

UNITED STATES
DEPARTMENT OF THE INTERIOR
BUREAU OF LAND MANAGEMENTFORM 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 ☐ Other8. Well Name and No.
QUIEN SABE FEDERAL COM 702H2. Name of Operator
COG OPERATING LLCContact: MAYTE X REYES
E-Mail: mreyes1@concho.com9. API Well No.
30-015-46127-00-X13a. Address
600 W ILLINOIS AVENUE
MIDLAND, TX 797013b. Phone No. (include area code)
Ph: 575-748-694510. 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 2250FEL
32.208328 N Lat, 104.142738 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			
<input checked="" type="checkbox"/> Notice of Intent	<input type="checkbox"/> Acidize	<input type="checkbox"/> Deepen	<input type="checkbox"/> Production (Start/Resume)	<input type="checkbox"/> Water Shut-Off
<input type="checkbox"/> Subsequent Report	<input type="checkbox"/> Alter Casing	<input type="checkbox"/> Hydraulic Fracturing	<input type="checkbox"/> Reclamation	<input type="checkbox"/> Well Integrity
<input type="checkbox"/> Final Abandonment Notice	<input type="checkbox"/> Casing Repair	<input type="checkbox"/> New Construction	<input type="checkbox"/> Recomplete	<input checked="" type="checkbox"/> Other
	<input type="checkbox"/> Change Plans	<input type="checkbox"/> Plug and Abandon	<input type="checkbox"/> Temporarily Abandon	Change to Original APD
	<input type="checkbox"/> Convert to Injection	<input type="checkbox"/> Plug Back	<input type="checkbox"/> Water Disposal	

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 702H

To: Quien Sabe Federal Com 603H ✓

BHL

From: 200' FSL & 1650' FEL Section 25, T24S, R27E

To: 200' FSL & 1310' FEL Section 25, T24S, R27E ✓

C102 attached.

Carlsbad Field Office
Operator Copy

RECEIVED

AUG 01 2019

DISTRICT/ARTESIA/OCD

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

Electronic Submission #472006 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 (19PP2764SE)

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 **

KUR8-219

Additional data for EC transaction #472006 that would not fit on the form

32. Additional remarks, continued

Drilling changes
Drilling program attached.
AC attached.
Directional plan attached.

Revisions to Operator-Submitted EC Data for Sundry Notice #472006

	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 603H Sec 24 T24S R27E NWNE 695FNL 2250FEL	QUIEN SABE FEDERAL COM 702H Sec 24 T24S R27E NWNE 695FNL 2250FEL 32.208328 N Lat, 104.142738 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

DISTRICT IV
1220 S. ST. FRANCIS DR., SANTA FE, NM 87505
Phone: (505) 476-3480 Fax: (505) 476-3462

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

WELL LOCATION AND ACREAGE DEDICATION PLAT

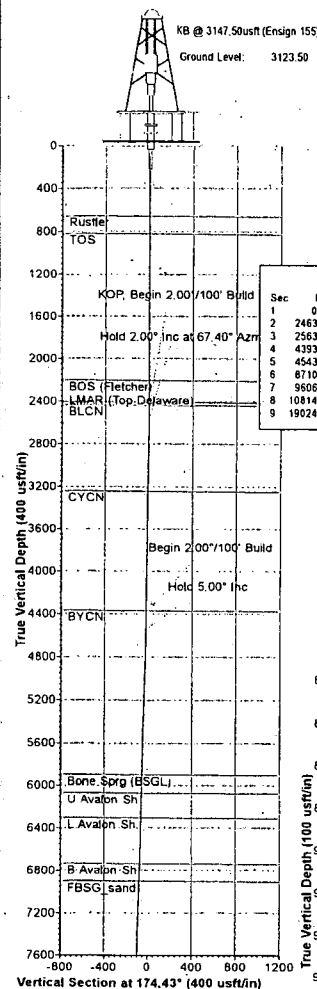
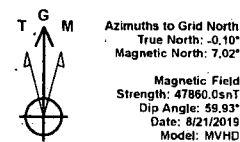
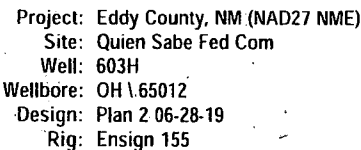
Surface Location

Bottom Hole Location If Different From Surface

NO ALLOWABLE WILL BE ASSIGNED TO THIS COMPLETION UNTIL ALL INTERESTS HAVE BEEN CONSOLIDATED
OR A NON-STANDARD UNIT HAS BEEN APPROVED BY THE DIVISION



Rev 8-1-19



WELL DETAILS				
		Ground Level:		
		Northing	Easting	Latitude Longitude
-N/S	+E/W			
0.00	0.00	439518.50	559102.60	32° 12' 29.526 N 104° 8' 32.070 W

