NM OIL CONSERVATION
ARTESIA DISTRICT

AUG 17 2018

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Form 3160-3
(March 2012)

UNITED STATES
DEPARTMENT OF THE INTERIOR
BUREAU OF LAND MANAGEMENT

FORM APPROVED
OMB No. 1004-0137
Expires October 31, 2014

APPLICATION FOR PERMIT TO DRILL OR REENTER

5. Lease Serial No. NMNM112907	
6. If Indian, Allotee or Tribe Name	
7. If Unit or CA Agreement, Name and No.	316775
8. Lease Name and Well No. ROADRUNNER FEDERAL COM 23H	
9. API Well No. 30-015-45184	
10. Field and Pool, or Exploratory PURPLE SAGE / WOLFCAMP GAS	
11. Sec., T. R. M. or Blk. and Survey or Area SEC 36 / T25S / R26E / NMP	
12. County or Parish EDDY	13. State NM

1a. Type of work: ☑ DRILL ☐ REENTER

1b. Type of Well: ☑ Oil Well ☐ Gas Well ☐ Other ☑ Single Zone ☐ Multiple Zone

2. Name of Operator: COG OPERATING LLC 229137

3a. Address: 600 West Illinois Ave Midland TX 79701

3b. Phone No. *(include area code)*: (432)683-7443

4. Location of Well *(Report location clearly and in accordance with any State requirements.*)*

At surface: SESW / 210 FSL / 2180 FWL / LAT 32.0796 / LONG -104.248138

At proposed prod. zone: NENW / 200 FNL / 1980 FWL / LAT 32.107578 / LONG -104.248366

14. Distance in miles and direction from nearest town or post office*: 10 miles

15. Distance from proposed* location to nearest property or lease line, ft. (Also to nearest drig. unit line, if any)	16. No. of acres in lease	17. Spacing Unit dedicated to this well
200 feet	440	640
18. Distance from proposed location* to nearest well, drilling, completed, applied for, on this lease, ft.	**19. Proposed Depth**	**20. BLM/BIA Bond No. on file**
456 feet	8953 feet / 19130 feet	FED: NMB000215
21. Elevations (Show whether DF, KDB, RT, GL, etc.)	**22. Approximate date work will start***	**23. Estimated duration**
3351 feet	08/01/2018	30 days

24. Attachments

The following, completed in accordance with the requirements of Onshore Oil and Gas Order No.1, must be attached to this form:

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

25. Signature	Name *(Printed/Typed)*	Date
(Electronic Submission)	Mayte Reyes / Ph: (575)748-6945	04/19/2018
Title Regulatory Analyst		
Approved by *(Signature)* (Electronic Submission)	**Name *(Printed/Typed)*** Christopher Walls / Ph: (575)234-2234	**Date** 08/10/2018
Title Petroleum Engineer	**Office** CARLSBAD	

Application approval does not warrant or certify that the applicant holds legal or equitable title to those rights in the subject lease which would entitle the applicant to conduct operations thereon.
Conditions of approval, if any, are attached.

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

(Continued on page 2)

*(Instructions on page 2)

APPROVED WITH CONDITIONS

Approval Date: 08/10/2018

RWP 8-21-18

INSTRUCTIONS

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

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

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

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

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

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

NOTICES

The Privacy Act of 1974 and regulation in 43 CFR 2.48(d) provide that you be furnished the following information in connection with information required by this application.
AUTHORITY: 30 U.S.C. 181 et seq., 25 U.S.C. 396; 43 CFR 3160
PRINCIPAL PURPOSES: The information will be used to: (1) process and evaluate your application for a permit to drill a new oil, gas, or service well or to reenter a plugged and abandoned well; and (2) document, for administrative use, information for the management, disposal and use of National Resource Lands and resources including (a) analyzing your proposal to discover and extract the Federal or Indian resources encountered; (b) reviewing procedures and equipment and the projected impact on the land involved; and (c) evaluating the effects of the proposed operation on the surface and subsurface water and other environmental impacts.
ROUTINE USE: Information from the record and/or the record will be transferred to appropriate Federal, State, and local or foreign agencies, when relevant to civil, criminal or regulatory investigations or prosecution, in connection with congressional inquiries and for regulatory responsibilities.
EFFECT OF NOT PROVIDING INFORMATION: Filing of this application and disclosure of the information is mandatory only if you elect to initiate a drilling or reentry operation on an oil and gas lease.

The Paperwork Reduction Act of 1995 requires us to inform you that:
The BLM collects this information to allow evaluation of the technical, safety, and environmental factors involved with drilling for oil and/or gas on Federal and Indian oil and gas leases. This information will be used to analyze and approve applications. Response to this request is mandatory only if the operator elects to initiate drilling or reentry operations on an oil and gas lease. The BLM would like you to know that you do not have to respond to this or any other Federal agency-sponsored information collection unless it displays a currently valid OMB control number.

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

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Additional Operator Remarks

Location of Well

1. SHL: SESW / 210 FSL / 2180 FWL / TWSP: 25S / RANGE: 26E / SECTION: 36 / LAT: 32.0796 / LONG: -104.248138 (TVD: 0 feet, MD: 0 feet)
   PPP: SENW / 1320 FNL / 1980 FWL / TWSP: 25S / RANGE: 26E / SECTION: 25 / LAT: 32.104479 / LONG: -104.248412 (TVD: 8938 feet, MD: 17650 feet)
   PPP: SESW / 330 FSL / 1980 FWL / TWSP: 25S / RANGE: 26E / SECTION: 36 / LAT: 32.079928 / LONG: -104.248778 (TVD: 8920 feet, MD: 9100 feet)
   BHL: NENW / 200 FNL / 1980 FWL / TWSP: 25S / RANGE: 26E / SECTION: 25 / LAT: 32.107578 / LONG: -104.248366 (TVD: 8953 feet, MD: 19130 feet)

BLM Point of Contact

Name: Katrina Ponder
Title: Geologist
Phone: 5752345969
Email: kponder@blm.gov

Review and Appeal Rights

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

PECOS DISTRICT
DRILLING CONDITIONS OF APPROVAL

OPERATOR'S NAME:	COG Operating LLC
LEASE NO.:	NMNM112907
WELL NAME & NO.:	Roadrunner Federal Com 23H
SURFACE HOLE FOOTAGE:	210'/S & 2180'/W
BOTTOM HOLE FOOTAGE	200'/N & 1980'/W
LOCATION:	Section 36, T.25 S., R.26 E., NMPM
COUNTY:	Eddy County, New Mexico

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

A. Hydrogen Sulfide

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

B. CASING

1. The **13 3/8** inch surface casing shall be set at approximately **400** feet (a minimum of 25 feet into the Rustler Anhydrite and above the salt) and cemented to the surface.

    a. If cement does not circulate to the surface, the appropriate BLM office shall be notified and a temperature survey utilizing an electronic type temperature survey with surface log readout will be used or a cement bond log shall be run to verify the top of the cement. Temperature survey will be run a minimum of six hours after pumping cement and ideally between 8-10 hours after completing the cement job.

    b. Wait on cement (WOC) time for a primary cement job will be a minimum of **8 hours** or 500 pounds compressive strength, whichever is greater. (This is to include the lead cement)

    c. Wait on cement (WOC) time for a remedial job will be a minimum of 4 hours after bringing cement to surface or 500 pounds compressive strength, whichever is greater.

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

A MINIMUM OF TWO CASING STRINGS CEMENTED TO SURFACE IS REQUIRED IN HIGH CAVE/KARST AREAS. THE CEMENT MUST BE IN A SOLID SHEATH. THEREFORE, ONE INCH OPERATIONS ARE NOT SUFFICIENT TO PROTECT CAVE KARST RESOURCES. A CASING DESIGN THAT HAS A ONE INCH JOB PERFORMED DOES NOT COUNT AS A SOLID SHEATH.

- ❖ In **High Cave/Karst Areas** if cement does not circulate to surface on the first two casing strings, the cement on the 3rd casing string must come to surface.

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

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

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

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

C. PRESSURE CONTROL

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

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

3. Minimum working pressure of the blowout preventer (BOP) and related equipment (BOPE) required for drilling below the **9 5/8** inch intermediate casing shoe shall be **5000 (5M)** psi.

D. SPECIAL REQUIREMENT(S)

Communitization Agreement

- The operator will submit a Communitization Agreement to the Carlsbad Field Office, 620 E Greene St. Carlsbad, New Mexico 88220, at least 90 days before the anticipated date of first production from a well subject to a spacing order issued by the New Mexico Oil Conservation Division. The Communitization Agreement will include the signatures of all working interest owners in all Federal and Indian leases subject to the Communitization Agreement (i.e., operating rights owners and lessees

of record), or certification that the operator has obtained the written signatures of all such owners and will make those signatures available to the BLM immediately upon request.

- If the operator does not comply with this condition of approval, the BLM may take enforcement actions that include, but are not limited to, those specified in 43 CFR 3163.1.
- In addition, the well sign shall include the surface and bottom hole lease numbers. When the Communitization Agreement number is known, it shall also be on the sign.

Waste Minimization Plan (WMP)

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

MHH 08092018

GENERAL REQUIREMENTS

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

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

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

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

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

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

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

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

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

A. CASING

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

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

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

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

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

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

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

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

B. PRESSURE CONTROL

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

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

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

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

    a. Wellhead shall be installed by manufacturer's representatives, submit documentation with subsequent sundry.
    b. If the welding is performed by a third party, the manufacturer's representative shall monitor the temperature to verify that it does not exceed the maximum temperature of the seal.
    c. Manufacturer representative shall install the test plug for the initial BOP test.
    d. Operator shall perform the intermediate casing integrity test to 70% of the casing burst. This will test the multi-bowl seals.
    e. If the cement does not circulate and one inch operations would have been possible with a standard wellhead, the well head shall be cut off, cementing operations performed and another wellhead installed.

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

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

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

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

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

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

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

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

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

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

C. DRILLING MUD

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

D. WASTE MATERIAL AND FLUIDS

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

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

PECOS DISTRICT
SURFACE USE
CONDITIONS OF APPROVAL

OPERATOR'S NAME:	COG Operating LLC
LEASE NO.:	NMNM112907
WELL NAME & NO.:	Roadrunner Federal Com 23H
SURFACE HOLE FOOTAGE:	210'/S & 2180'/W
BOTTOM HOLE FOOTAGE	200'/N & 1980'/W
LOCATION:	Section 36, T.25 S., R.26 E., NMPM
COUNTY:	Eddy County, New Mexico

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

I. GENERAL PROVISIONS

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

II. PERMIT EXPIRATION

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

III. ARCHAEOLOGICAL, PALEONTOLOGY & HISTORICAL SITES

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

IV. NOXIOUS WEEDS

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

V. SPECIAL REQUIREMENT(S)

Cave/Karst Surface Mitigation

The following stipulations will be applied to minimize impacts during construction, drilling and production:

Construction:

In the advent that any underground voids are opened up during construction activities, construction activities will be halted and the BLM will be notified immediately.

No Blasting:

No blasting will be utilized for pad construction. The pad will be constructed and leveled by adding the necessary fill and caliche.

Pad Berming:

- The entire perimeter of the well pad will be bermed to prevent oil, salt, and other chemical contaminants from leaving the well pad.
- The compacted berm shall be constructed at a minimum of 12 inches high with impermeable mineral material (e.g., caliche).
- No water flow from the uphill side(s) of the pad shall be allowed to enter the well pad.
- The topsoil stockpile shall be located outside the bermed well pad.
- Topsoil, either from the well pad or surrounding area, shall not be used to construct the berm.
- No storm drains, tubing or openings shall be placed in the berm.
- If fluid collects within the bermed area, the fluid must be vacuumed into a safe container and disposed of properly at a state approved facility.
- The integrity of the berm shall be maintained around the surfaced pad throughout the life of the well and around the downsized pad after interim reclamation has been completed.
- Any access road entering the well pad shall be constructed so that the integrity of the berm height surrounding the well pad is not compromised. (Any access road crossing the berm cannot be lower than the berm height.)
- Following a rain event, all fluids will vacuumed off of the pad and hauled off-site and disposed at a proper disposal facility.

Tank Battery Liners and Berms:

Tank battery locations and all facilities will be lined and bermed. A 20 mil permanent liner will be installed with a 4 oz. felt backing, or equivalent, to prevent tears or punctures. Tank battery berms must be large enough to contain 1 ½ times the content of the largest tank.

Leak Detection System:

A method of detecting leaks is required. The method could incorporate gauges to measure loss, situating values and lines so they can be visually inspected, or installing electronic sensors to alarm when a leak is present. Leak detection plan will be submitted to BLM for approval.

Automatic Shut-off Systems:
Automatic shut off, check values, or similar systems will be installed for pipelines and tanks to minimize the effects of catastrophic line failures used in production or drilling.

Cave/Karst Subsurface Mitigation
The following stipulations will be applied to protect cave/karst and ground water concerns:
Rotary Drilling with Fresh Water:
Fresh water will be used as a circulating medium in zones where caves or karst features are expected. SEE ALSO: Drilling COAs for this well.

Directional Drilling:
Kick off for directional drilling will occur at least 100 feet below the bottom of the cave occurrence zone. SEE ALSO: Drilling COAs for this well.

Lost Circulation:
ALL lost circulation zones from the surface to the base of the cave occurrence zone will be logged and reported in the drilling report.
Regardless of the type of drilling machinery used, if a void of four feet or more and circulation losses greater than 70 percent occur simultaneously while drilling in any cave-bearing zone, the BLM will be notified immediately by the operator. The BLM will assess the situation and work with the operator on corrective actions to resolve the problem.

Abandonment Cementing:
Upon well abandonment in cave karst areas additional plugging conditions of approval may be required. The BLM will assess the situation and work with the operator to ensure proper plugging of the wellbore.

Pressure Testing:
The operator will perform annual pressure monitoring on all casing annuli and reported in a sundry notice. If the test results indicated a casing failure has occurred, remedial action will be undertaken to correct the problem to the BLM's approval.

ROADS

- Roads will be routed around sinkholes and other karst features to avoid or lessen the possibility of encountering near surface voids and to minimize changes to runoff or possible leaks and spills from entering karst systems.
- The BLM, Carlsbad Field Office, will be informed immediately if any subsurface drainage channels, cave passages, or voids are penetrated during construction and no further construction will be done until clearance has been issued by the Authorized Officer.
- Turnout ditches and drainage leadoffs will not be constructed in such a manner as to increase or decrease the natural flow of water into or out of cave or karst features.

- Special restoration stipulations or realignment may be required.
- All spills or leaks will be reported to the BLM immediately for their immediate and proper treatment.

FLOWLINES (SURFACE):

- Flowlines will be routed around sinkholes and other karst features to avoid or lessen the possibility of encountering near surface voids and to minimize the possibility of leaks and spills from entering karst systems.
- If a void is encountered alignments may be rerouted to avoid the karst feature and lessen; the potential of subsidence or collapse of karst features, buildup of toxic or combustible gas, or other possible impacts to cave and karst resources from the buried pipeline.
- Regular monitoring is required to quickly identify leaks for their immediate and proper treatment.
- All spills or leaks will be reported to the BLM immediately for their immediate and proper treatment.

POWERLINES:

- Smaller powerlines will be routed around sinkholes and other karst features to avoid or lessen the possibility of encountering near surface voids and to minimize changes to runoff or possible leaks and spills from entering karst systems. Larger powerlines will adjust their pole spacing to avoid cave and karst features.
- The BLM, Carlsbad Field Office, will be informed immediately if any subsurface drainage channels, cave passages, or voids are penetrated during construction.
- No further construction will be done until clearance has been issued by the Authorized Officer.
- Special restoration stipulations or realignment may be required.

Hydrology

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

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

A leak detection plan will be submitted to the BLM Carlsbad Field Office for approval prior to pipeline installation. The method could incorporate gauges to detect pressure drops, situating values and lines so they can be visually inspected periodically or installing electronic sensors to alarm when a leak is present. The leak detection plan will incorporate an automatic shut off system that will be installed for proposed pipelines to minimize the effects of an undesirable event.

Range

The proponent shall not damage the allotment fence during construction of this well. If fence is damaged during construction all activities must cease till the blm has been notified and the fence has been repaied to the condition it was in or better.

VI. CONSTRUCTION

A. NOTIFICATION

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

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

B. TOPSOIL

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

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

C. CLOSED LOOP SYSTEM

Tanks are required for drilling operations: No Pits.

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

D. FEDERAL MINERAL MATERIALS PIT

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

E. WELL PAD SURFACING

Surfacing of the well pad is not required.

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

F. EXCLOSURE FENCING (CELLARS & PITS)

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

G. ON LEASE ACCESS ROADS

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

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

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

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

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

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

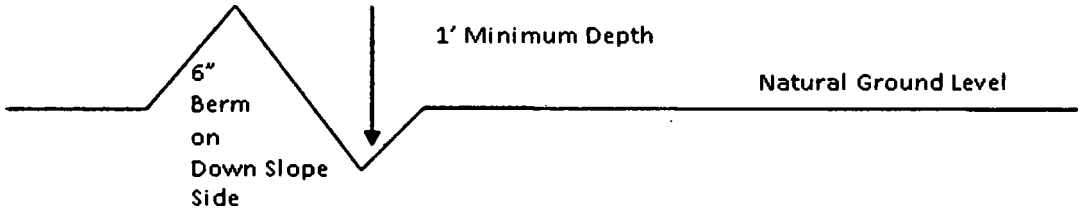
Turnouts
Vehicle turnouts shall be constructed on the road. Turnouts shall be intervisible with interval spacing distance less than 1000 feet. Turnouts shall conform to Figure 1; cross section and plans for typical road construction.

Drainage

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

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

Cross Section of a Typical Lead-off Ditch



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

Formula for Spacing Interval of Lead-off Ditches

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

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

Cattle guards

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

Fence Requirement

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

Public Access

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

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

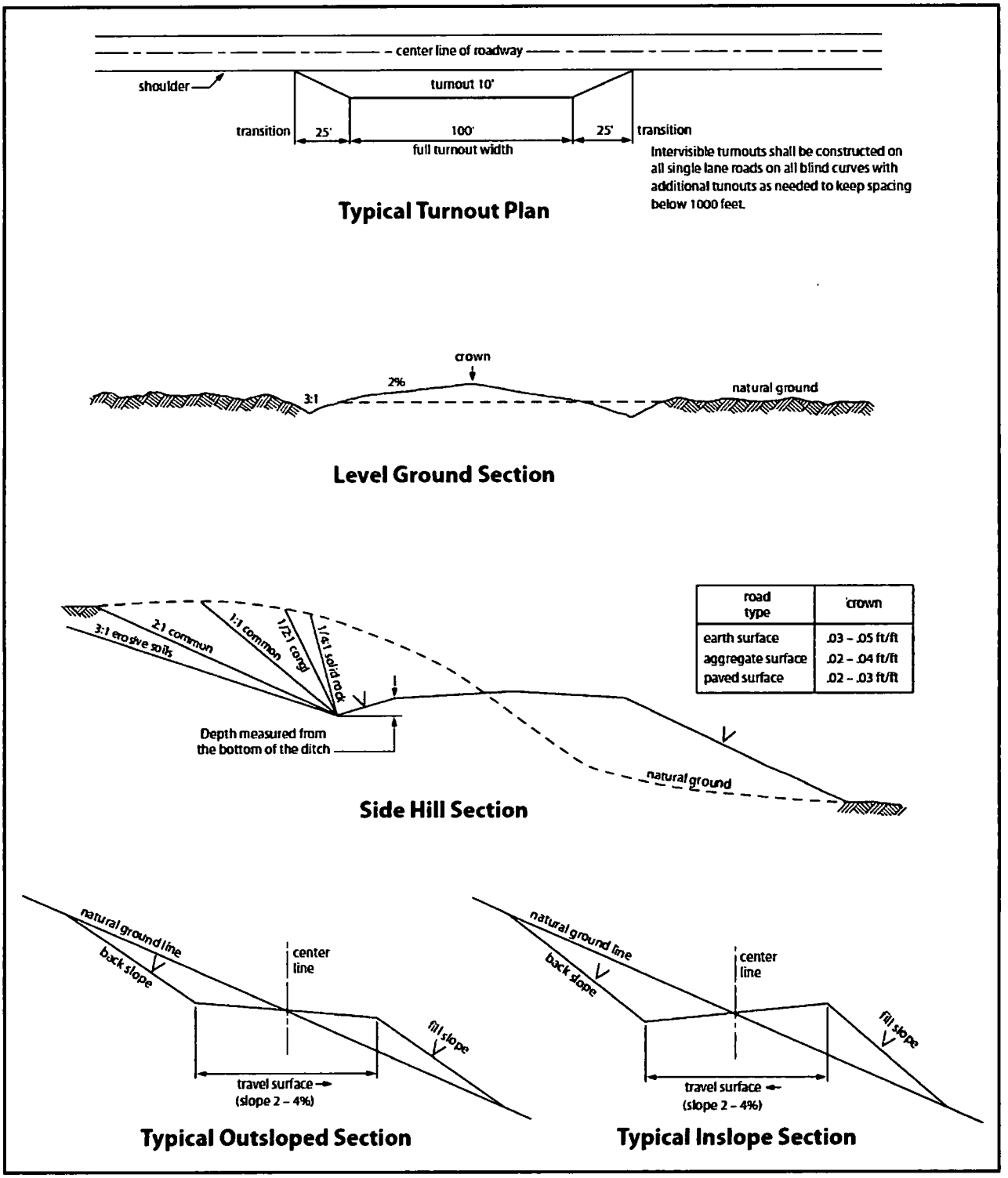


Figure 1. Cross-sections and plans for typical road sections representative of BLM resource or FS local and higher-class roads.

VII. PRODUCTION (POST DRILLING)

A. WELL STRUCTURES & FACILITIES

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

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

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

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

Containment Structures

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

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

VIII. INTERIM RECLAMATION

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

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

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

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

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

IX. FINAL ABANDONMENT & RECLAMATION

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

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

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

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

Seed Mixture 1 for Loamy Sites

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

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

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

Species	lb/acre
Plains lovegrass (Eragrostis intermedia)	0.5
Sand dropseed (Sporobolus cryptandrus)	1.0
Sideoats grama (Bouteloua curtipendula)	5.0
Plains bristlegrass (Setaria macrostachya)	2.0

*Pounds of pure live seed:

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

AFMSS

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

Operator Certification Data Report

08/13/2018

Operator Certification

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

NAME: Mayte Reyes **Signed on:** 04/03/2018

Title: Regulatory Analyst

Street Address: 2208 W Main Street

City: Artesia **State:** NM **Zip:** 88210

Phone: (575)748-6945

Email address: Mreyes1@concho.com

Field Representative

Representative Name: Rand French

Street Address: 2208 West Main Street

City: Artesia **State:** NM **Zip:** 88210

Phone: (575)748-6940

Email address: rfrench@concho.com

APD ID: 10400029025
Submission Date: 04/19/2018
Operator Name: COG OPERATING LLC
Well Name: ROADRUNNER FEDERAL COM
Well Number: 23H
Well Type: OIL WELL
Well Work Type: Drill

Highlighted data reflects the most recent changes

Show Final Text

Section 1 - General

APD ID: 10400029025
Tie to previous NOS?
Submission Date: 04/19/2018
BLM Office: CARLSBAD
User: Mayte Reyes
Title: Regulatory Analyst
Federal/Indian APD: FED
Is the first lease penetrated for production Federal or Indian? FED
Lease number: NMNM112907
Lease Acres: 440
Surface access agreement in place?
Allotted?
Reservation:
Agreement in place? NO
Federal or Indian agreement:
Agreement number:
Agreement name:
Keep application confidential? YES
Permitting Agent? NO
APD Operator: COG OPERATING LLC
Operator letter of designation:

Operator Info

Operator Organization Name: COG OPERATING LLC
Operator Address: 600 West Illinois Ave
Zip: 79701
Operator PO Box:
Operator City: Midland
State: TX
Operator Phone: (432)683-7443
Operator Internet Address: RODOM@CONCHO.COM

Section 2 - Well Information

Well in Master Development Plan? NO
Mater Development Plan name:
Well in Master SUPO? NO
Master SUPO name:
Well in Master Drilling Plan? NO
Master Drilling Plan name:
Well Name: ROADRUNNER FEDERAL COM
Well Number: 23H
Well API Number:
Field/Pool or Exploratory? Field and Pool
Field Name: PURPLE SAGE
Pool Name: WOLFCAMP GAS
Is the proposed well in an area containing other mineral resources? USEABLE WATER,OIL

Operator Name: COG OPERATING LLC

Well Name: ROADRUNNER FEDERAL COM **Well Number:** 23H

Describe other minerals:

Is the proposed well in a Helium production area? N **Use Existing Well Pad?** NO **New surface disturbance?**

Type of Well Pad: SINGLE WELL **Multiple Well Pad Name:** **Number:**

Well Class: HORIZONTAL **Number of Legs:**

Well Work Type: Drill

Well Type: OIL WELL

Describe Well Type:

Well sub-Type: EXPLORATORY (WILDCAT)

Describe sub-type:

Distance to town: 10 Miles **Distance to nearest well:** 456 FT **Distance to lease line:** 200 FT

Reservoir well spacing assigned acres Measurement: 640 Acres

Well plat: COG_Roadrunner_23H_C102_20180419110042.pdf

Well work start Date: 08/01/2018 **Duration:** 30 DAYS

Section 3 - Well Location Table

Survey Type: RECTANGULAR

Describe Survey Type:

Datum: NAD83 **Vertical Datum:** NAVD88

Survey number:

	NS-Foot	NS Indicator	EW-Foot	EW Indicator	Twsp	Range	Section	Aliquot/Lot/Tract	Latitude	Longitude	County	State	Meridian	Lease Type	Lease Number	Elevation	MD	TVD
SHL Leg #1	210	FSL	2180	FWL	25S	26E	36	Aliquot SESW	32.0796	-104.248138	EDDY	NEW MEXICO	NEW MEXICO	S	STATE	3351	0	0
KOP Leg #1	210	FSL	2180	FWL	25S	26E	36	Aliquot SESW	32.0796	-104.248138	EDDY	NEW MEXICO	NEW MEXICO	S	STATE	3351	0	0
PPP Leg #1	330	FSL	1980	FWL	25S	26E	36	Aliquot SESW	32.079928	-104.248778	EDDY	NEW MEXICO	NEW MEXICO	S	STATE	-5569	9100	8920

Operator Name: COG OPERATING LLC

Well Name: ROADRUNNER FEDERAL COM **Well Number:** 23H

	NS-Foot	NS Indicator	EW-Foot	EW Indicator	Twsp	Range	Section	Aliquot/Lot/Tract	Latitude	Longitude	County	State	Meridian	Lease Type	Lease Number	Elevation	MD	TVD
PPP Leg #1	1320	FNL	1980	FWL	25S	26E	25	Aliquot SENW	32.104479	-104.248412	EDDY	NEW MEXICO	NEW MEXICO	F	FEE	-5587	17650	8938
EXIT Leg #1	330	FNL	1980	FWL	25S	26E	25	Aliquot NENW	32.107221	-104.248371	EDDY	NEW MEXICO	NEW MEXICO	F	NMNM 112907	-5586	18650	8937
BHL Leg #1	200	FNL	1980	FWL	25S	26E	25	Aliquot NENW	32.107578	-104.248366	EDDY	NEW MEXICO	NEW MEXICO	F	NMNM 112907	-5602	19130	8953

Operator Name: COG OPERATING LLC

Well Name: ROADRUNNER FEDERAL COM **Well Number:** 23H

[redacted] **Rating Depth:** 8410

Equipment: Annular. Accessories to the BOP equipment will include a Kelly cock and floor safety valve (inside BOP) and choke lines and choke manifold.
Requesting Variance? YES

Variance request: A variance is requested for the use of a flexible choke line from the BOP to the choke manifold. See attached for specs and hydrostatic test chart.
Testing Procedure: 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.

Choke Diagram Attachment:

COG_Roadrunner_23H_3M_Choke_20180723152041.pdf

BOP Diagram Attachment:

COG_Roadrunner_23H_3M_BOP_20180723152049.pdf

COG_Roadrunner_23H_Flex_Hose_20180723152059.pdf

[redacted] **Rating Depth:** 8953

Equipment: Annular, Blind Ram, Pipe Ram. Other accessories to the BOP equipment will include a Kelly cock and floor safety valve (inside BOP) and choke lines and choke manifold
Requesting Variance? YES

Variance request: A variance is requested for the use of a flexible choke line from the BOP to the choke manifold. See attached for specs and hydrostatic test chart.
Testing Procedure: 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.

Choke Diagram Attachment:

COG_Roadrunner_23H_5M_Choke_20180419103059.pdf

BOP Diagram Attachment:

COG_Roadrunner_23H_5M_BOP_20180419103106.pdf

COG_Roadrunner_23H_Flex_Hose_20180723152125.pdf

Operator Name: COG OPERATING LLC

Well Name: ROADRUNNER FEDERAL COM **Well Number:** 23H

Section 3 - Casing

Casing ID	String Type	Hole Size	Csg Size	Condition	Standard	Tapered String	Top Set MD	Bottom Set MD	Top Set TVD	Bottom Set TVD	Top Set MSL	Bottom Set MSL	Calculated casing length MD	Grade	Weight	Joint Type	Collapse SF	Burst SF	Joint SF Type	Joint SF	Body SF Type	Body SF
1	SURFACE	17.5	13.375	NEW	API	N	0	400	0	400	-6999	-7974	400	J-55	68	STC	10.65	1.11	DRY	24.82	DRY	24.82
2	INTERMEDIATE	12.25	9.625	NEW	API	N	0	8410	0	8410	-6999	-18749	8410	L-80	47	OTHER - BTC	1.8	1.72	DRY	2.75	DRY	2.75
3	PRODUCTION	8.5	5.5	NEW	API	N	0	19130	0	19130	-6999	-24211	19130	P-110	20	OTHER - btc	2.97	3.17	DRY	4.07	DRY	4.07

Casing Attachments

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

Inspection Document:

Spec Document:

Tapered String Spec:

Casing Design Assumptions and Worksheet(s):

COG_Roadrunner_23H_Casing_Rpt_20180419103217.pdf

Operator Name: COG OPERATING LLC

Well Name: ROADRUNNER FEDERAL COM **Well Number:** 23H

Casing Attachments

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

Inspection Document:

Spec Document:

Tapered String Spec:

Casing Design Assumptions and Worksheet(s):

COG_Roadrunner_23H_Casing_Rpt_20180419103209.pdf

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

Inspection Document:

Spec Document:

Tapered String Spec:

Casing Design Assumptions and Worksheet(s):

COG_Roadrunner_23H_Casing_Rpt_20180419103203.pdf

Section 4 - Cement

String Type	Lead/Tail	Stage Tool Depth	Top MD	Bottom MD	Quantity(sx)	Yield	Density	Cu Ft	Excess%	Cement type	Additives
SURFACE	Lead		0	400	50	1.75	13.5	87	50	Class C	4% Gel + 1% CaCl2
SURFACE	Tail		0	400	250	1.34	14.8	335	50	Class C	2% CaCl2
INTERMEDIATE	Lead		0	8410	1790	2	12.7	3580	50	Lead: 35:65:6 C Blend	As needed
INTERMEDIATE	Tail		0	8410	250	1.34	14.8	335	50	Tail: Class C	2% CaCl
PRODUCTION	Lead		0	19130	120	2.5	14.4	300	30	50:50:10 H Blend	As needed

Operator Name: COG OPERATING LLC

Well Name: ROADRUNNER FEDERAL COM **Well Number:** 23H

String Type	Lead/Tail	Stage Tool Depth	Top MD	Bottom MD	Quantity(sx)	Yield	Density	Cu Ft	Excess%	Cement type	Additives
PRODUCTION	Tail		0	19130	2830	1.24	14.4	3509	30	50:50:2 Class H Blend	As needed

Section 5 - Circulating Medium

Mud System Type: Closed

Will an air or gas system be Used? NO

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

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

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

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

Circulating Medium Table

Top Depth	Bottom Depth	Mud Type	Min Weight (lbs/gal)	Max Weight (lbs/gal)	Density (lbs/cu ft)	Gel Strength (lbs/100 sqft)	PH	Viscosity (CP)	Salinity (ppm)	Filtration (cc)	Additional Characteristics
400	8410	OTHER : Brine Diesel Emulsion	8.4	9							Brine Diesel Emulsion
0	400	OTHER : FW Gel	8.6	8.8							FW Gel
8410	19130	OIL-BASED MUD	9.6	10.5							OBM

Section 6 - Test, Logging, Coring

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

None planned

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

CNL,GR

Coring operation description for the well:

None planned

Section 7 - Pressure

Anticipated Bottom Hole Pressure: 4890 **Anticipated Surface Pressure:** 3207

Anticipated Bottom Hole Temperature(F): 150

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

Describe:

Contingency Plans geoharzards description:

Contingency Plans geohazards attachment:

Hydrogen Sulfide drilling operations plan required? YES

Hydrogen sulfide drilling operations plan:

COG_Roadrunner_23H_H2S_Schem_20180419104019.pdf
COG_Roadrunner_23H_H2S_SUP_20180419104026.pdf

Section 8 - Other Information

Proposed horizontal/directional/multi-lateral plan submission:

COG_Roadrunner_23H_AC_20180419104052.pdf
COG_Roadrunner_23H_Direct_Rpt_20180419104100.pdf

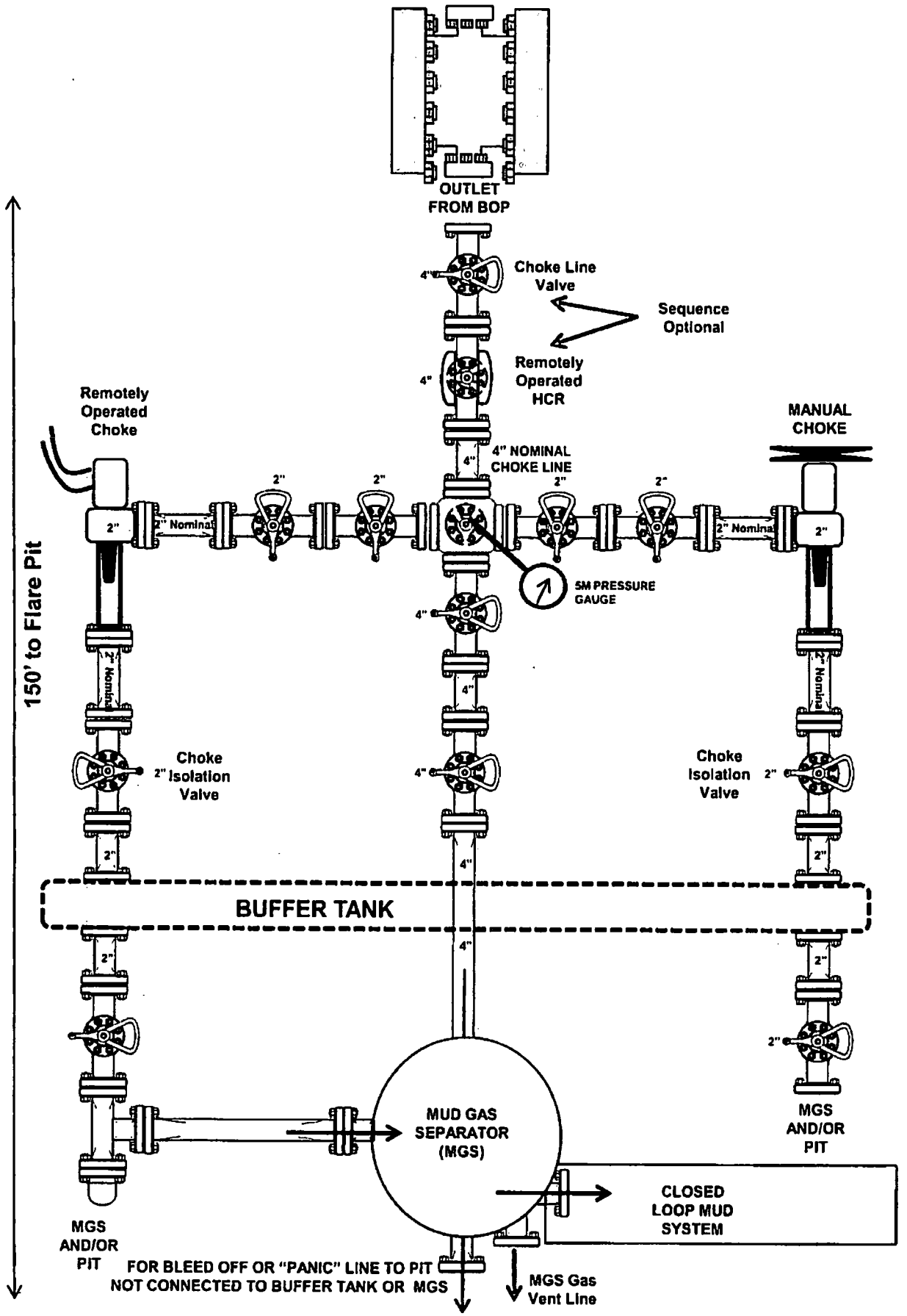
Other proposed operations facets description:

Other proposed operations facets attachment:

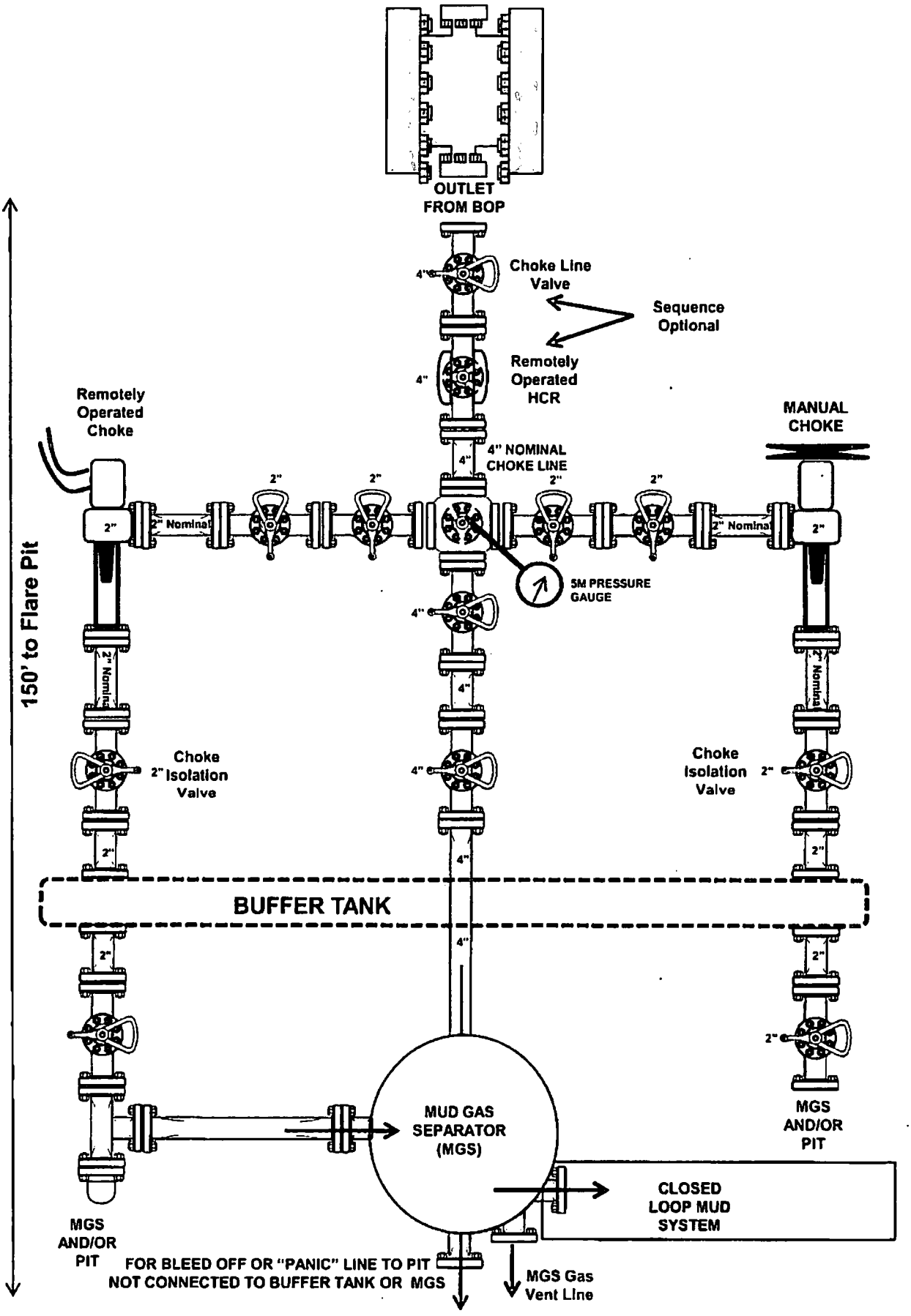
COG_Roadrunner__23H_GCP_20180419104133.pdf
COG_Roadrunner_23H_Drill_Rpt_20180723152223.pdf

