.32	4,213.00	14.85	14.80	78.81	152.90	773.18	788.15	758.50	29.65	26.584	
4,300.00	4,300.00	4,316.32	4,313.00	15.20	15.16	78.81	152.90	773.18	788.15	757.79	30.36	25.959	
4,400.00	4,400.00	4,416.32	4,413.00	15.56	15.51	78.81	152.90	773.18	788.15	757.08	31.08	25.362	
4,500.00	4,500.00	4,516.32	4,513.00	15.92	15.87	78.81	152.90	773.18	788.15	756.36	31.79	24.792	
4,600.00	4,600.00	4,616.32	4,613.00	16.28	16.22	78.81	152.90	773.18	788.15	755.65	32.50	24.247	
4,700.00	4,700.00	4,716.32	4,713.00	16.64	16.58	78.81	152.90	773.18	788.15	754.93	33.22	23.726	
4,800.00	4,800.00	4,816.32	4,813.00	17.00	16.94	78.81	152.90	773.18	788.15	754.22	33.93	23.226	
4,900.00	4,900.00	4,916.32	4,913.00	17.36	17.29	78.81	152.90	773.18	788.15	753.50	34.65	22.747	
5,000.00	5,000.00	5,016.32	5,013.00	17.71	17.65	78.81	152.90	773.18	788.15	752.79	35.36	22.287	

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



Anticollision Report



Company: COG Operating LLC
Project: Lea County, NM (NAD27 NME)
Reference Site: Zeppo 5 Federal COM
Site Error: 0.00 usft
Reference Well: 27H
Well Error: 0.00 usft
Reference Wellbore: OH
Reference Design: Plan 1 07-25-18

Local Co-ordinate Reference: Well 27H
TVD Reference: RKB @ 4130.00usft (Double K 7)
MD Reference: RKB @ 4130.00usft (Double K 7)
North Reference: Grid
Survey Calculation Method: Minimum Curvature
Output errors are at 2.00 sigma
Database: USA Compass
Offset TVD Reference: Offset 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		Offset		Semi Major Axis		Highside Toolface (°)	Distance		Between Centres (usft)	Between Ellipses (usft)	Minimum Separation (usft)	Separation Factor	Warning	
Measured Depth (usft)	Vertical Depth (usft)	Measured Depth (usft)	Vertical Depth (usft)	Reference (usft)	Offset (usft)		Offset Wellbore Centre +N/-S (usft)	+E/-W (usft)						
5,100.00	5,100.00	5,116.32	5,113.00	18.07	18.01	78.81	152.90	773.18	788.15	752.07	36.08	21.845		
5,200.00	5,200.00	5,216.32	5,213.00	18.43	18.36	78.81	152.90	773.18	788.15	751.36	36.79	21.420		
5,300.00	5,300.00	5,316.32	5,313.00	18.79	18.72	78.81	152.90	773.18	788.15	750.64	37.51	21.012		
5,400.00	5,400.00	5,416.32	5,413.00	19.15	19.08	78.81	152.90	773.18	788.15	749.93	38.22	20.619		
5,500.00	5,500.00	5,516.32	5,513.00	19.51	19.43	78.81	152.90	773.18	788.15	749.21	38.94	20.240		
5,600.00	5,600.00	5,516.32	5,513.00	19.86	19.79	78.81	152.90	773.18	788.15	748.50	39.66	19.875		
5,700.00	5,700.00	5,736.91	5,733.36	20.22	20.20	79.16	148.06	773.22	787.53	747.10	40.43	19.481		
5,800.00	5,799.86	5,870.74	5,861.46	20.56	20.63	-81.59	110.86	773.51	782.39	741.19	41.19	18.994		
5,900.00	5,897.16	5,990.79	5,963.63	20.88	20.97	-80.03	48.43	774.01	771.68	729.83	41.85	18.439		
6,000.00	5,987.71	6,098.67	6,039.61	21.18	21.29	-78.98	-27.83	774.61	756.37	713.90	42.47	17.809		
6,100.00	6,067.54	6,196.55	6,092.18	21.49	21.62	-78.45	-110.18	775.27	737.49	694.38	43.11	17.108		
6,200.00	6,133.16	6,286.71	6,124.84	21.81	21.96	-78.42	-194.07	775.93	715.92	672.15	43.77	16.355		
6,300.00	6,181.72	6,371.15	6,140.63	22.18	22.30	-78.82	-276.91	776.59	692.44	647.96	44.48	15.566		
6,400.00	6,211.08	6,457.74	6,143.34	22.61	22.68	-79.60	-363.42	777.27	667.56	622.27	45.29	14.739		
6,500.00	6,220.13	6,552.98	6,144.08	23.08	23.17	-81.50	-458.65	778.03	640.12	593.87	46.25	13.840		
6,600.00	6,221.16	6,649.84	6,144.84	23.63	23.73	-81.33	-555.51	778.80	615.63	568.27	47.36	12.998		
6,700.00	6,222.21	6,748.19	6,145.62	24.25	24.37	-81.20	-653.85	779.58	597.91	549.28	48.62	12.297		
6,800.00	6,223.25	6,847.56	6,146.40	24.91	25.09	-81.12	-753.21	780.37	587.01	537.01	50.00	11.740		
6,900.00	6,224.30	6,947.46	6,147.18	25.61	25.87	-81.10	-853.10	781.16	583.00	531.52	51.48	11.325		
6,908.61	6,224.39	6,956.06	6,147.25	25.68	25.94	-81.11	-861.71	781.23	582.98	531.37	51.61	11.295 CC		
7,000.00	6,225.33	7,047.39	6,147.97	26.34	26.70	-81.15	-953.03	781.95	585.88	532.83	53.05	11.045		
7,100.00	6,226.36	7,147.21	6,148.75	27.10	27.59	-81.21	-1,052.85	782.74	591.87	537.17	54.69	10.821		
7,200.00	6,227.39	7,247.03	6,149.54	27.92	28.52	-81.28	-1,152.66	783.54	597.86	541.42	56.44	10.593		
7,300.00	6,228.42	7,346.85	6,150.32	28.78	29.49	-81.34	-1,252.47	784.33	603.85	545.57	58.28	10.361		
7,400.00	6,229.45	7,446.67	6,151.11	29.69	30.51	-81.41	-1,352.28	785.12	609.85	549.65	60.20	10.130		
7,500.00	6,230.48	7,546.48	6,151.89	30.64	31.55	-81.47	-1,452.09	785.91	615.84	553.65	62.20	9.902		
7,600.00	6,231.51	7,646.30	6,152.67	31.63	32.63	-81.53	-1,551.91	786.70	621.84	557.58	64.26	9.677		
7,700.00	6,232.54	7,746.12	6,153.46	32.65	33.73	-81.59	-1,651.72	787.50	627.83	561.44	66.39	9.457		
7,800.00	6,233.56	7,846.08	6,154.24	33.72	34.87	-81.58	-1,751.67	788.29	630.28	561.69	68.58	9.190		
7,900.00	6,234.59	7,946.07	6,155.03	34.82	36.02	-81.57	-1,851.66	789.08	630.87	560.02	70.85	8.905		
8,000.00	6,235.61	8,046.07	6,155.81	35.95	37.20	-81.55	-1,951.65	789.88	631.46	558.30	73.15	8.632		
8,100.00	6,236.63	8,146.07	6,156.60	37.11	38.39	-81.54	-2,051.64	790.67	632.05	556.54	75.50	8.371		
8,200.00	6,237.65	8,246.07	6,157.39	38.28	39.61	-81.53	-2,151.63	791.46	632.64	554.75	77.89	8.122		
8,300.00	6,238.67	8,346.07	6,158.17	39.47	40.83	-81.51	-2,251.63	792.26	633.23	552.92	80.31	7.885		
8,400.00	6,239.70	8,446.06	6,158.96	40.68	42.08	-81.50	-2,351.62	793.05	633.82	551.06	82.76	7.659		
8,500.00	6,240.72	8,546.06	6,159.74	41.91	43.33	-81.48	-2,451.61	793.84	634.41	549.17	85.24	7.443		
8,600.00	6,241.74	8,646.06	6,160.53	43.15	44.60	-81.47	-2,551.60	794.64	635.00	547.25	87.75	7.237		
8,700.00	6,242.76	8,746.06	6,161.31	44.40	45.88	-81.46	-2,651.59	795.43	635.58	545.31	90.28	7.041		
8,800.00	6,243.78	8,846.06	6,162.10	45.66	47.17	-81.44	-2,751.59	796.22	636.17	543.35	92.83	6.853		
8,900.00	6,244.80	8,946.06	6,162.89	46.94	48.46	-81.43	-2,851.58	797.02	636.76	541.37	95.40	6.675		
9,000.00	6,245.83	9,046.05	6,163.67	48.22	49.77	-81.42	-2,951.57	797.81	637.35	539.36	97.99	6.504		
9,100.00	6,246.85	9,146.05	6,164.46	49.51	51.08	-81.40	-3,051.56	798.60	637.94	537.35	100.60	6.342		
9,200.00	6,247.87	9,246.05	6,165.24	50.82	52.41	-81.39	-3,151.55	799.39	638.54	535.31	103.22	6.186		
9,300.00	6,248.89	9,346.05	6,166.03	52.13	53.74	-81.38	-3,251.55	800.19	639.13	533.26	105.86	6.037		
9,400.00	6,249.91	9,446.05	6,166.81	53.44	55.07	-81.36	-3,351.54	800.98	639.72	531.20	108.51	5.895		
9,500.00	6,250.94	9,546.04	6,167.60	54.77	56.41	-81.35	-3,451.53	801.77	640.31	529.13	111.18	5.759		
9,600.00	6,251.96	9,646.04	6,168.39	56.10	57.76	-81.34	-3,551.52	802.57	640.90	527.04	113.85	5.629		
9,700.00	6,252.98	9,746.04	6,169.17	57.43	59.11	-81.32	-3,651.51	803.36	641.49	524.95	116.54	5.504		
9,800.00	6,254.00	9,846.04	6,169.96	58.77	60.46	-81.31	-3,751.51	804.15	642.08	522.84	119.24	5.385		
9,900.00	6,255.02	9,946.04	6,170.74	60.12	61.82	-81.30	-3,851.50	804.95	642.67	520.72	121.94	5.270		
10,000.00	6,256.05	10,046.04	6,171.53	61.47	63.19	-81.28	-3,951.49	805.74	643.26	518.60	124.66	5.160		
10,100.00	6,257.07	10,146.03	6,172.31	62.83	64.56	-81.27	-4,051.48	806.53	643.85	516.46	127.39	5.054		

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



Anticollision Report



Company: COG Operating LLC
Project: Lea County, NM (NAD27 NME)
Reference Site: Zeppo 5 Federal COM
Site Error: 0.00 usft
Reference Well: 27H
Well Error: 0.00 usft
Reference Wellbore: OH
Reference Design: Plan 1 07-25-18

