

UNITED STATES
DEPARTMENT OF THE INTERIOR
BUREAU OF LAND MANAGEMENT

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

SUNDRY NOTICES AND REPORTS ON WELLS
Do not use this form for proposals to drill or to re-enter an abandoned well. Use form 3160-3 (APD) for such proposals.

5. Lease Serial No.
NMNM18613A

6. If Indian, Allottee or Tribe Name

SUBMIT IN TRIPLICATE - Other instructions on page 2

7. If Unit or CA/Agreement, Name and/or No.

1. Type of Well
☒ Oil Well ☐ Gas Well ☐ Other

8. Well Name and No.
QUIEN SABE FEDERAL COM 703H

2. Name of Operator
COG OPERATING LLC

Contact: MAYTE X REYES
E-Mail: mreyes1@concho.com

9. API Well No.
30-015-46128-00-X1

3a. Address
600 W ILLINOIS AVENUE
MIDLAND, TX 79701

3b. Phone No. (include area code)
Ph: 575-748-6945

10. Field and Pool or Exploratory Area
PURPLE SAGE-WOLFCAMP (GAS)

4. Location of Well (Footage, Sec., T., R., M., or Survey Description)

Sec 24 T24S R27E NWNE 695FNL 2310FEL
32.208324 N Lat, 104.142929 W Lon

11. County or Parish, State

EDDY COUNTY, NM

12. CHECK THE APPROPRIATE BOX(ES) TO INDICATE NATURE OF NOTICE, REPORT, OR OTHER DATA

TYPE OF SUBMISSION	TYPE OF ACTION			
☒ Notice of Intent	☐ Acidize	☐ Deepen	☐ Production (Start/Resume)	☐ Water Shut-Off
☐ Subsequent Report	☐ Alter Casing	☐ Hydraulic Fracturing	☐ Reclamation	☐ Well Integrity
☐ Final Abandonment Notice	☐ Casing Repair	☐ New Construction	☐ Recomplete	☒ Other
	☐ Change Plans	☐ Plug and Abandon	☐ Temporarily Abandon	Change to Original A
	☐ Convert to Injection	☐ Plug Back	☐ Water Disposal	PD

13. Describe Proposed or Completed Operation: Clearly state all pertinent details, including estimated starting date of any proposed work and approximate duration thereof. If the proposal is to deepen directionally or recompleat horizontally, give subsurface locations and measured and true vertical depths of all pertinent markers and zones. Attach the Bond under which the work will be performed or provide the Bond No. on file with BLM/BIA. Required subsequent reports must be filed within 30 days following completion of the involved operations. If the operation results in a multiple completion or recompleat in a new interval, a Form 3160-4 must be filed once testing has been completed. Final Abandonment Notices must be filed only after all requirements, including reclamation, have been completed and the operator has determined that the site is ready for final inspection.

COG Operating respectfully requests approval for the following changes to the originally approved APD.

Name Change
From: Quien Sabe Federal Com 703H
To: Quien Sabe Federal Com 602H

C102 attached.

Drilling changes
Drilling program attached.
AC attached.

Then to 603 on 7/31/19

RECEIVED

**Carlsbad Field Office
Operator Copy**

AUG 01 2019

DISTRICT II-ARTESIA O.C.D.

14. I hereby certify that the foregoing is true and correct.

Electronic Submission #472040 verified by the BLM Well Information System
For COG OPERATING LLC, sent to the Carlsbad
Committed to AFMSS for processing by PRISCILLA PEREZ on 07/10/2019 (19PP2766SE)

Name (Printed/Typed) MAYTE X REYES

Title REGULATORY ANALYST

Signature (Electronic Submission)

Date 07/02/2019

THIS SPACE FOR FEDERAL OR STATE OFFICE USE

Approved By NDUNGU KAMAU

Title PETROLEUM ENGINEER

Date 07/23/2019

Conditions of approval, if any, are attached. Approval of this notice 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.

Office Carlsbad

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.

(Instructions on page 2)

**** BLM REVISED ** BLM REVISED ** BLM REVISED ** BLM REVISED ** BLM REVISED ****

K.R. 8-1-19

Additional data for EC transaction #472040 that would not fit on the form

32. Additional remarks, continued

Directional plan attached.

Revisions to Operator-Submitted EC Data for Sundry Notice #472040

	Operator Submitted	BLM Revised (AFMSS)
Sundry Type:	APDCH NOI	APDCH NOI
Lease:	NMNM111412	NMNM18613A
Agreement:		
Operator:	COG OPERATING LLC 2208 WEST MAIN STREET ARTESIA, NM 88210 Ph: 575-748-6940	COG OPERATING LLC 600 W ILLINOIS AVENUE MIDLAND, TX 79701 Ph: 432.685.4385
Admin Contact:	MAYTE X REYES SENIOR REGULATORY ANALYST E-Mail: mreyes1@concho.com Ph: 575-748-6945	MAYTE X REYES REGULATORY ANALYST E-Mail: mreyes1@concho.com Ph: 575-748-6945
Tech Contact:	MAYTE X REYES SENIOR REGULATORY ANALYST E-Mail: mreyes1@concho.com Ph: 575-748-6945	MAYTE X REYES REGULATORY ANALYST E-Mail: mreyes1@concho.com Ph: 575-748-6945
Location:		
State:	NM	NM
County:	EDDY	EDDY
Field/Pool:	PURPLE SAGE; WOLFCAMP GAS	PURPLE SAGE-WOLFCAMP (GAS)
Well/Facility:	QUIEN SABE FEDERAL COM 602H Sec 24 T24S R27E NWNE 695FNL 2310FEL	QUIEN SABE FEDERAL COM 703H Sec 24 T24S R27E NWNE 695FNL 2310FEL 32.208324 N Lat, 104.142929 W Lon

**PECOS DISTRICT
DRILLING CONDITIONS OF APPROVAL**

OPERATOR'S NAME: COG OPERATING LLC
LEASE NO.: NMNM18613A
COUNTY: EDDY

QUIEN SABE FEDERAL COM 602H

LOCATION: Section 24, T.26 S., R.27 E., NMPM
SURFACE HOLE FOOTAGE: 695'/N & 2310'/E
BOTTOM HOLE FOOTAGE: 200'/S & 2310'/E

QUIEN SABE FEDERAL COM 603H

LOCATION: Section 24, T.24 S., R.27 E., NMPM
SURFACE HOLE FOOTAGE: 695'/N & 2250'/E
BOTTOM HOLE FOOTAGE: 200'/S & 1310'/E

QUIEN SABE FEDERAL COM 801H

LOCATION: Section 24, T.24 S., R.27 E., NMPM
SURFACE HOLE FOOTAGE: 695'/N & 2280'/E
BOTTOM HOLE FOOTAGE: 200'/S & 2310'/E

ALL PREVIOUS COAs STILL APPLY.

A. CASING

Casing Design:

1. The 13-3/8 inch surface casing shall be set at approximately **750 feet** (a minimum of **70 feet (Eddy County)** 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.

Intermediate casing must be kept fluid filled to meet BLM minimum collapse requirement.

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. **Wait on cement (WOC) time for a primary cement job is to include the lead cement slurry due to cave/karst or potash.**

Option 2:

Operator has proposed a DV tool, the depth may be adjusted as long as the cement is changed proportionally. The DV tool may be cancelled if cement circulates to surface on the first stage.

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

b. Second stage above DV tool:

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

Wait on cement (WOC) time for a primary cement job is to include the lead cement slurry due to cave/karst or potash.

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

Option 1 (Single Stage):

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

Option 2:

Operator has proposed a DV tool; the depth may be adjusted as long as the cement is changed proportionally. The DV tool may be cancelled if cement circulates to surface on the first stage.

- a. First stage to DV tool: Cement to circulate. If cement does not circulate off the DV tool, contact the appropriate BLM office before proceeding with second stage cement job.
- b. Second stage above DV tool:
 - Cement should tie-back at least **200 feet** into previous casing string. Operator shall provide method of verification.

B. PRESSURE CONTROL

1. Variance approved to use flex line from BOP to choke manifold. Manufacturer's specification to be readily available. No external damage to flex line. Flex line to be installed as straight as possible (no hard bends).
- 2.

Option 1:

- a. Minimum working pressure of the blowout preventer (BOP) and related equipment (BOPE) required for drilling below the surface casing shoe shall be **3000 (3M)** psi.
- b. Minimum working pressure of the blowout preventer (BOP) and related equipment (BOPE) required for drilling below the intermediate casing shoe shall be **5000 (5M)** psi.

Option 2:

1. Operator has proposed a multi-bowl wellhead assembly. This assembly will only be tested when installed on the surface casing. Minimum working pressure of the blowout preventer (BOP) and related equipment (BOPE) required for drilling below the surface casing shoe shall be **5000 (5M)** psi.
 - 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. 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.
 - e. Whenever any seal subject to test pressure is broken, all the tests in OOGO2.III.A.2.i must be followed.

C. 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.

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. The casing integrity test can be done (prior to the cement setting up) immediately after bumping the plug.
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. The casing integrity test can be done (prior to the cement setting up) immediately after bumping the plug.
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, except the casing pressure test can be initiated immediately after bumping the plug (only applies to single stage cement jobs).
- 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.

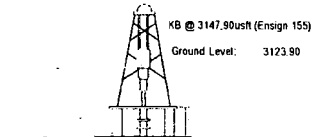
NMK7222019



Project: Eddy County, NM (NAD27 NME)
Site: Quien Sabe Fed Com
Well: 602H
Wellbore: OH \ 65011
Design: Plan 2 06-28-19
Rig: Ensign 155



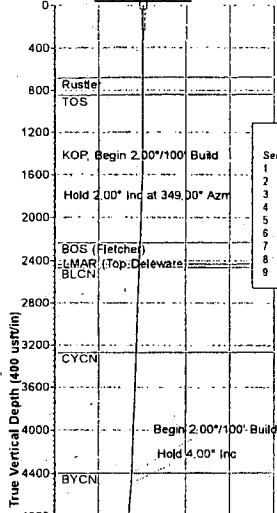
Azimuths to Grid North
True North: -0.10°
Magnetic North: 7.02°
Magnetic Field
Strength: 47859.9nT
Dip Angle: 59.93°
Date: 8/21/2019
Model: MVHD



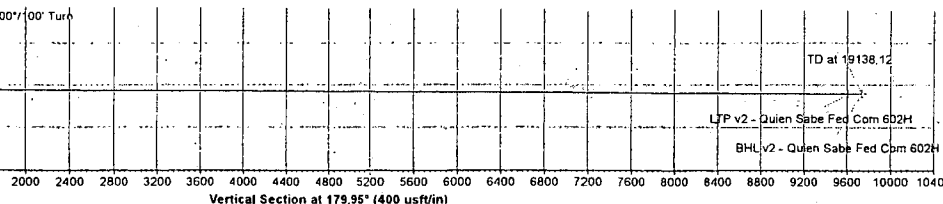
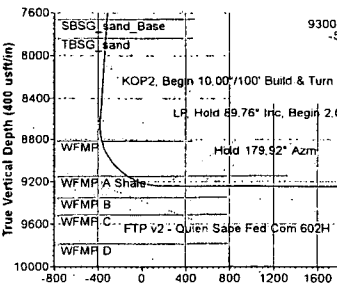
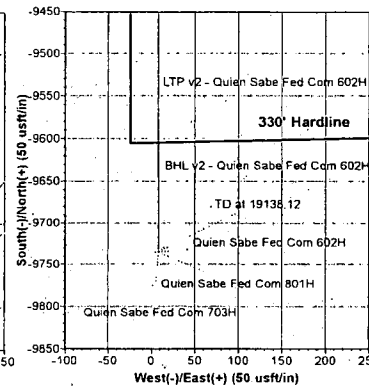
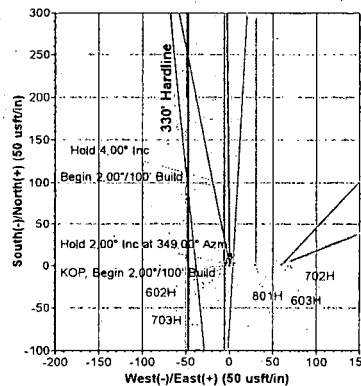
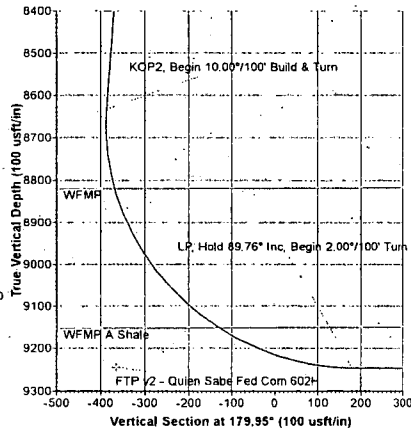
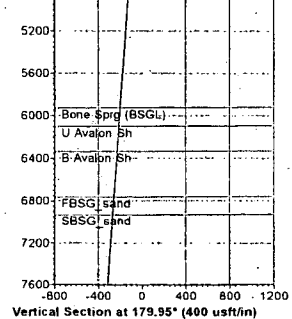
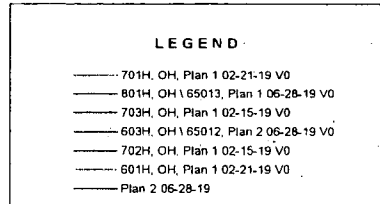
KB @ 3147.90usft (Ensign 155)
Ground Level: 3123.90

WELL DETAILS					
		Ground Level	3123.90		
+N/S	+E/W	Northing	Easting	Latitude	Longitude
0.00	0.00	439517.00	559042.60	32° 12' 29.5388 N	104° 8' 32.7754 W

DESIGN TARGET DETAILS					
Name	TVD	+N/S	+E/W	Northing	Easting
FTP v2 - Quien Sabe Fed Com 602H	9243.00	0.00	-5.60	439882.00	559038.00
LTP v2 - Quien Sabe Fed Com 602H	9284.46	0.00	-5.60	439912.20	559050.10
BHL v2 - Quien Sabe Fed Com 602H	9285.00	-9734.80	7.70	429782.20	559050.30

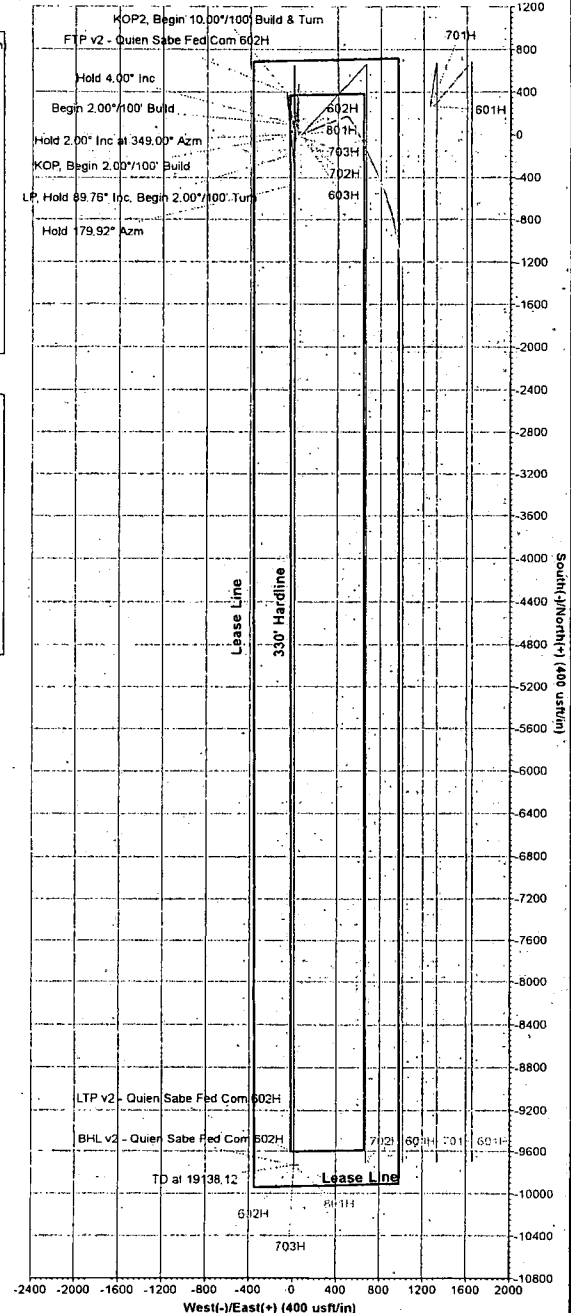


SECTION DETAILS											
Sec	ID	Inc	Azi	TVD	+N/S	+E/W	Dleg	TFace	VSecl	Target	Annotation
1	-0.90	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	KOP, Begin 2.00°/100° Build
2	1500.00	0.00	0.00	1500.00	0.00	0.00	0.00	0.00	0.00	0.00	Hold 2.00° Inc at 349.00° Azm
3	1600.00	2.00	349.00	1599.98	1.71	-0.33	2.00	349.00	-1.71	-1.71	Begin 2.00°/100° Build
4	4393.00	2.00	349.00	4391.28	97.40	-18.93	0.00	0.00	0.00	-97.41	Hold 4.00° Inc
5	4493.00	4.00	349.00	4491.14	102.53	-19.93	2.00	0.00	0.00	-102.55	KOP2, Begin 10.00°/100° Build & Turn
6	8544.96	4.00	349.00	8533.00	306.04	-75.19	0.00	0.00	0.00	-306.90	LP, Hold 69.76° Inc, Begin 2.00°/100° Turn
7	9582.42	89.76	174.10	9245.75	-179.71	-20.46	10.00	-174.89	179.69	179.69	Hold 179.92° Azm
8	9873.40	89.76	179.92	9246.96	-470.17	-5.29	2.00	89.97	470.16	470.16	TD at 19138.12
9	19138.12	89.76	179.92	9285.00	-9734.80	7.70	0.00	0.00	9734.80	BHL v2 - Quien Sabe Fed Com 602H	



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 602H, Grid North
Latitude: 32° 12' 29.5388 N
Longitude: 104° 8' 32.7754 W
Grid East: 559042.60
Grid North: 439517.00
Scale Factor: 1.000
Geomagnetic Model: MVHD
Sample Date: 21-Aug-19
Magnetic Declination: 7.12°
Dip Angle from Horizontal: 59.93°
Magnetic Field Strength: 47859.91327692nT
To convert a Magnetic Direction to a Grid Direction, Add 7.02°
To convert a Magnetic Direction to a True Direction, Add 7.12° East
To convert a True Direction to a Grid Direction, Subtract 0.10°

FORMATION TOP DETAILS					
TVDPath	MDPath	Formation	DipAngle	DipDir	
680.90	680.90	Rustle	-0.24	179.95	
844.90	844.90	TOS	-0.24	179.95	
2231.00	2231.40	BOS (Fletcher)	-0.24	179.95	
2433.03	2433.55	LMAR (Top Deleware)	-0.24	179.95	
2464.03	2464.58	BLCN	-0.24	179.95	
3269.15	3270.18	CYCN	-0.24	179.95	
4394.31	4396.03	BYCN	-0.24	179.95	
5926.74	5932.11	Bone Sprg (BSGL)	-0.24	179.95	
6958.79	6104.58	U Avalon Sh	-0.24	179.95	
6333.86	6340.22	B Avalon Sh	-0.24	179.95	
6762.98	6770.39	FBSC sand	-0.24	179.95	
6930.03	6937.85	SBSG sand	-0.24	179.95	
7661.24	7670.85	SBSG sand Base	-0.24	179.95	
7837.29	7847.33	TBSG sand	-0.24	179.95	
8919.45	8933.11	WFMF	-0.24	179.95	
9151.45	9151.40	WFMF A Shale	-0.24	179.95	





COG Operating LLC

Eddy County, NM (NAD27 NME)

Quien Sabe Fed Com

602H

OH \ 65011

Plan: Plan 2 06-28-19

Standard Planning Report

28 June, 2019





Planning Report



Database: USA Compass
 Company: COG Operating LLC
 Project: Eddy County, NM (NAD27 NME)
 Site: Quien Sabe Fed Com
 Well: 602H
 Wellbore: OH \ 65011
 Design: Plan 2 06-28-19

Local Co-ordinate Reference: Well 602H
 TVD Reference: KB @ 3147.90usft (Ensign 155)
 MD Reference: KB @ 3147.90usft (Ensign 155)
 North Reference: Grid
 Survey Calculation Method: Minimum Curvature

Project	Eddy 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	Quien Sabe Fed Com				
Site Position:		Northing:	439,517.00 usft	Latitude:	32° 12' 29.5388 N
From:	Map	Easting:	559,042.60 usft	Longitude:	104° 8' 32.7754 W
Position Uncertainty:	0.00 usft	Slot Radius:	13-3/16 "	Grid Convergence:	0.10 °

Well	602H					
Well Position	+N/-S	0.00 usft	Northing:	439,517.00 usft	Latitude:	32° 12' 29.5388 N
	+E/-W	0.00 usft	Easting:	559,042.60 usft	Longitude:	104° 8' 32.7754 W
Position Uncertainty		0.00 usft	Wellhead Elevation:		Ground Level:	3,123.90 usft

Wellbore	OH \ 65011				
Magnetics	Model Name	Sample Date	Declination (°)	Dip Angle (°)	Field Strength (nT)
	MVHD	8/21/2019	7.12	59.93	47,859.91327692

Design	Plan 2 06-28-19			
Audit Notes:				
Version:	Phase:	PLAN	Tie On Depth:	0.00
Vertical Section:	Depth From (TVD) (usft)	+N-S (usft)	+E-W (usft)	Direction (°)
	0.00	0.00	0.00	179.95

Plan Sections										
Measured Depth (usft)	Inclination (°)	Azimuth (°)	Vertical Depth (usft)	+N-S (usft)	+E-W (usft)	Dogleg Rate (°/100usft)	Build Rate (°/100usft)	Turn Rate (°/100usft)	TFO (°)	Target
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	
1,500.00	0.00	0.00	1,500.00	0.00	0.00	0.00	0.00	0.00	0.00	
1,600.00	2.00	349.00	1,599.98	-1.71	-0.33	2.00	2.00	0.00	349.00	
4,393.00	2.00	349.00	4,391.28	97.40	-18.93	0.00	0.00	0.00	0.00	
4,493.00	4.00	349.00	4,491.14	102.53	-19.93	2.00	2.00	0.00	0.00	
8,644.98	4.00	349.00	8,633.00	386.84	-75.19	0.00	0.00	0.00	0.00	
9,582.42	89.76	174.10	9,245.75	-179.71	-20.46	10.00	9.15	-18.66	-174.89	
9,873.40	89.76	179.92	9,246.96	-470.17	-5.29	2.00	0.00	2.00	89.97	
19,138.12	89.76	179.92	9,285.00	-9,734.80	7.70	0.00	0.00	0.00	0.00	BHL v2 - Quien Sabe



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 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
680.90	0.00	0.00	680.90	0.00	0.00	0.00	0.00	0.00	0.00
Rustler									
844.90	0.00	0.00	844.90	0.00	0.00	0.00	0.00	0.00	0.00
TOS									
1,500.00	0.00	0.00	1,500.00	0.00	0.00	0.00	0.00	0.00	0.00
KOP, Begin 2.00°/100' Build									
1,600.00	2.00	349.00	1,599.98	1.71	-0.33	-1.71	2.00	2.00	0.00
Hold 2.00° Inc at 349.00° Azm									
1,700.00	2.00	349.00	1,699.92	5.14	-1.00	-5.14	0.00	0.00	0.00
1,800.00	2.00	349.00	1,799.86	8.56	-1.66	-8.57	0.00	0.00	0.00
1,900.00	2.00	349.00	1,899.80	11.99	-2.33	-11.99	0.00	0.00	0.00
2,000.00	2.00	349.00	1,999.74	15.42	-3.00	-15.42	0.00	0.00	0.00
2,100.00	2.00	349.00	2,099.68	18.84	-3.66	-18.85	0.00	0.00	0.00
2,200.00	2.00	349.00	2,199.61	22.27	-4.33	-22.27	0.00	0.00	0.00
2,231.40	2.00	349.00	2,231.00	23.34	-4.54	-23.35	0.00	0.00	0.00
BOS (Fletcher)									
2,300.00	2.00	349.00	2,299.55	25.69	-4.99	-25.70	0.00	0.00	0.00
2,400.00	2.00	349.00	2,399.49	29.12	-5.66	-29.12	0.00	0.00	0.00
2,433.55	2.00	349.00	2,433.03	30.27	-5.88	-30.27	0.00	0.00	0.00
LMAR (Top Delaware)									
2,464.58	2.00	349.00	2,464.03	31.33	-6.09	-31.34	0.00	0.00	0.00
BLCN									
2,500.00	2.00	349.00	2,499.43	32.55	-6.33	-32.55	0.00	0.00	0.00
2,600.00	2.00	349.00	2,599.37	35.97	-6.99	-35.98	0.00	0.00	0.00
2,700.00	2.00	349.00	2,699.31	39.40	-7.66	-39.40	0.00	0.00	0.00
2,800.00	2.00	349.00	2,799.25	42.82	-8.32	-42.83	0.00	0.00	0.00
2,900.00	2.00	349.00	2,899.19	46.25	-8.99	-46.26	0.00	0.00	0.00
3,000.00	2.00	349.00	2,999.13	49.67	-9.66	-49.68	0.00	0.00	0.00
3,100.00	2.00	349.00	3,099.07	53.10	-10.32	-53.11	0.00	0.00	0.00
3,200.00	2.00	349.00	3,199.01	56.53	-10.99	-56.54	0.00	0.00	0.00
3,270.18	2.00	349.00	3,269.15	58.93	-11.45	-58.94	0.00	0.00	0.00
CYCN									
3,300.00	2.00	349.00	3,298.94	59.95	-11.65	-59.96	0.00	0.00	0.00
3,400.00	2.00	349.00	3,398.88	63.38	-12.32	-63.39	0.00	0.00	0.00
3,500.00	2.00	349.00	3,498.82	66.80	-12.99	-66.81	0.00	0.00	0.00
3,600.00	2.00	349.00	3,598.76	70.23	-13.65	-70.24	0.00	0.00	0.00
3,700.00	2.00	349.00	3,698.70	73.66	-14.32	-73.67	0.00	0.00	0.00
3,800.00	2.00	349.00	3,798.64	77.08	-14.98	-77.09	0.00	0.00	0.00
3,900.00	2.00	349.00	3,898.58	80.51	-15.65	-80.52	0.00	0.00	0.00
4,000.00	2.00	349.00	3,998.52	83.93	-16.31	-83.95	0.00	0.00	0.00
4,100.00	2.00	349.00	4,098.46	87.36	-16.98	-87.37	0.00	0.00	0.00
4,200.00	2.00	349.00	4,198.40	90.78	-17.65	-90.80	0.00	0.00	0.00
4,300.00	2.00	349.00	4,298.34	94.21	-18.31	-94.22	0.00	0.00	0.00
4,393.00	2.00	349.00	4,391.28	97.40	-18.93	-97.41	0.00	0.00	0.00
Begin 2.00°/100' Build									
4,396.03	2.06	349.00	4,394.31	97.50	-18.95	-97.52	2.00	2.00	0.00
BYCN									
4,400.00	2.14	349.00	4,398.27	97.64	-18.98	-97.66	2.00	2.00	0.00
4,493.00	4.00	349.00	4,491.14	102.53	-19.93	-102.55	2.00	2.00	0.00
Hold 4.00° Inc									
4,500.00	4.00	349.00	4,498.12	103.01	-20.02	-103.03	0.00	0.00	0.00
4,600.00	4.00	349.00	4,597.88	109.86	-21.35	-109.88	0.00	0.00	0.00



Planning Report



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Local Co-ordinate Reference: Well 602H
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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)
4,700.00	4.00	349.00	4,697.63	116.71	-22.69	-116.73	0.00	0.00	0.00
4,800.00	4.00	349.00	4,797.39	123.56	-24.02	-123.57	0.00	0.00	0.00
4,900.00	4.00	349.00	4,897.14	130.40	-25.35	-130.42	0.00	0.00	0.00
5,000.00	4.00	349.00	4,996.90	137.25	-26.68	-137.27	0.00	0.00	0.00
5,100.00	4.00	349.00	5,096.66	144.10	-28.01	-144.12	0.00	0.00	0.00
5,200.00	4.00	349.00	5,196.41	150.95	-29.34	-150.97	0.00	0.00	0.00
5,300.00	4.00	349.00	5,296.17	157.79	-30.67	-157.82	0.00	0.00	0.00
5,400.00	4.00	349.00	5,395.93	164.64	-32.00	-164.67	0.00	0.00	0.00
5,500.00	4.00	349.00	5,495.68	171.49	-33.33	-171.51	0.00	0.00	0.00
5,600.00	4.00	349.00	5,595.44	178.34	-34.66	-178.36	0.00	0.00	0.00
5,700.00	4.00	349.00	5,695.20	185.18	-36.00	-185.21	0.00	0.00	0.00
5,800.00	4.00	349.00	5,794.95	192.03	-37.33	-192.06	0.00	0.00	0.00
5,900.00	4.00	349.00	5,894.71	198.88	-38.66	-198.91	0.00	0.00	0.00
5,932.11	4.00	349.00	5,926.74	201.08	-39.09	-201.11	0.00	0.00	0.00
Bone Sprg (BSGL)									
6,000.00	4.00	349.00	5,994.47	205.73	-39.99	-205.76	0.00	0.00	0.00
6,100.00	4.00	349.00	6,094.22	212.57	-41.32	-212.61	0.00	0.00	0.00
6,104.58	4.00	349.00	6,098.79	212.89	-41.38	-212.92	0.00	0.00	0.00
U Avalon Sh									
6,200.00	4.00	349.00	6,193.98	219.42	-42.65	-219.45	0.00	0.00	0.00
6,300.00	4.00	349.00	6,293.73	226.27	-43.98	-226.30	0.00	0.00	0.00
6,340.22	4.00	349.00	6,333.86	229.02	-44.52	-229.06	0.00	0.00	0.00
B Avalon Sh									
6,400.00	4.00	349.00	6,393.49	233.12	-45.31	-233.15	0.00	0.00	0.00
6,500.00	4.00	349.00	6,493.25	239.96	-46.64	-240.00	0.00	0.00	0.00
6,600.00	4.00	349.00	6,593.00	246.81	-47.98	-246.85	0.00	0.00	0.00
6,700.00	4.00	349.00	6,692.76	253.66	-49.31	-253.70	0.00	0.00	0.00
6,770.39	4.00	349.00	6,762.98	258.48	-50.24	-258.52	0.00	0.00	0.00
FBSG_sand									
6,800.00	4.00	349.00	6,792.52	260.51	-50.64	-260.55	0.00	0.00	0.00
6,900.00	4.00	349.00	6,892.27	267.35	-51.97	-267.39	0.00	0.00	0.00
6,937.85	4.00	349.00	6,930.03	269.94	-52.47	-269.99	0.00	0.00	0.00
SBSG_sand									
7,000.00	4.00	349.00	6,992.03	274.20	-53.30	-274.24	0.00	0.00	0.00
7,100.00	4.00	349.00	7,091.79	281.05	-54.63	-281.09	0.00	0.00	0.00
7,200.00	4.00	349.00	7,191.54	287.90	-55.96	-287.94	0.00	0.00	0.00
7,300.00	4.00	349.00	7,291.30	294.74	-57.29	-294.79	0.00	0.00	0.00
7,400.00	4.00	349.00	7,391.06	301.59	-58.62	-301.64	0.00	0.00	0.00
7,500.00	4.00	349.00	7,490.81	308.44	-59.95	-308.48	0.00	0.00	0.00
7,600.00	4.00	349.00	7,590.57	315.29	-61.29	-315.33	0.00	0.00	0.00
7,670.85	4.00	349.00	7,661.24	320.14	-62.23	-320.19	0.00	0.00	0.00
SBSG_sand_Base									
7,700.00	4.00	349.00	7,690.32	322.13	-62.62	-322.18	0.00	0.00	0.00
7,800.00	4.00	349.00	7,790.08	328.98	-63.95	-329.03	0.00	0.00	0.00
7,847.33	4.00	349.00	7,837.29	332.22	-64.58	-332.27	0.00	0.00	0.00
TBSG_sand									
7,900.00	4.00	349.00	7,889.84	335.83	-65.28	-335.88	0.00	0.00	0.00
8,000.00	4.00	349.00	7,989.59	342.67	-66.61	-342.73	0.00	0.00	0.00
8,100.00	4.00	349.00	8,089.35	349.52	-67.94	-349.58	0.00	0.00	0.00
8,200.00	4.00	349.00	8,189.11	356.37	-69.27	-356.42	0.00	0.00	0.00
8,300.00	4.00	349.00	8,288.86	363.22	-70.60	-363.27	0.00	0.00	0.00
8,400.00	4.00	349.00	8,388.62	370.06	-71.93	-370.12	0.00	0.00	0.00
8,500.00	4.00	349.00	8,488.38	376.91	-73.26	-376.97	0.00	0.00	0.00