Other Variance attachment:

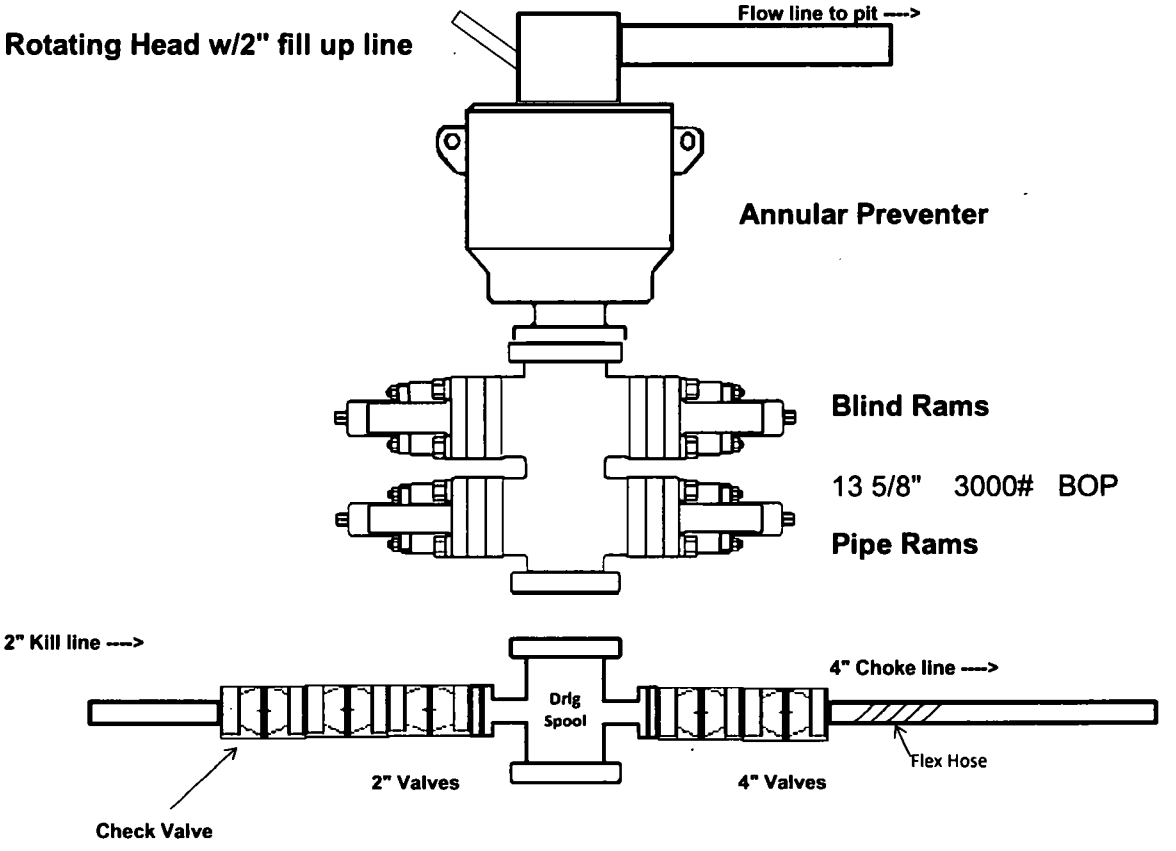
3M Choke Manifold Equipment (WITH MGS + CLOSED LOOP)

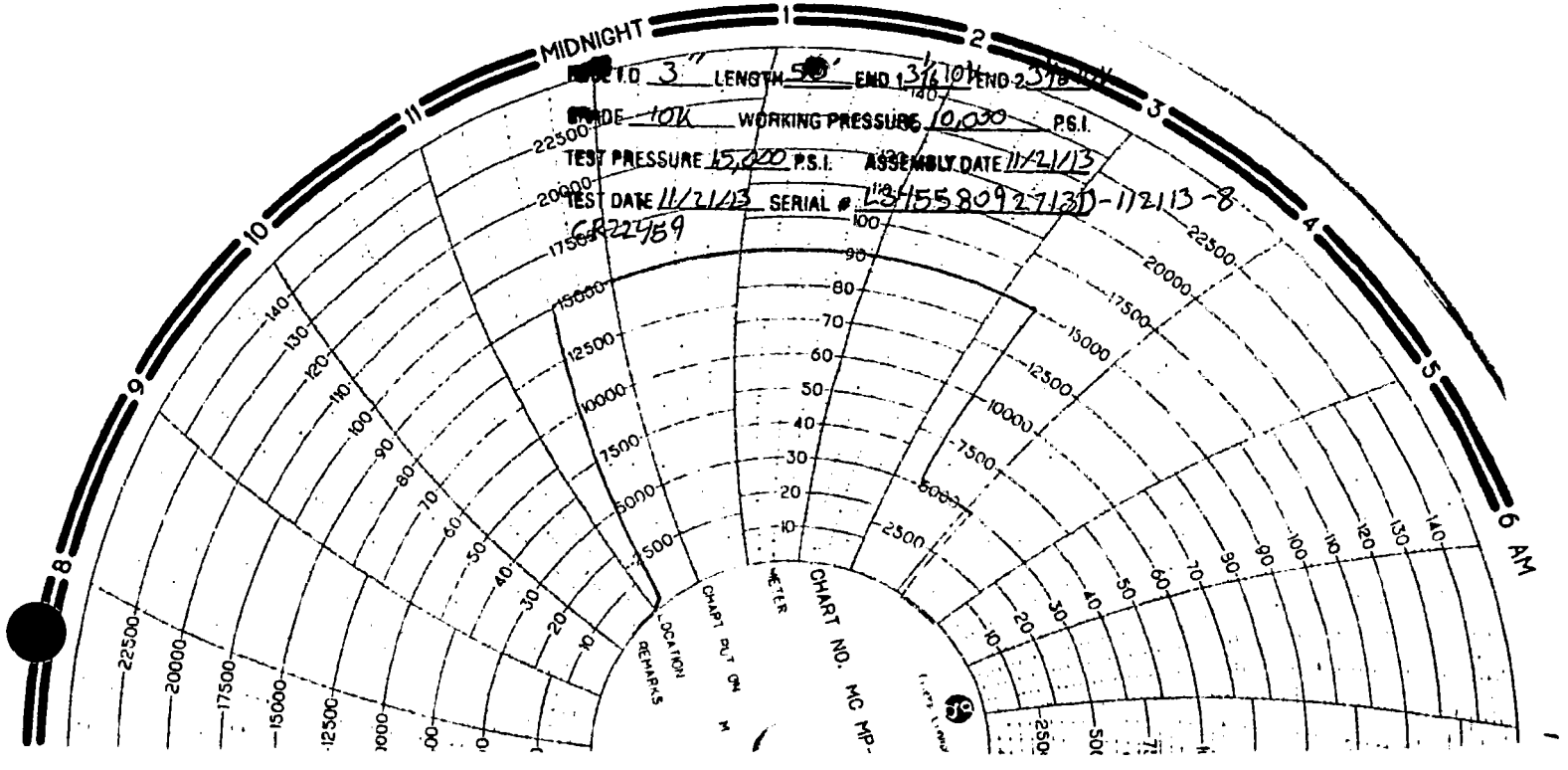


5M Choke Manifold Equipment (WITH MGS + CLOSED LOOP)



3,000 psi BOP Schematic




MIDNIGHT
1
2
3
4
5
6 AM
7
8
9
10
11
I.D 3"
LENGTH 50'
END 1 3 1/16 10K
END 2 3 1/16 10K
GRADE 10K
WORKING PRESSURE 10,000 P.S.I.
TEST PRESSURE 15,000 P.S.I.
ASSEMBLY DATE 11/21/13
TEST DATE 11/21/13
SERIAL # L3455809271310-112113-8
GR22759
CHART NO. MC MP-
METER
CHART PUT ON
LOCATION
REMARKS

GATES E & S NORTH AMERICA, INC
DU-TEX
134 44TH STREET
CORPUS CHRISTI, TEXAS 78405

PHONE: 361-887-9807
FAX: 361-887-0812
EMAIL: crpe&s@gates.com
WEB: www.gates.com

10K CHOKE & KILL ASSEMBLY PRESSURE TEST CERTIFICATE

Customer :	SPECIALTY SALES, INC.	Test Date:	11/21/2013
Customer Ref. :	49680-S	Hose Serial No.:	D-112113-8
Invoice No. :	197465	Created By:	Norma M.

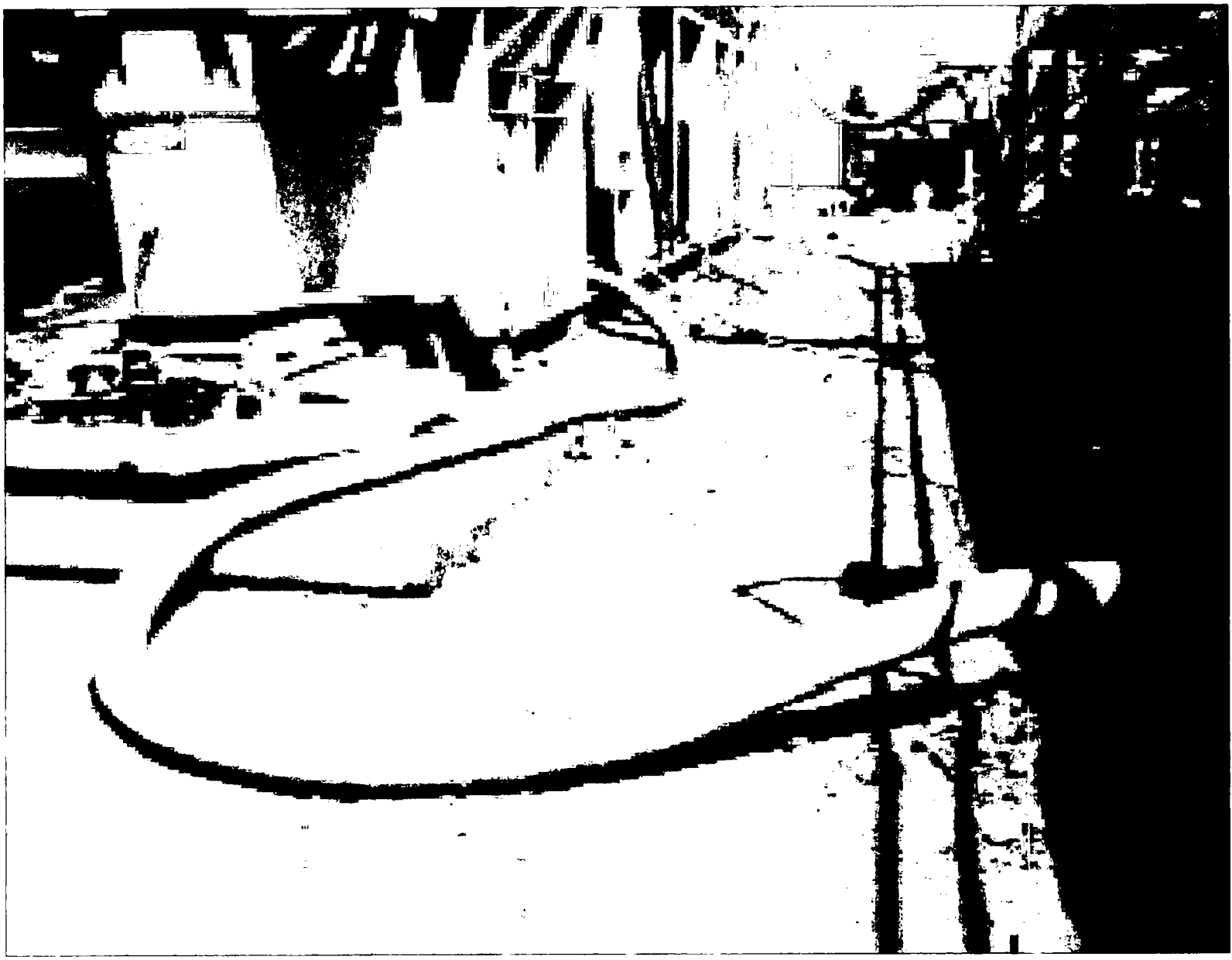
Product Description:	10K3.050.0CK31/1610KFLGE/E

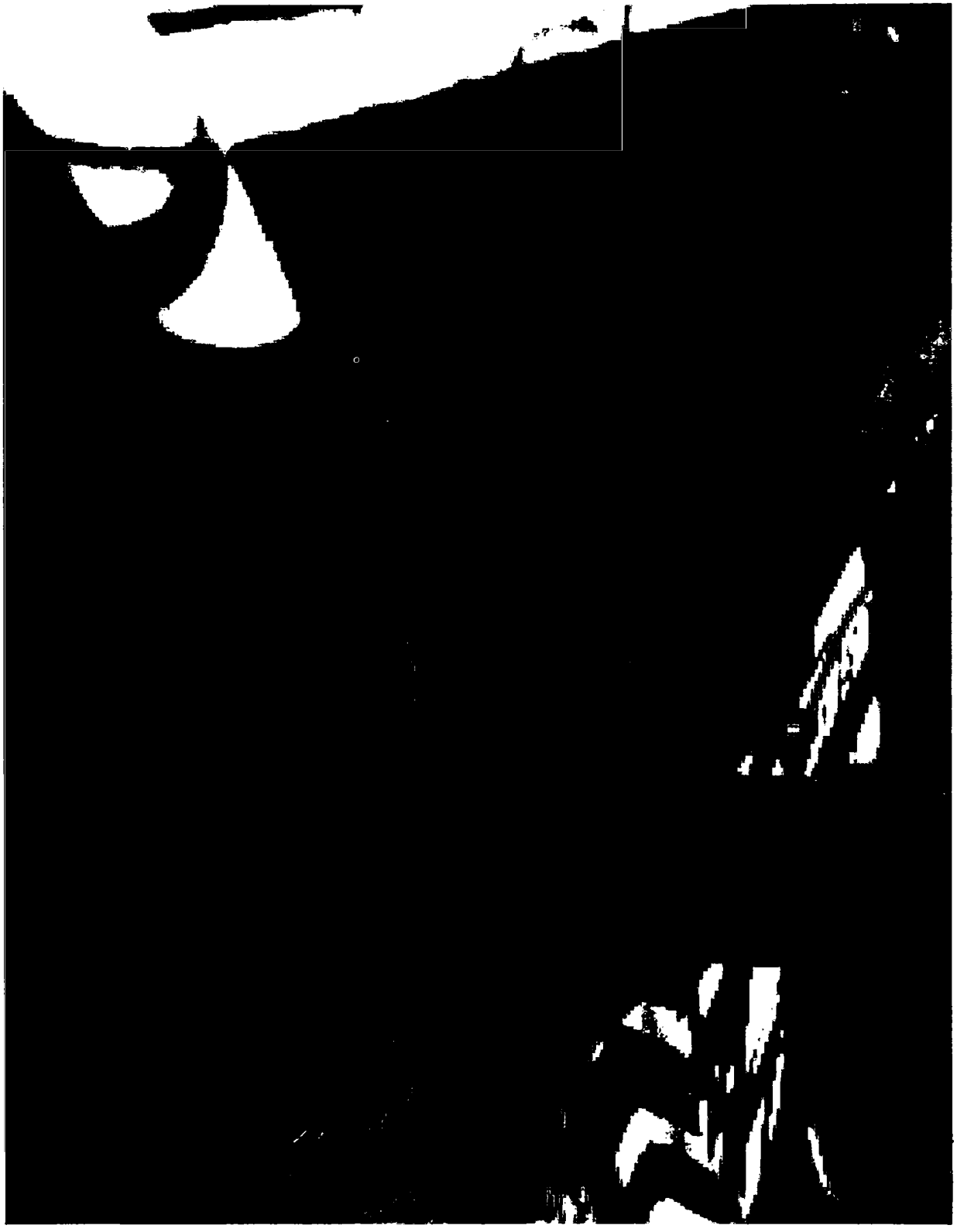
End Fitting 1 :	3 1/16 10K FLG	End Fitting 2 :	3 1/16 10K FLG
Gates Part No. :	47773-4290	Assembly Code :	L34558092713D-112113-8
Working Pressure :	10,000 PSI	Test Pressure :	15,000 PSI

Gates E & S North America, Inc. certifies that the following hose assembly has been tested to the Gates Oilfield Roughneck Agreement/Specification requirements and passed the 15 minute hydrostatic test per API Spec 7K/Q1, Fifth Edition, June 2010, Test pressure 9.6.7 and per Table 9 to 15,000 psi in accordance with this product number. Hose burst pressure 9.6.7.2 exceeds the minimum of 2.5 times the working pressure per Table 9.

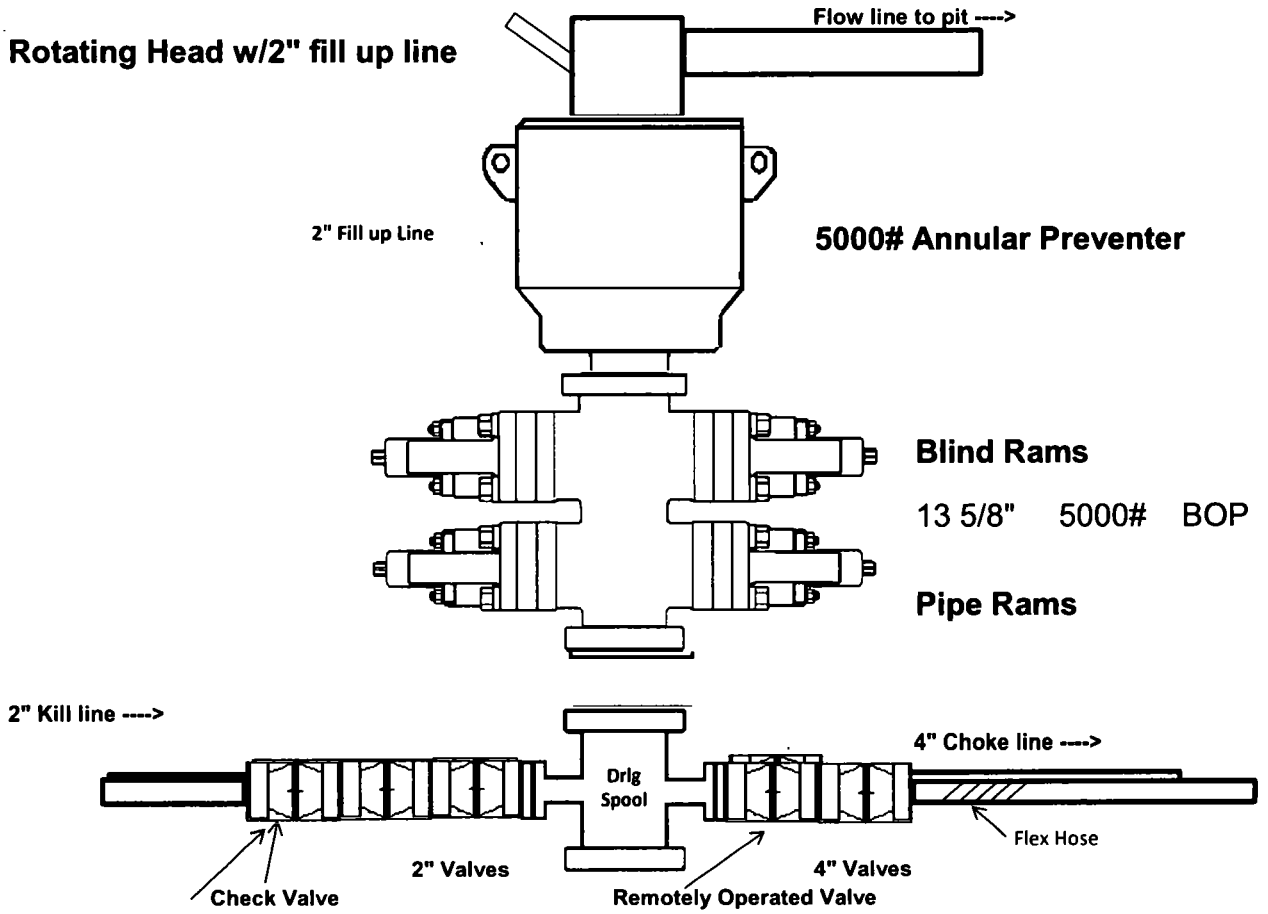
Quality Manager :	QUALITY	Technical Supervisor :	PRODUCTION
Date :	11/22/2013	Date :	11/22/2013
Signature :		Signature :	

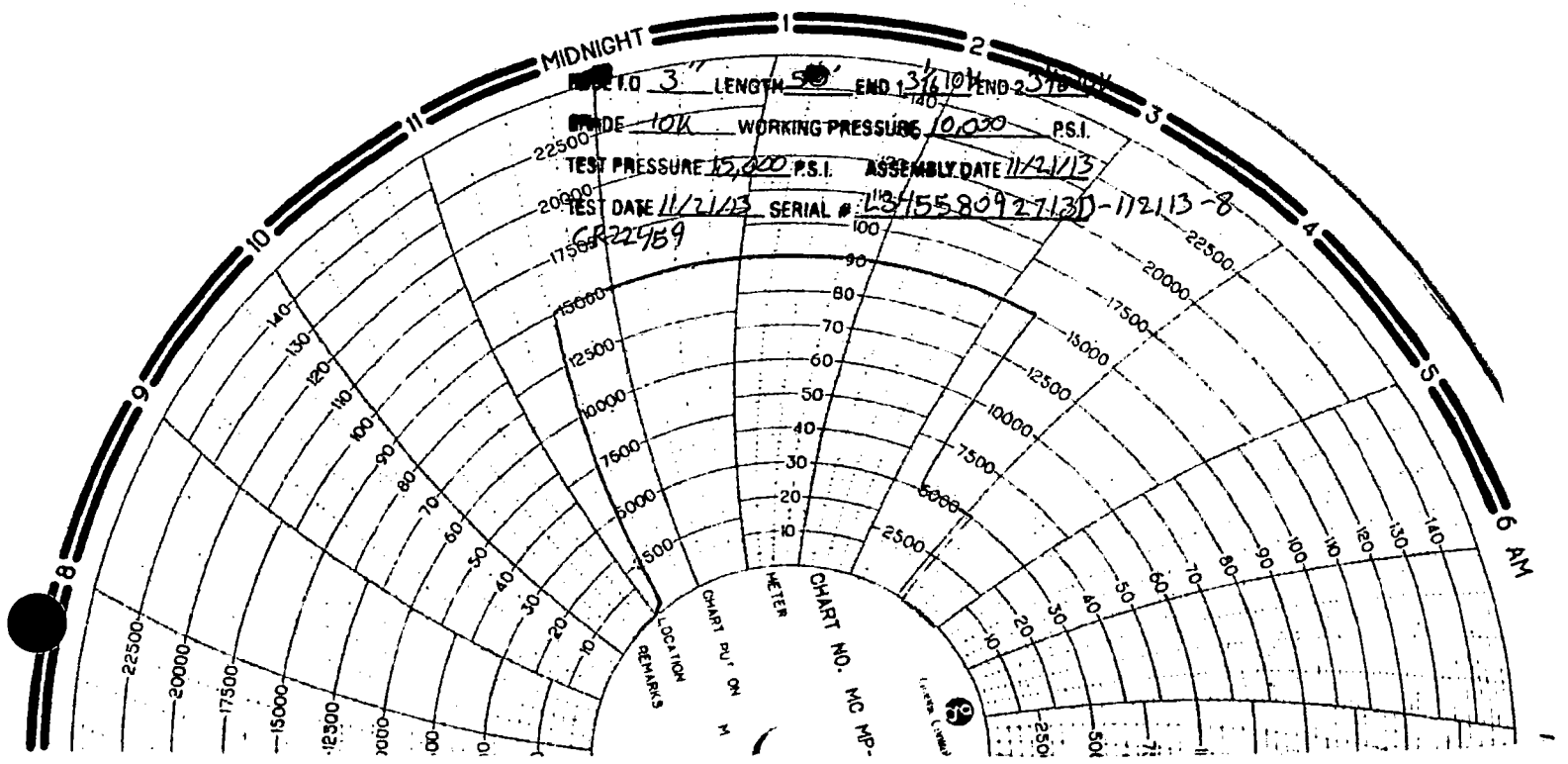
Form PTC - 01 Rev.0 2





5,000 psi BOP Schematic




MIDNIGHT
6 AM
I.D. 3"
LENGTH 50'
END 1 3/4 10K
END 2 3/4 10K
GRADE 10K
WORKING PRESSURE 10,000 P.S.I.
TEST PRESSURE 15,000 P.S.I.
ASSEMBLY DATE 11/21/13
TEST DATE 11/21/13
SERIAL # L3/15580927130-112113-8
CR22759
CHART NO. MC MP-
METER
CHART PUT ON
REMARKS
LOCATION

GATES E & S NORTH AMERICA, INC
DU-TEX
134 44TH STREET
CORPUS CHRISTI, TEXAS 78405

PHONE: 361-887-9807
FAX: 361-887-0812
EMAIL: crpe&s@gates.com
WEB: www.gates.com

10K CHOKE & KILL ASSEMBLY PRESSURE TEST CERTIFICATE

Customer :	SPECIALTY SALES, INC.	Test Date:	11/21/2013
Customer Ref. :	49680-S	Hose Serial No.:	D-112113-8
Invoice No. :	197465	Created By:	Norma M.

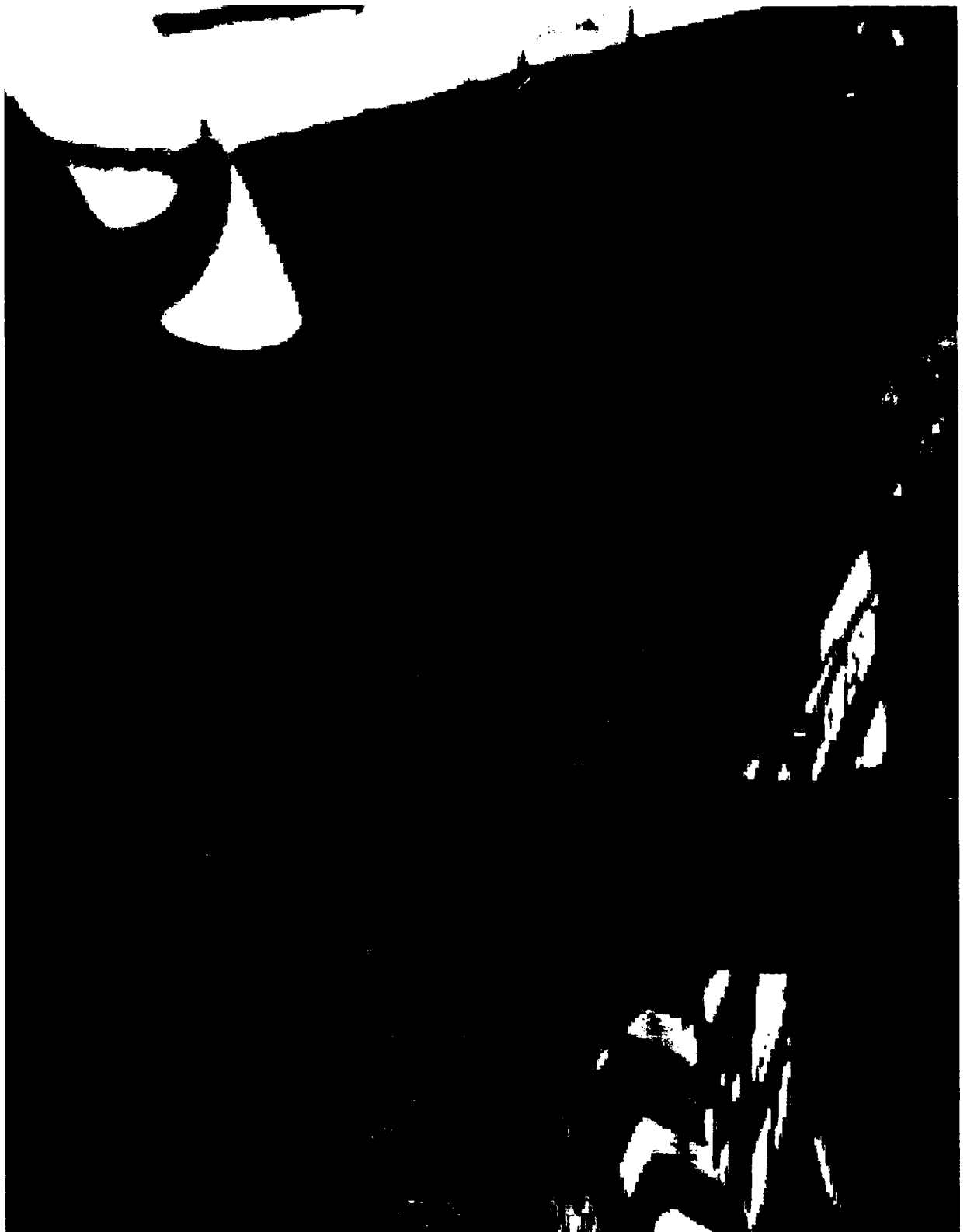
Product Description:	10K3.050.0CK31/1610KFLGE/E

End Fitting 1 :	3 1/16 10K FLG	End Fitting 2 :	3 1/16 10K FLG
Gates Part No. :	47773-4290	Assembly Code :	L34558092713D-112113-8
Working Pressure :	10,000 PSI	Test Pressure :	15,000 PSI

Gates E & S North America, Inc. certifies that the following hose assembly has been tested to the Gates Oilfield Roughneck Agreement/Specification requirements and passed the 15 minute hydrostatic test per API Spec 7K/Q1, Fifth Edition, June 2010, Test pressure 9.6.7 and per Table 9 to 15,000 psi in accordance with this product number. Hose burst pressure 9.6.7.2 exceeds the minimum of 2.5 times the working pressure per Table 9.

Quality Manager :	QUALITY	Technical Supervisor :	PRODUCTION
Date :	11/22/2013	Date :	11/22/2013
Signature :		Signature :	

Form PTC - 01 Rev.0 2



Casing Program

Hole Size	Casing Interval		Csg. Size	Weight (lbs)	Grade	Conn.	SF Collapse	SF Burst	SF Body
	From	To							
13.5"	0	975	10.75"	45.5	N80	BTC	5.54	1.20	23.44
9.875"	0	11750	7.625"	29.7	P110	BTC	1.29	1.11	3.11
6.75"	0	11250	5.5"	23	P110	BTC	1.95	2.04	3.25
6.75"	11250	17,212	5"	18	P110	BTC	1.95	2.04	3.25
			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. Surface burst based on 0.7 frac gradient at the shoe with Gas Gradient 0.1 psi/ft to surface and
All casing strings will be tested in accordance with Onshore Oil and Gas Order #2 III.B.1.h

The 5" casing will be run back 500' into the intermediate casing to ensure the coupling OD clearance is greater than .422" for the cement bond tie in.

Casing Program

Hole Size	Casing		Csg. Size	Weight (lbs)	Grade	Conn.	SF Collapse	SF Burst	SF Tension
	From	To							
17.5"	0	875	13.375"	54.5	J55	STC	2.82	1.27	10.78
12.25"	0	4000	9.625"	40	J55	LTC	1.22	1.00	3.25
12.25"	4000	4875	9.625"	40	L80	LTC	1.21	1.45	5.73
8.75"	0	14,768	5.5"	17	P110	LTC	1.50	2.69	2.54
			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

Casing Program

Hole Size	Casing Interval		Csg. Size	Weight (lbs)	Grade	Conn.	SF Collapse	SF Burst	SF Body
	From	To							
17.5"	0	400	13.375"	. 68	J55	STC	10.65	1.11	24.82
12.25"	0	8410	9.625"	47	L80	BTC	1.80	1.72	2.75
8.5"	0	19,130	5.5"	20	P110	BTC	2.97	3.17	4.07
				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. Surface burst based on 0.7 frac gradient at the shoe with Gas Gradient 0.1 psi/ft to surface and
All casing strings will be tested in accordance with Onshore Oil and Gas Order #2 III.B.1.h

Casing Program

Hole Size	Casing Interval		Csg. Size	Weight (lbs)	Grade	Conn.	SF Collapse	SF Burst	SF Body
	From	To							
17.5"	0	400	13.375"	68	J55	STC	10.65	1.11	24.82
12.25"	0	8410	9.625"	47	L80	BTC	1.80	1.72	2.75
8.5"	0	19,130	5.5"	20	P110	BTC	2.97	3.17	4.07
			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. Surface burst based on 0.7 frac gradient at the shoe with Gas Gradient 0.1 psi/ft to surface and
All casing strings will be tested in accordance with Onshore Oil and Gas Order #2 III.B.1.h

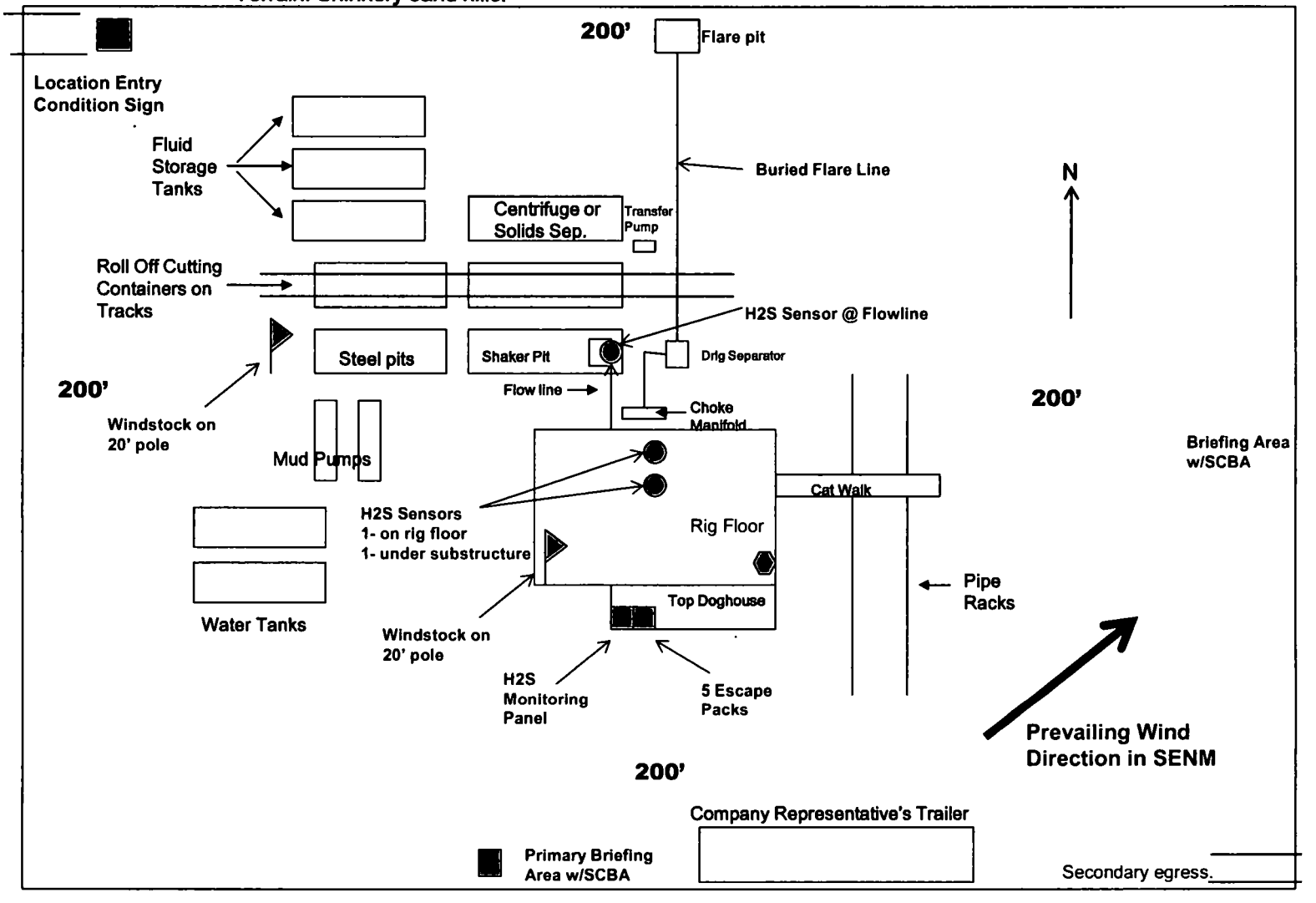
Casing Program

Hole Size	Casing Interval		Csg. Size	Weight (lbs)	Grade	Conn.	SF Collapse	SF Burst	SF Body
	From	To							
17.5"	0	400	13.375"	68	J55	STC	10.65	1.11	24.82
12.25"	0	8410	9.625"	47	L80	BTC	1.80	1.72	2.75
8.5"	0	19,130	5.5"	20	P110	BTC	2.97	3.17	4.07
			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. Surface burst based on 0.7 frac gradient at the shoe with Gas Gradient 0.1 psi/ft to surface and
All casing strings will be tested in accordance with Onshore Oil and Gas Order #2 III.B.1.h

COG Operating LLC
H_2S Equipment Schematic
Terrain: Shinnery sand hills.

Well pad will be 400' x 400' with cellar in center of pad



COG OPERATING LLC
HYDROGEN SULFIDE DRILLING OPERATIONS PLAN

1. HYDROGEN SULFIDE TRAINING

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

a. The hazards and characteristics of hydrogen sulfide (H_2S).
b. The proper use and maintenance of personal protective equipment and life support systems.
c. The proper use of H_2S detectors, alarms, warning systems, briefing areas, evacuation procedures, and prevailing winds.
d. The proper techniques for first aid and rescue procedures.

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

a. The effects of H2S on metal components. If high tensile tubulars are to be used, personnel will be trained in their special maintenance requirements.
b. Corrective action and shut-in procedures when drilling or reworking a well and blowout prevention and well control procedures.
c. The contents and requirements of the H_2S Drilling Operations Plan and the Public Protection Plan.

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

2. H_2S SAFETY EQUIPMENT AND SYSTEMS

Note: All H_2S safety equipment and systems will be installed, tested, and operational when drilling reaches a depth of 500 feet above, or three days prior to penetrating the first zone containing or reasonably expected to contain H2S. If H2S greater than 100 ppm is encountered in the gas stream we will shut in and install H2S equipment.

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

b. Protective equipment for essential personnel:
Mark II Surviveair 30-minute units located in the dog house and at briefing areas.

c. H2S detection and monitoring equipment:
2 - portable H2S monitor positioned on location for best coverage and response. These units have warning lights and audible sirens when H2S levels of 20 ppm are reached.

d. Visual warning systems:
Caution/Danger signs shall be posted on roads providing direct access to location. Signs will be painted a high visibility yellow with black lettering of sufficient size to be readable at a reasonable distance from the immediate location. Bilingual signs will be used, when appropriate. See example attached.

e. Mud Program:
The mud program has been designed to minimize the volume of H2S circulated to the surface.

f. Metallurgy:
All drill strings, casings, tubing, wellhead, blowout preventers, drilling spool, kill lines, choke manifold and lines, and valves shall be suitable for H2S service.

g. Communication:
Company vehicles equipped with cellular telephone.