Local Co-ordinate Reference: Well 27H
TVD Reference: RKB @ 4130.00usft (Double K 7)
MD Reference: RKB @ 4130.00usft (Double K 7)
North Reference: Grid
Survey Calculation Method: Minimum Curvature
Output errors are at 2.00 sigma
Database: USA Compass
Offset TVD Reference: Offset 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		Offset		Semi Major Axis		Distance						Warning	
Measured Depth (usft)	Vertical Depth (usft)	Measured Depth (usft)	Vertical Depth (usft)	Reference (usft)	Offset (usft)	Highside Toolface (°)	Offset Wellbore Centre +N/-S (usft)	Offset Wellbore Centre +E/-W (usft)	Between Centres (usft)	Between Ellipses (usft)	Minimum Separation (usft)	Separation Factor	
10,200.00	6,258.09	10,246.03	6,173.10	64.19	65.93	-81.26	-4,151.47	807.33	644.44	514.32	130.12	4.953	
10,300.00	6,259.11	10,346.03	6,173.89	65.55	67.30	-81.24	-4,251.47	808.12	645.03	512.17	132.86	4.855	
10,400.00	6,260.13	10,446.03	6,174.67	66.92	68.68	-81.23	-4,351.46	808.91	645.62	510.02	135.60	4.761	
10,500.00	6,261.16	10,546.03	6,175.46	68.29	70.06	-81.22	-4,451.45	809.71	646.21	507.85	138.36	4.671	
10,600.00	6,262.18	10,646.02	6,176.24	69.67	71.45	-81.20	-4,551.44	810.50	646.80	505.69	141.11	4.584	
10,700.00	6,263.20	10,746.02	6,177.03	71.04	72.83	-81.19	-4,651.43	811.29	647.39	503.51	143.88	4.500	
10,800.00	6,264.22	10,846.02	6,177.81	72.42	74.22	-81.18	-4,751.42	812.09	647.98	501.33	146.65	4.419	
10,900.00	6,265.24	10,946.02	6,178.60	73.81	75.62	-81.17	-4,851.42	812.88	648.57	499.15	149.42	4.341	
11,000.00	6,266.27	11,046.02	6,179.39	75.19	77.01	-81.15	-4,951.41	813.67	649.16	496.96	152.20	4.265	
11,100.00	6,267.29	11,146.01	6,180.17	76.58	78.41	-81.14	-5,051.40	814.47	649.75	494.77	154.99	4.192	
11,200.00	6,268.31	11,246.01	6,180.96	77.97	79.80	-81.13	-5,151.39	815.26	650.34	492.57	157.78	4.122	
11,300.00	6,269.33	11,346.01	6,181.74	79.36	81.20	-81.11	-5,251.38	816.05	650.94	490.37	160.57	4.054	
11,400.00	6,270.35	11,446.01	6,182.53	80.76	82.61	-81.10	-5,351.38	816.85	651.53	488.16	163.37	3.988	
11,500.00	6,271.37	11,546.01	6,183.31	82.16	84.01	-81.09	-5,451.37	817.64	652.12	485.95	166.17	3.924	
11,600.00	6,272.40	11,646.01	6,184.10	83.55	85.42	-81.07	-5,551.36	818.43	652.71	483.74	168.97	3.863	
11,700.00	6,273.42	11,746.00	6,184.89	84.95	86.82	-81.06	-5,651.35	819.23	653.30	481.52	171.78	3.803	
11,800.00	6,274.44	11,846.00	6,185.67	86.36	88.23	-81.05	-5,751.34	820.02	653.89	479.30	174.59	3.745	
11,900.00	6,275.46	11,946.00	6,186.46	87.76	89.64	-81.04	-5,851.34	820.81	654.48	477.08	177.40	3.689	
12,000.00	6,276.48	12,046.00	6,187.24	89.17	91.05	-81.02	-5,951.33	821.61	655.07	474.85	180.22	3.635	
12,100.00	6,277.51	12,146.00	6,188.03	90.57	92.46	-81.01	-6,051.32	822.40	655.66	472.63	183.04	3.582	
12,200.00	6,278.53	12,245.99	6,188.81	91.98	93.88	-81.00	-6,151.31	823.19	656.25	470.40	185.86	3.531	
12,300.00	6,279.55	12,345.99	6,189.60	93.39	95.29	-80.99	-6,251.30	823.99	656.84	468.16	188.68	3.481	
12,400.00	6,280.57	12,445.99	6,190.39	94.80	96.71	-80.97	-6,351.30	824.78	657.44	465.93	191.51	3.433	
12,500.00	6,281.59	12,545.99	6,191.17	96.21	98.13	-80.96	-6,451.29	825.57	658.03	463.69	194.34	3.386	
12,600.00	6,282.62	12,645.99	6,191.96	97.62	99.54	-80.95	-6,551.28	826.37	658.62	461.45	197.17	3.340	
12,700.00	6,283.64	12,745.99	6,192.74	99.04	100.96	-80.93	-6,651.27	827.16	659.21	459.21	200.00	3.296	
12,800.00	6,284.66	12,845.98	6,193.53	100.45	102.38	-80.92	-6,751.26	827.95	659.80	456.96	202.84	3.253	
12,900.00	6,285.68	12,945.98	6,194.31	101.87	103.80	-80.91	-6,851.25	828.75	660.39	454.72	205.67	3.211	
13,000.00	6,286.70	13,045.98	6,195.10	103.29	105.23	-80.90	-6,951.25	829.54	660.98	452.47	208.51	3.170	
13,100.00	6,287.73	13,145.98	6,195.88	104.70	106.65	-80.88	-7,051.24	830.33	661.58	450.22	211.35	3.130	
13,200.00	6,288.75	13,245.98	6,196.67	106.12	108.07	-80.87	-7,151.23	831.13	662.17	447.97	214.20	3.091	
13,300.00	6,289.77	13,345.97	6,197.46	107.54	109.50	-80.86	-7,251.22	831.92	662.76	445.72	217.04	3.054	
13,400.00	6,290.79	13,445.97	6,198.24	108.96	110.92	-80.85	-7,351.21	832.71	663.35	443.46	219.88	3.017	
13,500.00	6,291.81	13,545.97	6,199.03	110.38	112.35	-80.83	-7,451.21	833.51	663.94	441.21	222.73	2.981	
13,600.00	6,292.83	13,645.97	6,199.81	111.81	113.77	-80.82	-7,551.20	834.30	664.53	438.95	225.58	2.946	
13,700.00	6,293.86	13,745.97	6,200.60	113.23	115.20	-80.81	-7,651.19	835.09	665.12	436.69	228.43	2.912	
13,800.00	6,294.88	13,845.96	6,201.38	114.65	116.63	-80.80	-7,751.18	835.89	665.72	434.43	231.28	2.878	
13,900.00	6,295.90	13,945.96	6,202.17	116.08	118.06	-80.79	-7,851.17	836.68	666.31	432.17	234.13	2.846	
14,000.00	6,296.92	14,045.96	6,202.96	117.50	119.49	-80.77	-7,951.17	837.47	666.90	429.91	236.99	2.814	
14,100.00	6,297.94	14,145.96	6,203.74	118.93	120.91	-80.76	-8,051.16	838.27	667.49	427.65	239.84	2.783	
14,200.00	6,298.97	14,245.96	6,204.53	120.35	122.34	-80.75	-8,151.15	839.06	668.08	425.38	242.70	2.753	
14,291.37	6,299.90	14,337.32	6,205.25	121.46	123.65	-80.74	-8,242.51	839.79	668.62	423.51	245.12	2.728 ES, SF	

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

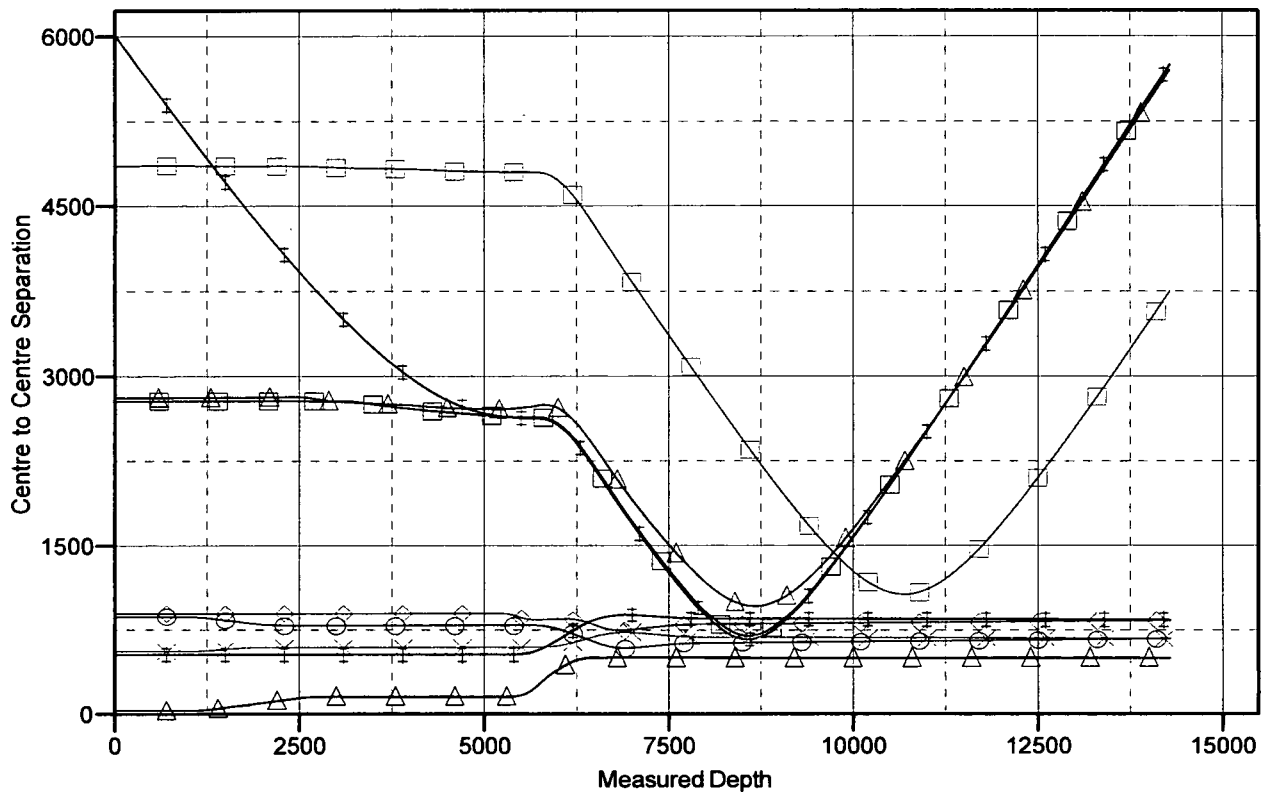
Company: COG Operating LLC
Project: Lea County, NM (NAD27 NME)
Reference Site: Zeppo 5 Federal COM
Site Error: 0.00 usft
Reference Well: 27H
Well Error: 0.00 usft
Reference Wellbore: OH
Reference Design: Plan 1 07-25-18

Local Co-ordinate Reference: Well 27H
TVD Reference: RKB @ 4130.00usft (Double K 7)
MD Reference: RKB @ 4130.00usft (Double K 7)
North Reference: Grid
Survey Calculation Method: Minimum Curvature
Output errors are at 2.00 sigma
Database: USA Compass
Offset TVD Reference: Offset Datum

Reference Depths are relative to RKB @ 4130.00usft (Double K 7)
 Offset Depths are relative to Offset Datum
 Central Meridian is 104° 19' 60.00000 W

Coordinates are relative to: 27H
 Coordinate System is US State Plane 1927 (Exact solution), New Mexico East 30
 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 | ▲ 17H, 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 |

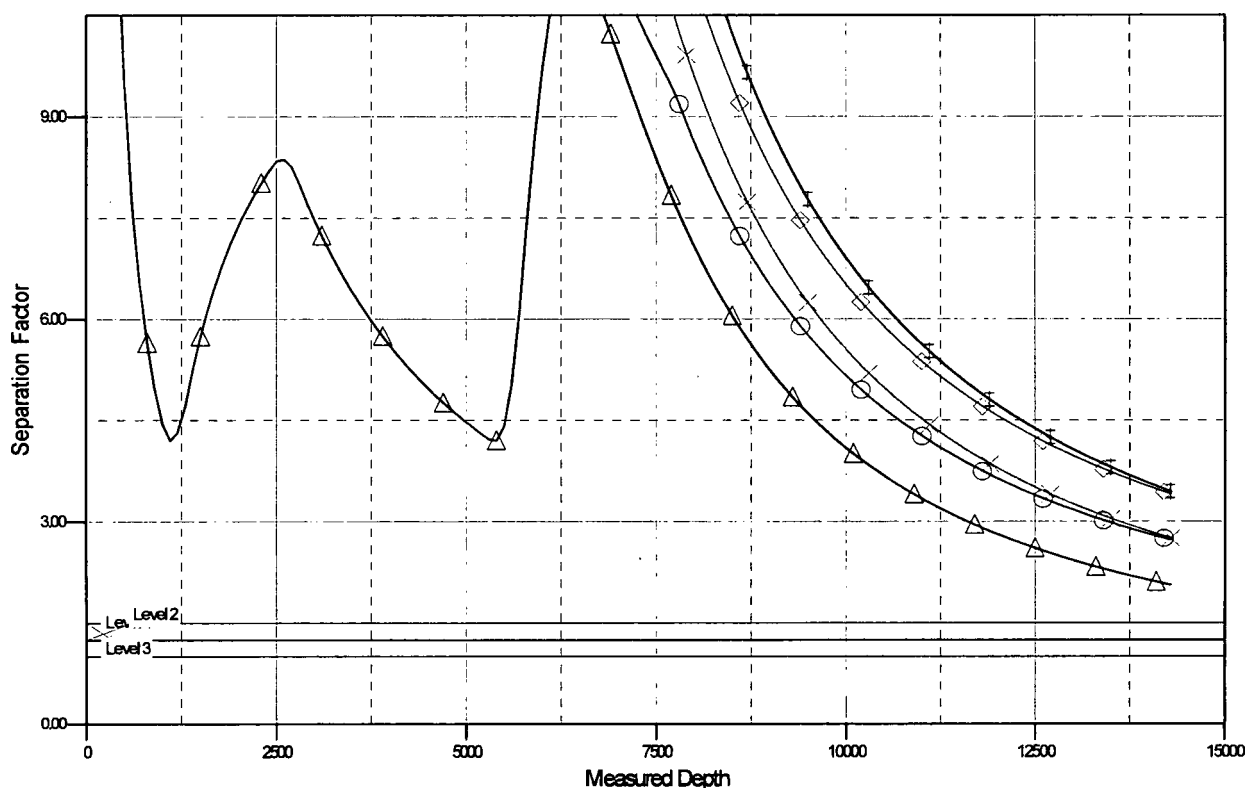
Company: COG Operating LLC
Project: Lea County, NM (NAD27 NME)
Reference Site: Zeppo 5 Federal COM
Site Error: 0.00 usft
Reference Well: 27H
Well Error: 0.00 usft
Reference Wellbore: OH
Reference Design: Plan 1 07-25-18