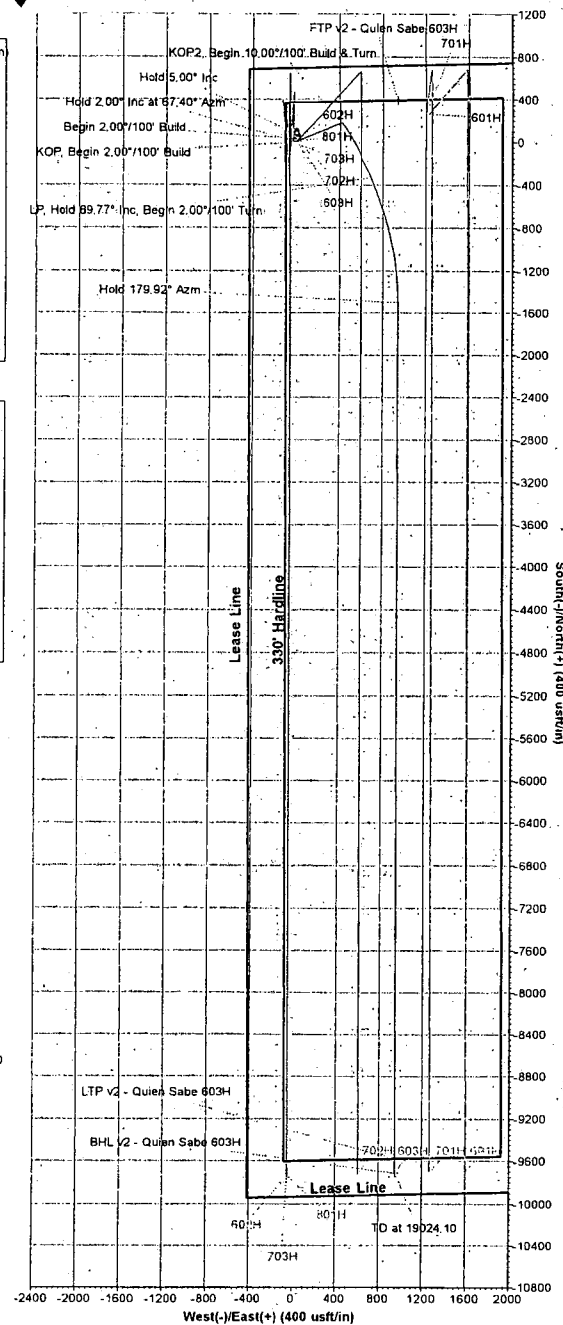
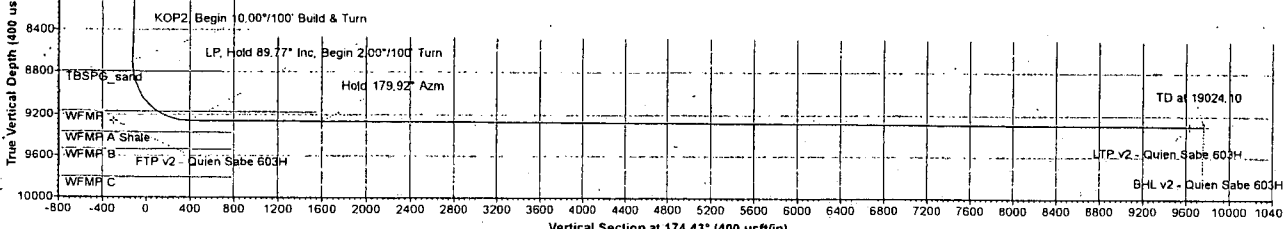
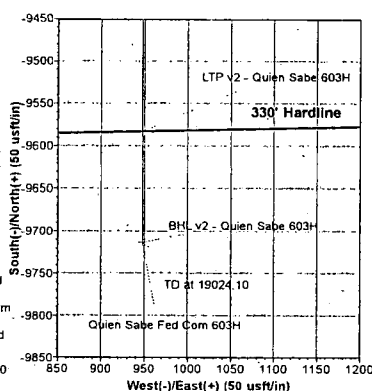
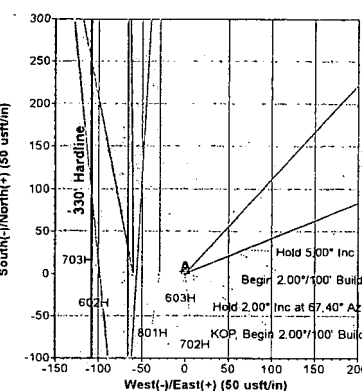
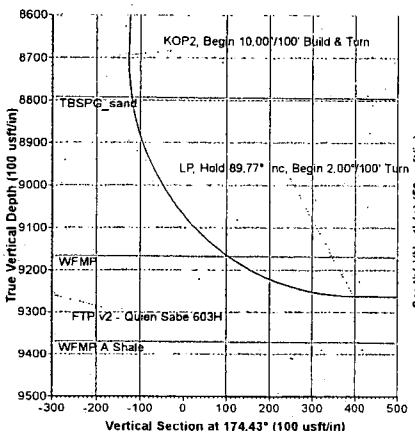
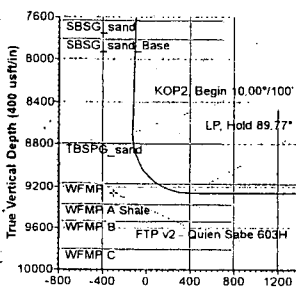
DESIGN TARGET DETAILS							
Name	TVD	+N+S	+E+W	Northing	Easting	Latitude	Longitude
FTP v2 - Quien Sabe 603H	9280.00	388.50	933.10	4398907.00	560035.70	32° 12' 33.2807 N	104° 8' 21.2081 W
LTP v2 - Quien Sabe 603H	9299.48	-9583.20	947.40	429935.30	560050.00	32° 10' 54.6968 N	104° 8' 21.2511 W
BHL v2 - Quien Sabe 603H	9300.00	-9713.30	947.60	429805.20	560050.20	32° 10' 53.4093 N	104° 8' 21.2515 W

SECTION DETAILS										
Sec	MD	Inc	Azi	TVD	+N/S	+E/W	Deg	IFace	VSEct	Target
1	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	
2	2463.00	0.00	0.00	2463.00	0.00	0.00	0.00	0.00	0.00	KOPF, Begin 2.00°/100' Build
3	2563.00	2.00	67.40	2552.98	0.67	1.61	2.00	67.40	-0.51	Hold 2.00° Inc at 67.40° Azim
4	4393.00	2.00	67.40	4391.86	25.21	60.57	0.00	0.00	-19.21	Begin 2.00°/100' Build
5	4543.00	5.00	67.40	4541.57	28.73	69.03	0.00	0.00	-21.89	Hold 5.00° Inc
6	8710.29	5.00	67.40	8693.00	166.31	404.34	0.00	0.00	-128.26	KOP2, Begin 10.00°/100' Build & Turn
7	9606.57	89.77	155.78	9292.37	-331.68	583.85	10.00	88.92	58.51	10° Hold 89.77° Inc, Begin 2.00°/100' Tu
8	10814.66	89.77	179.92	9267.27	-1503.93	936.42	2.00	90.05	158.74	Hold 179.92° Azim
9	19024.10	89.77	179.92	9300.79	-9713.30	947.60	0.00	0.00	9759.94	TO at 19024.10'
										BHL 2.0° - Queen Sabe 603H

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 603H, Grid North
Latitude: 32° 12' 29.5526 N
Longitude: 104° 8' 32.0770 W
Grid East: 559102.60
Grid North: 439518.50
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: 47859.96611345nT

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° East

FORMATION TOP DETAILS				
TVPDPath	MDPath	Formation	DipAngle	DipDir
657.50	657.50	Ruster	0.23	174.43
821.50	821.50	TOS	0.23	174.43
2207.50	2207.50	BGS (Fletcher)	0.23	174.43
2405.50	2405.50	LMAK (Top Delaware)	0.23	174.43
2440.50	2440.50	RLCN	0.23	174.43
3245.47	3245.91	CVCN	0.23	174.43
4370.42	4371.55	BYCN	0.23	174.43
5902.27	5908.90	Bone Sprg (BSGL)	0.23	174.43
6074.25	6081.54	U Avaton Sh	0.23	174.43
6309.23	6317.41	L Avaton Sh	0.23	174.43
6738.19	6748.01	B Avaton Sh *	0.23	174.43
6905.17	6915.63	FSB_sand	0.23	174.43
7346.09	7346.25	SB36.09	0.23	174.43
7812.08	7826.00	SB50_sand_Base	0.23	174.43
8794.01	8812.24	TB36P_sand	0.23	174.43
9167.91	9274.52	WFMP	0.23	174.43



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1. Geologic Formations

TVD of target	9,300' EOL	Pilot hole depth	NA
MD at TD:	19,024'	Deepest expected fresh water:	110'

Formation	Depth (TVD) from KB	Water/Mineral Bearing/Target Zone?	Hazards
Quaternary Fill	Surface	Water	
Rustler	657	Water	
Top of Salt	821	Salt	
Base of Salt	2207	Salt	
Lamar	2406	Salt Water	
Bell Canyon	2440	Salt Water	
Cherry Canyon	3245	Oil/Gas	
Brushy Canyon	4370	Oil/Gas	
Bone Spring Lime	5902	Oil/Gas	
U. Avalon Shale	6074	Oil/Gas	
L. Avalon Shale	6309	Oil/Gas	
1st Bone Spring Sand	6905	Oil/Gas	
2nd Bone Spring Sand	7636	Oil/Gas	
3rd Bone Spring Sand	8794	Oil/Gas	
Wolfcamp	9167	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	750	13.375"	54.5	J55	STC	3.37	9.40	12.57
12.25"	0	8570	9.625"	40	HCL80	BTC	1.39	1.22	2.76
8.5	0	19,024	5.5"	20	P110	BTC	1.84	2.47	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

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	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?	

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3. Cementing Program

Casing	# Sks	Wt. lb/ gal	Yld ft ³ / sack	H ₂ O gal/sk	500# Comp. Strength (hours)	Slurry Description
Surf.	260	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	920	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
	2880	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	8,070'	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.

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	6045 psi at 9300' 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	H ₂ S Plan.
x	BOP & Choke Schematics.
x	Directional Plan