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

W A R N I N G

YOU ARE ENTERING AN H_2S AREA
AUTHORIZED PERSONNEL ONLY

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

COG OPERATING LLC

1-575-748-6940

EMERGENCY CALL LIST

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

EMERGENCY RESPONSE NUMBERS

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

COG OPERATING, LLC

Eddy County, NM (NAD27) NMZ
Roadrunner Fed COM
#23H

OH
Plan #1 - IP

Anticollision Report

12 April, 2018

Anticollision Report

Company:	COG OPERATING, LLC	**Local Co-ordinate Reference:**	Well #23H
Project:	Eddy County, NM (NAD27) NMZ	**TVD Reference:**	RKB @ 3375.60usft (Latshaw 44 - RKB=25')
Reference Site:	Roadrunner Fed COM	**MD Reference:**	RKB @ 3375.60usft (Latshaw 44 - RKB=25')
Site Error:	0.00 usft	**North Reference:**	Grid
Reference Well:	#23H	**Survey Calculation Method:**	Minimum Curvature
Well Error:	0.00 usft	**Output errors are at**	2.000 sigma
Reference Wellbore	OH	**Database:**	EDM 5000.14 Single User Db
Reference Design:	Plan #1 - IP	**Offset TVD Reference:**	Offset Datum

Reference	Plan #1 - IP		
Filter type:	NO GLOBAL FILTER: Using user defined selection & filtering criteria		
Interpolation Method:	Stations	**Error Model:**	ISCWSA
Depth Range:	Unlimited	**Scan Method:**	Closest Approach 3D
Results Limited by:	Maximum center-center distance of 9,999.98 usft	**Error Surface:**	Pedal Curve
Warning Levels Evaluated at:	2.000 **Sigma**	**Casing Method:**	Not applied

Survey Tool Program **Date** 04/12/18

From (usft)	To (usft)	Survey (Wellbore)	Tool Name	Description
0.00	19,130.59	Plan #1 - IP (OH)	MWD	MWD v3:standard declination

Summary

Site Name Offset Well - Wellbore - Design	Reference Measured Depth (usft)	Offset Measured Depth (usft)	Distance Between Centres (usft)	Distance Between Ellipses (usft)	Separation Factor	Warning
Roadrunner Fed COM						
#13H - OH - Plan #1	19,100.00	12,820.80	8.00	-106.76	0.070	Level 1, ES, SF
#13H - OH - Plan #1	19,130.59	12,850.32	0.00	0.00	10,000.000	CC
#3H - OH - Plan #1	19,130.59	12,418.55	1,461.64	1,344.85	12.515	CC, ES, SF

Offset Design Roadrunner Fed COM - #13H - OH - Plan #1 — **Offset Site Error:** 0.00 usft

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

Reference Measured Depth (usft)	Reference Vertical Depth (usft)	Offset Measured Depth (usft)	Offset Vertical Depth (usft)	Semi Major Axis Reference (usft)	Semi Major Axis Offset (usft)	Highside Toolface (°)	Offset Wellbore Centre +N/-S (usft)	Offset Wellbore Centre +E/-W (usft)	Distance Between Centres (usft)	Distance Between Ellipses (usft)	Minimum Separation (usft)	Separation Factor	Warning
0.00	0.00	0.00	0.00	0.00	0.00	-1.16	5,283.30	-107.30	5,285.51				
100.00	100.00	9.00	-9.00	0.08	0.01	-1.16	5,283.30	-107.30	5,284.39	5,284.30	.092	N/A	
200.00	200.00	109.00	91.00	0.31	0.10	-1.16	5,283.30	-107.30	5,284.39	5,283.98	.414	N/A	
300.00	300.00	209.00	191.00	0.53	0.33	-1.16	5,283.30	-107.30	5,284.39	5,283.53	.863	6,122.557	
400.00	400.00	309.00	291.00	0.76	0.55	-1.16	5,283.30	-107.30	5,284.39	5,283.08	1.313	4,025.791	
500.00	500.00	409.00	391.00	0.98	0.78	-1.16	5,283.30	-107.30	5,284.39	5,282.63	1.762	2,998.804	
600.00	600.00	509.00	491.00	1.21	1.00	-1.16	5,283.30	-107.30	5,284.39	5,282.18	2.212	2,389.291	
700.00	700.00	609.00	591.00	1.43	1.23	-1.16	5,283.30	-107.30	5,284.39	5,281.73	2.661	1,985.694	
800.00	800.00	709.00	691.00	1.66	1.45	-1.16	5,283.30	-107.30	5,284.39	5,281.28	3.111	1,698.744	
900.00	900.00	809.00	791.00	1.88	1.68	-1.16	5,283.30	-107.30	5,284.39	5,280.83	3.560	1,484.256	
1,000.00	1,000.00	909.00	891.00	2.11	1.90	-1.16	5,283.30	-107.30	5,284.39	5,280.38	4.010	1,317.860	
1,100.00	1,100.00	991.00	991.00	2.33	2.09	-1.16	5,283.30	-107.30	5,284.39	5,279.97	4.419	1,195.861	
1,200.00	1,200.00	1,268.73	1,268.63	2.56	2.62	-1.21	5,278.69	-111.60	5,282.86	5,277.68	5.177	1,020.395	
1,300.00	1,300.00	1,389.27	1,389.01	2.78	2.86	-1.26	5,274.14	-115.84	5,279.13	5,273.49	5.637	936.449	
1,400.00	1,400.00	1,489.13	1,488.74	3.01	3.06	-1.30	5,270.32	-119.41	5,275.38	5,269.31	6.064	869.958	
1,500.00	1,500.00	1,589.00	1,588.46	3.23	3.28	-1.34	5,266.50	-122.97	5,271.63	5,265.14	6.495	811.638	
1,600.00	1,600.00	1,688.86	1,688.19	3.46	3.49	-1.38	5,262.67	-126.53	5,267.89	5,260.96	6.930	760.168	
1,700.00	1,700.00	1,788.72	1,787.91	3.68	3.71	-1.42	5,258.85	-130.10	5,264.14	5,256.78	7.368	714.475	
1,800.00	1,800.00	1,888.58	1,887.64	3.91	3.93	-1.46	5,255.03	-133.66	5,260.40	5,252.60	7.808	673.685	
1,900.00	1,900.00	1,988.45	1,987.37	4.13	4.16	-1.50	5,251.21	-137.23	5,256.67	5,248.42	8.251	637.082	
2,000.00	2,000.00	2,088.31	2,087.09	4.35	4.38	-1.54	5,247.38	-140.79	5,252.93	5,244.24	8.696	604.079	
2,100.00	2,100.00	2,188.17	2,186.82	4.58	4.61	-1.58	5,243.56	-144.36	5,249.20	5,240.06	9.142	574.185	
2,200.00	2,200.00	2,288.04	2,286.55	4.80	4.84	-1.62	5,239.74	-147.92	5,245.47	5,235.88	9.590	546.995	
2,300.00	2,300.00	2,387.90	2,386.27	5.03	5.08	-1.66	5,235.92	-151.49	5,241.75	5,231.71	10.038	522.167	

Anticollision Report

Company:	COG OPERATING, LLC	**Local Co-ordinate Reference:**	Well #23H
Project:	Eddy County, NM (NAD27) NMZ	**TVD Reference:**	RKB @ 3375.60usft (Latshaw 44 - RKB=25')
Reference Site:	Roadrunner Fed COM	**MD Reference:**	RKB @ 3375.60usft (Latshaw 44 - RKB=25')
Site Error:	0.00 usft	**North Reference:**	Grid
Reference Well:	#23H	**Survey Calculation Method:**	Minimum Curvature
Well Error:	0.00 usft	**Output errors are at**	2.000 sigma
Reference Wellbore	OH	**Database:**	EDM 5000.14 Single User Db
Reference Design:	Plan #1 - IP	**Offset TVD Reference:**	Offset Datum

Offset Design Roadrunner Fed COM - #13H - OH - Plan #1 — **Offset Site Error:** 0.00 usft

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

Reference Measured Depth (usft)	Reference Vertical Depth (usft)	Offset Measured Depth (usft)	Offset Vertical Depth (usft)	Semi Major Axis Reference (usft)	Semi Major Axis Offset (usft)	Highside Toolface (°)	Offset Wellbore Centre +N/-S (usft)	Offset Wellbore Centre +E/-W (usft)	Distance Between Centres (usft)	Distance Between Ellipses (usft)	Minimum Separation (usft)	Separation Factor	Warning
2,400.00	2,400.00	2,487.76	2,486.00	5.25	5.31	-1.70	5,232.09	-155.05	5,238.02	5,227.53	10.488	499.415	
2,500.00	2,500.00	2,587.63	2,585.72	5.48	5.54	-1.74	5,228.27	-158.61	5,234.30	5,223.36	10.939	478.494	
2,600.00	2,600.00	2,687.49	2,685.45	5.70	5.78	-1.78	5,224.45	-162.18	5,230.58	5,219.19	11.391	459.197	
2,700.00	2,700.00	2,787.35	2,785.18	5.93	6.01	-1.82	5,220.63	-165.74	5,226.87	5,215.02	11.843	441.344	
2,800.00	2,800.00	2,887.21	2,884.90	6.15	6.25	-1.86	5,216.81	-169.31	5,223.15	5,210.86	12.296	424.783	
2,900.00	2,900.00	2,987.08	2,984.63	6.38	6.49	-1.90	5,212.98	-172.87	5,219.44	5,206.69	12.750	409.380	
3,000.00	3,000.00	3,086.94	3,084.35	6.60	6.73	-1.94	5,209.16	-176.44	5,215.73	5,202.53	13.204	395.020	
3,100.00	3,100.00	3,186.80	3,184.08	6.83	6.96	-1.98	5,205.34	-180.00	5,212.03	5,198.37	13.658	381.601	
3,200.00	3,200.00	3,286.67	3,283.81	7.05	7.20	-2.02	5,201.52	-183.57	5,208.32	5,194.21	14.113	369.036	
3,300.00	3,300.00	3,386.53	3,383.53	7.28	7.44	-2.06	5,197.69	-187.13	5,204.62	5,190.05	14.569	357.247	
3,400.00	3,400.00	3,486.39	3,483.26	7.50	7.68	-2.10	5,193.87	-190.69	5,200.93	5,185.90	15.024	346.163	
3,500.00	3,500.00	3,586.25	3,582.98	7.73	7.92	-2.14	5,190.05	-194.26	5,197.23	5,181.75	15.481	335.726	
3,600.00	3,600.00	3,686.12	3,682.71	7.95	8.16	-2.18	5,186.23	-197.82	5,193.54	5,177.60	15.937	325.880	
3,700.00	3,700.00	3,785.98	3,782.44	8.18	8.40	-2.23	5,182.40	-201.39	5,189.85	5,173.45	16.394	316.577	
3,800.00	3,800.00	3,885.84	3,882.16	8.40	8.65	-2.27	5,178.58	-204.95	5,186.16	5,169.31	16.851	307.773	
3,900.00	3,900.00	3,985.71	3,981.89	8.63	8.89	-2.31	5,174.76	-208.52	5,182.48	5,165.17	17.308	299.431	
4,000.00	4,000.00	4,085.57	4,081.61	8.85	9.13	-2.35	5,170.94	-212.08	5,178.79	5,161.03	17.765	291.514	
4,100.00	4,100.00	4,185.43	4,181.34	9.07	9.37	-2.39	5,167.11	-215.65	5,175.11	5,156.89	18.223	283.991	
4,200.00	4,200.00	4,285.30	4,281.07	9.30	9.61	-2.43	5,163.29	-219.21	5,171.44	5,152.76	18.681	276.835	
4,300.00	4,300.00	4,385.16	4,380.79	9.52	9.85	-2.47	5,159.47	-222.77	5,167.76	5,148.62	19.139	270.018	
4,400.00	4,400.00	4,485.02	4,480.52	9.75	10.10	-2.51	5,155.65	-226.34	5,164.09	5,144.50	19.597	263.518	
4,500.00	4,500.00	4,584.88	4,580.25	9.97	10.34	-2.56	5,151.82	-229.90	5,160.42	5,140.37	20.055	257.312	
4,600.00	4,600.00	4,684.75	4,679.97	10.20	10.58	-2.60	5,148.00	-233.47	5,156.76	5,136.24	20.514	251.382	
4,700.00	4,700.00	4,784.61	4,779.70	10.42	10.82	-2.64	5,144.18	-237.03	5,153.09	5,132.12	20.972	245.710	
4,800.00	4,800.00	4,884.47	4,879.42	10.65	11.07	-2.68	5,140.36	-240.60	5,149.43	5,128.00	21.431	240.280	
4,900.00	4,900.00	4,984.34	4,979.15	10.87	11.31	-2.72	5,136.54	-244.16	5,145.78	5,123.89	21.890	235.075	
5,000.00	5,000.00	5,053.77	5,048.50	11.10	11.48	-2.75	5,134.03	-246.50	5,142.35	5,120.08	22.278	230.830	
5,100.00	5,100.00	5,115.22	5,109.90	11.32	11.62	-2.77	5,132.30	-248.11	5,139.67	5,117.02	22.645	226.965	
5,200.00	5,200.00	5,176.71	5,171.37	11.55	11.76	-2.78	5,131.05	-249.28	5,137.73	5,114.72	23.009	223.289	
5,300.00	5,300.00	5,238.23	5,232.88	11.77	11.89	-2.79	5,130.28	-249.99	5,136.54	5,113.17	23.364	219.846	
5,399.44	5,399.44	5,314.63	5,290.44	12.00	12.04	-2.79	5,129.99	-250.26	5,136.09	5,112.35	23.741	216.342	
5,400.00	5,400.00	5,314.08	5,291.00	12.00	12.04	-2.79	5,129.99	-250.26	5,136.09	5,112.35	23.741	216.340	
5,500.00	5,500.00	5,403.65	5,391.00	12.22	12.20	-2.79	5,129.99	-250.26	5,136.09	5,111.96	24.132	212.833	
5,600.00	5,600.00	5,503.65	5,491.00	12.45	12.38	-2.79	5,129.99	-250.26	5,136.09	5,111.55	24.544	209.262	
5,700.00	5,700.00	5,603.65	5,591.00	12.67	12.57	-2.79	5,129.99	-250.26	5,136.09	5,111.14	24.957	205.798	
5,800.00	5,800.00	5,703.65	5,691.00	12.90	12.75	-2.79	5,129.99	-250.26	5,136.09	5,110.72	25.371	202.437	
5,900.00	5,900.00	5,803.65	5,791.00	13.12	12.94	-2.79	5,129.99	-250.26	5,136.09	5,110.31	25.787	199.175	
6,000.00	6,000.00	5,903.65	5,891.00	13.35	13.12	-2.79	5,129.99	-250.26	5,136.09	5,109.89	26.203	196.009	
6,100.00	6,100.00	6,003.65	5,991.00	13.57	13.31	-2.79	5,129.99	-250.26	5,136.09	5,109.47	26.621	192.934	
6,200.00	6,200.00	6,103.65	6,091.00	13.80	13.50	-2.79	5,129.99	-250.26	5,136.09	5,109.05	27.040	189.947	
6,300.00	6,300.00	6,203.65	6,191.00	14.02	13.69	-2.79	5,129.99	-250.26	5,136.09	5,108.64	27.459	187.045	
6,400.00	6,400.00	6,303.65	6,291.00	14.24	13.88	-2.79	5,129.99	-250.26	5,136.09	5,108.21	27.880	184.223	
6,500.00	6,500.00	6,403.65	6,391.00	14.47	14.07	-2.79	5,129.99	-250.26	5,136.09	5,107.79	28.301	181.480	
6,600.00	6,600.00	6,503.65	6,491.00	14.69	14.27	-2.79	5,129.99	-250.26	5,136.09	5,107.37	28.723	178.812	
6,700.00	6,700.00	6,603.65	6,591.00	14.92	14.46	-2.79	5,129.99	-250.26	5,136.09	5,106.95	29.146	176.217	
6,800.00	6,800.00	6,703.65	6,691.00	15.14	14.66	-2.79	5,129.99	-250.26	5,136.09	5,106.52	29.570	173.691	
6,900.00	6,900.00	6,803.65	6,791.00	15.37	14.85	-2.79	5,129.99	-250.26	5,136.09	5,106.10	29.995	171.233	
7,000.00	7,000.00	6,903.65	6,891.00	15.59	15.05	-2.79	5,129.99	-250.26	5,136.09	5,105.67	30.420	168.839	
7,100.00	7,100.00	7,003.65	6,991.00	15.82	15.25	-2.79	5,129.99	-250.26	5,136.09	5,105.25	30.846	166.507	
7,200.00	7,200.00	7,103.65	7,091.00	16.04	15.44	-2.79	5,129.99	-250.26	5,136.09	5,104.82	31.273	164.236	
7,203.56	7,203.56	7,107.08	7,094.56	16.05	15.44	-2.79	5,129.99	-250.26	5,136.09	5,104.82	31.274	164.231	
7,300.00	7,300.00	7,177.89	7,172.54	16.27	15.59	-2.79	5,129.99	-250.26	5,136.13	5,104.48	31.647	162.294	

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

Anticollision Report

Company:	COG OPERATING, LLC	**Local Co-ordinate Reference:**	Well #23H
Project:	Eddy County, NM (NAD27) NMZ	**TVD Reference:**	RKB @ 3375.60usft (Latshaw 44 - RKB=25')
Reference Site:	Roadrunner Fed COM	**MD Reference:**	RKB @ 3375.60usft (Latshaw 44 - RKB=25')
Site Error:	0.00 usft	**North Reference:**	Grid
Reference Well:	#23H	**Survey Calculation Method:**	Minimum Curvature
Well Error:	0.00 usft	**Output errors are at**	2.000 sigma
Reference Wellbore	OH	**Database:**	EDM 5000.14 Single User Db
Reference Design:	Plan #1 - IP	**Offset TVD Reference:**	Offset Datum

Offset Design Roadrunner Fed COM - #13H - OH - Plan #1 — **Offset Site Error:** 0.00 usft

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

Reference Measured Depth (usft)	Reference Vertical Depth (usft)	Offset Measured Depth (usft)	Offset Vertical Depth (usft)	Semi Major Axis Reference (usft)	Semi Major Axis Offset (usft)	Highside Toolface (°)	Offset Wellbore Centre +N/-S (usft)	Offset Wellbore Centre +E/-W (usft)	Distance Between Centres (usft)	Distance Between Ellipses (usft)	Minimum Separation (usft)	Separation Factor	Warning
7,400.00	7,400.00	7,187.97	7,182.61	16.49	15.61	-2.79	5,130.10	-250.27	5,137.34	5,105.46	31.887	161.113	
7,500.00	7,500.00	7,200.00	7,194.64	16.72	15.64	-2.79	5,130.50	-250.29	5,140.36	5,108.23	32.126	160.008	
7,600.00	7,600.00	7,200.00	7,194.64	16.94	15.64	-2.79	5,130.50	-250.29	5,145.15	5,112.81	32.334	159.125	
7,700.00	7,700.00	7,213.42	7,208.03	17.17	15.66	-2.79	5,131.31	-250.33	5,151.67	5,119.10	32.567	158.188	
7,800.00	7,800.00	7,225.00	7,219.57	17.39	15.68	-2.79	5,132.31	-250.39	5,160.00	5,127.21	32.791	157.359	
7,900.00	7,900.00	7,225.00	7,219.57	17.62	15.68	-2.79	5,132.31	-250.39	5,170.09	5,137.11	32.985	156.743	
8,000.00	8,000.00	7,238.67	7,233.16	17.84	15.71	-2.79	5,133.85	-250.47	5,181.88	5,148.68	33.205	156.057	
8,100.00	8,100.00	7,250.00	7,244.37	18.07	15.73	-2.79	5,135.42	-250.55	5,195.46	5,162.04	33.416	155.478	
8,200.00	8,200.00	7,250.00	7,244.37	18.29	15.73	-2.79	5,135.42	-250.55	5,210.77	5,177.17	33.596	155.101	
8,300.00	8,300.00	7,263.59	7,257.78	18.52	15.75	-2.79	5,137.65	-250.68	5,227.73	5,193.93	33.805	154.645	
8,388.00	8,388.00	7,275.00	7,268.98	18.71	15.77	-2.79	5,139.82	-250.79	5,244.12	5,210.14	33.984	154.310	
8,400.00	8,400.00	7,275.00	7,268.98	18.74	15.77	36.36	5,139.82	-250.79	5,246.33	5,212.33	34.004	154.287	
8,450.00	8,449.85	7,275.00	7,268.98	18.85	15.77	35.89	5,139.82	-250.79	5,253.48	5,219.40	34.083	154.137	
8,500.00	8,499.14	7,275.00	7,268.98	18.96	15.77	35.65	5,139.82	-250.79	5,257.24	5,223.08	34.161	153.896	
8,550.00	8,547.40	7,275.00	7,268.98	19.07	15.77	35.63	5,139.82	-250.79	5,257.57	5,223.34	34.238	153.561	
8,600.00	8,594.20	7,288.22	7,281.89	19.19	15.79	35.86	5,142.67	-250.95	5,254.29	5,219.94	34.347	152.976	
8,650.00	8,639.09	7,300.00	7,293.32	19.30	15.80	36.33	5,145.50	-251.10	5,247.73	5,213.28	34.453	152.315	
8,700.00	8,681.67	7,300.00	7,293.32	19.43	15.80	37.00	5,145.50	-251.10	5,237.67	5,203.14	34.531	151.681	
8,751.64	8,722.81	7,300.00	7,293.32	19.58	15.80	37.97	5,145.50	-251.10	5,223.84	5,189.23	34.614	150.915	
8,800.00	8,758.81	7,300.00	7,293.32	19.75	15.80	33.53	5,145.50	-251.10	5,207.39	5,172.70	34.697	150.084	
8,850.00	8,793.61	7,300.00	7,293.32	19.94	15.80	29.66	5,145.50	-251.10	5,186.48	5,151.70	34.780	149.120	
8,900.00	8,825.64	7,300.00	7,293.32	20.16	15.80	26.36	5,145.50	-251.10	5,161.73	5,126.87	34.861	148.066	
8,950.00	8,854.59	7,313.64	7,306.47	20.40	15.82	23.53	5,149.13	-251.30	5,133.12	5,098.14	34.972	146.778	
9,000.00	8,880.20	7,325.00	7,317.33	20.67	15.84	20.95	5,152.44	-251.48	5,101.23	5,066.16	35.070	145.461	
9,050.00	8,902.24	7,325.00	7,317.33	20.97	15.84	18.45	5,152.44	-251.48	5,065.98	5,030.86	35.128	144.216	
9,100.00	8,920.51	7,325.00	7,317.33	21.29	15.84	15.91	5,152.44	-251.48	5,027.79	4,992.61	35.175	142.936	
9,150.00	8,934.83	7,325.00	7,317.33	21.63	15.84	13.14	5,152.44	-251.48	4,986.93	4,951.72	35.211	141.631	
9,200.00	8,945.07	7,325.00	7,317.33	21.99	15.84	9.83	5,152.44	-251.48	4,943.72	4,908.49	35.234	140.311	
9,250.00	8,951.14	7,325.00	7,317.33	22.37	15.84	5.46	5,152.44	-251.48	4,898.51	4,863.26	35.245	138.986	
9,297.76	8,953.00	7,325.00	7,317.33	22.75	15.84	-0.67	5,152.44	-251.48	4,853.79	4,818.54	35.244	137.721	
9,300.00	8,952.99	7,325.00	7,317.33	22.76	15.84	-0.67	5,152.44	-251.48	4,851.66	4,816.41	35.247	137.649	
9,400.00	8,952.82	7,325.00	7,317.33	23.61	15.84	-0.67	5,152.44	-251.48	4,756.78	4,721.57	35.218	135.066	
9,500.00	8,952.65	7,336.14	7,327.91	24.57	15.85	-0.68	5,155.94	-251.67	4,661.99	4,626.76	35.224	132.354	
9,600.00	8,952.47	7,350.00	7,340.95	25.63	15.87	-0.69	5,160.63	-251.92	4,567.60	4,532.36	35.240	129.614	
9,700.00	8,952.30	7,350.00	7,340.95	26.77	15.87	-0.69	5,160.63	-251.92	4,473.23	4,438.01	35.221	127.003	
9,800.00	8,952.13	7,350.00	7,340.95	27.99	15.87	-0.69	5,160.63	-251.92	4,379.11	4,343.90	35.206	124.385	
9,900.00	8,951.96	7,350.00	7,340.95	29.28	15.87	-0.69	5,160.63	-251.92	4,285.26	4,250.06	35.195	121.758	
10,000.00	8,951.78	7,350.00	7,340.95	30.63	15.87	-0.69	5,160.63	-251.92	4,191.69	4,156.50	35.188	119.122	
10,100.00	8,951.61	7,350.00	7,340.95	32.03	15.87	-0.69	5,160.63	-251.92	4,098.42	4,063.23	35.186	116.478	
10,200.00	8,951.44	7,350.00	7,340.95	33.47	15.87	-0.69	5,160.63	-251.92	4,005.48	3,970.29	35.189	113.826	
10,300.00	8,951.26	7,375.00	7,364.10	34.95	15.90	-0.72	5,170.05	-252.43	3,912.78	3,877.51	35.268	110.944	
10,400.00	8,951.09	7,375.00	7,364.10	36.47	15.90	-0.72	5,170.05	-252.43	3,820.31	3,785.03	35.283	108.275	
10,500.00	8,950.92	7,375.00	7,364.10	38.01	15.90	-0.72	5,170.05	-252.43	3,728.23	3,692.92	35.306	105.597	
10,600.00	8,950.75	7,375.00	7,364.10	39.58	15.90	-0.72	5,170.05	-252.43	3,636.57	3,601.23	35.337	102.911	
10,700.00	8,950.57	7,375.00	7,364.10	41.18	15.90	-0.72	5,170.05	-252.43	3,545.36	3,509.98	35.377	100.216	
10,800.00	8,950.40	7,387.32	7,375.32	42.80	15.92	-0.74	5,175.13	-252.71	3,454.45	3,418.99	35.458	97.423	
10,900.00	8,950.23	7,400.00	7,386.72	44.43	15.93	-0.75	5,180.65	-253.00	3,364.13	3,328.58	35.550	94.631	
11,000.00	8,950.05	7,400.00	7,386.72	46.08	15.93	-0.75	5,180.65	-253.00	3,274.17	3,238.55	35.622	91.914	
11,100.00	8,949.88	7,400.00	7,386.72	47.75	15.93	-0.75	5,180.65	-253.00	3,184.81	3,149.10	35.708	89.190	
11,200.00	8,949.71	7,400.00	7,386.72	49.43	15.93	-0.75	5,180.65	-253.00	3,096.10	3,060.29	35.810	86.458	
11,300.00	8,949.54	7,425.00	7,408.76	51.12	15.96	-0.79	5,192.43	-253.64	3,007.87	2,971.89	35.978	83.603	
11,400.00	8,949.36	7,425.00	7,408.76	52.82	15.96	-0.79	5,192.43	-253.64	2,920.23	2,884.12	36.113	80.863	

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

Anticollision Report

Company:	COG OPERATING, LLC	**Local Co-ordinate Reference:**	Well #23H
Project:	Eddy County, NM (NAD27) NMZ	**TVD Reference:**	RKB @ 3375.60usft (Latshaw 44 - RKB=25')
Reference Site:	Roadrunner Fed COM	**MD Reference:**	RKB @ 3375.60usft (Latshaw 44 - RKB=25')
Site Error:	0.00 usft	**North Reference:**	Grid
Reference Well:	#23H	**Survey Calculation Method:**	Minimum Curvature
Well Error:	0.00 usft	**Output errors are at**	2.000 sigma
Reference Wellbore	OH	**Database:**	EDM 5000.14 Single User Db
Reference Design:	Plan #1 - IP	**Offset TVD Reference:**	Offset Datum

Offset Design Roadrunner Fed COM - #13H - OH - Plan #1 — **Offset Site Error:** 0.00 usft

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

Reference Measured Depth (usft)	Reference Vertical Depth (usft)	Offset Measured Depth (usft)	Offset Vertical Depth (usft)	Semi Major Axis Reference (usft)	Semi Major Axis Offset (usft)	Highside Toolface (°)	Offset Wellbore Centre +N/-S (usft)	Offset Wellbore Centre +E/-W (usft)	Distance Between Centres (usft)	Distance Between Ellipses (usft)	Minimum Separation (usft)	Separation Factor	Warning
11,500.00	8,949.19	7,425.00	7,408.76	54.54	15.96	-0.79	5,192.43	-253.64	2,833.41	2,797.14	36.270	78.120	
11,600.00	8,949.02	7,437.50	7,419.55	56.26	15.98	-0.81	5,198.75	-253.98	2,747.30	2,710.83	36.468	75.335	
11,700.00	8,948.84	7,450.00	7,430.16	57.99	15.99	-0.82	5,205.34	-254.34	2,662.07	2,625.38	36.687	72.562	
11,800.00	8,948.67	7,450.00	7,430.16	59.72	15.99	-0.82	5,205.34	-254.34	2,577.69	2,540.77	36.919	69.820	
11,900.00	8,948.50	7,462.36	7,440.47	61.47	16.00	-0.84	5,212.14	-254.71	2,494.28	2,457.09	37.190	67.068	
12,000.00	8,948.33	7,475.00	7,450.84	63.22	16.02	-0.86	5,219.36	-255.10	2,411.96	2,374.46	37.491	64.334	
12,100.00	8,948.15	7,475.00	7,450.84	64.97	16.02	-0.86	5,219.36	-255.10	2,330.80	2,292.98	37.825	61.621	
12,200.00	8,947.98	7,500.00	7,470.77	66.73	16.04	-0.91	5,234.43	-255.92	2,250.89	2,212.70	38.190	58.940	
12,300.00	8,947.81	7,500.00	7,470.77	68.50	16.04	-0.91	5,234.43	-255.92	2,172.24	2,133.63	38.606	56.267	
12,400.00	8,947.63	7,514.36	7,481.84	70.27	16.06	-0.93	5,243.55	-256.41	2,095.13	2,056.08	39.055	53.646	
12,500.00	8,947.46	7,525.00	7,489.87	72.05	16.07	-0.95	5,250.53	-256.79	2,019.67	1,980.12	39.555	51.060	
12,600.00	8,947.29	7,539.82	7,500.79	73.82	16.08	-0.98	5,260.53	-257.33	1,945.98	1,905.88	40.097	48.532	
12,700.00	8,947.12	7,550.00	7,508.11	75.61	16.09	-1.00	5,267.60	-257.71	1,874.25	1,833.55	40.702	46.048	
12,800.00	8,946.94	7,575.00	7,525.42	77.39	16.11	-1.05	5,285.60	-258.69	1,804.68	1,763.36	41.320	43.676	
12,900.00	8,946.77	7,575.00	7,525.42	79.18	16.11	-1.05	5,285.60	-258.69	1,737.45	1,695.37	42.074	41.296	
13,000.00	8,946.60	7,600.00	7,541.77	80.97	16.13	-1.10	5,304.48	-259.71	1,672.60	1,629.80	42.801	39.078	
13,100.00	8,946.42	7,625.00	7,557.11	82.77	16.15	-1.16	5,324.19	-260.78	1,610.70	1,567.12	43.581	36.958	
13,200.00	8,946.25	7,637.27	7,564.26	84.56	16.16	-1.19	5,334.16	-261.32	1,551.74	1,507.26	44.475	34.890	
13,300.00	8,946.08	7,650.00	7,571.39	86.36	16.17	-1.21	5,344.68	-261.89	1,496.21	1,450.78	45.428	32.935	
13,400.00	8,945.91	7,675.00	7,584.58	88.16	16.21	-1.27	5,365.88	-263.04	1,444.16	1,397.78	46.375	31.141	
13,500.00	8,945.73	7,700.00	7,596.64	89.97	16.29	-1.33	5,387.74	-264.22	1,396.05	1,348.68	47.369	29.472	
13,600.00	8,945.56	7,725.00	7,607.54	91.77	16.39	-1.39	5,410.21	-265.44	1,352.18	1,303.77	48.405	27.935	
13,700.00	8,945.39	7,750.00	7,617.25	93.58	16.50	-1.46	5,433.21	-266.68	1,312.82	1,263.35	49.473	26.536	
13,800.00	8,945.21	7,775.00	7,625.73	95.39	16.62	-1.52	5,456.69	-267.95	1,278.28	1,227.72	50.563	25.281	
13,900.00	8,945.04	7,800.00	7,632.98	97.20	16.75	-1.58	5,480.58	-269.25	1,248.85	1,197.19	51.661	24.174	
14,000.00	8,944.87	7,825.00	7,638.96	99.01	16.88	-1.65	5,504.81	-270.56	1,224.81	1,172.06	52.750	23.219	
14,100.00	8,944.70	7,850.00	7,643.67	100.82	17.03	-1.71	5,529.33	-271.89	1,206.40	1,152.58	53.813	22.418	
14,200.00	8,944.52	7,875.00	7,647.08	102.64	17.19	-1.77	5,554.05	-273.23	1,193.81	1,138.98	54.830	21.773	
14,300.00	8,944.35	7,910.26	7,649.68	104.46	17.43	-1.85	5,589.16	-275.13	1,187.04	1,131.26	55.778	21.281	
14,400.00	8,944.18	7,990.29	7,650.59	106.27	18.04	-2.03	5,669.07	-279.31	1,185.53	1,128.85	56.682	20.915	
14,500.00	8,944.00	8,158.34	7,658.77	108.09	19.63	-2.34	5,836.75	-286.52	1,180.63	1,123.04	57.591	20.500	
14,600.00	8,943.83	8,325.02	7,676.34	109.91	21.53	-2.57	6,002.39	-291.52	1,170.01	1,111.53	58.481	20.007	
14,700.00	8,943.66	8,489.22	7,702.82	111.73	23.62	-2.71	6,164.40	-294.33	1,153.77	1,094.44	59.332	19.446	
14,800.00	8,943.49	8,649.96	7,737.47	113.56	25.82	-2.78	6,321.33	-295.04	1,132.05	1,071.92	60.124	18.829	
14,900.00	8,943.31	8,766.91	7,767.37	115.38	27.48	-2.78	6,434.40	-294.44	1,106.19	1,045.10	61.088	18.108	
15,000.00	8,943.14	8,863.43	7,792.42	117.20	28.90	-2.78	6,527.61	-293.86	1,080.04	1,017.86	62.184	17.368	
15,100.00	8,942.97	8,959.95	7,817.46	119.03	30.34	-2.78	6,620.82	-293.28	1,053.89	990.59	63.300	16.649	
15,200.00	8,942.79	9,056.48	7,842.51	120.86	31.81	-2.78	6,714.04	-292.70	1,027.75	963.31	64.434	15.950	
15,300.00	8,942.62	9,153.00	7,867.56	122.68	33.30	-2.78	6,807.25	-292.12	1,001.60	936.01	65.585	15.272	
15,400.00	8,942.45	9,249.52	7,892.60	124.51	34.82	-2.78	6,900.46	-291.54	975.45	908.69	66.758	14.612	
15,500.00	8,942.28	9,346.04	7,917.65	126.34	36.35	-2.78	6,993.68	-290.96	949.30	881.38	67.924	13.976	
15,600.00	8,942.10	9,442.56	7,942.70	128.17	37.90	-2.78	7,086.89	-290.38	923.16	854.04	69.120	13.356	
15,700.00	8,941.93	9,539.08	7,967.74	130.00	39.46	-2.78	7,180.10	-289.80	897.01	826.68	70.325	12.755	
15,800.00	8,941.76	9,635.60	7,992.79	131.83	41.03	-2.78	7,273.31	-289.22	870.86	799.32	71.541	12.173	
15,900.00	8,941.58	9,732.12	8,017.84	133.66	42.62	-2.78	7,366.53	-288.64	844.71	771.95	72.767	11.609	
16,000.00	8,941.41	9,828.64	8,042.88	135.49	44.21	-2.78	7,459.74	-288.06	818.57	744.56	74.002	11.061	
16,100.00	8,941.24	9,925.17	8,067.93	137.32	45.81	-2.78	7,552.95	-287.48	792.42	717.17	75.247	10.531	
16,200.00	8,941.07	10,021.69	8,092.98	139.15	47.43	-2.78	7,646.17	-286.90	766.27	689.77	76.499	10.017	
16,300.00	8,940.89	10,118.21	8,118.02	140.99	49.04	-2.78	7,739.38	-286.32	740.13	662.37	77.759	9.518	
16,400.00	8,940.72	10,214.73	8,143.07	142.82	50.67	-2.78	7,832.59	-285.74	713.98	634.95	79.026	9.035	
16,500.00	8,940.55	10,311.25	8,168.12	144.66	52.30	-2.78	7,925.80	-285.16	687.83	607.53	80.300	8.566	
16,600.00	8,940.37	10,407.77	8,193.17	146.49	53.93	-2.78	8,019.02	-284.58	661.68	580.10	81.579	8.111	

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

Anticollision Report

Company:	COG OPERATING, LLC	**Local Co-ordinate Reference:**	Well #23H
Project:	Eddy County, NM (NAD27) NMZ	**TVD Reference:**	RKB @ 3375.60usft (Latshaw 44 - RKB=25')
Reference Site:	Roadrunner Fed COM	**MD Reference:**	RKB @ 3375.60usft (Latshaw 44 - RKB=25')
Site Error:	0.00 usft	**North Reference:**	Grid
Reference Well:	#23H	**Survey Calculation Method:**	Minimum Curvature
Well Error:	0.00 usft	**Output errors are at**	2.000 sigma
Reference Wellbore	OH	**Database:**	EDM 5000.14 Single User Db
Reference Design:	Plan #1 - IP	**Offset TVD Reference:**	Offset Datum

Offset Design Roadrunner Fed COM - #13H - OH - Plan #1 — **Offset Site Error:** 0.00 usft

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

Reference Measured Depth (usft)	Reference Vertical Depth (usft)	Offset Measured Depth (usft)	Offset Vertical Depth (usft)	Semi Major Axis Reference (usft)	Semi Major Axis Offset (usft)	Highside Toolface (°)	Offset Wellbore Centre +N/-S (usft)	Offset Wellbore Centre +E/-W (usft)	Distance Between Centres (usft)	Distance Between Ellipses (usft)	Minimum Separation (usft)	Separation Factor	Warning
16,700.00	8,940.20	10,504.29	8,218.21	148.33	55.57	-2.78	8,112.23	-284.00	635.54	552.67	82.864	7.670	
16,800.00	8,940.03	10,600.81	8,243.26	150.16	57.22	-2.78	8,205.44	-283.42	609.39	525.23	84.155	7.241	
16,900.00	8,939.86	10,697.33	8,268.31	152.00	58.87	-2.78	8,298.66	-282.84	583.24	497.79	85.451	6.825	
17,000.00	8,939.68	10,806.15	8,293.35	153.83	60.73	-2.78	8,391.87	-282.26	557.09	470.26	86.829	6.416	
17,100.00	8,939.51	10,909.62	8,318.40	155.67	62.51	-2.78	8,485.08	-281.68	530.95	442.77	88.179	6.021	
17,200.00	8,939.34	10,986.90	8,343.45	157.51	63.84	-2.78	8,578.29	-281.10	504.80	415.43	89.364	5.649	
17,300.00	8,939.16	11,083.42	8,368.49	159.35	65.50	-2.78	8,671.51	-280.52	478.65	387.97	90.676	5.279	
17,400.00	8,938.99	11,179.94	8,393.54	161.18	67.16	-2.78	8,764.72	-279.94	452.50	360.51	91.993	4.919	
17,500.00	8,938.82	11,276.46	8,418.59	163.02	68.83	-2.78	8,857.93	-279.36	426.36	333.04	93.312	4.569	
17,600.00	8,938.65	11,372.98	8,443.63	164.86	70.50	-2.78	8,951.15	-278.78	400.21	305.57	94.635	4.229	
17,700.00	8,938.47	11,469.50	8,468.68	166.70	72.17	-2.78	9,044.36	-278.20	374.06	278.10	95.960	3.898	
17,800.00	8,938.30	11,566.02	8,493.73	168.54	73.85	-2.78	9,137.57	-277.62	347.91	250.63	97.289	3.576	
17,900.00	8,938.13	11,662.54	8,518.78	170.38	75.52	-2.78	9,230.78	-277.04	321.77	223.15	98.620	3.263	
18,000.00	8,937.95	11,759.07	8,543.82	172.22	77.20	-2.78	9,324.00	-276.46	295.62	195.67	99.954	2.958	
18,100.00	8,937.78	11,855.59	8,568.87	174.06	78.88	-2.78	9,417.21	-275.88	269.47	168.18	101.290	2.660	
18,200.00	8,937.61	11,952.11	8,593.92	175.90	80.56	-2.78	9,510.42	-275.30	243.33	140.70	102.628	2.371	
18,300.00	8,937.44	12,048.63	8,618.96	177.74	82.24	-2.78	9,603.63	-274.72	217.18	113.21	103.969	2.089	
18,400.00	8,937.26	12,145.15	8,644.01	179.58	83.92	-2.78	9,696.85	-274.14	191.03	85.72	105.312	1.814	
18,500.00	8,937.09	12,241.67	8,669.06	181.42	85.61	-2.78	9,790.06	-273.56	164.88	58.23	106.656	1.546	
18,600.00	8,936.92	12,338.19	8,694.10	183.26	87.30	-2.78	9,883.27	-272.98	138.74	30.73	108.003	1.285	Level 3
18,700.00	8,936.74	12,434.71	8,719.15	185.11	88.98	-2.78	9,976.49	-272.40	112.59	3.24	109.351	1.030	Level 2
18,800.00	8,936.57	12,531.23	8,744.20	186.95	90.67	-2.78	10,069.70	-271.82	86.44	-24.26	110.701	0.781	Level 1
18,900.00	8,936.40	12,627.76	8,769.24	188.79	92.36	-2.78	10,162.91	-271.24	60.29	-51.76	112.053	0.538	Level 1
19,000.00	8,936.23	12,724.28	8,794.29	190.63	94.05	-2.78	10,256.12	-270.66	34.15	-79.26	113.406	0.301	Level 1
19,100.00	8,936.05	12,820.80	8,819.34	192.47	95.74	-2.78	10,349.34	-270.08	8.00	-106.76	114.760	0.070	Level 1, ES, SF
19,130.59	8,936.00	12,850.32	8,827.00	193.04	96.26	0.00	10,377.85	-269.90	0.00	0.00	.000	N/A	CC

Anticollision Report

Company:	COG OPERATING, LLC	**Local Co-ordinate Reference:**	Well #23H
Project:	Eddy County, NM (NAD27) NMZ	**TVD Reference:**	RKB @ 3375.60usft (Latshaw 44 - RKB=25')
Reference Site:	Roadrunner Fed COM	**MD Reference:**	RKB @ 3375.60usft (Latshaw 44 - RKB=25')
Site Error:	0.00 usft	**North Reference:**	Grid
Reference Well:	#23H	**Survey Calculation Method:**	Minimum Curvature
Well Error:	0.00 usft	**Output errors are at**	2.000 sigma
Reference Wellbore	OH	**Database:**	EDM 5000.14 Single User Db
Reference Design:	Plan #1 - IP	**Offset TVD Reference:**	Offset Datum