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8,600.00	4.00	349.00	8,588.13	383.76	-74.60	-383.82	0.00	0.00	0.00
8,644.98	4.00	349.00	8,633.00	386.84	-75.19	-386.90	0.00	0.00	0.00
KOP2, Begin 10.00°/100' Build & Turn									
8,700.00	1.56	187.30	8,687.99	387.98	-75.66	-388.04	10.00	-4.44	-293.89
8,800.00	11.52	175.85	8,787.21	376.64	-75.10	-376.70	10.00	9.96	-11.45
8,833.11	14.83	175.44	8,819.45	369.12	-74.53	-369.17	10.00	10.00	-1.21
WFMP									
8,900.00	21.52	175.00	8,882.96	348.33	-72.78	-348.39	10.00	10.00	-0.66
9,000.00	31.52	174.68	8,972.33	303.92	-68.74	-303.98	10.00	10.00	-0.32
9,100.00	41.52	174.50	9,052.59	244.75	-63.13	-244.80	10.00	10.00	-0.18
9,200.00	51.52	174.38	9,121.31	172.63	-56.10	-172.67	10.00	10.00	-0.12
9,251.40	56.66	174.33	9,151.45	131.22	-52.01	-131.26	10.00	10.00	-0.09
WFMP A Shale									
9,300.00	61.52	174.29	9,176.41	89.73	-47.88	-89.77	10.00	10.00	-0.08
9,400.00	71.52	174.22	9,216.21	-1.41	-38.71	1.38	10.00	10.00	-0.07
9,500.00	81.52	174.15	9,239.49	-98.03	-28.86	98.01	10.00	10.00	-0.07
9,582.42	89.76	174.10	9,245.75	-179.71	-20.46	179.69	10.00	10.00	-0.06
LP, Hold 89.76° Inc, Begin 2.00°/100' Turn									
9,600.00	89.76	174.45	9,245.82	-197.20	-18.71	197.19	2.00	0.00	2.00
9,700.00	89.76	176.45	9,246.24	-296.88	-10.78	296.87	2.00	0.00	2.00
9,800.00	89.76	178.45	9,246.66	-396.78	-6.33	396.77	2.00	0.00	2.00
9,873.40	89.76	179.92	9,246.96	-470.17	-5.29	470.16	2.00	0.00	2.00
Hold 179.92° Azm									
9,900.00	89.76	179.92	9,247.07	-496.77	-5.25	496.76	0.00	0.00	0.00
10,000.00	89.76	179.92	9,247.48	-596.76	-5.11	596.76	0.00	0.00	0.00
10,100.00	89.76	179.92	9,247.89	-696.76	-4.97	696.76	0.00	0.00	0.00
10,200.00	89.76	179.92	9,248.30	-796.76	-4.83	796.76	0.00	0.00	0.00
10,300.00	89.76	179.92	9,248.71	-896.76	-4.69	896.76	0.00	0.00	0.00
10,400.00	89.76	179.92	9,249.12	-996.76	-4.55	996.76	0.00	0.00	0.00
10,500.00	89.76	179.92	9,249.53	-1,096.76	-4.41	1,096.76	0.00	0.00	0.00
10,600.00	89.76	179.92	9,249.94	-1,196.76	-4.27	1,196.75	0.00	0.00	0.00
10,700.00	89.76	179.92	9,250.35	-1,296.76	-4.13	1,296.75	0.00	0.00	0.00
10,800.00	89.76	179.92	9,250.76	-1,396.76	-3.99	1,396.75	0.00	0.00	0.00
10,900.00	89.76	179.92	9,251.17	-1,496.76	-3.85	1,496.75	0.00	0.00	0.00
11,000.00	89.76	179.92	9,251.58	-1,596.75	-3.71	1,596.75	0.00	0.00	0.00
11,100.00	89.76	179.92	9,251.99	-1,696.75	-3.57	1,696.75	0.00	0.00	0.00
11,200.00	89.76	179.92	9,252.41	-1,796.75	-3.43	1,796.75	0.00	0.00	0.00
11,300.00	89.76	179.92	9,252.82	-1,896.75	-3.29	1,896.75	0.00	0.00	0.00
11,400.00	89.76	179.92	9,253.23	-1,996.75	-3.15	1,996.75	0.00	0.00	0.00
11,500.00	89.76	179.92	9,253.64	-2,096.75	-3.01	2,096.75	0.00	0.00	0.00
11,600.00	89.76	179.92	9,254.05	-2,196.75	-2.87	2,196.75	0.00	0.00	0.00
11,700.00	89.76	179.92	9,254.46	-2,296.75	-2.73	2,296.75	0.00	0.00	0.00
11,800.00	89.76	179.92	9,254.87	-2,396.75	-2.59	2,396.74	0.00	0.00	0.00
11,900.00	89.76	179.92	9,255.28	-2,496.75	-2.45	2,496.74	0.00	0.00	0.00
12,000.00	89.76	179.92	9,255.69	-2,596.75	-2.31	2,596.74	0.00	0.00	0.00
12,100.00	89.76	179.92	9,256.10	-2,696.74	-2.17	2,696.74	0.00	0.00	0.00
12,200.00	89.76	179.92	9,256.51	-2,796.74	-2.03	2,796.74	0.00	0.00	0.00
12,300.00	89.76	179.92	9,256.92	-2,896.74	-1.89	2,896.74	0.00	0.00	0.00
12,400.00	89.76	179.92	9,257.33	-2,996.74	-1.75	2,996.74	0.00	0.00	0.00
12,500.00	89.76	179.92	9,257.74	-3,096.74	-1.61	3,096.74	0.00	0.00	0.00
12,600.00	89.76	179.92	9,258.15	-3,196.74	-1.47	3,196.74	0.00	0.00	0.00
12,700.00	89.76	179.92	9,258.56	-3,296.74	-1.33	3,296.74	0.00	0.00	0.00
12,800.00	89.76	179.92	9,258.98	-3,396.74	-1.19	3,396.74	0.00	0.00	0.00



Planning Report



Database: USA Compass
Company: COG Operating LLC
Project: Eddy County, NM (NAD27 NME)
Site: Quien Sabe Fed Com
Well: 602H
Wellbore: OH \ 65011
Design: Plan 2 06-28-19

Local Co-ordinate Reference: Well 602H
TVD Reference: KB @ 3147.90usft (Ensign 155)
MD Reference: KB @ 3147.90usft (Ensign 155)
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)
12,900.00	89.76	179.92	9,259.39	-3,496.74	-1.05	3,496.74	0.00	0.00	0.00
13,000.00	89.76	179.92	9,259.80	-3,596.74	-0.90	3,596.73	0.00	0.00	0.00
13,100.00	89.76	179.92	9,260.21	-3,696.74	-0.76	3,696.73	0.00	0.00	0.00
13,200.00	89.76	179.92	9,260.62	-3,796.73	-0.62	3,796.73	0.00	0.00	0.00
13,300.00	89.76	179.92	9,261.03	-3,896.73	-0.48	3,896.73	0.00	0.00	0.00
13,400.00	89.76	179.92	9,261.44	-3,996.73	-0.34	3,996.73	0.00	0.00	0.00
13,500.00	89.76	179.92	9,261.85	-4,096.73	-0.20	4,096.73	0.00	0.00	0.00
13,600.00	89.76	179.92	9,262.26	-4,196.73	-0.06	4,196.73	0.00	0.00	0.00
13,700.00	89.76	179.92	9,262.67	-4,296.73	0.08	4,296.73	0.00	0.00	0.00
13,800.00	89.76	179.92	9,263.08	-4,396.73	0.22	4,396.73	0.00	0.00	0.00
13,900.00	89.76	179.92	9,263.49	-4,496.73	0.36	4,496.73	0.00	0.00	0.00
14,000.00	89.76	179.92	9,263.90	-4,596.73	0.50	4,596.73	0.00	0.00	0.00
14,100.00	89.76	179.92	9,264.31	-4,696.73	0.64	4,696.72	0.00	0.00	0.00
14,200.00	89.76	179.92	9,264.72	-4,796.72	0.78	4,796.72	0.00	0.00	0.00
14,300.00	89.76	179.92	9,265.13	-4,896.72	0.92	4,896.72	0.00	0.00	0.00
14,400.00	89.76	179.92	9,265.55	-4,996.72	1.06	4,996.72	0.00	0.00	0.00
14,500.00	89.76	179.92	9,265.96	-5,096.72	1.20	5,096.72	0.00	0.00	0.00
14,600.00	89.76	179.92	9,266.37	-5,196.72	1.34	5,196.72	0.00	0.00	0.00
14,700.00	89.76	179.92	9,266.78	-5,296.72	1.48	5,296.72	0.00	0.00	0.00
14,800.00	89.76	179.92	9,267.19	-5,396.72	1.62	5,396.72	0.00	0.00	0.00
14,900.00	89.76	179.92	9,267.60	-5,496.72	1.76	5,496.72	0.00	0.00	0.00
15,000.00	89.76	179.92	9,268.01	-5,596.72	1.90	5,596.72	0.00	0.00	0.00
15,100.00	89.76	179.92	9,268.42	-5,696.72	2.04	5,696.72	0.00	0.00	0.00
15,200.00	89.76	179.92	9,268.83	-5,796.72	2.18	5,796.72	0.00	0.00	0.00
15,300.00	89.76	179.92	9,269.24	-5,896.71	2.32	5,896.71	0.00	0.00	0.00
15,400.00	89.76	179.92	9,269.65	-5,996.71	2.46	5,996.71	0.00	0.00	0.00
15,500.00	89.76	179.92	9,270.06	-6,096.71	2.60	6,096.71	0.00	0.00	0.00
15,600.00	89.76	179.92	9,270.47	-6,196.71	2.74	6,196.71	0.00	0.00	0.00
15,700.00	89.76	179.92	9,270.88	-6,296.71	2.88	6,296.71	0.00	0.00	0.00
15,800.00	89.76	179.92	9,271.29	-6,396.71	3.02	6,396.71	0.00	0.00	0.00
15,900.00	89.76	179.92	9,271.70	-6,496.71	3.16	6,496.71	0.00	0.00	0.00
16,000.00	89.76	179.92	9,272.11	-6,596.71	3.30	6,596.71	0.00	0.00	0.00
16,100.00	89.76	179.92	9,272.53	-6,696.71	3.44	6,696.71	0.00	0.00	0.00
16,200.00	89.76	179.92	9,272.94	-6,796.71	3.58	6,796.71	0.00	0.00	0.00
16,300.00	89.76	179.92	9,273.35	-6,896.71	3.72	6,896.71	0.00	0.00	0.00
16,400.00	89.76	179.92	9,273.76	-6,996.70	3.86	6,996.71	0.00	0.00	0.00
16,500.00	89.76	179.92	9,274.17	-7,096.70	4.00	7,096.70	0.00	0.00	0.00
16,600.00	89.76	179.92	9,274.58	-7,196.70	4.14	7,196.70	0.00	0.00	0.00
16,700.00	89.76	179.92	9,274.99	-7,296.70	4.28	7,296.70	0.00	0.00	0.00
16,800.00	89.76	179.92	9,275.40	-7,396.70	4.42	7,396.70	0.00	0.00	0.00
16,900.00	89.76	179.92	9,275.81	-7,496.70	4.56	7,496.70	0.00	0.00	0.00
17,000.00	89.76	179.92	9,276.22	-7,596.70	4.70	7,596.70	0.00	0.00	0.00
17,100.00	89.76	179.92	9,276.63	-7,696.70	4.84	7,696.70	0.00	0.00	0.00
17,200.00	89.76	179.92	9,277.04	-7,796.70	4.98	7,796.70	0.00	0.00	0.00
17,300.00	89.76	179.92	9,277.45	-7,896.70	5.12	7,896.70	0.00	0.00	0.00
17,400.00	89.76	179.92	9,277.86	-7,996.69	5.26	7,996.70	0.00	0.00	0.00
17,500.00	89.76	179.92	9,278.27	-8,096.69	5.40	8,096.70	0.00	0.00	0.00
17,600.00	89.76	179.92	9,278.68	-8,196.69	5.54	8,196.69	0.00	0.00	0.00
17,700.00	89.76	179.92	9,279.10	-8,296.69	5.68	8,296.69	0.00	0.00	0.00
17,800.00	89.76	179.92	9,279.51	-8,396.69	5.82	8,396.69	0.00	0.00	0.00
17,900.00	89.76	179.92	9,279.92	-8,496.69	5.96	8,496.69	0.00	0.00	0.00
18,000.00	89.76	179.92	9,280.33	-8,596.69	6.10	8,596.69	0.00	0.00	0.00
18,100.00	89.76	179.92	9,280.74	-8,696.69	6.24	8,696.69	0.00	0.00	0.00
18,200.00	89.76	179.92	9,281.15	-8,796.69	6.38	8,796.69	0.00	0.00	0.00



Planning Report



Database: USA Compass
Company: COG Operating LLC
Project: Eddy County, NM (NAD27 NME)
Site: Quien Sabe Fed Com
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Design: Plan 2 06-28-19

Local Co-ordinate Reference: Well 602H
TVD Reference: KB @ 3147.90usft (Ensign 155)
MD Reference: KB @ 3147.90usft (Ensign 155)
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)
18,300.00	89.76	179.92	9,281.56	-8,896.69	6.53	8,896.69	0.00	0.00	0.00
18,400.00	89.76	179.92	9,281.97	-8,996.69	6.67	8,996.69	0.00	0.00	0.00
18,500.00	89.76	179.92	9,282.38	-9,096.68	6.81	9,096.69	0.00	0.00	0.00
18,600.00	89.76	179.92	9,282.79	-9,196.68	6.95	9,196.69	0.00	0.00	0.00
18,700.00	89.76	179.92	9,283.20	-9,296.68	7.09	9,296.69	0.00	0.00	0.00
18,800.00	89.76	179.92	9,283.61	-9,396.68	7.23	9,396.68	0.00	0.00	0.00
18,900.00	89.76	179.92	9,284.02	-9,496.68	7.37	9,496.68	0.00	0.00	0.00
19,000.00	89.76	179.92	9,284.43	-9,596.68	7.51	9,596.68	0.00	0.00	0.00
19,100.00	89.76	179.92	9,284.84	-9,696.68	7.65	9,696.68	0.00	0.00	0.00
19,138.12	89.76	179.92	9,285.00	-9,734.80	7.70	9,734.80	0.00	0.00	0.00

TD at 19138.12

Design Targets

Target Name

- hit/miss target - Shape	Dip Angle (°)	Dip Dir. (°)	TVD (usft)	+N/-S (usft)	+E/-W (usft)	Northing (usft)	Easting (usft)	Latitude	Longitude
FTP v2 - Quien Sabe Fe - plan misses target center by 225.07usft at 9148.22usft MD (9087.31 TVD, 211.46 N, -59.90 E) - Point	0.00	0.01	9,243.00	365.00	-6.60	439,882.00	559,036.00	32° 12' 33.1511 N	104° 8' 32.8447 W
LTP v2 - Quien Sabe Fe - plan misses target center by 0.02usft at 19008.02usft MD (9284.47 TVD, -9604.70 N, 7.52 E) - Point	0.00	0.00	9,284.46	-9,604.70	7.50	429,912.30	559,050.10	32° 10' 54.4869 N	104° 8' 32.8865 W
BHL v2 - Quien Sabe Fe - plan hits target center - Point	0.00	-0.00	9,285.00	-9,734.80	7.70	429,782.20	559,050.30	32° 10' 53.1994 N	104° 8' 32.8869 W

Formations

Measured Depth (usft)	Vertical Depth (usft)	Name	Lithology	Dip (°)	Dip Direction (°)
680.90	680.90	Rustler		-0.24	179.95
844.90	844.90	TOS		-0.24	179.95
2,231.40	2,231.00	BOS (Fletcher)		-0.24	179.95
2,433.55	2,433.03	LMAR (Top Deleware)		-0.24	179.95
2,464.58	2,464.03	BLCN		-0.24	179.95
3,270.18	3,269.15	CYCN		-0.24	179.95
4,396.03	4,394.31	BYCN		-0.24	179.95
5,932.11	5,926.74	Bone Sprg (BSGL)		-0.24	179.95
6,104.58	6,098.79	U Avalon Sh		-0.24	179.95
6,340.22	6,333.86	B Avalon Sh		-0.24	179.95
6,770.39	6,762.98	FBSG_sand		-0.24	179.95
6,937.85	6,930.03	SBSG_sand		-0.24	179.95
7,670.85	7,661.24	SBSG_sand_Base		-0.24	179.95
7,847.33	7,837.29	TBSG_sand		-0.24	179.95
8,833.11	8,819.45	WFMP		-0.24	179.95
9,251.40	9,151.45	WFMP A Shale		-0.24	179.95



Planning Report



Database: USA Compass
Company: COG Operating LLC
Project: Eddy County, NM (NAD27 NME)
Site: Quien Sabe Fed Com
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Wellbore: OH \ 65011
Design: Plan 2 06-28-19

Local Co-ordinate Reference: Well 602H
TVD Reference: KB @ 3147.90usft (Ensign 155)
MD Reference: KB @ 3147.90usft (Ensign 155)
North Reference: Grid
Survey Calculation Method: Minimum Curvature

Plan Annotations

Measured Depth (usft)	Vertical Depth (usft)	Local Coordinates		Comment
		+N/-S (usft)	+E/-W (usft)	
1,500.00	1,500.00	0.00	0.00	KOP, Begin 2.00°/100' Build
1,600.00	1,599.98	1.71	-0.33	Hold 2.00° Inc at 349.00° Azm
4,393.00	4,391.28	97.40	-18.93	Begin 2.00°/100' Build
4,493.00	4,491.14	102.53	-19.93	Hold 4.00° Inc
8,644.98	8,633.00	386.84	-75.19	KOP2, Begin 10.00°/100' Build & Turn
9,582.42	9,245.75	-179.71	-20.46	LP, Hold 89.76° Inc, Begin 2.00°/100' Turn
9,873.40	9,246.96	-470.17	-5.29	Hold 179.92° Azm
19,138.12	9,285.00	-9,734.80	7.70	TD at 19138.12



COG Operating LLC

Eddy County, NM (NAD27 NME)

Quien Sabe Fed Com

602H

OH \ 65011

Plan 2 06-28-19

Anticollision Report

28 June, 2019





Anticollision Report



Company:	COG Operating LLC	Local Co-ordinate Reference:	Well 602H
Project:	Eddy County, NM (NAD27 NME)	TVD Reference:	KB @ 3147.90usft (Ensign 155)
Reference Site:	Quien Sabe Fed Com	MD Reference:	KB @ 3147.90usft (Ensign 155)
Site Error:	0.00 usft	North Reference:	Grid
Reference Well:	602H	Survey Calculation Method:	Minimum Curvature
Well Error:	0.00 usft	Output errors are at:	2.00 sigma
Reference Wellbore:	OH \ 65011	Database:	USA Compass
Reference Design:	Plan 2 06-28-19	Offset TVD Reference:	Offset Datum

Reference Plan 2 06-28-19

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

Survey Tool Program Date 6/28/2019

From (usft)	To (usft)	Survey (Wellbore)	Tool Name	Description
0.00	19,138.12	Plan 2 06-28-19 (OH \ 65011)	MWD+HRGM	OWSG MWD + HRGM

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						
Quien Sabe Fed Com						
601H - OH - Plan 1 02-21-19	1,500.00	1,482.20	1,312.80	1,301.28	113.912	CC
601H - OH - Plan 1 02-21-19	1,600.00	1,560.34	1,313.46	1,301.22	107.312	ES
601H - OH - Plan 1 02-21-19	19,138.12	19,396.42	1,650.23	1,354.84	5.587	SF
603H - OH \ 65012 - Plan 2 06-28-19	1,500.00	1,499.60	60.02	49.04	5.469	CC
603H - OH \ 65012 - Plan 2 06-28-19	1,600.00	1,599.58	60.33	48.71	5.190	ES
603H - OH \ 65012 - Plan 2 06-28-19	19,138.12	19,024.10	1,000.28	708.39	3.427	SF
701H - OH - Plan 1 02-21-19	1,500.00	1,483.00	1,283.28	1,271.74	111.259	CC
701H - OH - Plan 1 02-21-19	19,138.12	19,562.54	1,331.67	1,037.96	4.534	ES, SF
702H - OH - Plan 1 02-15-19	1,416.47	1,417.07	60.02	49.82	5.887	CC
702H - OH - Plan 1 02-15-19	1,500.00	1,500.00	60.02	49.23	5.560	ES
702H - OH - Plan 1 02-15-19	19,138.12	19,569.11	676.10	388.28	2.349	SF
703H - OH - Plan 1 02-15-19	1,416.64	1,417.74	0.00	0.00	10,000.000	CC
703H - OH - Plan 1 02-15-19	1,500.00	1,501.10	0.00	-10.77	0.000	Level 1, SF
703H - OH - Plan 1 02-15-19	19,138.12	19,548.68	137.90	-25.93	0.842	Level 1, ES
801H - OH \ 65013 - Plan 1 06-28-19	1,500.00	1,499.40	30.01	18.73	2.661	CC
801H - OH \ 65013 - Plan 1 06-28-19	4,400.00	4,399.31	49.04	16.95	1.528	ES
801H - OH \ 65013 - Plan 1 06-28-19	4,500.00	4,499.22	50.09	17.29	1.527	SF

Offset Design Quien Sabe Fed Com - 601H - OH - Plan 1 02-21-19										Offset Site Error: 0.00 usft				
Survey Program: 0-MWD+HRGM										Offset Well Error: 0.00 usft				
Measured Depth (usft)	Vertical Depth (usft)	Measured Depth (usft)	Vertical Depth (usft)	Reference (usft)	Offset (usft)	Semi Major Axis (ft)	Highside Toolface (°)	Offset Wellbore Centre N-S (usft)	Offset Wellbore Centre E-W (usft)	Distance Between Centres (usft)	Distance Between Ellipses (usft)	Minimum Separation (usft)	Separation Factor	Warning
0.00	0.00	0.00	0.00	0.00	0.00	78.25		267.30	1,285.30	1,312.92				
100.00	100.00	82.20	82.20	0.28	0.23	78.25		267.30	1,285.30	1,312.80	1,312.35	0.45	2,924.017	
200.00	200.00	182.20	182.20	0.93	0.81	78.25		267.30	1,285.30	1,312.80	1,311.26	1.54	849.971	
300.00	300.00	282.20	282.20	1.44	1.35	78.25		267.30	1,285.30	1,312.80	1,310.30	2.50	525.320	
400.00	400.00	382.20	382.20	1.88	1.80	78.25		267.30	1,285.30	1,312.80	1,309.46	3.34	393.130	
500.00	500.00	482.20	482.20	2.29	2.22	78.25		267.30	1,285.30	1,312.80	1,308.67	4.13	317.691	
600.00	600.00	582.20	582.20	2.69	2.62	78.25		267.30	1,285.30	1,312.80	1,307.90	4.90	267.828	
700.00	700.00	682.20	682.20	3.08	3.01	78.25		267.30	1,285.30	1,312.80	1,307.14	5.66	232.061	
800.00	800.00	782.20	782.20	3.46	3.39	78.25		267.30	1,285.30	1,312.80	1,306.40	6.40	205.006	
900.00	900.00	882.20	882.20	3.83	3.77	78.25		267.30	1,285.30	1,312.80	1,305.66	7.14	183.757	
1,000.00	1,000.00	982.20	982.20	4.21	4.14	78.25		267.30	1,285.30	1,312.80	1,304.92	7.88	166.592	

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



Anticollision Report



Company: COG Operating LLC
Project: Eddy County, NM (NAD27 NME)
Reference Site: Quien Sabe Fed Com
Site Error: 0.00 usft
Reference Well: 602H
Well Error: 0.00 usft
Reference Wellbore: OH \ 65011
Reference Design: Plan 2 06-28-19

Local Co-ordinate Reference: Well 602H
TVD Reference: KB @ 3147.90usft (Ensign 155)
MD Reference: KB @ 3147.90usft (Ensign 155)
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 Quien Sabe Fed Com - 601H - OH - Plan 102-21-19											Offset Site Error: 0.00 usft		
Survey Program: 0-MWD+HRGM											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
1,100.00	1,100.00	1,082.20	1,082.20	4.58	4.51	78.25	267.30	1,285.30	1,312.80	1,304.19	8.61	152.417	
1,200.00	1,200.00	1,182.20	1,182.20	4.95	4.88	78.25	267.30	1,285.30	1,312.80	1,303.46	9.34	140.502	
1,300.00	1,300.00	1,282.20	1,282.20	5.32	5.25	78.25	267.30	1,285.30	1,312.80	1,302.73	10.07	130.340	
1,400.00	1,400.00	1,382.20	1,382.20	5.68	5.62	78.25	267.30	1,285.30	1,312.80	1,302.00	10.80	121.567	
1,500.00	1,500.00	1,482.20	1,482.20	6.05	5.98	78.25	267.30	1,285.30	1,312.80	1,301.28	11.52	113.912	CC
1,600.00	1,599.98	1,560.34	1,560.34	6.50	6.36	89.28	267.78	1,285.71	1,313.46	1,301.22	12.24	107.312	ES
1,700.00	1,699.92	1,633.73	1,633.68	6.96	6.79	89.32	269.67	1,287.32	1,316.09	1,303.09	13.00	101.204	
1,800.00	1,799.86	1,707.01	1,706.83	7.31	7.29	89.32	272.99	1,290.15	1,320.74	1,306.92	13.82	95.576	
1,900.00	1,899.80	1,791.11	1,790.64	7.66	7.59	89.26	278.32	1,294.70	1,327.24	1,312.77	14.47	91.749	
2,000.00	1,999.74	1,890.86	1,890.01	8.02	7.89	89.18	284.94	1,300.34	1,334.08	1,318.93	15.15	88.058	
2,100.00	2,099.68	1,990.61	1,989.38	8.38	8.22	89.10	291.56	1,305.98	1,340.93	1,325.07	15.86	84.567	
2,200.00	2,199.61	2,090.36	2,088.75	8.73	8.55	89.02	298.18	1,311.62	1,347.78	1,331.21	16.57	81.357	
2,300.00	2,299.55	2,190.11	2,188.12	9.09	8.88	88.94	304.80	1,317.26	1,354.63	1,337.35	17.28	78.405	
2,400.00	2,399.49	2,289.86	2,287.48	9.45	9.21	88.87	311.41	1,322.90	1,361.48	1,343.49	17.99	75.681	
2,500.00	2,499.43	2,389.60	2,386.85	9.80	9.55	88.79	318.03	1,328.54	1,368.34	1,349.63	18.70	73.160	
2,600.00	2,599.37	2,489.35	2,486.22	10.16	9.89	88.71	324.65	1,334.18	1,375.19	1,355.78	19.42	70.822	
2,700.00	2,699.31	2,589.10	2,585.59	10.52	10.23	88.64	331.27	1,339.82	1,382.06	1,361.92	20.13	68.646	
2,800.00	2,799.25	2,688.85	2,684.96	10.87	10.57	88.57	337.88	1,345.46	1,388.92	1,368.07	20.85	66.617	
2,900.00	2,899.19	2,788.60	2,784.33	11.23	10.92	88.49	344.50	1,351.10	1,395.78	1,374.22	21.57	64.721	
3,000.00	2,999.13	2,888.35	2,883.70	11.59	11.27	88.42	351.12	1,356.74	1,402.65	1,380.37	22.28	62.946	
3,100.00	3,099.07	2,988.09	2,983.06	11.95	11.61	88.35	357.74	1,362.38	1,409.52	1,386.52	23.00	61.279	
3,200.00	3,199.01	3,087.84	3,082.43	12.31	11.96	88.28	364.35	1,368.02	1,416.39	1,392.67	23.72	59.713	
3,300.00	3,298.94	3,187.59	3,181.80	12.66	12.32	88.21	370.97	1,373.66	1,423.27	1,398.83	24.44	58.237	
3,400.00	3,398.88	3,287.34	3,281.17	13.02	12.67	88.14	377.59	1,379.30	1,430.14	1,404.99	25.16	56.845	
3,500.00	3,498.82	3,387.09	3,380.54	13.38	13.02	88.07	384.21	1,384.94	1,437.02	1,411.14	25.88	55.530	
3,600.00	3,598.76	3,486.84	3,479.91	13.74	13.37	88.00	390.82	1,390.58	1,443.90	1,417.30	26.60	54.285	
3,700.00	3,698.70	3,586.58	3,579.28	14.10	13.73	87.93	397.44	1,396.22	1,450.78	1,423.47	27.32	53.106	
3,800.00	3,798.64	3,686.33	3,678.64	14.46	14.08	87.87	404.06	1,401.86	1,457.67	1,429.63	28.04	51.986	
3,900.00	3,898.58	3,786.08	3,778.01	14.81	14.44	87.80	410.68	1,407.50	1,464.56	1,435.80	28.76	50.922	
4,000.00	3,998.52	3,885.83	3,877.38	15.17	14.80	87.73	417.29	1,413.14	1,471.44	1,441.96	29.48	49.910	
4,100.00	4,098.46	3,985.58	3,976.75	15.53	15.16	87.67	423.91	1,418.78	1,478.33	1,448.13	30.20	48.946	
4,200.00	4,198.40	4,085.33	4,076.12	15.89	15.51	87.60	430.53	1,424.42	1,485.23	1,454.30	30.92	48.027	
4,300.00	4,298.34	4,185.07	4,175.49	16.25	15.87	87.54	437.15	1,430.06	1,492.12	1,460.47	31.65	47.149	
4,400.00	4,398.27	4,284.82	4,274.86	16.61	16.23	87.47	443.77	1,435.70	1,499.02	1,466.65	32.37	46.314	
4,500.00	4,498.12	4,384.58	4,374.24	16.97	16.59	87.35	450.38	1,441.34	1,505.82	1,472.74	33.08	45.520	
4,600.00	4,597.88	4,484.34	4,473.61	17.32	16.95	87.42	457.00	1,446.98	1,512.56	1,478.77	33.80	44.757	
4,700.00	4,697.63	4,584.10	4,572.99	17.68	17.31	87.49	463.62	1,452.62	1,519.31	1,484.79	34.52	44.013	
4,800.00	4,797.39	4,683.85	4,672.37	18.04	17.68	87.56	470.24	1,458.26	1,526.05	1,490.81	35.24	43.300	
4,900.00	4,897.14	4,783.61	4,771.74	18.40	18.04	87.63	476.86	1,463.90	1,532.80	1,496.83	35.97	42.615	
5,000.00	4,996.90	4,883.36	4,871.12	18.76	18.40	87.70	483.47	1,469.54	1,539.55	1,502.86	36.69	41.957	
5,100.00	5,096.66	4,983.12	4,970.49	19.12	18.76	87.76	490.09	1,475.18	1,546.30	1,508.88	37.42	41.324	
5,200.00	5,196.41	5,082.87	5,069.87	19.49	19.13	87.83	496.71	1,480.82	1,553.05	1,514.91	38.14	40.715	
5,300.00	5,296.17	5,182.63	5,169.25	19.85	19.49	87.89	503.33	1,486.47	1,559.81	1,520.94	38.87	40.128	
5,400.00	5,395.93	5,282.39	5,268.62	20.21	19.85	87.96	509.95	1,492.11	1,566.57	1,526.97	39.60	39.562	
5,500.00	5,495.68	5,382.14	5,368.00	20.57	20.22	88.02	516.57	1,497.75	1,573.33	1,533.00	40.32	39.017	
5,600.00	5,595.44	5,481.90	5,467.37	20.94	20.58	88.09	523.18	1,503.39	1,580.09	1,539.04	41.05	38.491	
5,700.00	5,695.20	5,581.65	5,566.75	21.30	20.95	88.15	529.80	1,509.03	1,586.85	1,545.07	41.78	37.983	
5,800.00	5,794.95	5,681.41	5,666.13	21.66	21.31	88.21	536.42	1,514.67	1,593.62	1,551.11	42.51	37.492	
5,900.00	5,894.71	5,781.16	5,765.50	22.02	21.68	88.28	543.04	1,520.31	1,600.39	1,557.15	43.23	37.017	
6,000.00	5,994.47	5,880.92	5,864.88	22.39	22.05	88.34	549.66	1,525.95	1,607.15	1,563.19	43.96	36.558	
6,100.00	6,094.22	5,980.68	5,964.25	22.75	22.41	88.40	556.27	1,531.59	1,613.93	1,569.24	44.69	36.114	
6,200.00	6,193.98	6,080.43	6,063.63	23.11	22.78	88.46	562.89	1,537.23	1,620.70	1,575.28	45.42	35.684	

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



Anticollision Report



Company: COG Operating LLC
Project: Eddy County, NM (NAD27 NME)
Reference Site: Quien Sabe Fed Com
Site Error: 0.00 usft
Reference Well: 602H
Well Error: 0.00 usft
Reference Wellbore: OH \ 65011
Reference Design: Plan 2 06-28-19