Local Co-ordinate Reference: Well 27H
TVD Reference: RKB @ 4130.00usft (Double K 7)
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North Reference: Grid
Survey Calculation Method: Minimum Curvature
Output errors are at 2.00 sigma
Database: USA Compass
Offset TVD Reference: Offset Datum

Reference Depths are relative to RKB @ 4130.00usft (Double K 7)
 Offset Depths are relative to Offset Datum
 Central Meridian is 104° 19' 60.00000 W

Coordinates are relative to: 27H
 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 | ▲ 17H, 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 |

Production Cement Breakdown

Well: Zeppo 5 Fed Com #27H

Hole Volumes						
Hole	Hole Section (Length)	Casing	Capacity (ft ³ /Lin.ft)	Cu.Ft	Total Cu.Ft	% Excess
Prod	0-2220 (2220)	7"	0.1585	351.9	351.9	0
Prod	2220-5719 (3499)	7"	0.1503	525.9	525.9	105

Cement Volumes					
Blend	Cement Sacks	Yield	Weight	Volume	Total Volume
35:65:6	600	2.01	12.5	1206	1754
50:50:02	400	1.37	14	548	

% Excess Calculation			
Total Volume	1754		1402.1
Cu.Ft	-351.9		/525.9
	1402.1		167% Excess

7" to be run from surface to kickoff point and changed over to 5 ½" with DV Tool and ECP at kickoff point. 5 ½" casing will be run from kickoff point to td and isolation packers set throughout curve and lateral. 7" to be cemented from kickoff point to surface.

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)

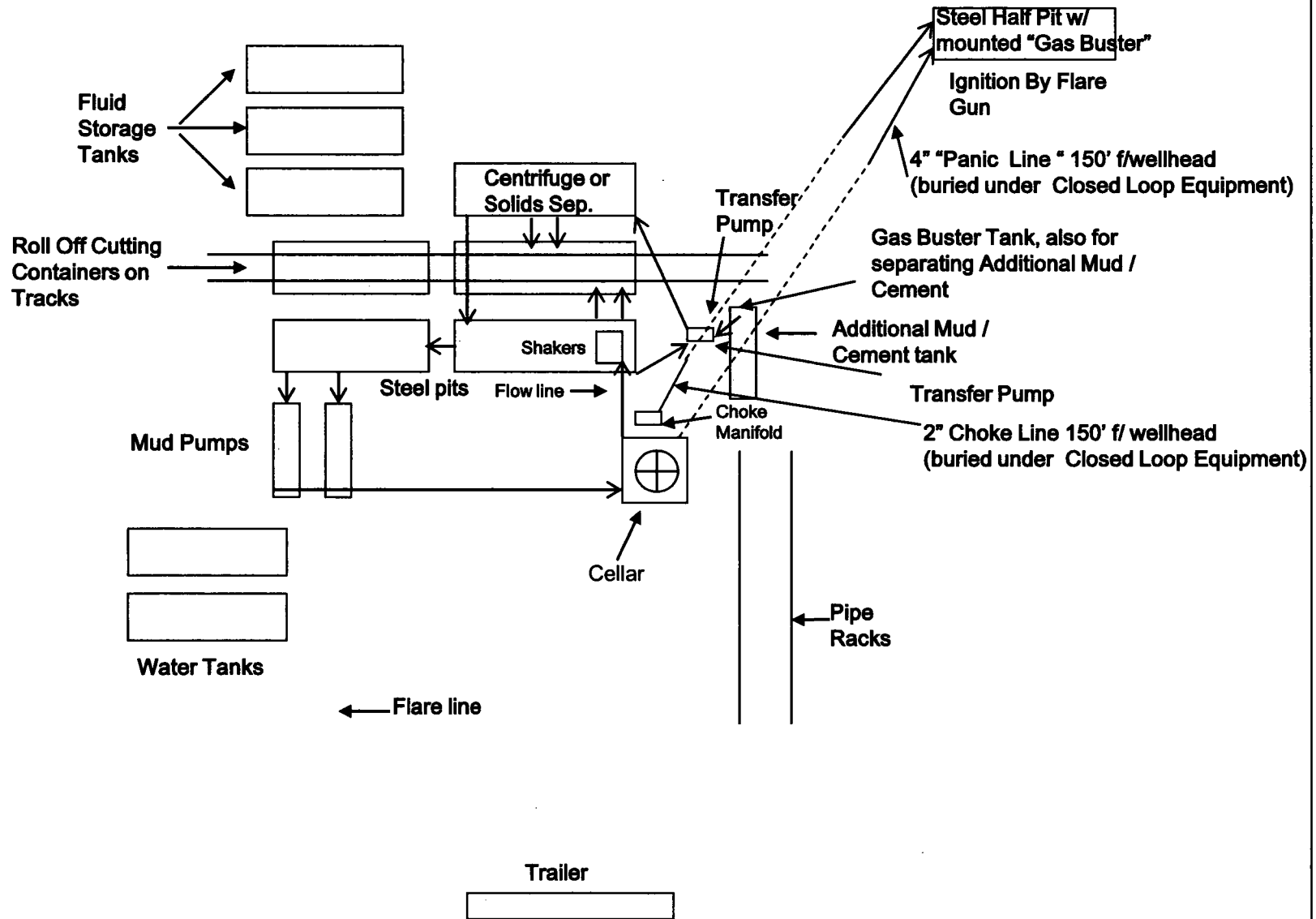
or

GMI (permit number 711-019-001)

dependent upon which rig is available to drill this well.

COG Operating LLC

Closed Loop Equipment Diagram





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

SUPO Data Report

10/22/2018

APD ID: 10400027567

Submission Date: 03/06/2018

Operator Name: COG OPERATING LLC

Well Name: ZEPPU 5 FEDERAL COM

Well Number: 27H

Well Type: OIL WELL

Well Work Type: Drill



[Show Final Text](#)

Section 1 - Existing Roads

Will existing roads be used? YES

Existing Road Map:

Zeppo_5_Federal_Com_27H_Vicinity_plat_20180801114044.pdf

Existing Road Purpose: ACCESS,FLUID TRANSPORT

Row(s) Exist? NO

ROW ID(s)

ID:

Do the existing roads need to be improved? NO

Existing Road Improvement Description:

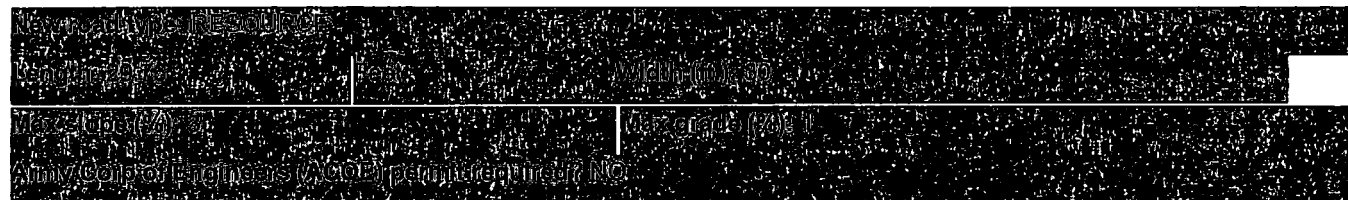
Existing Road Improvement Attachment:

Section 2 - New or Reconstructed Access Roads

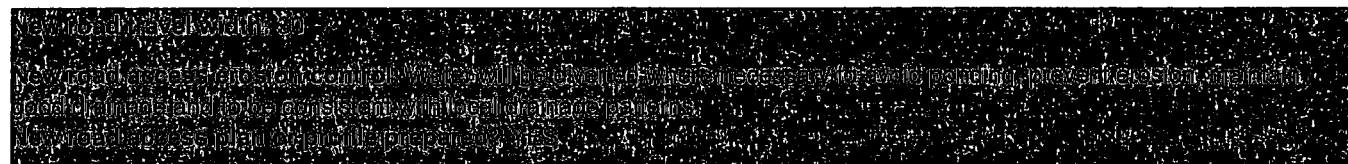
Will new roads be needed? YES

New Road Map:

Zeppo_5_Federal_Com_27H_New_Road_plat_20180801114518.pdf



ACOE Permit Number(s):



New road access plan attachment:

New_Access_Road_Plan_20180221123627.pdf



Well Name: ZEPPO 5 FEDERAL COM

on the top soil surface classification. Surface material will consist of the native caliche. Caliche will be broken down into the gravel and the available secondary cement resources will be used. All the broken caliche will be used in place for the 12% of the

Road Damage Control Measures (RDCM) Definition: Water will be diverted where necessary to avoid ponding, flow will be kept in main road drains and to be consistent with local drainage plans.

Newick-type resource	
length (mm)	width (mm)
Max depth (mm)	Max depth (mm)
Why/How or Evidence (C/O) point returned NO	

New boardroom screening controls. Ware will be checked whenever necessary to avoid bonding, prevent election, maintain or improve health, and/or be considered at all other times as appropriate.

Operator Name: COG OPERATING LLC

Well Name: ZEPP0 5 FEDERAL COM

Well Number: 27H

New road access plan or plan already prepared? YES

New road access plan attachment:

New_Access_Road_Plan_20180221123627.pdf

Access road engineering design? NO

Access road engineering design attachment:

Access road design type: CULVERT

Access road design type: ON SITE

Access road design where it connects to other

Access road design where it connects to other

Access road design where it connects to other

Access road design where it connects to other

Access other construction information:

Access miscellaneous information:

Number of access turnouts:

Access turnout map:

Drainage Control

New road drainage structures? YES

Drainage control structure type: DRAINAGE

Road drainage control structures are required for all new roads. They will be installed where necessary to control runoff, prevent erosion, maintain good drainage and to be constructed in accordance with the standards.