Offset Design Roadrunner Fed COM - #3H - OH - Plan #1 — Offset Site Error: 0.00 usft

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

Reference Measured Depth (usft)	Reference Vertical Depth (usft)	Offset Measured Depth (usft)	Offset Vertical Depth (usft)	Semi Major Axis Reference (usft)	Semi Major Axis Offset (usft)	Highside Toolface (°)	Offset Wellbore Centre +N/-S (usft)	Offset Wellbore Centre +E/-W (usft)	Distance Between Centres (usft)	Distance Between Ellipses (usft)	Minimum Separation (usft)	Separation Factor	Warning
0.00	0.00	0.00	0.00	0.00	0.00	-1.49	5,283.30	-137.30	5,286.21				
100.00	100.00	9.20	-9.20	0.08	0.01	-1.49	5,283.30	-137.30	5,285.08	5,284.99	.092	N/A	
200.00	200.00	109.20	90.80	0.31	0.10	-1.49	5,283.30	-137.30	5,285.08	5,284.67	.414	N/A	
300.00	300.00	209.20	190.80	0.53	0.33	-1.49	5,283.30	-137.30	5,285.08	5,284.22	.864	6,120.173	
400.00	400.00	309.20	290.80	0.76	0.55	-1.49	5,283.30	-137.30	5,285.08	5,283.77	1.313	4,024.941	
500.00	500.00	409.20	390.80	0.98	0.78	-1.49	5,283.30	-137.30	5,285.08	5,283.32	1.763	2,998.433	
600.00	600.00	509.20	490.80	1.21	1.00	-1.49	5,283.30	-137.30	5,285.08	5,282.87	2.212	2,389.119	
700.00	700.00	609.20	590.80	1.43	1.23	-1.49	5,283.30	-137.30	5,285.08	5,282.42	2.662	1,985.620	
800.00	800.00	709.20	690.80	1.66	1.45	-1.49	5,283.30	-137.30	5,285.08	5,281.97	3.111	1,698.722	
900.00	900.00	809.20	790.80	1.88	1.68	-1.49	5,283.30	-137.30	5,285.08	5,281.52	3.561	1,484.264	
1,000.00	1,000.00	909.20	890.80	2.11	1.90	-1.49	5,283.30	-137.30	5,285.08	5,281.07	4.010	1,317.885	
1,100.00	1,100.00	990.80	990.80	2.33	2.09	-1.49	5,283.30	-137.30	5,285.08	5,280.67	4.418	1,196.140	
1,200.00	1,200.00	1,265.34	1,265.25	2.56	2.62	-1.54	5,278.81	-141.49	5,283.58	5,278.41	5.171	1,021.801	
1,300.00	1,300.00	1,453.66	1,453.21	2.78	2.99	-1.62	5,270.35	-149.37	5,279.00	5,273.23	5.769	915.099	
1,400.00	1,400.00	1,553.42	1,552.72	3.01	3.21	-1.68	5,265.27	-154.12	5,274.03	5,267.83	6.201	850.528	
1,500.00	1,500.00	1,653.18	1,652.24	3.23	3.43	-1.73	5,260.18	-158.86	5,269.06	5,262.43	6.638	793.790	
1,600.00	1,600.00	1,752.93	1,751.75	3.46	3.65	-1.78	5,255.09	-163.61	5,264.11	5,257.03	7.079	743.640	
1,700.00	1,700.00	1,852.69	1,851.26	3.68	3.88	-1.84	5,250.00	-168.35	5,259.15	5,251.63	7.523	699.060	
1,800.00	1,800.00	1,952.45	1,950.78	3.91	4.12	-1.89	5,244.91	-173.10	5,254.20	5,246.23	7.970	659.221	
1,900.00	1,900.00	2,052.20	2,050.29	4.13	4.35	-1.94	5,239.82	-177.85	5,249.25	5,240.83	8.420	623.428	
2,000.00	2,000.00	2,151.96	2,149.80	4.35	4.59	-2.00	5,234.73	-182.59	5,244.31	5,235.44	8.871	591.154	
2,100.00	2,100.00	2,251.72	2,249.32	4.58	4.83	-2.05	5,229.64	-187.34	5,239.38	5,230.05	9.325	561.882	
2,200.00	2,200.00	2,351.47	2,348.83	4.80	5.07	-2.11	5,224.55	-192.08	5,234.45	5,224.67	9.780	535.245	
2,300.00	2,300.00	2,451.23	2,448.34	5.03	5.32	-2.16	5,219.46	-196.83	5,229.52	5,219.28	10.236	510.910	
2,400.00	2,400.00	2,550.98	2,547.86	5.25	5.56	-2.21	5,214.37	-201.58	5,224.60	5,213.90	10.693	488.598	
2,500.00	2,500.00	2,650.74	2,647.37	5.48	5.81	-2.27	5,209.28	-206.32	5,219.68	5,208.53	11.151	468.074	
2,600.00	2,600.00	2,750.50	2,746.88	5.70	6.06	-2.32	5,204.19	-211.07	5,214.76	5,203.15	11.611	449.136	
2,700.00	2,700.00	2,850.25	2,846.40	5.93	6.31	-2.38	5,199.11	-215.81	5,209.86	5,197.79	12.071	431.610	
2,800.00	2,800.00	2,950.01	2,945.91	6.15	6.56	-2.43	5,194.02	-220.56	5,204.95	5,192.42	12.532	415.347	
2,900.00	2,900.00	3,049.77	3,045.42	6.38	6.81	-2.49	5,188.93	-225.30	5,200.05	5,187.06	12.993	400.218	
3,000.00	3,000.00	3,149.52	3,144.94	6.60	7.06	-2.54	5,183.84	-230.05	5,195.16	5,181.70	13.455	386.109	
3,100.00	3,100.00	3,249.28	3,244.45	6.83	7.31	-2.60	5,178.75	-234.80	5,190.27	5,176.35	13.918	372.924	
3,200.00	3,200.00	3,349.04	3,343.96	7.05	7.56	-2.65	5,173.66	-239.54	5,185.39	5,171.00	14.381	360.574	
3,300.00	3,300.00	3,448.79	3,443.48	7.28	7.82	-2.71	5,168.57	-244.29	5,180.51	5,165.66	14.845	348.985	
3,400.00	3,400.00	3,548.55	3,542.99	7.50	8.07	-2.76	5,163.48	-249.03	5,175.63	5,160.32	15.309	338.088	
3,500.00	3,500.00	3,648.31	3,642.50	7.73	8.32	-2.82	5,158.39	-253.78	5,170.76	5,154.99	15.773	327.825	
3,600.00	3,600.00	3,748.06	3,742.02	7.95	8.58	-2.87	5,153.30	-258.52	5,165.89	5,149.66	16.238	318.142	
3,700.00	3,700.00	3,847.82	3,841.53	8.18	8.83	-2.93	5,148.21	-263.27	5,161.03	5,144.33	16.703	308.992	
3,800.00	3,800.00	3,947.57	3,941.04	8.40	9.09	-2.98	5,143.12	-268.02	5,156.18	5,139.01	17.168	300.333	
3,900.00	3,900.00	4,031.70	4,024.96	8.63	9.30	-3.03	5,138.87	-271.98	5,151.39	5,133.79	17.596	292.755	
4,000.00	4,000.00	4,100.00	4,093.15	8.85	9.47	-3.06	5,135.90	-274.75	5,147.23	5,129.24	17.985	286.189	
4,100.00	4,100.00	4,154.67	4,147.75	9.07	9.60	-3.08	5,133.95	-276.57	5,143.79	5,125.45	18.338	280.494	
4,200.00	4,200.00	4,216.25	4,209.29	9.30	9.74	-3.10	5,132.22	-278.19	5,141.11	5,122.41	18.705	274.853	
4,300.00	4,300.00	4,277.88	4,270.89	9.52	9.88	-3.12	5,130.96	-279.36	5,139.18	5,120.12	19.068	269.524	
4,400.00	4,400.00	4,339.53	4,332.53	9.75	10.01	-3.12	5,130.19	-280.08	5,138.00	5,118.58	19.421	264.553	
4,500.00	4,500.00	4,415.55	4,390.80	9.97	10.16	-3.13	5,129.90	-280.35	5,137.56	5,117.76	19.797	259.506	
4,600.00	4,600.00	4,502.20	4,490.80	10.20	10.31	-3.13	5,129.90	-280.35	5,137.56	5,117.37	20.184	254.540	
4,700.00	4,700.00	4,602.20	4,590.80	10.42	10.50	-3.13	5,129.90	-280.35	5,137.56	5,116.96	20.596	249.441	
4,800.00	4,800.00	4,702.20	4,690.80	10.65	10.68	-3.13	5,129.90	-280.35	5,137.56	5,116.55	21.010	244.525	
4,900.00	4,900.00	4,802.20	4,790.80	10.87	10.86	-3.13	5,129.90	-280.35	5,137.56	5,116.13	21.426	239.784	
5,000.00	5,000.00	4,902.20	4,890.80	11.10	11.05	-3.13	5,129.90	-280.35	5,137.56	5,115.71	21.843	235.209	
5,100.00	5,100.00	5,002.20	4,990.80	11.32	11.23	-3.13	5,129.90	-280.35	5,137.56	5,115.30	22.261	230.792	

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

Anticollision Report

Company:	COG OPERATING, LLC	**Local Co-ordinate Reference:**	Well #23H
Project:	Eddy County, NM (NAD27) NMZ	**TVD Reference:**	RKB @ 3375.60usft (Latshaw 44 - RKB=25')
Reference Site:	Roadrunner Fed COM	**MD Reference:**	RKB @ 3375.60usft (Latshaw 44 - RKB=25')
Site Error:	0.00 usft	**North Reference:**	Grid
Reference Well:	#23H	**Survey Calculation Method:**	Minimum Curvature
Well Error:	0.00 usft	**Output errors are at**	2.000 sigma
Reference Wellbore	OH	**Database:**	EDM 5000.14 Single User Db
Reference Design:	Plan #1 - IP	**Offset TVD Reference:**	Offset Datum

Offset Design Roadrunner Fed COM - #3H - OH - Plan #1 — **Offset Site Error:** 0.00 usft

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

Reference Measured Depth (usft)	Reference Vertical Depth (usft)	Offset Measured Depth (usft)	Offset Vertical Depth (usft)	Semi Major Axis Reference (usft)	Semi Major Axis Offset (usft)	Highside Toolface (°)	Offset Wellbore Centre +N/-S (usft)	Offset Wellbore Centre +E/-W (usft)	Distance Between Centres (usft)	Distance Between Ellipses (usft)	Minimum Separation (usft)	Separation Factor	Warning
5,200.00	5,200.00	5,102.20	5,090.80	11.55	11.42	-3.13	5,129.90	-280.35	5,137.56	5,114.88	22.680	226.526	
5,300.00	5,300.00	5,202.20	5,190.80	11.77	11.61	-3.13	5,129.90	-280.35	5,137.56	5,114.46	23.100	222.404	
5,400.00	5,400.00	5,302.20	5,290.80	12.00	11.80	-3.13	5,129.90	-280.35	5,137.56	5,114.03	23.521	218.420	
5,500.00	5,500.00	5,402.20	5,390.80	12.22	11.99	-3.13	5,129.90	-280.35	5,137.56	5,113.61	23.944	214.567	
5,600.00	5,600.00	5,502.20	5,490.80	12.45	12.19	-3.13	5,129.90	-280.35	5,137.56	5,113.19	24.367	210.839	
5,700.00	5,700.00	5,602.20	5,590.80	12.67	12.38	-3.13	5,129.90	-280.35	5,137.56	5,112.76	24.791	207.231	
5,800.00	5,800.00	5,702.20	5,690.80	12.90	12.58	-3.13	5,129.90	-280.35	5,137.56	5,112.34	25.217	203.737	
5,900.00	5,900.00	5,802.20	5,790.80	13.12	12.77	-3.13	5,129.90	-280.35	5,137.56	5,111.91	25.643	200.352	
6,000.00	6,000.00	5,902.20	5,890.80	13.35	12.97	-3.13	5,129.90	-280.35	5,137.56	5,111.49	26.069	197.072	
6,100.00	6,100.00	6,002.20	5,990.80	13.57	13.17	-3.13	5,129.90	-280.35	5,137.56	5,111.06	26.497	193.893	
6,200.00	6,200.00	6,102.20	6,090.80	13.80	13.37	-3.13	5,129.90	-280.35	5,137.56	5,110.63	26.925	190.809	
6,300.00	6,300.00	6,202.20	6,190.80	14.02	13.57	-3.13	5,129.90	-280.35	5,137.56	5,110.20	27.354	187.817	
6,400.00	6,400.00	6,302.20	6,290.80	14.24	13.77	-3.13	5,129.90	-280.35	5,137.56	5,109.77	27.784	184.913	
6,500.00	6,500.00	6,402.20	6,390.80	14.47	13.97	-3.13	5,129.90	-280.35	5,137.56	5,109.34	28.214	182.094	
6,600.00	6,600.00	6,502.20	6,490.80	14.69	14.17	-3.13	5,129.90	-280.35	5,137.56	5,108.91	28.645	179.355	
6,700.00	6,700.00	6,602.20	6,590.80	14.92	14.37	-3.13	5,129.90	-280.35	5,137.56	5,108.48	29.076	176.694	
6,800.00	6,800.00	6,702.20	6,690.80	15.14	14.58	-3.13	5,129.90	-280.35	5,137.56	5,108.05	29.508	174.108	
6,900.00	6,900.00	6,802.20	6,790.80	15.37	14.78	-3.13	5,129.90	-280.35	5,137.56	5,107.62	29.940	171.593	
7,000.00	7,000.00	6,897.80	6,890.80	15.59	14.98	-3.13	5,129.90	-280.35	5,137.56	5,107.19	30.364	169.199	
7,100.00	7,100.00	6,899.54	6,892.54	15.82	14.98	-3.13	5,129.90	-280.35	5,138.50	5,107.91	30.587	167.996	
7,200.00	7,200.00	6,925.00	6,917.99	16.04	15.03	-3.13	5,130.58	-280.35	5,141.14	5,110.28	30.857	166.614	
7,300.00	7,300.00	6,925.00	6,917.99	16.27	15.03	-3.13	5,130.58	-280.35	5,145.47	5,114.40	31.066	165.630	
7,400.00	7,400.00	6,925.00	6,917.99	16.49	15.03	-3.13	5,130.58	-280.35	5,151.74	5,120.47	31.270	164.750	
7,500.00	7,500.00	6,950.00	6,942.91	16.72	15.08	-3.13	5,132.57	-280.34	5,159.69	5,128.17	31.526	163.663	
7,600.00	7,600.00	6,950.00	6,942.91	16.94	15.08	-3.13	5,132.57	-280.34	5,169.33	5,137.61	31.721	162.964	
7,700.00	7,700.00	6,950.00	6,942.91	17.17	15.08	-3.13	5,132.57	-280.34	5,180.89	5,148.98	31.910	162.359	
7,800.00	7,800.00	6,975.00	6,967.69	17.39	15.12	-3.12	5,135.85	-280.34	5,194.08	5,161.92	32.154	161.536	
7,900.00	7,900.00	6,975.00	6,967.69	17.62	15.12	-3.12	5,135.85	-280.34	5,208.94	5,176.61	32.335	161.093	
8,000.00	8,000.00	6,975.00	6,967.69	17.84	15.12	-3.12	5,135.85	-280.34	5,225.68	5,193.17	32.511	160.735	
8,100.00	8,100.00	7,000.00	6,992.26	18.07	15.16	-3.12	5,140.43	-280.34	5,244.02	5,211.27	32.745	160.149	
8,200.00	8,200.00	7,000.00	6,992.26	18.29	15.16	-3.12	5,140.43	-280.34	5,263.97	5,231.08	32.913	159.935	
8,300.00	8,300.00	7,000.00	6,992.26	18.52	15.16	-3.12	5,140.43	-280.34	5,285.75	5,252.67	33.078	159.796	
8,388.00	8,388.00	7,025.00	7,016.56	18.71	15.20	-3.12	5,146.29	-280.33	5,306.24	5,272.95	33.283	159.426	
8,400.00	8,400.00	7,025.00	7,016.56	18.74	15.20	36.00	5,146.29	-280.33	5,308.99	5,275.69	33.302	159.421	
8,450.00	8,449.85	7,025.00	7,016.56	18.85	15.20	35.38	5,146.29	-280.33	5,318.41	5,285.03	33.375	159.351	
8,500.00	8,499.14	7,025.00	7,016.56	18.96	15.20	35.00	5,146.29	-280.33	5,324.42	5,290.97	33.447	159.188	
8,550.00	8,547.40	7,025.00	7,016.56	19.07	15.20	34.84	5,146.29	-280.33	5,326.97	5,293.46	33.518	158.928	
8,600.00	8,594.20	7,025.00	7,016.56	19.19	15.20	34.89	5,146.29	-280.33	5,326.07	5,292.48	33.588	158.569	
8,650.00	8,639.09	7,036.35	7,027.48	19.30	15.21	35.21	5,149.37	-280.33	5,321.55	5,287.86	33.688	157.968	
8,700.00	8,681.67	7,050.00	7,040.52	19.43	15.23	35.77	5,153.41	-280.32	5,313.74	5,279.95	33.795	157.236	
8,751.64	8,722.81	7,050.00	7,040.52	19.58	15.23	36.56	5,153.41	-280.32	5,301.93	5,268.06	33.872	156.528	
8,800.00	8,758.81	7,050.00	7,040.52	19.75	15.23	32.12	5,153.41	-280.32	5,287.30	5,253.35	33.948	155.747	
8,850.00	8,793.61	7,050.00	7,040.52	19.94	15.23	28.24	5,153.41	-280.32	5,268.22	5,234.20	34.025	154.832	
8,900.00	8,825.64	7,050.00	7,040.52	20.16	15.23	24.91	5,153.41	-280.32	5,245.26	5,211.16	34.099	153.823	
8,950.00	8,854.59	7,050.00	7,040.52	20.40	15.23	21.99	5,153.41	-280.32	5,218.56	5,184.40	34.167	152.735	
9,000.00	8,880.20	7,050.00	7,040.52	20.67	15.23	19.32	5,153.41	-280.32	5,188.34	5,154.11	34.228	151.581	
9,050.00	8,902.24	7,075.00	7,064.08	20.97	15.27	16.88	5,161.78	-280.31	5,154.72	5,120.37	34.348	150.072	
9,100.00	8,920.51	7,075.00	7,064.08	21.29	15.27	14.31	5,161.78	-280.31	5,117.95	5,083.56	34.390	148.820	
9,150.00	8,934.83	7,075.00	7,064.08	21.63	15.27	11.52	5,161.78	-280.31	5,078.39	5,043.97	34.421	147.540	
9,200.00	8,945.07	7,075.00	7,064.08	21.99	15.27	8.25	5,161.78	-280.31	5,036.36	5,001.92	34.439	146.240	
9,250.00	8,951.14	7,075.00	7,064.08	22.37	15.27	4.06	5,161.78	-280.31	4,992.18	4,957.74	34.445	144.930	
9,297.76	8,953.00	7,075.00	7,064.08	22.75	15.27	-1.50	5,161.78	-280.31	4,948.31	4,913.87	34.441	143.676	

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

Anticollision Report

Company:	COG OPERATING, LLC	**Local Co-ordinate Reference:**	Well #23H
Project:	Eddy County, NM (NAD27) NMZ	**TVD Reference:**	RKB @ 3375.60usft (Latshaw 44 - RKB=25')
Reference Site:	Roadrunner Fed COM	**MD Reference:**	RKB @ 3375.60usft (Latshaw 44 - RKB=25')
Site Error:	0.00 usft	**North Reference:**	Grid
Reference Well:	#23H	**Survey Calculation Method:**	Minimum Curvature
Well Error:	0.00 usft	**Output errors are at**	2.000 sigma
Reference Wellbore	OH	**Database:**	EDM 5000.14 Single User Db
Reference Design:	Plan #1 - IP	**Offset TVD Reference:**	Offset Datum

Offset Design Roadrunner Fed COM - #3H - OH - Plan #1 — **Offset Site Error:** 0.00 usft

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

Reference Measured Depth (usft)	Reference Vertical Depth (usft)	Offset Measured Depth (usft)	Offset Vertical Depth (usft)	Semi Major Axis Reference (usft)	Semi Major Axis Offset (usft)	Highside Toolface (°)	Offset Wellbore Centre +N/-S (usft)	Offset Wellbore Centre +E/-W (usft)	Distance Between Centres (usft)	Distance Between Ellipses (usft)	Minimum Separation (usft)	Separation Factor	Warning
9,300.00	8,952.99	7,075.00	7,064.08	22.76	15.27	-1.50	5,161.78	-280.31	4,946.21	4,911.77	34.444	143.602	
9,400.00	8,952.82	7,075.00	7,064.08	23.61	15.27	-1.50	5,161.78	-280.31	4,852.98	4,818.58	34.407	141.046	
9,500.00	8,952.65	7,075.00	7,064.08	24.57	15.27	-1.50	5,161.78	-280.31	4,760.03	4,725.66	34.374	138.478	
9,600.00	8,952.47	7,075.00	7,064.08	25.63	15.27	-1.50	5,161.78	-280.31	4,667.37	4,633.03	34.345	135.898	
9,700.00	8,952.30	7,088.82	7,076.90	26.77	15.28	-1.51	5,166.93	-280.31	4,574.80	4,540.44	34.359	133.147	
9,800.00	8,952.13	7,100.00	7,087.16	27.99	15.30	-1.52	5,171.37	-280.30	4,482.70	4,448.33	34.371	130.423	
9,900.00	8,951.96	7,100.00	7,087.16	29.28	15.30	-1.52	5,171.37	-280.30	4,390.80	4,356.45	34.356	127.805	
10,000.00	8,951.78	7,100.00	7,087.16	30.63	15.30	-1.52	5,171.37	-280.30	4,299.27	4,264.92	34.346	125.175	
10,100.00	8,951.61	7,100.00	7,087.16	32.03	15.30	-1.52	5,171.37	-280.30	4,208.12	4,173.77	34.343	122.532	
10,200.00	8,951.44	7,100.00	7,087.16	33.47	15.30	-1.52	5,171.37	-280.30	4,117.37	4,083.03	34.347	119.876	
10,300.00	8,951.26	7,113.29	7,099.22	34.95	15.31	-1.53	5,176.95	-280.30	4,026.87	3,992.47	34.396	117.075	
10,400.00	8,951.09	7,125.00	7,109.71	36.47	15.33	-1.54	5,182.15	-280.29	3,936.92	3,902.47	34.448	114.287	
10,500.00	8,950.92	7,125.00	7,109.71	38.01	15.33	-1.54	5,182.15	-280.29	3,847.30	3,812.82	34.477	111.592	
10,600.00	8,950.75	7,125.00	7,109.71	39.58	15.33	-1.54	5,182.15	-280.29	3,758.20	3,723.69	34.516	108.883	
10,700.00	8,950.57	7,125.00	7,109.71	41.18	15.33	-1.54	5,182.15	-280.29	3,669.67	3,635.10	34.567	106.161	
10,800.00	8,950.40	7,138.68	7,121.80	42.80	15.34	-1.55	5,188.55	-280.29	3,581.52	3,546.86	34.665	103.318	
10,900.00	8,950.23	7,150.00	7,131.67	44.43	15.35	-1.55	5,194.10	-280.28	3,494.05	3,459.28	34.769	100.493	
11,000.00	8,950.05	7,150.00	7,131.67	46.08	15.35	-1.55	5,194.10	-280.28	3,407.11	3,372.25	34.861	97.735	
11,100.00	8,949.88	7,150.00	7,131.67	47.75	15.35	-1.55	5,194.10	-280.28	3,320.90	3,285.93	34.970	94.965	
11,200.00	8,949.71	7,163.31	7,143.10	49.43	15.37	-1.56	5,200.93	-280.27	3,235.28	3,200.15	35.124	92.109	
11,300.00	8,949.54	7,175.00	7,152.97	51.12	15.38	-1.57	5,207.18	-280.27	3,150.47	3,115.18	35.293	89.266	
11,400.00	8,949.36	7,175.00	7,152.97	52.82	15.38	-1.57	5,207.18	-280.27	3,066.41	3,030.95	35.461	86.472	
11,500.00	8,949.19	7,175.00	7,152.97	54.54	15.38	-1.57	5,207.18	-280.27	2,983.33	2,947.68	35.655	83.672	
11,600.00	8,949.02	7,200.00	7,173.56	56.26	15.41	-1.59	5,221.36	-280.25	2,900.99	2,865.08	35.907	80.791	
11,700.00	8,948.84	7,200.00	7,173.56	57.99	15.41	-1.59	5,221.36	-280.25	2,819.63	2,783.48	36.153	77.991	
11,800.00	8,948.67	7,200.00	7,173.56	59.72	15.41	-1.59	5,221.36	-280.25	2,739.50	2,703.07	36.432	75.195	
11,900.00	8,948.50	7,225.00	7,193.38	61.47	15.43	-1.60	5,236.60	-280.24	2,660.31	2,623.55	36.758	72.374	
12,000.00	8,948.33	7,225.00	7,193.38	63.22	15.43	-1.60	5,236.60	-280.24	2,582.40	2,545.30	37.104	69.599	
12,100.00	8,948.15	7,239.02	7,204.14	64.97	15.44	-1.61	5,245.59	-280.23	2,505.81	2,468.32	37.489	66.841	
12,200.00	8,947.98	7,250.00	7,212.37	66.73	15.45	-1.62	5,252.85	-280.22	2,430.66	2,392.75	37.911	64.115	
12,300.00	8,947.81	7,260.98	7,220.44	68.50	15.46	-1.62	5,260.30	-280.21	2,357.05	2,318.68	38.372	61.426	
12,400.00	8,947.63	7,275.00	7,230.48	70.27	15.48	-1.63	5,270.07	-280.21	2,285.10	2,246.23	38.872	58.785	
12,500.00	8,947.46	7,285.31	7,237.69	72.05	15.49	-1.63	5,277.45	-280.20	2,214.94	2,175.52	39.420	56.188	
12,600.00	8,947.29	7,300.00	7,247.67	73.82	15.50	-1.64	5,288.22	-280.19	2,146.72	2,106.71	40.007	53.658	
12,700.00	8,947.12	7,312.27	7,255.76	75.61	15.51	-1.65	5,297.45	-280.18	2,080.58	2,039.93	40.645	51.188	
12,800.00	8,946.94	7,325.00	7,263.89	77.39	15.52	-1.65	5,307.25	-280.17	2,016.70	1,975.37	41.332	48.793	
12,900.00	8,946.77	7,350.00	7,279.09	79.18	15.54	-1.66	5,327.09	-280.15	1,955.34	1,913.30	42.033	46.519	
13,000.00	8,946.60	7,350.00	7,279.09	80.97	15.54	-1.66	5,327.09	-280.15	1,896.52	1,853.67	42.853	44.256	
13,100.00	8,946.42	7,375.00	7,293.23	82.77	15.56	-1.67	5,347.71	-280.13	1,840.44	1,796.79	43.646	42.168	
13,200.00	8,946.25	7,400.00	7,306.27	84.56	15.59	-1.68	5,369.03	-280.11	1,787.54	1,743.06	44.480	40.188	
13,300.00	8,946.08	7,411.24	7,311.76	86.36	15.62	-1.68	5,378.84	-280.10	1,737.76	1,692.35	45.404	38.273	
13,400.00	8,945.91	7,425.00	7,318.17	88.16	15.67	-1.69	5,391.01	-280.08	1,691.56	1,645.20	46.359	36.488	
13,500.00	8,945.73	7,450.00	7,328.91	89.97	15.76	-1.69	5,413.58	-280.06	1,648.98	1,601.67	47.304	34.859	
13,600.00	8,945.56	7,475.00	7,338.46	91.77	15.87	-1.70	5,436.69	-280.04	1,610.38	1,562.10	48.276	33.358	
13,700.00	8,945.39	7,500.00	7,346.78	93.58	15.99	-1.70	5,460.26	-280.01	1,575.96	1,526.69	49.267	31.988	
13,800.00	8,945.21	7,515.61	7,351.34	95.39	16.07	-1.70	5,475.18	-280.00	1,545.79	1,495.48	50.302	30.730	
13,900.00	8,945.04	7,538.58	7,357.17	97.20	16.19	-1.70	5,497.40	-279.98	1,520.24	1,468.92	51.311	29.628	
14,000.00	8,944.87	7,562.09	7,362.02	99.01	16.32	-1.70	5,520.40	-279.95	1,499.42	1,447.11	52.308	28.665	
14,100.00	8,944.70	7,586.04	7,365.79	100.82	16.46	-1.69	5,544.05	-279.93	1,483.48	1,430.20	53.284	27.841	
14,200.00	8,944.52	7,610.32	7,368.40	102.64	16.62	-1.69	5,568.19	-279.90	1,472.55	1,418.33	54.227	27.156	
14,300.00	8,944.35	7,634.81	7,369.78	104.46	16.79	-1.68	5,592.64	-279.88	1,466.71	1,411.59	55.127	26.606	
14,400.00	8,944.18	7,688.11	7,369.97	106.27	17.18	-1.67	5,645.94	-279.83	1,465.63	1,409.64	55.990	26.177	

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

Anticollision Report

Company:	COG OPERATING, LLC	**Local Co-ordinate Reference:**	Well #23H
Project:	Eddy County, NM (NAD27) NMZ	**TVD Reference:**	RKB @ 3375.60usft (Latshaw 44 - RKB=25')
Reference Site:	Roadrunner Fed COM	**MD Reference:**	RKB @ 3375.60usft (Latshaw 44 - RKB=25')
Site Error:	0.00 usft	**North Reference:**	Grid
Reference Well:	#23H	**Survey Calculation Method:**	Minimum Curvature
Well Error:	0.00 usft	**Output errors are at**	2.000 sigma
Reference Wellbore	OH	**Database:**	EDM 5000.14 Single User Db
Reference Design:	Plan #1 - IP	**Offset TVD Reference:**	Offset Datum

Offset Design Roadrunner Fed COM - #3H - OH - Plan #1 — **Offset Site Error:** 0.00 usft

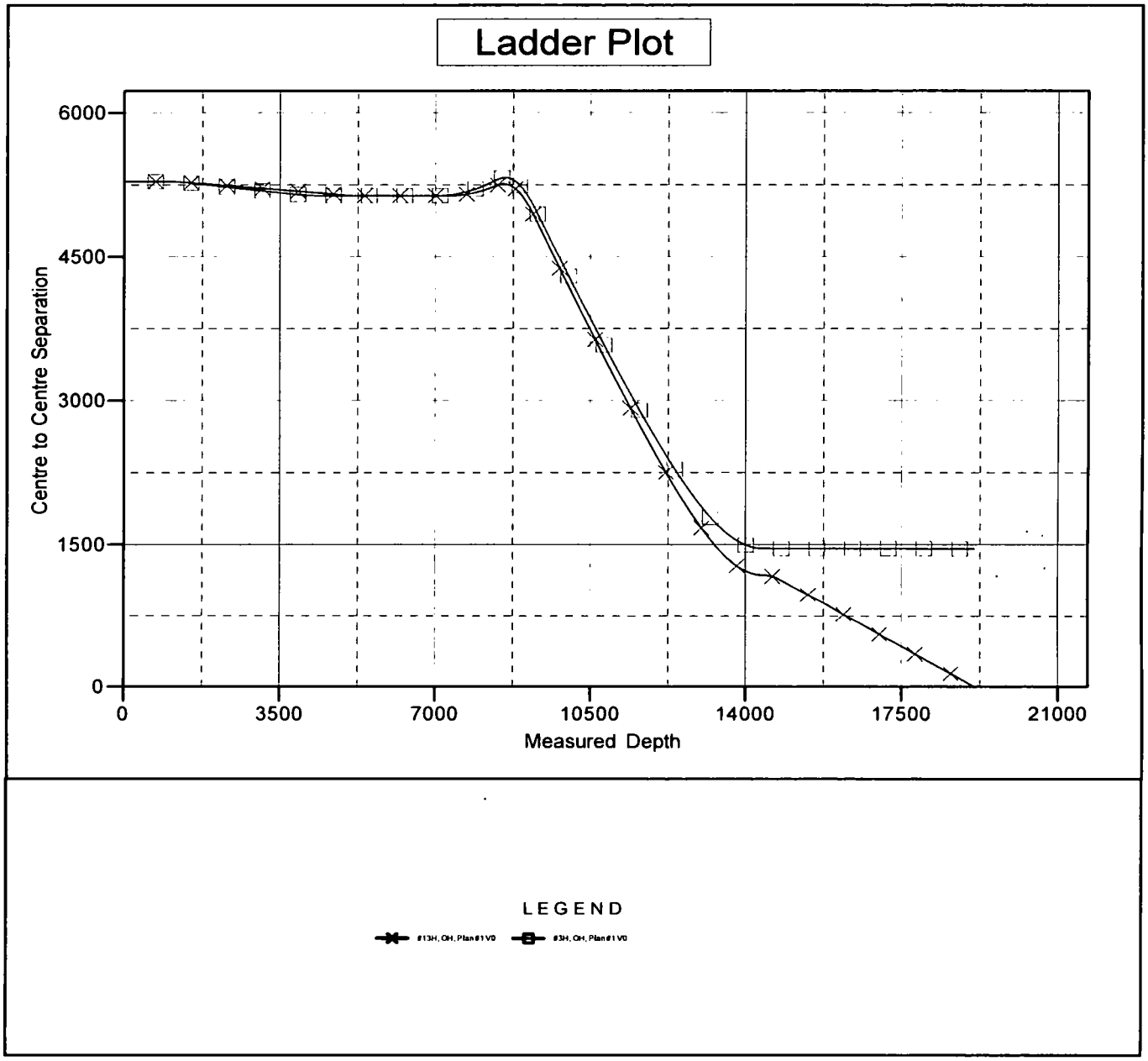
Survey Program: 0-MWD — **Offset Well Error:** 0.00 usft

Reference Measured Depth (usft)	Reference Vertical Depth (usft)	Offset Measured Depth (usft)	Offset Vertical Depth (usft)	Semi Major Axis Reference (usft)	Semi Major Axis Offset (usft)	Highside Toolface (°)	Offset Wellbore Centre +N/-S (usft)	Offset Wellbore Centre +E/-W (usft)	Distance Between Centres (usft)	Distance Between Ellipses (usft)	Minimum Separation (usft)	Separation Factor	Warning
14,500.00	8,944.00	7,788.11	7,369.86	108.09	18.04	-1.64	5,745.93	-279.72	1,465.54	1,408.65	56.888	25.762	
14,600.00	8,943.83	7,888.11	7,369.76	109.91	19.03	-1.61	5,845.93	-279.62	1,465.44	1,407.62	57.825	25.343	
14,700.00	8,943.66	7,988.10	7,369.66	111.73	20.15	-1.58	5,945.93	-279.52	1,465.35	1,406.55	58.801	24.921	
14,800.00	8,943.49	8,088.10	7,369.56	113.56	21.36	-1.54	6,045.92	-279.42	1,465.26	1,405.45	59.812	24.498	
14,900.00	8,943.31	8,188.10	7,369.46	115.38	22.66	-1.51	6,145.92	-279.32	1,465.17	1,404.31	60.857	24.075	
15,000.00	8,943.14	8,288.09	7,369.36	117.20	24.04	-1.48	6,245.92	-279.22	1,465.07	1,403.14	61.933	23.656	
15,100.00	8,942.97	8,388.09	7,369.26	119.03	25.47	-1.45	6,345.92	-279.12	1,464.98	1,401.94	63.037	23.240	
15,200.00	8,942.79	8,488.09	7,369.15	120.86	26.96	-1.42	6,445.91	-279.02	1,464.89	1,400.72	64.167	22.829	
15,300.00	8,942.62	8,588.08	7,369.05	122.68	28.48	-1.39	6,545.91	-278.92	1,464.80	1,399.48	65.321	22.425	
15,400.00	8,942.45	8,688.08	7,368.95	124.51	30.05	-1.36	6,645.91	-278.81	1,464.71	1,398.21	66.497	22.027	
15,500.00	8,942.28	8,788.08	7,368.85	126.34	31.64	-1.33	6,745.90	-278.71	1,464.62	1,396.93	67.692	21.636	
15,600.00	8,942.10	8,888.07	7,368.75	128.17	33.26	-1.30	6,845.90	-278.61	1,464.53	1,395.62	68.906	21.254	
15,700.00	8,941.93	8,988.07	7,368.65	130.00	34.90	-1.27	6,945.90	-278.51	1,464.44	1,394.30	70.136	20.880	
15,800.00	8,941.76	9,088.07	7,368.55	131.83	36.57	-1.23	7,045.89	-278.41	1,464.35	1,392.97	71.381	20.514	
15,900.00	8,941.58	9,188.06	7,368.44	133.66	38.25	-1.20	7,145.89	-278.31	1,464.26	1,391.62	72.640	20.158	
16,000.00	8,941.41	9,288.06	7,368.34	135.49	39.94	-1.17	7,245.89	-278.21	1,464.18	1,390.26	73.912	19.810	
16,100.00	8,941.24	9,388.06	7,368.24	137.32	41.65	-1.14	7,345.88	-278.11	1,464.09	1,388.89	75.195	19.471	
16,200.00	8,941.07	9,488.05	7,368.14	139.15	43.37	-1.11	7,445.88	-278.01	1,464.00	1,387.51	76.489	19.140	
16,300.00	8,940.89	9,588.05	7,368.04	140.99	45.10	-1.08	7,545.88	-277.91	1,463.92	1,386.12	77.792	18.818	
16,400.00	8,940.72	9,688.05	7,367.94	142.82	46.84	-1.05	7,645.87	-277.80	1,463.83	1,384.72	79.104	18.505	
16,500.00	8,940.55	9,788.05	7,367.84	144.66	48.59	-1.02	7,745.87	-277.70	1,463.74	1,383.32	80.425	18.200	
16,600.00	8,940.37	9,888.04	7,367.73	146.49	50.35	-0.99	7,845.87	-277.60	1,463.66	1,381.91	81.753	17.903	
16,700.00	8,940.20	9,988.04	7,367.63	148.33	52.11	-0.96	7,945.86	-277.50	1,463.57	1,380.49	83.088	17.615	
16,800.00	8,940.03	10,088.04	7,367.53	150.16	53.88	-0.93	8,045.86	-277.40	1,463.49	1,379.06	84.429	17.334	
16,900.00	8,939.86	10,188.03	7,367.43	152.00	55.65	-0.89	8,145.86	-277.30	1,463.41	1,377.63	85.777	17.061	
17,000.00	8,939.68	10,288.03	7,367.33	153.83	57.43	-0.86	8,245.85	-277.20	1,463.32	1,376.19	87.130	16.795	
17,100.00	8,939.51	10,388.03	7,367.23	155.67	59.21	-0.83	8,345.85	-277.10	1,463.24	1,374.75	88.488	16.536	
17,200.00	8,939.34	10,488.02	7,367.13	157.51	61.00	-0.80	8,445.85	-277.00	1,463.16	1,373.31	89.851	16.284	
17,300.00	8,939.16	10,588.02	7,367.02	159.35	62.79	-0.77	8,545.84	-276.89	1,463.07	1,371.86	91.218	16.039	
17,400.00	8,938.99	10,688.02	7,366.92	161.18	64.58	-0.74	8,645.84	-276.79	1,462.99	1,370.40	92.590	15.801	
17,500.00	8,938.82	10,788.01	7,366.82	163.02	66.38	-0.71	8,745.84	-276.69	1,462.91	1,368.94	93.966	15.569	
17,600.00	8,938.65	10,888.01	7,366.72	164.86	68.18	-0.68	8,845.83	-276.59	1,462.83	1,367.48	95.345	15.342	
17,700.00	8,938.47	10,988.01	7,366.62	166.70	69.98	-0.65	8,945.83	-276.49	1,462.75	1,366.02	96.728	15.122	
17,800.00	8,938.30	11,088.00	7,366.52	168.54	71.79	-0.62	9,045.83	-276.39	1,462.67	1,364.56	98.114	14.908	
17,900.00	8,938.13	11,188.00	7,366.41	170.38	73.60	-0.58	9,145.82	-276.29	1,462.59	1,363.09	99.503	14.699	
18,000.00	8,937.95	11,288.00	7,366.31	172.22	75.40	-0.55	9,245.82	-276.19	1,462.51	1,361.62	100.895	14.495	
18,100.00	8,937.78	11,387.99	7,366.21	174.06	77.22	-0.52	9,345.82	-276.09	1,462.43	1,360.14	102.290	14.297	
18,200.00	8,937.61	11,487.99	7,366.11	175.90	79.03	-0.49	9,445.81	-275.99	1,462.35	1,358.67	103.687	14.104	
18,300.00	8,937.44	11,587.99	7,366.01	177.74	80.84	-0.46	9,545.81	-275.88	1,462.27	1,357.19	105.087	13.915	
18,400.00	8,937.26	11,687.99	7,365.91	179.58	82.66	-0.43	9,645.81	-275.78	1,462.20	1,355.71	106.489	13.731	
18,500.00	8,937.09	11,787.98	7,365.81	181.42	84.48	-0.40	9,745.80	-275.68	1,462.12	1,354.23	107.893	13.552	
18,600.00	8,936.92	11,887.98	7,365.70	183.26	86.30	-0.37	9,845.80	-275.58	1,462.04	1,352.74	109.300	13.376	
18,700.00	8,936.74	11,987.98	7,365.60	185.11	88.12	-0.34	9,945.80	-275.48	1,461.97	1,351.26	110.708	13.206	
18,800.00	8,936.57	12,087.97	7,365.50	186.95	89.94	-0.30	10,045.79	-275.38	1,461.89	1,349.77	112.119	13.039	
18,900.00	8,936.40	12,187.97	7,365.40	188.79	91.76	-0.27	10,145.79	-275.28	1,461.82	1,348.29	113.531	12.876	
19,000.00	8,936.23	12,287.97	7,365.30	190.63	93.59	-0.24	10,245.79	-275.18	1,461.74	1,346.80	114.945	12.717	
19,100.00	8,936.05	12,387.96	7,365.20	192.47	95.41	-0.21	10,345.78	-275.08	1,461.67	1,345.31	116.361	12.562	
19,130.59	8,936.00	12,418.55	7,365.17	193.04	95.97	-0.20	10,376.37	-275.05	1,461.64	1,344.85	116.794	12.515	CC, ES, SF