Local Co-ordinate Reference: Well 602H
TVD Reference: KB @ 3147.90usft (Ensign 155)
MD Reference: KB @ 3147.90usft (Ensign 155)
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 Quien Sabe Fed Com -- 601H - OH - Plan 1 02-21-19													Offset Site Error: 0.00 usft
Survey Program: 0-MWD+HRGM													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)	Between Centres (usft)	Between Ellipses (usft)					
6,300.00	6,293.73	6,180.19	6,163.01	23.48	23.15	88.52	569.51	1,542.87	1,627.47	1,581.33	46.15	35.267	
6,400.00	6,393.49	6,279.94	6,262.38	23.84	23.51	88.58	576.13	1,548.51	1,634.25	1,587.37	46.88	34.863	
6,500.00	6,493.25	6,379.70	6,361.76	24.20	23.88	88.64	582.75	1,554.15	1,641.03	1,593.42	47.61	34.471	
6,600.00	6,593.00	6,479.45	6,461.13	24.57	24.25	88.70	589.36	1,559.79	1,647.81	1,599.47	48.33	34.092	
6,700.00	6,692.76	6,579.21	6,560.51	24.93	24.61	88.76	595.98	1,565.43	1,654.59	1,605.53	49.06	33.723	
6,800.00	6,792.52	6,678.97	6,659.89	25.29	24.98	88.81	602.60	1,571.07	1,661.37	1,611.58	49.79	33.365	
6,900.00	6,892.27	6,778.72	6,759.26	25.66	25.35	88.87	609.22	1,576.71	1,668.16	1,617.63	50.52	33.017	
7,000.00	6,992.03	6,878.48	6,858.64	26.02	25.72	88.93	615.84	1,582.35	1,674.95	1,623.69	51.25	32.680	
7,100.00	7,091.79	6,978.23	6,958.01	26.39	26.09	88.98	622.46	1,588.00	1,681.73	1,629.75	51.98	32.351	
7,200.00	7,191.54	7,077.99	7,057.39	26.75	26.46	89.04	629.07	1,593.64	1,688.52	1,635.81	52.71	32.032	
7,300.00	7,291.30	7,177.74	7,156.77	27.11	26.83	89.10	635.69	1,599.28	1,695.31	1,641.87	53.44	31.721	
7,400.00	7,391.06	7,277.50	7,256.14	27.48	27.19	89.15	642.31	1,604.92	1,702.11	1,647.93	54.17	31.419	
7,500.00	7,490.81	7,377.26	7,355.52	27.84	27.56	89.21	648.93	1,610.56	1,708.90	1,654.00	54.91	31.125	
7,600.00	7,590.57	7,477.01	7,454.89	28.21	27.93	89.26	655.55	1,616.20	1,715.70	1,660.06	55.64	30.838	
7,700.00	7,690.32	7,576.77	7,554.27	28.57	28.30	89.31	662.16	1,621.84	1,722.50	1,666.13	56.37	30.559	
7,800.00	7,790.08	7,676.52	7,653.65	28.94	28.67	89.37	668.78	1,627.48	1,729.30	1,672.20	57.10	30.287	
7,900.00	7,889.84	7,776.28	7,753.02	29.30	29.04	89.42	675.40	1,633.12	1,736.10	1,678.27	57.83	30.021	
8,000.00	7,989.59	7,930.00	7,906.32	29.66	29.61	89.55	683.91	1,640.37	1,741.99	1,683.18	58.81	29.622	
8,100.00	8,089.35	8,095.28	8,071.55	30.03	30.22	89.86	686.41	1,642.50	1,743.30	1,683.52	59.78	29.160	
8,162.03	8,151.22	8,157.15	8,133.42	30.25	30.43	90.00	686.41	1,642.50	1,743.30	1,683.07	60.22	28.948	
8,200.00	8,189.11	8,195.04	8,171.31	30.39	30.56	90.09	686.41	1,642.50	1,743.30	1,682.81	60.49	28.821	
8,300.00	8,288.86	8,294.79	8,271.06	30.76	30.90	90.32	686.41	1,642.50	1,743.32	1,682.13	61.20	28.488	
8,400.00	8,388.62	8,394.55	8,370.82	31.12	31.24	90.54	686.41	1,642.50	1,743.37	1,681.47	61.90	28.163	
8,500.00	8,488.38	8,494.30	8,470.58	31.49	31.58	90.77	686.41	1,642.50	1,743.45	1,680.84	62.61	27.846	
8,600.00	8,588.13	8,594.06	8,570.33	31.85	31.92	91.00	686.41	1,642.50	1,743.56	1,680.24	63.32	27.536	
8,700.00	8,687.99	8,702.60	8,678.87	32.21	32.29	107.14	686.16	1,642.50	1,743.86	1,679.80	64.06	27.223	
8,800.00	8,787.21	8,905.82	8,876.72	32.68	32.84	-95.32	644.67	1,642.56	1,741.76	1,676.95	64.81	26.875	
8,900.00	8,882.96	9,091.31	9,034.56	33.10	33.38	-93.61	548.78	1,642.70	1,735.43	1,670.19	65.24	26.599	
9,000.00	8,972.33	9,251.65	9,140.31	33.47	33.80	-92.27	428.96	1,642.87	1,726.20	1,660.58	65.63	26.304	
9,100.00	9,052.59	9,388.36	9,201.33	33.78	34.04	-91.15	306.99	1,643.05	1,715.41	1,649.37	66.04	25.974	
9,200.00	9,121.31	9,506.30	9,229.50	34.02	34.22	-90.25	192.67	1,643.21	1,704.10	1,637.61	66.49	25.631	
9,300.00	9,176.41	9,606.80	9,235.06	34.18	34.38	-89.60	92.43	1,643.36	1,692.97	1,626.05	66.92	25.300	
9,400.00	9,216.21	9,698.09	9,235.38	34.29	34.57	-89.39	1.14	1,643.49	1,682.60	1,615.26	67.34	24.987	
9,500.00	9,236.49	9,794.80	9,235.69	34.36	34.82	-89.62	-95.57	1,643.63	1,672.55	1,604.75	67.81	24.666	
9,600.00	9,245.82	9,894.00	9,236.02	34.43	35.12	-90.25	-194.77	1,643.77	1,662.50	1,594.17	68.33	24.330	
9,700.00	9,246.24	9,993.70	9,236.34	34.52	35.49	-90.26	-294.46	1,643.92	1,654.71	1,585.74	68.98	23.990	
9,800.00	9,246.66	10,093.60	9,236.67	34.71	35.91	-90.27	-394.37	1,644.06	1,650.41	1,580.63	69.79	23.649	
9,899.78	9,247.07	10,193.36	9,236.99	34.94	36.39	-90.27	-494.13	1,644.21	1,649.14	1,578.48	70.65	23.342	
9,900.00	9,247.07	10,193.59	9,236.99	34.94	36.39	-90.27	-494.36	1,644.21	1,649.48	1,578.82	70.65	23.346	
10,000.00	9,247.48	10,293.59	9,237.32	35.24	36.92	-90.27	-594.36	1,644.35	1,649.48	1,577.88	71.60	23.038	
10,100.00	9,247.89	10,393.59	9,237.65	35.62	37.49	-90.26	-694.36	1,644.49	1,649.48	1,576.84	72.64	22.706	
10,200.00	9,248.30	10,493.59	9,237.97	36.09	38.12	-90.26	-794.36	1,644.64	1,649.49	1,575.70	73.79	22.354	
10,300.00	9,248.71	10,593.59	9,238.30	36.61	38.78	-90.26	-894.35	1,644.78	1,649.49	1,574.46	75.03	21.985	
10,400.00	9,249.12	10,693.59	9,238.62	37.19	39.49	-90.25	-994.35	1,644.93	1,649.50	1,573.14	76.36	21.602	
10,500.00	9,249.53	10,793.59	9,238.95	37.83	40.24	-90.25	-1,094.35	1,645.07	1,649.50	1,571.73	77.77	21.210	
10,600.00	9,249.94	10,893.59	9,239.28	38.51	41.03	-90.25	-1,194.35	1,645.22	1,649.50	1,570.24	79.26	20.811	
10,700.00	9,250.35	10,993.59	9,239.60	39.24	41.85	-90.24	-1,294.35	1,645.36	1,649.51	1,568.68	80.83	20.408	
10,800.00	9,250.76	11,093.59	9,239.93	40.01	42.70	-90.24	-1,394.35	1,645.51	1,649.51	1,567.05	82.46	20.003	
10,900.00	9,251.17	11,193.59	9,240.25	40.81	43.59	-90.24	-1,494.35	1,645.65	1,649.52	1,565.35	84.17	19.598	
11,000.00	9,251.58	11,293.59	9,240.58	41.65	44.50	-90.24	-1,594.35	1,645.79	1,649.52	1,563.58	85.94	19.195	
11,100.00	9,251.99	11,393.59	9,240.91	42.53	45.45	-90.23	-1,694.35	1,645.94	1,649.52	1,561.76	87.76	18.795	
11,200.00	9,252.41	11,493.59	9,241.23	43.43	46.42	-90.23	-1,794.35	1,646.08	1,649.53	1,559.88	89.65	18.401	

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



Anticollision Report



Company: COG Operating LLC
Project: Eddy County, NM (NAD27 NME)
Reference Site: Quien Sabe Fed Com
Site Error: 0.00 usft
Reference Well: 602H
Well Error: 0.00 usft
Reference Wellbore: OH \ 65011
Reference Design: Plan 2 06-28-19

Local Co-ordinate Reference: Well 602H
TVD Reference: KB @ 3147.90usft (Ensign 155)
MD Reference: KB @ 3147.90usft (Ensign 155)
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 Quien Sabe Fed Com - 601H - OH - Plan 1 02-21-19													Offset Site Error: 0.00 usft
Survey Program: 0-MWD+HRGM													Offset Well Error: 0.00 usft
Reference		Offset		Semi Major Axis		Highside Toothface (")	Distance					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)	Minimum Separation (usft)		
11,300.00	9,252.82	11,593.59	9,241.56	44.37	47.41	-90.23	-1,894.35	1,646.23	1,649.53	1,557.95	91.58	18.012	
11,400.00	9,253.23	11,693.59	9,241.88	45.33	48.42	-90.22	-1,994.35	1,646.37	1,649.53	1,555.97	93.56	17.630	
11,500.00	9,253.64	11,793.59	9,242.21	46.31	49.46	-90.22	-2,094.35	1,646.52	1,649.54	1,553.95	95.59	17.256	
11,600.00	9,254.05	11,893.59	9,242.54	47.32	50.51	-90.22	-2,194.35	1,646.66	1,649.54	1,551.88	97.66	16.890	
11,700.00	9,254.46	11,993.59	9,242.86	48.35	51.59	-90.22	-2,294.35	1,646.81	1,649.55	1,549.77	99.78	16.533	
11,800.00	9,254.87	12,093.59	9,243.19	49.41	52.68	-90.21	-2,394.34	1,646.95	1,649.55	1,547.63	101.93	16.184	
11,900.00	9,255.28	12,193.59	9,243.51	50.48	53.79	-90.21	-2,494.34	1,647.10	1,649.55	1,545.44	104.11	15.844	
12,000.00	9,255.69	12,293.59	9,243.84	51.57	54.91	-90.21	-2,594.34	1,647.24	1,649.56	1,543.23	106.33	15.514	
12,100.00	9,256.10	12,393.59	9,244.17	52.67	56.05	-90.20	-2,694.34	1,647.38	1,649.56	1,540.98	108.58	15.192	
12,200.00	9,256.51	12,493.59	9,244.49	53.80	57.21	-90.20	-2,794.34	1,647.53	1,649.57	1,538.71	110.86	14.880	
12,300.00	9,256.92	12,593.59	9,244.82	54.93	58.37	-90.20	-2,894.34	1,647.67	1,649.57	1,536.41	113.16	14.577	
12,400.00	9,257.33	12,693.59	9,245.14	56.08	59.55	-90.19	-2,994.34	1,647.82	1,649.57	1,534.08	115.50	14.283	
12,500.00	9,257.74	12,793.59	9,245.47	57.25	60.74	-90.19	-3,094.34	1,647.96	1,649.58	1,531.73	117.85	13.997	
12,600.00	9,258.15	12,893.59	9,245.80	58.43	61.94	-90.19	-3,194.34	1,648.11	1,649.58	1,529.35	120.23	13.720	
12,700.00	9,258.56	12,993.59	9,246.12	59.61	63.15	-90.19	-3,294.34	1,648.25	1,649.59	1,526.95	122.63	13.451	
12,800.00	9,258.98	13,093.59	9,246.45	60.81	64.36	-90.18	-3,394.34	1,648.40	1,649.59	1,524.54	125.05	13.191	
12,900.00	9,259.39	13,193.59	9,246.78	62.02	65.59	-90.18	-3,494.34	1,648.54	1,649.59	1,522.10	127.50	12.938	
13,000.00	9,259.80	13,293.59	9,247.10	63.24	66.83	-90.18	-3,594.34	1,648.68	1,649.60	1,519.64	129.95	12.694	
13,100.00	9,260.21	13,393.59	9,247.43	64.47	68.07	-90.17	-3,694.34	1,648.83	1,649.60	1,517.17	132.43	12.456	
13,200.00	9,260.62	13,493.59	9,247.75	65.71	69.33	-90.17	-3,794.34	1,648.97	1,649.61	1,514.68	134.92	12.226	
13,300.00	9,261.03	13,593.59	9,248.08	66.95	70.58	-90.17	-3,894.33	1,649.12	1,649.61	1,512.18	137.43	12.003	
13,400.00	9,261.44	13,693.59	9,248.41	68.21	71.85	-90.17	-3,994.33	1,649.26	1,649.61	1,509.66	139.95	11.787	
13,500.00	9,261.85	13,793.59	9,248.73	69.47	73.12	-90.16	-4,094.33	1,649.41	1,649.62	1,507.13	142.49	11.577	
13,600.00	9,262.26	13,893.59	9,249.06	70.73	74.40	-90.16	-4,194.33	1,649.55	1,649.62	1,504.59	145.03	11.374	
13,700.00	9,262.67	13,993.59	9,249.38	72.01	75.69	-90.16	-4,294.33	1,649.70	1,649.63	1,502.03	147.59	11.177	
13,800.00	9,263.08	14,093.59	9,249.71	73.29	76.98	-90.15	-4,394.33	1,649.84	1,649.63	1,499.46	150.17	10.985	
13,900.00	9,263.49	14,193.59	9,250.04	74.57	78.27	-90.15	-4,494.33	1,649.98	1,649.63	1,496.89	152.75	10.800	
14,000.00	9,263.90	14,293.59	9,250.36	75.86	79.57	-90.15	-4,594.33	1,650.13	1,649.64	1,494.30	155.34	10.619	
14,100.00	9,264.31	14,393.59	9,250.69	77.16	80.88	-90.15	-4,694.33	1,650.27	1,649.64	1,491.70	157.95	10.444	
14,200.00	9,264.72	14,493.59	9,251.01	78.46	82.19	-90.14	-4,794.33	1,650.42	1,649.65	1,489.09	160.56	10.274	
14,300.00	9,265.13	14,593.59	9,251.34	79.77	83.50	-90.14	-4,894.33	1,650.56	1,649.65	1,486.47	163.18	10.109	
14,400.00	9,265.55	14,693.59	9,251.67	81.08	84.82	-90.14	-4,994.33	1,650.71	1,649.66	1,483.84	165.81	9.949	
14,500.00	9,265.96	14,793.59	9,251.99	82.40	86.14	-90.13	-5,094.33	1,650.85	1,649.66	1,481.21	168.45	9.793	
14,600.00	9,266.37	14,893.59	9,252.32	83.71	87.47	-90.13	-5,194.33	1,651.00	1,649.66	1,478.56	171.10	9.642	
14,700.00	9,266.78	14,993.59	9,252.64	85.04	88.80	-90.13	-5,294.33	1,651.14	1,649.67	1,475.91	173.75	9.494	
14,800.00	9,267.19	15,093.59	9,252.97	86.37	90.13	-90.12	-5,394.32	1,651.28	1,649.67	1,473.26	176.41	9.351	
14,900.00	9,267.60	15,193.59	9,253.30	87.70	91.47	-90.12	-5,494.32	1,651.43	1,649.68	1,470.59	179.08	9.212	
15,000.00	9,268.01	15,293.59	9,253.62	89.03	92.81	-90.12	-5,594.32	1,651.57	1,649.68	1,467.92	181.76	9.076	
15,100.00	9,268.42	15,393.59	9,253.95	90.37	94.15	-90.12	-5,694.32	1,651.72	1,649.68	1,465.25	184.44	8.944	
15,200.00	9,268.83	15,493.59	9,254.28	91.71	95.49	-90.11	-5,794.32	1,651.86	1,649.69	1,462.56	187.12	8.816	
15,300.00	9,269.24	15,593.59	9,254.60	93.05	96.84	-90.11	-5,894.32	1,652.01	1,649.69	1,459.87	189.82	8.691	
15,400.00	9,269.65	15,693.59	9,254.93	94.40	98.19	-90.11	-5,994.32	1,652.15	1,649.70	1,457.18	192.52	8.569	
15,500.00	9,270.06	15,793.59	9,255.25	95.75	99.54	-90.10	-6,094.32	1,652.30	1,649.70	1,454.48	195.22	8.451	
15,600.00	9,270.47	15,893.59	9,255.58	97.10	100.90	-90.10	-6,194.32	1,652.44	1,649.70	1,451.78	197.93	8.335	
15,700.00	9,270.88	15,993.59	9,255.91	98.45	102.26	-90.10	-6,294.32	1,652.58	1,649.71	1,449.07	200.64	8.222	
15,800.00	9,271.29	16,093.59	9,256.23	99.81	103.62	-90.10	-6,394.32	1,652.73	1,649.71	1,446.35	203.36	8.112	
15,900.00	9,271.70	16,193.59	9,256.56	101.17	104.98	-90.09	-6,494.32	1,652.87	1,649.72	1,443.64	206.08	8.005	
16,000.00	9,272.11	16,293.59	9,256.88	102.53	106.34	-90.09	-6,594.32	1,653.02	1,649.72	1,440.91	208.81	7.901	
16,100.00	9,272.53	16,393.59	9,257.21	103.89	107.71	-90.09	-6,694.32	1,653.16	1,649.73	1,438.19	211.54	7.799	
16,200.00	9,272.94	16,493.59	9,257.54	105.26	109.08	-90.08	-6,794.31	1,653.31	1,649.73	1,435.46	214.27	7.699	
16,300.00	9,273.35	16,593.59	9,257.86	106.63	110.45	-90.08	-6,894.31	1,653.45	1,649.73	1,432.72	217.01	7.602	
16,400.00	9,273.76	16,693.59	9,258.19	108.00	111.82	-90.08	-6,994.31	1,653.60	1,649.74	1,429.99	219.75	7.507	

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



Anticollision Report



Company: COG Operating LLC
Project: Eddy County, NM (NAD27 NME)
Reference Site: Quien Sabe Fed Com
Site Error: 0.00 usft
Reference Well: 602H
Well Error: 0.00 usft
Reference Wellbore: OH \ 65011
Reference Design: Plan 2 06-28-19

Local Co-ordinate Reference: Well 602H
TVD Reference: KB @ 3147.90usft (Ensign 155)
MD Reference: KB @ 3147.90usft (Ensign 155)
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 Quien Sabe Fed Com - 601H - OH - Plan 1 02-21-19													Offset Site Error: 0.00 usft
Survey Program: 0-MWD-HRGM													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 Ellipse's (usft)			
16,500.00	9,274.17	16,793.59	9,258.51	109.37	113.19	-90.07	-7,094.31	1,653.74	1,649.74	1,427.24	222.50	7.415	
16,600.00	9,274.58	16,893.59	9,258.84	110.74	114.57	-90.07	-7,194.31	1,653.88	1,649.75	1,424.50	225.25	7.324	
16,700.00	9,274.99	16,993.59	9,259.17	112.11	115.94	-90.07	-7,294.31	1,654.03	1,649.75	1,421.75	228.00	7.236	
16,800.00	9,275.40	17,093.59	9,259.49	113.49	117.32	-90.07	-7,394.31	1,654.17	1,649.75	1,419.00	230.75	7.149	
16,900.00	9,275.81	17,193.59	9,259.82	114.87	118.70	-90.06	-7,494.31	1,654.32	1,649.76	1,416.25	233.51	7.065	
17,000.00	9,276.22	17,293.59	9,260.14	116.25	120.08	-90.06	-7,594.31	1,654.46	1,649.76	1,413.49	236.27	6.982	
17,100.00	9,276.63	17,393.59	9,260.47	117.63	121.47	-90.06	-7,694.31	1,654.61	1,649.77	1,410.73	239.04	6.902	
17,200.00	9,277.04	17,493.59	9,260.80	119.01	122.85	-90.05	-7,794.31	1,654.75	1,649.77	1,407.97	241.81	6.823	
17,300.00	9,277.45	17,593.59	9,261.12	120.39	124.24	-90.05	-7,894.31	1,654.90	1,649.78	1,405.20	244.57	6.745	
17,400.00	9,277.86	17,693.59	9,261.45	121.78	125.62	-90.05	-7,994.31	1,655.04	1,649.78	1,402.43	247.35	6.670	
17,500.00	9,278.27	17,793.59	9,261.77	123.17	127.01	-90.05	-8,094.31	1,655.19	1,649.78	1,399.66	250.12	6.596	
17,600.00	9,278.68	17,893.59	9,262.10	124.55	128.40	-90.04	-8,194.31	1,655.33	1,649.79	1,396.89	252.90	6.524	
17,700.00	9,279.10	17,993.59	9,262.43	125.94	129.79	-90.04	-8,294.30	1,655.47	1,649.79	1,394.11	255.68	6.453	
17,800.00	9,279.51	18,093.59	9,262.75	127.33	131.18	-90.04	-8,394.30	1,655.62	1,649.80	1,391.34	258.46	6.383	
17,900.00	9,279.92	18,193.59	9,263.08	128.72	132.57	-90.03	-8,494.30	1,655.76	1,649.80	1,388.56	261.24	6.315	
18,000.00	9,280.33	18,293.59	9,263.41	130.11	133.96	-90.03	-8,594.30	1,655.91	1,649.80	1,385.78	264.03	6.249	
18,100.00	9,280.74	18,393.59	9,263.73	131.51	135.36	-90.03	-8,694.30	1,656.05	1,649.81	1,382.99	266.82	6.183	
18,200.00	9,281.15	18,493.59	9,264.06	132.90	136.75	-90.02	-8,794.30	1,656.20	1,649.81	1,380.21	269.61	6.119	
18,300.00	9,281.56	18,593.59	9,264.38	134.30	138.15	-90.02	-8,894.30	1,656.34	1,649.82	1,377.42	272.40	6.057	
18,400.00	9,281.97	18,693.59	9,264.71	135.69	139.55	-90.02	-8,994.30	1,656.49	1,649.82	1,374.63	275.19	5.995	
18,500.00	9,282.38	18,793.59	9,265.04	137.09	140.94	-90.02	-9,094.30	1,656.63	1,649.83	1,371.84	277.99	5.935	
18,600.00	9,282.79	18,893.59	9,265.36	138.49	142.34	-90.01	-9,194.30	1,656.77	1,649.83	1,369.05	280.78	5.876	
18,700.00	9,283.20	18,993.59	9,265.69	139.89	143.74	-90.01	-9,294.30	1,656.92	1,649.83	1,366.25	283.58	5.818	
18,800.00	9,283.61	19,093.59	9,266.01	141.29	145.14	-90.01	-9,394.30	1,657.06	1,649.84	1,363.46	286.38	5.761	
18,900.00	9,284.02	19,193.59	9,266.34	142.69	146.54	-90.00	-9,494.30	1,657.21	1,649.84	1,360.66	289.18	5.705	
19,000.00	9,284.43	19,293.59	9,266.67	144.09	147.95	-90.00	-9,594.30	1,657.35	1,649.85	1,357.86	291.99	5.650	
19,100.00	9,284.84	19,393.59	9,266.99	145.49	149.35	-90.00	-9,694.30	1,657.50	1,649.85	1,355.06	294.79	5.597	
19,138.12	9,285.00	19,396.42	9,267.00	146.02	149.39	-90.00	-9,697.13	1,657.50	1,650.23	1,354.84	295.39	5.587 SF	



Anticollision Report



Company: COG Operating LLC
Project: Eddy County, NM (NAD27 NME)
Reference Site: Quien Sabe Fed Com
Site Error: 0.00 usft
Reference Well: 602H
Well Error: 0.00 usft
Reference Wellbore: OH \ 65011
Reference Design: Plan 2 06-28-19

Local Co-ordinate Reference: Well 602H
TVD Reference: KB @ 3147.90usft (Ensign 155)
MD Reference: KB @ 3147.90usft (Ensign 155)
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 Quien Sabe Fed Com - 603H - OH \ 65012 - Plan 2 06-28-19													Offset Site Error: 0.00 usft
Survey Program: 0-MWD+HRGM													Offset Well Error: 0.00 usft
Reference		Offset		Semi Major Axis			Distance			Minimum Separation (usft)	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)
0.00	0.00	100.00	100.00	0.00	0.00	88.57	1.50	60.00	116.97				
100.00	100.00	100.00	100.00	0.28	0.00	88.57	1.50	60.00	60.02	59.80	0.22	267.004	
133.47	133.47	133.07	133.07	0.50	0.15	88.57	1.50	60.00	60.02	59.50	0.52	115.469	
200.00	200.00	199.60	199.60	0.93	0.46	88.57	1.50	60.00	60.02	58.91	1.11	54.066	
300.00	300.00	299.60	299.60	1.44	1.09	88.57	1.50	60.00	60.02	57.95	2.07	29.012	
400.00	400.00	399.60	399.60	1.88	1.56	88.57	1.50	60.00	60.02	57.14	2.88	20.816	
500.00	500.00	499.60	499.60	2.29	1.98	88.57	1.50	60.00	60.02	56.36	3.66	16.415	
600.00	600.00	599.60	599.60	2.69	2.38	88.57	1.50	60.00	60.02	55.61	4.41	13.609	
700.00	700.00	699.60	699.60	3.08	2.77	88.57	1.50	60.00	60.02	54.87	5.15	11.646	
800.00	800.00	799.60	799.60	3.46	3.15	88.57	1.50	60.00	60.02	54.13	5.89	10.190	
900.00	900.00	899.60	899.60	3.83	3.53	88.57	1.50	60.00	60.02	53.40	6.62	9.063	
1,000.00	1,000.00	999.60	999.60	4.21	3.90	88.57	1.50	60.00	60.02	52.67	7.35	8.164	
1,100.00	1,100.00	1,099.60	1,099.60	4.58	4.27	88.57	1.50	60.00	60.02	51.94	8.08	7.429	
1,200.00	1,200.00	1,199.60	1,199.60	4.95	4.64	88.57	1.50	60.00	60.02	51.21	8.80	6.817	
1,300.00	1,300.00	1,299.60	1,299.60	5.32	5.01	88.57	1.50	60.00	60.02	50.49	9.53	6.299	
1,400.00	1,400.00	1,399.60	1,399.60	5.68	5.38	88.57	1.50	60.00	60.02	49.77	10.25	5.854	
1,500.00	1,500.00	1,499.60	1,499.60	6.05	5.74	88.57	1.50	60.00	60.02	49.04	10.97	5.469 CC	
1,600.00	1,599.98	1,599.58	1,599.58	6.50	6.11	101.20	1.50	60.00	60.33	48.71	11.62	5.190 ES	
1,700.00	1,699.92	1,699.52	1,699.52	6.96	6.47	104.41	1.50	60.00	61.11	48.89	12.22	5.000	
1,800.00	1,799.86	1,799.46	1,799.46	7.31	6.83	107.53	1.50	60.00	62.07	49.24	12.83	4.837	
1,900.00	1,899.80	1,899.40	1,899.40	7.66	7.20	110.54	1.50	60.00	63.21	49.75	13.45	4.698	
2,000.00	1,999.74	1,999.34	1,999.34	8.02	7.56	113.44	1.50	60.00	64.52	50.43	14.08	4.582	
2,100.00	2,099.68	2,099.28	2,099.28	8.38	7.92	116.22	1.50	60.00	65.98	51.26	14.72	4.483	
2,200.00	2,199.61	2,199.21	2,199.21	8.73	8.28	118.88	1.50	60.00	67.60	52.23	15.37	4.399	
2,300.00	2,299.55	2,299.15	2,299.15	9.09	8.64	121.40	1.50	60.00	69.35	53.33	16.02	4.329	
2,400.00	2,399.49	2,399.09	2,399.09	9.45	9.00	123.80	1.50	60.00	71.23	54.55	16.69	4.269	
2,500.00	2,499.43	2,498.42	2,498.42	9.80	9.34	125.93	1.58	60.20	73.38	56.03	17.35	4.229	
2,600.00	2,599.37	2,597.21	2,597.17	10.16	9.67	126.51	2.63	62.71	77.29	59.23	18.06	4.279	
2,700.00	2,699.31	2,697.11	2,697.01	10.52	9.99	126.65	3.97	65.93	81.70	62.92	18.78	4.351	
2,800.00	2,799.25	2,797.02	2,796.85	10.87	10.31	126.78	5.31	69.15	86.10	66.59	19.51	4.413	
2,900.00	2,899.19	2,896.92	2,896.70	11.23	10.64	126.90	6.65	72.37	90.51	70.26	20.25	4.470	
3,000.00	2,999.13	2,996.82	2,996.54	11.59	10.97	127.01	7.99	75.59	94.92	73.94	20.98	4.524	
3,100.00	3,099.07	3,096.73	3,096.38	11.95	11.31	127.10	9.33	78.81	99.32	77.61	21.71	4.574	
3,200.00	3,199.01	3,196.63	3,196.22	12.31	11.64	127.19	10.67	82.03	103.73	81.29	22.45	4.621	
3,300.00	3,298.94	3,296.53	3,296.06	12.66	11.98	127.27	12.01	85.25	108.14	84.96	23.18	4.666	
3,400.00	3,398.88	3,396.43	3,395.91	13.02	12.31	127.35	13.35	88.46	112.55	88.64	23.91	4.708	
3,500.00	3,498.82	3,496.34	3,495.75	13.38	12.66	127.42	14.69	91.68	116.96	92.32	24.64	4.747	
3,600.00	3,598.76	3,596.24	3,595.59	13.74	13.00	127.48	16.03	94.90	121.36	96.00	25.37	4.784	
3,700.00	3,698.70	3,696.14	3,695.43	14.10	13.34	127.54	17.37	98.12	125.77	99.68	26.10	4.820	
3,800.00	3,798.64	3,796.04	3,795.27	14.46	13.68	127.60	18.71	101.34	130.18	103.36	26.82	4.853	
3,900.00	3,898.58	3,895.95	3,895.11	14.81	14.03	127.65	20.05	104.56	134.59	107.04	27.55	4.885	
4,000.00	3,998.52	3,995.85	3,994.96	15.17	14.38	127.70	21.39	107.78	139.00	110.72	28.28	4.915	
4,100.00	4,098.46	4,095.75	4,094.80	15.53	14.73	127.74	22.73	111.00	143.41	114.40	29.01	4.944	
4,200.00	4,198.40	4,195.66	4,194.64	15.89	15.08	127.79	24.07	114.21	147.82	118.08	29.73	4.972	
4,300.00	4,298.34	4,295.56	4,294.48	16.25	15.43	127.83	25.41	117.43	152.23	121.77	30.46	4.998	
4,400.00	4,398.27	4,395.38	4,394.24	16.61	15.78	127.86	26.75	120.65	156.64	125.46	31.18	5.024	
4,500.00	4,498.12	4,494.66	4,490.38	16.97	16.15	127.87	28.09	125.32	163.41	131.52	31.89	5.124	
4,600.00	4,597.88	4,589.26	4,587.65	17.32	16.50	127.62	31.78	132.75	173.03	140.44	32.59	5.309	
4,700.00	4,697.63	4,688.76	4,686.77	17.68	16.85	127.28	35.11	140.75	182.97	149.66	33.31	5.493	
4,800.00	4,797.39	4,788.26	4,785.89	18.04	17.20	126.97	38.45	148.76	192.92	158.88	34.04	5.667	
4,900.00	4,897.14	4,887.76	4,885.02	18.40	17.55	126.70	41.78	156.77	202.87	168.10	34.77	5.835	
5,000.00	4,996.90	4,987.26	4,984.14	18.76	17.91	126.45	45.11	164.77	212.83	177.33	35.50	5.995	

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



Anticollision Report



Company: COG Operating LLC
 Project: Eddy County, NM (NAD27 NME)
 Reference Site: Quien Sabe Fed Com
 Site Error: 0.00 usft
 Reference Well: 602H
 Well Error: 0.00 usft
 Reference Wellbore: OH \ 65011
 Reference Design: Plan 2 06-28-19

Local Co-ordinate Reference: Well 602H
 TVD Reference: KB @ 3147.90usft (Ensign 155)
 MD Reference: KB @ 3147.90usft (Ensign 155)
 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 Quien Sabe Fed Com - 603H - OH \ 65012 - Plan 2 06-28-19													Offset Site Error: 0.00 usft
Survey Program: 0-MWD+HRGM													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	5,096.66	5,086.76	5,083.26	19.12	-18.26	126.22	48.45	172.78	222.79	186.56	36.23	6.149	
5,200.00	5,196.41	5,186.26	5,182.38	19.49	18.62	126.01	51.78	180.78	232.75	195.79	36.96	6.297	
5,300.00	5,296.17	5,285.76	5,281.50	19.85	18.97	125.82	55.11	188.79	242.72	205.02	37.69	6.440	
5,400.00	5,395.93	5,385.25	5,380.62	20.21	19.33	125.64	58.44	196.80	252.68	214.26	38.42	6.577	
5,500.00	5,495.68	5,484.75	5,479.74	20.57	19.68	125.48	61.78	204.80	262.65	223.50	39.15	6.709	
5,600.00	5,595.44	5,584.25	5,578.86	20.94	20.04	125.33	65.11	212.81	272.63	232.75	39.88	6.836	
5,700.00	5,695.20	5,683.75	5,677.98	21.30	20.40	125.18	68.44	220.81	282.60	241.99	40.61	6.959	
5,800.00	5,794.95	5,783.25	5,777.10	21.66	20.76	125.05	71.77	228.82	292.58	251.23	41.34	7.077	
5,900.00	5,894.71	5,882.75	5,876.22	22.02	21.12	124.93	75.11	236.83	302.55	260.48	42.07	7.192	
6,000.00	5,994.47	5,982.25	5,975.34	22.39	21.48	124.82	78.44	244.83	312.53	269.73	42.80	7.302	
6,100.00	6,094.22	6,081.75	6,074.46	22.75	21.84	124.71	81.77	252.84	322.51	278.98	43.53	7.409	
6,200.00	6,193.98	6,181.25	6,173.58	23.11	22.20	124.61	85.10	260.84	332.49	288.23	44.26	7.512	
6,300.00	6,293.73	6,280.75	6,272.70	23.48	22.56	124.51	88.44	268.85	342.47	297.48	44.99	7.612	
6,400.00	6,393.49	6,380.24	6,371.82	23.84	22.93	124.42	91.77	276.86	352.45	306.73	45.72	7.709	
6,500.00	6,493.25	6,479.74	6,470.94	24.20	23.29	124.34	95.10	284.86	362.44	315.99	46.45	7.802	
6,600.00	6,593.00	6,579.24	6,570.06	24.57	23.65	124.26	98.43	292.87	372.42	325.24	47.18	7.893	
6,700.00	6,692.76	6,678.74	6,669.18	24.93	24.02	124.18	101.77	300.87	382.41	334.49	47.91	7.981	
6,800.00	6,792.52	6,778.24	6,768.30	25.29	24.38	124.11	105.10	308.88	392.39	343.75	48.64	8.067	
6,900.00	6,892.27	6,877.74	6,867.42	25.66	24.74	124.04	108.43	316.89	402.38	353.00	49.37	8.150	
7,000.00	6,992.03	6,977.24	6,966.54	26.02	25.11	123.98	111.76	324.89	412.36	362.26	50.10	8.230	
7,100.00	7,091.79	7,076.74	7,065.66	26.39	25.48	123.91	115.10	332.90	422.35	371.52	50.83	8.309	
7,200.00	7,191.54	7,176.24	7,164.78	26.75	25.84	123.86	118.43	340.90	432.34	380.77	51.56	8.384	
7,300.00	7,291.30	7,275.74	7,263.91	27.11	26.21	123.80	121.76	348.91	442.33	390.03	52.29	8.458	
7,400.00	7,391.06	7,375.24	7,363.03	27.48	26.57	123.74	125.09	356.92	452.31	399.29	53.02	8.530	
7,500.00	7,490.81	7,474.73	7,462.15	27.84	26.94	123.69	128.43	364.92	462.30	408.55	53.76	8.600	
7,600.00	7,590.57	7,574.23	7,561.27	28.21	27.31	123.64	131.76	372.93	472.29	417.80	54.49	8.668	
7,700.00	7,690.32	7,673.73	7,660.39	28.57	27.68	123.60	135.09	380.93	482.28	427.06	55.22	8.734	
7,800.00	7,790.08	7,773.23	7,759.51	28.94	28.04	123.55	138.42	388.94	492.27	436.32	55.95	8.799	
7,900.00	7,889.84	7,872.73	7,858.63	29.30	28.41	123.51	141.76	396.95	502.26	445.58	56.68	8.862	
8,000.00	7,989.59	7,972.23	7,957.75	29.66	28.78	123.46	145.09	404.95	512.25	454.84	57.41	8.923	
8,100.00	8,089.35	8,071.73	8,056.87	30.03	29.15	123.42	148.42	412.96	522.24	464.10	58.14	8.982	
8,200.00	8,189.11	8,171.23	8,155.99	30.39	29.52	123.38	151.75	420.96	532.23	473.36	58.87	9.041	
8,300.00	8,288.86	8,270.73	8,255.11	30.76	29.89	123.35	155.09	428.97	542.22	482.62	59.60	9.097	
8,400.00	8,388.62	8,370.23	8,354.23	31.12	30.25	123.31	158.42	436.98	552.21	491.88	60.33	9.153	
8,500.00	8,488.38	8,469.72	8,453.35	31.49	30.62	123.28	161.75	444.98	562.20	501.14	61.06	9.207	
8,600.00	8,588.13	8,569.22	8,552.47	31.85	30.99	123.24	165.09	452.99	572.19	510.40	61.79	9.260	
8,700.00	8,687.99	8,668.76	8,651.62	32.21	31.36	-74.96	168.42	461.00	580.95	518.41	62.54	9.290	
8,800.00	8,787.21	8,750.00	8,732.52	32.68	31.67	-64.48	169.88	468.10	583.75	520.69	63.06	9.257	
8,900.00	8,882.96	8,800.00	8,781.99	33.10	31.91	-64.73	166.41	474.40	585.33	522.23	63.10	9.276	
9,000.00	8,972.33	8,850.00	8,830.76	33.47	32.20	-65.82	158.98	482.42	587.12	524.20	62.93	9.330	
9,100.00	9,052.59	8,913.48	8,891.12	33.78	32.55	-67.87	143.95	494.97	589.56	526.53	63.03	9.354	
9,200.00	9,121.31	8,969.82	8,942.65	34.02	32.84	-69.97	125.51	508.21	593.67	530.57	63.10	9.408	
9,300.00	9,176.41	9,026.16	8,991.76	34.18	33.11	-72.19	102.44	523.29	600.29	536.87	63.42	9.465	
9,400.00	9,216.21	9,082.70	9,038.13	34.29	33.36	-74.40	74.87	540.14	610.29	546.22	64.07	9.526	
9,500.00	9,239.49	9,139.73	9,081.48	34.36	33.59	-76.48	42.84	558.71	624.44	559.45	64.99	9.609	
9,600.00	9,245.82	9,200.00	9,123.10	34.43	33.80	-78.81	4.75	579.83	643.43	577.36	66.06	9.740	
9,700.00	9,246.24	9,263.74	9,161.91	34.52	34.00	-82.48	-39.82	603.60	671.26	604.22	67.04	10.013	
9,800.00	9,246.66	9,341.50	9,201.34	34.71	34.21	-86.14	-99.38	634.18	707.61	639.69	67.93	10.418	
9,900.00	9,247.07	9,431.10	9,235.12	34.94	34.44	-89.13	-173.73	670.86	749.41	680.75	68.66	10.915	
10,000.00	9,247.48	9,531.45	9,257.17	35.24	34.74	-90.91	-262.08	712.72	792.08	722.69	69.39	11.415	
10,100.00	9,247.89	9,644.31	9,262.52	35.62	35.17	-91.23	-364.70	759.12	833.26	763.00	70.26	11.859	
10,200.00	9,248.30	9,776.21	9,263.05	36.09	35.85	-91.16	-486.83	808.88	870.87	799.47	71.40	12.197	

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



Anticollision Report



Company: COG Operating LLC
Project: Eddy County, NM (NAD27 NME)
Reference Site: Quien Sabe Fed Com
Site Error: 0.00 usft
Reference Well: 602H
Well Error: 0.00 usft
Reference Wellbore: OH \ 65011
Reference Design: Plan 2 06-28-19

Local Co-ordinate Reference: Well 602H
TVD Reference: KB @ 3147.90usft (Ensign 155)
MD Reference: KB @ 3147.90usft (Ensign 155)
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 Quien Sabe Fed Com - 603H - OH \ 65012 - Plan 2 06-28-19													Offset Site Error: 0.00 usft
Survey Program: 0-MWD+HRGM													Offset Well Error: 0.00 usft
Reference		Offset		Semi Major Axis		Highside Toothface (")	Offset Wellbore Centre		Distance		Minimum Separation (usft)	Separation Factor	Warning
Measured Depth (usft)	Vertical Depth (usft)	Measured Depth (usft)	Vertical Depth (usft)	Reference (usft)	Offset (usft)		+N/-S (usft)	+E/-W (usft)	Between Centres (usft)	Between Ellipses (usft)			
10,300.00	9,248.71	9,912.87	9,263.61	36.51	36.71	-91.10	-615.65	854.45	904.09	831.36	72.73	12.431	
10,400.00	9,249.12	10,053.90	9,264.18	37.19	37.68	-91.05	-750.73	894.98	932.70	858.49	74.21	12.568	
10,500.00	9,249.53	10,198.82	9,264.78	37.83	38.76	-91.01	-891.41	929.65	956.49	880.69	75.80	12.618	
10,600.00	9,249.94	10,347.00	9,265.38	38.51	39.91	-90.98	-1,036.90	957.70	975.29	897.81	77.48	12.587	
10,700.00	9,250.35	10,497.75	9,266.00	39.24	41.12	-90.96	-1,186.19	978.48	988.94	909.73	79.21	12.485	
10,800.00	9,250.76	10,650.28	9,266.61	40.01	42.37	-90.95	-1,338.15	991.48	997.33	916.37	80.96	12.319	
10,900.00	9,251.17	10,803.75	9,267.23	40.81	43.63	-90.94	-1,491.52	996.39	1,000.38	917.70	82.68	12.099	
11,000.00	9,251.58	10,907.56	9,267.64	41.65	44.45	-90.94	-1,595.33	996.55	1,000.39	916.06	84.34	11.862	
11,100.00	9,251.99	11,007.56	9,268.04	42.53	45.26	-90.94	-1,695.33	996.69	1,000.39	914.33	86.06	11.625	
11,200.00	9,252.41	11,107.56	9,268.44	43.43	46.11	-90.94	-1,795.33	996.82	1,000.39	912.55	87.84	11.389	
11,300.00	9,252.82	11,207.56	9,268.84	44.37	46.99	-90.94	-1,895.32	996.96	1,000.38	910.70	89.68	11.155	
11,400.00	9,253.23	11,307.56	9,269.24	45.33	47.89	-90.94	-1,995.32	997.09	1,000.38	908.81	91.57	10.925	
11,500.00	9,253.64	11,407.56	9,269.64	46.31	48.82	-90.94	-2,095.32	997.23	1,000.37	906.86	93.51	10.698	
11,600.00	9,254.05	11,507.56	9,270.04	47.32	49.77	-90.94	-2,195.32	997.37	1,000.37	904.86	95.50	10.475	
11,700.00	9,254.46	11,607.56	9,270.44	48.35	50.75	-90.94	-2,295.32	997.50	1,000.36	902.83	97.54	10.256	
11,800.00	9,254.87	11,707.56	9,270.83	49.41	51.74	-90.94	-2,395.32	997.64	1,000.36	900.74	99.62	10.042	
11,900.00	9,255.28	11,807.56	9,271.23	50.48	52.76	-90.94	-2,495.32	997.77	1,000.36	898.62	101.73	9.833	
12,000.00	9,255.69	11,907.56	9,271.63	51.57	53.79	-90.94	-2,595.32	997.91	1,000.35	896.47	103.88	9.630	
12,100.00	9,256.10	12,007.56	9,272.03	52.67	54.84	-90.94	-2,695.32	998.05	1,000.35	894.28	106.07	9.431	
12,200.00	9,256.51	12,107.56	9,272.43	53.80	55.92	-90.93	-2,795.32	998.18	1,000.34	892.05	108.29	9.238	
12,300.00	9,256.92	12,207.56	9,272.83	54.93	57.00	-90.93	-2,895.32	998.32	1,000.34	889.80	110.54	9.050	
12,400.00	9,257.33	12,307.56	9,273.23	56.08	58.10	-90.93	-2,995.31	998.46	1,000.33	887.52	112.82	8.867	
12,500.00	9,257.74	12,407.56	9,273.62	57.25	59.22	-90.93	-3,095.31	998.59	1,000.33	885.21	115.12	8.689	
12,600.00	9,258.15	12,507.56	9,274.02	58.43	60.35	-90.93	-3,195.31	998.73	1,000.33	882.87	117.46	8.517	
12,700.00	9,258.56	12,607.56	9,274.42	59.61	61.49	-90.93	-3,295.31	998.86	1,000.32	880.51	119.81	8.349	
12,800.00	9,258.98	12,707.56	9,274.82	60.81	62.65	-90.93	-3,395.31	999.00	1,000.32	878.13	122.19	8.187	
12,900.00	9,259.39	12,807.56	9,275.22	62.02	63.81	-90.93	-3,495.31	999.14	1,000.31	875.73	124.59	8.029	
13,000.00	9,259.80	12,907.56	9,275.62	63.24	64.99	-90.93	-3,595.31	999.27	1,000.31	873.30	127.01	7.876	
13,100.00	9,260.21	13,007.56	9,276.02	64.47	66.18	-90.93	-3,695.31	999.41	1,000.31	870.86	129.44	7.728	
13,200.00	9,260.62	13,107.56	9,276.41	65.71	67.37	-90.93	-3,795.31	999.54	1,000.30	868.40	131.90	7.584	
13,300.00	9,261.03	13,207.56	9,276.81	66.95	68.58	-90.93	-3,895.31	999.68	1,000.30	865.93	134.37	7.444	
13,400.00	9,261.44	13,307.56	9,277.21	68.21	69.80	-90.93	-3,995.31	999.82	1,000.29	863.43	136.86	7.309	
13,500.00	9,261.85	13,407.56	9,277.61	69.47	71.02	-90.93	-4,095.31	999.95	1,000.29	860.92	139.36	7.178	
13,600.00	9,262.26	13,507.56	9,278.01	70.73	72.25	-90.93	-4,195.30	1,000.09	1,000.28	858.40	141.88	7.050	
13,700.00	9,262.67	13,607.56	9,278.41	72.01	73.49	-90.92	-4,295.30	1,000.23	1,000.28	855.87	144.41	6.927	
13,800.00	9,263.08	13,707.56	9,278.81	73.29	74.74	-90.92	-4,395.30	1,000.36	1,000.28	853.32	146.96	6.807	
13,900.00	9,263.49	13,807.56	9,279.21	74.57	75.99	-90.92	-4,495.30	1,000.50	1,000.27	850.76	149.51	6.690	
14,000.00	9,263.90	13,907.56	9,279.60	75.86	77.25	-90.92	-4,595.30	1,000.63	1,000.27	848.19	152.08	6.577	
14,100.00	9,264.31	14,007.56	9,280.00	77.16	78.52	-90.92	-4,695.30	1,000.77	1,000.26	845.60	154.66	6.467	
14,200.00	9,264.72	14,107.56	9,280.40	78.45	79.79	-90.92	-4,795.30	1,000.91	1,000.26	843.01	157.25	6.361	
14,300.00	9,265.13	14,207.56	9,280.80	79.77	81.07	-90.92	-4,895.30	1,001.04	1,000.25	840.40	159.85	6.257	
14,400.00	9,265.55	14,307.56	9,281.20	81.08	82.35	-90.92	-4,995.30	1,001.18	1,000.25	837.79	162.46	6.157	
14,500.00	9,265.96	14,407.56	9,281.60	82.40	83.64	-90.92	-5,095.30	1,001.31	1,000.25	835.17	165.08	6.059	
14,600.00	9,266.37	14,507.56	9,282.00	83.71	84.93	-90.92	-5,195.30	1,001.45	1,000.24	832.54	167.70	5.964	
14,700.00	9,266.78	14,607.56	9,282.39	85.04	86.23	-90.92	-5,295.29	1,001.59	1,000.24	829.90	170.34	5.872	
14,800.00	9,267.19	14,707.56	9,282.79	86.37	87.53	-90.92	-5,395.29	1,001.72	1,000.23	827.25	172.98	5.782	
14,900.00	9,267.60	14,807.56	9,283.19	87.70	88.84	-90.92	-5,495.29	1,001.86	1,000.23	824.60	175.63	5.695	
15,000.00	9,268.01	14,907.56	9,283.59	89.03	90.15	-90.92	-5,595.29	1,002.00	1,000.23	821.94	178.29	5.610	
15,100.00	9,268.42	15,007.56	9,283.99	90.37	91.47	-90.91	-5,695.29	1,002.13	1,000.22	819.27	180.95	5.527	
15,200.00	9,268.83	15,107.56	9,284.39	91.71	92.78	-90.91	-5,795.29	1,002.27	1,000.22	816.59	183.63	5.447	
15,300.00	9,269.24	15,207.56	9,284.79	93.05	94.11	-90.91	-5,895.29	1,002.40	1,000.21	813.91	186.30	5.369	
15,400.00	9,269.65	15,307.56	9,285.18	94.40	95.43	-90.91	-5,995.29	1,002.54	1,000.21	811.22	188.99	5.293	

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



Anticollision Report



Company: COG Operating LLC
Project: Eddy County, NM (NAD27 NME)
Reference Site: Quien Sabe Fed Com
Site Error: 0.00 usft
Reference Well: 602H
Well Error: 0.00 usft
Reference Wellbore: OH \ 65011
Reference Design: Plan 2 06-28-19

Local Co-ordinate Reference: Well 602H
TVD Reference: KB @ 3147.90usft (Ensign 155)
MD Reference: KB @ 3147.90usft (Ensign 155)
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 Quien Sabe Fed Com - 603H - OH \ 65012 - Plan 2 06-28-19													Offset Site Error: 0.00 usft
Survey Program: 0-MWD+HRGM													Offset Well Error: 0.00 usft
Reference		Offset		Semi Major Axis		Highside Toolface (°)	Offset Wellbore Centre		Distance		Minimum Separation (usft)	Separation Factor	Warning
Measured Depth (usft)	Vertical Depth (usft)	Measured Depth (usft)	Vertical Depth (usft)	Reference (usft)	Offset (usft)		N-S (usft)	E-W (usft)	Between Centres (usft)	Between Ellipses (usft)			
15,500.00	9,270.06	15,407.56	9,285.58	95.75	96.76	-90.91	-6,095.29	1,002.68	1,000.20	808.53	191.67	5.218	
15,600.00	9,270.47	15,507.56	9,285.98	97.10	98.09	-90.91	-6,195.29	1,002.81	1,000.20	805.83	194.37	5.146	
15,700.00	9,270.88	15,607.56	9,286.38	98.45	99.43	-90.91	-6,295.29	1,002.95	1,000.20	803.13	197.07	5.075	
15,800.00	9,271.29	15,707.56	9,286.78	99.81	100.76	-90.91	-6,395.28	1,003.08	1,000.19	800.42	199.77	5.007	
15,900.00	9,271.70	15,807.56	9,287.18	101.17	102.10	-90.91	-6,495.28	1,003.22	1,000.19	797.70	202.48	4.940	
16,000.00	9,272.11	15,907.56	9,287.58	102.53	103.45	-90.91	-6,595.28	1,003.36	1,000.18	794.99	205.20	4.874	
16,100.00	9,272.53	16,007.56	9,287.98	103.89	104.79	-90.91	-6,695.28	1,003.49	1,000.18	792.26	207.92	4.811	
16,200.00	9,272.94	16,107.56	9,288.37	105.26	106.14	-90.91	-6,795.28	1,003.63	1,000.17	789.54	210.64	4.748	
16,300.00	9,273.35	16,207.56	9,288.77	106.63	107.49	-90.91	-6,895.28	1,003.77	1,000.17	786.80	213.37	4.688	
16,400.00	9,273.76	16,307.56	9,289.17	108.00	108.85	-90.91	-6,995.28	1,003.90	1,000.17	784.07	216.10	4.628	
16,500.00	9,274.17	16,407.56	9,289.57	109.37	110.20	-90.91	-7,095.28	1,004.04	1,000.16	781.33	218.83	4.570	
16,600.00	9,274.58	16,507.56	9,289.97	110.74	111.56	-90.90	-7,195.28	1,004.17	1,000.16	778.59	221.57	4.514	
16,700.00	9,274.99	16,607.56	9,290.37	112.11	112.92	-90.90	-7,295.28	1,004.31	1,000.15	775.84	224.31	4.459	
16,800.00	9,275.40	16,707.56	9,290.77	113.49	114.28	-90.90	-7,395.28	1,004.45	1,000.15	773.09	227.06	4.405	
16,900.00	9,275.81	16,807.56	9,291.16	114.87	115.64	-90.90	-7,495.28	1,004.58	1,000.14	770.34	229.81	4.352	
17,000.00	9,276.22	16,907.56	9,291.56	116.25	117.01	-90.90	-7,595.27	1,004.72	1,000.14	767.58	232.56	4.301	
17,100.00	9,276.63	17,007.56	9,291.96	117.63	118.38	-90.90	-7,695.27	1,004.85	1,000.14	764.82	235.31	4.250	
17,200.00	9,277.04	17,107.56	9,292.36	119.01	119.74	-90.90	-7,795.27	1,004.99	1,000.13	762.06	238.07	4.201	
17,300.00	9,277.45	17,207.56	9,292.76	120.39	121.11	-90.90	-7,895.27	1,005.13	1,000.13	759.29	240.83	4.153	
17,400.00	9,277.86	17,307.56	9,293.16	121.78	122.49	-90.90	-7,995.27	1,005.26	1,000.12	756.53	243.60	4.106	
17,500.00	9,278.27	17,407.56	9,293.56	123.17	123.86	-90.90	-8,095.27	1,005.40	1,000.12	753.76	246.36	4.060	
17,600.00	9,278.68	17,507.56	9,293.95	124.55	125.23	-90.90	-8,195.27	1,005.54	1,000.12	750.98	249.13	4.014	
17,700.00	9,279.10	17,607.56	9,294.35	125.94	126.61	-90.90	-8,295.27	1,005.67	1,000.11	748.21	251.91	3.970	
17,800.00	9,279.51	17,707.56	9,294.75	127.33	127.99	-90.90	-8,395.27	1,005.81	1,000.11	745.43	254.68	3.927	
17,900.00	9,279.92	17,807.56	9,295.15	128.72	129.37	-90.90	-8,495.27	1,005.94	1,000.10	742.65	257.46	3.885	
18,000.00	9,280.33	17,907.56	9,295.55	130.11	130.75	-90.90	-8,595.27	1,006.08	1,000.10	739.86	260.23	3.843	
18,100.00	9,280.74	18,007.56	9,295.95	131.51	132.13	-90.89	-8,695.26	1,006.22	1,000.09	737.08	263.02	3.802	
18,200.00	9,281.15	18,107.56	9,296.35	132.90	133.51	-90.89	-8,795.26	1,006.35	1,000.09	734.29	265.80	3.763	
18,300.00	9,281.56	18,207.56	9,296.75	134.30	134.90	-90.89	-8,895.26	1,006.49	1,000.09	731.50	268.58	3.724	
18,400.00	9,281.97	18,307.56	9,297.14	135.69	136.28	-90.89	-8,995.26	1,006.62	1,000.08	728.71	271.37	3.685	
18,500.00	9,282.38	18,407.56	9,297.54	137.09	137.67	-90.89	-9,095.26	1,006.76	1,000.08	725.92	274.16	3.648	
18,600.00	9,282.79	18,507.56	9,297.94	138.49	139.06	-90.89	-9,195.26	1,006.90	1,000.07	723.12	276.95	3.611	
18,700.00	9,283.20	18,607.56	9,298.34	139.89	140.45	-90.89	-9,295.26	1,007.03	1,000.07	720.33	279.74	3.575	
18,800.00	9,283.61	18,707.56	9,298.74	141.29	141.84	-90.89	-9,395.26	1,007.17	1,000.06	717.53	282.54	3.540	
18,900.00	9,284.02	18,807.56	9,299.14	142.69	143.23	-90.89	-9,495.26	1,007.31	1,000.06	714.73	285.33	3.505	
19,000.00	9,284.43	18,907.56	9,299.54	144.09	144.62	-90.89	-9,595.26	1,007.44	1,000.06	711.92	288.13	3.471	
19,100.00	9,284.84	19,007.56	9,299.93	145.49	146.01	-90.89	-9,695.26	1,007.58	1,000.05	709.12	290.93	3.437	
19,116.59	9,284.91	19,024.10	9,300.00	145.72	146.24	-90.89	-9,711.80	1,007.60	1,000.05	708.66	291.40	3.432	
19,138.12	9,285.00	19,024.10	9,300.00	146.02	146.24	-90.89	-9,711.80	1,007.60	1,000.28	708.39	291.90	3.427 SF	



Anticollision Report



Company: COG Operating LLC
 Project: Eddy County, NM (NAD27 NME)
 Reference Site: Quien Sabe Fed Com
 Site Error: 0.00 usft
 Reference Well: 602H
 Well Error: 0.00 usft
 Reference Wellbore: OH \ 65011
 Reference Design: Plan 2 06-28-19

Local Co-ordinate Reference: Well 602H
 TVD Reference: KB @ 3147.90usft (Ensign 155)
 MD Reference: KB @ 3147.90usft (Ensign 155)
 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 Quien Sabe Fed Com - 701H - OH - Plan 1 02-21-19													Offset Site Error: 0.00 usft
Survey Program: 0-MWD+HRGM													Offset Well Error: 0.00 usft
Measured Depth (usft)	Vertical Depth (usft)	Measured Depth (usft)	Vertical Depth (usft)	Semi Major Axis Reference (usft)	Semi Major Axis 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)	Separation Factor	Warning
0.00	0.00	0.00	0.00	0.00	0.00	78.01	266.50	1,255.30	1,283.39				
100.00	100.00	83.00	83.00	0.28	0.23	78.01	266.50	1,255.30	1,283.28	1,282.83	0.45	2,840.412	
200.00	200.00	183.00	183.00	0.93	0.82	78.01	266.50	1,255.30	1,283.28	1,281.73	1.55	826.942	
300.00	300.00	283.00	283.00	1.44	1.35	78.01	266.50	1,255.30	1,283.28	1,280.77	2.51	511.950	
400.00	400.00	383.00	383.00	1.88	1.80	78.01	266.50	1,255.30	1,283.28	1,279.93	3.35	383.386	
500.00	500.00	483.00	483.00	2.29	2.22	78.01	266.50	1,255.30	1,283.28	1,279.14	4.14	309.934	
600.00	600.00	583.00	583.00	2.69	2.62	78.01	266.50	1,255.30	1,283.28	1,278.37	4.91	261.356	
700.00	700.00	683.00	683.00	3.08	3.01	78.01	266.50	1,255.30	1,283.28	1,277.61	5.67	226.497	
800.00	800.00	783.00	783.00	3.46	3.39	78.01	266.50	1,255.30	1,283.28	1,276.86	6.41	200.121	
900.00	900.00	883.00	883.00	3.83	3.77	78.01	266.50	1,255.30	1,283.28	1,276.12	7.15	179.400	
1,000.00	1,000.00	983.00	983.00	4.21	4.14	78.01	266.50	1,255.30	1,283.28	1,275.39	7.89	162.658	
1,100.00	1,100.00	1,083.00	1,083.00	4.58	4.52	78.01	266.50	1,255.30	1,283.28	1,274.65	8.62	148.831	
1,200.00	1,200.00	1,183.00	1,183.00	4.95	4.89	78.01	266.50	1,255.30	1,283.28	1,273.92	9.35	137.207	
1,300.00	1,300.00	1,283.00	1,283.00	5.32	5.25	78.01	266.50	1,255.30	1,283.28	1,273.20	10.08	127.291	
1,400.00	1,400.00	1,383.00	1,383.00	5.68	5.62	78.01	266.50	1,255.30	1,283.28	1,272.47	10.81	118.729	
1,500.00	1,500.00	1,483.00	1,483.00	6.05	5.99	78.01	266.50	1,255.30	1,283.28	1,271.74	11.53	111.259 CC	
1,600.00	1,599.98	1,572.02	1,572.01	6.50	6.40	89.04	267.40	1,255.42	1,283.60	1,271.36	12.25	104.824	
1,700.00	1,699.92	1,658.78	1,658.70	6.96	6.94	89.03	270.86	1,255.91	1,284.91	1,271.93	12.98	98.996	
1,800.00	1,799.86	1,745.43	1,745.13	7.31	7.41	88.90	276.91	1,256.75	1,287.26	1,273.58	13.68	94.076	
1,900.00	1,899.80	1,844.57	1,843.89	7.66	7.73	88.70	285.46	1,257.94	1,290.19	1,275.81	14.38	89.743	
2,000.00	1,999.74	1,944.42	1,943.36	8.02	8.05	88.49	294.08	1,259.14	1,293.13	1,278.04	15.09	85.697	
2,100.00	2,099.68	2,044.26	2,042.83	8.38	8.40	88.28	302.70	1,260.34	1,296.10	1,280.28	15.81	81.957	
2,200.00	2,199.61	2,144.11	2,142.29	8.73	8.74	88.08	311.32	1,261.54	1,299.08	1,282.54	16.54	78.540	
2,300.00	2,299.55	2,243.96	2,241.76	9.09	9.08	87.87	319.94	1,262.74	1,302.07	1,284.81	17.27	75.406	
2,400.00	2,399.49	2,343.80	2,341.23	9.45	9.43	87.67	328.56	1,263.94	1,305.09	1,287.09	18.00	72.523	
2,500.00	2,499.43	2,443.65	2,440.69	9.80	9.78	87.46	337.18	1,265.14	1,308.12	1,289.39	18.72	69.862	
2,600.00	2,599.37	2,543.50	2,540.16	10.16	10.13	87.26	345.80	1,266.34	1,311.16	1,291.71	19.45	67.399	
2,700.00	2,699.31	2,643.34	2,639.63	10.52	10.48	87.06	354.43	1,267.54	1,314.23	1,294.04	20.18	65.112	
2,800.00	2,799.25	2,743.19	2,739.09	10.87	10.83	86.86	363.05	1,268.74	1,317.30	1,296.39	20.91	62.985	
2,900.00	2,899.19	2,843.04	2,838.56	11.23	11.19	86.66	371.67	1,269.94	1,320.40	1,298.75	21.65	61.000	
3,000.00	2,999.13	2,942.88	2,938.02	11.59	11.54	86.46	380.29	1,271.14	1,323.51	1,301.13	22.38	59.145	
3,100.00	3,099.07	3,042.73	3,037.49	11.95	11.90	86.26	388.91	1,272.34	1,326.64	1,303.53	23.11	57.407	
3,200.00	3,199.01	3,142.58	3,136.96	12.31	12.25	86.07	397.53	1,273.54	1,329.78	1,305.94	23.84	55.776	
3,300.00	3,298.94	3,242.42	3,236.42	12.66	12.61	85.87	406.15	1,274.74	1,332.94	1,308.36	24.57	54.242	
3,400.00	3,398.88	3,342.27	3,335.89	13.02	12.97	85.68	414.77	1,275.94	1,336.11	1,310.80	25.31	52.797	
3,500.00	3,498.82	3,442.11	3,435.36	13.38	13.33	85.48	423.39	1,277.14	1,339.30	1,313.26	26.04	51.433	
3,600.00	3,598.76	3,541.96	3,534.82	13.74	13.69	85.29	432.01	1,278.34	1,342.50	1,315.73	26.77	50.144	
3,700.00	3,698.70	3,641.81	3,634.29	14.10	14.05	85.10	440.63	1,279.54	1,345.72	1,318.22	27.51	48.924	
3,800.00	3,798.64	3,741.65	3,733.76	14.46	14.41	84.91	449.25	1,280.74	1,348.96	1,320.72	28.24	47.768	
3,900.00	3,898.58	3,841.50	3,833.22	14.81	14.77	84.72	457.87	1,281.94	1,352.21	1,323.23	28.97	46.671	
4,000.00	3,998.52	3,941.35	3,932.69	15.17	15.13	84.53	466.49	1,283.14	1,355.47	1,325.77	29.71	45.628	
4,100.00	4,098.46	4,041.19	4,032.15	15.53	15.49	84.34	475.11	1,284.34	1,358.75	1,328.31	30.44	44.636	
4,200.00	4,198.40	4,141.04	4,131.62	15.89	15.85	84.15	483.73	1,285.54	1,362.05	1,330.87	31.17	43.690	
4,300.00	4,298.34	4,240.89	4,231.09	16.25	16.21	83.96	492.35	1,286.74	1,365.35	1,333.44	31.91	42.789	
4,400.00	4,398.27	4,340.73	4,330.55	16.61	16.58	83.77	500.97	1,287.93	1,368.68	1,336.03	32.64	41.932	
4,500.00	4,498.12	4,440.65	4,430.09	16.97	16.94	83.61	509.60	1,289.14	1,371.79	1,338.43	33.37	41.114	
4,600.00	4,597.88	4,540.80	4,529.66	17.32	17.30	83.57	518.23	1,290.34	1,374.74	1,340.65	34.09	40.327	
4,700.00	4,697.63	4,640.55	4,629.23	17.68	17.67	83.53	526.86	1,291.54	1,377.70	1,342.87	34.82	39.562	
4,800.00	4,797.39	4,740.50	4,728.80	18.04	18.03	83.50	535.49	1,292.74	1,380.65	1,345.09	35.56	38.828	
4,900.00	4,897.14	4,840.46	4,828.38	18.40	18.40	83.46	544.12	1,293.94	1,383.60	1,347.31	36.29	38.123	
5,000.00	4,996.90	4,940.41	4,927.95	18.76	18.76	83.42	552.74	1,295.14	1,386.56	1,349.53	37.03	37.446	
5,100.00	5,096.66	5,040.36	5,027.52	19.12	19.13	83.38	561.37	1,296.34	1,389.51	1,351.75	37.76	36.795	

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



Anticollision Report



Company: COG Operating LLC
Project: Eddy County, NM (NAD27 NME)
Reference Site: Quien Sabe Fed Com
Site Error: 0.00 usft
Reference Well: 602H
Well Error: 0.00 usft
Reference Wellbore: OH \ 65011
Reference Design: Plan 2 06-28-19

Local Co-ordinate Reference: Well 602H
TVD Reference: KB @ 3147.90usft (Ensign 155)
MD Reference: KB @ 3147.90usft (Ensign 155)
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 Quien Sabe Fed Com - 701H - OH - Plan 1 02-21-19													Offset Site Error: 0.00 usft	
Survey Program: 0-MWD+HRGM													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)	Between Centres (usft)	Between Ellipses (usft)				
5,200.00	5,196.41	5,140.31	5,127.09	19.49	19.49	83.34	570.00	1,297.54	1,392.47	1,353.97	38.50	36.169		
5,300.00	5,296.17	5,240.26	5,226.66	19.85	19.86	83.30	578.63	1,298.74	1,395.43	1,356.19	39.23	35.566		
5,400.00	5,395.93	5,340.22	5,326.23	20.21	20.22	83.26	587.26	1,299.95	1,398.38	1,358.41	39.97	34.985		
5,500.00	5,495.68	5,440.17	5,425.80	20.57	20.59	83.22	595.89	1,301.15	1,401.34	1,360.63	40.71	34.425		
5,600.00	5,595.44	5,540.12	5,525.38	20.94	20.96	83.19	604.52	1,302.35	1,404.30	1,362.86	41.44	33.885		
5,700.00	5,695.20	5,640.07	5,624.95	21.30	21.32	83.15	613.15	1,303.55	1,407.26	1,365.08	42.18	33.364		
5,800.00	5,794.95	5,740.02	5,724.52	21.66	21.69	83.11	621.78	1,304.75	1,410.22	1,367.30	42.92	32.860		
5,900.00	5,894.71	5,839.98	5,824.09	22.02	22.06	83.07	630.41	1,305.95	1,413.18	1,369.52	43.65	32.373		
6,000.00	5,994.47	5,939.93	5,923.66	22.39	22.42	83.04	639.04	1,307.15	1,416.14	1,371.75	44.39	31.902		
6,100.00	6,094.22	6,039.88	6,023.23	22.75	22.79	83.00	647.67	1,308.35	1,419.10	1,373.97	45.13	31.447		
6,200.00	6,193.98	6,139.83	6,122.80	23.11	23.16	82.96	656.30	1,309.55	1,422.06	1,376.20	45.86	31.006		
6,300.00	6,293.73	6,239.78	6,222.38	23.48	23.52	82.92	664.93	1,310.76	1,425.02	1,378.42	46.60	30.581		
6,400.00	6,393.49	6,359.81	6,342.06	23.84	23.97	82.93	673.83	1,311.99	1,427.48	1,380.07	47.41	30.107		
6,500.00	6,493.25	6,487.50	6,469.67	24.20	24.49	83.14	677.99	1,312.57	1,428.07	1,379.80	48.27	29.588		
6,600.00	6,593.00	6,593.83	6,576.00	24.57	24.86	83.43	678.15	1,312.60	1,427.31	1,378.32	48.99	29.136		
6,700.00	6,692.76	6,693.59	6,675.76	24.93	25.21	83.70	678.15	1,312.60	1,426.52	1,376.83	49.69	28.708		
6,800.00	6,792.52	6,793.35	6,775.52	25.29	25.56	83.98	678.15	1,312.60	1,425.77	1,375.38	50.40	28.291		
6,900.00	6,892.27	6,893.10	6,875.27	25.66	25.90	84.26	678.15	1,312.60	1,425.06	1,373.95	51.10	27.887		
7,000.00	6,992.03	6,992.86	6,975.03	26.02	26.25	84.54	678.15	1,312.60	1,424.37	1,372.57	51.81	27.494		
7,100.00	7,091.79	7,092.62	7,074.79	26.39	26.60	84.82	678.15	1,312.60	1,423.72	1,371.21	52.51	27.112		
7,200.00	7,191.54	7,192.37	7,174.54	26.75	26.95	85.10	678.15	1,312.60	1,423.11	1,369.89	53.22	26.740		
7,300.00	7,291.30	7,292.13	7,274.30	27.11	27.30	85.38	678.15	1,312.60	1,422.53	1,368.60	53.93	26.379		
7,400.00	7,391.06	7,391.89	7,374.06	27.48	27.65	85.65	678.15	1,312.60	1,421.98	1,367.35	54.63	26.028		
7,500.00	7,490.81	7,491.64	7,473.81	27.84	28.00	85.93	678.15	1,312.60	1,421.47	1,366.13	55.34	25.686		
7,600.00	7,590.57	7,591.40	7,573.57	28.21	28.35	86.21	678.15	1,312.60	1,420.99	1,364.94	56.05	25.353		
7,700.00	7,690.32	7,691.16	7,673.32	28.57	28.70	86.49	678.15	1,312.60	1,420.55	1,363.79	56.75	25.029		
7,800.00	7,790.08	7,790.91	7,773.08	28.94	29.06	86.77	678.15	1,312.60	1,420.14	1,362.67	57.46	24.714		
7,900.00	7,889.84	7,890.67	7,872.84	29.30	29.41	87.06	678.15	1,312.60	1,419.76	1,361.59	58.17	24.407		
8,000.00	7,989.59	7,990.42	7,972.59	29.66	29.76	87.34	678.15	1,312.60	1,419.42	1,360.54	58.88	24.108		
8,100.00	8,089.35	8,090.18	8,072.35	30.03	30.11	87.62	678.15	1,312.60	1,419.11	1,359.52	59.59	23.816		
8,200.00	8,189.11	8,189.94	8,172.11	30.39	30.46	87.90	678.15	1,312.60	1,418.84	1,358.54	60.29	23.532		
8,300.00	8,288.86	8,289.69	8,271.86	30.76	30.81	88.18	678.15	1,312.60	1,418.60	1,357.59	61.00	23.255		
8,400.00	8,388.62	8,389.45	8,371.62	31.12	31.16	88.46	678.15	1,312.60	1,418.39	1,356.68	61.71	22.984		
8,500.00	8,488.38	8,489.21	8,471.38	31.49	31.52	88.74	678.15	1,312.60	1,418.22	1,355.80	62.42	22.721		
8,600.00	8,588.13	8,588.96	8,571.13	31.85	31.87	89.02	678.15	1,312.60	1,418.08	1,354.95	63.13	22.463		
8,611.43	8,599.54	8,600.37	8,582.54	31.89	31.91	90.00	678.15	1,312.60	1,418.08	1,354.87	63.21	22.434		
8,700.00	8,687.99	8,688.82	8,670.99	32.21	32.22	-109.09	678.15	1,312.60	1,418.25	1,354.40	63.85	22.211		
8,800.00	8,787.21	8,788.04	8,770.21	32.68	32.57	-97.94	678.15	1,312.60	1,420.07	1,355.50	64.58	21.990		
8,900.00	8,882.96	8,924.75	8,906.73	33.10	33.06	-98.25	673.65	1,312.60	1,423.64	1,358.35	65.29	21.804		
9,000.00	8,972.33	9,140.18	9,110.30	33.47	33.91	-99.28	607.31	1,312.70	1,422.83	1,357.06	65.76	21.636		
9,100.00	9,052.59	9,400.71	9,303.14	33.78	34.63	-99.04	435.60	1,312.95	1,414.77	1,349.09	65.69	21.537		
9,200.00	9,121.31	9,608.32	9,389.87	34.02	34.89	-97.77	248.22	1,313.22	1,400.82	1,334.93	65.89	21.259		
9,300.00	9,176.41	9,765.51	9,408.06	34.18	35.01	-96.54	92.56	1,313.44	1,383.84	1,317.40	66.44	20.827		
9,400.00	9,216.21	9,856.80	9,408.37	34.29	35.09	-96.61	1.27	1,313.57	1,368.36	1,301.34	67.03	20.415		
9,500.00	9,239.49	9,953.52	9,408.71	34.36	35.23	-97.02	-95.44	1,313.71	1,355.43	1,287.85	67.58	20.058		
9,600.00	9,245.82	10,052.72	9,409.05	34.43	35.43	-97.71	-194.65	1,313.86	1,344.70	1,276.58	68.11	19.742		
9,700.00	9,246.24	10,152.42	9,409.40	34.52	35.71	-97.74	-294.34	1,314.00	1,336.97	1,268.22	68.75	19.446		
9,800.00	9,246.66	10,252.32	9,409.74	34.71	36.07	-97.76	-394.24	1,314.14	1,332.70	1,263.14	69.56	19.160		
9,900.00	9,247.07	10,352.31	9,410.09	34.94	36.50	-97.77	-494.23	1,314.29	1,331.77	1,261.35	70.42	18.912		
10,000.00	9,247.48	10,452.31	9,410.43	35.24	36.99	-97.77	-594.23	1,314.43	1,331.76	1,260.41	71.35	18.664		
10,100.00	9,247.89	10,552.31	9,410.78	35.62	37.55	-97.76	-694.23	1,314.58	1,331.76	1,259.36	72.39	18.396		
10,200.00	9,248.30	10,652.31	9,411.13	36.09	38.15	-97.76	-794.23	1,314.72	1,331.75	1,258.22	73.53	18.112		

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



Anticollision Report



Company: COG Operating LLC
Project: Eddy County, NM (NAD27 NME)
Reference Site: Quien Sabe Fed Com
Site Error: 0.00 usft
Reference Well: 602H
Well Error: 0.00 usft
Reference Wellbore: OH \ 65011
Reference Design: Plan 2 06-28-19

Local Co-ordinate Reference: Well 602H
TVD Reference: KB @ 3147.90usft (Ensign 155)
MD Reference: KB @ 3147.90usft (Ensign 155)
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 Quien Sabe Fed Com - 701H - OH - Plan 1 02-21-19													Offset Site Error: 0.00 usft
Survey Program: 0-MWD+HRGM													Offset Well Error: 0.00 usft
Reference		Offset		Semi Major Axis		Highside Toolface (°)	Distance					Separation Factor	Warning
Measured Depth (usft)	Vertical Depth (usft)	Measured Depth (usft)	Vertical Depth (usft)	Reference (usft)	Offset (usft)		Offset Wellbore +N/-S (usft)	Centre E/W (usft)	Between Centres (usft)	Between Ellipses (usft)	Minimum Separation (usft)		
10,300.00	9,248.71	10,752.31	9,411.47	36.61	38.81	-97.76	-894.23	1,314.87	1,331.75	1,256.99	74.76	17.814	
10,400.00	9,249.12	10,852.31	9,411.82	37.19	39.51	-97.75	-994.23	1,315.01	1,331.74	1,255.67	76.08	17.505	
10,500.00	9,249.53	10,952.31	9,412.17	37.83	40.25	-97.75	-1,094.23	1,315.16	1,331.74	1,254.26	77.48	17.189	
10,600.00	9,249.94	11,052.31	9,412.51	38.51	41.03	-97.75	-1,194.23	1,315.30	1,331.74	1,252.78	78.96	16.867	
10,700.00	9,250.35	11,152.31	9,412.86	39.24	41.85	-97.75	-1,294.23	1,315.45	1,331.73	1,251.22	80.51	16.541	
10,800.00	9,250.76	11,252.31	9,413.21	40.01	42.70	-97.74	-1,394.23	1,315.59	1,331.73	1,249.59	82.14	16.214	
10,900.00	9,251.17	11,352.31	9,413.55	40.81	43.58	-97.74	-1,494.23	1,315.73	1,331.72	1,247.89	83.83	15.886	
11,000.00	9,251.58	11,452.31	9,413.90	41.65	44.49	-97.74	-1,594.23	1,315.88	1,331.72	1,246.14	85.58	15.561	
11,100.00	9,251.99	11,552.31	9,414.25	42.53	45.43	-97.74	-1,694.23	1,316.02	1,331.71	1,244.32	87.39	15.238	
11,200.00	9,252.41	11,652.31	9,414.59	43.43	46.40	-97.73	-1,794.23	1,316.17	1,331.71	1,242.45	89.26	14.919	
11,300.00	9,252.82	11,752.31	9,414.94	44.37	47.39	-97.73	-1,894.22	1,316.31	1,331.70	1,240.52	91.18	14.605	
11,400.00	9,253.23	11,852.31	9,415.29	45.33	48.40	-97.73	-1,994.22	1,316.46	1,331.70	1,238.55	93.15	14.296	
11,500.00	9,253.64	11,952.31	9,415.63	46.31	49.43	-97.72	-2,094.22	1,316.60	1,331.70	1,236.53	95.16	13.994	
11,600.00	9,254.05	12,052.31	9,415.98	47.32	50.49	-97.72	-2,194.22	1,316.75	1,331.69	1,234.47	97.22	13.698	
11,700.00	9,254.46	12,152.31	9,416.33	48.35	51.56	-97.72	-2,294.22	1,316.89	1,331.69	1,232.37	99.31	13.409	
11,800.00	9,254.87	12,252.31	9,416.67	49.41	52.65	-97.72	-2,394.22	1,317.04	1,331.68	1,230.23	101.45	13.127	
11,900.00	9,255.28	12,352.31	9,417.02	50.48	53.76	-97.71	-2,494.22	1,317.18	1,331.68	1,228.06	103.62	12.852	
12,000.00	9,255.69	12,452.31	9,417.36	51.57	54.88	-97.71	-2,594.22	1,317.32	1,331.67	1,225.85	105.82	12.584	
12,100.00	9,256.10	12,552.31	9,417.71	52.67	56.02	-97.71	-2,694.22	1,317.47	1,331.67	1,223.62	108.05	12.324	
12,200.00	9,256.51	12,652.31	9,418.06	53.80	57.17	-97.71	-2,794.22	1,317.61	1,331.67	1,221.35	110.32	12.071	
12,300.00	9,256.92	12,752.31	9,418.40	54.93	58.34	-97.70	-2,894.22	1,317.76	1,331.66	1,219.06	112.61	11.826	
12,400.00	9,257.33	12,852.31	9,418.75	56.08	59.51	-97.70	-2,994.22	1,317.90	1,331.66	1,216.74	114.92	11.588	
12,500.00	9,257.74	12,952.31	9,419.10	57.25	60.70	-97.70	-3,094.22	1,318.05	1,331.65	1,214.39	117.26	11.356	
12,600.00	9,258.15	13,052.31	9,419.44	58.43	61.90	-97.69	-3,194.21	1,318.19	1,331.65	1,212.03	119.62	11.132	
12,700.00	9,258.56	13,152.31	9,419.79	59.61	63.11	-97.69	-3,294.21	1,318.34	1,331.64	1,209.64	122.01	10.914	
12,800.00	9,258.98	13,252.31	9,420.14	60.81	64.33	-97.69	-3,394.21	1,318.48	1,331.64	1,207.23	124.41	10.703	
12,900.00	9,259.39	13,352.31	9,420.48	62.02	65.56	-97.69	-3,494.21	1,318.63	1,331.64	1,204.80	126.84	10.499	
13,000.00	9,259.80	13,452.31	9,420.83	63.24	66.79	-97.68	-3,594.21	1,318.77	1,331.63	1,202.35	129.28	10.301	
13,100.00	9,260.21	13,552.31	9,421.18	64.47	68.04	-97.68	-3,694.21	1,318.91	1,331.63	1,199.89	131.74	10.108	
13,200.00	9,260.62	13,652.31	9,421.52	65.71	69.29	-97.68	-3,794.21	1,319.06	1,331.62	1,197.41	134.21	9.922	
13,300.00	9,261.03	13,752.31	9,421.87	66.95	70.55	-97.67	-3,894.21	1,319.20	1,331.62	1,194.92	136.70	9.741	
13,400.00	9,261.44	13,852.31	9,422.22	68.21	71.81	-97.67	-3,994.21	1,319.35	1,331.61	1,192.41	139.20	9.566	
13,500.00	9,261.85	13,952.31	9,422.56	69.47	73.09	-97.67	-4,094.21	1,319.49	1,331.61	1,189.89	141.72	9.396	
13,600.00	9,262.26	14,052.31	9,422.91	70.73	74.36	-97.67	-4,194.21	1,319.64	1,331.61	1,187.35	144.25	9.231	
13,700.00	9,262.67	14,152.31	9,423.25	72.01	75.65	-97.66	-4,294.21	1,319.78	1,331.60	1,184.81	146.80	9.071	
13,800.00	9,263.08	14,252.31	9,423.60	73.29	76.94	-97.66	-4,394.21	1,319.93	1,331.60	1,182.25	149.35	8.916	
13,900.00	9,263.49	14,352.31	9,423.95	74.57	78.23	-97.66	-4,494.21	1,320.07	1,331.59	1,179.68	151.92	8.765	
14,000.00	9,263.90	14,452.31	9,424.29	75.86	79.53	-97.66	-4,594.20	1,320.21	1,331.59	1,177.10	154.49	8.619	
14,100.00	9,264.31	14,552.31	9,424.64	77.16	80.84	-97.65	-4,694.20	1,320.36	1,331.58	1,174.50	157.08	8.477	
14,200.00	9,264.72	14,652.31	9,424.99	78.46	82.15	-97.65	-4,794.20	1,320.50	1,331.58	1,171.90	159.68	8.339	
14,300.00	9,265.13	14,752.31	9,425.33	79.77	83.46	-97.65	-4,894.20	1,320.65	1,331.58	1,169.30	162.28	8.205	
14,400.00	9,265.55	14,852.31	9,425.68	81.08	84.78	-97.64	-4,994.20	1,320.79	1,331.57	1,166.68	164.89	8.075	
14,500.00	9,265.96	14,952.31	9,426.03	82.40	86.10	-97.64	-5,094.20	1,320.94	1,331.57	1,164.05	167.52	7.949	
14,600.00	9,266.37	15,052.31	9,426.37	83.71	87.43	-97.64	-5,194.20	1,321.08	1,331.56	1,161.42	170.15	7.826	
14,700.00	9,266.78	15,152.31	9,426.72	85.04	88.76	-97.64	-5,294.20	1,321.23	1,331.56	1,158.78	172.78	7.707	
14,800.00	9,267.19	15,252.31	9,427.07	86.37	90.09	-97.63	-5,394.20	1,321.37	1,331.56	1,156.13	175.43	7.590	
14,900.00	9,267.60	15,352.31	9,427.41	87.70	91.43	-97.63	-5,494.20	1,321.52	1,331.55	1,153.47	178.08	7.477	
15,000.00	9,268.01	15,452.31	9,427.76	89.03	92.76	-97.63	-5,594.20	1,321.66	1,331.55	1,150.81	180.73	7.367	
15,100.00	9,268.42	15,552.31	9,428.11	90.37	94.11	-97.63	-5,694.20	1,321.80	1,331.54	1,148.14	183.40	7.260	
15,200.00	9,268.83	15,652.31	9,428.45	91.71	95.45	-97.62	-5,794.20	1,321.95	1,331.54	1,145.47	186.07	7.156	
15,300.00	9,269.24	15,752.31	9,428.80	93.05	96.80	-97.62	-5,894.20	1,322.09	1,331.53	1,142.79	188.74	7.055	
15,400.00	9,269.65	15,852.31	9,429.14	94.40	98.15	-97.62	-5,994.19	1,322.24	1,331.53	1,140.11	191.42	6.956	

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



Anticollision Report



Company: COG Operating LLC
Project: Eddy County, NM (NAD27 NME)
Reference Site: Quien Sabe Fed Com
Site Error: 0.00 usft
Reference Well: 602H
Well Error: 0.00 usft
Reference Wellbore: OH \ 65011
Reference Design: Plan 2 06-28-19

Local Co-ordinate Reference: Well 602H
TVD Reference: KB @ 3147.90usft (Ensign 155)
MD Reference: KB @ 3147.90usft (Ensign 155)
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 Quien Sabe Fed Com - 701H - OH - Plan 1 02-21-19											Offset Site Error: 0.00 usft	
Survey Program: 0-MWD+HRGM											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)
15,500.00	9,270.06	15,952.31	9,429.49	95.75	99.50	-97.61	-6,094.19	1,322.38	1,331.53	1,137.42	194.11	6.860
15,600.00	9,270.47	16,052.31	9,429.84	97.10	100.86	-97.61	-6,194.19	1,322.53	1,331.52	1,134.72	196.80	6.766
15,700.00	9,270.88	16,152.31	9,430.18	98.45	102.22	-97.61	-6,294.19	1,322.67	1,331.52	1,132.02	199.50	6.674
15,800.00	9,271.29	16,252.31	9,430.53	99.81	103.58	-97.61	-6,394.19	1,322.82	1,331.51	1,129.31	202.20	6.585
15,900.00	9,271.70	16,352.31	9,430.88	101.17	104.94	-97.60	-6,494.19	1,322.96	1,331.51	1,126.61	204.90	6.498
16,000.00	9,272.11	16,452.31	9,431.22	102.53	106.30	-97.60	-6,594.19	1,323.11	1,331.50	1,123.89	207.61	6.413
16,100.00	9,272.53	16,552.31	9,431.57	103.89	107.67	-97.60	-6,694.19	1,323.25	1,331.50	1,121.17	210.33	6.331
16,200.00	9,272.94	16,652.31	9,431.92	105.26	109.04	-97.59	-6,794.19	1,323.39	1,331.50	1,118.45	213.04	6.250
16,300.00	9,273.35	16,752.31	9,432.26	106.63	110.41	-97.59	-6,894.19	1,323.54	1,331.49	1,115.73	215.77	6.171
16,400.00	9,273.76	16,852.31	9,432.61	108.00	111.78	-97.59	-6,994.19	1,323.68	1,331.49	1,113.00	218.49	6.094
16,500.00	9,274.17	16,952.31	9,432.96	109.37	113.15	-97.59	-7,094.19	1,323.83	1,331.48	1,110.27	221.22	6.019
16,600.00	9,274.58	17,052.31	9,433.30	110.74	114.53	-97.58	-7,194.19	1,323.97	1,331.48	1,107.53	223.95	5.945
16,700.00	9,274.99	17,152.31	9,433.65	112.11	115.90	-97.58	-7,294.19	1,324.12	1,331.48	1,104.79	226.69	5.874
16,800.00	9,275.40	17,252.31	9,434.00	113.49	117.28	-97.58	-7,394.18	1,324.26	1,331.47	1,102.05	229.42	5.804
16,900.00	9,275.81	17,352.31	9,434.34	114.87	118.66	-97.58	-7,494.18	1,324.41	1,331.47	1,099.30	232.17	5.735
17,000.00	9,276.22	17,452.31	9,434.69	116.25	120.04	-97.57	-7,594.18	1,324.55	1,331.46	1,096.55	234.91	5.668
17,100.00	9,276.63	17,552.31	9,435.04	117.63	121.42	-97.57	-7,694.18	1,324.69	1,331.46	1,093.80	237.66	5.602
17,200.00	9,277.04	17,652.31	9,435.38	119.01	122.81	-97.57	-7,794.18	1,324.84	1,331.45	1,091.05	240.41	5.538
17,300.00	9,277.45	17,752.31	9,435.73	120.39	124.19	-97.56	-7,894.18	1,324.98	1,331.45	1,088.29	243.16	5.476
17,400.00	9,277.86	17,852.31	9,436.07	121.78	125.58	-97.56	-7,994.18	1,325.13	1,331.45	1,085.53	245.92	5.414
17,500.00	9,278.27	17,952.31	9,436.42	123.17	126.97	-97.56	-8,094.18	1,325.27	1,331.44	1,082.77	248.67	5.354
17,600.00	9,278.68	18,052.31	9,436.77	124.55	128.36	-97.56	-8,194.18	1,325.42	1,331.44	1,080.00	251.43	5.295
17,700.00	9,279.10	18,152.31	9,437.11	125.94	129.75	-97.55	-8,294.18	1,325.56	1,331.43	1,077.24	254.20	5.238
17,800.00	9,279.51	18,252.31	9,437.46	127.33	131.14	-97.55	-8,394.18	1,325.71	1,331.43	1,074.47	256.96	5.181
17,900.00	9,279.92	18,352.31	9,437.81	128.72	132.53	-97.55	-8,494.18	1,325.85	1,331.43	1,071.70	259.73	5.126
18,000.00	9,280.33	18,452.31	9,438.15	130.11	133.92	-97.55	-8,594.18	1,326.00	1,331.42	1,068.92	262.50	5.072
18,100.00	9,280.74	18,552.31	9,438.50	131.51	135.32	-97.54	-8,694.18	1,326.14	1,331.42	1,066.15	265.27	5.019
18,200.00	9,281.15	18,652.31	9,438.85	132.90	136.71	-97.54	-8,794.17	1,326.28	1,331.41	1,063.37	268.04	4.967
18,300.00	9,281.56	18,752.31	9,439.19	134.30	138.11	-97.54	-8,894.17	1,326.43	1,331.41	1,060.59	270.82	4.916
18,400.00	9,281.97	18,852.31	9,439.54	135.69	139.50	-97.53	-8,994.17	1,326.57	1,331.40	1,057.81	273.59	4.866
18,500.00	9,282.38	18,952.31	9,439.89	137.09	140.90	-97.53	-9,094.17	1,326.72	1,331.40	1,055.03	276.37	4.817
18,600.00	9,282.79	19,052.31	9,440.23	138.49	142.30	-97.53	-9,194.17	1,326.86	1,331.40	1,052.24	279.15	4.769
18,700.00	9,283.20	19,152.31	9,440.58	139.89	143.70	-97.53	-9,294.17	1,327.01	1,331.39	1,049.46	281.93	4.722
18,800.00	9,283.61	19,252.31	9,440.93	141.29	145.10	-97.52	-9,394.17	1,327.15	1,331.39	1,046.67	284.72	4.676
18,900.00	9,284.02	19,352.31	9,441.27	142.69	146.50	-97.52	-9,494.17	1,327.30	1,331.38	1,043.88	287.50	4.631
19,000.00	9,284.43	19,452.31	9,441.62	144.09	147.90	-97.52	-9,594.17	1,327.44	1,331.38	1,041.09	290.29	4.586
19,100.00	9,284.84	19,552.31	9,441.96	145.49	149.30	-97.51	-9,694.17	1,327.59	1,331.38	1,038.30	293.08	4.543
19,109.92	9,284.88	19,562.23	9,442.00	145.63	149.44	-97.51	-9,704.08	1,327.60	1,331.38	1,038.02	293.35	4.538
19,138.12	9,285.00	19,562.54	9,442.00	146.02	149.45	-97.51	-9,704.40	1,327.60	1,331.67	1,037.96	293.71	4.534 ES. SF



Anticollision Report



Company: COG Operating LLC
 Project: Eddy County, NM (NAD27 NME)
 Reference Site: Quien Sabe Fed Com
 Site Error: 0.00 usft
 Reference Well: 602H
 Well Error: 0.00 usft
 Reference Wellbore: OH \ 65011
 Reference Design: Plan 2 06-28-19

Local Co-ordinate Reference: Well 602H
 TVD Reference: KB @ 3147.90usft (Ensign 155)
 MD Reference: KB @ 3147.90usft (Ensign 155)
 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 Quien Sabe Fed Com - 702H - OH - Plan 1 02-15-19													Offset Site Error: 0.00 usft
Survey Program: 0-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)	+E-W (usft)	Between Centres (usft)	Between Ellipses (usft)	Minimum Separation (usft)	Separation Factor	Warning
0.00	0.00	0.60	0.60	0.00	0.00	88.57	1.50	60.00	60.02				
100.00	100.00	100.60	100.60	0.28	0.14	88.57	1.50	60.00	60.02	59.66	0.36	166.418	
200.00	200.00	200.60	200.60	0.93	0.50	88.57	1.50	60.00	60.02	58.77	1.25	48.007	
300.00	300.00	300.60	300.60	1.44	0.85	88.57	1.50	60.00	60.02	57.97	2.05	29.269	
400.00	400.00	400.60	400.60	1.88	1.21	88.57	1.50	60.00	60.02	57.21	2.81	21.361	
500.00	500.00	500.60	500.60	2.29	1.57	88.57	1.50	60.00	60.02	56.47	3.55	16.894	
600.00	600.00	600.60	600.60	2.69	1.93	88.57	1.50	60.00	60.02	55.73	4.29	13.998	
700.00	700.00	700.60	700.60	3.08	2.29	88.57	1.50	60.00	60.02	55.00	5.02	11.962	
800.00	800.00	800.60	800.60	3.46	2.65	88.57	1.50	60.00	60.02	54.27	5.74	10.448	
900.00	900.00	900.60	900.60	3.83	3.00	88.57	1.50	60.00	60.02	53.55	6.47	9.277	
1,000.00	1,000.00	1,000.60	1,000.60	4.21	3.36	88.57	1.50	60.00	60.02	52.83	7.19	8.344	
1,100.00	1,100.00	1,100.60	1,100.60	4.58	3.72	88.57	1.50	60.00	60.02	52.10	7.91	7.583	
1,200.00	1,200.00	1,200.60	1,200.60	4.95	4.08	88.57	1.50	60.00	60.02	51.38	8.64	6.950	
1,300.00	1,300.00	1,300.60	1,300.60	5.32	4.44	88.57	1.50	60.00	60.02	50.66	9.36	6.414	
1,400.00	1,400.00	1,400.60	1,400.60	5.68	4.80	88.57	1.50	60.00	60.02	49.94	10.08	5.956	
1,416.47	1,416.47	1,417.07	1,417.07	5.74	4.86	88.57	1.50	60.00	60.02	49.82	10.20	5.887 CC	
1,500.00	1,500.00	1,500.00	1,500.00	6.05	5.15	88.57	1.50	60.00	60.02	49.23	10.79	5.560 ES	
1,600.00	1,599.98	1,599.15	1,599.13	6.50	5.51	99.96	2.78	61.15	61.51	50.02	11.48	5.357	
1,700.00	1,699.92	1,697.58	1,697.42	6.96	5.86	99.65	6.57	64.55	65.64	53.47	12.17	5.396	
1,800.00	1,799.86	1,795.68	1,795.16	7.31	6.21	97.44	12.84	70.19	72.17	59.29	12.88	5.602	
1,900.00	1,899.80	1,893.23	1,892.00	7.66	6.56	94.01	21.55	78.00	81.34	67.72	13.61	5.975	
2,000.00	1,999.74	1,992.35	1,990.15	8.02	6.92	90.48	31.80	87.21	92.25	77.88	14.37	6.420	
2,100.00	2,099.68	2,091.61	2,088.45	8.38	7.28	87.70	42.08	96.44	103.44	88.32	15.12	6.841	
2,200.00	2,199.61	2,190.87	2,186.74	8.73	7.65	85.47	52.35	105.67	114.83	98.97	15.87	7.238	
2,300.00	2,299.55	2,290.13	2,285.04	9.09	8.02	83.64	62.63	114.90	126.36	109.75	16.61	7.610	
2,400.00	2,399.49	2,389.39	2,383.33	9.45	8.39	82.12	72.91	124.13	137.99	120.65	17.34	7.958	
2,500.00	2,499.43	2,488.65	2,481.62	9.80	8.77	80.83	83.18	133.35	149.71	131.54	18.07	8.283	
2,600.00	2,599.37	2,587.91	2,579.92	10.16	9.15	79.74	93.46	142.58	161.49	142.68	18.81	8.587	
2,700.00	2,699.31	2,687.17	2,678.21	10.52	9.53	78.79	103.73	151.81	173.32	153.78	19.54	8.872	
2,800.00	2,799.25	2,786.43	2,776.51	10.87	9.91	77.96	114.01	161.04	185.19	164.92	20.27	9.138	
2,900.00	2,899.19	2,885.69	2,874.80	11.23	10.29	77.23	124.28	170.26	197.09	176.10	20.99	9.388	
3,000.00	2,999.13	2,984.95	2,973.10	11.59	10.68	76.59	134.56	179.49	209.03	187.30	21.72	9.623	
3,100.00	3,099.07	3,084.21	3,071.39	11.95	11.06	76.01	144.83	188.72	220.98	198.53	22.45	9.843	
3,200.00	3,199.01	3,183.47	3,169.68	12.31	11.45	75.50	155.11	197.95	232.96	209.78	23.18	10.051	
3,300.00	3,298.94	3,282.73	3,267.98	12.66	11.83	75.03	165.39	207.18	244.95	221.04	23.90	10.247	
3,400.00	3,398.88	3,381.99	3,366.27	13.02	12.22	74.61	175.66	216.40	256.95	232.32	24.63	10.432	
3,500.00	3,498.82	3,481.25	3,464.57	13.38	12.61	74.23	185.94	225.63	268.97	243.61	25.36	10.607	
3,600.00	3,598.76	3,580.51	3,562.86	13.74	13.00	73.87	196.21	234.86	281.00	254.92	26.08	10.773	
3,700.00	3,698.70	3,679.77	3,661.16	14.10	13.39	73.55	206.49	244.09	293.04	266.23	26.81	10.930	
3,800.00	3,798.64	3,779.03	3,759.45	14.46	13.78	73.26	216.76	253.32	305.09	277.55	27.54	11.079	
3,900.00	3,898.58	3,878.29	3,857.74	14.81	14.17	72.98	227.04	262.54	317.14	288.88	28.26	11.221	
4,000.00	3,998.52	3,977.54	3,956.04	15.17	14.56	72.73	237.31	271.77	329.20	300.21	28.99	11.356	
4,100.00	4,098.46	4,076.80	4,054.33	15.53	14.95	72.49	247.59	281.00	341.27	311.55	29.72	11.484	
4,200.00	4,198.40	4,176.06	4,152.63	15.89	15.34	72.27	257.87	290.23	353.34	322.90	30.44	11.605	
4,300.00	4,298.34	4,275.32	4,250.92	16.25	15.74	72.06	268.14	299.45	365.42	334.25	31.17	11.723	
4,400.00	4,398.27	4,374.58	4,349.22	16.61	16.13	71.86	278.42	308.68	377.50	345.61	31.89	11.836	
4,500.00	4,498.12	4,473.92	4,447.58	16.97	16.52	71.75	288.70	317.92	388.97	356.36	32.61	11.927	
4,600.00	4,597.88	4,573.29	4,545.99	17.32	16.92	72.05	298.99	327.16	399.98	366.65	33.33	12.001	
4,700.00	4,697.63	4,672.66	4,644.39	17.68	17.31	72.33	309.27	336.39	411.00	376.94	34.06	12.068	
4,800.00	4,797.39	4,772.03	4,742.80	18.04	17.70	72.60	319.56	345.63	422.02	387.24	34.79	12.132	
4,900.00	4,897.14	4,871.40	4,841.20	18.40	18.10	72.86	329.85	354.87	433.06	397.55	35.52	12.194	
5,000.00	4,996.90	4,970.77	4,939.60	18.76	18.49	73.10	340.14	364.11	444.11	407.86	36.25	12.253	

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



Anticollision Report



Company: COG Operating LLC
Project: Eddy County, NM (NAD27 NME)
Reference Site: Quien Sabe Fed Com
Site Error: 0.00 usft
Reference Well: 602H
Well Error: 0.00 usft
Reference Wellbore: OH \ 65011
Reference Design: Plan 2 06-28-19

Local Co-ordinate Reference: Well 602H
TVD Reference: KB @ 3147.90usft (Ensign 155)
MD Reference: KB @ 3147.90usft (Ensign 155)
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 Quien Sabe Fed Com - 702H - OH - Plan 1 02-15-19												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)			
5,100.00	5,096.66	5,070.14	5,038.01	19.12	18.89	73.33	350.42	373.35	455.16	418.18	36.98	12.310	
5,200.00	5,196.41	5,169.52	5,136.41	19.49	19.28	73.55	360.71	382.59	466.22	428.51	37.71	12.364	
5,300.00	5,296.17	5,268.89	5,234.82	19.85	19.68	73.76	371.00	391.82	477.28	438.84	38.44	12.417	
5,400.00	5,395.93	5,368.26	5,333.22	20.21	20.07	73.96	381.28	401.06	488.35	449.18	39.17	12.467	
5,500.00	5,495.68	5,467.63	5,431.63	20.57	20.47	74.15	391.57	410.30	499.43	459.53	39.90	12.516	
5,600.00	5,595.44	5,567.00	5,530.03	20.94	20.87	74.33	401.86	419.54	510.51	469.87	40.64	12.563	
5,700.00	5,695.20	5,666.37	5,628.44	21.30	21.26	74.51	412.15	428.78	521.60	480.23	41.37	12.609	
5,800.00	5,794.95	5,765.74	5,726.84	21.66	21.66	74.67	422.43	438.01	532.69	490.59	42.10	12.652	
5,900.00	5,894.71	5,865.11	5,825.25	22.02	22.05	74.83	432.72	447.25	543.78	500.95	42.84	12.695	
6,000.00	5,994.47	5,964.48	5,923.65	22.39	22.45	74.99	443.01	456.49	554.88	511.31	43.57	12.736	
6,100.00	6,094.22	6,063.86	6,022.06	22.75	22.85	75.14	453.29	465.73	565.99	521.68	44.30	12.775	
6,200.00	6,193.98	6,163.23	6,120.46	23.11	23.24	75.28	463.58	474.97	577.09	532.05	45.04	12.813	
6,300.00	6,293.73	6,262.60	6,218.86	23.48	23.64	75.42	473.87	484.21	588.20	542.43	45.77	12.850	
6,400.00	6,393.49	6,361.97	6,317.27	23.84	24.04	75.55	484.16	493.44	599.32	552.81	46.51	12.886	
6,500.00	6,493.25	6,461.34	6,415.67	24.20	24.43	75.68	494.44	502.68	610.43	563.19	47.24	12.921	
6,600.00	6,593.00	6,560.71	6,514.08	24.57	24.83	75.80	504.73	511.92	621.55	573.57	47.98	12.954	
6,700.00	6,692.76	6,660.08	6,612.48	24.93	25.23	75.92	515.02	521.16	632.68	583.96	48.72	12.987	
6,800.00	6,792.52	6,759.45	6,710.89	25.29	25.62	76.03	525.30	530.40	643.80	594.35	49.45	13.019	
6,900.00	6,892.27	6,858.83	6,809.29	25.66	26.02	76.14	535.59	539.63	654.93	604.74	50.19	13.049	
7,000.00	6,992.03	6,958.20	6,907.70	26.02	26.42	76.25	545.88	548.87	666.06	615.13	50.93	13.079	
7,100.00	7,091.79	7,057.57	7,006.10	26.39	26.82	76.35	556.17	558.11	677.19	625.53	51.66	13.108	
7,200.00	7,191.54	7,156.94	7,104.51	26.75	27.21	76.45	566.45	567.35	688.32	635.92	52.40	13.136	
7,300.00	7,291.30	7,256.31	7,202.91	27.11	27.61	76.55	576.74	576.59	699.46	646.32	53.14	13.163	
7,400.00	7,391.06	7,355.88	7,301.31	27.48	28.01	76.64	587.03	585.83	710.60	656.72	53.87	13.190	
7,500.00	7,490.81	7,455.05	7,399.72	27.84	28.41	76.73	597.31	595.06	721.74	667.13	54.61	13.216	
7,600.00	7,590.57	7,554.42	7,498.12	28.21	28.80	76.82	607.60	604.30	732.88	677.53	55.35	13.241	
7,700.00	7,690.32	7,653.80	7,596.53	28.57	29.20	76.91	617.89	613.54	744.02	687.94	56.09	13.265	
7,800.00	7,790.08	7,753.17	7,694.93	28.94	29.60	76.99	628.18	622.78	755.17	698.34	56.83	13.289	
7,900.00	7,889.84	7,852.54	7,793.34	29.30	30.00	77.07	638.46	632.02	766.31	708.75	57.56	13.312	
8,000.00	7,989.59	7,976.82	7,916.64	29.66	30.48	77.22	650.01	642.39	776.24	717.76	58.48	13.274	
8,100.00	8,089.35	8,109.37	8,048.74	30.03	30.98	77.56	658.01	649.57	782.11	722.74	59.36	13.175	
8,200.00	8,189.11	8,242.10	8,181.38	30.39	31.44	78.08	661.46	652.67	783.80	723.65	60.16	13.029	
8,300.00	8,288.86	8,350.19	8,289.46	30.76	31.79	78.61	661.61	652.80	782.53	721.65	60.87	12.855	
8,400.00	8,388.62	8,449.94	8,389.22	31.12	32.12	79.11	661.61	652.80	781.18	719.59	61.58	12.685	
8,500.00	8,488.38	8,549.70	8,488.98	31.49	32.45	79.61	661.61	652.80	779.89	717.59	62.30	12.519	
8,600.00	8,588.13	8,649.46	8,588.73	31.85	32.78	80.12	661.61	652.80	778.66	715.65	63.01	12.358	
8,673.85	8,661.93	8,723.25	8,662.53	32.12	33.02	177.76	661.61	652.80	778.45	714.91	63.54	12.252	
8,700.00	8,687.99	8,749.31	8,688.59	32.21	33.11	-117.87	661.61	652.80	778.15	714.42	63.73	12.211	
8,800.00	8,787.21	8,848.54	8,787.81	32.68	33.44	-106.90	661.61	652.80	781.70	717.25	64.45	12.129	
8,900.00	8,882.96	9,039.37	8,975.72	33.10	33.94	-107.76	633.69	652.84	785.14	720.48	64.66	12.143	
9,000.00	8,972.33	9,247.72	9,158.02	33.47	34.25	-107.69	535.21	652.98	780.15	716.17	63.99	12.192	
9,100.00	9,052.59	9,442.50	9,286.39	33.78	34.32	-106.21	389.95	653.19	767.18	703.79	63.39	12.102	
9,200.00	9,121.31	9,612.29	9,353.13	34.02	34.24	-103.89	234.50	653.41	748.80	685.16	63.64	11.767	
9,300.00	9,176.41	9,756.61	9,372.00	34.18	34.13	-101.27	91.81	653.61	728.09	663.52	64.57	11.276	
9,400.00	9,216.21	9,847.89	9,372.56	34.29	34.07	-100.38	0.53	653.74	709.75	644.24	65.51	10.834	
9,500.00	9,239.49	9,944.67	9,373.15	34.36	34.13	-100.15	-96.24	653.88	695.59	629.41	66.18	10.511	
9,600.00	9,245.82	10,043.89	9,373.76	34.43	34.36	-100.74	-195.46	654.02	684.68	618.04	66.64	10.274	
9,700.00	9,246.24	10,143.58	9,374.37	34.52	34.68	-100.86	-295.15	654.17	677.06	609.92	67.14	10.085	
9,800.00	9,246.66	10,243.48	9,374.98	34.71	35.05	-100.94	-395.05	654.31	672.87	605.06	67.82	9.922	
9,897.67	9,247.06	10,341.14	9,375.57	34.94	35.46	-100.98	-492.71	654.45	671.66	603.11	68.54	9.799	
9,900.00	9,247.07	10,343.48	9,375.59	34.94	35.47	-100.97	-495.04	654.45	671.99	603.43	68.56	9.801	
10,000.00	9,247.48	10,443.48	9,376.20	35.24	35.94	-100.99	-595.04	654.59	672.03	602.65	69.38	9.686	

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



Anticollision Report



Company: COG Operating LLC
 Project: Eddy County, NM (NAD27 NME)
 Reference Site: Quien Sabe Fed Com
 Site Error: 0.00 usft
 Reference Well: 602H
 Well Error: 0.00 usft
 Reference Wellbore: OH \ 65011
 Reference Design: Plan 2 06-28-19

Local Co-ordinate Reference: Well 602H
 TVD Reference: KB @ 3147.90usft (Ensign 155)
 MD Reference: KB @ 3147.90usft (Ensign 155)
 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 Quien Sabe Fed Com - 702H - OH - Plan 1 02-15-19													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 Toothface (")	Offset Wellbore Centre +N/-S (usft)	+E/-W (usft)	Between Centres (usft)	Between Ellipses (usft)	Minimum Separation (usft)	Separation Factor	Warning
10,100.00	9,247.89	10,543.48	9,376.81	35.62	36.45	-101.01	-695.04	654.74	672.07	601.75	70.32	9.558	
10,200.00	9,248.30	10,643.48	9,377.42	36.09	37.01	-101.02	-795.04	654.88	672.11	600.76	71.35	9.420	
10,300.00	9,248.71	10,743.48	9,378.03	36.61	37.62	-101.04	-895.03	655.02	672.15	599.67	72.48	9.273	
10,400.00	9,249.12	10,843.48	9,378.65	37.19	38.27	-101.06	-995.03	655.16	672.19	598.49	73.71	9.120	
10,500.00	9,249.53	10,943.48	9,379.26	37.83	38.96	-101.07	-1,095.03	655.31	672.24	597.22	75.02	8.961	
10,600.00	9,249.94	11,043.47	9,379.87	38.51	39.69	-101.09	-1,195.03	655.45	672.28	595.86	76.41	8.798	
10,700.00	9,250.35	11,143.47	9,380.48	39.24	40.45	-101.11	-1,295.03	655.59	672.32	594.43	77.89	8.632	
10,800.00	9,250.76	11,243.47	9,381.09	40.01	41.25	-101.12	-1,395.02	655.73	672.36	592.92	79.43	8.464	
10,900.00	9,251.17	11,343.47	9,381.70	40.81	42.09	-101.14	-1,495.02	655.88	672.40	591.35	81.05	8.296	
11,000.00	9,251.58	11,443.47	9,382.32	41.65	42.95	-101.16	-1,595.02	656.02	672.44	589.71	82.73	8.128	
11,100.00	9,251.99	11,543.47	9,382.93	42.53	43.85	-101.18	-1,695.02	656.16	672.48	588.00	84.48	7.960	
11,200.00	9,252.41	11,643.47	9,383.54	43.43	44.77	-101.19	-1,795.01	656.30	672.52	586.24	86.28	7.795	
11,300.00	9,252.82	11,743.47	9,384.15	44.37	45.72	-101.21	-1,895.01	656.45	672.56	584.43	88.14	7.631	
11,400.00	9,253.23	11,843.47	9,384.76	45.33	46.69	-101.23	-1,995.01	656.59	672.61	582.56	90.05	7.470	
11,500.00	9,253.64	11,943.47	9,385.37	46.31	47.69	-101.24	-2,095.01	656.73	672.65	580.64	92.00	7.311	
11,600.00	9,254.05	12,043.47	9,385.98	47.32	48.71	-101.26	-2,195.01	656.87	672.69	578.68	94.00	7.156	
11,700.00	9,254.46	12,143.47	9,386.60	48.35	49.75	-101.28	-2,295.00	657.02	672.73	576.68	96.05	7.004	
11,800.00	9,254.87	12,243.47	9,387.21	49.41	50.81	-101.29	-2,395.00	657.16	672.77	574.64	98.13	6.856	
11,900.00	9,255.28	12,343.47	9,387.82	50.48	51.89	-101.31	-2,495.00	657.30	672.81	572.56	100.25	6.711	
12,000.00	9,255.69	12,443.47	9,388.43	51.57	52.98	-101.33	-2,595.00	657.44	672.86	570.45	102.40	6.571	
12,100.00	9,256.10	12,543.47	9,389.04	52.67	54.09	-101.34	-2,694.99	657.59	672.90	568.31	104.59	6.434	
12,200.00	9,256.51	12,643.47	9,389.65	53.80	55.22	-101.36	-2,794.99	657.73	672.94	566.13	106.81	6.300	
12,300.00	9,256.92	12,743.47	9,390.26	54.93	56.36	-101.38	-2,894.99	657.87	672.98	563.93	109.05	6.171	
12,400.00	9,257.33	12,843.47	9,390.88	56.08	57.51	-101.39	-2,994.99	658.01	673.02	561.70	111.33	6.045	
12,500.00	9,257.74	12,943.47	9,391.49	57.25	58.68	-101.41	-3,094.99	658.16	673.07	559.44	113.62	5.924	
12,600.00	9,258.15	13,043.47	9,392.10	58.43	59.85	-101.43	-3,194.98	658.30	673.11	557.16	115.95	5.805	
12,700.00	9,258.56	13,143.47	9,392.71	59.61	61.04	-101.44	-3,294.98	658.44	673.15	554.86	118.29	5.691	
12,800.00	9,258.98	13,243.47	9,393.32	60.81	62.24	-101.46	-3,394.98	658.58	673.19	552.54	120.66	5.579	
12,900.00	9,259.39	13,343.47	9,393.93	62.02	63.45	-101.48	-3,494.98	658.73	673.23	550.19	123.04	5.472	
13,000.00	9,259.80	13,443.47	9,394.55	63.24	64.67	-101.49	-3,594.98	658.87	673.28	547.83	125.44	5.367	
13,100.00	9,260.21	13,543.47	9,395.16	64.47	65.90	-101.51	-3,694.97	659.01	673.32	545.46	127.86	5.266	
13,200.00	9,260.62	13,643.47	9,395.77	65.71	67.14	-101.53	-3,794.97	659.15	673.36	543.06	130.30	5.168	
13,300.00	9,261.03	13,743.47	9,396.38	66.95	68.38	-101.54	-3,894.97	659.30	673.40	540.65	132.75	5.073	
13,400.00	9,261.44	13,843.47	9,396.99	68.21	69.63	-101.56	-3,994.97	659.44	673.45	538.23	135.22	4.980	
13,500.00	9,261.85	13,943.47	9,397.60	69.47	70.89	-101.58	-4,094.96	659.58	673.49	535.79	137.70	4.891	
13,600.00	9,262.26	14,043.47	9,398.21	70.73	72.16	-101.59	-4,194.96	659.72	673.53	533.33	140.20	4.804	
13,700.00	9,262.67	14,143.47	9,398.83	72.01	73.43	-101.61	-4,294.96	659.87	673.57	530.87	142.70	4.720	
13,800.00	9,263.08	14,243.47	9,399.44	73.29	74.71	-101.63	-4,394.96	660.01	673.62	528.39	145.22	4.639	
13,900.00	9,263.49	14,343.47	9,400.05	74.57	75.99	-101.64	-4,494.96	660.15	673.66	525.91	147.75	4.559	
14,000.00	9,263.90	14,443.47	9,400.66	75.86	77.28	-101.66	-4,594.95	660.29	673.70	523.41	150.29	4.483	
14,100.00	9,264.31	14,543.47	9,401.27	77.16	78.57	-101.68	-4,694.95	660.44	673.75	520.90	152.84	4.408	
14,200.00	9,264.72	14,643.47	9,401.88	78.46	79.87	-101.69	-4,794.95	660.58	673.79	518.38	155.40	4.336	
14,300.00	9,265.13	14,743.47	9,402.50	79.77	81.18	-101.71	-4,894.95	660.72	673.83	515.86	157.97	4.265	
14,400.00	9,265.55	14,843.47	9,403.11	81.08	82.49	-101.73	-4,994.94	660.86	673.87	513.32	160.55	4.197	
14,500.00	9,265.96	14,943.47	9,403.72	82.40	83.80	-101.74	-5,094.94	661.01	673.92	510.78	163.14	4.131	
14,600.00	9,266.37	15,043.47	9,404.33	83.71	85.12	-101.76	-5,194.94	661.15	673.96	508.23	165.73	4.067	
14,700.00	9,266.78	15,143.47	9,404.94	85.04	86.44	-101.78	-5,294.94	661.29	674.00	505.67	168.33	4.004	
14,800.00	9,267.19	15,243.47	9,405.55	86.37	87.76	-101.79	-5,394.94	661.44	674.05	503.10	170.94	3.943	
14,900.00	9,267.60	15,343.47	9,406.16	87.70	89.09	-101.81	-5,494.93	661.58	674.09	500.53	173.56	3.884	
15,000.00	9,268.01	15,443.47	9,406.78	89.03	90.42	-101.83	-5,594.93	661.72	674.13	497.95	176.18	3.826	
15,100.00	9,268.42	15,543.47	9,407.39	90.37	91.76	-101.84	-5,694.93	661.86	674.18	495.37	178.81	3.770	
15,200.00	9,268.83	15,643.47	9,408.00	91.71	93.10	-101.86	-5,794.93	662.01	674.22	492.78	181.44	3.716	

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



Anticollision Report



Company: COG Operating LLC
Project: Eddy County, NM (NAD27 NME)
Reference Site: Quien Sabe Fed Com
Site Error: 0.00 usft
Reference Well: 602H
Well Error: 0.00 usft
Reference Wellbore: OH \ 65011
Reference Design: Plan 2 06-28-19

Local Co-ordinate Reference: Well 602H
TVD Reference: KB @ 3147.90usft (Ensign 155)
MD Reference: KB @ 3147.90usft (Ensign 155)
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 Quien Sabe Fed Com - 702H - OH - Plan 1 02-15-19												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)		Between Centres (usft)	Between Ellipses (usft)					
15,300.00	9,269.24	15,743.47	9,408.61	93.05	94.44	-101.88	-5,894.93	662.15	674.27	490.18	184.08	3.663	
15,400.00	9,269.65	15,843.47	9,409.22	94.40	95.78	-101.89	-5,994.92	662.29	674.31	487.58	186.73	3.611	
15,500.00	9,270.06	15,943.47	9,409.83	95.75	97.13	-101.91	-6,094.92	662.43	674.35	484.98	189.38	3.561	
15,600.00	9,270.47	16,043.46	9,410.45	97.10	98.48	-101.93	-6,194.92	662.58	674.40	482.37	192.03	3.512	
15,700.00	9,270.88	16,143.46	9,411.06	98.45	99.83	-101.94	-6,294.92	662.72	674.44	479.75	194.69	3.464	
15,800.00	9,271.29	16,243.46	9,411.67	99.81	101.19	-101.96	-6,394.91	662.86	674.48	477.13	197.35	3.418	
15,900.00	9,271.70	16,343.46	9,412.28	101.17	102.54	-101.98	-6,494.91	663.00	674.53	474.51	200.02	3.372	
16,000.00	9,272.11	16,443.46	9,412.89	102.53	103.90	-101.99	-6,594.91	663.15	674.57	471.88	202.69	3.328	
16,100.00	9,272.53	16,543.46	9,413.50	103.89	105.26	-102.01	-6,694.91	663.29	674.62	469.25	205.37	3.285	
16,200.00	9,272.94	16,643.46	9,414.11	105.26	106.63	-102.03	-6,794.91	663.43	674.66	466.61	208.05	3.243	
16,300.00	9,273.35	16,743.46	9,414.73	106.63	107.99	-102.04	-6,894.90	663.57	674.70	463.97	210.73	3.202	
16,400.00	9,273.76	16,843.46	9,415.34	108.00	109.36	-102.06	-6,994.90	663.72	674.75	461.33	213.42	3.162	
16,500.00	9,274.17	16,943.46	9,415.95	109.37	110.73	-102.08	-7,094.90	663.86	674.79	458.68	216.11	3.122	
16,600.00	9,274.58	17,043.46	9,416.56	110.74	112.10	-102.09	-7,194.90	664.00	674.84	456.03	218.81	3.084	
16,700.00	9,274.99	17,143.46	9,417.17	112.11	113.47	-102.11	-7,294.89	664.14	674.88	453.38	221.50	3.047	
16,800.00	9,275.40	17,243.46	9,417.78	113.49	114.85	-102.13	-7,394.89	664.29	674.93	450.72	224.20	3.010	
16,900.00	9,275.81	17,343.46	9,418.40	114.87	116.22	-102.14	-7,494.89	664.43	674.97	448.07	226.91	2.975	
17,000.00	9,276.22	17,443.46	9,419.01	116.25	117.60	-102.16	-7,594.89	664.57	675.02	445.41	229.61	2.940	
17,100.00	9,276.63	17,543.46	9,419.62	117.63	118.98	-102.18	-7,694.89	664.71	675.06	442.74	232.32	2.906	
17,200.00	9,277.04	17,643.46	9,420.23	119.01	120.36	-102.19	-7,794.88	664.86	675.11	440.08	235.03	2.872	
17,300.00	9,277.45	17,743.46	9,420.84	120.39	121.74	-102.21	-7,894.88	665.00	675.15	437.41	237.74	2.840	
17,400.00	9,277.86	17,843.46	9,421.45	121.78	123.13	-102.23	-7,994.88	665.14	675.19	434.74	240.46	2.808	
17,500.00	9,278.27	17,943.46	9,422.06	123.17	124.51	-102.24	-8,094.88	665.28	675.24	432.07	243.17	2.777	
17,600.00	9,278.68	18,043.46	9,422.68	124.55	125.90	-102.26	-8,194.88	665.43	675.28	429.39	245.89	2.746	
17,700.00	9,279.10	18,143.46	9,423.29	125.94	127.28	-102.28	-8,294.87	665.57	675.33	426.71	248.62	2.716	
17,800.00	9,279.51	18,243.46	9,423.90	127.33	128.67	-102.29	-8,394.87	665.71	675.37	424.04	251.34	2.687	
17,900.00	9,279.92	18,343.46	9,424.51	128.72	130.06	-102.31	-8,494.87	665.85	675.42	421.36	254.06	2.658	
18,000.00	9,280.33	18,443.46	9,425.12	130.11	131.45	-102.33	-8,594.87	666.00	675.47	418.67	256.79	2.630	
18,100.00	9,280.74	18,543.46	9,425.73	131.51	132.84	-102.34	-8,694.86	666.14	675.51	415.99	259.52	2.603	
18,200.00	9,281.15	18,643.46	9,426.35	132.90	134.24	-102.36	-8,794.86	666.28	675.56	413.30	262.25	2.576	
18,300.00	9,281.56	18,743.46	9,426.96	134.30	135.63	-102.38	-8,894.86	666.42	675.60	410.62	264.99	2.550	
18,400.00	9,281.97	18,843.46	9,427.57	135.69	137.02	-102.39	-8,994.86	666.57	675.65	407.93	267.72	2.524	
18,500.00	9,282.38	18,943.46	9,428.18	137.09	138.42	-102.41	-9,094.86	666.71	675.69	405.24	270.46	2.498	
18,600.00	9,282.79	19,043.46	9,428.79	138.49	139.82	-102.43	-9,194.85	666.85	675.74	402.54	273.19	2.473	
18,700.00	9,283.20	19,143.46	9,429.40	139.89	141.21	-102.44	-9,294.85	666.99	675.78	399.85	275.93	2.449	
18,800.00	9,283.61	19,243.46	9,430.01	141.29	142.61	-102.46	-9,394.85	667.14	675.83	397.16	278.67	2.425	
18,900.00	9,284.02	19,343.46	9,430.63	142.69	144.01	-102.48	-9,494.85	667.28	675.87	394.46	281.41	2.402	
19,000.00	9,284.43	19,443.46	9,431.24	144.09	145.41	-102.49	-9,594.84	667.42	675.92	391.76	284.16	2.379	
19,100.00	9,284.84	19,543.46	9,431.85	145.49	146.81	-102.51	-9,694.84	667.56	675.97	389.07	286.90	2.356	
19,100.89	9,284.85	19,544.35	9,431.85	145.50	146.82	-102.51	-9,695.73	667.57	675.97	389.04	286.92	2.356	
19,138.12	9,285.00	19,569.11	9,432.01	146.02	147.17	-102.51	-9,720.49	667.60	676.10	388.28	287.82	2.349 SF	



Anticollision Report



Company: COG Operating LLC
Project: Eddy County, NM (NAD27 NME)
Reference Site: Quien Sabe Fed Com
Site Error: 0.00 usft
Reference Well: 602H
Well Error: 0.00 usft
Reference Wellbore: OH \ 65011
Reference Design: Plan 2 06-28-19

Local Co-ordinate Reference: Well 602H
TVD Reference: KB @ 3147.90usft (Ensign 155)
MD Reference: KB @ 3147.90usft (Ensign 155)
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 Quien Sabe Fed Com - 703H - OH - Plan 1 02-15-19													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	1.10	1.10	0.00	0.00	0.00	0.00	0.00	0.00				
100.00	100.00	101.10	101.10	0.28	0.14	0.00	0.00	0.00	0.00	0.00	0.00	N/A	
200.00	200.00	201.10	201.10	0.93	0.50	0.00	0.00	0.00	0.00	0.00	0.00	N/A	
300.00	300.00	301.10	301.10	1.44	0.86	0.00	0.00	0.00	0.00	0.00	0.00	N/A	
400.00	400.00	401.10	401.10	1.88	1.21	0.00	0.00	0.00	0.00	0.00	0.00	N/A	
500.00	500.00	501.10	501.10	2.29	1.57	0.00	0.00	0.00	0.00	0.00	0.00	N/A	
600.00	600.00	601.10	601.10	2.69	1.93	0.00	0.00	0.00	0.00	0.00	0.00	N/A	
700.00	700.00	701.10	701.10	3.08	2.29	0.00	0.00	0.00	0.00	0.00	0.00	N/A	
800.00	800.00	801.10	801.10	3.46	2.65	0.00	0.00	0.00	0.00	0.00	0.00	N/A	
900.00	900.00	901.10	901.10	3.83	3.01	0.00	0.00	0.00	0.00	0.00	0.00	N/A	
1,000.00	1,000.00	1,001.10	1,001.10	4.21	3.36	0.00	0.00	0.00	0.00	0.00	0.00	N/A	
1,100.00	1,100.00	1,101.10	1,101.10	4.58	3.72	0.00	0.00	0.00	0.00	0.00	0.00	N/A	
1,200.00	1,200.00	1,201.10	1,201.10	4.95	4.08	0.00	0.00	0.00	0.00	0.00	0.00	N/A	
1,300.00	1,300.00	1,301.10	1,301.10	5.32	4.44	0.00	0.00	0.00	0.00	0.00	0.00	N/A	
1,400.00	1,400.00	1,401.10	1,401.10	5.68	4.80	0.00	0.00	0.00	0.00	0.00	0.00	N/A	
1,416.54	1,416.54	1,417.74	1,417.74	5.74	4.86	0.00	0.00	0.00	0.00	0.00	0.00	N/A CC	
1,500.00	1,500.00	1,501.10	1,501.10	6.05	5.16	-0.62	0.00	0.00	0.00	-10.77	10.77	0.000 Level 1, SF	
1,600.00	1,599.98	1,601.10	1,601.08	6.50	5.52	88.32	1.78	-0.02	0.32	-11.36	11.68	0.028 Level 1	
1,700.00	1,699.92	1,701.05	1,700.89	6.96	5.87	36.69	7.05	-0.08	2.13	-10.66	12.79	0.166 Level 1	
1,800.00	1,799.86	1,800.75	1,800.20	7.31	6.23	22.64	15.77	-0.17	7.40	-5.94	13.34	0.555 Level 1	
1,900.00	1,899.80	1,900.51	1,899.41	7.66	6.59	19.14	26.19	-0.28	14.43	0.42	14.01	1.030 Level 2	
2,000.00	1,999.74	2,000.26	1,998.51	8.02	6.95	17.94	36.61	-0.40	21.47	6.77	14.70	1.460 Level 3	
2,100.00	2,099.68	2,100.01	2,097.82	8.38	7.31	17.33	47.03	-0.51	28.52	13.11	15.41	1.851	
2,200.00	2,199.61	2,199.76	2,197.02	8.73	7.68	16.96	57.46	-0.62	35.57	19.46	16.12	2.207	
2,300.00	2,299.55	2,299.51	2,296.23	9.09	8.04	16.71	67.88	-0.74	42.63	25.80	16.83	2.533	
2,400.00	2,399.49	2,399.26	2,395.43	9.45	8.41	16.54	78.30	-0.85	49.68	32.14	17.54	2.832	
2,500.00	2,499.43	2,499.01	2,494.64	9.80	8.78	16.41	88.72	-0.96	56.73	38.48	18.26	3.107	
2,600.00	2,599.37	2,598.76	2,593.84	10.16	9.15	16.30	99.14	-1.08	63.79	44.81	18.98	3.362	
2,700.00	2,699.31	2,698.51	2,693.05	10.52	9.52	16.22	109.56	-1.19	70.84	51.15	19.69	3.598	
2,800.00	2,799.25	2,798.26	2,792.25	10.87	9.89	16.15	119.98	-1.30	77.90	57.49	20.41	3.817	
2,900.00	2,899.19	2,898.01	2,891.46	11.23	10.26	16.10	130.40	-1.41	84.95	63.83	21.13	4.021	
3,000.00	2,999.13	2,997.76	2,990.66	11.59	10.64	16.05	140.82	-1.53	92.01	70.16	21.85	4.212	
3,100.00	3,099.07	3,097.52	3,089.87	11.95	11.01	16.01	151.24	-1.64	99.06	76.50	22.56	4.390	
3,200.00	3,199.01	3,197.27	3,189.07	12.31	11.39	15.97	161.66	-1.75	106.12	82.83	23.28	4.558	
3,300.00	3,298.94	3,297.02	3,288.28	12.66	11.76	15.94	172.08	-1.87	113.17	89.17	24.00	4.715	
3,400.00	3,398.88	3,396.77	3,387.48	13.02	12.14	15.91	182.51	-1.98	120.23	95.50	24.72	4.863	
3,500.00	3,498.82	3,496.52	3,486.69	13.38	12.51	15.89	192.93	-2.09	127.28	101.84	25.44	5.003	
3,600.00	3,598.76	3,596.27	3,585.89	13.74	12.89	15.87	203.35	-2.21	134.34	108.17	26.16	5.135	
3,700.00	3,698.70	3,696.02	3,685.10	14.10	13.26	15.85	213.77	-2.32	141.39	114.51	26.88	5.259	
3,800.00	3,798.64	3,795.77	3,784.30	14.46	13.64	15.83	224.19	-2.43	148.45	120.84	27.60	5.378	
3,900.00	3,898.58	3,895.52	3,883.51	14.81	14.02	15.81	234.61	-2.54	155.50	127.18	28.33	5.490	
4,000.00	3,998.52	3,995.27	3,982.71	15.17	14.39	15.80	245.03	-2.66	162.56	133.51	29.05	5.596	
4,100.00	4,098.46	4,095.02	4,081.92	15.53	14.77	15.78	255.45	-2.77	169.61	139.84	29.77	5.698	
4,200.00	4,198.40	4,194.77	4,181.12	15.89	15.15	15.77	265.87	-2.88	176.67	146.18	30.49	5.794	
4,300.00	4,298.34	4,294.53	4,280.33	16.25	15.52	15.76	276.29	-3.00	183.72	152.51	31.21	5.886	
4,400.00	4,398.27	4,394.28	4,379.53	16.61	15.90	15.75	286.71	-3.11	190.77	158.84	31.93	5.975	
4,500.00	4,498.12	4,494.14	4,478.85	16.97	16.28	15.87	297.15	-3.22	195.92	163.25	32.68	5.996	
4,600.00	4,597.88	4,594.06	4,578.23	17.32	16.66	16.13	307.59	-3.34	199.63	166.23	33.39	5.978	
4,700.00	4,697.63	4,693.99	4,677.61	17.68	17.04	16.38	318.03	-3.45	203.34	169.21	34.12	5.959	
4,800.00	4,797.39	4,793.92	4,776.99	18.04	17.42	16.62	328.47	-3.56	207.05	172.20	34.85	5.941	
4,900.00	4,897.14	4,893.85	4,876.37	18.40	17.79	16.85	338.90	-3.68	210.76	175.19	35.58	5.924	
5,000.00	4,996.90	4,993.77	4,975.75	18.76	18.17	17.08	349.34	-3.79	214.48	178.18	36.31	5.908	

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



Anticollision Report



Company: COG Operating LLC
Project: Eddy County, NM (NAD27 NME)
Reference Site: Quien Sabe Fed Com
Site Error: 0.00 usft
Reference Well: 602H
Well Error: 0.00 usft
Reference Wellbore: OH \ 65011
Reference Design: Plan 2 06-28-19

Local Co-ordinate Reference: Well 602H
TVD Reference: KB @ 3147.90usft (Ensign 155)
MD Reference: KB @ 3147.90usft (Ensign 155)
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 Quien Sabe Fed Com - 703H - OH - Plan 1 02-15-19													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 +N/-S (usft)	Centre +E/-W (usft)					
5,100.00	5,096.66	5,093.70	5,075.13	19.12	18.55	17.29	359.78	-3.90	218.20	181.17	37.04	5.892	
5,200.00	5,196.41	5,193.63	5,174.51	19.49	18.93	17.50	370.22	-4.02	221.93	184.17	37.76	5.877	
5,300.00	5,296.17	5,293.56	5,273.89	19.85	19.31	17.71	380.66	-4.13	225.66	187.17	38.49	5.862	
5,400.00	5,395.93	5,393.48	5,373.27	20.21	19.69	17.90	391.10	-4.24	229.39	190.17	39.22	5.849	
5,500.00	5,495.68	5,493.41	5,472.65	20.57	20.07	18.09	401.54	-4.36	233.12	193.17	39.95	5.835	
5,600.00	5,595.44	5,593.34	5,572.03	20.94	20.45	18.28	411.98	-4.47	236.86	196.18	40.68	5.823	
5,700.00	5,695.20	5,693.27	5,671.41	21.30	20.83	18.45	422.42	-4.58	240.60	199.19	41.41	5.810	
5,800.00	5,794.95	5,793.19	5,770.79	21.66	21.21	18.63	432.86	-4.70	244.34	202.20	42.14	5.799	
5,900.00	5,894.71	5,893.12	5,870.17	22.02	21.59	18.79	443.30	-4.81	248.08	205.21	42.87	5.787	
6,000.00	5,994.47	5,993.05	5,969.55	22.39	21.97	18.96	453.74	-4.92	251.83	208.23	43.60	5.776	
6,100.00	6,094.22	6,092.98	6,068.93	22.75	22.35	19.11	464.18	-5.03	255.57	211.25	44.33	5.766	
6,200.00	6,193.98	6,192.90	6,168.31	23.11	22.73	19.27	474.62	-5.15	259.32	214.27	45.05	5.756	
6,300.00	6,293.73	6,292.83	6,267.69	23.48	23.11	19.42	485.06	-5.26	263.07	217.29	45.78	5.746	
6,400.00	6,393.49	6,392.76	6,367.08	23.84	23.49	19.56	495.49	-5.37	266.82	220.31	46.51	5.737	
6,500.00	6,493.25	6,492.68	6,466.46	24.20	23.87	19.70	505.93	-5.49	270.58	223.34	47.24	5.727	
6,600.00	6,593.00	6,592.61	6,565.84	24.57	24.25	19.84	516.37	-5.60	274.33	226.36	47.97	5.719	
6,700.00	6,692.76	6,692.54	6,665.22	24.93	24.63	19.97	526.81	-5.71	278.09	229.39	48.70	5.710	
6,800.00	6,792.52	6,792.47	6,764.60	25.29	25.01	20.10	537.25	-5.83	281.85	232.42	49.43	5.702	
6,900.00	6,892.27	6,892.39	6,863.98	25.66	25.39	20.23	547.69	-5.94	285.61	235.45	50.16	5.694	
7,000.00	6,992.03	6,992.32	6,963.36	26.02	25.77	20.35	558.13	-6.05	289.37	238.48	50.89	5.686	
7,100.00	7,091.79	7,092.25	7,062.74	26.39	26.16	20.47	568.57	-6.17	293.13	241.51	51.62	5.679	
7,200.00	7,191.54	7,192.18	7,162.12	26.75	26.54	20.59	579.01	-6.28	296.90	244.55	52.35	5.671	
7,300.00	7,291.30	7,292.10	7,261.50	27.11	26.92	20.70	589.45	-6.39	300.66	247.58	53.08	5.664	
7,400.00	7,391.06	7,392.03	7,360.88	27.48	27.30	20.81	599.89	-6.51	304.43	250.62	53.81	5.658	
7,500.00	7,490.81	7,491.96	7,460.26	27.84	27.68	20.92	610.33	-6.62	308.19	253.65	54.54	5.651	
7,600.00	7,590.57	7,591.89	7,559.64	28.21	28.06	21.02	620.77	-6.73	311.96	256.69	55.27	5.644	
7,700.00	7,690.32	7,693.96	7,661.16	28.57	28.45	21.13	631.36	-6.85	315.67	259.65	56.02	5.635	
7,800.00	7,790.08	7,806.11	7,772.96	28.94	28.86	21.35	640.12	-6.94	316.84	260.02	56.82	5.576	
7,900.00	7,889.84	7,918.17	7,884.93	29.30	29.26	21.71	644.49	-6.99	314.18	256.62	57.56	5.459	
8,000.00	7,989.59	8,023.94	7,990.69	29.66	29.63	22.20	645.04	-7.00	308.18	249.93	58.26	5.290	
8,100.00	8,089.35	8,123.69	8,090.45	30.03	29.97	22.70	645.04	-7.00	301.73	242.75	58.98	5.116	
8,200.00	8,189.11	8,223.45	8,190.21	30.39	30.31	23.22	645.04	-7.00	295.31	235.60	59.71	4.946	
8,300.00	8,288.86	8,323.20	8,289.95	30.76	30.65	23.77	645.04	-7.00	288.91	228.48	60.43	4.781	
8,400.00	8,388.62	8,422.96	8,389.72	31.12	30.99	24.34	645.04	-7.00	282.54	221.38	61.16	4.620	
8,500.00	8,488.38	8,522.72	8,489.48	31.49	31.33	24.94	645.04	-7.00	276.19	214.31	61.88	4.463	
8,600.00	8,588.13	8,622.47	8,589.23	31.85	31.68	25.56	645.04	-7.00	269.88	207.27	62.61	4.311	
8,686.09	8,674.16	8,708.50	8,675.26	32.16	31.97	175.38	645.04	-7.00	267.80	204.58	63.22	4.236	
8,700.00	8,687.99	8,722.33	8,689.09	32.21	32.02	-172.34	645.04	-7.00	266.07	202.75	63.32	4.202	
8,800.00	8,787.21	8,821.55	8,788.31	32.68	32.36	-161.25	645.04	-7.00	276.90	212.75	64.15	4.316	
8,900.00	8,882.96	8,994.16	8,959.14	33.10	32.85	-162.16	625.03	-6.97	294.16	231.27	62.88	4.678	
9,000.00	8,972.33	9,195.56	9,140.35	33.47	33.22	-163.53	539.54	-6.85	295.32	238.96	56.36	5.240	
9,100.00	9,052.59	9,390.01	9,277.08	33.78	33.44	-164.75	402.58	-6.65	279.29	232.34	46.94	5.950	
9,200.00	9,121.31	9,564.28	9,354.58	34.02	33.58	-165.84	247.24	-6.43	248.87	209.62	39.24	6.342	
9,300.00	9,176.41	9,714.77	9,381.35	34.18	33.70	-166.87	99.59	-6.22	208.28	171.57	36.71	5.674	
9,400.00	9,216.21	9,815.03	9,382.32	34.29	33.81	-168.20	-0.66	-6.08	168.22	130.92	37.29	4.511	
9,500.00	9,239.49	9,911.76	9,382.74	34.36	33.96	-170.75	-97.39	-5.95	143.99	106.47	37.52	3.838	
9,600.00	9,245.82	10,010.98	9,383.16	34.43	34.18	-174.59	-196.60	-5.80	136.85	99.38	37.47	3.652	
9,700.00	9,246.24	10,110.67	9,383.59	34.52	34.46	-177.84	-296.29	-5.66	136.35	98.76	37.59	3.627	
9,800.00	9,246.66	10,210.57	9,384.02	34.71	34.80	-179.65	-396.19	-5.52	136.27	98.22	38.04	3.582	
9,800.49	9,246.66	10,211.06	9,384.02	34.71	34.80	-179.66	-396.68	-5.52	136.27	98.22	38.04	3.582	
9,900.00	9,247.07	10,310.56	9,384.45	34.94	35.19	-179.95	-496.18	-5.38	136.28	97.67	38.61	3.529	
10,000.00	9,247.48	10,410.56	9,384.87	35.24	35.64	179.95	-596.18	-5.24	136.30	97.06	39.24	3.473	