Road Drainage Control Structures (DCS) attachment:

Access Additional Attachments

Additional Attachment(s):

Section 2 - New or Reconstructed Access Roads

Will new roads be needed? YES

New Road Map:

Zeppo_5_Federal_Com_27H_New_Road_plat_20180801114518.pdf

New road type:

Length:

(ft)

Width (ft):

Width (ft):

Year/Corp of Engineer (VOE) for road design:

ACOE Permit Number(s):

Operator Name: COG OPERATING LLC

Well Name: ZEPP0 5 FEDERAL COM

Well Number: 27H

New road design with file:

New road access plan/turnout plan:

New road access plan/turnout file prepared:

New road access plan attachment:

New_Access_Road_Plan_20180221123627.pdf

Access road engineering design:

Access road engineering design attachment:

Access road design type:

Access road design type:

Access road design type description:

Access road design type description:

Access road design type description:

Access road design type description:

Access other construction information:

Access miscellaneous information:

Number of access turnouts:

Access turnout map:

Drainage Control

New road drainage structure:

Drainage Control comments:

Road Drainage Control Structures (DCS) description:

Road Drainage Control Structures (DCS) attachment:

Access Additional Attachments

Additional Attachment(s):

Section 3 - Location of Existing Wells

Existing Wells Map? YES

Attach Well map:

Zeppo_5_Federal_Com_27H_1mileRadius_Map_20180801114254.pdf

Existing Wells description:

Operator Name: COG OPERATING LLC

Well Name: ZEPP0 5 FEDERAL COM

Well Number: 27H

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

Submit or defer a Proposed Production Facilities plan? SUBMIT

Production Facilities description: If the well is productive, contemplated facilities will be as follows: Two (2) proposed flowlines, will follow an archaeologically approved route to the Zeppo 5 Fed Com #15H Federal Tank Battery located in Section 5 in T17S R32E. The flowlines will be SDR 7 3" poly line laid on the surface and will be approximately 2640 feet in length. Normal working pressure of the flowlines will be below 70 psi and carry a mixture of produced oil, water, and gas. Flowlines will follow existing well-traveled or proposed roads. The tank battery and facilities including all flow lines and piping will be installed according to API specifications.

Production Facilities map:

Zeppo_5_Federal_Com_27H_Flowlines_Map_20180801114306.pdf

Section 5 - Location and Types of Water Supply

Water Source Table

Water source use type: DUST CONTROL,
INTERMEDIATE/PRODUCTION CASING, SURFACE CASING
Describe type:

Water source type: GW WELL

Source latitude:

Source longitude:

Source datum:

Water source permit type: WATER WELL

Source land ownership: PRIVATE

Water source transport method: PIPELINE,TRUCKING

Source transportation land ownership: PRIVATE

Water source volume (barrels): 8000

Source volume (acre-feet): 1.0311447

Source volume (gal): 336000

Water source and transportation map:

Caswell_Ranch_Water_Supply_20180221122333.pdf

Loco_Hills_Water_Disposal_Co_Water_Supply_20180221122340.pdf

Water source comments: The well will be drilled with combination brine and fresh water mud system as outlined in the drilling program. Water will be obtained from commercial water stations in the area and hauled to location by transport truck over the existing and proposed access roads shown in Vicinity Map. A fresh water source is nearby and fast line may be laid along existing road ROW's and fresh water pumped to the well. Water will originate from 1 and/or all of the 3 private wells location described on the attached "Caswell Ranch Water Supply" Map. No water well will be drilled on the location. A secondary water source will be from private wells location depicted on the attached "Loco Hills Water Disposal Co" map attached to this APD. James R. Maloney, 575-677-2118. No water well will be drilled on location.

New water well? NO

New Water Well Info

Well latitude:

Well Longitude:

Well datum:

Operator Name: COG OPERATING LLC

Well Name: ZEPP0 5 FEDERAL COM

Well Number: 27H

Well target aquifer:

Est. depth to top of aquifer(ft):

Est thickness of aquifer:

Aquifer comments:

Aquifer documentation:

Well depth (ft):

Well casing type:

Well casing outside diameter (in.):

Well casing inside diameter (in.):

New water well casing?

Used casing source:

Drilling method:

Drill material:

Grout material:

Grout depth:

Casing length (ft.):

Casing top depth (ft.):

Well Production type:

Completion Method:

Water well additional information:

State appropriation permit:

Additional information attachment:

Section 6 - Construction Materials

Construction Materials description: Surfacing material will consist of native caliche. Caliche will be obtained from the actual well site if available. Secondary candidate source will be Caswell Ranch owned Caliche Pit located in NESE of Sec 9, T17S, R32E. A third candidate source will be NMSLO Caliche Pit located in S2/SW4 of Sec 32, T16S, R30E.

Construction Materials source location attachment:

Construction_Turn_Over_Procedure_20180221122436.pdf

Caswell_Ranch_Caliche_Pit_20180221122509.pdf

NMSLO_Caliche_Pit_20180221122516.pdf

Section 7 - Methods for Handling Waste

Waste type: PRODUCED WATER

Waste content description: Produced Water

Amount of waste: 100 barrels

Waste disposal frequency : Daily

Safe containment description: Dteel Tanks

Safe containmant attachment:

Waste disposal type: HAUL TO COMMERCIAL FACILITY

Disposal location ownership: STATE

Disposal type description:

Disposal location description: NMOCD approved commercial disposal facility. R360's disposal site located at 4507 West Carlsbad Highway, Hobbs, NM 88240.

Operator Name: COG OPERATING LLC

Well Name: ZEPP0 5 FEDERAL COM

Well Number: 27H

Waste type: GARBAGE

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

Amount of waste: 100 pounds

Waste disposal frequency : Weekly

Safe containment description: Trash Bin

Safe containmant attachment:

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

Disposal type description:

Disposal location description: Garbage and trash to be collected in trash bin and hauled to Lea Landfill LLC. Located at mile marker 64, Highway 62-180 East, PO Box 3247, Carlsbad, NM 88221. No toxic waste or hazardous chemicals will be produced by this operation.

Waste type: SEWAGE

Waste content description: Human waste and grey water

Amount of waste: 100 gallons

Waste disposal frequency : Weekly

Safe containment description: Portable septic system and/or portable waste gathering system.

Safe containmant attachment:

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

Disposal type description:

Disposal location description: Hauled to NMOCD approved waste disposal facility.

Waste type: DRILLING

Waste content description: Drill cuttings and drilling fluids

Amount of waste: 100 pounds

Waste disposal frequency : Daily

Safe containment description: Closed Loop System

Safe containmant attachment:

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

Disposal type description:

Disposal location description: R360's disposal site located at 4507 West Carlsbad Highway, Hobbs, NM 88240.

Reserve Pit

Reserve Pit being used? NO

Operator Name: COG OPERATING LLC

Well Name: ZEPP0 5 FEDERAL COM

Well Number: 27H

Temporary disposal of produced water into reserve pit?

Reserve pit length (ft.)

Reserve pit width (ft.)

Reserve pit depth (ft.)

Reserve pit volume (cu. yd.)

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

Reserve pit liner

Reserve pit liner specifications and installation description

Cuttings Area

Cuttings Area being used? NO

Are you storing cuttings on location? YES

Description of cuttings location Description of cuttings location: Closed Loop Mud System: Roll-off Style Mud Box

Cuttings area length (ft.)

Cuttings area width (ft.)

Cuttings area depth (ft.)

Cuttings area volume (cu. yd.)

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

WCuttings area liner

Cuttings area liner specifications and installation description

Section 8 - Ancillary Facilities

Are you requesting any Ancillary Facilities?: NO

Ancillary Facilities attachment:

Comments:

Section 9 - Well Site Layout

Well Site Layout Diagram:

Zeppo_5_Federal_Com_27H_Well_Site_plat_20180801114428.pdf

Zeppo_5_Federal_Com_27H_Interim_Reclamation_plat_20180801114437.pdf

Comments:

Operator Name: COG OPERATING LLC

Well Name: ZEPP0 5 FEDERAL COM

Well Number: 27H

Section 10 - Plans for Surface Reclamation

Type of disturbance: New Surface Disturbance

Multiple Well Pad Name: ZEPP0 5 FEDERAL COM

Multiple Well Pad Number: 7

Recontouring attachment:

Drainage/Erosion control construction: No sedimentation or erosion control will be necessary on this location as it is generally flat with little to no slope or cut and fill.

Drainage/Erosion control reclamation: No sedimentation or erosion control will be necessary on this location as it is generally flat with little to no slope or cut and fill.

Well pad proposed disturbance (acres): 3.27	Well pad interim reclamation (acres): 0.07	Well pad long term disturbance (acres): 2.36
Road proposed disturbance (acres): 0.24	Road interim reclamation (acres): 0	Road long term disturbance (acres): 0.24
Powerline proposed disturbance (acres): 0.12	Powerline interim reclamation (acres): 0	Powerline long term disturbance (acres): 0.12
Pipeline proposed disturbance (acres): 1.25	Pipeline interim reclamation (acres): 0	Pipeline long term disturbance (acres): 1.25
Other proposed disturbance (acres): 0	Other interim reclamation (acres): 0	Other long term disturbance (acres): 0
Total proposed disturbance: 4.88	Total interim reclamation: 0.07	Total long term disturbance: 3.97

Disturbance Comments:

Reconstruction method: After well is completed, the pad will be downsized by reclaiming the areas not needed for production operations. The portions of the pad that are not needed for production operations will be re-contoured to its original state as much as possible. The caliche that is removed will be reused to either build another pad site or for road repairs within the lease.

Topsoil redistribution: The stockpiled topsoil will be spread out on reclaimed area and reseeded with a BLM approved seed mixture.

Soil treatment: Interim reclamation as identified during on-site.

Existing Vegetation at the well pad: Grassland area with sandy topsoil. Vegetation is moderately sparse with Native prairie grasses, some mesquite and shinnery oak.

Existing Vegetation at the well pad attachment:

Existing Vegetation Community at the road: Grassland area with sandy topsoil. Vegetation is moderately sparse with Native prairie grasses, some mesquite and shinnery oak.

Existing Vegetation Community at the road attachment:

Existing Vegetation Community at the pipeline: Grassland area with sandy topsoil. Vegetation is moderately sparse with Native prairie grasses, some mesquite and shinnery oak.

Existing Vegetation Community at the pipeline attachment:

Existing Vegetation Community at other disturbances: Grassland area with sandy topsoil. Vegetation is moderately sparse with Native prairie grasses, some mesquite and shinnery oak.

Existing Vegetation Community at other disturbances attachment:

Non native seed used? NO

Operator Name: COG OPERATING LLC

Well Name: ZEPP0 5 FEDERAL COM

Well Number: 27H

Non native seed description:

Seedling transplant description:

Will seedlings be transplanted for this project? NO

Seedling transplant description attachment:

Will seed be harvested for use in site reclamation? NO

Seed harvest description:

Seed harvest description attachment:

Seed Management

Seed Table

Seed type:

Seed source:

Seed name:

Source name:

Source address:

Source phone:

Seed cultivar:

Seed use location:

PLS pounds per acre:

Proposed seeding season:

Seed Summary

Total pounds/Acre:

Seed Type	Pounds/Acre
-----------	-------------

Seed reclamation attachment:

Operator Contact/Responsible Official Contact Info

First Name:

Last Name:

Phone:

Email:

Seedbed prep:

Seed BMP:

Seed method:

Existing invasive species? NO

Existing invasive species treatment description:

Existing invasive species treatment attachment:

Operator Name: COG OPERATING LLC

Well Name: ZEPP0 5 FEDERAL COM

Well Number: 27H

Weed treatment plan description: Approved EPA and BLM requirements and policies for weed control methods will be followed.

Weed treatment plan attachment:

Monitoring plan description: Evaluation of growth will be made after the completion of one full growing season after seeding. -OR- BLM representative will be contacted prior to commencing construction of well pad and road. BLM representative will also be contacted prior to commencing reclamation work.

Monitoring plan attachment:

Success standards: 80% coverage by 2nd growing season of native species with less than 5% invasive species.

Pit closure description: N/A

Pit closure attachment:

Section 11 - Surface Ownership

Disturbance type: WELL PAD

Describe:

Surface Owner: PRIVATE OWNERSHIP

Other surface owner description:

BIA Local Office:

BOR Local Office:

COE Local Office:

DOD Local Office:

NPS Local Office:

State Local Office:

Military Local Office:

USFWS Local Office:

Other Local Office:

USFS Region:

USFS Forest/Grassland:

USFS Ranger District:

Operator Name: COG OPERATING LLC

Well Name: ZEPP0 5 FEDERAL COM

Well Number: 27H

Fee Owner: OLANE CASWELL

Fee Owner Address: 1702 GILLHAM DR

Phone: (806)637-7004

Email:

Surface use plan certification: YES

Surface use plan certification document:

Zeppo_5_Federal_Com_27H_SUPO_Certification_20180221122206.pdf

Surface access agreement or bond: Agreement

Surface Access Agreement Need description: A Surface Use Agreement has been reached with the Surface Owner.