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

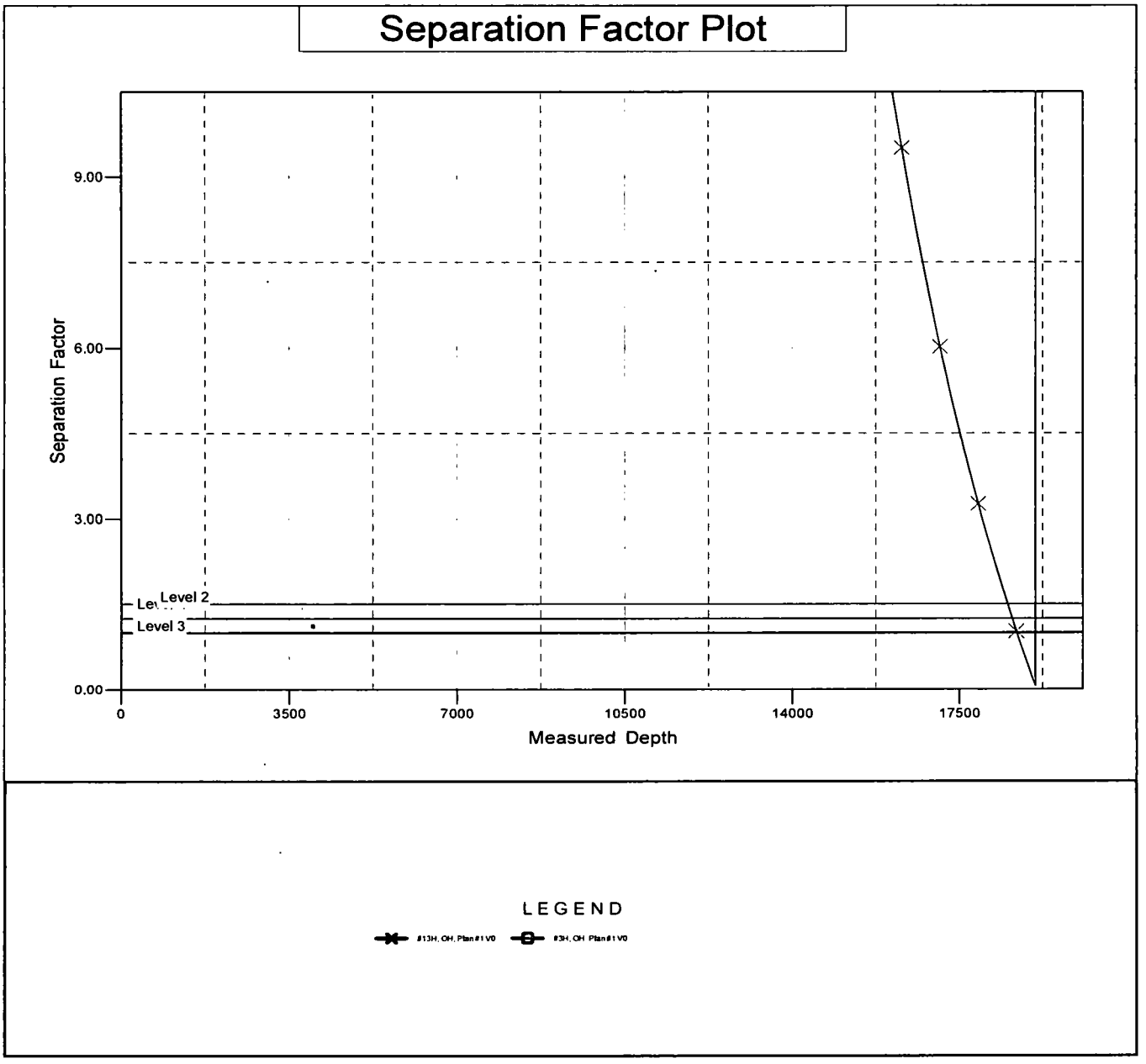
Company:	COG OPERATING, LLC	**Local Co-ordinate Reference:**	Well #23H
Project:	Eddy County, NM (NAD27) NMZ	**TVD Reference:**	RKB @ 3375.60usft (Latshaw 44 - RKB=25')
Reference Site:	Roadrunner Fed COM	**MD Reference:**	RKB @ 3375.60usft (Latshaw 44 - RKB=25')
Site Error:	0.00 usft	**North Reference:**	Grid
Reference Well:	#23H	**Survey Calculation Method:**	Minimum Curvature
Well Error:	0.00 usft	**Output errors are at**	2.000 sigma
Reference Wellbore	OH	**Database:**	EDM 5000.14 Single User Db
Reference Design:	Plan #1 - IP	**Offset TVD Reference:**	Offset Datum

Reference Depths are relative to RKB @ 3375.60usft (Latshaw 44 - RK	Coordinates are relative to: #23H
Offset Depths are relative to Offset Datum	Coordinate System is US State Plane 1927 (Exact solution), New Mexico East 30
Central Meridian is 104° 20' 0.000 W	Grid Convergence at Surface is: 0.05°



Company:	COG OPERATING, LLC	**Local Co-ordinate Reference:**	Well #23H
Project:	Eddy County, NM (NAD27) NMZ	**TVD Reference:**	RKB @ 3375.60usft (Latshaw 44 - RKB=25')
Reference Site:	Roadrunner Fed COM	**MD Reference:**	RKB @ 3375.60usft (Latshaw 44 - RKB=25')
Site Error:	0.00 usft	**North Reference:**	Grid
Reference Well:	#23H	**Survey Calculation Method:**	Minimum Curvature
Well Error:	0.00 usft	**Output errors are at**	2.000 sigma
Reference Wellbore	OH	**Database:**	EDM 5000.14 Single User Db
Reference Design:	Plan #1 - IP	**Offset TVD Reference:**	Offset Datum

Reference Depths are relative to RKB @ 3375.60usft (Latshaw 44 - RK	Coordinates are relative to: #23H
Offset Depths are relative to Offset Datum	Coordinate System is US State Plane 1927 (Exact solution), New Mexico East 30
Central Meridian is 104° 20' 0.000 W	Grid Convergence at Surface is: 0.05°



COG OPERATING, LLC

Eddy County, NM (NAD27) NMZ

Roadrunner Fed COM #23H

SHL: 210' FSL, 2,180' FWL, Sec36, T-25S, R-26E, Unit N
PP: 330' FSL, 1,980' FWL, Sec36, T-25S, R-26E, Unit N
PBHL: 200' FNL, 1,980' FWL, Sec25, T-25S, R-26E, Unit C

Plan: Plan #1 - IP

Standard Planning Report

12 April, 2018

Database:	EDM 5000.14 Single User Db	**Local Co-ordinate Reference:**	Well #23H
Company:	COG OPERATING, LLC	**TVD Reference:**	RKB @ 3375.60usft (Latshaw 44 - RKB=25')
Project:	Eddy County, NM (NAD27) NMZ	**MD Reference:**	RKB @ 3375.60usft (Latshaw 44 - RKB=25')
Site:	Roadrunner Fed COM	**North Reference:**	Grid
Well:	#23H	**Survey Calculation Method:**	Minimum Curvature
Wellbore:	OH		
Design:	Plan #1 - IP		

Project	Eddy County, NM (NAD27) NMZ		
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	Roadrunner Fed COM				
Site Position:		**Northing:**	397,932.60 usft	**Latitude:**	32° 5' 38.414 N
From:	Map	**Easting:**	526,403.60 usft	**Longitude:**	104° 14' 53.059 W
Position Uncertainty:	0.00 usft	**Slot Radius:**	13-3/16 "	**Grid Convergence:**	0.05 °

Well	#23H					
Well Position	**+N/-S**	-5,283.30 usft	**Northing:**	392,649.30 usft	**Latitude:**	32° 4' 46.127 N
	+E/-W	137.30 usft	**Easting:**	526,540.90 usft	**Longitude:**	104° 14' 51.511 W
Position Uncertainty		0.00 usft	**Wellhead Elevation:**		**Ground Level:**	3,350.60 usft

Wellbore	OH				
Magnetics	**Model Name**	**Sample Date**	**Declination (°)**	**Dip Angle (°)**	**Field Strength (nT)**
	IGRF2015	04/12/18	7.17	59.81	47,696.14620821

Design	Plan #1 - IP				
Audit Notes:					
Version:		**Phase:**	PLAN	**Tie On Depth:**	0.00
Vertical Section:	**Depth From (TVD) (usft)**	**+N/-S (usft)**	**+E/-W (usft)**	**Direction (°)**	
	7,749.00	0.00	0.00	359.60	

Plan Survey Tool Program **Date** 04/12/18

	Depth From (usft)	Depth To (usft)	Survey (Wellbore)	Tool Name	Remarks
1	0.00	19,130.59	Plan #1 - IP (OH)	MWD	
				MWD v3:standard declination	

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	
8,388.00	0.00	0.00	8,388.00	0.00	0.00	0.00	0.00	0.00	0.00	
8,751.64	40.00	320.70	8,722.81	94.30	-77.18	11.00	11.00	0.00	320.70	
9,297.76	90.10	359.60	8,953.00	545.27	-201.88	11.00	9.17	7.12	46.44	
19,130.59	90.10	359.60	8,936.00	10,377.85	-269.90	0.00	0.00	0.00	0.00	PBHL(RFC#13H)

Database:	EDM 5000.14 Single User Db	**Local Co-ordinate Reference:**	Well #23H
Company:	COG OPERATING, LLC	**TVD Reference:**	RKB @ 3375.60usft (Latshaw 44 - RKB=25')
Project:	Eddy County, NM (NAD27) NMZ	**MD Reference:**	RKB @ 3375.60usft (Latshaw 44 - RKB=25')
Site:	Roadrunner Fed COM	**North Reference:**	Grid
Well:	#23H	**Survey Calculation Method:**	Minimum Curvature
Wellbore:	OH		
Design:	Plan #1 - IP		

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
SHL(PRF#23H)									
100.00	0.00	0.00	100.00	0.00	0.00	0.00	0.00	0.00	0.00
200.00	0.00	0.00	200.00	0.00	0.00	0.00	0.00	0.00	0.00
300.00	0.00	0.00	300.00	0.00	0.00	0.00	0.00	0.00	0.00
400.00	0.00	0.00	400.00	0.00	0.00	0.00	0.00	0.00	0.00
500.00	0.00	0.00	500.00	0.00	0.00	0.00	0.00	0.00	0.00
600.00	0.00	0.00	600.00	0.00	0.00	0.00	0.00	0.00	0.00
700.00	0.00	0.00	700.00	0.00	0.00	0.00	0.00	0.00	0.00
800.00	0.00	0.00	800.00	0.00	0.00	0.00	0.00	0.00	0.00
900.00	0.00	0.00	900.00	0.00	0.00	0.00	0.00	0.00	0.00
1,000.00	0.00	0.00	1,000.00	0.00	0.00	0.00	0.00	0.00	0.00
1,100.00	0.00	0.00	1,100.00	0.00	0.00	0.00	0.00	0.00	0.00
1,200.00	0.00	0.00	1,200.00	0.00	0.00	0.00	0.00	0.00	0.00
1,300.00	0.00	0.00	1,300.00	0.00	0.00	0.00	0.00	0.00	0.00
1,400.00	0.00	0.00	1,400.00	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	0.00	0.00	1,600.00	0.00	0.00	0.00	0.00	0.00	0.00
1,700.00	0.00	0.00	1,700.00	0.00	0.00	0.00	0.00	0.00	0.00
1,800.00	0.00	0.00	1,800.00	0.00	0.00	0.00	0.00	0.00	0.00
1,900.00	0.00	0.00	1,900.00	0.00	0.00	0.00	0.00	0.00	0.00
2,000.00	0.00	0.00	2,000.00	0.00	0.00	0.00	0.00	0.00	0.00
2,100.00	0.00	0.00	2,100.00	0.00	0.00	0.00	0.00	0.00	0.00
2,200.00	0.00	0.00	2,200.00	0.00	0.00	0.00	0.00	0.00	0.00
2,300.00	0.00	0.00	2,300.00	0.00	0.00	0.00	0.00	0.00	0.00
2,400.00	0.00	0.00	2,400.00	0.00	0.00	0.00	0.00	0.00	0.00
2,500.00	0.00	0.00	2,500.00	0.00	0.00	0.00	0.00	0.00	0.00
2,600.00	0.00	0.00	2,600.00	0.00	0.00	0.00	0.00	0.00	0.00
2,700.00	0.00	0.00	2,700.00	0.00	0.00	0.00	0.00	0.00	0.00
2,800.00	0.00	0.00	2,800.00	0.00	0.00	0.00	0.00	0.00	0.00
2,900.00	0.00	0.00	2,900.00	0.00	0.00	0.00	0.00	0.00	0.00
3,000.00	0.00	0.00	3,000.00	0.00	0.00	0.00	0.00	0.00	0.00
3,100.00	0.00	0.00	3,100.00	0.00	0.00	0.00	0.00	0.00	0.00
3,200.00	0.00	0.00	3,200.00	0.00	0.00	0.00	0.00	0.00	0.00
3,300.00	0.00	0.00	3,300.00	0.00	0.00	0.00	0.00	0.00	0.00
3,400.00	0.00	0.00	3,400.00	0.00	0.00	0.00	0.00	0.00	0.00
3,500.00	0.00	0.00	3,500.00	0.00	0.00	0.00	0.00	0.00	0.00
3,600.00	0.00	0.00	3,600.00	0.00	0.00	0.00	0.00	0.00	0.00
3,700.00	0.00	0.00	3,700.00	0.00	0.00	0.00	0.00	0.00	0.00
3,800.00	0.00	0.00	3,800.00	0.00	0.00	0.00	0.00	0.00	0.00
3,900.00	0.00	0.00	3,900.00	0.00	0.00	0.00	0.00	0.00	0.00
4,000.00	0.00	0.00	4,000.00	0.00	0.00	0.00	0.00	0.00	0.00
4,100.00	0.00	0.00	4,100.00	0.00	0.00	0.00	0.00	0.00	0.00
4,200.00	0.00	0.00	4,200.00	0.00	0.00	0.00	0.00	0.00	0.00
4,300.00	0.00	0.00	4,300.00	0.00	0.00	0.00	0.00	0.00	0.00
4,400.00	0.00	0.00	4,400.00	0.00	0.00	0.00	0.00	0.00	0.00
4,500.00	0.00	0.00	4,500.00	0.00	0.00	0.00	0.00	0.00	0.00
4,600.00	0.00	0.00	4,600.00	0.00	0.00	0.00	0.00	0.00	0.00
4,700.00	0.00	0.00	4,700.00	0.00	0.00	0.00	0.00	0.00	0.00
4,800.00	0.00	0.00	4,800.00	0.00	0.00	0.00	0.00	0.00	0.00
4,900.00	0.00	0.00	4,900.00	0.00	0.00	0.00	0.00	0.00	0.00
5,000.00	0.00	0.00	5,000.00	0.00	0.00	0.00	0.00	0.00	0.00
5,100.00	0.00	0.00	5,100.00	0.00	0.00	0.00	0.00	0.00	0.00
5,200.00	0.00	0.00	5,200.00	0.00	0.00	0.00	0.00	0.00	0.00

Database:	EDM 5000.14 Single User Db	**Local Co-ordinate Reference:**	Well #23H
Company:	COG OPERATING, LLC	**TVD Reference:**	RKB @ 3375.60usft (Latshaw 44 - RKB=25')
Project:	Eddy County, NM (NAD27) NMZ	**MD Reference:**	RKB @ 3375.60usft (Latshaw 44 - RKB=25')
Site:	Roadrunner Fed COM	**North Reference:**	Grid
Well:	#23H	**Survey Calculation Method:**	Minimum Curvature
Wellbore:	OH		
Design:	Plan #1 - IP		

Planned Survey

Measured Depth (usft)	Inclination (°)	Azimuth (°)	Vertical Depth (usft)	+N/-S (usft)	+E/-W (usft)	Vertical Section (usft)	Dogleg Rate (°/100usft)	Build Rate (°/100usft)	Turn Rate (°/100usft)
5,300.00	0.00	0.00	5,300.00	0.00	0.00	0.00	0.00	0.00	0.00
5,400.00	0.00	0.00	5,400.00	0.00	0.00	0.00	0.00	0.00	0.00
5,500.00	0.00	0.00	5,500.00	0.00	0.00	0.00	0.00	0.00	0.00
5,600.00	0.00	0.00	5,600.00	0.00	0.00	0.00	0.00	0.00	0.00
5,700.00	0.00	0.00	5,700.00	0.00	0.00	0.00	0.00	0.00	0.00
5,800.00	0.00	0.00	5,800.00	0.00	0.00	0.00	0.00	0.00	0.00
5,900.00	0.00	0.00	5,900.00	0.00	0.00	0.00	0.00	0.00	0.00
6,000.00	0.00	0.00	6,000.00	0.00	0.00	0.00	0.00	0.00	0.00
6,100.00	0.00	0.00	6,100.00	0.00	0.00	0.00	0.00	0.00	0.00
6,200.00	0.00	0.00	6,200.00	0.00	0.00	0.00	0.00	0.00	0.00
6,300.00	0.00	0.00	6,300.00	0.00	0.00	0.00	0.00	0.00	0.00
6,400.00	0.00	0.00	6,400.00	0.00	0.00	0.00	0.00	0.00	0.00
6,500.00	0.00	0.00	6,500.00	0.00	0.00	0.00	0.00	0.00	0.00
6,600.00	0.00	0.00	6,600.00	0.00	0.00	0.00	0.00	0.00	0.00
6,700.00	0.00	0.00	6,700.00	0.00	0.00	0.00	0.00	0.00	0.00
6,800.00	0.00	0.00	6,800.00	0.00	0.00	0.00	0.00	0.00	0.00
6,900.00	0.00	0.00	6,900.00	0.00	0.00	0.00	0.00	0.00	0.00
7,000.00	0.00	0.00	7,000.00	0.00	0.00	0.00	0.00	0.00	0.00
7,100.00	0.00	0.00	7,100.00	0.00	0.00	0.00	0.00	0.00	0.00
7,200.00	0.00	0.00	7,200.00	0.00	0.00	0.00	0.00	0.00	0.00
7,300.00	0.00	0.00	7,300.00	0.00	0.00	0.00	0.00	0.00	0.00
7,400.00	0.00	0.00	7,400.00	0.00	0.00	0.00	0.00	0.00	0.00
7,500.00	0.00	0.00	7,500.00	0.00	0.00	0.00	0.00	0.00	0.00
7,600.00	0.00	0.00	7,600.00	0.00	0.00	0.00	0.00	0.00	0.00
7,700.00	0.00	0.00	7,700.00	0.00	0.00	0.00	0.00	0.00	0.00
7,800.00	0.00	0.00	7,800.00	0.00	0.00	0.00	0.00	0.00	0.00
7,900.00	0.00	0.00	7,900.00	0.00	0.00	0.00	0.00	0.00	0.00
8,000.00	0.00	0.00	8,000.00	0.00	0.00	0.00	0.00	0.00	0.00
8,100.00	0.00	0.00	8,100.00	0.00	0.00	0.00	0.00	0.00	0.00
8,200.00	0.00	0.00	8,200.00	0.00	0.00	0.00	0.00	0.00	0.00
8,300.00	0.00	0.00	8,300.00	0.00	0.00	0.00	0.00	0.00	0.00
8,388.00	0.00	0.00	8,388.00	0.00	0.00	0.00	0.00	0.00	0.00
KOP: 8388.00' MD, 8388.00' TVD - Build at 11°/100ft to 40° INC @ 320.7° AZ									
8,400.00	1.32	320.70	8,400.00	0.11	-0.09	0.11	11.00	11.00	0.00
8,450.00	6.82	320.70	8,449.85	2.85	-2.33	2.87	11.00	11.00	0.00
8,500.00	12.32	320.70	8,499.14	9.28	-7.60	9.34	11.00	11.00	0.00
8,550.00	17.82	320.70	8,547.40	19.34	-15.83	19.45	11.00	11.00	0.00
8,600.00	23.32	320.70	8,594.20	32.93	-26.95	33.11	11.00	11.00	0.00
8,650.00	28.82	320.70	8,639.09	49.92	-40.86	50.21	11.00	11.00	0.00
8,700.00	34.32	320.70	8,681.67	70.17	-57.44	70.57	11.00	11.00	0.00
8,751.64	40.00	320.70	8,722.81	94.30	-77.19	94.84	11.00	11.00	0.00
Build & Turn: 90.1° INC, 359.6° AZ/ 2° DLS									
8,800.00	43.81	326.27	8,758.81	120.27	-96.34	120.94	11.00	7.87	11.52
8,850.00	47.99	331.25	8,793.61	150.97	-114.90	151.77	11.00	8.36	9.96
8,900.00	52.36	335.60	8,825.64	185.31	-132.02	186.23	11.00	8.74	8.70
8,946.12	56.52	339.18	8,852.46	219.94	-146.41	220.95	11.00	9.02	7.75
FTP(RFC#23H)									
8,950.00	56.87	339.46	8,854.59	222.97	-147.56	224.00	11.00	9.13	7.34
9,000.00	61.49	342.94	8,880.20	263.61	-161.36	264.73	11.00	9.24	6.96
9,050.00	66.19	346.12	8,902.24	306.85	-173.30	308.05	11.00	9.40	6.37
9,100.00	70.95	349.08	8,920.51	352.30	-183.27	353.57	11.00	9.52	5.92
9,150.00	75.76	351.87	8,934.83	399.52	-191.18	400.85	11.00	9.61	5.59
9,200.00	80.60	354.55	8,945.07	448.10	-196.95	449.47	11.00	9.67	5.35

Database:	EDM 5000.14 Single User Db	**Local Co-ordinate Reference:**	Well #23H
Company:	COG OPERATING, LLC	**TVD Reference:**	RKB @ 3375.60usft (Latshaw 44 - RKB=25')
Project:	Eddy County, NM (NAD27) NMZ	**MD Reference:**	RKB @ 3375.60usft (Latshaw 44 - RKB=25')
Site:	Roadrunner Fed COM	**North Reference:**	Grid
Well:	#23H	**Survey Calculation Method:**	Minimum Curvature
Wellbore:	OH		
Design:	Plan #1 - IP		

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)
9,250.00	85.45	357.15	8,951.14	497.58	-200.53	498.97	11.00	9.71	5.20
9,297.73	90.10	359.60	8,953.00	545.24	-201.88	546.64	11.00	9.73	5.13
EOC: 9297.73' MD, 8953.00' TVD, 90.10° INC, 359.60° AZ, 546.64' VS									
9,297.76	90.10	359.60	8,953.00	545.27	-201.88	546.66	11.00	9.73	5.12
9,300.00	90.10	359.60	8,952.99	547.51	-201.90	548.91	0.00	0.00	0.00
9,400.00	90.10	359.60	8,952.82	647.51	-202.59	648.91	0.00	0.00	0.00
9,500.00	90.10	359.60	8,952.65	747.51	-203.28	748.91	0.00	0.00	0.00
9,600.00	90.10	359.60	8,952.47	847.50	-203.97	848.91	0.00	0.00	0.00
9,700.00	90.10	359.60	8,952.30	947.50	-204.66	948.91	0.00	0.00	0.00
9,800.00	90.10	359.60	8,952.13	1,047.50	-205.36	1,048.91	0.00	0.00	0.00
9,900.00	90.10	359.60	8,951.96	1,147.50	-206.05	1,148.91	0.00	0.00	0.00
10,000.00	90.10	359.60	8,951.78	1,247.49	-206.74	1,248.91	0.00	0.00	0.00
10,100.00	90.10	359.60	8,951.61	1,347.49	-207.43	1,348.91	0.00	0.00	0.00
10,200.00	90.10	359.60	8,951.44	1,447.49	-208.12	1,448.91	0.00	0.00	0.00
10,300.00	90.10	359.60	8,951.26	1,547.49	-208.81	1,548.91	0.00	0.00	0.00
10,400.00	90.10	359.60	8,951.09	1,647.48	-209.51	1,648.91	0.00	0.00	0.00
10,500.00	90.10	359.60	8,950.92	1,747.48	-210.20	1,748.91	0.00	0.00	0.00
10,600.00	90.10	359.60	8,950.75	1,847.48	-210.89	1,848.91	0.00	0.00	0.00
10,700.00	90.10	359.60	8,950.57	1,947.48	-211.58	1,948.91	0.00	0.00	0.00
10,800.00	90.10	359.60	8,950.40	2,047.47	-212.27	2,048.90	0.00	0.00	0.00
10,900.00	90.10	359.60	8,950.23	2,147.47	-212.97	2,148.90	0.00	0.00	0.00
11,000.00	90.10	359.60	8,950.05	2,247.47	-213.66	2,248.90	0.00	0.00	0.00
11,100.00	90.10	359.60	8,949.88	2,347.47	-214.35	2,348.90	0.00	0.00	0.00
11,200.00	90.10	359.60	8,949.71	2,447.46	-215.04	2,448.90	0.00	0.00	0.00
11,300.00	90.10	359.60	8,949.54	2,547.46	-215.73	2,548.90	0.00	0.00	0.00
11,400.00	90.10	359.60	8,949.36	2,647.46	-216.42	2,648.90	0.00	0.00	0.00
11,500.00	90.10	359.60	8,949.19	2,747.46	-217.12	2,748.90	0.00	0.00	0.00
11,600.00	90.10	359.60	8,949.02	2,847.45	-217.81	2,848.90	0.00	0.00	0.00
11,700.00	90.10	359.60	8,948.84	2,947.45	-218.50	2,948.90	0.00	0.00	0.00
11,800.00	90.10	359.60	8,948.67	3,047.45	-219.19	3,048.90	0.00	0.00	0.00
11,900.00	90.10	359.60	8,948.50	3,147.44	-219.88	3,148.90	0.00	0.00	0.00
12,000.00	90.10	359.60	8,948.33	3,247.44	-220.57	3,248.90	0.00	0.00	0.00
12,100.00	90.10	359.60	8,948.15	3,347.44	-221.27	3,348.90	0.00	0.00	0.00
12,200.00	90.10	359.60	8,947.98	3,447.44	-221.96	3,448.90	0.00	0.00	0.00
12,300.00	90.10	359.60	8,947.81	3,547.43	-222.65	3,548.90	0.00	0.00	0.00
12,400.00	90.10	359.60	8,947.63	3,647.43	-223.34	3,648.90	0.00	0.00	0.00
12,500.00	90.10	359.60	8,947.46	3,747.43	-224.03	3,748.90	0.00	0.00	0.00
12,600.00	90.10	359.60	8,947.29	3,847.43	-224.72	3,848.90	0.00	0.00	0.00
12,700.00	90.10	359.60	8,947.12	3,947.42	-225.42	3,948.90	0.00	0.00	0.00
12,800.00	90.10	359.60	8,946.94	4,047.42	-226.11	4,048.90	0.00	0.00	0.00
12,900.00	90.10	359.60	8,946.77	4,147.42	-226.80	4,148.90	0.00	0.00	0.00
13,000.00	90.10	359.60	8,946.60	4,247.42	-227.49	4,248.90	0.00	0.00	0.00
13,100.00	90.10	359.60	8,946.42	4,347.41	-228.18	4,348.90	0.00	0.00	0.00
13,200.00	90.10	359.60	8,946.25	4,447.41	-228.88	4,448.90	0.00	0.00	0.00
13,300.00	90.10	359.60	8,946.08	4,547.41	-229.57	4,548.90	0.00	0.00	0.00
13,400.00	90.10	359.60	8,945.91	4,647.41	-230.26	4,648.90	0.00	0.00	0.00
13,500.00	90.10	359.60	8,945.73	4,747.40	-230.95	4,748.90	0.00	0.00	0.00
13,600.00	90.10	359.60	8,945.56	4,847.40	-231.64	4,848.90	0.00	0.00	0.00
13,700.00	90.10	359.60	8,945.39	4,947.40	-232.33	4,948.90	0.00	0.00	0.00
13,800.00	90.10	359.60	8,945.21	5,047.40	-233.03	5,048.90	0.00	0.00	0.00
13,900.00	90.10	359.60	8,945.04	5,147.39	-233.72	5,148.90	0.00	0.00	0.00
14,000.00	90.10	359.60	8,944.87	5,247.39	-234.41	5,248.90	0.00	0.00	0.00
14,100.00	90.10	359.60	8,944.70	5,347.39	-235.10	5,348.90	0.00	0.00	0.00

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Project:	Eddy County, NM (NAD27) NMZ	**MD Reference:**	RKB @ 3375.60usft (Latshaw 44 - RKB=25')
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Well:	#23H	**Survey Calculation Method:**	Minimum Curvature
Wellbore:	OH		
Design:	Plan #1 - IP		

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)
14,200.00	90.10	359.60	8,944.52	5,447.39	-235.79	5,448.90	0.00	0.00	0.00
14,300.00	90.10	359.60	8,944.35	5,547.38	-236.48	5,548.90	0.00	0.00	0.00
14,400.00	90.10	359.60	8,944.18	5,647.38	-237.18	5,648.90	0.00	0.00	0.00
14,500.00	90.10	359.60	8,944.00	5,747.38	-237.87	5,748.90	0.00	0.00	0.00
14,600.00	90.10	359.60	8,943.83	5,847.38	-238.56	5,848.90	0.00	0.00	0.00
14,700.00	90.10	359.60	8,943.66	5,947.37	-239.25	5,948.90	0.00	0.00	0.00
14,800.00	90.10	359.60	8,943.49	6,047.37	-239.94	6,048.90	0.00	0.00	0.00
14,900.00	90.10	359.60	8,943.31	6,147.37	-240.64	6,148.90	0.00	0.00	0.00
15,000.00	90.10	359.60	8,943.14	6,247.37	-241.33	6,248.90	0.00	0.00	0.00
15,100.00	90.10	359.60	8,942.97	6,347.36	-242.02	6,348.90	0.00	0.00	0.00
15,200.00	90.10	359.60	8,942.79	6,447.36	-242.71	6,448.90	0.00	0.00	0.00
15,300.00	90.10	359.60	8,942.62	6,547.36	-243.40	6,548.90	0.00	0.00	0.00
15,400.00	90.10	359.60	8,942.45	6,647.36	-244.09	6,648.90	0.00	0.00	0.00
15,500.00	90.10	359.60	8,942.28	6,747.35	-244.79	6,748.90	0.00	0.00	0.00
15,600.00	90.10	359.60	8,942.10	6,847.35	-245.48	6,848.90	0.00	0.00	0.00
15,700.00	90.10	359.60	8,941.93	6,947.35	-246.17	6,948.90	0.00	0.00	0.00
15,800.00	90.10	359.60	8,941.76	7,047.35	-246.86	7,048.90	0.00	0.00	0.00
15,900.00	90.10	359.60	8,941.58	7,147.34	-247.55	7,148.90	0.00	0.00	0.00
16,000.00	90.10	359.60	8,941.41	7,247.34	-248.24	7,248.90	0.00	0.00	0.00
16,100.00	90.10	359.60	8,941.24	7,347.34	-248.94	7,348.90	0.00	0.00	0.00
16,200.00	90.10	359.60	8,941.07	7,447.34	-249.63	7,448.90	0.00	0.00	0.00
16,300.00	90.10	359.60	8,940.89	7,547.33	-250.32	7,548.90	0.00	0.00	0.00
16,400.00	90.10	359.60	8,940.72	7,647.33	-251.01	7,648.90	0.00	0.00	0.00
16,500.00	90.10	359.60	8,940.55	7,747.33	-251.70	7,748.90	0.00	0.00	0.00
16,600.00	90.10	359.60	8,940.37	7,847.33	-252.39	7,848.90	0.00	0.00	0.00
16,700.00	90.10	359.60	8,940.20	7,947.32	-253.09	7,948.90	0.00	0.00	0.00
16,800.00	90.10	359.60	8,940.03	8,047.32	-253.78	8,048.90	0.00	0.00	0.00
16,900.00	90.10	359.60	8,939.86	8,147.32	-254.47	8,148.90	0.00	0.00	0.00
17,000.00	90.10	359.60	8,939.68	8,247.32	-255.16	8,248.90	0.00	0.00	0.00
17,100.00	90.10	359.60	8,939.51	8,347.31	-255.85	8,348.90	0.00	0.00	0.00
17,200.00	90.10	359.60	8,939.34	8,447.31	-256.55	8,448.90	0.00	0.00	0.00
17,300.00	90.10	359.60	8,939.16	8,547.31	-257.24	8,548.90	0.00	0.00	0.00
17,400.00	90.10	359.60	8,938.99	8,647.31	-257.93	8,648.90	0.00	0.00	0.00
17,500.00	90.10	359.60	8,938.82	8,747.30	-258.62	8,748.90	0.00	0.00	0.00
17,600.00	90.10	359.60	8,938.65	8,847.30	-259.31	8,848.89	0.00	0.00	0.00
17,700.00	90.10	359.60	8,938.47	8,947.30	-260.00	8,948.89	0.00	0.00	0.00
17,800.00	90.10	359.60	8,938.30	9,047.30	-260.70	9,048.89	0.00	0.00	0.00
17,900.00	90.10	359.60	8,938.13	9,147.29	-261.39	9,148.89	0.00	0.00	0.00
18,000.00	90.10	359.60	8,937.95	9,247.29	-262.08	9,248.89	0.00	0.00	0.00
18,100.00	90.10	359.60	8,937.78	9,347.29	-262.77	9,348.89	0.00	0.00	0.00
18,200.00	90.10	359.60	8,937.61	9,447.28	-263.46	9,448.89	0.00	0.00	0.00
18,300.00	90.10	359.60	8,937.44	9,547.28	-264.15	9,548.89	0.00	0.00	0.00
18,400.00	90.10	359.60	8,937.26	9,647.28	-264.85	9,648.89	0.00	0.00	0.00
18,500.00	90.10	359.60	8,937.09	9,747.28	-265.54	9,748.89	0.00	0.00	0.00
18,600.00	90.10	359.60	8,936.92	9,847.27	-266.23	9,848.89	0.00	0.00	0.00
18,700.00	90.10	359.60	8,936.74	9,947.27	-266.92	9,948.89	0.00	0.00	0.00
18,800.00	90.10	359.60	8,936.57	10,047.27	-267.61	10,048.89	0.00	0.00	0.00
18,900.00	90.10	359.60	8,936.40	10,147.27	-268.30	10,148.89	0.00	0.00	0.00
19,000.00	90.10	359.60	8,936.23	10,247.26	-269.00	10,248.89	0.00	0.00	0.00
19,100.00	90.10	359.60	8,936.05	10,347.26	-269.69	10,348.89	0.00	0.00	0.00
19,130.59	90.10	359.60	8,936.00	10,377.85	-269.90	10,379.48	0.00	0.00	0.00

TD: 19130.59' MD, 8936.00' TVD - PBHL(RFC#13H)

Database:	EDM 5000.14 Single User Db	**Local Co-ordinate Reference:**	Well #23H
Company:	COG OPERATING, LLC	**TVD Reference:**	RKB @ 3375.60usft (Latshaw 44 - RKB=25')
Project:	Eddy County, NM (NAD27) NMZ	**MD Reference:**	RKB @ 3375.60usft (Latshaw 44 - RKB=25')
Site:	Roadrunner Fed COM	**North Reference:**	Grid
Well:	#23H	**Survey Calculation Method:**	Minimum Curvature
Wellbore:	OH		
Design:	Plan #1 - IP		

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
SHL(PRF#23H) - plan hits target center - Point	0.00	0.00	0.00	0.00	0.00	392,649.30	526,540.90	32° 4' 46.127 N	104° 14' 51.511 W
PBHL(RFC#13H) - plan hits target center - Point	0.00	0.00	8,936.00	10,377.85	-269.90	403,027.15	526,271.00	32° 6' 28.834 N	104° 14' 54.554 W
FTP(RFC#23H) - plan misses target center by 153.67usft at 8946.12usft MD (8852.46 TVD, 219.94 N, -146.41 E) - Point	0.00	0.00	8,956.00	118.94	-198.30	392,768.23	526,342.61	32° 4' 47.305 N	104° 14' 53.815 W

Plan Annotations

Measured Depth (usft)	Vertical Depth (usft)	Local Coordinates +N/-S (usft)	Local Coordinates +E/-W (usft)	Comment
8,388.00	8,388.00	0.00	0.00	KOP: 8388.00' MD, 8388.00' TVD
8,388.00	8,388.00	0.00	0.00	Build at 11°/100ft to 40° INC @ 320.7° AZ
8,751.64	8,722.81	94.30	-77.19	Build & Turn: 90.1° INC, 359.6° AZ/ 2° DLS
9,297.73	8,953.00	545.24	-201.88	EOC: 9297.73' MD, 8953.00' TVD, 90.10° INC, 359.60° AZ, 546.64' VS
19,130.59	8,936.00	10,377.85	-269.90	TD: 19130.59' MD, 8936.00' TVD

COG Operating, LLC - Roadrunner Federal Com 23H

	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 3rd 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 2nd 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?	

3. Cementing Program

Casing	# Sks	Wt. lb/ gal	Yld ft3/ sack	H_20 gal/sk	500# Comp. Strength (hours)	Slurry Description
Surf.	50	13.5	1.75	9	12	Lead: Class C + 4% Gel + 1% CaCl2
	250	14.8	1.34	6.34	8	Tail: Class C + 2% CaCl2
Inter.	1790	12.7	2.0	9.6	16	Lead: 35:65:6 C Blend
	250	14.8	1.34	6.34	8	Tail: Class C + 2% CaCl
5.5 Prod	120	11.9	2.5	19	72	Lead: 50:50:10 H Blend
	2830	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%
1st Intermediate	0'	50%
Production	7,910'	30% OH in Lateral (KOP to EOL) – 40% OH in Vertical

4. Pressure Control Equipment

N	A variance is requested for the use of a diverter on the surface casing. See attached for schematic.

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
			Blind Ram	x	3M
			Pipe Ram	x	
			Double Ram		
			Other*		
8-3/4"	13-5/8"	5M	Annular	x	50% testing pressure
			Blind Ram	x	5M
			Pipe Ram	x	
			Double Ram		
			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.

X	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	8.6 - 8.8	28-34	N/C
Surf csg	9-5/8" Int shoe	Brine Diesel Emulsion	8.4 - 9	28-34	N/C
9-5/8" Int shoe	Lateral TD	OBM	9.6 - 10.5	35-45	<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

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.
Y	No 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	

7. Drilling Conditions

Condition	Specify what type and where?
BH Pressure at deepest TVD	4890 psi at 8953' 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

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

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

APD ID: 10400029025 **Submission Date:** 04/19/2018

Operator Name: COG OPERATING LLC

Well Name: ROADRUNNER FEDERAL COM **Well Number:** 23H

Well Type: OIL WELL **Well Work Type:** Drill

Highlighted data reflects the most recent changes

Show Final Text

Section 1 - Existing Roads

Will existing roads be used? YES

Existing Road Map:

COG_Roadrunner_23H_Exist_Rd_20180412083911.pdf

Existing Road Purpose: ACCESS **Row(s) Exist?** NO

ROW ID(s)

ID:

Do the existing roads need to be improved? NO

Existing Road Improvement Description:

Existing Road Improvement Attachment:

Section 2 - New or Reconstructed Access Roads

Will new roads be needed? YES

New Road Map:

COG_Roadrunner_23H_MapsPlats_20180412083953.pdf

New road type: TWO-TRACK

Length: 730.5 Feet **Width (ft.):** 30

Max slope (%): 33 **Max grade (%):** 1

Army Corp of Engineers (ACOE) permit required? NO

ACOE Permit Number(s):

New road travel width: 14

New road access erosion control: Water will be diverted where necessary to avoid ponding, prevent erosion, maintain good drainage, and to be consistent with local drainage patterns.