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



Anticollision Report



Company: COG Operating LLC
Project: Eddy County, NM (NAD27 NME)
Reference Site: Quien Sabe Fed Com
Site Error: 0.00 usft
Reference Well: 602H
Well Error: 0.00 usft
Reference Wellbore: OH \ 65011
Reference Design: Plan 2 06-28-19

Local Co-ordinate Reference: Well 602H
TVD Reference: KB @ 3147.90usft (Ensign 155)
MD Reference: KB @ 3147.90usft (Ensign 155)
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 Quien Sabe Fed Com - 703H - OH - Plan 1 02-15-19												Offset Site Error:	0.00 usft
Survey Program: 0-MWD+HDGM												Offset Well Error:	0.00 usft
Reference		Offset		Semi Major Axis		Highside Toolface (")	Offset Wellbore Centre		Distance		Minimum Separation (usft)	Separation Factor	Warning
Measured Depth (usft)	Vertical Depth (usft)	Measured Depth (usft)	Vertical Depth (usft)	Reference (usft)	Offset (usft)		+N/-S (usft)	+E/-W (usft)	Between Centres (usft)	Between Ellipses (usft)			
10,100.00	9,247.89	10,510.56	9,385.30	35.62	36.14	179.95	-696.18	-5.10	136.31	96.39	39.93	3.414	
10,200.00	9,248.30	10,610.56	9,385.73	36.09	36.69	179.95	-796.18	-4.96	136.33	95.67	40.66	3.353	
10,300.00	9,248.71	10,710.56	9,386.16	36.61	37.28	179.95	-896.18	-4.81	136.35	94.91	41.44	3.290	
10,400.00	9,249.12	10,810.56	9,386.59	37.19	37.92	179.95	-996.18	-4.67	136.37	94.10	42.27	3.226	
10,500.00	9,249.53	10,910.56	9,387.02	37.83	38.61	179.95	-1,096.18	-4.53	136.39	93.25	43.13	3.162	
10,600.00	9,249.94	11,010.56	9,387.44	38.51	39.34	179.95	-1,196.17	-4.39	136.40	92.36	44.04	3.097	
10,700.00	9,250.35	11,110.56	9,387.87	39.24	40.10	179.95	-1,296.17	-4.25	136.42	91.44	44.98	3.033	
10,800.00	9,250.76	11,210.56	9,388.30	40.01	40.90	179.95	-1,396.17	-4.11	136.44	90.48	45.96	2.969	
10,900.00	9,251.17	11,310.56	9,388.73	40.81	41.74	179.95	-1,496.17	-3.96	136.46	89.49	46.96	2.906	
11,000.00	9,251.58	11,410.56	9,389.16	41.65	42.60	179.95	-1,596.17	-3.82	136.47	88.47	48.00	2.843	
11,100.00	9,251.99	11,510.56	9,389.58	42.53	43.50	179.95	-1,696.17	-3.68	136.49	87.42	49.07	2.782	
11,200.00	9,252.41	11,610.56	9,390.01	43.43	44.43	179.95	-1,796.17	-3.54	136.51	86.35	50.16	2.722	
11,300.00	9,252.82	11,710.56	9,390.44	44.37	45.38	179.95	-1,896.17	-3.40	136.53	85.25	51.28	2.663	
11,400.00	9,253.23	11,810.56	9,390.87	45.33	46.36	179.95	-1,996.17	-3.26	136.54	84.13	52.42	2.605	
11,500.00	9,253.64	11,910.56	9,391.30	46.31	47.36	179.96	-2,096.17	-3.12	136.56	82.98	53.58	2.549	
11,600.00	9,254.05	12,010.56	9,391.72	47.32	48.39	179.96	-2,196.16	-2.97	136.58	81.82	54.76	2.494	
11,700.00	9,254.46	12,110.56	9,392.15	48.35	49.43	179.96	-2,296.16	-2.83	136.60	80.63	55.96	2.441	
11,800.00	9,254.87	12,210.56	9,392.58	49.41	50.50	179.96	-2,396.16	-2.69	136.61	79.43	57.18	2.389	
11,900.00	9,255.28	12,310.56	9,393.01	50.48	51.58	179.96	-2,496.16	-2.55	136.63	78.21	58.42	2.339	
12,000.00	9,255.69	12,410.56	9,393.44	51.57	52.68	179.96	-2,596.16	-2.41	136.65	76.98	59.67	2.290	
12,100.00	9,256.10	12,510.56	9,393.87	52.67	53.80	179.96	-2,696.16	-2.27	136.67	75.73	60.93	2.243	
12,200.00	9,256.51	12,610.56	9,394.29	53.80	54.93	179.96	-2,796.16	-2.12	136.68	74.47	62.21	2.197	
12,300.00	9,256.92	12,710.56	9,394.72	54.93	56.07	179.96	-2,896.16	-1.98	136.70	73.19	63.51	2.153	
12,400.00	9,257.33	12,810.56	9,395.15	56.08	57.23	179.96	-2,996.16	-1.84	136.72	71.91	64.81	2.109	
12,500.00	9,257.74	12,910.56	9,395.58	57.25	58.40	179.96	-3,096.16	-1.70	136.74	70.61	66.13	2.068	
12,600.00	9,258.15	13,010.56	9,396.01	58.43	59.59	179.96	-3,196.15	-1.56	136.75	69.30	67.46	2.027	
12,700.00	9,258.56	13,110.56	9,396.43	59.61	60.78	179.96	-3,296.15	-1.42	136.77	67.98	68.79	1.988	
12,800.00	9,258.98	13,210.56	9,396.86	60.81	61.98	179.96	-3,396.15	-1.27	136.79	66.65	70.14	1.950	
12,900.00	9,259.39	13,310.56	9,397.29	62.02	63.20	179.96	-3,496.15	-1.13	136.81	65.31	71.50	1.913	
13,000.00	9,259.80	13,410.56	9,397.72	63.24	64.42	179.96	-3,596.15	-0.99	136.82	63.96	72.86	1.878	
13,100.00	9,260.21	13,510.56	9,398.15	64.47	65.66	179.96	-3,696.15	-0.85	136.84	62.60	74.24	1.843	
13,200.00	9,260.62	13,610.56	9,398.57	65.71	66.90	179.97	-3,796.15	-0.71	136.86	61.24	75.62	1.810	
13,300.00	9,261.03	13,710.56	9,399.00	66.95	68.15	179.97	-3,896.15	-0.57	136.88	59.87	77.00	1.777	
13,400.00	9,261.44	13,810.56	9,399.43	68.21	69.40	179.97	-3,996.15	-0.43	136.89	58.49	78.40	1.746	
13,500.00	9,261.85	13,910.56	9,399.86	69.47	70.67	179.97	-4,096.15	-0.28	136.91	57.11	79.80	1.716	
13,600.00	9,262.26	14,010.56	9,400.29	70.73	71.94	179.97	-4,196.14	-0.14	136.93	55.72	81.21	1.686	
13,700.00	9,262.67	14,110.56	9,400.72	72.01	73.21	179.97	-4,296.14	0.00	136.95	54.32	82.62	1.657	
13,800.00	9,263.08	14,210.56	9,401.14	73.29	74.49	179.97	-4,396.14	0.14	136.96	52.92	84.04	1.630	
13,900.00	9,263.49	14,310.56	9,401.57	74.57	75.78	179.97	-4,496.14	0.28	136.98	51.52	85.46	1.603	
14,000.00	9,263.90	14,410.56	9,402.00	75.86	77.08	179.97	-4,596.14	0.42	137.00	50.10	86.89	1.577	
14,100.00	9,264.31	14,510.56	9,402.43	77.16	78.37	179.97	-4,696.14	0.57	137.02	48.69	88.33	1.551	
14,200.00	9,264.72	14,610.56	9,402.86	78.46	79.68	179.97	-4,796.14	0.71	137.03	47.27	89.77	1.527	
14,300.00	9,265.13	14,710.56	9,403.28	79.77	80.99	179.97	-4,896.14	0.85	137.05	45.84	91.21	1.503	
14,400.00	9,265.55	14,810.56	9,403.71	81.08	82.30	179.97	-4,996.14	0.99	137.07	44.41	92.66	1.479 Level 3	
14,500.00	9,265.96	14,910.56	9,404.14	82.40	83.61	179.97	-5,096.14	1.13	137.09	42.98	94.11	1.457 Level 3	
14,600.00	9,266.37	15,010.56	9,404.57	83.71	84.94	179.97	-5,196.13	1.27	137.10	41.54	95.56	1.435 Level 3	
14,700.00	9,266.78	15,110.56	9,405.00	85.04	86.26	179.97	-5,296.13	1.42	137.12	40.10	97.02	1.413 Level 3	
14,800.00	9,267.19	15,210.56	9,405.42	86.37	87.59	179.97	-5,396.13	1.56	137.14	38.66	98.48	1.393 Level 3	
14,900.00	9,267.60	15,310.56	9,405.85	87.70	88.92	179.98	-5,496.13	1.70	137.16	37.21	99.95	1.372 Level 3	
15,000.00	9,268.01	15,410.56	9,406.28	89.03	90.26	179.98	-5,596.13	1.84	137.17	35.76	101.42	1.353 Level 3	
15,100.00	9,268.42	15,510.56	9,406.71	90.37	91.59	179.98	-5,696.13	1.98	137.19	34.30	102.89	1.333 Level 3	
15,200.00	9,268.83	15,610.56	9,407.14	91.71	92.93	179.98	-5,796.13	2.12	137.21	32.85	104.36	1.315 Level 3	

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



Anticollision Report



Company: COG Operating LLC
Project: Eddy County, NM (NAD27 NME)
Reference Site: Quien Sabe Fed Com
Site Error: 0.00 usft
Reference Well: 602H
Well Error: 0.00 usft
Reference Wellbore: OH \ 65011
Reference Design: Plan 2 06-28-19

Local Co-ordinate Reference: Well 602H
TVD Reference: KB @ 3147.90usft (Ensign 155)
MD Reference: KB @ 3147.90usft (Ensign 155)
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 Quien Sabe Fed Com - 703H - OH - Plan 1 02-15-19													Offset Site Error: 0.00 usft
Survey Program: 0-MWD+HDGM													Offset Well Error: 0.00 usft
Reference		Offset		Semi Major Axis		Highside Toolface [°]	Offset Wellbore Centre		Distance		Minimum Separation (usft)	Separation Factor	Warning
Measured Depth (usft)	Vertical Depth (usft)	Measured Depth (usft)	Vertical Depth (usft)	Reference (usft)	Offset (usft)		+N/S (usft)	+E/W (usft)	Between Centres (usft)	Between Ellipses (usft)			
15,300.00	9,269.24	15,710.56	9,407.57	93.05	94.28	179.98	-5,896.13	2.26	137.23	31.39	105.84	1.297 Level 3	
15,400.00	9,269.65	15,810.56	9,407.99	94.40	95.63	179.98	-5,996.13	2.41	137.24	29.93	107.32	1.279 Level 3	
15,500.00	9,270.06	15,910.56	9,408.42	95.75	96.98	179.98	-6,096.13	2.55	137.26	28.46	108.80	1.262 Level 3	
15,600.00	9,270.47	16,010.56	9,408.85	97.10	98.33	179.98	-6,196.12	2.69	137.28	27.00	110.28	1.245 Level 2	
15,700.00	9,270.88	16,110.56	9,409.28	98.45	99.68	179.98	-6,296.12	2.83	137.30	25.53	111.77	1.228 Level 2	
15,800.00	9,271.29	16,210.56	9,409.71	99.81	101.04	179.98	-6,396.12	2.97	137.31	24.06	113.26	1.212 Level 2	
15,900.00	9,271.70	16,310.56	9,410.13	101.17	102.40	179.98	-6,496.12	3.11	137.33	22.58	114.75	1.197 Level 2	
16,000.00	9,272.11	16,410.56	9,410.56	102.53	103.76	179.98	-6,596.12	3.26	137.35	21.11	116.24	1.182 Level 2	
16,100.00	9,272.53	16,510.56	9,410.99	103.89	105.13	179.98	-6,696.12	3.40	137.37	19.63	117.74	1.167 Level 2	
16,200.00	9,272.94	16,610.56	9,411.42	105.26	106.49	179.98	-6,796.12	3.54	137.38	18.15	119.23	1.152 Level 2	
16,300.00	9,273.35	16,710.56	9,411.85	106.63	107.86	179.98	-6,896.12	3.68	137.40	16.67	120.73	1.138 Level 2	
16,400.00	9,273.76	16,810.56	9,412.27	108.00	109.23	179.98	-6,996.12	3.82	137.42	15.19	122.23	1.124 Level 2	
16,500.00	9,274.17	16,910.56	9,412.70	109.37	110.60	179.98	-7,096.11	3.96	137.44	13.70	123.74	1.111 Level 2	
16,600.00	9,274.58	17,010.56	9,413.13	110.74	111.97	179.99	-7,196.11	4.11	137.45	12.21	125.24	1.098 Level 2	
16,700.00	9,274.99	17,110.56	9,413.56	112.11	113.35	179.99	-7,296.11	4.25	137.47	10.73	126.75	1.085 Level 2	
16,800.00	9,275.40	17,210.56	9,413.99	113.49	114.72	179.99	-7,396.11	4.39	137.49	9.24	128.25	1.072 Level 2	
16,900.00	9,275.81	17,310.56	9,414.42	114.87	116.10	179.99	-7,496.11	4.53	137.51	7.75	129.76	1.060 Level 2	
17,000.00	9,276.22	17,410.56	9,414.84	116.25	117.48	179.99	-7,596.11	4.67	137.52	6.25	131.27	1.048 Level 2	
17,100.00	9,276.63	17,510.56	9,415.27	117.63	118.86	179.99	-7,696.11	4.81	137.54	4.76	132.78	1.036 Level 2	
17,200.00	9,277.04	17,610.56	9,415.70	119.01	120.25	179.99	-7,796.11	4.96	137.56	3.26	134.30	1.024 Level 2	
17,300.00	9,277.45	17,710.56	9,416.13	120.39	121.63	179.99	-7,896.11	5.10	137.58	1.77	135.81	1.013 Level 2	
17,400.00	9,277.86	17,810.56	9,416.56	121.78	123.01	179.99	-7,996.11	5.24	137.59	0.27	137.32	1.002 Level 2	
17,500.00	9,278.27	17,910.56	9,416.98	123.17	124.40	179.99	-8,096.10	5.38	137.61	-1.23	138.84	0.991 Level 1	
17,600.00	9,278.68	18,010.56	9,417.41	124.55	125.79	179.99	-8,196.10	5.52	137.63	-2.73	140.36	0.981 Level 1	
17,700.00	9,279.10	18,110.56	9,417.84	125.94	127.18	179.99	-8,296.10	5.66	137.65	-4.23	141.88	0.970 Level 1	
17,800.00	9,279.51	18,210.56	9,418.27	127.33	128.57	179.99	-8,396.10	5.80	137.66	-5.73	143.40	0.960 Level 1	
17,900.00	9,279.92	18,310.56	9,418.70	128.72	129.96	179.99	-8,496.10	5.95	137.68	-7.24	144.92	0.950 Level 1	
18,000.00	9,280.33	18,410.56	9,419.13	130.11	131.35	179.99	-8,596.10	6.09	137.70	-8.74	146.44	0.940 Level 1	
18,100.00	9,280.74	18,510.56	9,419.55	131.51	132.74	179.99	-8,696.10	6.23	137.72	-10.25	147.96	0.931 Level 1	
18,200.00	9,281.15	18,610.56	9,419.98	132.90	134.14	179.99	-8,796.10	6.37	137.73	-11.75	149.49	0.921 Level 1	
18,300.00	9,281.56	18,710.56	9,420.41	134.30	135.53	180.00	-8,896.10	6.51	137.75	-13.26	151.01	0.912 Level 1	
18,400.00	9,281.97	18,810.56	9,420.84	135.69	136.93	180.00	-8,996.10	6.65	137.77	-14.77	152.54	0.903 Level 1	
18,500.00	9,282.38	18,910.56	9,421.27	137.09	138.32	180.00	-9,096.09	6.80	137.79	-16.28	154.07	0.894 Level 1	
18,600.00	9,282.79	19,010.56	9,421.69	138.49	139.72	180.00	-9,196.09	6.94	137.80	-17.79	155.59	0.886 Level 1	
18,700.00	9,283.20	19,110.56	9,422.12	139.89	141.12	180.00	-9,296.09	7.08	137.82	-19.30	157.12	0.877 Level 1	
18,800.00	9,283.61	19,210.56	9,422.55	141.29	142.52	180.00	-9,396.09	7.22	137.84	-20.81	158.65	0.869 Level 1	
18,900.00	9,284.02	19,310.56	9,422.98	142.69	143.92	180.00	-9,496.09	7.36	137.86	-22.32	160.18	0.861 Level 1	
19,000.00	9,284.43	19,410.56	9,423.41	144.09	145.32	180.00	-9,596.09	7.50	137.87	-23.84	161.71	0.853 Level 1	
19,100.00	9,284.84	19,510.56	9,423.83	145.49	146.72	180.00	-9,696.09	7.65	137.89	-25.35	163.24	0.845 Level 1	
19,138.12	9,285.00	19,548.68	9,424.00	146.02	147.26	180.00	-9,734.21	7.70	137.90	-25.93	163.83	0.842 Level 1, ES	



Anticollision Report



Company: COG Operating LLC
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Local Co-ordinate Reference: Well 602H
TVD Reference: KB @ 3147.90usft (Ensign 155)
MD Reference: KB @ 3147.90usft (Ensign 155)
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 Quien Sabe Fed Com - 801H - OH \ 65013 - Plan 1 06-28-19													Offset Site Error: 0.00 usft
Survey Program: 0-MWD+HRGM													Offset Well Error: 0.00 usft
Reference		Offset		Semi Major Axis		Highside Toothface (")	Offset Wellbore Centre		Distance		Minimum Separation (usft)	Separation Factor	Warning
Measured Depth (usft)	Vertical Depth (usft)	Measured Depth (usft)	Vertical Depth (usft)	Reference (usft)	Offset (usft)		+N/S (usft)	+E/W (usft)	Between Centres (usft)	Between Ellipses (usft)			
0.00	0.00	0.00	0.00	0.00	0.00	88.66	0.70	30.00	30.01				
100.00	100.00	99.40	99.40	0.28	0.28	88.66	0.70	30.00	30.01	29.56	0.45	67.229	
200.00	200.00	199.40	199.40	0.93	0.93	88.66	0.70	30.00	30.01	28.50	1.51	19.929	
300.00	300.00	299.40	299.40	1.44	1.44	88.66	0.70	30.00	30.01	27.62	2.39	12.558	
400.00	400.00	399.40	399.40	1.88	1.88	88.66	0.70	30.00	30.01	26.82	3.19	9.405	
500.00	500.00	499.40	499.40	2.29	2.29	88.66	0.70	30.00	30.01	26.05	3.96	7.578	
600.00	600.00	599.40	599.40	2.69	2.69	88.66	0.70	30.00	30.01	25.30	4.71	6.368	
700.00	700.00	699.40	699.40	3.08	3.07	88.66	0.70	30.00	30.01	24.55	5.46	5.501	
800.00	800.00	799.40	799.40	3.46	3.46	88.66	0.70	30.00	30.01	23.82	6.19	4.846	
900.00	900.00	899.40	899.40	3.83	3.83	88.66	0.70	30.00	30.01	23.08	6.93	4.333	
1,000.00	1,000.00	999.40	999.40	4.21	4.21	88.66	0.70	30.00	30.01	22.35	7.65	3.920	
1,100.00	1,100.00	1,099.40	1,099.40	4.58	4.58	88.66	0.70	30.00	30.01	21.63	8.38	3.580	
1,200.00	1,200.00	1,199.40	1,199.40	4.95	4.95	88.66	0.70	30.00	30.01	20.90	9.11	3.295	
1,300.00	1,300.00	1,299.40	1,299.40	5.32	5.31	88.66	0.70	30.00	30.01	20.18	9.83	3.052	
1,400.00	1,400.00	1,399.40	1,399.40	5.68	5.68	88.66	0.70	30.00	30.01	19.45	10.56	2.843	
1,500.00	1,500.00	1,499.40	1,499.40	6.05	6.05	88.66	0.70	30.00	30.01	18.73	11.28	2.661 CC	
1,600.00	1,599.98	1,599.38	1,599.36	6.50	6.53	99.65	2.42	30.00	30.34	18.36	11.98	2.532	
1,700.00	1,699.92	1,699.37	1,699.29	6.96	7.00	99.56	5.91	30.00	31.01	18.32	12.69	2.444	
1,800.00	1,799.86	1,799.37	1,799.23	7.31	7.35	99.48	9.40	30.00	31.68	18.27	13.40	2.363	
1,900.00	1,899.80	1,899.37	1,899.17	7.66	7.70	99.39	12.89	30.00	32.34	18.22	14.12	2.291	
2,000.00	1,999.74	1,999.37	1,999.10	8.02	8.05	99.31	16.38	30.00	33.01	18.18	14.83	2.225	
2,100.00	2,099.68	2,099.36	2,099.04	8.38	8.41	99.24	19.87	30.00	33.68	18.13	15.55	2.166	
2,200.00	2,199.61	2,199.36	2,198.98	8.73	8.76	99.17	23.36	30.00	34.35	18.08	16.27	2.111	
2,300.00	2,299.55	2,299.36	2,298.91	9.09	9.12	99.10	26.85	30.00	35.01	18.03	16.99	2.061	
2,400.00	2,399.49	2,399.36	2,398.85	9.45	9.47	99.03	30.34	30.00	35.68	17.98	17.70	2.016	
2,500.00	2,499.43	2,499.35	2,498.79	9.80	9.83	98.96	33.83	30.00	36.35	17.93	18.42	1.973	
2,600.00	2,599.37	2,599.35	2,598.72	10.16	10.18	98.90	37.32	30.00	37.02	17.88	19.14	1.934	
2,700.00	2,699.31	2,699.35	2,698.66	10.52	10.54	98.84	40.81	30.00	37.68	17.83	19.86	1.898	
2,800.00	2,799.25	2,799.35	2,798.60	10.87	10.90	98.78	44.30	30.00	38.35	17.78	20.58	1.864	
2,900.00	2,899.19	2,899.35	2,898.53	11.23	11.25	98.73	47.79	30.00	39.02	17.72	21.30	1.832	
3,000.00	2,999.13	2,999.34	2,998.47	11.59	11.61	98.67	51.28	30.00	39.69	17.67	22.02	1.803	
3,100.00	3,099.07	3,099.34	3,098.41	11.95	11.97	98.62	54.77	30.00	40.36	17.62	22.74	1.775	
3,200.00	3,199.01	3,199.34	3,198.34	12.31	12.32	98.57	58.26	30.00	41.02	17.57	23.45	1.749	
3,300.00	3,298.94	3,299.34	3,298.28	12.66	12.68	98.52	61.75	30.00	41.69	17.52	24.17	1.725	
3,400.00	3,398.88	3,399.33	3,398.22	13.02	13.04	98.47	65.24	30.00	42.36	17.47	24.89	1.702	
3,500.00	3,498.82	3,499.33	3,498.16	13.38	13.40	98.42	68.73	30.00	43.03	17.41	25.61	1.680	
3,600.00	3,598.76	3,599.33	3,598.09	13.74	13.75	98.38	72.22	30.00	43.70	17.36	26.33	1.659	
3,700.00	3,698.70	3,699.33	3,698.03	14.10	14.11	98.34	75.71	30.00	44.36	17.31	27.05	1.640	
3,800.00	3,798.64	3,799.33	3,797.97	14.46	14.47	98.29	79.20	30.00	45.03	17.26	27.77	1.621	
3,900.00	3,898.58	3,899.32	3,897.90	14.81	14.83	98.25	82.69	30.00	45.70	17.21	28.49	1.604	
4,000.00	3,998.52	3,999.32	3,997.84	15.17	15.19	98.21	86.18	30.00	46.37	17.15	29.22	1.587	
4,100.00	4,098.46	4,099.32	4,097.78	15.53	15.54	98.18	89.67	30.00	47.04	17.10	29.94	1.571	
4,200.00	4,198.40	4,199.32	4,197.71	15.89	15.90	98.14	93.16	30.00	47.71	17.05	30.66	1.556	
4,300.00	4,298.34	4,299.31	4,297.65	16.25	16.26	98.10	96.65	30.00	48.37	17.00	31.38	1.542	
4,400.00	4,398.27	4,399.31	4,397.58	16.61	16.61	98.07	100.15	30.00	49.04	16.95	32.09	1.528 ES	
4,500.00	4,498.12	4,499.22	4,497.34	16.97	16.98	98.02	103.59	30.00	50.09	17.29	32.80	1.527 SF	
4,600.00	4,597.88	4,599.21	4,597.09	17.32	17.33	97.96	112.56	30.00	51.43	17.91	33.51	1.534	
4,700.00	4,697.63	4,699.20	4,696.83	17.68	17.69	97.89	119.54	30.00	52.76	18.52	34.24	1.541	
4,800.00	4,797.39	4,799.19	4,796.58	18.04	18.05	97.83	126.51	30.00	54.10	19.13	34.97	1.547	
4,900.00	4,897.14	4,899.18	4,896.33	18.40	18.41	97.78	133.49	30.00	55.43	19.73	35.70	1.553	
5,000.00	4,996.90	4,999.17	4,996.08	18.76	18.77	97.72	140.46	30.00	56.77	20.34	36.43	1.558	
5,100.00	5,096.66	5,099.16	5,095.82	19.12	19.13	97.67	147.44	30.00	58.11	20.95	37.16	1.564	

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



Anticollision Report



Company: COG Operating LLC
 Project: Eddy County, NM (NAD27 NME)
 Reference Site: Quien Sabe Fed Com
 Site Error: 0.00 usft
 Reference Well: 602H
 Well Error: 0.00 usft
 Reference Wellbore: OH \ 65011
 Reference Design: Plan 2 06-28-19

Local Co-ordinate Reference: Well 602H
 TVD Reference: KB @ 3147.90usft (Ensign 155)
 MD Reference: KB @ 3147.90usft (Ensign 155)
 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 Quien Sabe Fed Com - 801H - OH \ 65013 - Plan 1 06-28-19														Offset Site Error: 0.00 usft
Survey Program: 0-MWD-HRGM														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)				
5,200.00	5,196.41	5,199.16	5,195.57	19.49	19.49	97.62	154.41	30.00	59.44	21.55	37.89	1.569		
5,300.00	5,296.17	5,299.15	5,295.32	19.85	19.85	97.58	161.39	30.00	60.78	22.16	38.62	1.574		
5,400.00	5,395.93	5,399.14	5,395.07	20.21	20.21	97.53	168.36	30.00	62.11	22.77	39.35	1.579		
5,500.00	5,495.68	5,499.13	5,494.81	20.57	20.58	97.49	175.34	30.00	63.45	23.37	40.08	1.583		
5,600.00	5,595.44	5,599.12	5,594.56	20.94	20.94	97.45	182.31	30.00	64.79	23.98	40.81	1.588		
5,700.00	5,695.20	5,699.11	5,694.31	21.30	21.30	97.41	189.29	30.00	66.12	24.58	41.54	1.592		
5,800.00	5,794.95	5,799.10	5,794.06	21.66	21.66	97.37	196.26	30.00	67.46	25.19	42.27	1.596		
5,900.00	5,894.71	5,899.09	5,893.80	22.02	22.02	97.33	203.24	30.00	68.80	25.79	43.00	1.600		
6,000.00	5,994.47	5,999.08	5,993.55	22.39	22.39	97.30	210.21	30.00	70.13	26.40	43.74	1.604		
6,100.00	6,094.22	6,099.08	6,093.30	22.75	22.75	97.26	217.19	30.00	71.47	27.00	44.47	1.607		
6,200.00	6,193.98	6,199.07	6,193.05	23.11	23.11	97.23	224.16	30.00	72.81	27.61	45.20	1.611		
6,300.00	6,293.73	6,299.06	6,292.79	23.48	23.47	97.20	231.14	30.00	74.14	28.21	45.93	1.614		
6,400.00	6,393.49	6,399.05	6,392.54	23.84	23.84	97.17	238.11	30.00	75.48	28.82	46.66	1.617		
6,500.00	6,493.25	6,499.04	6,492.29	24.20	24.20	97.14	245.09	30.00	76.82	29.42	47.40	1.621		
6,600.00	6,593.00	6,599.03	6,592.04	24.57	24.56	97.11	252.06	30.00	78.15	30.02	48.13	1.624		
6,700.00	6,692.76	6,699.02	6,691.78	24.93	24.92	97.08	259.04	30.00	79.49	30.63	48.86	1.627		
6,800.00	6,792.52	6,799.01	6,791.53	25.29	25.29	97.06	266.01	30.00	80.83	31.23	49.59	1.630		
6,900.00	6,892.27	6,899.00	6,891.28	25.66	25.65	97.03	272.99	30.00	82.16	31.83	50.33	1.633		
7,000.00	6,992.03	6,998.99	6,991.03	26.02	26.01	97.01	279.96	30.00	83.50	32.44	51.06	1.635		
7,100.00	7,091.79	7,098.99	7,090.77	26.39	26.38	96.98	286.94	30.00	84.84	33.04	51.79	1.638		
7,200.00	7,191.54	7,198.98	7,190.52	26.75	26.74	96.96	293.91	30.00	86.17	33.65	52.53	1.641		
7,300.00	7,291.30	7,298.97	7,290.27	27.11	27.10	96.94	300.89	30.00	87.51	34.25	53.26	1.643		
7,400.00	7,391.06	7,398.96	7,390.02	27.48	27.47	96.92	307.86	30.00	88.85	34.85	53.99	1.645		
7,500.00	7,490.81	7,498.95	7,489.76	27.84	27.83	96.89	314.84	30.00	90.18	35.46	54.73	1.648		
7,600.00	7,590.57	7,598.94	7,589.51	28.21	28.19	96.87	321.81	30.00	91.52	36.06	55.46	1.650		
7,700.00	7,690.32	7,698.93	7,689.26	28.57	28.56	96.85	328.79	30.00	92.86	36.66	56.20	1.652		
7,800.00	7,790.08	7,798.92	7,789.01	28.94	28.92	96.83	335.76	30.00	94.19	37.26	56.93	1.655		
7,900.00	7,889.84	7,898.91	7,888.75	29.30	29.29	96.82	342.74	30.00	95.53	37.87	57.66	1.657		
8,000.00	7,989.59	7,998.91	7,988.50	29.66	29.65	96.80	349.71	30.00	96.87	38.47	58.40	1.659		
8,100.00	8,089.35	8,098.90	8,088.25	30.03	30.01	96.78	356.69	30.00	98.20	39.07	59.13	1.661		
8,200.00	8,189.11	8,198.89	8,188.00	30.39	30.38	96.76	363.66	30.00	99.54	39.68	59.86	1.663		
8,300.00	8,288.86	8,298.88	8,287.74	30.76	30.74	96.74	370.64	30.00	100.88	40.28	60.60	1.665		
8,400.00	8,388.62	8,398.87	8,387.49	31.12	31.11	96.73	377.61	30.00	102.21	40.88	61.33	1.667		
8,500.00	8,488.38	8,498.86	8,487.24	31.49	31.47	96.71	384.59	30.00	103.55	41.48	62.07	1.668		
8,600.00	8,588.13	8,598.85	8,586.99	31.85	31.83	96.70	391.56	30.00	104.89	42.09	62.80	1.670		
8,700.00	8,687.99	8,698.76	8,686.65	32.21	32.20	-102.98	398.53	30.00	106.18	42.59	63.60	1.670		
8,800.00	8,787.21	8,796.95	8,784.60	32.58	32.56	-100.71	405.38	30.00	108.98	44.33	64.65	1.686		
8,900.00	8,882.96	8,890.49	8,877.92	33.10	32.90	-114.40	411.91	30.00	120.93	55.19	65.74	1.840		
9,000.00	8,972.33	8,976.54	8,963.76	33.47	33.21	-127.90	417.91	30.00	151.02	84.44	66.58	2.268		
9,100.00	9,052.59	9,052.48	9,039.51	33.78	33.49	-137.07	423.21	30.00	201.68	134.59	67.08	3.006		
9,200.00	9,121.31	9,116.01	9,102.88	34.02	33.72	-141.42	427.64	30.00	269.74	202.35	67.40	4.002		
9,300.00	9,176.41	9,165.19	9,151.94	34.18	33.90	-140.93	431.07	30.00	350.92	283.33	67.59	5.192		
9,400.00	9,216.21	9,198.53	9,185.20	34.29	34.02	-133.41	433.39	30.00	441.25	373.56	67.68	6.519		
9,500.00	9,239.49	9,215.01	9,201.65	34.36	34.08	-109.71	434.54	30.00	537.11	469.42	67.69	7.935		
9,600.00	9,245.82	9,214.42	9,201.05	34.43	34.08	-69.23	434.50	30.00	635.12	567.48	67.64	9.390		
9,700.00	9,246.24	9,207.88	9,194.53	34.52	34.06	-60.77	434.05	30.00	733.85	666.26	67.59	10.858		
9,800.00	9,246.66	9,201.32	9,187.99	34.71	34.03	-47.08	433.59	30.00	833.18	765.63	67.55	12.334		
9,900.00	9,247.07	9,194.76	9,181.44	34.94	34.01	-30.85	433.13	30.00	932.83	865.30	67.53	13.813		
10,000.00	9,247.48	11,078.10	10,258.05	35.24	38.72	179.99	-588.04	-5.33	1,011.21	968.61	42.60	23.739		
10,100.00	9,247.89	11,178.10	10,258.91	35.52	39.08	179.99	-688.03	-5.18	1,011.66	968.49	43.17	23.432		
10,200.00	9,248.30	11,278.10	10,259.77	36.09	39.50	179.99	-788.03	-5.04	1,012.11	968.31	43.80	23.108		
10,300.00	9,248.71	11,378.10	10,260.64	36.61	39.98	179.99	-888.02	-4.90	1,012.57	968.09	44.47	22.769		

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



Anticollision Report



Company: COG Operating LLC
Project: Eddy County, NM (NAD27 NME)
Reference Site: Quien Sabe Fed Com
Site Error: 0.00 usft
Reference Well: 602H
Well Error: 0.00 usft
Reference Wellbore: OH \ 65011
Reference Design: Plan 2 06-28-19

Local Co-ordinate Reference: Well 602H
TVD Reference: KB @ 3147.90usft (Ensign 155)
MD Reference: KB @ 3147.90usft (Ensign 155)
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 Quien Sabe Fed Com - 801H - OH \ 65013 - Plan 1 06-28-19													Offset Site Error: 0.00 usft
Survey Program: 0-MWD+HRGM													Offset Well Error: 0.00 usft
Reference		Offset		Semi Major Axis		Distance							
Measured Depth (usft)	Vertical Depth (usft)	Measured Depth (usft)	Vertical Depth (usft)	Reference (usft)	Offset (usft)	Highside Tooface (")	Offset Wellbore Centre N/S (usft)	Offset Wellbore Centre E/W (usft)	Between Centres (usft)	Between Ellipses (usft)	Minimum Separation (usft)	Separation Factor	Warning
10,400.00	9,249.12	11,478.10	10,261.50	37.19	40.52	179.99	-988.02	-4.76	1,013.02	967.83	45.19	22.417	
10,500.00	9,249.53	11,578.10	10,262.36	37.83	41.11	179.99	-1,088.01	-4.61	1,013.47	967.52	45.95	22.057	
10,600.00	9,249.94	11,678.10	10,263.23	38.51	41.74	179.99	-1,188.01	-4.47	1,013.92	967.17	46.75	21.689	
10,700.00	9,250.35	11,778.09	10,264.09	39.24	42.41	179.99	-1,288.00	-4.33	1,014.38	966.79	47.59	21.316	
10,800.00	9,250.76	11,878.09	10,264.95	40.01	43.13	179.99	-1,388.00	-4.19	1,014.83	966.37	48.46	20.941	
10,900.00	9,251.17	11,978.09	10,265.82	40.81	43.88	179.99	-1,487.99	-4.04	1,015.28	965.91	49.37	20.564	
11,000.00	9,251.58	12,078.09	10,266.68	41.65	44.66	179.99	-1,587.99	-3.90	1,015.73	965.42	50.31	20.188	
11,100.00	9,251.99	12,178.09	10,267.54	42.53	45.48	179.99	-1,687.98	-3.76	1,016.19	964.90	51.29	19.814	
11,200.00	9,252.41	12,278.09	10,268.41	43.43	46.33	179.99	-1,787.98	-3.62	1,016.64	964.35	52.29	19.443	
11,300.00	9,252.82	12,378.09	10,269.27	44.37	47.21	179.99	-1,887.97	-3.47	1,017.09	963.78	53.32	19.077	
11,400.00	9,253.23	12,478.09	10,270.13	45.33	48.11	179.99	-1,987.97	-3.33	1,017.54	963.17	54.37	18.715	
11,500.00	9,253.64	12,578.09	10,271.00	46.31	49.05	179.99	-2,087.96	-3.19	1,018.00	962.55	55.45	18.359	
11,600.00	9,254.05	12,678.09	10,271.86	47.32	50.00	179.99	-2,187.96	-3.05	1,018.45	961.90	56.55	18.009	
11,700.00	9,254.46	12,778.08	10,272.72	48.35	50.98	179.99	-2,287.95	-2.90	1,018.90	961.23	57.68	17.666	
11,800.00	9,254.87	12,878.08	10,273.58	49.41	51.98	179.99	-2,387.95	-2.76	1,019.35	960.53	58.82	17.330	
11,900.00	9,255.28	12,978.08	10,274.45	50.48	53.00	179.99	-2,487.94	-2.62	1,019.81	959.82	59.98	17.002	
12,000.00	9,255.69	13,078.08	10,275.31	51.57	54.04	179.99	-2,587.94	-2.48	1,020.26	959.09	61.16	16.681	
12,100.00	9,256.10	13,178.08	10,276.17	52.67	55.10	179.99	-2,687.93	-2.34	1,020.71	958.35	62.36	16.367	
12,200.00	9,256.51	13,278.08	10,277.04	53.80	56.18	179.99	-2,787.93	-2.19	1,021.16	957.59	63.58	16.062	
12,300.00	9,256.92	13,378.08	10,277.90	54.93	57.27	179.99	-2,887.93	-2.05	1,021.62	956.81	64.81	15.764	
12,400.00	9,257.33	13,478.08	10,278.76	56.08	58.38	179.99	-2,987.92	-1.91	1,022.07	956.02	66.05	15.474	
12,500.00	9,257.74	13,578.08	10,279.63	57.25	59.50	179.99	-3,087.92	-1.77	1,022.52	955.21	67.31	15.191	
12,600.00	9,258.15	13,678.07	10,280.49	58.43	60.63	179.99	-3,187.91	-1.62	1,022.97	954.39	68.58	14.916	
12,700.00	9,258.56	13,778.07	10,281.35	59.61	61.78	179.99	-3,287.91	-1.48	1,023.43	953.56	69.86	14.649	
12,800.00	9,258.98	13,878.07	10,282.22	60.81	62.94	179.99	-3,387.90	-1.34	1,023.88	952.72	71.16	14.389	
12,900.00	9,259.39	13,978.07	10,283.08	62.02	64.11	179.99	-3,487.90	-1.20	1,024.33	951.87	72.46	14.136	
13,000.00	9,259.80	14,078.07	10,283.94	63.24	65.29	179.99	-3,587.89	-1.05	1,024.78	951.01	73.78	13.890	
13,100.00	9,260.21	14,178.07	10,284.81	64.47	66.48	179.99	-3,687.89	-0.91	1,025.24	950.13	75.10	13.651	
13,200.00	9,260.62	14,278.07	10,285.67	65.71	67.69	179.99	-3,787.88	-0.77	1,025.69	949.25	76.44	13.419	
13,300.00	9,261.03	14,378.07	10,286.53	66.95	68.90	179.99	-3,887.88	-0.63	1,026.14	948.36	77.78	13.193	
13,400.00	9,261.44	14,478.07	10,287.39	68.21	70.12	179.99	-3,987.87	-0.48	1,026.59	947.46	79.13	12.973	
13,500.00	9,261.85	14,578.07	10,288.26	69.47	71.34	179.99	-4,087.87	-0.34	1,027.05	946.56	80.49	12.760	
13,600.00	9,262.26	14,678.06	10,289.12	70.73	72.58	179.99	-4,187.86	-0.20	1,027.50	945.64	81.86	12.552	
13,700.00	9,262.67	14,778.06	10,289.98	72.01	73.82	179.99	-4,287.86	-0.06	1,027.95	944.72	83.23	12.350	
13,800.00	9,263.08	14,878.06	10,290.85	73.29	75.07	179.99	-4,387.85	0.09	1,028.40	943.79	84.61	12.154	
13,900.00	9,263.49	14,978.06	10,291.71	74.57	76.33	179.99	-4,487.85	0.23	1,028.86	942.86	86.00	11.963	
14,000.00	9,263.90	15,078.06	10,292.57	75.86	77.59	179.99	-4,587.84	0.37	1,029.31	941.92	87.39	11.778	
14,100.00	9,264.31	15,178.06	10,293.44	77.16	78.86	179.99	-4,687.84	0.51	1,029.76	940.97	88.79	11.597	
14,200.00	9,264.72	15,278.06	10,294.30	78.46	80.14	179.99	-4,787.83	0.66	1,030.21	940.02	90.20	11.422	
14,300.00	9,265.13	15,378.06	10,295.16	79.77	81.42	179.99	-4,887.83	0.80	1,030.67	939.06	91.61	11.251	
14,400.00	9,265.55	15,478.06	10,296.03	81.08	82.71	179.99	-4,987.82	0.94	1,031.12	938.10	93.02	11.085	
14,500.00	9,265.96	15,578.06	10,296.89	82.40	84.00	179.99	-5,087.82	1.08	1,031.57	937.13	94.44	10.923	
14,600.00	9,266.37	15,678.05	10,297.75	83.71	85.29	179.99	-5,187.81	1.22	1,032.02	936.16	95.87	10.765	
14,700.00	9,266.78	15,778.05	10,298.62	85.04	86.59	179.99	-5,287.81	1.37	1,032.48	935.18	97.30	10.612	
14,800.00	9,267.19	15,878.05	10,299.48	86.37	87.90	179.99	-5,387.80	1.51	1,032.93	934.20	98.73	10.462	
14,900.00	9,267.60	15,978.05	10,300.34	87.70	89.21	179.99	-5,487.80	1.65	1,033.38	933.21	100.17	10.316	
15,000.00	9,268.01	16,078.05	10,301.20	89.03	90.52	179.99	-5,587.79	1.79	1,033.83	932.22	101.61	10.175	
15,100.00	9,268.42	16,178.05	10,302.07	90.37	91.84	180.00	-5,687.79	1.94	1,034.29	931.23	103.06	10.036	
15,200.00	9,268.83	16,278.05	10,302.93	91.71	93.16	180.00	-5,787.78	2.08	1,034.74	930.24	104.50	9.901	
15,300.00	9,269.24	16,378.05	10,303.79	93.05	94.48	180.00	-5,887.78	2.22	1,035.19	929.24	105.96	9.770	
15,400.00	9,269.65	16,478.05	10,304.66	94.40	95.81	180.00	-5,987.77	2.36	1,035.64	928.23	107.41	9.642	
15,500.00	9,270.06	16,578.05	10,305.52	95.75	97.14	180.00	-6,087.77	2.51	1,036.10	927.23	108.87	9.517	

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



Anticollision Report



Company: COG Operating LLC
Project: Eddy County, NM (NAD27 NME)
Reference Site: Quien Sabe Fed Com
Site Error: 0.00 usft
Reference Well: 602H
Well Error: 0.00 usft
Reference Wellbore: OH \ 65011
Reference Design: Plan 2 06-28-19

Local Co-ordinate Reference: Well 602H
TVD Reference: KB @ 3147.90usft (Ensign 155)
MD Reference: KB @ 3147.90usft (Ensign 155)
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 Quien Sabe Fed Com - 801H - OH \ 65013 - Plan 1 06-28-19													Offset Site Error: 0.00 usft
Survey Program: 0-MWD+HRGM													Offset Well Error: 0.00 usft
Reference		Offset		Semi Major Axis		Distance							
Measured Depth (usft)	Vertical Depth (usft)	Measured Depth (usft)	Vertical Depth (usft)	Reference (usft)	Offset (usft)	Highside Toolface (°)	Offset Wellbore Centre +N-S (usft)	+E-W (usft)	Between Centres (usft)	Between Ellipses (usft)	Minimum Separation (usft)	Separation Factor	Warning
15,600.00	9,270.47	16,678.04	10,306.38	97.10	98.47	180.00	-6,187.77	2.65	1,036.55	926.22	110.33	9.395	
15,700.00	9,270.88	16,778.04	10,307.25	98.45	99.81	180.00	-6,287.76	2.79	1,037.00	925.21	111.80	9.276	
15,800.00	9,271.29	16,878.04	10,308.11	99.81	101.15	180.00	-6,387.76	2.93	1,037.45	924.19	113.26	9.160	
15,900.00	9,271.70	16,978.04	10,308.97	101.17	102.49	180.00	-6,487.75	3.08	1,037.91	923.17	114.73	9.046	
16,000.00	9,272.11	17,078.04	10,309.84	102.53	103.84	180.00	-6,587.75	3.22	1,038.36	922.15	116.21	8.935	
16,100.00	9,272.53	17,178.04	10,310.70	103.89	105.18	180.00	-6,687.74	3.36	1,038.81	921.13	117.68	8.827	
16,200.00	9,272.94	17,278.04	10,311.56	105.25	106.53	180.00	-6,787.74	3.50	1,039.26	920.11	119.16	8.722	
16,300.00	9,273.35	17,378.04	10,312.43	106.63	107.89	180.00	-6,887.73	3.65	1,039.72	919.08	120.64	8.618	
16,400.00	9,273.76	17,478.04	10,313.29	108.00	109.24	180.00	-6,987.73	3.79	1,040.17	918.05	122.12	8.517	
16,500.00	9,274.17	17,578.04	10,314.15	109.37	110.60	180.00	-7,087.72	3.93	1,040.62	917.02	123.61	8.419	
16,600.00	9,274.58	17,678.03	10,315.01	110.74	111.96	180.00	-7,187.72	4.07	1,041.08	915.98	125.09	8.322	
16,700.00	9,274.99	17,778.03	10,315.88	112.11	113.32	180.00	-7,287.71	4.22	1,041.53	914.95	126.58	8.228	
16,800.00	9,275.40	17,878.03	10,316.74	113.49	114.68	180.00	-7,387.71	4.36	1,041.98	913.91	128.07	8.136	
16,900.00	9,275.81	17,978.03	10,317.60	114.87	116.04	180.00	-7,487.70	4.50	1,042.43	912.87	129.56	8.046	
17,000.00	9,276.22	18,078.03	10,318.47	116.25	117.41	180.00	-7,587.70	4.64	1,042.89	911.83	131.06	7.957	
17,100.00	9,276.63	18,178.03	10,319.33	117.63	118.78	180.00	-7,687.69	4.78	1,043.34	910.78	132.55	7.871	
17,200.00	9,277.04	18,278.03	10,320.19	119.01	120.15	180.00	-7,787.69	4.93	1,043.79	909.74	134.05	7.787	
17,300.00	9,277.45	18,378.03	10,321.06	120.39	121.52	180.00	-7,887.68	5.07	1,044.24	908.69	135.55	7.704	
17,400.00	9,277.86	18,478.03	10,321.92	121.78	122.89	180.00	-7,987.68	5.21	1,044.70	907.65	137.05	7.623	
17,500.00	9,278.27	18,578.02	10,322.78	123.17	124.27	180.00	-8,087.67	5.35	1,045.15	906.60	138.55	7.543	
17,600.00	9,278.68	18,678.02	10,323.65	124.55	125.64	180.00	-8,187.67	5.50	1,045.60	905.54	140.06	7.466	
17,700.00	9,279.10	18,778.02	10,324.51	125.94	127.02	180.00	-8,287.66	5.64	1,046.05	904.49	141.56	7.389	
17,800.00	9,279.51	18,878.02	10,325.37	127.33	128.40	180.00	-8,387.66	5.78	1,046.51	903.44	143.07	7.315	
17,900.00	9,279.92	18,978.02	10,326.24	128.72	129.78	180.00	-8,487.65	5.92	1,046.96	902.38	144.58	7.242	
18,000.00	9,280.33	19,078.02	10,327.10	130.11	131.16	180.00	-8,587.65	6.07	1,047.41	901.33	146.08	7.170	
18,100.00	9,280.74	19,178.02	10,327.96	131.51	132.55	180.00	-8,687.64	6.21	1,047.86	900.27	147.59	7.100	
18,200.00	9,281.15	19,278.02	10,328.82	132.90	133.93	180.00	-8,787.64	6.35	1,048.32	899.21	149.11	7.031	
18,300.00	9,281.56	19,378.02	10,329.69	134.30	135.32	180.00	-8,887.63	6.49	1,048.77	898.15	150.62	6.963	
18,400.00	9,281.97	19,478.02	10,330.55	135.69	136.70	180.00	-8,987.63	6.64	1,049.22	897.09	152.13	6.897	
18,500.00	9,282.38	19,578.01	10,331.41	137.09	138.09	180.00	-9,087.62	6.78	1,049.67	896.02	153.65	6.832	
18,600.00	9,282.79	19,678.01	10,332.28	138.49	139.48	180.00	-9,187.62	6.92	1,050.13	894.96	155.16	6.768	
18,700.00	9,283.20	19,778.01	10,333.14	139.89	140.87	180.00	-9,287.61	7.06	1,050.58	893.90	156.68	6.705	
18,800.00	9,283.61	19,878.01	10,334.00	141.29	142.26	180.00	-9,387.61	7.21	1,051.03	892.83	158.20	6.644	
18,900.00	9,284.02	19,978.01	10,334.87	142.69	143.65	180.00	-9,487.61	7.35	1,051.48	891.76	159.72	6.583	
19,000.00	9,284.43	20,078.01	10,335.73	144.09	145.04	180.00	-9,587.60	7.49	1,051.94	890.70	161.24	6.524	
19,100.00	9,284.84	20,178.01	10,336.59	145.49	146.44	180.00	-9,687.60	7.63	1,052.39	889.63	162.76	6.466	
19,138.12	9,285.00	20,216.13	10,336.92	146.02	146.97	180.00	-9,725.72	7.69	1,052.56	889.22	163.34	6.444	



Anticollision Report

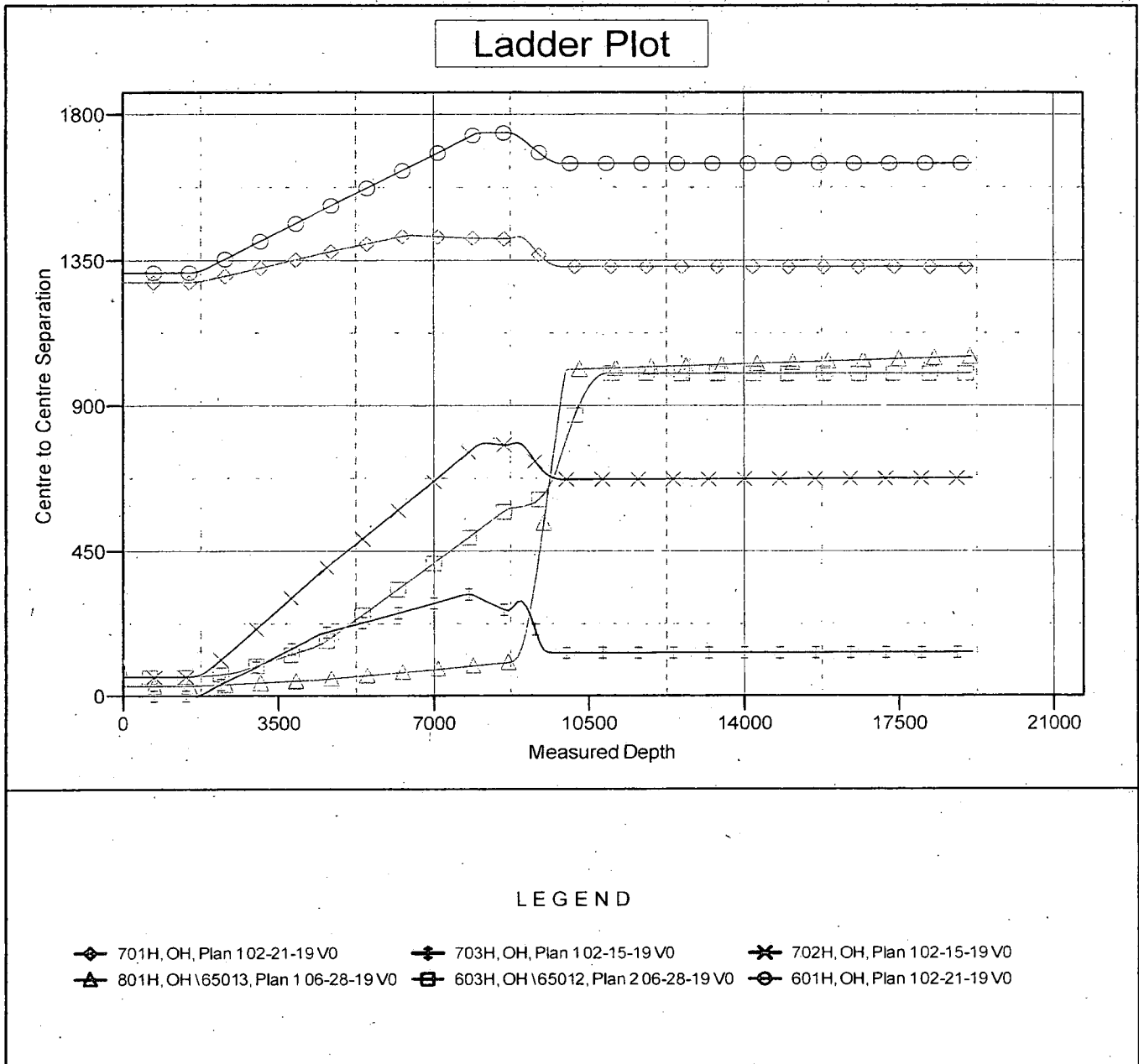


Company: COG Operating LLC
Project: Eddy County, NM (NAD27 NME)
Reference Site: Quien Sabe Fed Com
Site Error: 0.00 usft
Reference Well: 602H
Well Error: 0.00 usft
Reference Wellbore: OH \ 65011
Reference Design: Plan 2 06-28-19

Local Co-ordinate Reference: Well 602H
TVD Reference: KB @ 3147.90usft (Ensign 155)
MD Reference: KB @ 3147.90usft (Ensign 155)
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 KB @ 3147.90usft (Ensign 155)
Offset Depths are relative to Offset Datum
Central Meridian is 104° 19' 60.0000 W

Coordinates are relative to: 602H
Coordinate System is US State Plane 1927 (Exact solution), New Mexico East 30
Grid Convergence at Surface is: 0.10°





Anticollision Report



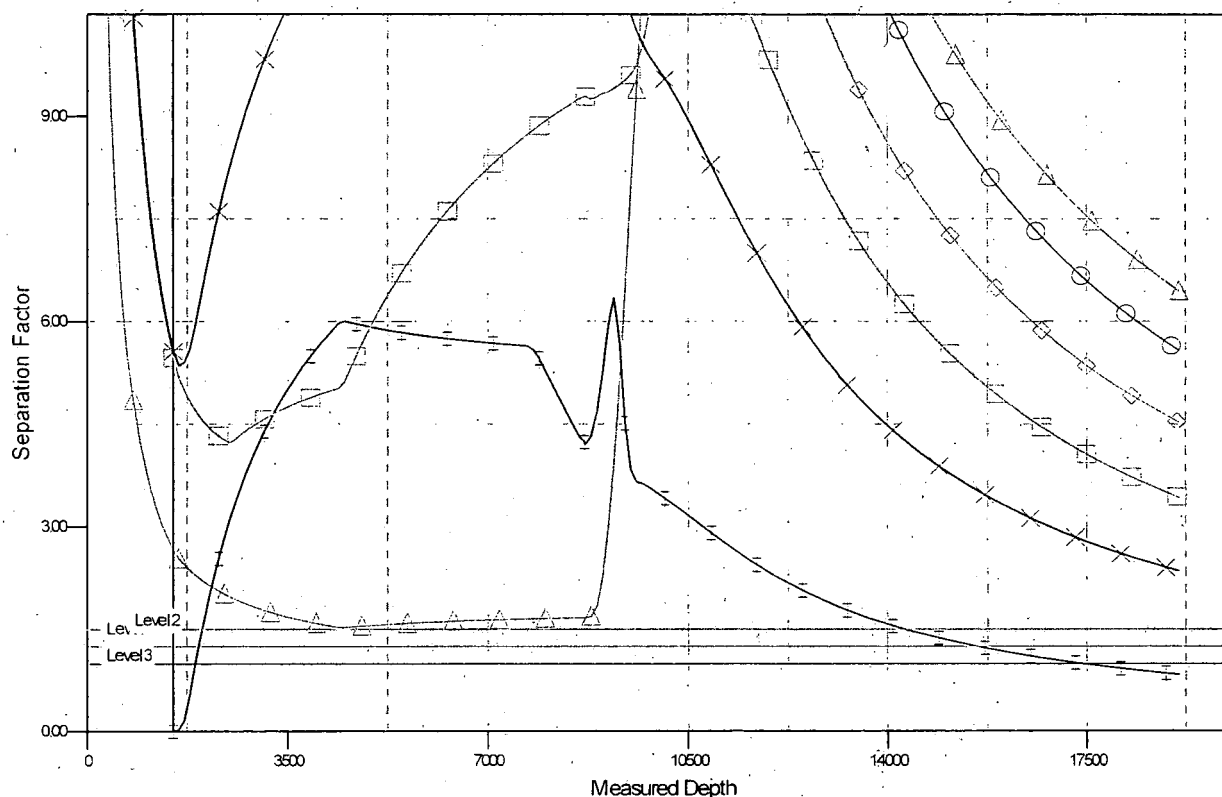
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Central Meridian is 104° 19' 60.0000 W

Coordinates are relative to: 602H
Coordinate System is US State Plane 1927 (Exact solution), New Mexico East 30
Grid Convergence at Surface is: 0.10°

Separation Factor Plot



LEGEND

701H, OH, Plan 102-21-19 V0 703H, OH, Plan 102-15-19 V0 702H, OH, Plan 102-15-19 V0
801H, OH \ 65013, Plan 1 06-28-19 V0 603H, OH \ 65012, Plan 2 06-28-19 V0 601H, OH, Plan 102-21-19 V0

COG Operating, LLC - Quien Sabe Federal Com 602H

1. Geologic Formations

TVD of target	9,285' EOL	Pilot hole depth	NA
MD at TD:	19,138'	Deepest expected fresh water:	110'

Formation	Depth (TVD) from KB	Water/Mineral Bearing/Target Zone?	Hazards
Quaternary Fill	Surface	Water	
Rustler	680	Water	
Top of Salt	844	Salt	
Base of Salt	2230	Salt	
Lamar	2432	Salt Water	
Bell Canyon	2463	Salt Water	
Cherry Canyon	3268	Oil/Gas	
Brushy Canyon	4393	Oil/Gas	
Bone Spring Lime	5925	Oil/Gas	
U. Avalon Shale	6097	Oil/Gas	
L. Avalon Shale	6332	Oil/Gas	
1st Bone Spring Sand	6928	Oil/Gas	
2nd Bone Spring Sand	7659	Oil/Gas	
3rd Bone Spring Sand	8817	Oil/Gas	
Wolfcamp	9150	Target Oil/Gas	

2. Casing Program

Hole Size	Casing Interval		Csg. Size	Weight (lbs)	Grade	Conn.	SF Collapse	SF Burst	SF Tension
	From	To							
17.5"	0	770	13.375"	54.5	J55	STC	3.28	9.15	12.25
12.25"	0	8500	9.625"	40	HCL80	BTC	1.40	1.23	2.79
8.5	0	19,138	5.5"	20	P110	BTC	1.84	2.48	3.59
BLM Minimum Safety Factor							1.125	1	1.6 Dry 1.8 Wet

Intermediate casing will be kept at least 1/3 full while running casing to mitigate collapse. Intermediate burst based on 0.7 frac gradient at the shoe with Gas Gradient 0.1 psi/ft to surface.
All casing strings will be tested in accordance with Onshore Oil and Gas Order #2 III.B.1.h

COG Operating, LLC - Quien Sabe Federal Com 602H

	Y or N
Is casing new? If used, attach certification as required in Onshore Order #1	Y
Does casing meet API specifications? If no, attach casing specification sheet.	Y
Is premium or uncommon casing planned? If yes attach casing specification sheet.	N
Does the above casing design meet or exceed BLM's minimum standards? If not provide justification (loading assumptions, casing design criteria).	Y
Will the intermediate pipe be kept at a minimum 1/3 fluid filled to avoid approaching the collapse pressure rating of the casing?	Y
Is well located within Capitan Reef?	N
If yes, does production casing cement tie back a minimum of 50' above the Reef?	
Is well within the designated 4 string boundary?	
Is well located in SOPA but not in R-111-P?	N
If yes, are the first 2 strings cemented to surface and 3 rd string cement tied back 500' into previous casing?	
Is well located in R-111-P and SOPA?	N
If yes, are the first three strings cemented to surface?	
Is 2 nd string set 100' to 600' below the base of salt?	
Is well located in high Cave/Karst?	N
If yes, are there two strings cemented to surface?	
(For 2 string wells) If yes, is there a contingency casing if lost circulation occurs?	
Is well located in critical Cave/Karst?	N
If yes, are there three strings cemented to surface?	

COG Operating, LLC - Quien Sabe Federal Com 602H

3. Cementing Program

Casing	# Sks	Wt. lb/ gal	Yld ft ³ / sack	H ₂ O gal/sk	500# Comp Strength (hours)	Slurry Description
Surf.	270	13.5	1.75	9	12	Lead: Class C + 4% Gel
	250	14.8	1.34	6.34	8	Tail: Class C + 2% CaCl ₂
Inter. Stage1	910	11	2.8	19	48	Lead: NeoCem
	300	16.4	1.1	5	8	Tail: Class H
DV Tool @ 2400'						
Inter. Stage2	260	11	2.8	19	48	Lead: NeoCem
	100	14.8	1.35	6.34	8	Tail: Class C + 2% CaCl
5.5 Prod	400	12.7	2	10.6	16	Lead: 35:65:6 H Blend
	2930	14.4	1.24	5.7	19	Tail: 50:50:2 Class H Blend

Volumes Subject to Observed Hole Conditions and/or Fluid Caliper Results

Lab reports with the 500 psi compressive strength time for the cement will be onsite for review.

Casing String	TOC	% Excess
Surface	0'	50%
1 st Intermediate	0'	50%
Production	8,000'	35%

4. Pressure Control Equipment

N	A variance is requested for the use of a diverter on the surface casing. See attached for schematic.
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BOP installed and tested before drilling which hole?	Size?	Min Required WP	Type	x	Tested to:
12-1/4"	13-5/8"	3M	Annular	x	1500 psi
			Blind Ram	x	3M
			Pipe Ram	x	
			Double Ram	x	
			Other*		
8 1/2"	13-5/8"	5M	5M Annular	x	2500 psi
			Blind Ram	x	5M
			Pipe Ram	x	
			Double Ram	x	
			Other*		

BOP/BOPE will be tested by an independent service company to 250 psi low and the high pressure indicated above per Onshore Order 2 requirements. The System may be upgraded to a higher pressure but still tested to the working pressure listed in the table above. If the system is upgraded all the components installed will be functional and tested.

Pipe rams will be 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. See attached schematics.

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

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5. Mud Program

Depth		Type	Weight (ppg)	Viscosity	Water Loss
From	To				
0	Surf. Shoe	FW Gel	8.4 - 8.6	28-29	N/C
Surf csg	Int shoe	Diesel Brine Emul	8.6 - 9.4	30-40	N/C
Int shoe	Lateral TD	OBM	10.5 - 12.5	30-40	20

Sufficient mud materials to maintain mud properties and meet minimum lost circulation and weight increase requirements will be kept on location at all times.

What will be used to monitor the loss or gain of fluid?	PVT/Pason/Visual Monitoring
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6. Logging and Testing Procedures

Logging, Coring and Testing	
Y	Will run GR/CNL from TD to surface (horizontal well – vertical portion of hole). Stated logs run will be in the Completion Report and submitted to the BLM.
N	Are Logs are planned based on well control or offset log information.
N	Drill stem test? If yes, explain.
N	Coring? If yes, explain.

Additional logs planned		Interval
N	Resistivity	Pilot Hole TD to ICP
N	Density	Pilot Hole TD to ICP
Y	CBL	Production casing (If cement not circulated to surface)
Y	Mud log	Intermediate shoe to TD
N	PEX	

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7. Drilling Conditions

Condition	Specify what type and where?
BH Pressure at deepest TVD	6040 psi at 9285' TVD
Abnormal Temperature	NO 150 Deg. F.

No abnormal pressure or temperature conditions are anticipated. Sufficient mud materials to maintain mud properties and weight increase requirements will be kept on location at all times.

Sufficient supplies of Paper/LCM for periodic sweeps to control seepage and losses will be maintained on location.

Hydrogen Sulfide (H2S) monitors will be installed prior to drilling out the surface shoe. If H2S is detected in concentrations greater than 100 ppm, the operator will comply with the provisions of Onshore Oil and Gas Order #6. If Hydrogen Sulfide is encountered, measured values and formations will be provided to the BLM.

N H2S is present

Y H2S Plan attached

8. Other Facets of Operation

Y	Is it a walking operation?
N	Is casing pre-set?

x	H2S Plan.
x	BOP & Choke Schematics.
x	Directional Plan