Surface Access Bond BLM or Forest Service: BLM

BLM Surface Access Bond number:

USFS Surface access bond number:

Disturbance type: PIPELINE

Describe:

Surface Owner: PRIVATE OWNERSHIP

Other surface owner description:

BIA Local Office:

BOR Local Office:

COE Local Office:

DOD Local Office:

NPS Local Office:

State Local Office:

Military Local Office:

USFWS Local Office:

Other Local Office:

USFS Region:

USFS Forest/Grassland:

USFS Ranger District:

Operator Name: COG OPERATING LLC

Well Name: ZEPP0 5 FEDERAL COM

Well Number: 27H

Fee Owner: OLANE CASWELL

Fee Owner Address: 1702 GILLHAM DR

Phone: (806)637-7004

Email:

Surface use plan certification: YES

Surface use plan certification document:

Zeppo_5_Federal_Com_27H_SUPO_Certification_20180221122213.pdf

Surface access agreement or bond: Agreement

Surface Access Agreement Need description: A Surface Use Agreement has been reached with the Surface Owner.

Surface Access Bond BLM or Forest Service:

BLM Surface Access Bond number:

USFS Surface access bond number:

Disturbance type: EXISTING ACCESS ROAD

Describe:

Surface Owner: PRIVATE OWNERSHIP

Other surface owner description:

BIA Local Office:

BOR Local Office:

COE Local Office:

DOD Local Office:

NPS Local Office:

State Local Office:

Military Local Office:

USFWS Local Office:

Other Local Office:

USFS Region:

USFS Forest/Grassland:

USFS Ranger District:

Operator Name: COG OPERATING LLC

Well Name: ZEPP0 5 FEDERAL COM

Well Number: 27H

Fee Owner: OLANE CASWELL

Fee Owner Address: 1702 GILLHAM DR

Phone: (806)637-7004

Email:

Surface use plan certification: YES

Surface use plan certification document:

Zeppo_5_Federal_Com_27H_SUPO_Certification_20180221122221.pdf

Surface access agreement or bond: Agreement

Surface Access Agreement Need description: A Surface Use Agreement has been reached with the Surface Owner.

Surface Access Bond BLM or Forest Service:

BLM Surface Access Bond number:

USFS Surface access bond number:

Disturbance type: NEW ACCESS ROAD

Describe:

Surface Owner: PRIVATE OWNERSHIP

Other surface owner description:

BIA Local Office:

BOR Local Office:

COE Local Office:

DOD Local Office:

NPS Local Office:

State Local Office:

Military Local Office:

USFWS Local Office:

Other Local Office:

USFS Region:

USFS Forest/Grassland:

USFS Ranger District:

Operator Name: COG OPERATING LLC

Well Name: ZEPP0 5 FEDERAL COM

Well Number: 27H

Fee Owner: OLANE CASWELL

Fee Owner Address: 1702 GILLHAM DR

Phone: (806)637-7004

Email:

Surface use plan certification: YES

Surface use plan certification document:

Zeppo_5_Federal_Com_27H_SUPO_Certification_20180221123947.pdf

Surface access agreement or bond: Agreement

Surface Access Agreement Need description: A Surface Use Agreement has been reached with the Surface Owner.

Surface Access Bond BLM or Forest Service:

BLM Surface Access Bond number:

USFS Surface access bond number:

Section 12 - Other Information

Right of Way needed? NO

Use APD as ROW?

ROW Type(s):

ROW Applications

SUPO Additional Information: 1. It will be necessary to run electric power if this well is productive. Power will be provided by CVE. There will be no necessary electric line construction for this well. CVE operates an existing primary line parallel to the well pad; therefor no poles will be set off the well pad disturbance. There is no permanent or live water in the immediate area. 2. There are no dwellings within 2 miles of this location. 3. If needed, a Cultural Resources Examination is being prepared by Boone Arch Services of New Mexico, LLC. Carlsbad, NM, 88220. 506 E Chapman Rd., phone # 575.887.7667 and the results will be forwarded to your office in the near future. Otherwise, COG will be participating in the Permian Basin MOA Program.

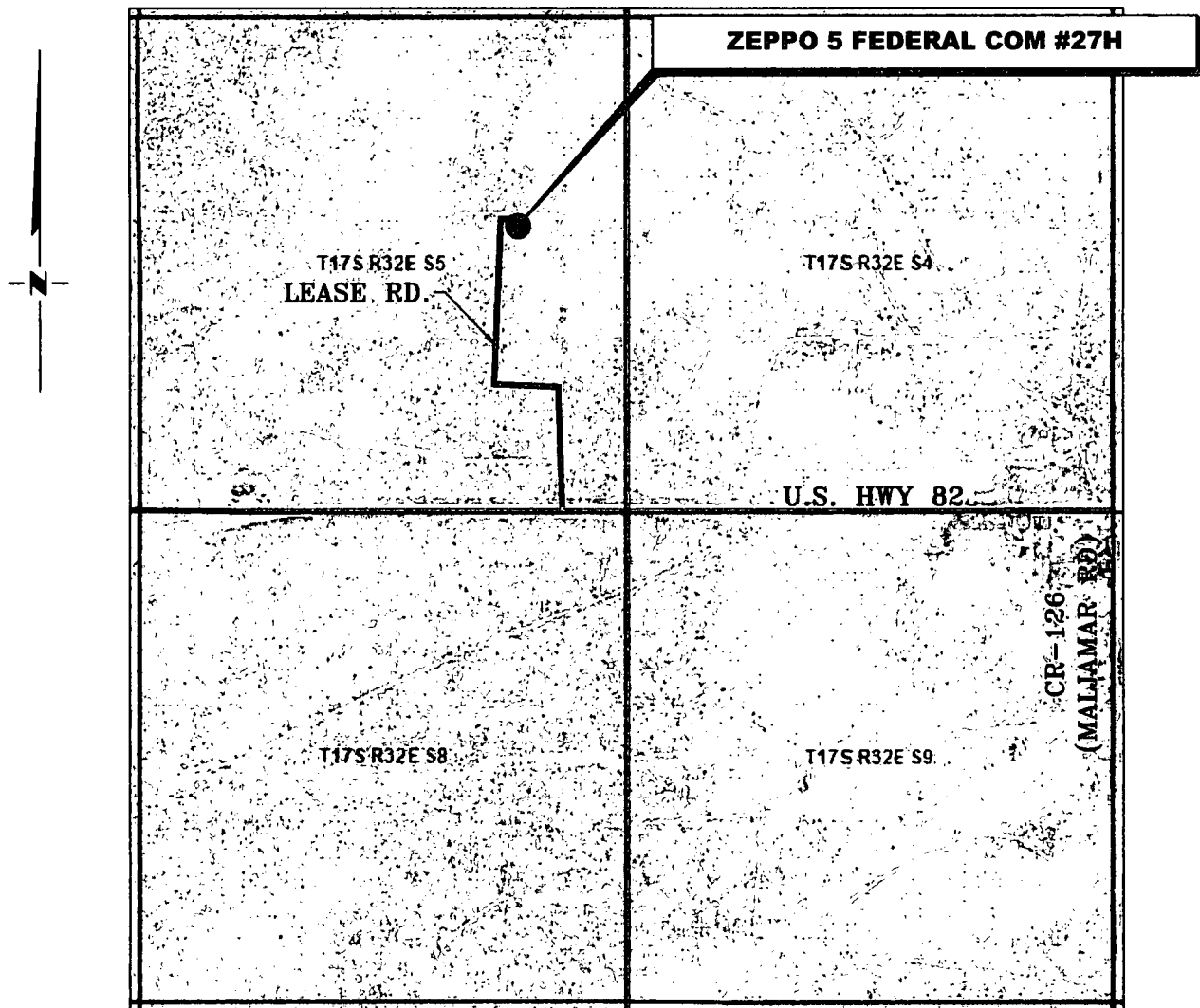
Use a previously conducted onsite? YES

Previous Onsite Information: Onsite information 05/17/2018 is will be used by BLM. Title held by COG. Eriqon Chavez (RPS)

Other SUPO Attachment

VICINITY MAP

NOT TO SCALE



**SECTION 5, TWP. 17 SOUTH, RGE. 32 EAST,
N. M. P. M., LEA COUNTY, NEW MEXICO**

OPERATOR: COG Operating, LLC

LEASE: Zeppo 5 Federal Com

WELL NO.: 27H

LOCATION: 2300' FNL & 1120' FEL

ELEVATION: 4113'

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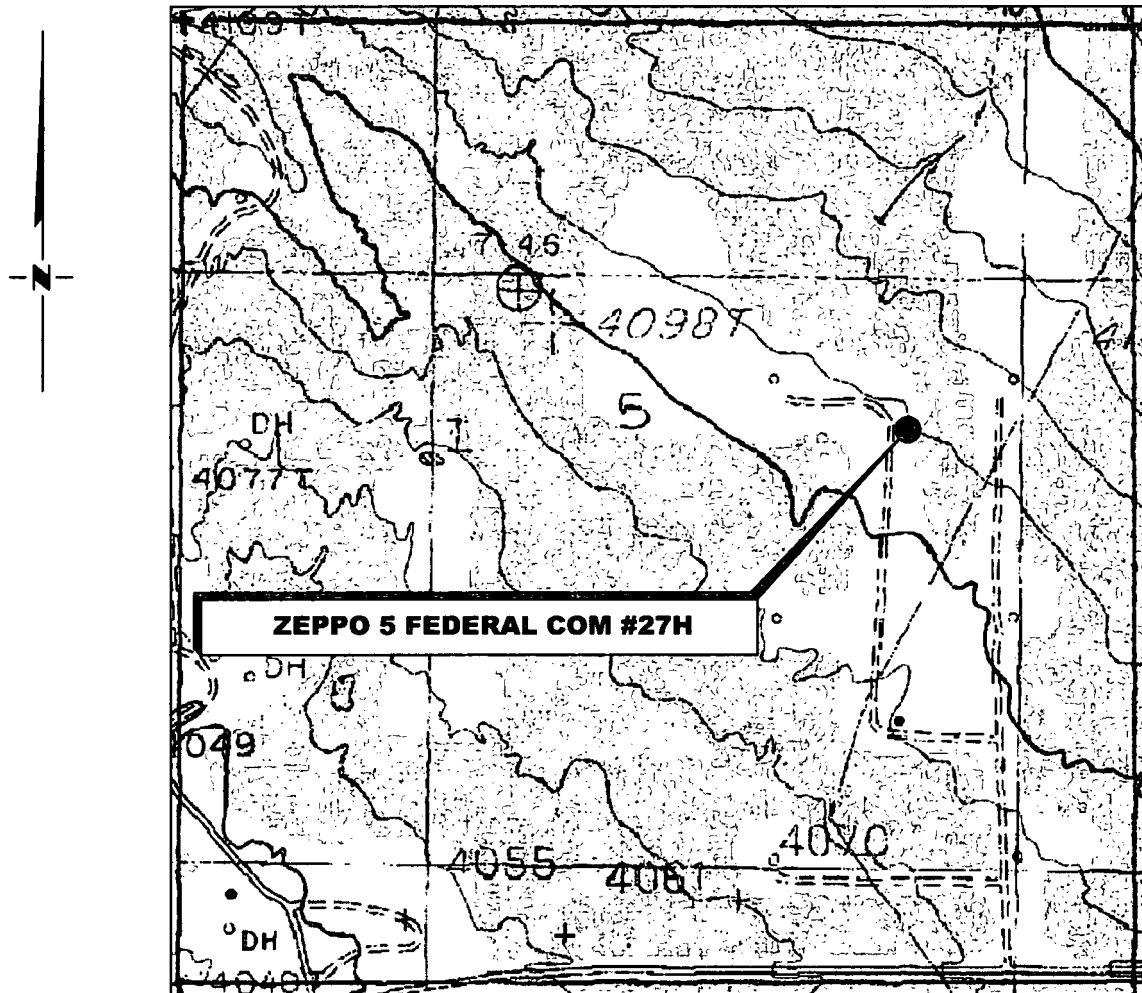
NO.	REVISION	DATE
JOB NO.: LS1608273H		
DWG. NO.: 1608273VM		

RRC

308 W. BROADWAY ST., HOBBS, NM 88240 (575) 964-8200

SCALE: N. T. S.
DATE: 6-4-18
SURVEYED BY: BC/AJ
DRAWN BY: GA
APPROVED BY: RMH
SHEET: 1 OF 1

LOCATION VERIFICATION MAP



*SECTION 5, TWP. 17 SOUTH, RGE. 32 EAST,
N. M. P. M., LEA CO., NEW MEXICO*

OPERATOR: COG Operating, LLC
LEASE: Zeppo 5 Federal Com
WELL NO.: 27H
ELEVATION: 4113'

LOCATION: 2300' FNL & 1120' FEL
CONTOUR INTERVAL: 10'
USGS TOPO. SOURCE MAP:
Maljamar, NM (P. E. 1985)

Copyright 2016 - All Rights Reserved

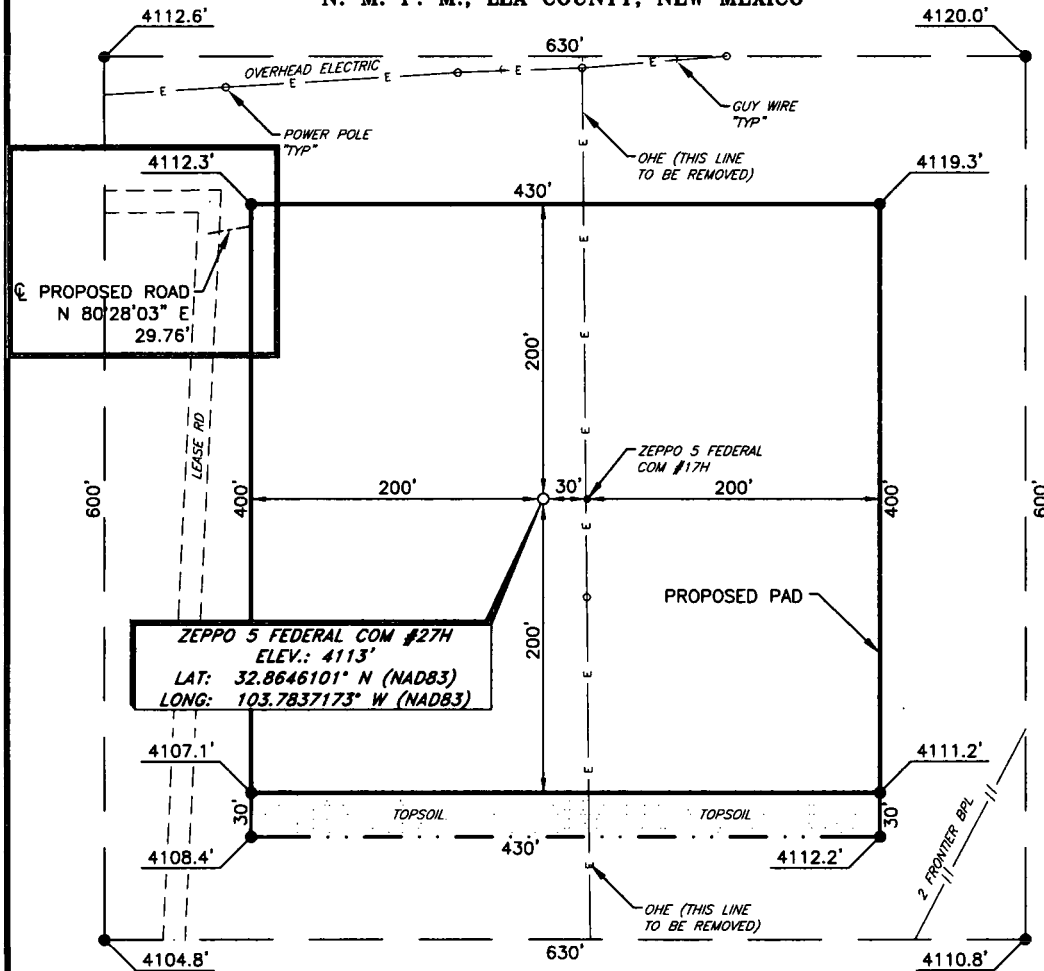
NO.	REVISION	DATE
JOB NO.: LS1608273H		
DWG. NO.: 1608273LVM		

RRC

308 W. BROADWAY ST., HOBBS, NM 88240 (575) 964-8200

SCALE: N. T. S.
DATE: 6-4-2018
SURVEYED BY: BC/AJ
DRAWN BY: GA
APPROVED BY: RMH
SHEET: 1 OF 1

COG OPERATING, LLC
ZEPPU 5 FEDERAL COM #27H
(2300' FNL & 1120' FEL)
SECTION 5, T17S, R32E
N. M. P. M., LEA COUNTY, NEW MEXICO



DIRECTIONS TO LOCATION

From the intersection of US HWY-82 and CR-126 (Maljamar Rd.);
 Go West on US HWY-82 approx. 1.1 miles to a lease road on the right;
 Turn right and go North approx. 0.2 miles to lease road on the left;
 Turn left and go West approx. 0.1 miles to a curve to the right;
 Turn right on curve and go North for approx. 0.3 miles to location on the right.

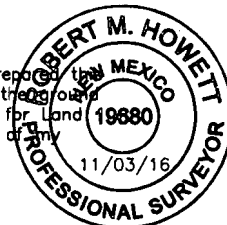


I, R. M. Howett, a N. M. Professional Surveyor, hereby certify that I prepared this unclassified survey of a well location from an actual survey made on the ground under my direct supervision, said survey and plat meet the Min. Stds. for Land Surveying in the State of N. M. and are true and correct to the best of my knowledge and belief.

Robert M. Howett
 Robert M. Howett

NM PS 19680

SCALE: 1" = 100'
 0 50 100
 BEARINGS ARE
 NAD 83 GRID - NM EAST
 DISTANCES ARE GROUND



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NO.	REVISION	DATE
JOB NO.:	LS1608273H	
DWG. NO.:	1608273PAD	

RRC

308 W. BROADWAY ST., HOBBS, NM 88240 (575) 964-8200

SCALE: 1" = 100'
DATE: 6-4-18
SURVEYED BY: BC/AJ
DRAWN BY: GA
APPROVED BY: RMH
SHEET: 1 OF 1

NEW ACCESS ROAD PLAN

1. Proposed Access Road:

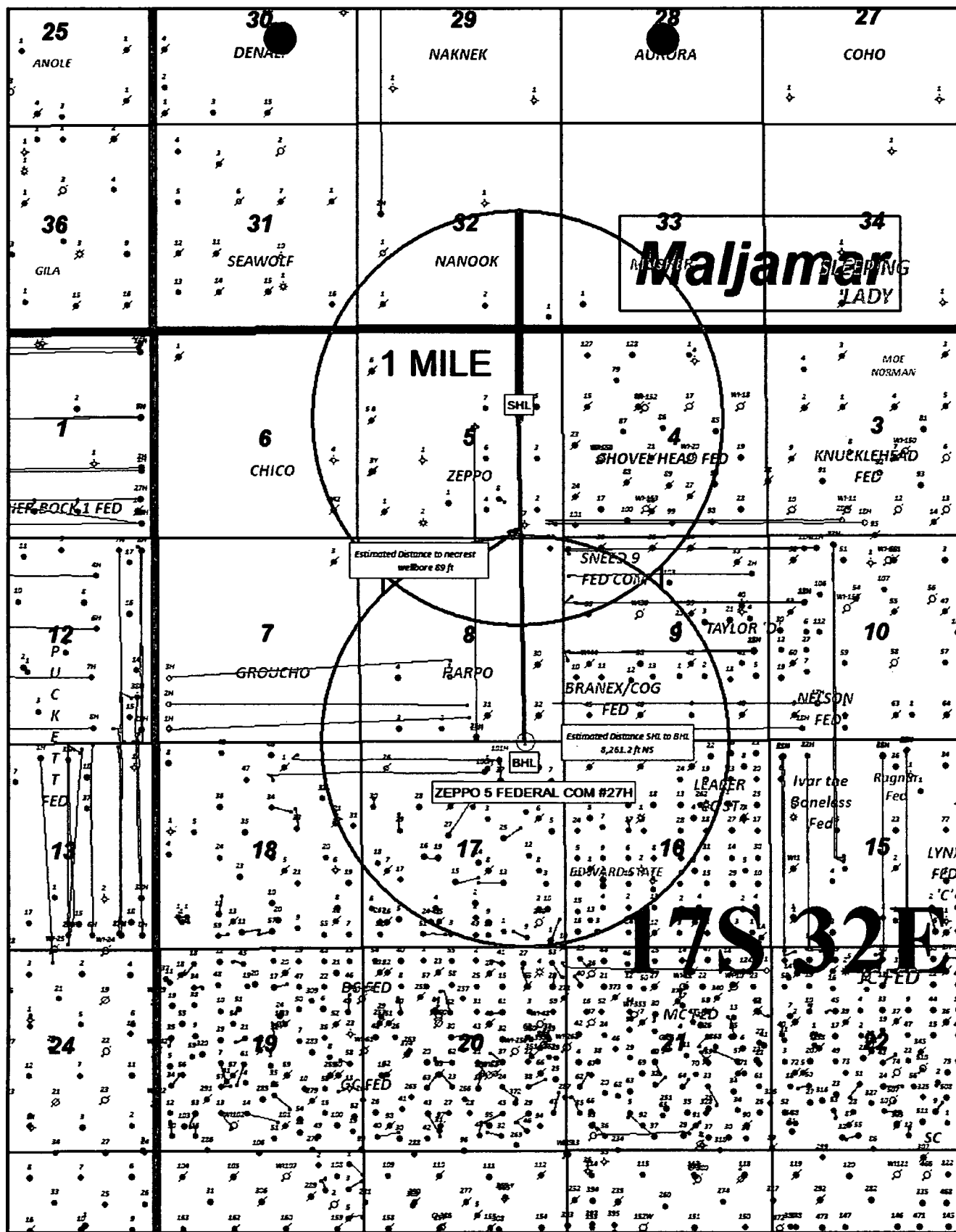
The Access Road Plat shows the footage of new access road will be required for this location. The new access road will be constructed as follows:

- A. The maximum width of the running surface will be 20'. The road will be crowned, ditched and constructed of 6" rolled and compacted caliche. Ditches will be at 3:1 slope and 4 feet wide. Water will be diverted where necessary to avoid ponding, prevent erosion, maintain good drainage, and to be consistent with local drainage patterns.
- B. The average grade will be less than 1%.
- C. No turnouts are planned.
- D. No culverts, cattleguard, gates, low water crossings or fence cuts are necessary.
- E. Surfacing material will consist of native caliche. Caliche will be obtained from the actual well site if available. Secondary and Tertiary candidate sources are identified the "Offsite topsoil source description" in Section 2 of the SUPO.

2. Source of Construction Materials and Location "Turn-Over" Procedure:

Obtaining caliche: The primary way of obtaining caliche to build locations and roads will be by "turning over" the location. This means, caliche will be obtained from the actual well sight. A caliche permit will be obtained from BLM prior to pushing up any caliche. 2400 cu. Yards is max amount of caliche needed for pad and roads. Amount will vary for each pad. The procedure below has been approved by BLM personnel:

- A. The top 6 inches of topsoil is pushed off and stockpiled along the side of the location.
- B. An approximate 120' X 120' area is used within the proposed well site to remove caliche.
- C. Subsoil is removed and piled alongside the 120' by 120' area within the pad site.
- D. When caliche is found, material will be stock piled within the pad site to build the location and road.
- E. Then subsoil is pushed back in the hole and caliche is spread accordingly across entire location and road.
- F. Once well is drilled, the stock piled top soil will be used for interim reclamation and spread along areas where caliche is picked up and the location size is reduced. Neither caliche nor subsoil will be stock piled outside of the well pad. Topsoil will be stockpiled along the edge of the pad as depicted in attached plat.




CONCHO

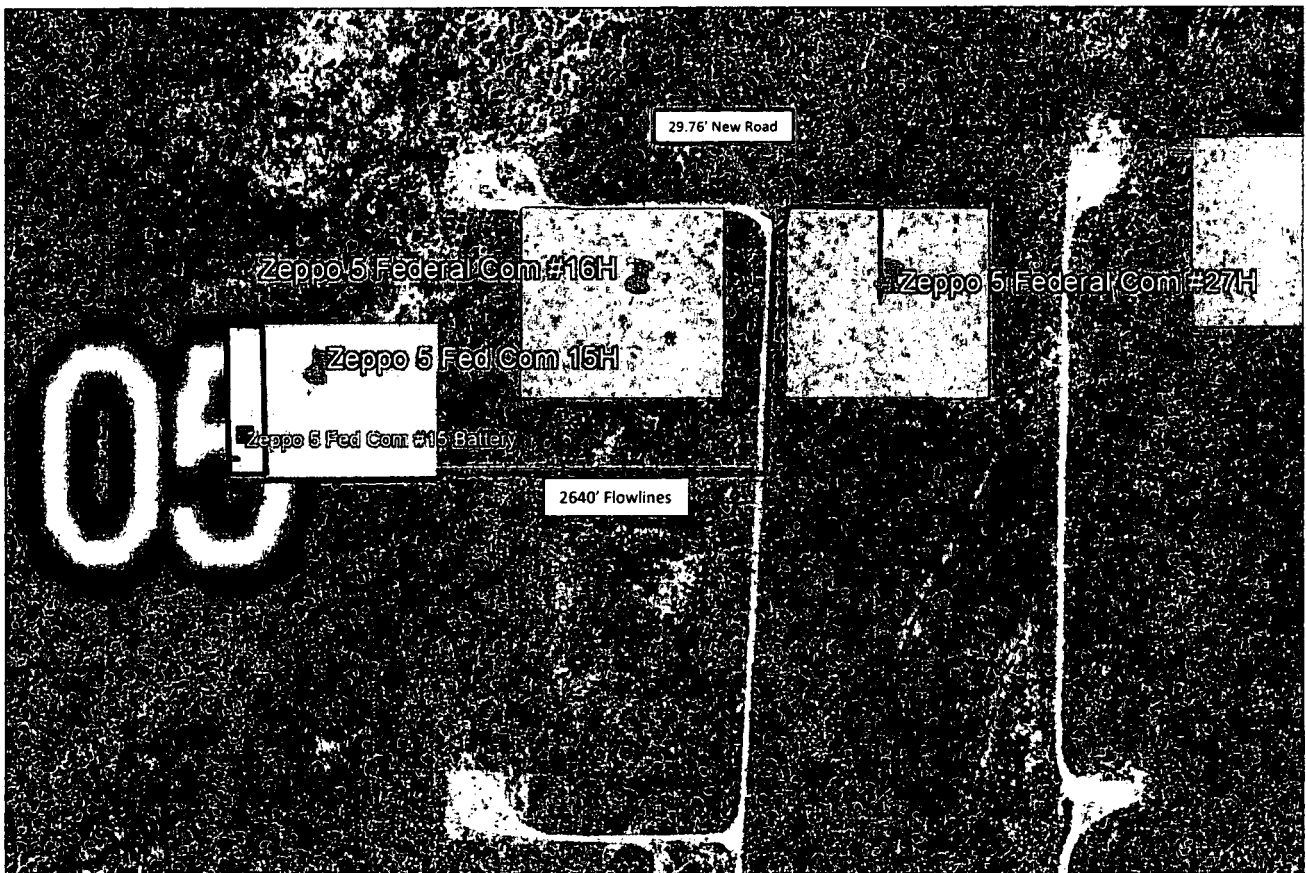
SENM Shelf Area
 Lea County, New Mexico

Zeppo 5 Federal Com #27H

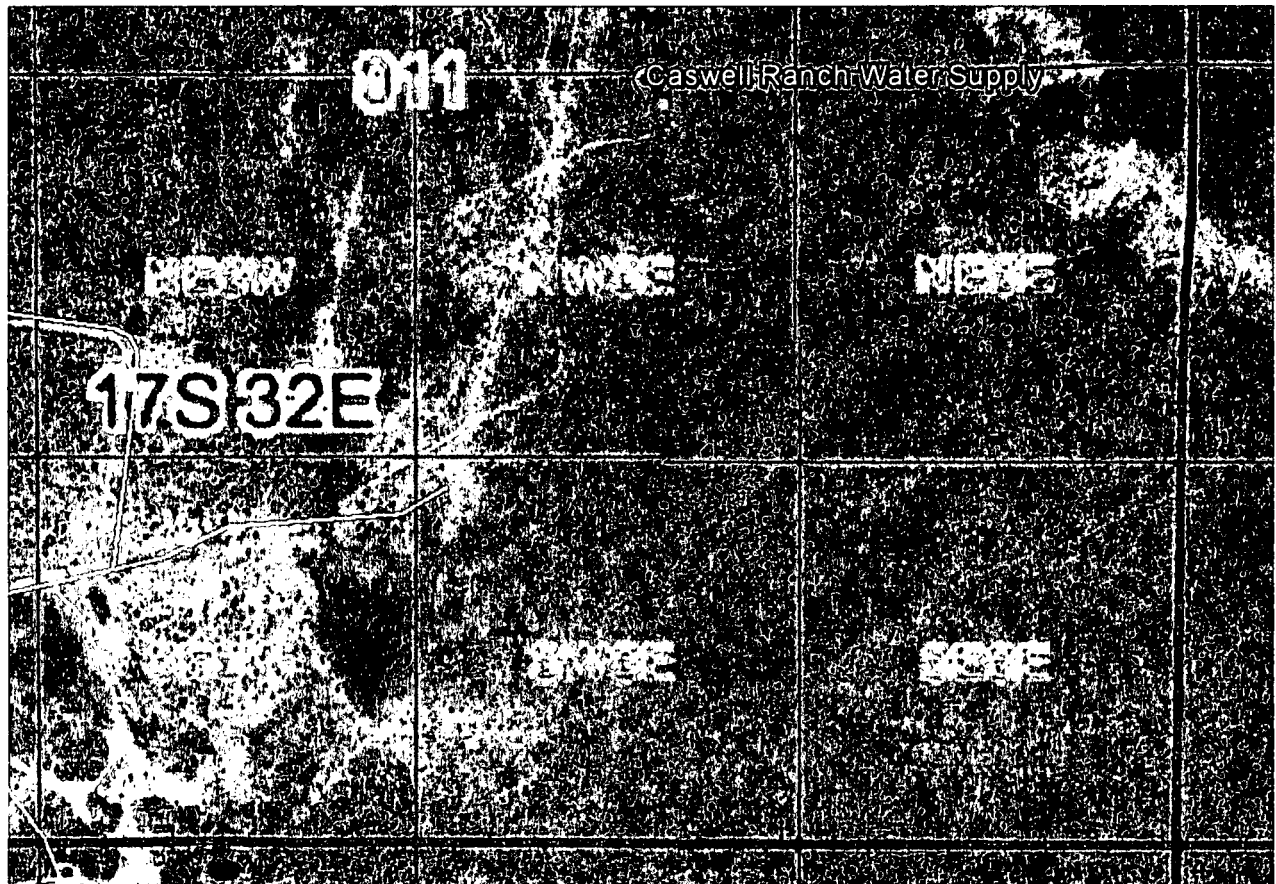
SHL: 2300' FNL 1120' FEL, SEC. 5 T17S-R32E, UNIT H
 BHL: 10' FSL 990' FEL, SEC. 8 T17S-R32E, UNIT P

Author: 61 B.R. Howell	Wells: All Wells Scale: 1:2000	Date: 7/21/2018
AOI: DL_SHELF		
File Path: J:\DLData\Draw\SENM\Map\ZEPP05FEDCOM_27H_Revized.gmp		

Zeppo 5 Federal Com #27H Surface Flowlines Map



Caswell Ranch Water Supply Map



Loco Hills Water Disposal Co. Water Well Map



WELL SITE AND ROAD CONSTRUCTION

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- D. When caliche is found, material will be stock piled within the pad site to build the location and road.**
- E. Then subsoil is pushed back in the hole and caliche is spread accordingly across entire location and road.**
- F. Once well is drilled, the stock piled top soil will be used for interim reclamation and spread along areas where caliche is picked up and the location size is reduced. Neither caliche nor subsoil will be stock piled outside of the well pad. Topsoil will be stockpiled along the edge of the pad as depicted in attached plat.**
 - In the event that no caliche is found onsite, caliche will be hauled in from a BLM approved caliche pit.

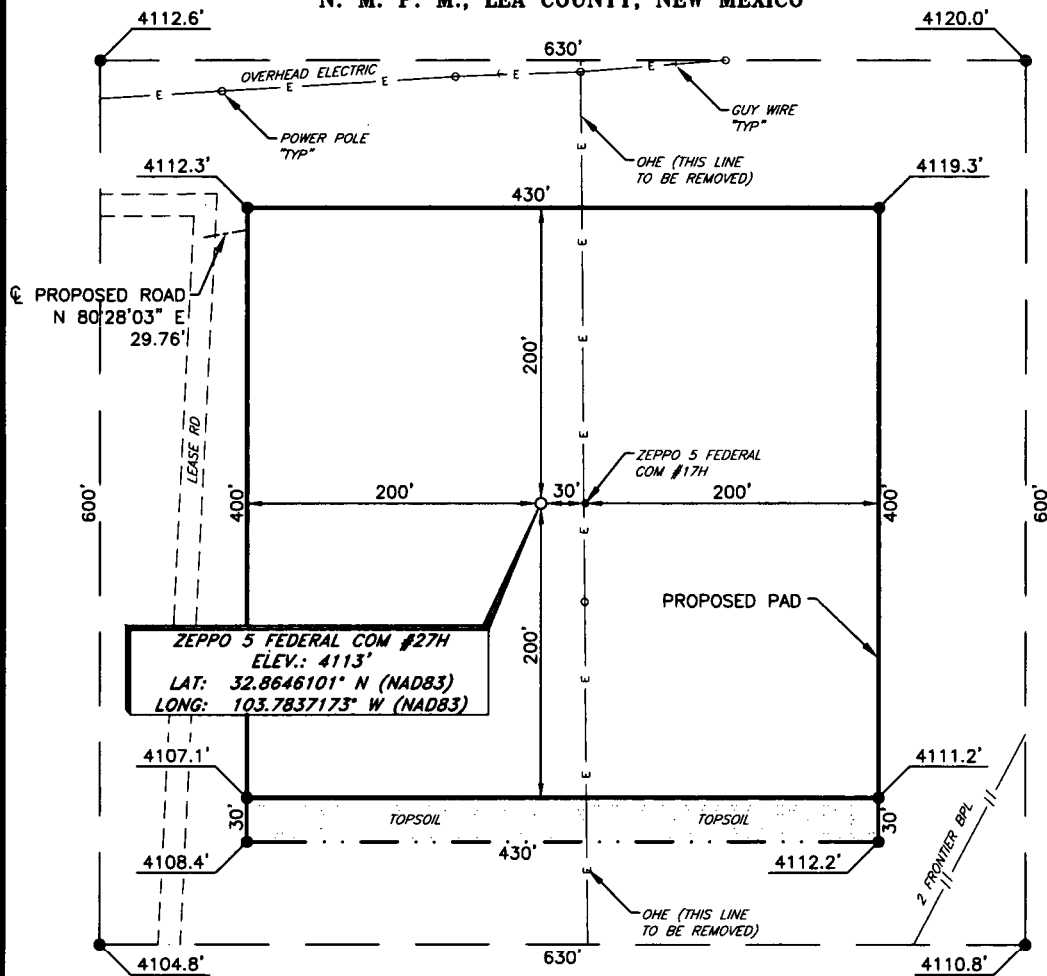
Caswell Ranch Caliche Pit Map



NMSLO Caliche Pit



COG OPERATING, LLC
ZEPPU 5 FEDERAL COM #27H
(2300' FNL & 1120' FEL)
SECTION 5, T17S, R32E
N. M. P. M., LEA COUNTY, NEW MEXICO



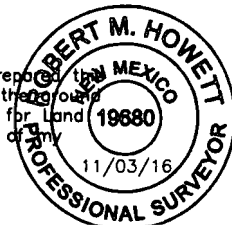
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I, R. M. Howett, a N. M. Professional Surveyor, hereby certify that I prepared this unclassified survey of a well location from an actual survey made on the ground under my direct supervision, said survey and plat meet the Min. Stds. for Land Surveying in the State of N. M. and are true and correct to the best of my knowledge and belief.

Robert M. Howett
 Robert M. Howett NM PS 19680

SCALE: 1" = 100'
 0 50 100
 BEARINGS ARE
 NAD 83 GRID - NM EAST
 DISTANCES ARE GROUND



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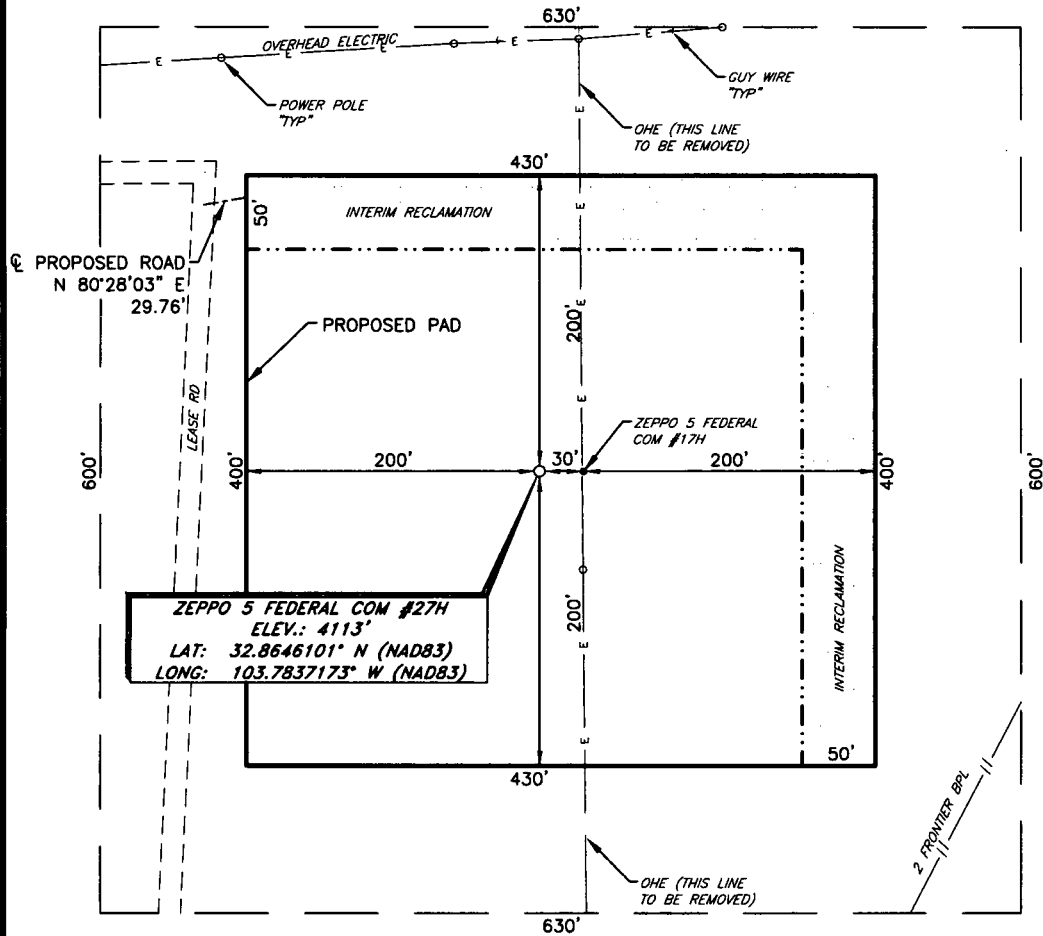
NO.	REVISION	DATE
JOB NO.:	LS1608273H	
DWG. NO.:	1608273PAD	

RRC

308 W. BROADWAY ST., HOBBS, NM 88240 (575) 964-8200

SCALE: 1" = 100'
 DATE: 6-4-18
 SURVEYED BY: BC/AJ
 DRAWN BY: GA
 APPROVED BY: RMH
 SHEET: 1 OF 1

**COG OPERATING, LLC
INTERIM RECLAMATION
ZEPP0 5 FEDERAL COM #27H
(2300' FNL & 1120' FEL)
SECTION 5, T17S, R32E
N. M. P. M., LEA COUNTY, NEW MEXICO**



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0 50 100
BEARINGS ARE
NAD 83 GRID - NM EAST
DISTANCES ARE GROUND

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NO.	REVISION	DATE
JOB NO.:	LS1608273H	
DWG. NO.:	1608273REC	

RRC

308 W. BROADWAY ST., HOBBS, NM 88240 (575) 964-8200

SCALE: 1" = 100'
DATE: 6-4-18
SURVEYED BY: BC/AJ
DRAWN BY: GA
APPROVED BY: RMH
SHEET: 1 OF 1



February 21, 2018

Bureau of Land Management
620 E. Greene St.
Carlsbad, NM 8820

**RE: Zeppo 5 Federal Com #27H
SL: 2490' FNL & 1250' FEL
Section 5, T17S, R32E, Unit H**

To Whom It May Concern:

COG Operating LLC has a Private Surface Owner Agreement with Olane Caswell whose address is 1702 Gillham Rd., Brownfield, TX 79316, for the Zeppo 5 Federal Com 27H well pad, pipelines and access road in Unit P of Section 5, T17S, R32E, Lea County, New Mexico.

Sincerely,

A handwritten signature in black ink, appearing to read "Robyn M. Russell", written over a horizontal line.

Robyn M. Russell
Regulatory Analyst
COG Operating LLC
Ph: (432) 685-4385
Email: Rrussell@concho.com



February 21, 2018

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620 E. Greene St.
Carlsbad, NM 8820

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Section 5, T17S, R32E, Unit H

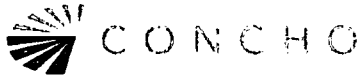
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Robyn M. Russell
Regulatory Analyst
COG Operating LLC
Ph: (432) 685-4385
Email: Russell@concho.com



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

PWD Data Report

10/22/2018

Section 1 - General

Would you like to address long-term produced water disposal? NO

Section 2 - Lined Pits

Would you like to utilize Lined Pit PWD options? NO

Produced Water Disposal (PWD) Location:

PWD surface owner:

PWD disturbance (acres):

Lined pit PWD on or off channel:

Lined pit PWD discharge volume (bbl/day):

Lined pit specifications:

Pit liner description:

Pit liner manufacturers information:

Precipitated solids disposal:

Describe precipitated solids disposal:

Precipitated solids disposal permit:

Lined pit precipitated solids disposal schedule:

Lined pit precipitated solids disposal schedule attachment:

Lined pit reclamation description:

Lined pit reclamation attachment:

Leak detection system description:

Leak detection system attachment:

Lined pit Monitor description:

Lined pit Monitor attachment:

Lined pit: do you have a reclamation bond for the pit?

Is the reclamation bond a rider under the BLM bond?

Lined pit bond number:

Lined pit bond amount:

Additional bond information attachment:

Section 3 - Unlined Pits

Would you like to utilize Unlined Pit PWD options? NO

Produced Water Disposal (PWD) Location:

PWD surface owner:

PWD disturbance (acres):

Unlined pit PWD on or off channel:

Unlined pit PWD discharge volume (bbl/day):

Unlined pit specifications:

Precipitated solids disposal:

Describe precipitated solids disposal:

Precipitated solids disposal permit:

Unlined pit precipitated solids disposal schedule:

Unlined pit precipitated solids disposal schedule attachment:

Unlined pit reclamation description:

Unlined pit reclamation attachment:

Unlined pit Monitor description:

Unlined pit Monitor attachment:

Do you propose to put the produced water to beneficial use?

Beneficial use user confirmation:

Estimated depth of the shallowest aquifer (feet):

Does the produced water have an annual average Total Dissolved Solids (TDS) concentration equal to or less than that of the existing water to be protected?

TDS lab results:

Geologic and hydrologic evidence:

State authorization:

Unlined Produced Water Pit Estimated percolation:

Unlined pit: do you have a reclamation bond for the pit?

Is the reclamation bond a rider under the BLM bond?

Unlined pit bond number:

Unlined pit bond amount:

Additional bond information attachment:

Section 4 - Injection

Would you like to utilize Injection PWD options? NO

Produced Water Disposal (PWD) Location:

PWD surface owner:

PWD disturbance (acres):

Injection PWD discharge volume (bbl/day):

Injection well mineral owner:

Injection well type:

Injection well number:

Injection well name:

Assigned injection well API number?

Injection well API number:

Injection well new surface disturbance (acres):

Minerals protection information:

Mineral protection attachment:

Underground Injection Control (UIC) Permit?

UIC Permit attachment:

Section 5 - Surface Discharge

Would you like to utilize Surface Discharge PWD options? NO

Produced Water Disposal (PWD) Location:

PWD surface owner:

PWD disturbance (acres):

Surface discharge PWD discharge volume (bbl/day):

Surface Discharge NPDES Permit?

Surface Discharge NPDES Permit attachment:

Surface Discharge site facilities information:

Surface discharge site facilities map:

Section 6 - Other

Would you like to utilize Other PWD options? NO

Produced Water Disposal (PWD) Location:

PWD surface owner:

PWD disturbance (acres):

Other PWD discharge volume (bbl/day):

Other PWD type description:

Other PWD type attachment:

Have other regulatory requirements been met?

Other regulatory requirements attachment:



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

Bond Info Data Report

10/22/2018

Bond Information

Federal/Indian APD: FED

BLM Bond number: NMB000215

BIA Bond number:

Do you have a reclamation bond? NO

Is the reclamation bond a rider under the BLM bond?

Is the reclamation bond BLM or Forest Service?

BLM reclamation bond number:

Forest Service reclamation bond number:

Forest Service reclamation bond attachment:

Reclamation bond number:

Reclamation bond amount:

Reclamation bond rider amount:

Additional reclamation bond information attachment:

Zeppo Federal Com #27H

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	+/- 1060'	1 st Lead	50:50:10 C: Poz:Gel	5% Salt + 5 pps LCM + 0.25 pps CF	150	2.45	11.8
		1 st Tail	Class C	2% CaCl ₂	200	1.32	14.8
		2 nd 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'	1 st 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	200	2.01	12.5
		1 st Tail	Class C	0.3% R-3 + 1.5% CD-32	600	1.37	14
		2 nd 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
		2 nd 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



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

Drilling Plan Data Report

10/22/2018

APD ID: 10400027567

Submission Date: 03/06/2018

Operator Name: COG OPERATING LLC

Well Name: ZEPP0 5 FEDERAL COM

Well Number: 27H

Well Type: OIL WELL

Well Work Type: Drill



[Show Final Text](#)

Section 1 - Geologic Formations

Formation ID	Formation Name	Elevation	True Vertical Depth	Measured Depth	Lithologies	Mineral Resources	Producing Formation
1	UNKNOWN		0	0	ALLUVIUM	USEABLE WATER	No
2	RUSTLER		874	874	ANHYDRITE	OTHER : Brackish Water	No
3	TOP OF SALT		1063	1063	SALT	OTHER : Salt	No
4	TANSILL		2098	2098	DOLOMITE	NONE	No
5	YATES		2208	2208	SANDSTONE, DOLOMITE	NATURAL GAS, OIL	No
6	QUEEN		3161	3161	SANDSTONE	NATURAL GAS, OIL	No
7	GRAYBURG		3612	3612	DOLOMITE, ANHYDRITE	NATURAL GAS, OIL	No
8	SAN ANDRES		3896	3896	DOLOMITE, ANHYDRITE	NATURAL GAS, OIL	No
9	GLORIETA		5394	5394	SANDSTONE, SILTSTONE	NATURAL GAS, OIL	No
10	PADDOCK		5454	5454	DOLOMITE	NATURAL GAS, OIL	No
11	BLINEBRY		5880	5880	DOLOMITE	NATURAL GAS, OIL	Yes
12	TUBB		6800	6800	SANDSTONE, DOLOMITE	NATURAL GAS, OIL	No

Section 2 - Blowout Prevention

Pressure Rating (PSI): 2M

Rating Depth: 9500

Equipment: All required equipment per Federal and State regulations to be in place prior to drilling out the Surface casing.

Requesting Variance? NO

Variance request:

Testing Procedure: BOP/BOPE will be tested by an independent service company to 250 psi low and the high pressure of 2000 psi per Onshore Order 2 requirements. The System may be upgraded to a higher pressure but still tested to the working pressure of 2000 psi. If the system is upgraded all the components installed will be functional and tested. Pipe rams will be