New road access plan or profile prepared? NO

New road access plan attachment:

Access road engineering design? NO

Access road engineering design attachment:

Access surfacing type: OTHER

Access topsoil source: ONSITE

Access surfacing type description: Caliche

Access onsite topsoil source depth: 6

Offsite topsoil source description:

Onsite topsoil removal process: Blading

Access other construction information: No turnouts are planned. Re-routing access road around proposed well location.

Access miscellaneous information:

Number of access turnouts: **Access turnout map:**

Drainage Control

New road drainage crossing: OTHER

Drainage Control comments: None necessary.

Road Drainage Control Structures (DCS) description: None needed.

Road Drainage Control Structures (DCS) attachment:

Access Additional Attachments

Additional Attachment(s):

Section 3 - Location of Existing Wells

Existing Wells Map? YES

Attach Well map:

COG_Roadrunner_23H_1Mile_Data_20180412084008.pdf

Existing Wells description:

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

Submit or defer a Proposed Production Facilities plan? SUBMIT

Production Facilities description: A tank battery and facilities will be constructed as shown on the Production Facility Layout. The tank battery and facilities including all flow lines and piping will be installed according to API specifications.
Production Facilities map:

COG_Roadrunner_23H_Prod_Layout_20180419142852.pdf

Section 5 - Location and Types of Water Supply

Water Source Table

Water source use type: INTERMEDIATE/PRODUCTION CASING **Water source type:** OTHER

Describe type: Brine Water

Source latitude: **Source longitude:**

Source datum:

Water source permit type: PRIVATE CONTRACT

Source land ownership: COMMERCIAL

Water source transport method: TRUCKING

Source transportation land ownership: COMMERCIAL

Water source volume (barrels): 30000 **Source volume (acre-feet):** 3.866793

Source volume (gal): 1260000

Water source use type: STIMULATION, SURFACE CASING **Water source type:** OTHER

Describe type: Fresh Water

Source latitude: **Source longitude:**

Source datum:

Water source permit type: PRIVATE CONTRACT

Source land ownership: PRIVATE

Water source transport method: PIPELINE

Source transportation land ownership: PRIVATE

Water source volume (barrels): 450000 **Source volume (acre-feet):** 58.001892

Source volume (gal): 18900000

Water source and transportation map:

COG_Roadrunner_23H_BrineH2O_20180412084536.pdf
COG_Roadrunner_23H_FreshH2O_20180412084546.pdf

Water source comments: Fresh water will be obtained from Black River Encampment Assoc., C-100 water well located in Section 24. T24S. R26E. Brine water will be obtained from the Malaga I Brine station in Section 2. T21S. R25E., and will be provided by Malaga Brine Station.
New water well? NO

New Water Well Info

Well latitude: **Well Longitude:** **Well datum:**

Well target aquifer:

Est. depth to top of aquifer(ft): **Est thickness of aquifer:**

Aquifer comments:

Aquifer documentation:

Well depth (ft): **Well casing type:**

Well casing outside diameter (in.): **Well casing inside diameter (in.):**

New water well casing? **Used casing source:**

Drilling method: **Drill material:**

Grout material: **Grout depth:**

Casing length (ft.): **Casing top depth (ft.):**

Well Production type: **Completion Method:**

Water well additional information:

State appropriation permit:

Additional information attachment:

Section 6 - Construction Materials

Construction Materials description: Caliche will be obtained from the actual well site if available. If not available onsite, caliche will be obtained from Concho SRO caliche pit located in Section 17, T26S, R28E Phone 575-748-6940.
Construction Materials source location attachment:

Section 7 - Methods for Handling Waste

Waste type: DRILLING

Waste content description: Drilling fluids and produced oil and water during drilling and completion operations

Amount of waste: 6000 barrels

Waste disposal frequency : One Time Only

Safe containment description: All drilling waste will be stored safely and disposed of properly

Safe containmant attachment:

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

Disposal location description: Trucked to an approved disposal facility

Waste type: SEWAGE

Waste content description: Human waste and gray water

Amount of waste: 250 gallons

Waste disposal frequency : Weekly

Safe containment description: Waste will be properly contained and disposed of properly at a state approved disposal facility
Safe containmant attachment:

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

Disposal location description: Trucked to an approved disposal facility

Waste type: GARBAGE

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

Amount of waste: 125 pounds

Waste disposal frequency : Weekly

Safe containment description: Garbage and trash produced during drilling and completion operations will be collected in a trash container and disposed of properly at a state approved disposal facility
Safe containmant attachment:

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

Disposal location description: Trucked to an approved disposal facility

Reserve Pit

Reserve Pit being used? NO

Temporary disposal of produced water into reserve pit?

Reserve pit length (ft.) **Reserve pit width (ft.)**

Reserve pit depth (ft.) **Reserve pit volume (cu. yd.)**

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

Reserve pit liner

Reserve pit liner specifications and installation description

Cuttings Area

Cuttings Area being used? NO

Are you storing cuttings on location? YES

Description of cuttings location Roll off cuttings containers on tracks

Cuttings area length (ft.) **Cuttings area width (ft.)**

Cuttings area depth (ft.) **Cuttings area volume (cu. yd.)**

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

WCuttings area liner

Cuttings area liner specifications and installation description

Operator Name: COG OPERATING LLC

Well Name: ROADRUNNER FEDERAL COM **Well Number:** 23H

Section 8 - Ancillary Facilities

Are you requesting any Ancillary Facilities?: NO

Ancillary Facilities attachment:

Comments:

Section 9 - Well Site Layout

Well Site Layout Diagram:

COG_Roadrunner_23H_Prod_Layout_20180419143011.pdf

Comments: A tank battery and facilities will be constructed as shown on the Production Facility Layout. The tank battery and facilities including all flow lines and piping will be installed according to API specifications.

Section 10 - Plans for Surface Reclamation

Type of disturbance: New Surface Disturbance **Multiple Well Pad Name:**

Multiple Well Pad Number:

Recontouring attachment:

Drainage/Erosion control construction: No waddles will be needed for this location due to its flat surface.

Drainage/Erosion control reclamation: Reclaim the west 80' and southwest side 80'

Well pad proposed disturbance (acres): 3.67
Road proposed disturbance (acres): 0.23
Powerline proposed disturbance (acres): 0.56
Pipeline proposed disturbance (acres): 0
Other proposed disturbance (acres): 0
Total proposed disturbance: 4.46

Well pad interim reclamation (acres): 0.15
Road interim reclamation (acres): 0.23
Powerline interim reclamation (acres): 0.56
Pipeline interim reclamation (acres): 0
Other interim reclamation (acres): 0
Total interim reclamation: 0.94

Well pad long term disturbance (acres): 2.35
Road long term disturbance (acres): 0.23
Powerline long term disturbance (acres): 0.56
Pipeline long term disturbance (acres): 0
Other long term disturbance (acres): 0
Total long term disturbance: 3.14

Disturbance Comments:

Reconstruction method: New construction of pad.

Topsoil redistribution: Reclaim the west 80' and southwest side 80'

Soil treatment: None

Existing Vegetation at the well pad: Shinnery Oak/Mesquite grassland

Existing Vegetation at the well pad attachment:

Existing Vegetation Community at the road: Shinnery Oak/Mesquite grassland

Existing Vegetation Community at the road attachment:

Existing Vegetation Community at the pipeline: Shinnery Oak/Mesquite grassland

Existing Vegetation Community at the pipeline attachment:

Existing Vegetation Community at other disturbances: N/A

Existing Vegetation Community at other disturbances attachment:

Non native seed used? NO

Non native seed description:

Seedling transplant description:

Will seedlings be transplanted for this project? NO

Seedling transplant description attachment:

Will seed be harvested for use in site reclamation? NO

Seed harvest description:

Seed harvest description attachment:

Seed Management

Seed Table

Seed type:

Seed source:

Seed name:

Source name:

Source address:

Source phone:

Seed cultivar:

Seed use location:

PLS pounds per acre:

Proposed seeding season:

Seed Summary

Total pounds/Acre:

Seed Type	Pounds/Acre

Seed reclamation attachment:

Operator Contact/Responsible Official Contact Info

First Name: Rand **Last Name:** French

Phone: (432)254-5556 **Email:** rfrench@concho.com

Seedbed prep:

Seed BMP:

Seed method:

Existing invasive species? NO

Existing invasive species treatment description:

Existing invasive species treatment attachment:

Weed treatment plan description: N/A

Weed treatment plan attachment:

Monitoring plan description: N/A

Monitoring plan attachment:

Success standards: N/A

Pit closure description: N/A

Pit closure attachment:

COG_Roadrunner_23H_ClosedLoop_20180412084802.pdf

Section 11 - Surface Ownership

Disturbance type: WELL PAD

Describe:

Surface Owner: STATE GOVERNMENT

Other surface owner description:

BIA Local Office:

BOR Local Office:

COE Local Office:

DOD Local Office:

NPS Local Office:

State Local Office: STATE OF NEW MEXICO

Military Local Office:

USFWS Local Office:

Other Local Office:

USFS Region:

USFS Forest/Grassland: **USFS Ranger District:**

Section 12 - Other Information

Right of Way needed? NO **Use APD as ROW?**

ROW Type(s):

ROW Applications

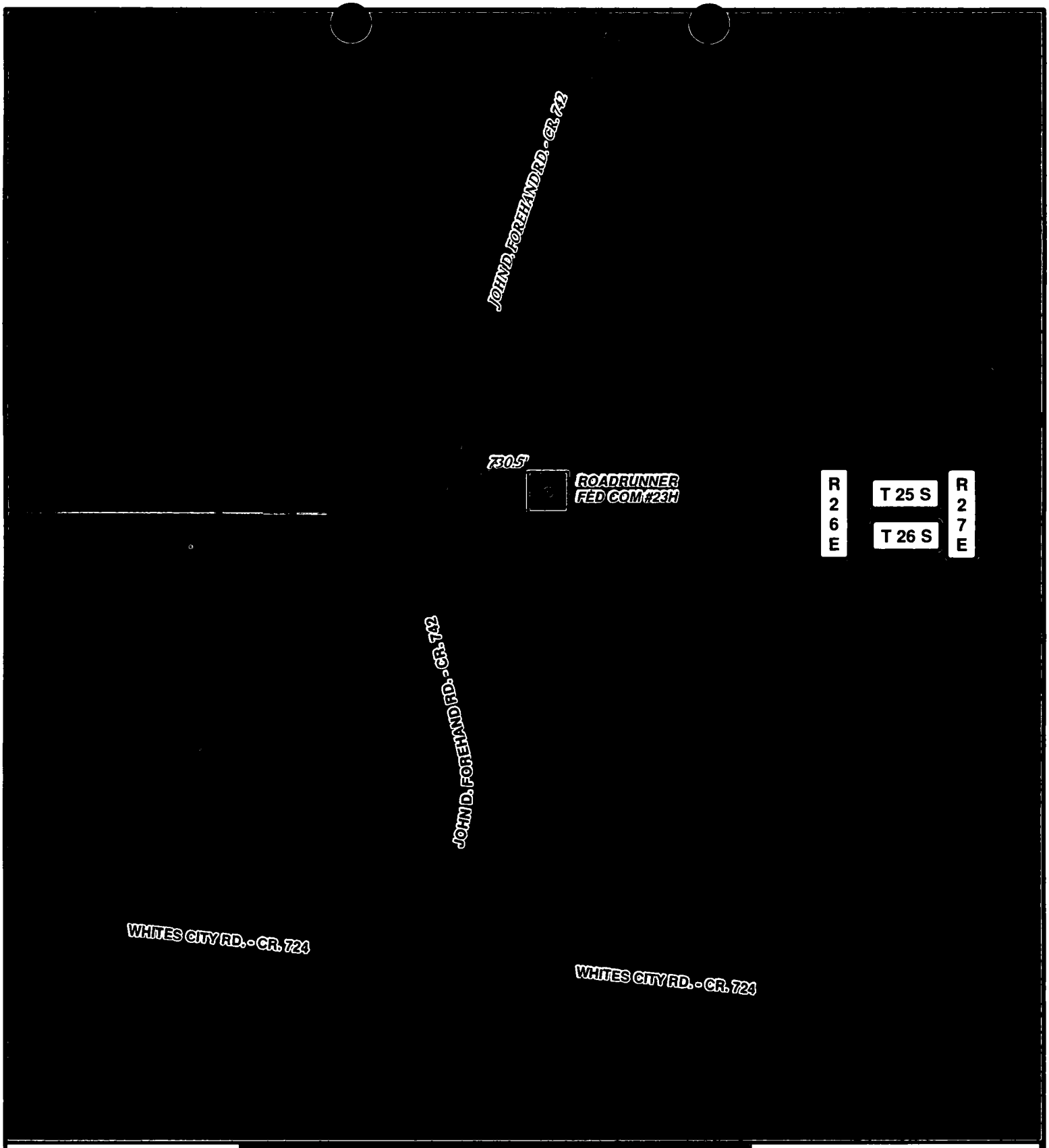
SUPO Additional Information:

Use a previously conducted onsite? YES

Previous Onsite information: Onsite completed on 3/1/2018 by Gerald Herrera (COG); Jeff Robertson (BLM) and Aaron Chastain (BLM).

Other SUPO Attachment

COG_Roadrunner_23H_Certification_20180412085006.pdf



LEGEND

- WELL
- WELLPAD
- EXISTING ROAD
- PROPOSED ROAD
- PRIVATE
- STATE OF NM
- US BLM

ROADRUNNER FEDERAL COM #23H

SEC: 36	TWP: 25 S.	RGE: 26 E.	ELEVATION: 3350.6'
STATE: NEW MEXICO		COUNTY: EDDY	210' FSL & 2180' FWL
W.O. # 18-207	LEASE: ROADRUNNER FED COM		SURVEY: N.M.P.M

0 500 1,000 1,500 2,000 2,500 3,000 3,500 FEET

0 0.125 0.25 0.5 Miles 1 IN = 1,250 FT

LOCATION MAP LAND STATUS 3/9/2018 A.M.

N

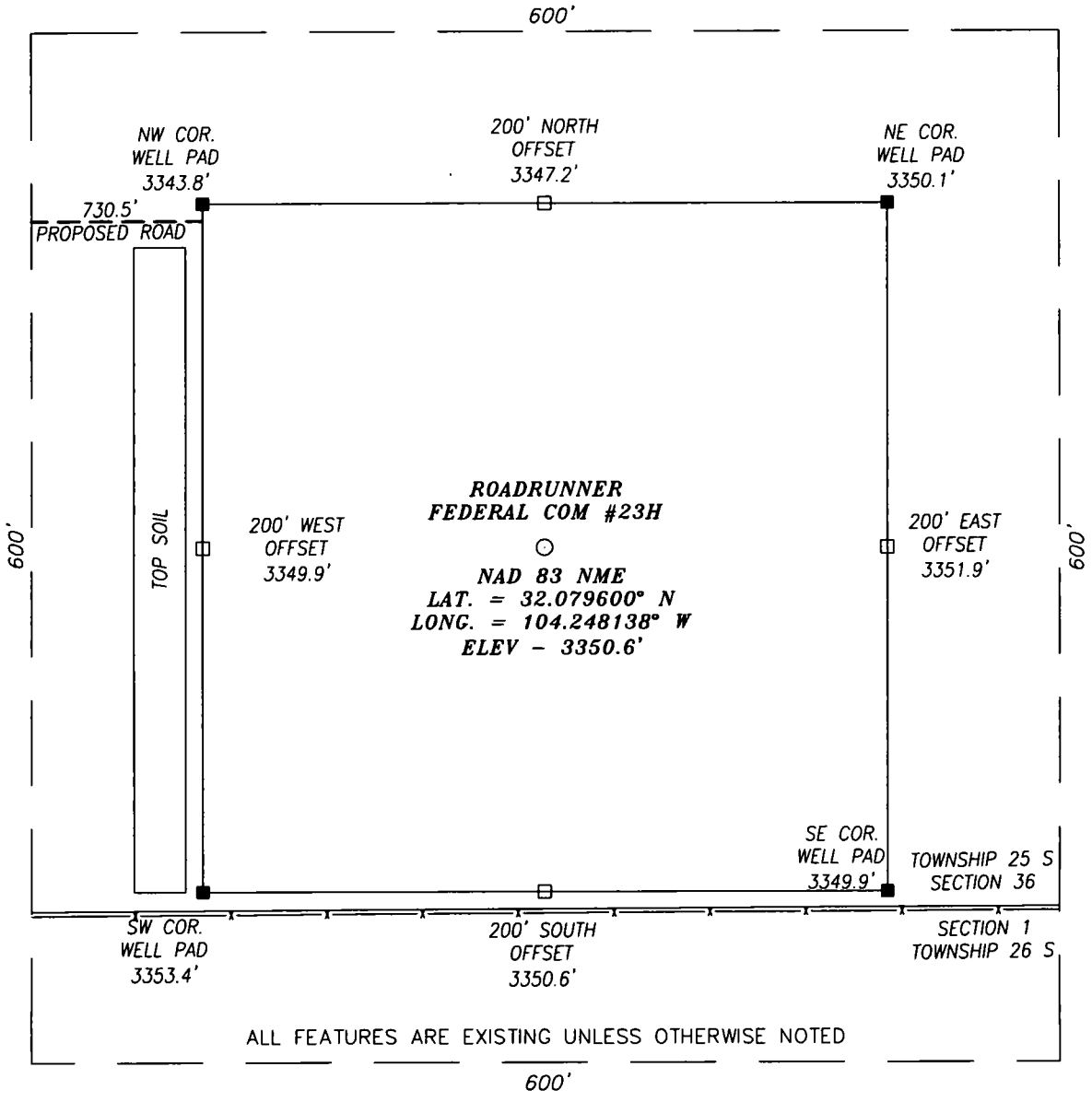
CONCHO

COG OPERATING, LLC

HARCROW SURVEYING, LLC.
2314 W. MAIN ST, ARTESIA, NM 88210
PH: (575) 746-2158 FAX: (575) 746-2158
TEXAS FIRM NO. 10194089
c.harcrow@harcrowsurveying.com

SECTION 36, TOWNSHIP 25 SOUTH, RANGE 26 EAST, N.M.P.M.,

EDDY COUNTY NEW MEXICO



DIRECTIONS TO LOCATION

FROM THE INTERSECTION OF WHITE CITY RD (C.R. 724) AND JOHN D. FOREHAND RD. (C.R. 742) HEADING NORTH ON C.R. 742 AND GO APPROX. 1.0 MILE TO A PROPOSED ROAD. THE PROPOSED WELL LIES APPROX. 950 FT EAST.

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c.harcrow@harcrowsurveying.com

100 0 100 200 Feet

Scale: 1"=100'

CERTIFICATION

I, CHAD HARCROW, A NEW MEXICO REGISTERED PROFESSIONAL SURVEYOR CERTIFY THAT I DIRECTED AND AM RESPONSIBLE FOR THIS SURVEY, THAT THIS SURVEY IS TRUE AND CORRECT TO THE BEST OF MY KNOWLEDGE AND BELIEF.

CHAD HARCROW NEW MEXICO 17777 LICENSED PROFESSIONAL SURVEYOR

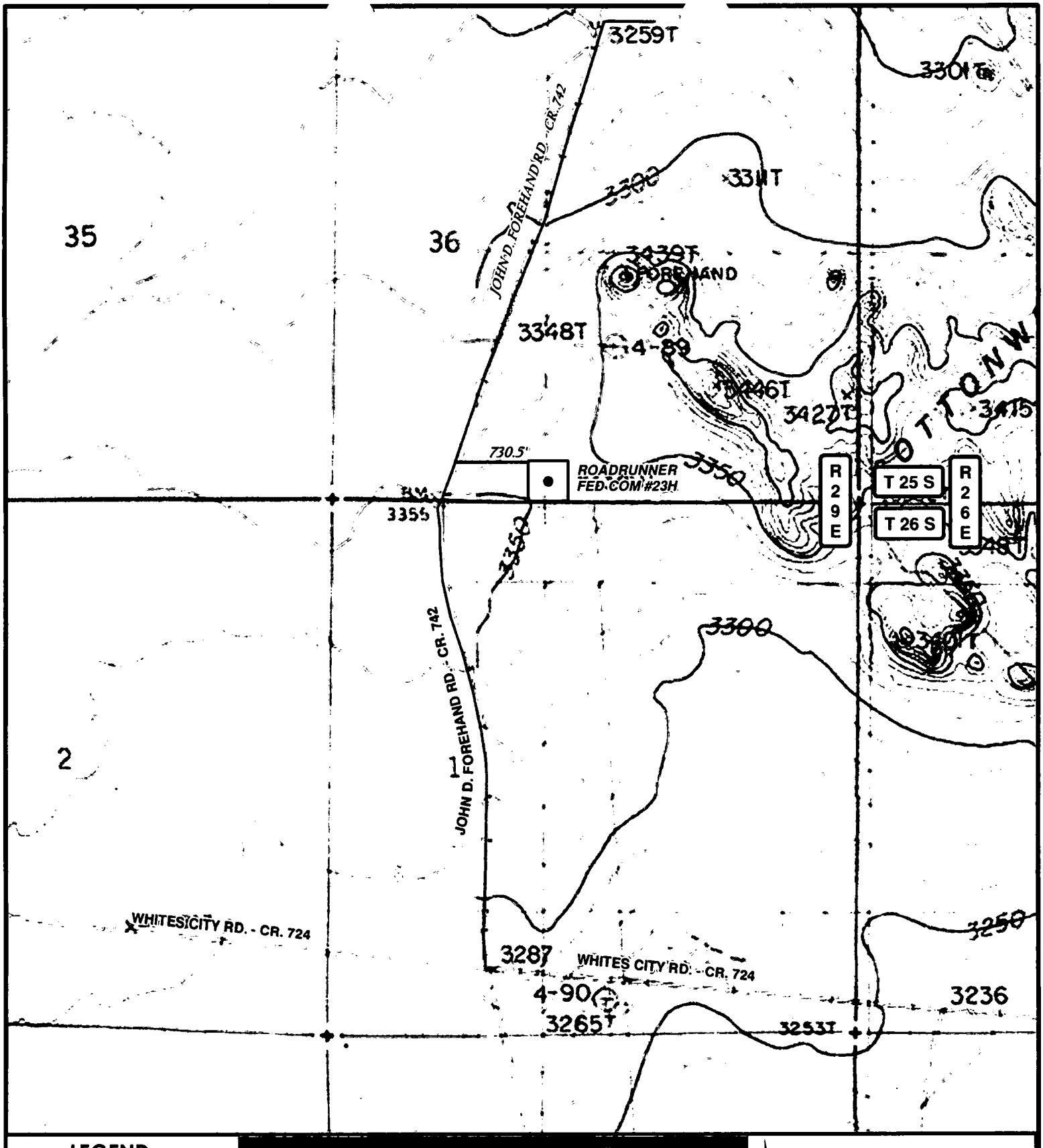
Chad Harcrow 3/13/18

CHAD HARCROW N.M.P.S. NO. 17777 DATE

COG OPERATING, LLC

ROADRUNNER FEDERAL COM #23H
LOCATED 210 FEET FROM THE SOUTH LINE AND 2180 FROM THE WEST LINE OF SECTION 36, TOWNSHIP 25 SOUTH, RANGE 26 EAST, N.M.P.M., COUNTY, NEW MEXICO

SURVEY DATE: MARCH 1, 2018		PAGE: 1 OF 1
DRAFTING DATE: MARCH 8, 2018		
APPROVED BY: CH	DRAWN BY: VB	FILE: 18-207



LEGEND

- WELL
- WELLPAD
- EXISTING ROAD
- PROPOSED ROAD

ROADRUNNER FEDERAL COM #23H

SEC: 36	TWP: 25 S.	RGE: 26 E.	ELEVATION: 3350.6'
STATE: NEW MEXICO		COUNTY: EDDY	210' FSL & 2180' FWL
W.O. # 18-207	LEASE: ROADRUNNER FED COM		SURVEY: N.M.P.M

0 500 1,000 1,500 2,000 2,500 3,000 3,500 FEET

0 0.125 0.25 0.5 Miles 1 IN = 1,250 FT

LOCATION MAP TOPO 3/9/2018 A.M.

N

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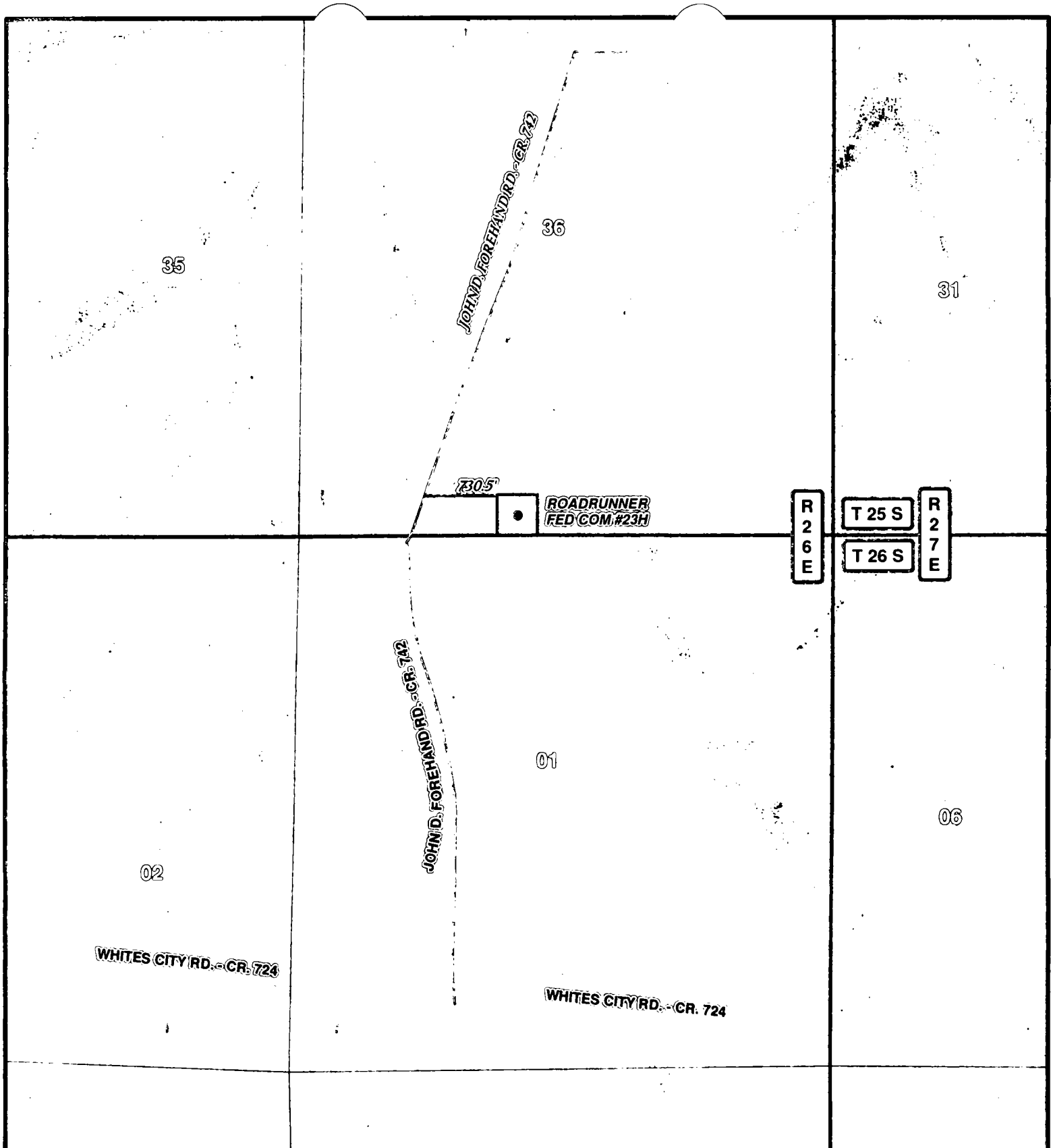

LEGEND

- WELL
- WELLPAD
- EXISTING ROAD
- PROPOSED ROAD

ROADRUNNER FEDERAL COM #23H

SEC: 36	TWP: 25 S.	RGE: 26 E.	ELEVATION: 3350.6'
STATE: NEW MEXICO		COUNTY: EDDY	210' FSL & 2180' FWL
W.O. # 18-207	LEASE: ROADRUNNER FED COM		SURVEY: N.M.P.M

0 500 1,000 1,500 2,000 2,500 3,000 3,500 FEET

0 0.125 0.25 0.5 Miles 1 IN = 1,250 FT

LOCATION MAP IMAGERY 3/9/2018 A.M.

N

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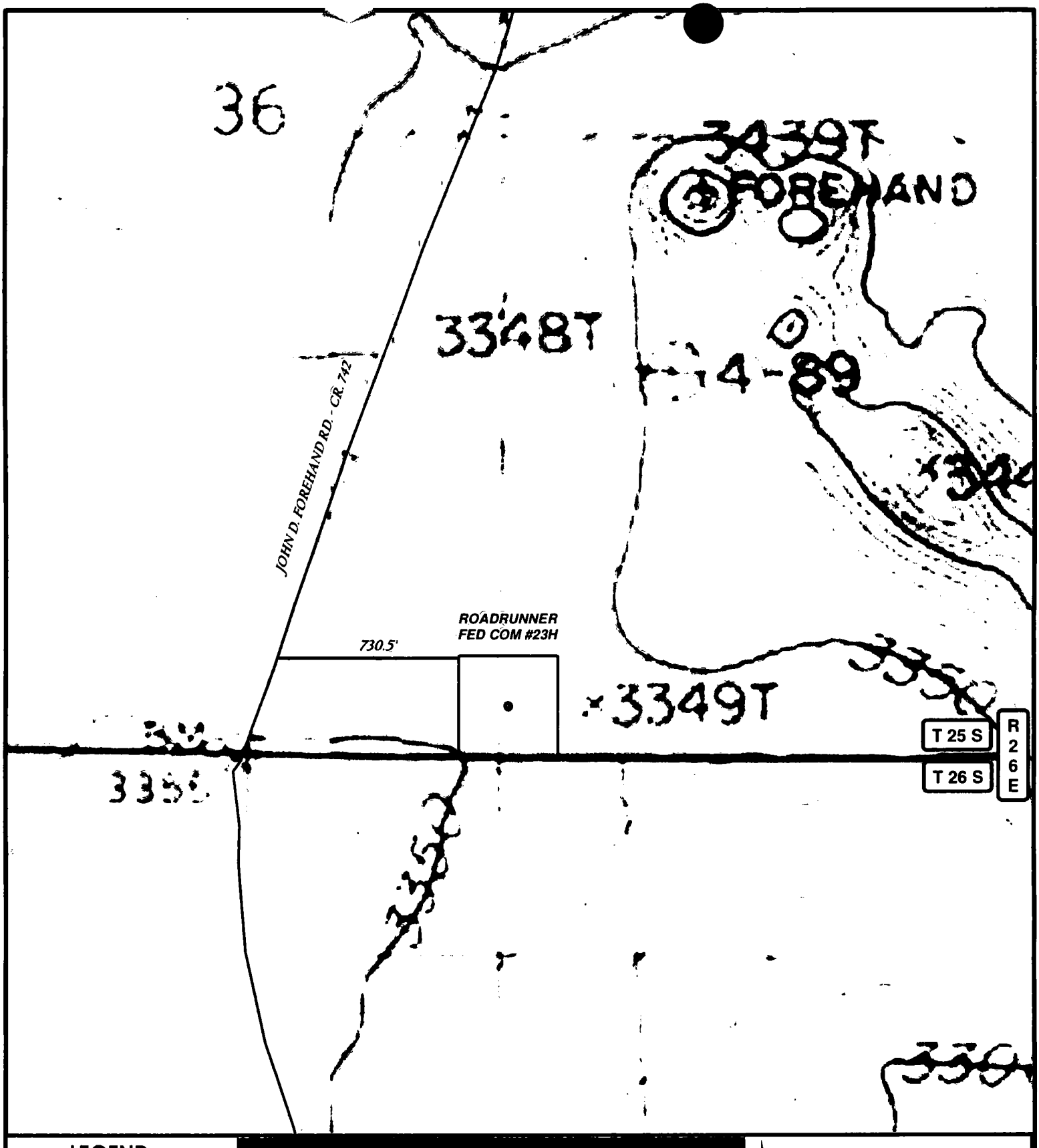

LEGEND

- WELL
- WELLPAD
- EXISTING ROAD
- PROPOSED ROAD

ROADRUNNER FEDERAL COM #23H			
SEC: 36	TWP: 25 S.	RGE: 26 E.	ELEVATION: 3350.6'
STATE: NEW MEXICO		COUNTY: EDDY	210' FSL & 2180' FWL
W.O. # 18-207	LEASE: ROADRUNNER FED COM		SURVEY: N.M.P.M

0 250 500 750 1,000 1,250 1,500 FEET

0 0.0375 0.075 0.15 Miles

1 IN = 500 FT

LOCATION MAP | TOPO ROAD | 3/9/2018 | A.M.

N

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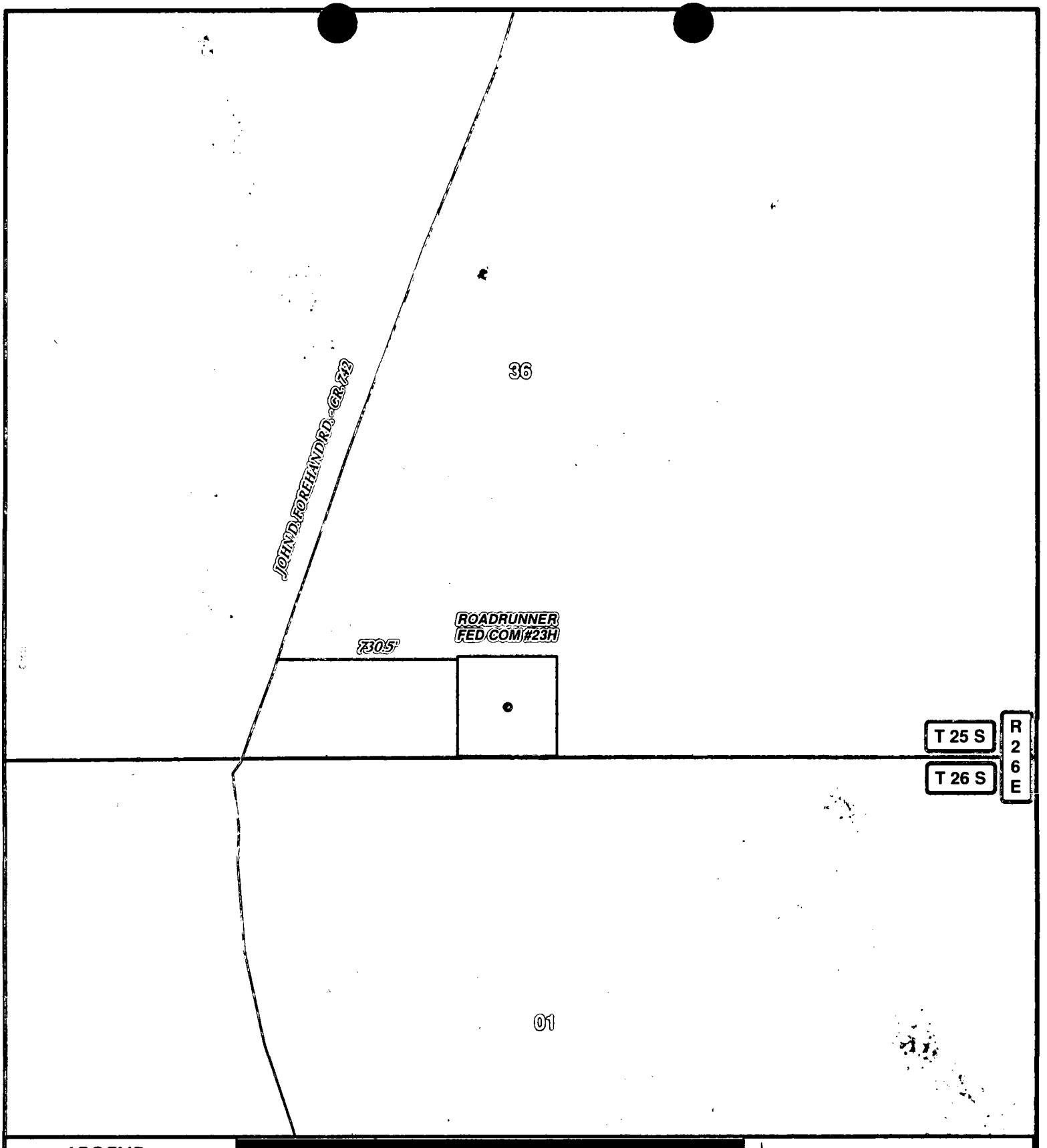

LEGEND

- WELL
- WELLPAD
- EXISTING ROAD
- PROPOSED ROAD

ROADRUNNER FEDERAL COM #23H

SEC: 36	TWP: 25 S.	RGE: 26 E.	ELEVATION: 3350.6'
STATE: NEW MEXICO		COUNTY: EDDY	210' FSL & 2180' FWL
W.O. # 18-207	LEASE: ROADRUNNER FED COM		SURVEY: N.M.P.M

0 250 500 750 1,000 1,250 1,500 FEET

0 0.0375 0.075 0.15 Miles

1 IN = 500 FT

LOCATION MAP | IMAGERY ROAD | 3/9/2018 | A.M.

N

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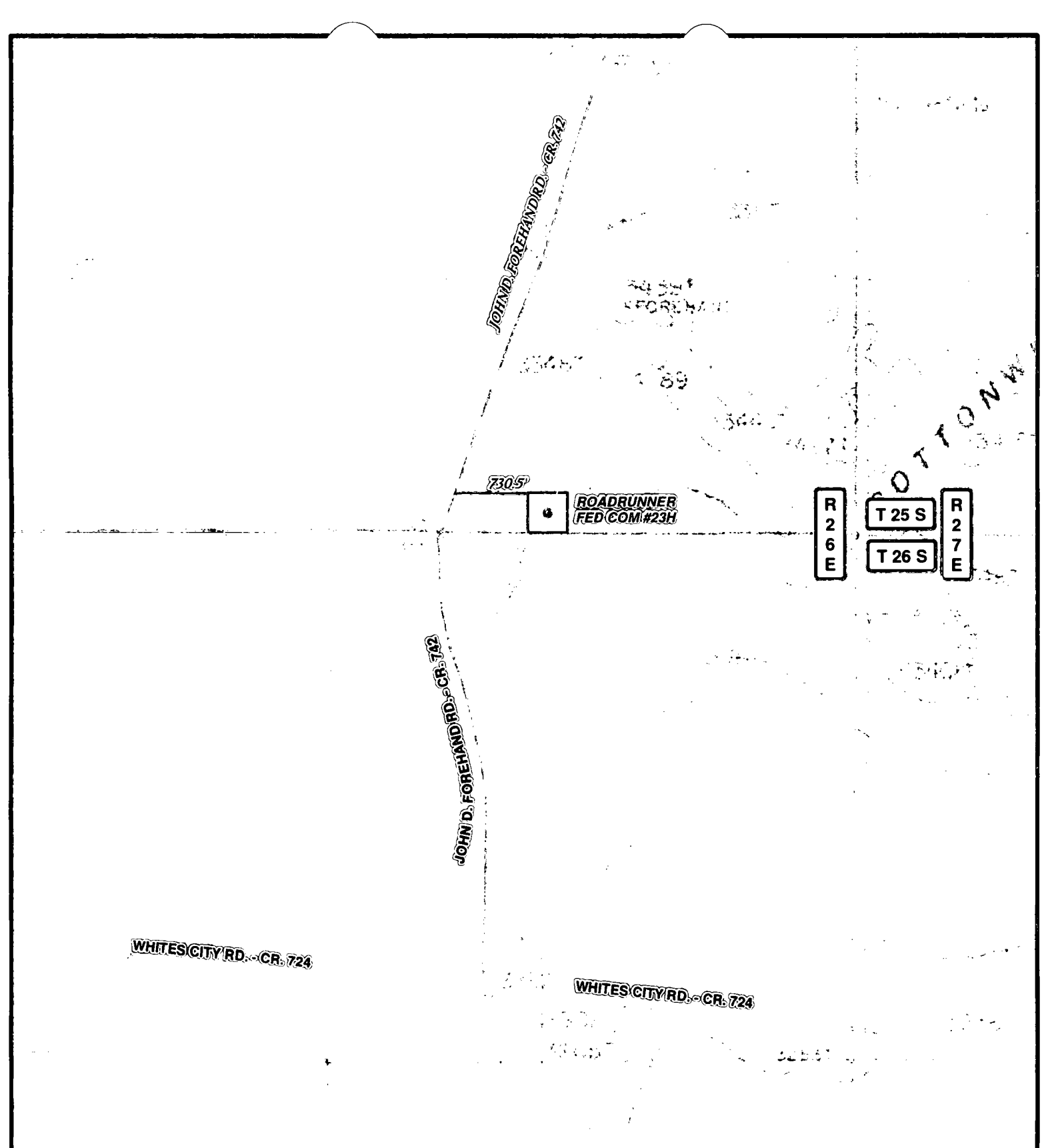

LEGEND

- WELL
- WELLPAD
- EXISTING ROAD
- PROPOSED ROAD
- PRIVATE
- STATE OF NM
- US BLM

ROADRUNNER FEDERAL COM #23H

SEC: 36	TWP: 25 S.	RGE: 26 E.	ELEVATION: 3350.6'
STATE: NEW MEXICO		COUNTY: EDDY	210' FSL & 2180' FWL
W.O. # 18-207	LEASE: ROADRUNNER FED COM		SURVEY: N.M.P.M

0 500 1,000 1,500 2,000 2,500 3,000 3,500 FEET

0 0.125 0.25 0.5 Miles 1 IN = 1,250 FT

LOCATION MAP | LAND STATUS | 3/9/2018 | A.M.

N

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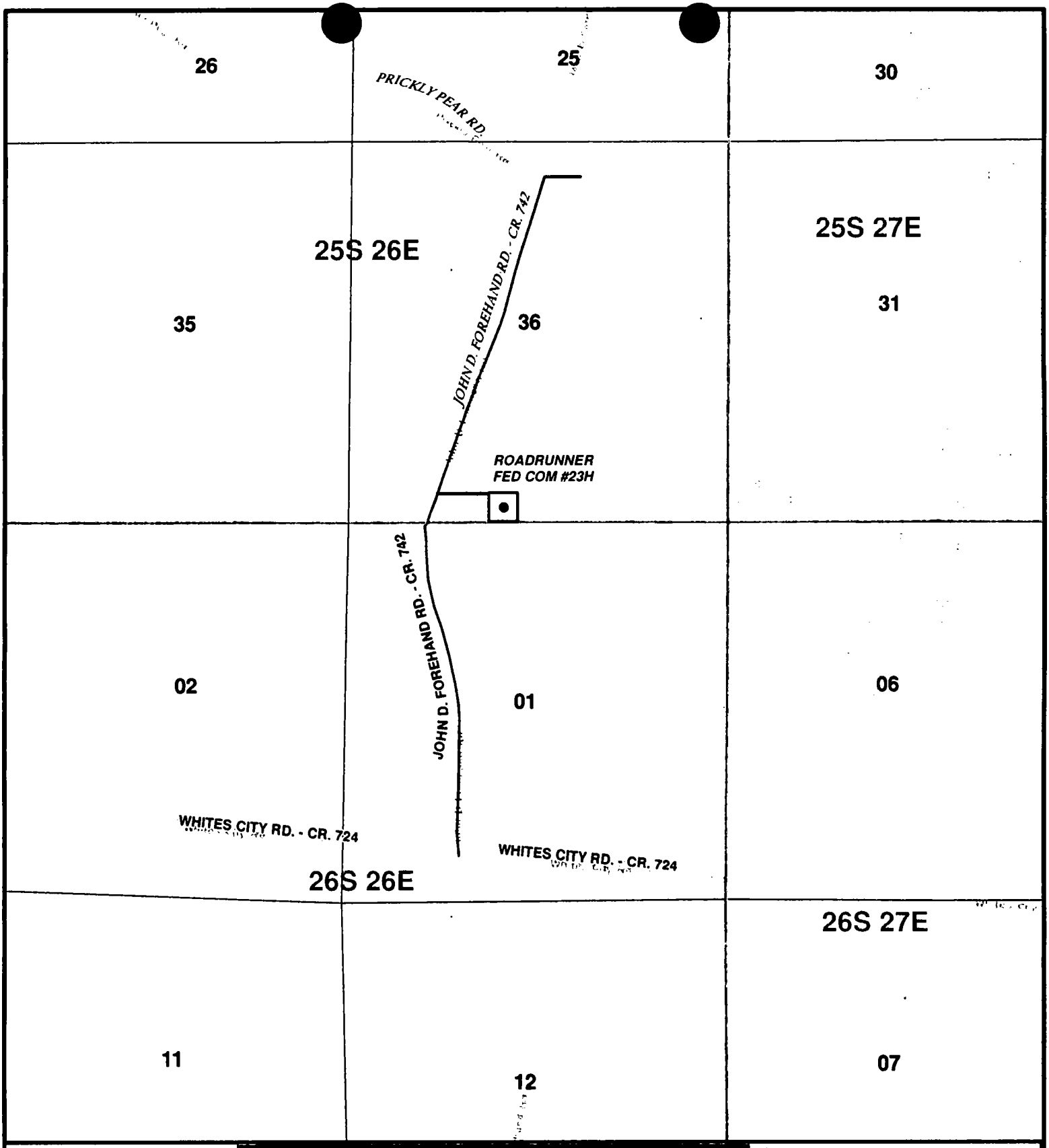

LEGEND

- WELL
- WELLPAD
- EXISTING ROAD
- PROPOSED ROAD

ROADRUNNER FEDERAL COM #23H

SEC: 36	TWP: 25 S.	RGE: 26 E.	ELEVATION: 3350.6'
STATE: NEW MEXICO		COUNTY: EDDY	210' FSL & 2180' FWL
W.O. # 18-207	LEASE: ROADRUNNER FED COM		SURVEY: N.M.P.M

0 500 1,000 1,500 2,000 2,500 3,000 3,500 FEET

0 0.175 0.35 0.7 Miles 1 IN = 1,750 FT

LOCATION MAP VICINITY 3/9/2018 A.M.

N

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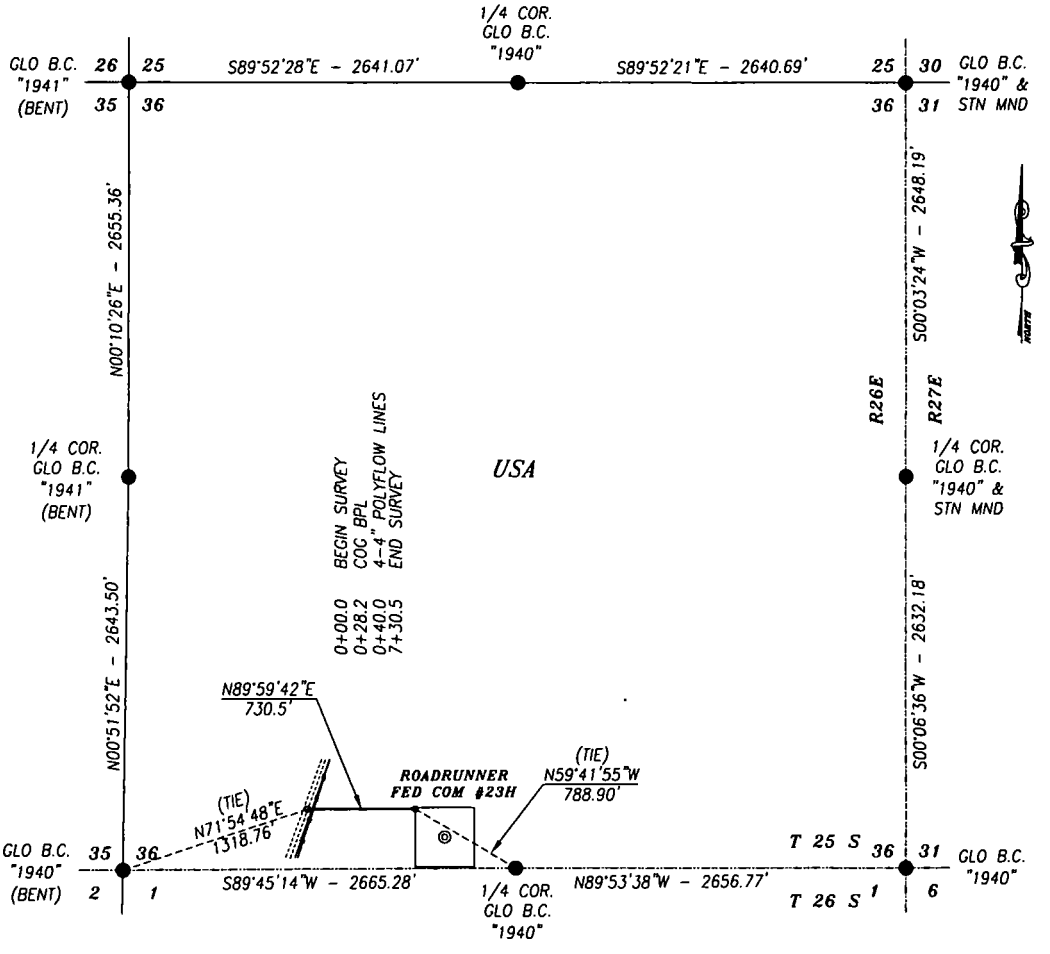
ACCESS ROAD PLAT
COG OPERATING, LLC
A PROPOSED ACCESS ROAD FROM JOHN D. FOREHAND RD
TO ROADRUNNER FED COM #23H IN
SECTION 36, TOWNSHIP 25 SOUTH, RANGE 26 EAST, N.M.P.M.,
EDDY COUNTY, NEW MEXICO.



DESCRIPTION

A STRIP OF LAND 30.0 FEET WIDE AND 730.5 FEET OR 44.27 RODS OR 0.138 MILES IN LENGTH CROSSING USA LAND IN SECTION 36, TOWNSHIP 25 SOUTH, RANGE 26 EAST, EDDY COUNTY, NEW MEXICO AND BEING 15.0 FEET LEFT AND 15.0 FEET RIGHT OF THE ABOVE PLATTED CENTERLINE SURVEY.

BASIS OF BEARING:
BEARINGS SHOWN HEREON ARE MERCATOR GRID AND CONFORM TO THE NEW MEXICO COORDINATE SYSTEM "NEW MEXICO EAST ZONE" NORTH AMERICAN DATUM 1983. DISTANCES ARE SURFACE VALUES.

CERTIFICATION
I, CHAD HARCROW, A NEW MEXICO REGISTERED PROFESSIONAL SURVEYOR CERTIFY THAT I DIRECTED AND AM RESPONSIBLE FOR THIS SURVEY, THAT THIS SURVEY IS TRUE AND CORRECT TO THE BEST OF MY KNOWLEDGE AND BELIEF, AND THIS SURVEY AND PLAT MEET THE MINIMUM STANDARDS FOR SURVEYING IN NEW MEXICO.

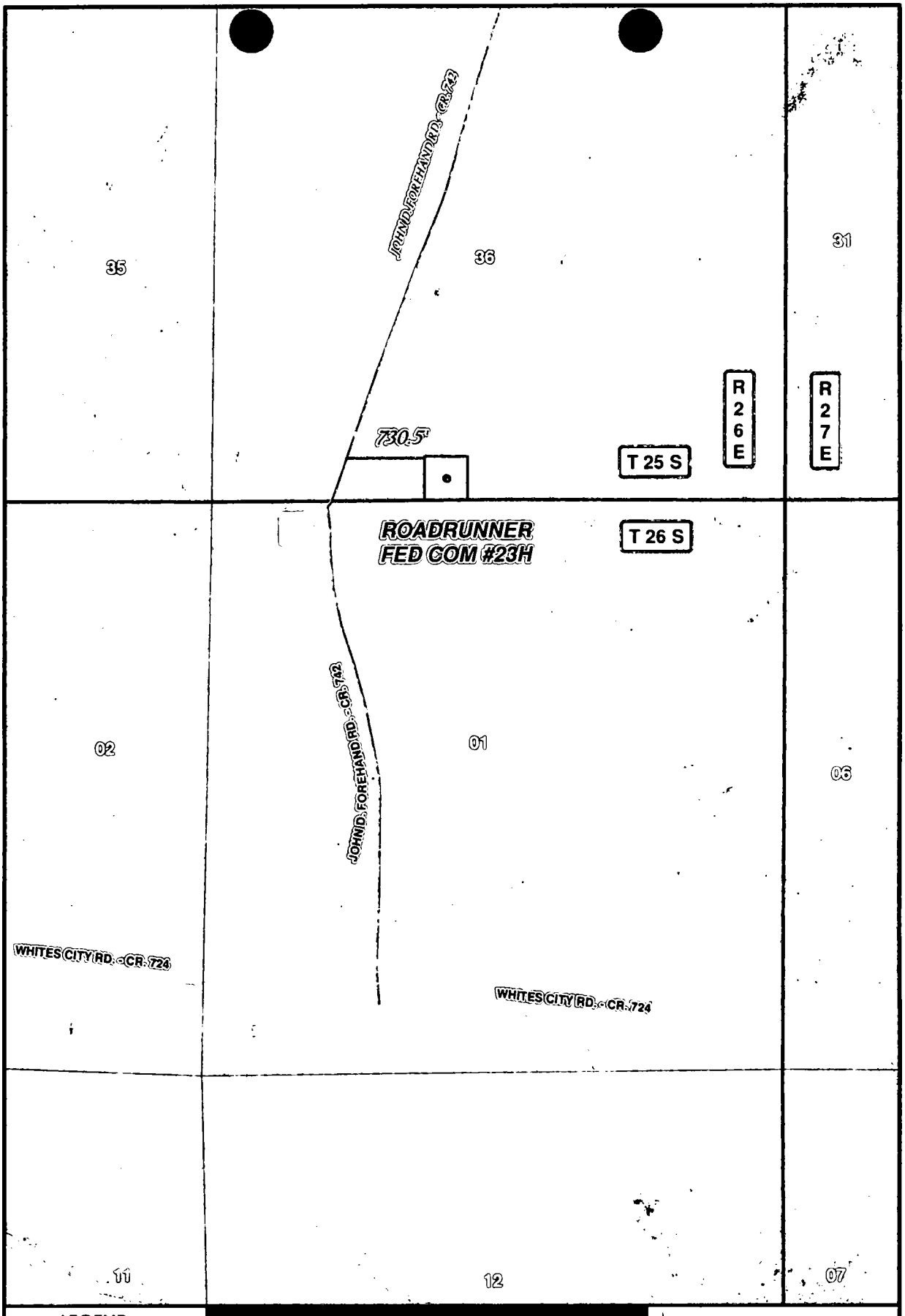
CHAD L. HARCROW NEW MEXICO 17777 LICENSED PROFESSIONAL SURVEYOR

Chad Harcrow 3/14/18
CHAD HARCROW N.M.P.S. NO. 17777 DATE

HARCROW SURVEYING, LLC
2314 W. MAIN ST. ARTESIA, N.M. 88210
PH: (575) 746-2158 FAX: (575) 746-2158
Texas Firm No. 10194089
c.harcrow@harcrowsurveying.com

1000 0 1000 2000 FEET
SCALE: 1"=1000'

COG OPERATING, LLC		
SURVEY OF A PROPOSED ACCESS ROAD LOCATED IN SECTION 36, TOWNSHIP 25 SOUTH, RANGE 26 EAST, NMPM, LEA COUNTY, NEW MEXICO		
SURVEY DATE: MARCH 01, 2018		ACCESS RD PLAT
DRAFTING DATE: MARCH 13, 2018		PAGE 1 OF 1
APPROVED BY: CH	DRAWN BY: LL	FILE: 18-221



LEGEND

- WELL
- WELLPAD
- EXISTING ROAD
- PROPOSED ROAD

ACCESS ROAD FOR ROADRUNNER FEDERAL COM #23H

SEC: 36 TWP: 25 S. RGE: 26 E.

STATE: NEW MEXICO COUNTY: EDDY

W.O. # 18-221 LEASE: ROADRUNNER FED COM SURVEY: N.M.P.M

0 500 1,000 1,500 2,000 2,500 3,000 FEET

0 0.1 0.2 0.4 Miles 1 IN = 1,000 FT

LOCATION MAP IMAGERY 3/13/2018 V.D.

N

CONCHO

COG OPERATING, LLC

HARCROW SURVEYING, LLC.
2314 W. MAIN ST, ARTESIA, NM 88210
PH: (575) 746-2158 FAX: (575) 746-2158
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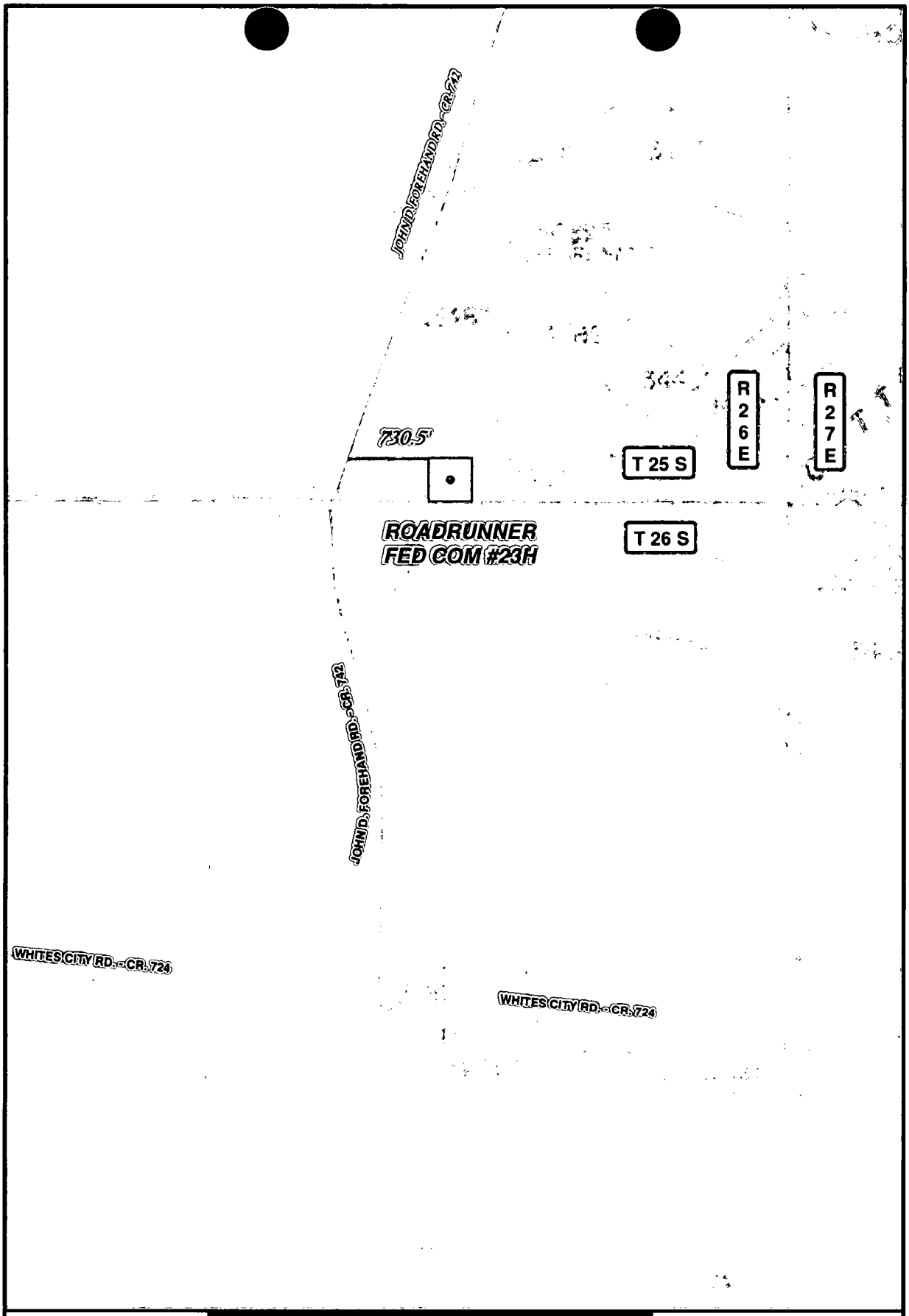
c.harcrow@harcrowsurveying.com



LEGEND

- WELL
- WELLPAD
- EXISTING ROAD
- PROPOSED ROAD
- PRIVATE
- STATE OF NM
- US BLM

ACCESS ROAD FOR ROADRUNNER FEDERAL COM #23H

SEC: 36 TWP: 25 S. RGE: 26 E.

STATE: NEW MEXICO COUNTY: EDDY

W.O. # 18-221 LEASE: ROADRUNNER FED COM SURVEY: N.M.P.M

0 500 1,000 1,500 2,000 2,500 3,000 FEET

0 0.1 0.2 0.4 Miles 1 IN = 1,000 FT

LOCATION MAP LANDSTATUS 3/13/2018 V.D.

N

CONCHO

COG OPERATING, LLC

HARCROW SURVEYING, LLC.
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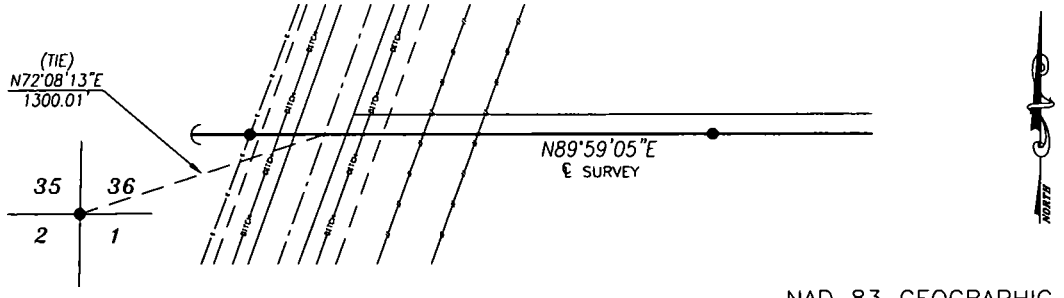
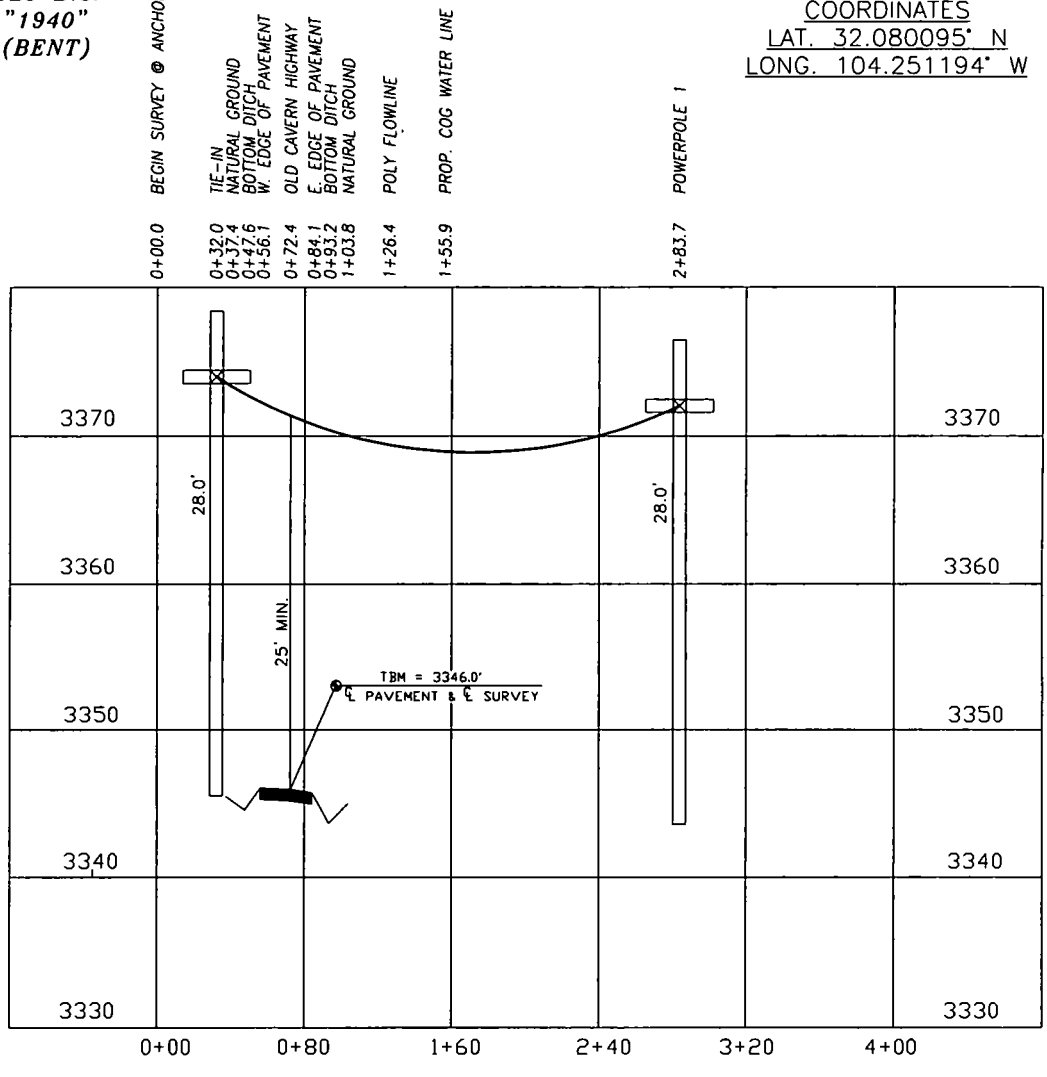
TEXAS FIRM NO. 10194089
c.harcrow@harcrowsurveying.com

POWERLINE PROFILE PLAT
COG OPERATING, LLC
A PROPOSED POWERLINE FROM AN EXISTING LINE TO
THE ROAD RUNNER FED COM #23H IN
SECTION 36, TOWNSHIP 25 SOUTH, RANGE 26 EAST, N.M.P.M.,
EDDY COUNTY, NEW MEXICO.



CLO B.C.
"1940"
(BENT)

NAD 83 GEOGRAPHIC
COORDINATES
LAT. 32.080095° N
LONG. 104.251194° W



BASIS OF BEARING:
BEARINGS SHOWN HEREON ARE MERCATOR GRID AND CONFORM TO THE NEW MEXICO COORDINATE SYSTEM "NEW MEXICO EAST ZONE" NORTH AMERICAN DATUM 1983. DISTANCES ARE SURFACE VALUES.

80 0 80 160 FEET
SCALE: 1"=80'

HARCROW SURVEYING, LLC
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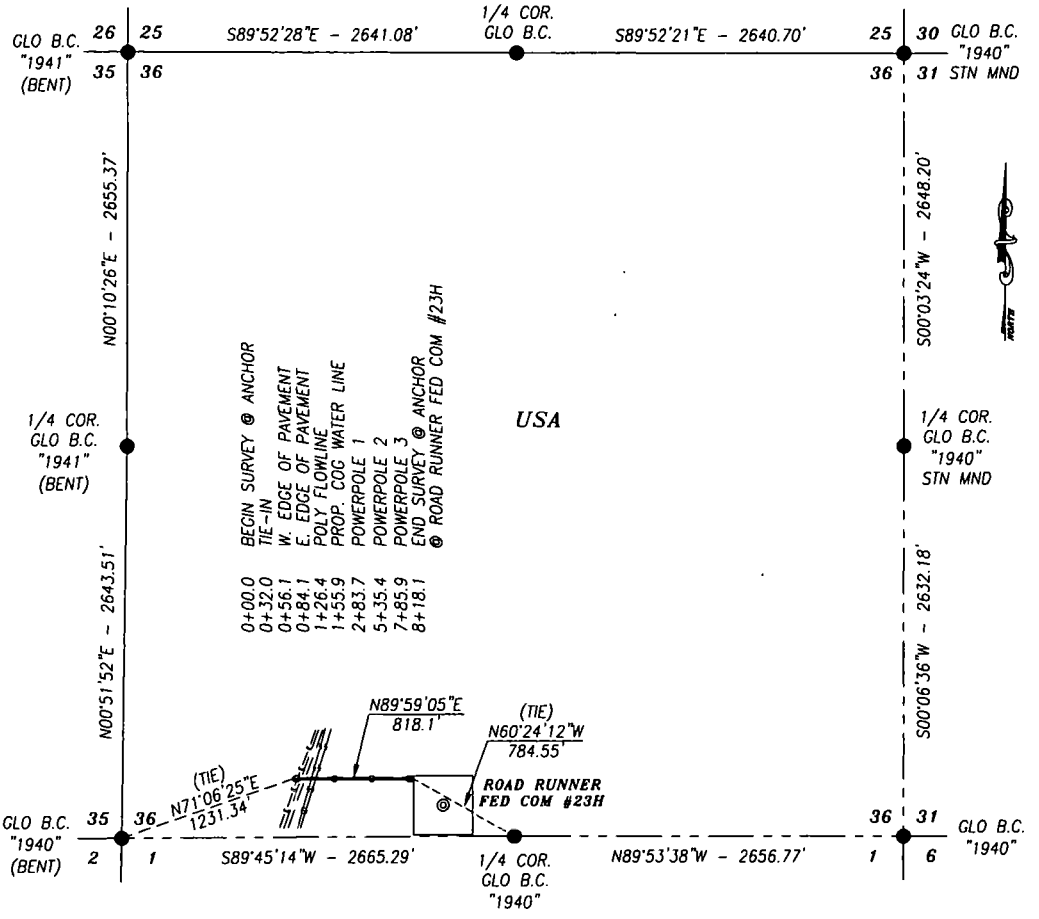
PH: (575) 746-2158 FAX: (575) 746-2158
Texas Firm No. 10194089
c.harcrow@harcrowsurveying.com

SURVEY OF A PROPOSED POWERLINE LOCATED IN SECTION 36, TOWNSHIP 25 SOUTH, RANGE 26 EAST, NMPM, EDDY COUNTY, NEW MEXICO

SURVEY DATE: MARCH 9, 2018	DRAFTING DATE: MARCH 27, 2018		
APPROVED BY: CH	DRAWN BY: VD	PAGE 1 OF 1	FILE: 18-239

POWERLINE PLAT
COG OPERATING, LLC
A PROPOSED POWERLINE FROM AN EXISTING LINE TO
THE ROAD RUNNER FED COM #23H IN
SECTION 36, TOWNSHIP 25 SOUTH, RANGE 26 EAST, N.M.P.M.,
EDDY COUNTY, NEW MEXICO.



DESCRIPTION

A STRIP OF LAND 30.0 FEET WIDE AND 818.1 FEET OR 49.58 RODS OR 0.155 MILES IN LENGTH CROSSING USA LAND IN SECTION 36, TOWNSHIP 25 SOUTH, RANGE 26 EAST, EDDY COUNTY, NEW MEXICO AND BEING 15.0 FEET LEFT AND 15.0 FEET RIGHT OF THE ABOVE PLATTED CENTERLINE SURVEY.

BASIS OF BEARING:
BEARINGS SHOWN HEREON ARE MERCATOR GRID AND CONFORM TO THE NEW MEXICO COORDINATE SYSTEM "NEW MEXICO EAST ZONE" NORTH AMERICAN DATUM 1983. DISTANCES ARE SURFACE VALUES.

CERTIFICATION
I, CHAD HARCROW, A NEW MEXICO REGISTERED PROFESSIONAL SURVEYOR CERTIFY THAT I DIRECTED AND AM RESPONSIBLE FOR THIS SURVEY, THAT THIS SURVEY IS TRUE AND CORRECT TO THE BEST OF MY KNOWLEDGE AND BELIEF, AND THIS SURVEY AND PLAT MEET THE MINIMUM STANDARDS FOR SURVEYING IN NEW MEXICO.

CHAD L. HARCROW NEW MEXICO 17777 LICENSED PROFESSIONAL SURVEYOR

Chad Harcrow 3/27/18
CHAD HARCROW N.M.P.S. NO. 17777 DATE

HARCROW SURVEYING, LLC
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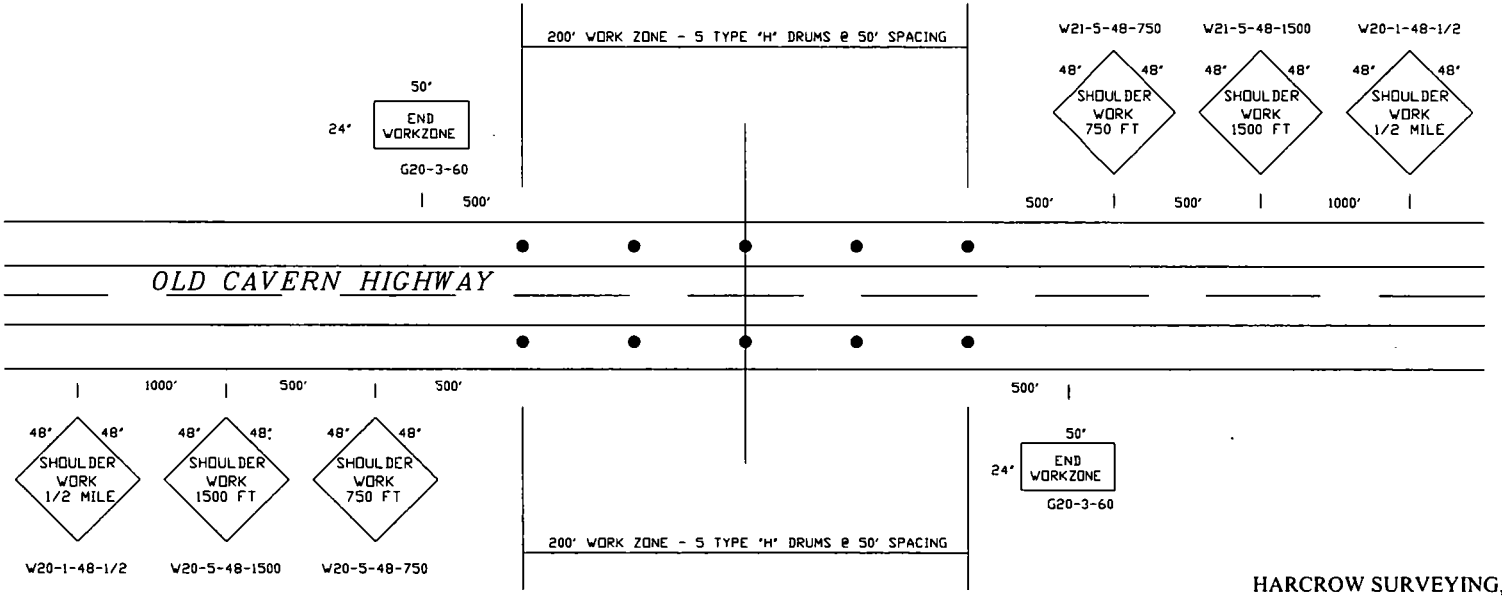
Texas Firm No. 10194089
c.harcrow@harcrowsurveying.com

1000 0 1000 2000 FEET
SCALE: 1"=1000'

COG OPERATING, LLC		
SURVEY OF A PROPOSED POWERLINE LOCATED IN SECTION 36, TOWNSHIP 25 SOUTH, RANGE 26 EAST, NMPM, EDDY COUNTY, NEW MEXICO		
SURVEY DATE: MARCH 9, 2018		
DRAFTING DATE: MARCH 26, 2018		PAGE 1 OF 1
APPROVED BY: CH	DRAWN BY: AM	FILE: 18-239

POWERLINE PROFILE PLAT
COG OPERATING, LLC
A PROPOSED POWERLINE FROM AN EXISTING LINE TO
THE ROAD RUNNER FED COM #23H IN
SECTION 36, TOWNSHIP 25 SOUTH, RANGE 26 EAST, N.M.P.M.,
EDDY COUNTY, NEW MEXICO.



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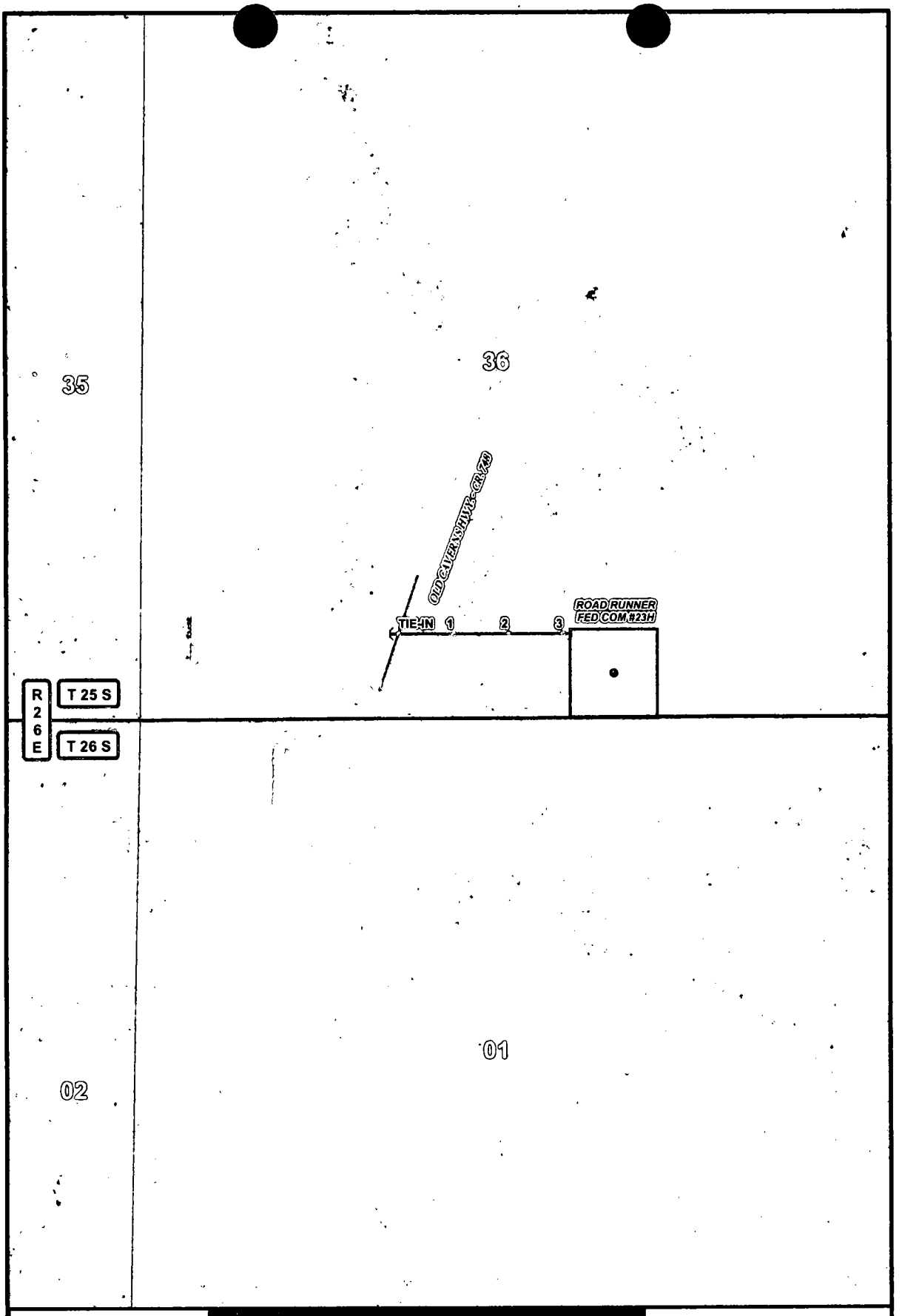
Texas Firm No. 10194089
c.harcrow@harcrowsurveying.com

80 0 80 160 FEET
SCALE: 1"=80'

CONSTRUCTION TRAFFIC CONTROL

SURVEY OF A PROPOSED POWERLINE LOCATED IN SECTION 36, TOWNSHIP 25 SOUTH, RANGE 26 EAST, NMPM, EDDY COUNTY, NEW MEXICO

SURVEY DATE: MARCH 9, 2018		DRAFTING DATE: MARCH 27, 2018	
APPROVED BY: CH	DRAWN BY: VD	PAGE 1 OF 1	FILE: 18-239



LEGEND

- ANCHOR
- POWERPOLE
- EXISTING LINE
- PROP. POWERLINE
- WELL
- WELLPAD

ROAD RUNNER FEDERAL COM #23H POWERLINE

SECTION: 36	TOWNSHIP: 25 S.	RANGE: 26 E.
STATE: NEW MEXICO	COUNTY: EDDY	SURVEY: N.M.P.M
W.O. # 18-239	LEASE: ROAD RUNNER FED COM	

0 500 1,000 1,500 FEET

0 0.05 0.1 0.2 Miles 1 IN = 500 FT

POWERLINE OVERVIEW IMAGERY 3/26/2018 A.M.

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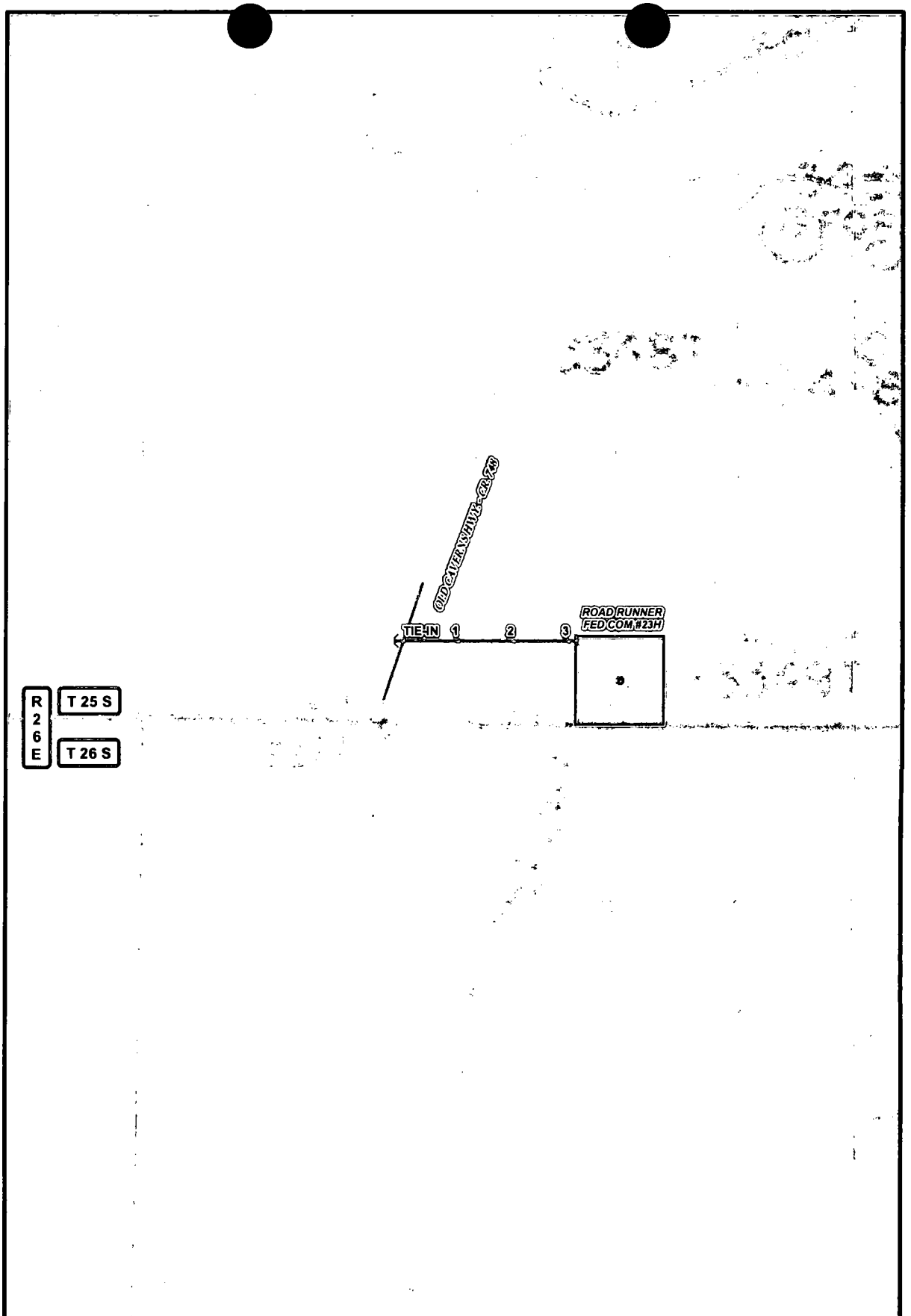


LEGEND

- ANCHOR
- POWERPOLE
- EXISTING LINE
- PROP. POWERLINE
- WELL
- WELLPAD
- PRIVATE
- STATE OF NM
- US BLM

ROAD RUNNER FEDERAL COM #23H POWERLINE

SECTION: 36	TOWNSHIP: 25 S.	RANGE: 26 E.
STATE: NEW MEXICO	COUNTY: EDDY	SURVEY: N.M.P.M
W.O. # 18-239	LEASE: ROAD RUNNER FED COM	

0 500 1,000 1,500 FEET

0 0.05 0.1 0.2 Miles 1 IN = 500 FT

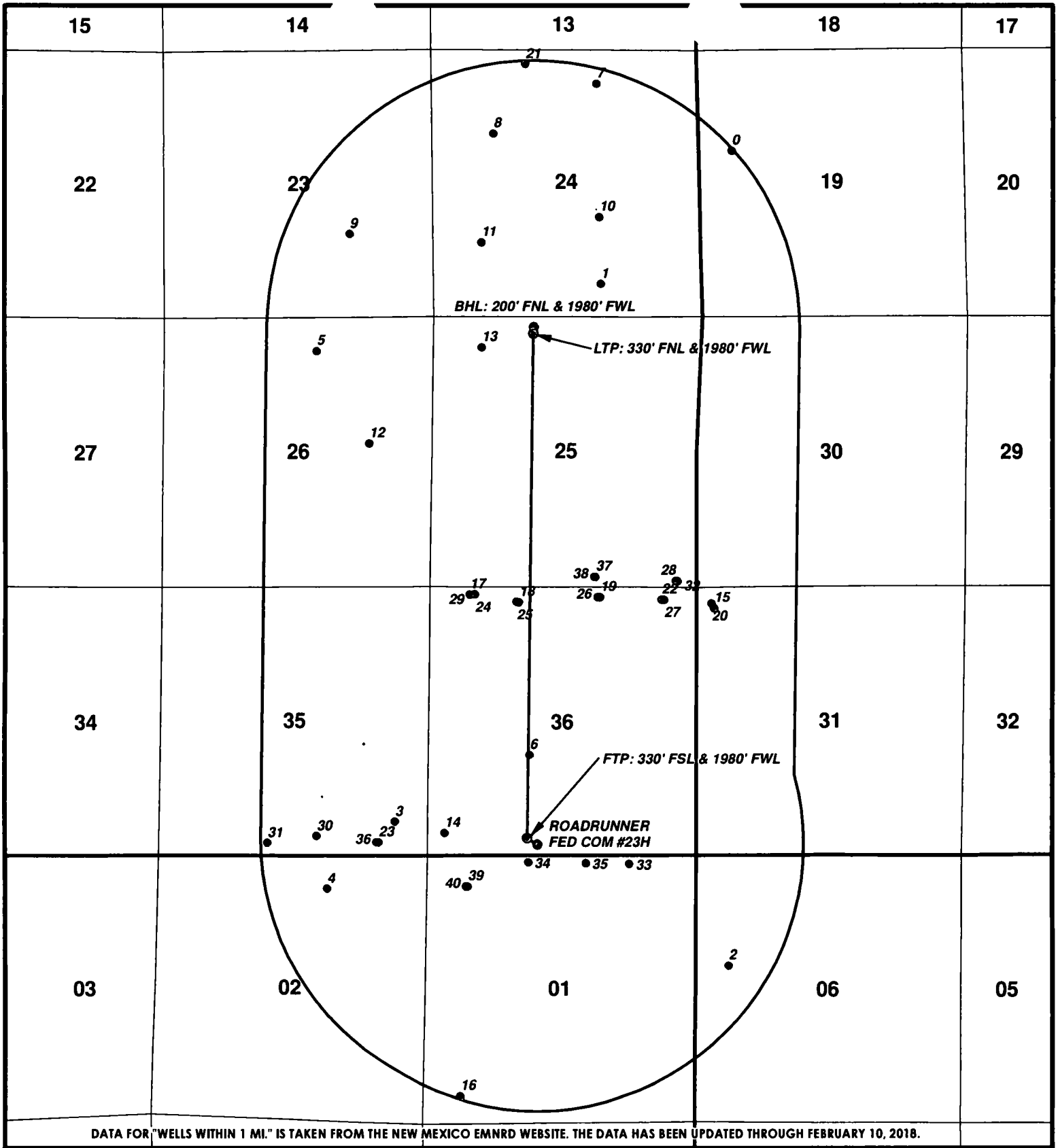
POWERLINE OVERVIEW | LAND STATUS | 3/26/2018 | A.M.

N

CONCHO

COG OPERATING, LLC

HARCROW SURVEYING, LLC.
2314 W. MAIN ST, ARTESIA, NM 88210
PH: (575) 746-2158 FAX: (575) 746-2158
TEXAS FIRM NO. 10194089
c.harcrow@harcrowsurveying.com



DATA FOR "WELLS WITHIN 1 MI." IS TAKEN FROM THE NEW MEXICO EMNRD WEBSITE. THE DATA HAS BEEN UPDATED THROUGH FEBRUARY 10, 2018.

LEGEND

- WELL
- BOTTOMHOLE
- WELLS WITHIN 1 MI.
- 1 MI. BUFFER

ROADRUNNER FEDERAL COM #23H

SEC: 36	TWP: 25 S.	RGE: 26 E.	ELEVATION: 3350.6'
STATE: NEW MEXICO		COUNTY: EDDY	210' FSL & 2180' FWL
W.O. # 18-207	LEASE: ROADRUNNER FED COM		SURVEY: N.M.P.M

0 2,500 5,000 FEET

0 0.175 0.35 0.7 Miles

1 IN = 2,500 FT

LOCATION MAP IMAGERY 3/9/2018 A.M.

N

CONCHO

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ROADRUNNER FEDERAL COM #23H 1 MILE DATA (18-207)

0	BOLTON FEDERAL 001	ROBERT N ENFIELD	3001521053	19	25.0S	27E	1980 N	660 W	32.117171	-104.235674 Plugged
1	GRIFFETH FED 001	BEARD OIL CO	3001521186	24	25.0S	26E	660 S	1980 E	32.109931	-104.244051 Plugged
2	FED J 001	AMOCO PRODUCTION CO	3001522471	6	26.0S	27E	2180 N	660 W	32.073014	-104.235889 Plugged
3	HNG 35 FEDERAL 001	OXY USA INC	3001525280	35	25.0S	26E	660 S	660 E	32.080842	-104.257275 Plugged
4	COTTONWOOD 2 STATE 001	POGO PRODUCING CO	3001527698	2	26.0S	26E	660 N	1980 E	32.077226	-104.261616 Plugged
5	CABLE 26 002	CHEVRON U S A INC	3001529474	26	25.0S	26E	660 N	2310 E	32.106284	-104.262253 Plugged
6	COTTONWOOD 36 STATE SWD 001	COG OPERATING LLC	3001529560	36	25.0S	26E	1980 S	1980 W	32.084475	-104.248667 Plugged
7	LIGHTNING 24 FEDERAL COM 001	COG OPERATING LLC	3001533001	24	25.0S	26E	660 N	1980 E	32.120816	-104.244344 Active
8	LIBERTY 24 FEDERAL COM 001	CIMAREX ENERGY CO. OF COLORADO	3001533094	24	25.0S	26E	1650 N	1200 W	32.11813	-104.250968 Active
9	WIGEON 23 FEDERAL COM 001	CIMAREX ENERGY CO. OF COLORADO	3001533563	23	25.0S	26E	1650 S	1650 E	32.112644	-104.260142 Active
10	LIGHTNING 24 FEDERAL COM 002	COG OPERATING LLC	3001533578	24	25.0S	26E	1980 S	1980 E	32.11356	-104.244149 Active
11	LIBERTY 24 FEDERAL COM 002	CIMAREX ENERGY CO. OF COLORADO	3001533683	24	25.0S	26E	1475 S	940 W	32.112183	-104.251728 Active
12	BUFFLEHEAD 26 FEDERAL COM 001	CIMAREX ENERGY CO. OF COLORADO	3001533685	26	25.0S	26E	2475 N	1250 E	32.10131	-104.258903 New (Not drilled or compl)
13	FREEDOM 25 FEE 001C	CIMAREX ENERGY CO. OF COLORADO	3001534716	25	25.0S	26E	660 N	990 W	32.106491	-104.251699 New (Not drilled or compl)
14	CRAIG STATE COM 001H	COG OPERATING LLC	3001537466	36	25.0S	26E	380 S	330 W	32.080242	-104.254096 Active
15	JACK FEDERAL 001H	COG OPERATING LLC	3001538643	31	25.0S	27E	330 N	380 W	32.092415	-104.236801 New (Not drilled or compl)
16	BODACIOUS BSM FEDERAL 001H	EOG Y RESOURCES, INC.	3001541158	1	26.0S	26E	510 S	660 W	32.065891	-104.253089 New (Not drilled or compl)
17	CRAIG STATE 002	COG OPERATING LLC	3001541970	36	25.0S	26E	210 N	800 W	32.093161	-104.252462 New (Not drilled or compl)
18	CRAIG STATE 003H	COG OPERATING LLC	3001541971	36	25.0S	26E	350 N	1770 W	32.092743	-104.249319 New (Not drilled or compl)
19	CRAIG STATE 004H	COG OPERATING LLC	3001541981	36	25.0S	26E	190 N	1870 E	32.093004	-104.244105 New (Not drilled or compl)
20	JACK FEDERAL 002H	COG OPERATING LLC	3001542132	31	25.0S	27E	240 N	330 W	32.092662	-104.236965 New (Not drilled or compl)
21	LIBERTY 24 FEDERAL COM 003H	CIMAREX ENERGY CO. OF COLORADO	3001542261	24	25.0S	26E	330 N	1830 W	32.121889	-104.248925 New (Not drilled or compl)
22	CRAIG STATE 005H	COG OPERATING LLC	3001542497	36	25.0S	26E	190 N	660 E	32.09287	-104.240178 New (Not drilled or compl)
23	BONNIE 35 FEDERAL COM 001H	CIMAREX ENERGY CO.	3001542956	35	25.0S	26E	200 S	970 E	32.07973	-104.258318 New (Not drilled or compl)
24	CRAIG STATE 012H	COG OPERATING LLC	3001542989	36	25.0S	26E	210 N	900 W	32.093162	-104.252138 New (Not drilled or compl)
25	CRAIG STATE 013H	COG OPERATING LLC	3001543045	36	25.0S	26E	350 N	1720 W	32.092748	-104.249481 New (Not drilled or compl)
26	CRAIG STATE 014H	COG OPERATING LLC	3001543046	36	25.0S	26E	190 N	1920 E	32.09301	-104.244267 New (Not drilled or compl)
27	CRAIG STATE 015H	COG OPERATING LLC	3001543047	36	25.0S	26E	190 N	610 E	32.092864	-104.240016 New (Not drilled or compl)
28	ROAD RUNNER FEDERAL COM 001H	COG OPERATING LLC	3001543133	25	25.0S	26E	190 S	380 E	32.093883	-104.239249 New (Not drilled or compl)
29	CRAIG STATE 002H	COG OPERATING LLC	3001543202	36	25.0S	26E	210 N	800 W	32.093161	-104.252462 New (Not drilled or compl)
30	BONNIE 35 FEDERAL COM 004H	CIMAREX ENERGY CO.	3001543619	35	25.0S	26E	330 S	2190 E	32.080072	-104.262274 New (Not drilled or compl)
31	BONNIE 35 FEDERAL 007H	CIMAREX ENERGY CO.	3001543762	35	25.0S	26E	200 S	2120 W	32.079702	-104.265435 New (Not drilled or compl)
32	ROAD RUNNER FEDERAL COM 011H	COG OPERATING LLC	3001543900	25	25.0S	26E	190 S	350 E	32.09388	-104.239152 New (Not drilled or compl)
33	BODACIOUS BSM FEDERAL 005H	EOG Y RESOURCES, INC.	3001544033	1	26.0S	26E	200 N	1320 E	32.078557	-104.242249 New (Not drilled or compl)
34	BODACIOUS BSM FEDERAL 003H	EOG Y RESOURCES, INC.	3001544034	1	26.0S	26E	200 N	1980 W	32.07864	-104.248754 New (Not drilled or compl)
35	BODACIOUS BSM FEDERAL 004H	EOG Y RESOURCES, INC.	3001544035	1	26.0S	26E	200 N	2180 E	32.078593	-104.245038 New (Not drilled or compl)
36	BONNIE 35 FEDERAL COM 002H	CIMAREX ENERGY CO.	3001544111	35	25.0S	26E	200 S	1010 E	32.07973	-104.258448 New (Not drilled or compl)
37	ROAD RUNNER FEDERAL COM 002H	COG OPERATING LLC	3001544147	25	25.0S	26E	210 S	1965 E	32.094114	-104.244387 New (Not drilled or compl)
38	ROAD RUNNER FEDERAL COM 012H	COG OPERATING LLC	3001544148	25	25.0S	26E	210 S	1995 E	32.094118	-104.244484 New (Not drilled or compl)
39	CRAIG FEDERAL COM 012H	COG OPERATING LLC	3001544208	1	26.0S	26E	675 N	790 W	32.077348	-104.25262 New (Not drilled or compl)
40	CRAIG FEDERAL COM 002H	COG OPERATING LLC	3001544209	1	26.0S	26E	675 N	760 W	32.077348	-104.252717 New (Not drilled or compl)

CONCHO

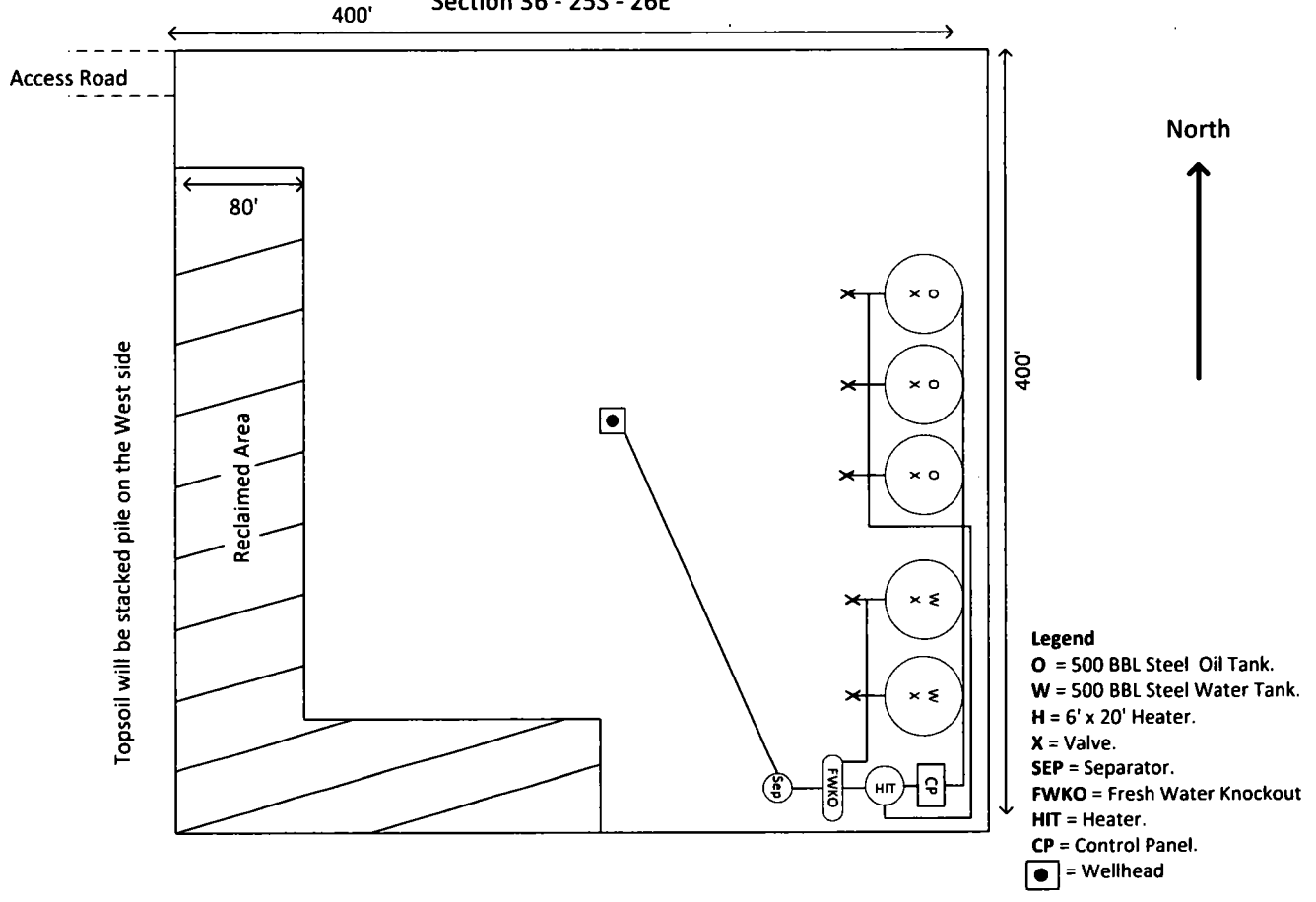
COG Operating LLC
2208 West Main Street
Artesia, NM 88210

Well Site Layout

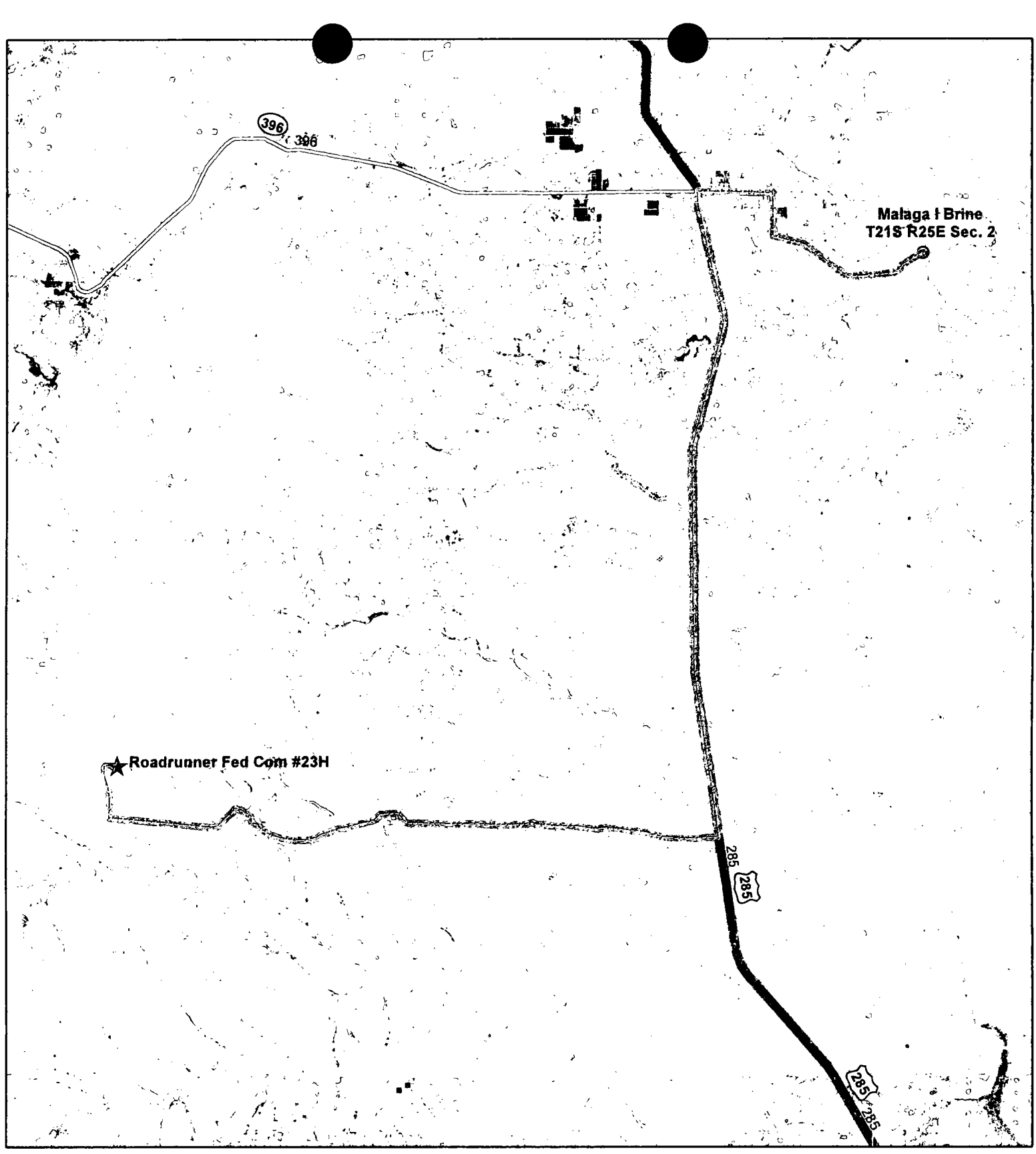
Production Facility Layout

Roadrunner Federal Com 23H
Section 36 - 25S - 26E

Exhibit 3



Legend
O = 500 BBL Steel Oil Tank.
W = 500 BBL Steel Water Tank.
H = 6' x 20' Heater.
X = Valve.
SEP = Separator.
FWKO = Fresh Water Knockout
HIT = Heater.
CP = Control Panel.
= Wellhead



CONCHO

Roadrunner Fed Com #23H
To Malaga I Brine

Date: 4/9/2018
Author: Whitnie McDonald
State: New Mexico
County: Eddy

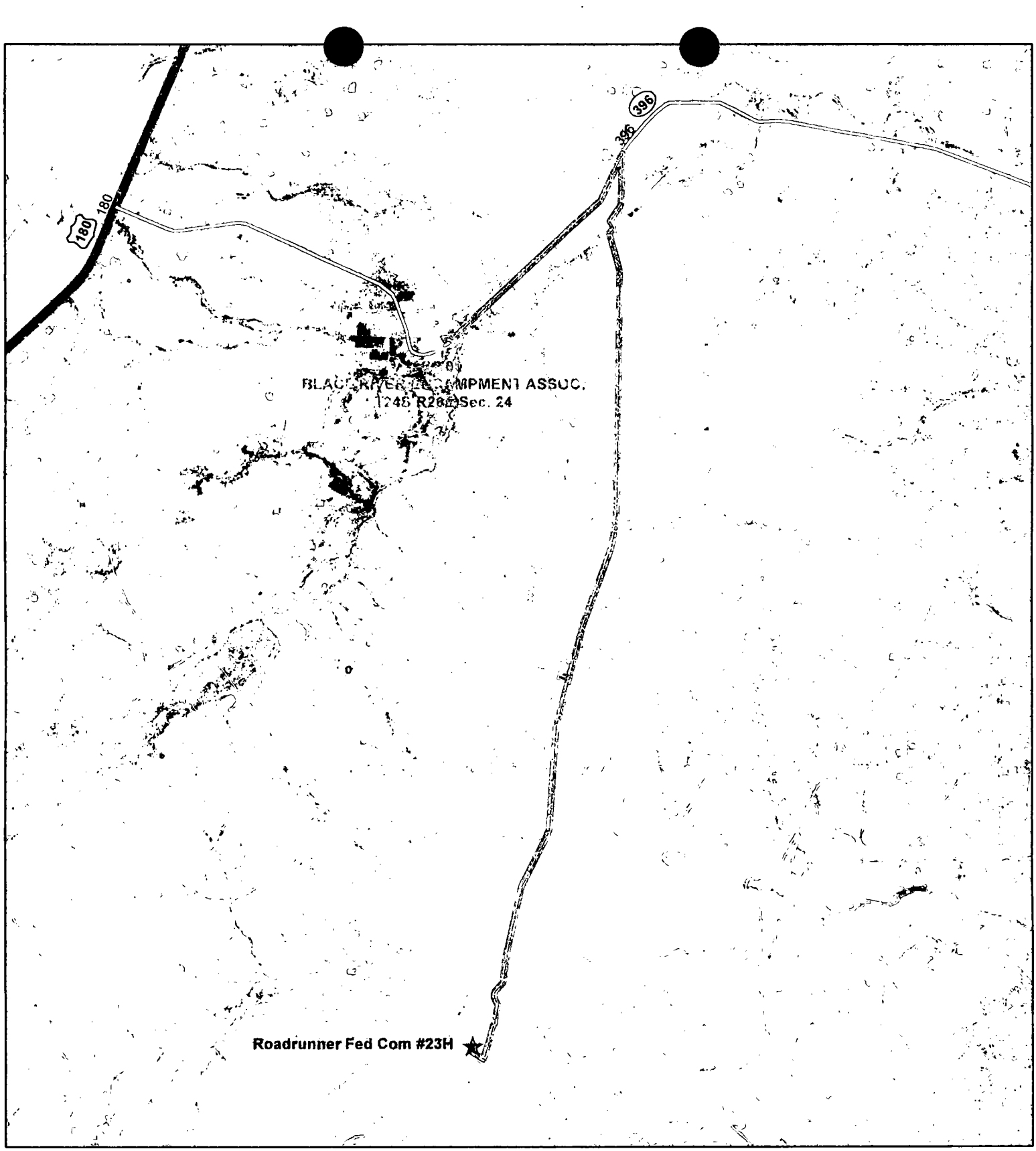
Disclaimer: This is not a legal survey document

Map Legend

Route

0 0.75 1.5 3 4.5 6
Miles

N
W E
S



CONCHO

Roadrunner Fed Com #23H
Water Transfer Route

Date 11/14/2017
Author Whitnie McDonald
State New Mexico
County Eddy

Disclaimer: This is not a legal survey document

Map Legend

Route

N
W E
S

0 0.5 1 2 3 4 Miles

CONCHO

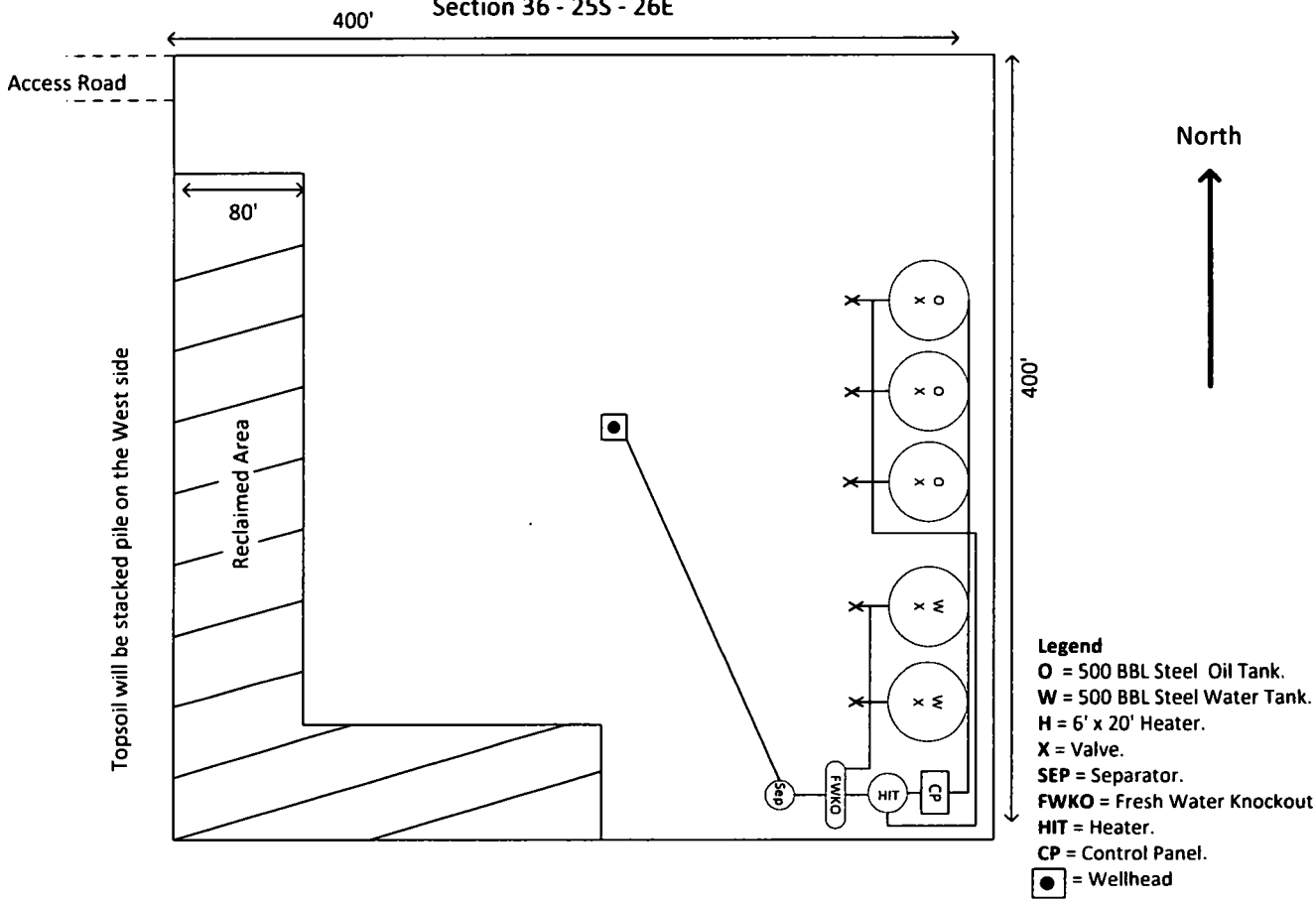
COG Operating LLC
2208 West Main Street
Artesia, NM 88210

Well Site Layout

Production Facility Layout

Roadrunner Federal Com 23H
Section 36 - 25S - 26E

Exhibit 3



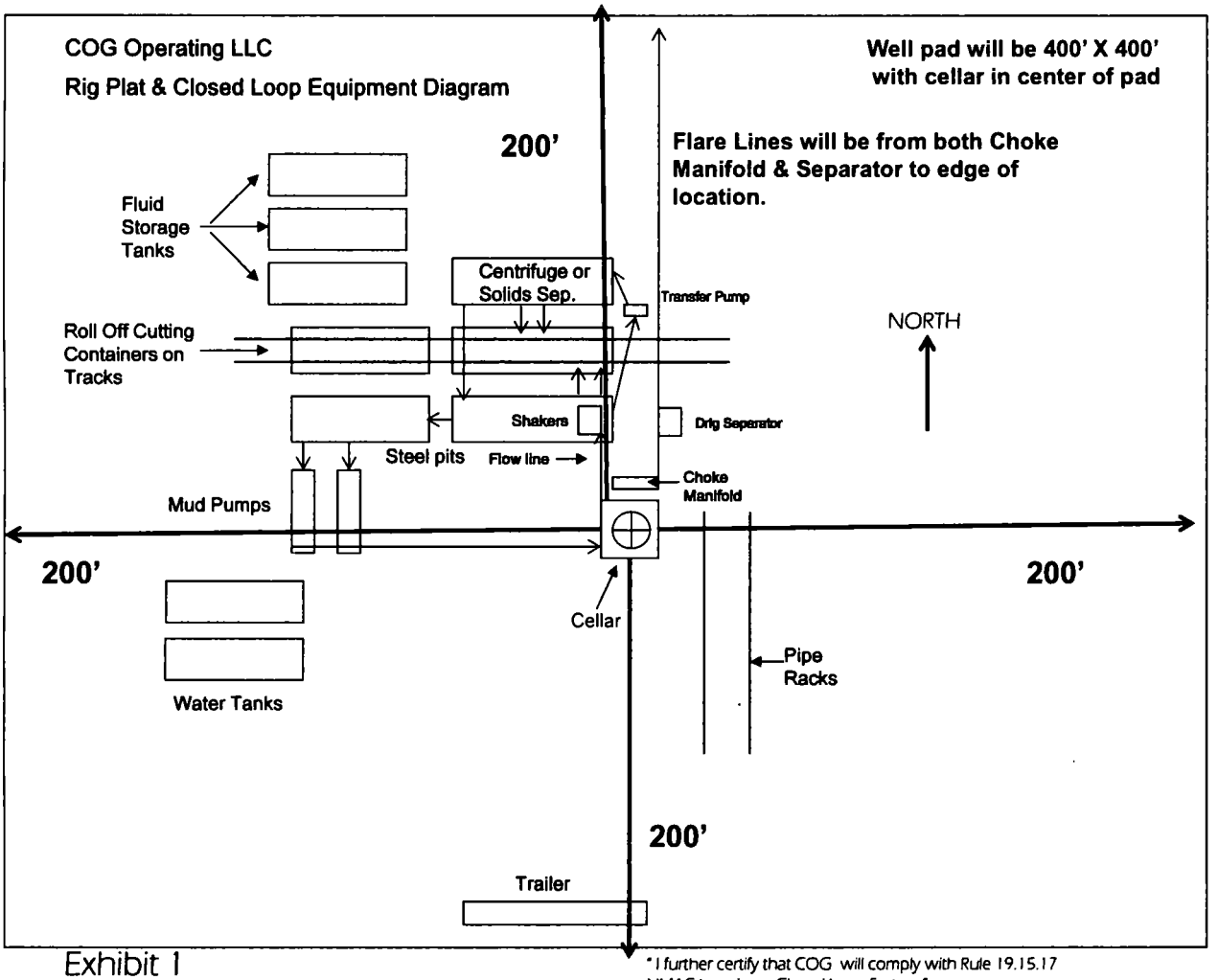


Exhibit 1

"I further certify that COG will comply with Rule 19.15.17 NMAC by using a Closed Loop System."

OPERATOR CERTIFICATION

I hereby certify that I, or persons under my direct supervision, have inspected the drill site and access road proposed herein; that I am familiar with the conditions that presently exist; that I have full knowledge of State and Federal laws applicable to this operation; that the statements made in this APD package are, to the best of my knowledge, true and correct; and that the work associated with the operations proposed herein will be performed in conformity with this APD package and the terms and conditions under which it is approved. I also certify that I, or COG Operating LLC, am responsible for the operations conducted under this application. These statements are subject to the provisions of 18 U.S.C. 1001 for the filing of false statements. Executed this 2ND day of APRIL, 2018.

Signed: Mayte Reyes

Printed Name: Mayte Reyes
Position: Regulatory Analyst
Address: 2208 W. Main Street, Artesia, NM 88210
Telephone: (575) 748-6945
E-mail: mreyes1@concho.com
Field Representative (if not above signatory): Rand French
Telephone: (575) 748-6940. E-mail: rfrench@concho.com

Section 1 - General

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

Section 2 - Lined Pits

Would you like to utilize Lined Pit PWD options? NO

Produced Water Disposal (PWD) Location:

PWD surface owner:

PWD disturbance (acres):

Lined pit PWD on or off channel:

Lined pit PWD discharge volume (bbl/day):

Lined pit specifications:

Pit liner description:

Pit liner manufacturers information:

Precipitated solids disposal:

Decribe precipitated solids disposal:

Precipitated solids disposal permit:

Lined pit precipitated solids disposal schedule:

Lined pit precipitated solids disposal schedule attachment:

Lined pit reclamation description:

Lined pit reclamation attachment:

Leak detection system description:

Leak detection system attachment:

Lined pit Monitor description:

Lined pit Monitor attachment:

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

Is the reclamation bond a rider under the BLM bond?

Lined pit bond number:

Lined pit bond amount:

Additional bond information attachment:

Section 3 - Unlined Pits

Would you like to utilize Unlined Pit PWD options? NO

Produced Water Disposal (PWD) Location:

PWD surface owner: **PWD disturbance (acres):**

Unlined pit PWD on or off channel:

Unlined pit PWD discharge volume (bbl/day):

Unlined pit specifications:

Precipitated solids disposal:

Decribe precipitated solids disposal:

Precipitated solids disposal permit:

Unlined pit precipitated solids disposal schedule:

Unlined pit precipitated solids disposal schedule attachment:

Unlined pit reclamation description:

Unlined pit reclamation attachment:

Unlined pit Monitor description:

Unlined pit Monitor attachment:

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

Beneficial use user confirmation:

Estimated depth of the shallowest aquifer (feet):

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

TDS lab results:

Geologic and hydrologic evidence:

State authorization:

Unlined Produced Water Pit Estimated percolation:

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

Is the reclamation bond a rider under the BLM bond?

Unlined pit bond number:

Unlined pit bond amount:

Additional bond information attachment:

Section 4 - Injection

Would you like to utilize Injection PWD options? NO

Produced Water Disposal (PWD) Location:

PWD surface owner: **PWD disturbance (acres):**

Injection PWD discharge volume (bbl/day):

Injection well mineral owner:

Injection well type:

Injection well number: **Injection well name:**

Assigned injection well API number? **Injection well API number:**

Injection well new surface disturbance (acres):

Minerals protection information:

Mineral protection attachment:

Underground Injection Control (UIC) Permit?

UIC Permit attachment:

Section 5 - Surface Discharge

Would you like to utilize Surface Discharge PWD options? NO

Produced Water Disposal (PWD) Location:

PWD surface owner: **PWD disturbance (acres):**

Surface discharge PWD discharge volume (bbl/day):

Surface Discharge NPDES Permit?

Surface Discharge NPDES Permit attachment:

Surface Discharge site facilities information:

Surface discharge site facilities map:

Section 6 - Other

Would you like to utilize Other PWD options? NO

Produced Water Disposal (PWD) Location:

PWD surface owner: **PWD disturbance (acres):**

Other PWD discharge volume (bbl/day):

Other PWD type description:

Other PWD type attachment:

Have other regulatory requirements been met?

Other regulatory requirements attachment:

AFMSS

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

Bond Info Data Report

08/13/2018

Bond Information

Federal/Indian APD: FED

BLM Bond number: NMB000215

BIA Bond number:

Do you have a reclamation bond? NO

Is the reclamation bond a rider under the BLM bond?

Is the reclamation bond BLM or Forest Service?

BLM reclamation bond number:

Forest Service reclamation bond number:

Forest Service reclamation bond attachment:

Reclamation bond number:

Reclamation bond amount:

Reclamation bond rider amount:

Additional reclamation bond information attachment: