

**Carlsbad Field Office
OCD Artesia**

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

UNITED STATES
DEPARTMENT OF THE INTERIOR
BUREAU OF LAND MANAGEMENT

APPLICATION FOR PERMIT TO DRILL OR REENTER

1a. Type of work: <input checked="" type="checkbox"/> DRILL <input type="checkbox"/> REENTER		5. Lease Serial No. NMLC0065928A
1b. Type of Well: <input checked="" type="checkbox"/> Oil Well <input type="checkbox"/> Gas Well <input type="checkbox"/> Other <input checked="" type="checkbox"/> Single Zone <input type="checkbox"/> Multiple Zone		6. If Indian, Allottee or Tribe Name
2. Name of Operator COG OPERATING LLC		7. If Unit or CA Agreement, Name and No.
3a. Address 600 West Illinois Ave Midland TX 79701		8. Lease Name and Well No. LITTLEFIELD 33 FEDERAL C 808H
3b. Phone No. (include area code) 229137 (432)683-7443		9. API Well No. 30-015-45169
4. Location of Well (Report location clearly and in accordance with any State requirements.) At surface LOT 9 / 250 FSL / 781 FWL / LAT 32.0007979 / LONG -103.995677 At proposed prod. zone NWNW / 200 FNL / 660 FWL / LAT 32.020596 / LONG -103.9957845		10. Field and Pool, or Exploratory PURPLE SAGE / WOLFCAMP GAS
14. Distance in miles and direction from nearest town or post office* 15 miles		11. Sec., T, R. M. or Blk. and Survey or Area SEC 33 / T26S / R29E / NMP
15. Distance from proposed* location to nearest property or lease line, ft. (Also to nearest drig. unit line, if any) 200 feet	16. No. of acres in lease 419.41	17. Spacing Unit dedicated to this well 463.13
18. Distance from proposed location* to nearest well, drilling, completed, 2370 feet applied for, on this lease, ft.	19. Proposed Depth 10879 feet / 18036 feet	20. BLM/BIA Bond No. on file FED: NMB000215
21. Elevations (Show whether DF, KDB, RT, GL, etc.) 2860 feet	22. Approximate date work will start* 09/01/2018	23. Estimated duration 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. | 4. Bond to cover the operations unless covered by an existing bond on file (see Item 20 above). |
| 2. A Drilling Plan. | 5. Operator certification |
| 3. A Surface Use Plan (if the location is on National Forest System Lands, the SUPO must be filed with the appropriate Forest Service Office). | 6. Such other site specific information and/or plans as may be required by the BLM. |

25. Signature (Electronic Submission)	Name (Printed/Typed) Mayte Reyes / Ph: (575)748-6945	Date 05/03/2018
Title Regulatory Analyst		
Approved by (Signature) (Electronic Submission)	Name (Printed/Typed) Cody Layton / Ph: (575)234-5959	Date 08/02/2018
Title Assistant Field Manager Lands & Minerals 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: 08/02/2018

**NM OIL CONSERVATION
ARTESIA DISTRICT**

AUG 10 2018

RECEIVED

RWP 8-13-18

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.

Additional Operator Remarks

Location of Well

1. SHL: LOT 9 / 250 FSL / 781 FWL / TWSP: 26S / RANGE: 29E / SECTION: 33 / LAT: 32.0007979 / LONG: -103.995677 (TVD: 0 feet, MD: 0 feet)
PPP: LOT 9 / 330 FSL / 660 FWL / TWSP: 26S / RANGE: 29E / SECTION: 33 / LAT: 32.0010175 / LONG: -103.9960663 (TVD: 10831 feet, MD: 11150 feet)
BHL: NWNW / 200 FNL / 660 FWL / TWSP: 26S / RANGE: 29E / SECTION: 28 / LAT: 32.020596 / LONG: -103.9957845 (TVD: 10879 feet, MD: 18036 feet)

BLM Point of Contact

Name: Judith Yeager
Title: Legal Instruments Examiner
Phone: 5752345936
Email: jyeager@blm.gov

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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.

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PECOS DISTRICT DRILLING CONDITIONS OF APPROVAL

OPERATOR'S NAME:	COG Operating LLC
LEASE NO.:	NMLC0065928A
WELL NAME & NO.:	Littlefield 33 Federal Com 808H
SURFACE HOLE FOOTAGE:	250'S & 781'W
BOTTOM HOLE FOOTAGE:	200'N & 660'W
LOCATION:	Section 33, T.26 S., R.29 E., NMPM
COUNTY:	Eddy County, New Mexico

Potash	<input checked="" type="radio"/> None	<input type="radio"/> Secretary	<input type="radio"/> R-111-P
Cave/Karst Potential	<input type="radio"/> Low	<input checked="" type="radio"/> Medium	<input type="radio"/> High
Variance	<input type="radio"/> None	<input checked="" type="radio"/> Flex Hose	<input type="radio"/> Other
Wellhead	<input checked="" type="radio"/> Conventional	<input type="radio"/> Multibowl	
Other	<input type="checkbox"/> 4 String Area	<input type="checkbox"/> Capitan Reef	<input type="checkbox"/> 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 10 3/4 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.
2. The minimum required fill of cement behind the 7 5/8 inch intermediate casing is:
 - Cement to surface. If cement does not circulate see B.1.a, c-d above. **Wait on cement (WOC) time for a primary cement job is to include the lead cement slurry due to cave/karst.**
 - ❖ In Medium 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
 3. The minimum required fill of cement behind the 5 1/2 X 5 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 7 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 07212018

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.

COG Operating, LLC - Littlefield 33 Federal Com 808H

1. Geologic Formations

TVD of target	10,879' EOL	Pilot hole depth	NA
MD at TD:	18,036'	Deepest expected fresh water:	200'

Formation	Depth (TVD) from KB	Water/Mineral Bearing/ Target Zone?	Hazards*
Quaternary Fill	Surface	Water	
Rustler	465	Water	
Top of Salt	620	Salt	
Base of Salt	2613	Salt	
Lamar	2804	Salt Water	
Delaware	2850	Salt Water	
Bone Spring	6496	Oil/Gas	
1st Bone Spring	7426	Oil/Gas	
2nd Bone Spring	8136	Oil/Gas	
3rd Bone Spring	9271	Oil/Gas	
Wolfcamp A	9646	Oil/Gas	
Wolfcamp B	10118	Oil/Gas	
Wolfcamp C	10412	Oil/Gas	
Wolfcamp D	10745	Target Oil/Gas	
Strawn	12200	Not Penetrated	

2. Casing Program - SEE CoA

Hole Size	Casing Interval		Csg. Size	Weight (lbs)	Grade	Conn.	SF Collapse	SF Burst	SF Body
	From	To							
13.5"	0	575	10.75"	45.5	N80	BTC	9.39	1.41	39.75
9.875"	0	10050	7.875" 7.5"	29.7	P110	BTC	1.51	1.34	3.64
6.75"	0	9550	5.5"	23	P110	BTC	2.33	2.46	3.72
6.75"	9550	18,036	5"	18	P110	BTC	2.33	2.46	3.72
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.

4. Pressure Control Equipment - *SEE CoA*

N	A variance is requested for the use of a diverter on the surface casing. See attached for schematic.
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BOP installed and tested before drilling which hole?	Size?	Min. Required WP	Type	x	Tested to:
9-7/8"	13-5/8"	3M	Annular	x	3000 psi 3M
			Blind Ram	X	
			Pipe Ram	X	
			Double Ram		
			Other*		
6-3/4"	13-5/8"	5M	Annular	x	50% testing pressure 5M
			Blind Ram	x	
			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.

**PECOS DISTRICT
SURFACE USE
CONDITIONS OF APPROVAL**

OPERATOR'S NAME:	COG Operating LLC
LEASE NO.:	NMLC0065928A
WELL NAME & NO.:	Littlefield 33 Federal Com 808H
SURFACE HOLE FOOTAGE:	250'/S & 781'/W
BOTTOM HOLE FOOTAGE:	200'/N & 660'/W
LOCATION:	Section 33, T.26 S., R.29 E., NMPM
COUNTY:	Eddy County, New Mexico

TABLE OF CONTENTS

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

- General Provisions**
- Permit Expiration**
- Archaeology, Paleontology, and Historical Sites**
- Noxious Weeds**
- Special Requirements**
 - Cave/Karst
 - Hydrology
- Construction**
 - Notification
 - Topsoil
 - Closed Loop System
 - Federal Mineral Material Pits
 - Well Pads
 - Roads
- Road Section Diagram**
- Production (Post Drilling)**
 - Well Structures & Facilities
- Interim Reclamation**
- Final Abandonment & Reclamation**

I. GENERAL PROVISIONS

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

II. PERMIT EXPIRATION

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

III. ARCHAEOLOGICAL, PALEONTOLOGY & HISTORICAL SITES

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

IV. NOXIOUS WEEDS

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

V. SPECIAL REQUIREMENT(S)

Cave and Karst Conditions of Approval for APDs

** Depending on location, additional Drilling, Casing, and Cementing procedures may be required by engineering to protect critical karst groundwater recharge areas.

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, siting valves 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 valves, 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.

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, siting valves 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.

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

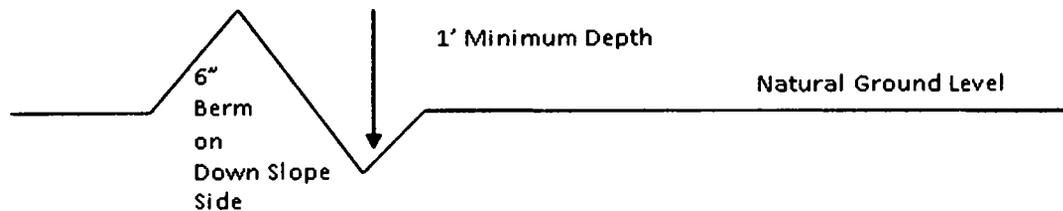
Vehicle turnouts shall be constructed on the road. Turnouts shall be intervisible with interval spacing distance less than 1000 feet. Turnouts shall conform to Figure 1; cross section and plans for typical road construction.

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:

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

Cattle guards

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

Fence Requirement

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

Public Access

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

Construction Steps

1. Salvage topsoil
2. Construct road

3. Redistribute topsoil
4. Revegetate slopes

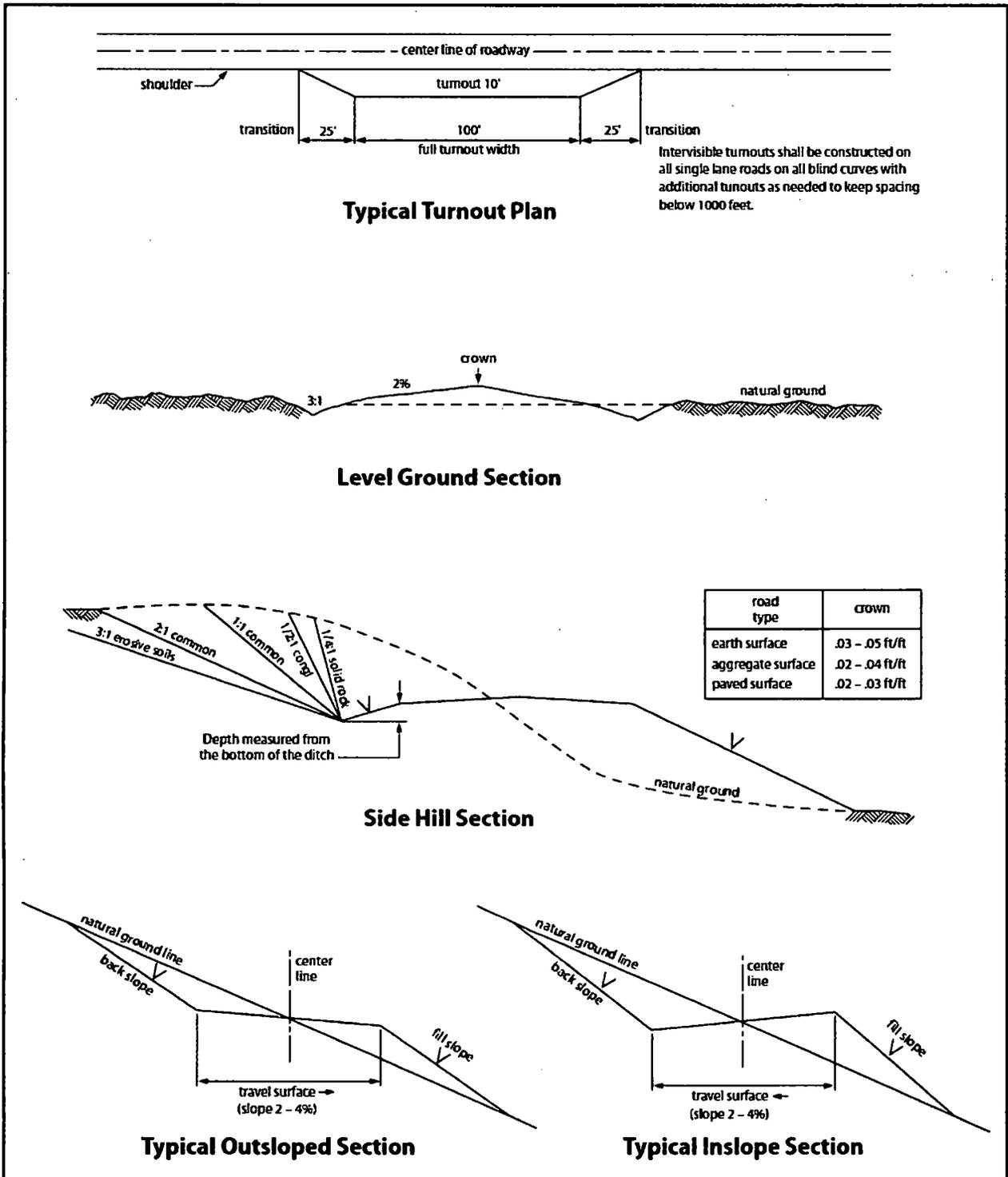


Figure 1. Cross-sections and plans for typical road sections representative of BLM resource or FS local and higher-class roads.

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 3, for Shallow Sites

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

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

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

<u>Species</u>	<u>lb/acre</u>
Plains Bristlegrass (<i>Setaria macrostachya</i>)	1.0
Green Sprangletop (<i>Leptochloa dubia</i>)	2.0
Sideoats Grama (<i>Bouteloua curtipendula</i>)	5.0

*Pounds of pure live seed:

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



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

Operator Certification Data Report

08/02/2018

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: 05/03/2018

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: 10400029967

Submission Date: 05/03/2018

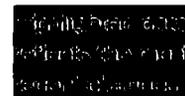
Operator Name: COG OPERATING LLC

Well Name: LITTLEFIELD 33 FEDERAL COM

Well Number: 808H

Well Type: OIL WELL

Well Work Type: Drill



[Show Final Text](#)

Section 1 - General

APD ID: 10400029967

Tie to previous NOS?

Submission Date: 05/03/2018

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: NMLC0065928A

Lease Acres: 419.41

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: LITTLEFIELD 33 FEDERAL COM

Well Number: 808H

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: LITTLEFIELD 33 FEDERAL COM

Well Number: 808H

Describe other minerals:

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

Type of Well Pad: MULTIPLE WELL

Multiple Well Pad Name: Number: 707H, 708H, 807H
LITTLEFIELD 33 FEDERAL COMAND 808H

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: 15 Miles

Distance to nearest well: 2370 FT

Distance to lease line: 200 FT

Reservoir well spacing assigned acres Measurement: 463.13 Acres

Well plat: COG_Littlefield_808H_C102_20180601080528.pdf

Well work start Date: 09/01/2018

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	250	FSL	781	FWL	26S	29E	33	Lot 9	32.0007979	-103.995677	EDD Y	NEW MEXI CO	NEW MEXI CO	F	NMLC0 065928 A	2860	0	0
KOP Leg #1	250	FSL	781	FWL	26S	29E	33	Lot 9	32.0007979	-103.995677	EDD Y	NEW MEXI CO	NEW MEXI CO	F	NMLC0 065928 A	2860	0	0
PPP Leg #1	330	FSL	660	FWL	26S	29E	33	Lot 9	32.0010175	-103.9960663	EDD Y	NEW MEXI CO	NEW MEXI CO	F	NMLC0 065928 A	-7971	11150	10831



APD ID: 10400029967

Submission Date: 05/03/2018

Highlighted data
reflects the most
recent changes

Operator Name: COG OPERATING LLC

Well Name: LITTLEFIELD 33 FEDERAL COM

Well Number: 808H

Show Final Text

Well Type: OIL WELL

Well Work Type: Drill

Section 1 - Geologic Formations

Formation ID	Formation Name	Elevation	True Vertical Depth	Measured Depth	Lithologies	Mineral Resources	Producing Formation
1	QUATERNARY	2860	0	0		NONE	No
2	RUSTLER	2395	465	465		NONE	No
3	TOP SALT	2240	620	620	SALT	NONE	No
4	BASE OF SALT	251	2613	2613	ANHYDRITE	NONE	No
5	LAMAR	56	2804	2804	LIMESTONE	OTHER : Salt Water	No
6	DELAWARE	14	2850	2850		OTHER : Salt Water	No
7	BONE SPRING	-3636	6496	6496		NATURAL GAS,OIL	No
8	BONE SPRING 1ST	-4562	7426	7426		NATURAL GAS,OIL	No
9	BONE SPRING 2ND	-5272	8136	8136	SANDSTONE	NATURAL GAS,OIL	No
10	BONE SPRING 3RD	-6407	9271	9271		NATURAL GAS,OIL	No
11	WOLFCAMP	-6786	9646	9646		NATURAL GAS,OIL	No
12	WOLFCAMP	-7254	10118	10118		NATURAL GAS,OIL	No
13	WOLFCAMP	-7548	10412	10412		NATURAL GAS,OIL	No
14	WOLFCAMP	-7885	10745	10745		NATURAL GAS,OIL	Yes
15	STRAWN	-9336	12200	12200		NATURAL GAS,OIL	No

Section 2 - Blowout Prevention

Operator Name: COG OPERATING LLC

Well Name: LITTLEFIELD 33 FEDERAL COM

Well Number: 808H

Pressure Rating (PSI): 3M

Rating Depth: 10050

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_Littlefield_808H_3M_Choke_20180503103104.pdf

BOP Diagram Attachment:

COG_Littlefield_808H_3M_BOP_20180503103110.pdf

COG_Littlefield_808H_Flex_Hose_20180716084709.pdf

Pressure Rating (PSI): 5M

Rating Depth: 10879

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_Littlefield_808H_5M_Choke_20180503103207.pdf

BOP Diagram Attachment:

COG_Littlefield_808H_Flex_Hose_20180503103153.pdf

COG_Littlefield_808H_Flex_Hose_20180716084658.pdf

Operator Name: COG OPERATING LLC

Well Name: LITTLEFIELD 33 FEDERAL COM

Well Number: 808H

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	13.5	10.75	NEW	API	N	0	575	0	575	-6999	-7974	575	N-80	45.5	OTHER - BTC	9.39	1.41	DRY	39.75	DRY	39.75
2	INTERMEDIATE	9.875	7.875	NEW	API	Y	0	10050	0	10050	-6999	-18749	10050	P-110	29.7	OTHER - BTC	1.51	1.34	DRY	3.64	DRY	3.64
3	PRODUCTION	6.75	5.0	NEW	API	N	0	18036	0	18036	-6999	-24211	18036	P-110	18	OTHER - BTC	2.33	2.46	DRY	3.72	DRY	3.72

Casing Attachments

Casing ID: 1 String Type: SURFACE

Inspection Document:

Spec Document:

Tapered String Spec:

Casing Design Assumptions and Worksheet(s):

COG_Littlefield_808H_Casing_Prog_20180503103329.pdf

Operator Name: COG OPERATING LLC

Well Name: LITTLEFIELD 33 FEDERAL COM

Well Number: 808H

Casing Attachments

Casing ID: 2 String Type: INTERMEDIATE

Inspection Document:

Spec Document:

Tapered String Spec:

COG_Littlefield_808H_Casing_Prog_20180503103318.pdf

Casing Design Assumptions and Worksheet(s):

COG_Littlefield_808H_Casing_Prog_20180503103336.pdf

Casing ID: 3 String Type: PRODUCTION

Inspection Document:

Spec Document:

Tapered String Spec:

Casing Design Assumptions and Worksheet(s):

COG_Littlefield_808H_Casing_Prog_20180503103344.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	575	20	1.75	13.5	35	75	Class C	4% Gel + 1% CaCl2
SURFACE	Tail		0	575	250	1.34	14.8	335	75	Class C	2% CaCl2
INTERMEDIATE	Lead		0	1005 0	820	3.6	10.3	2952	50	Tuned Light Blend	As needed
INTERMEDIATE	Tail		0	1005 0	250	1.08	16.4	270	50	Tail: Class H	As needed
PRODUCTION	Lead		0	1803 6	160	2.5	11.9	400	35	50:50:10 H Blend	As needed

Operator Name: COG OPERATING LLC

Well Name: LITTLEFIELD 33 FEDERAL COM

Well Number: 808H

String Type	Lead/Tail	Stage Tool Depth	Top MD	Bottom MD	Quantity(sx)	Yield	Density	Cu Ft	Excess%	Cement type	Additives
PRODUCTION	Tail		0	1803 6	940	1.24	14.4	1165	35	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
575	1005 0	OTHER : Brine Diesel Emulsion	8.4	9							Brine Diesel Emulsion
0	575	OTHER : FW Gel	8.6	8.8							FW Gel
1005 0	1803 6	OIL-BASED MUD	9.6	11							OBM

Operator Name: COG OPERATING LLC

Well Name: LITTLEFIELD 33 FEDERAL COM

Well Number: 808H

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: 6225

Anticipated Surface Pressure: 3831.62

Anticipated Bottom Hole Temperature(F): 165

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

Describe:

Contingency Plans geohazards description:

Contingency Plans geohazards attachment:

Hydrogen Sulfide drilling operations plan required? YES

Hydrogen sulfide drilling operations plan:

COG_Littlefield_808H_H2S_Schem_20180503103559.pdf

COG_Littlefield_808H_H2S_SUP_20180503103605.pdf

Section 8 - Other Information

Proposed horizontal/directional/multi-lateral plan submission:

COG_Littlefield_808H_AC_20180503103627.pdf

COG_Littlefield_808H_Direct_Plan_20180503103634.pdf

Other proposed operations facets description:

Drilling Plan Attached.

GCP Attached.

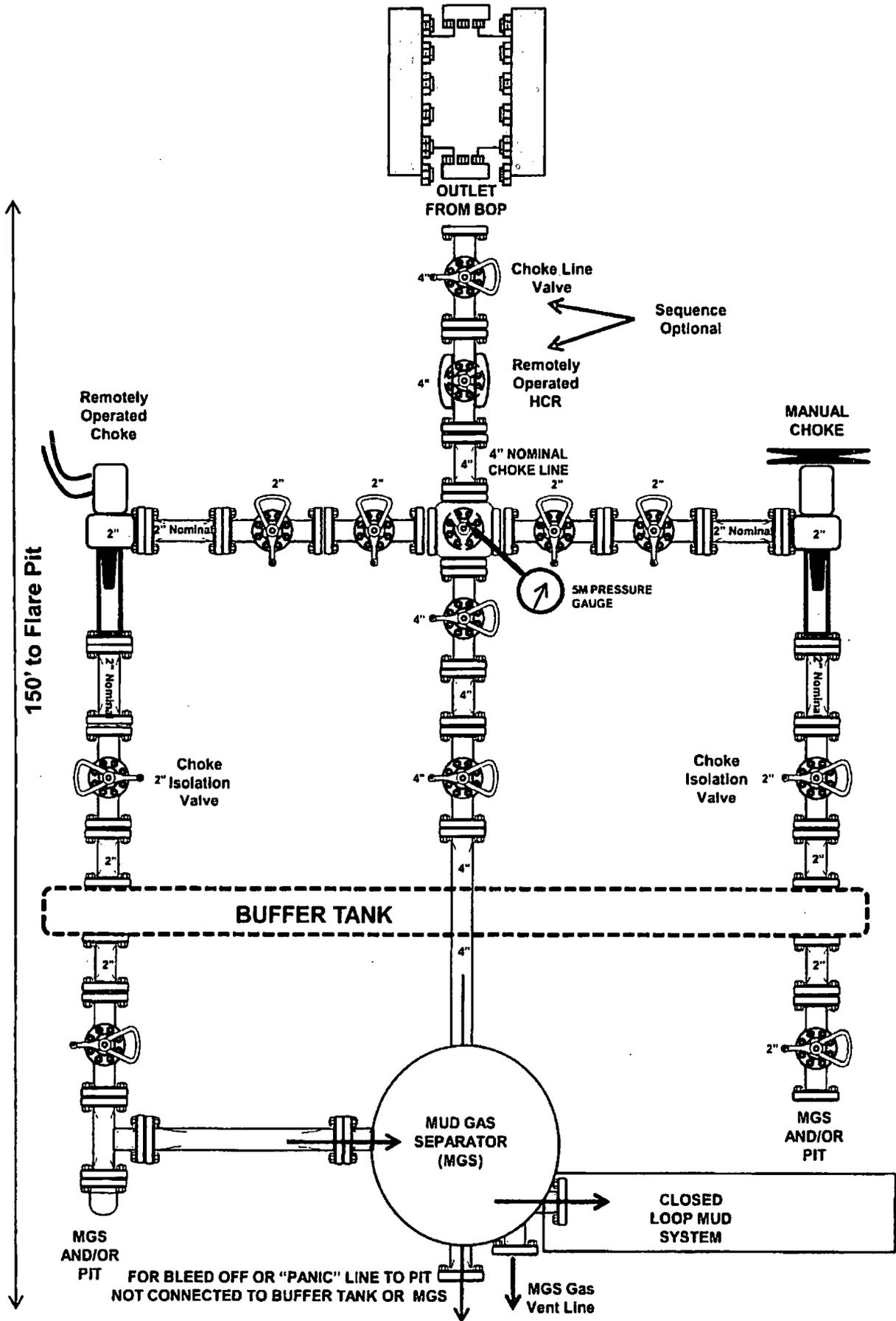
Other proposed operations facets attachment:

COG_Littlefield_808H_GCP_20180503103649.pdf

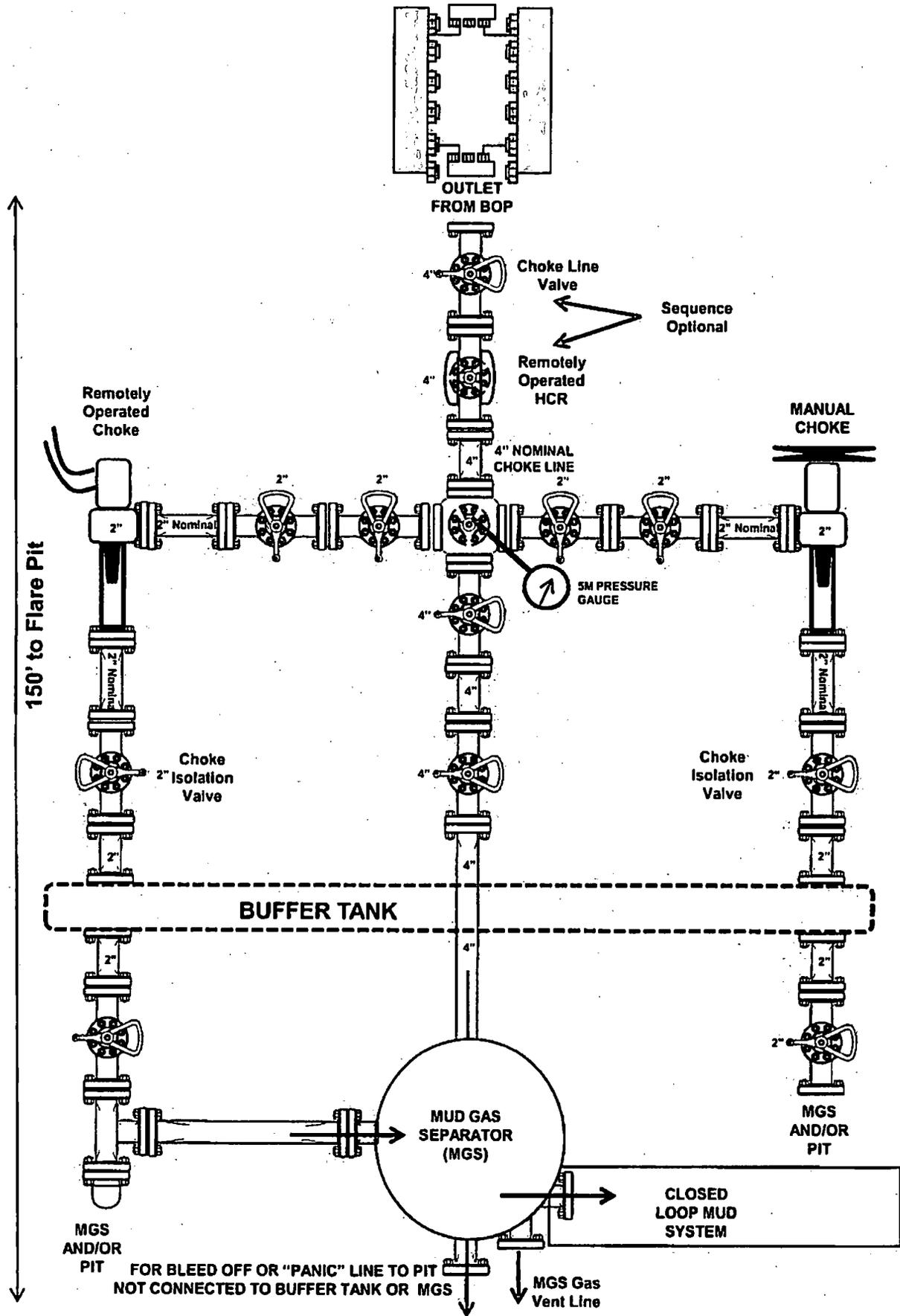
COG_Littlefield_808H_Drill_Prog_20180503103656.pdf

Other Variance attachment:

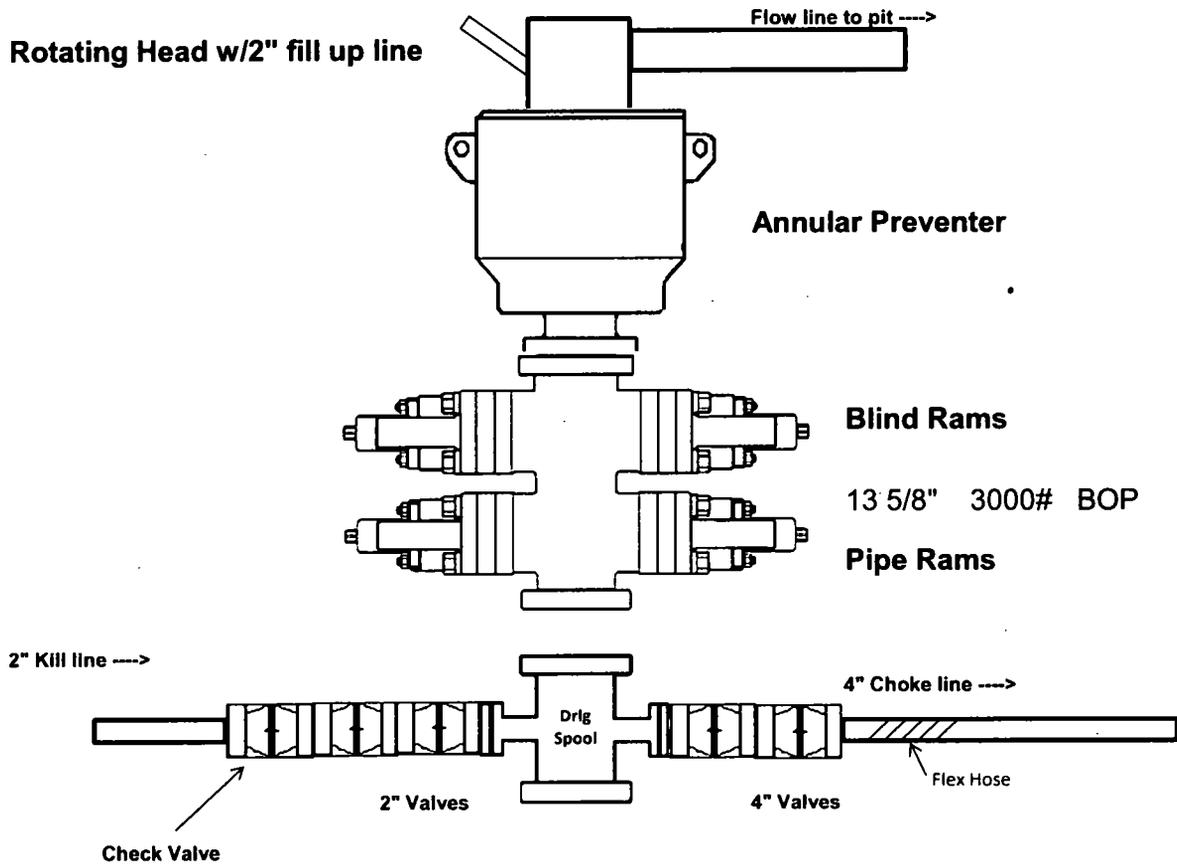
3M Choke Manifold Equipment (WITH MGS + CLOSED LOOP)

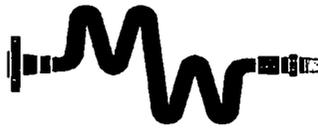


5M Choke Manifold Equipment (WITH MGS + CLOSED LOOP)



3,000 psi BOP Schematic





Midwest Hose
& Specialty, Inc.

Internal Hydrostatic Test Certificate

General Information		Hose Specifications	
Customer	LATSHAW DRILLING	Hose Assembly Type	Choke & Kill
MWH Sales Representative	ABYGAIL LOGAN	Certification	API 7K/FSL LEVEL2
Date Assembled	3/16/2018	Hose Grade	MUD
Location Assembled	OKC	Hose Working Pressure	N/A
Sales Order #	368223	Hose Lot # and Date Code	N/A
Customer Purchase Order #	412528	Hose I.D. (Inches)	3.35"
Assembly Serial # (Pick Ticket #)	454857	Hose O.D. (Inches)	5.77"
Hose Assembly Length	58'	Armor (yes/no)	YES
Fittings			
End A		End B	
Stem (Part and Revision #)	R3.5X64-WB	Stem (Part and Revision #)	R3.5X64-WB
Stem (Heat #)	1770131	Stem (Heat #)	1770131
Ferrule (Part and Revision #)	RF3.5X5330	Ferrule (Part and Revision #)	RF3.5X5330
Ferrule (Heat #)	60860852	Ferrule (Heat #)	60860852
Connection - Flange Hammer Union Part	4-1/16 10K	Connection (Part #)	4-1/16 10K
Connection (Heat #)		Connection (Heat #)	
Nut (Part #)		Nut (Part #)	
Nut (Heat #)		Nut (Heat #)	
Dies Used	N/A	Dies Used	5.75"
Hydrostatic Test Requirements			
Test Pressure (psi)	10,000	Hose assembly was tested with ambient water temperature.	
Test Pressure Hold Time (minutes)	16		
Date Tested	Tested By		Approved By
3/16/2018			



Midwest Hose
& Specialty, Inc.

Certificate of Conformity

Customer: **LATSHAW DRILLING**

Customer P.O.# **412528**

Sales Order # **368223**

Date Assembled: **3/16/2018**

Specifications

Hose Assembly Type: **Choke & Kill**

Rig # **N/A**

Assembly Serial # **454857**

Hose Lot # and Date Code **N/A**

Hose Working Pressure (psi) **N/A**

Test Pressure (psi) **10000**

Hose Assembly Description:

CK56-SS-5K-6410K-6410K-58.00' FT-TVM

We hereby certify that the above material supplied for the referenced purchase order to be true according to the requirements of the purchase order and current industry standards.

Supplier:

Midwest Hose & Specialty, Inc.

3312 S I-35 Service Rd

Oklahoma City, OK 73129

Comments:

Approved By

Date

3/19/2018



Midwest Hose
& Specialty, Inc.

Internal Hydrostatic Test Graph

March 16, 2018

Customer: Latshaw

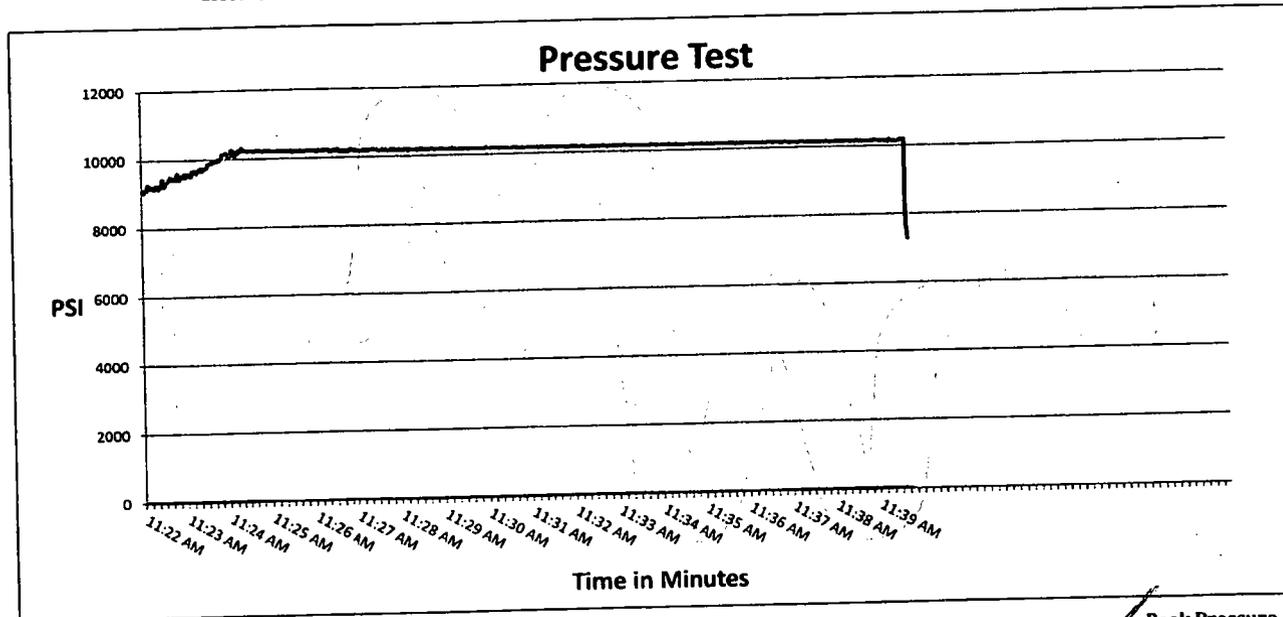
Pick Ticket #: 454857

Hose Specifications

Hose Type	Length
C&K	58'
I.D.	O.D.
3.5"	5.22"
Working Pressure	Burst Pressure
10000 PSI	Standard Safety Multiplier Applies

Verification

Type of Fitting	Coupling Method
4 1/16 10K	Swage
Die Size	Final O.D.
5.75"	5.77"
Hose Serial #	Hose Assembly Serial #
43175	454857



Test Pressure
10000 PSI

Time Held at Test Pressure
16 Minutes

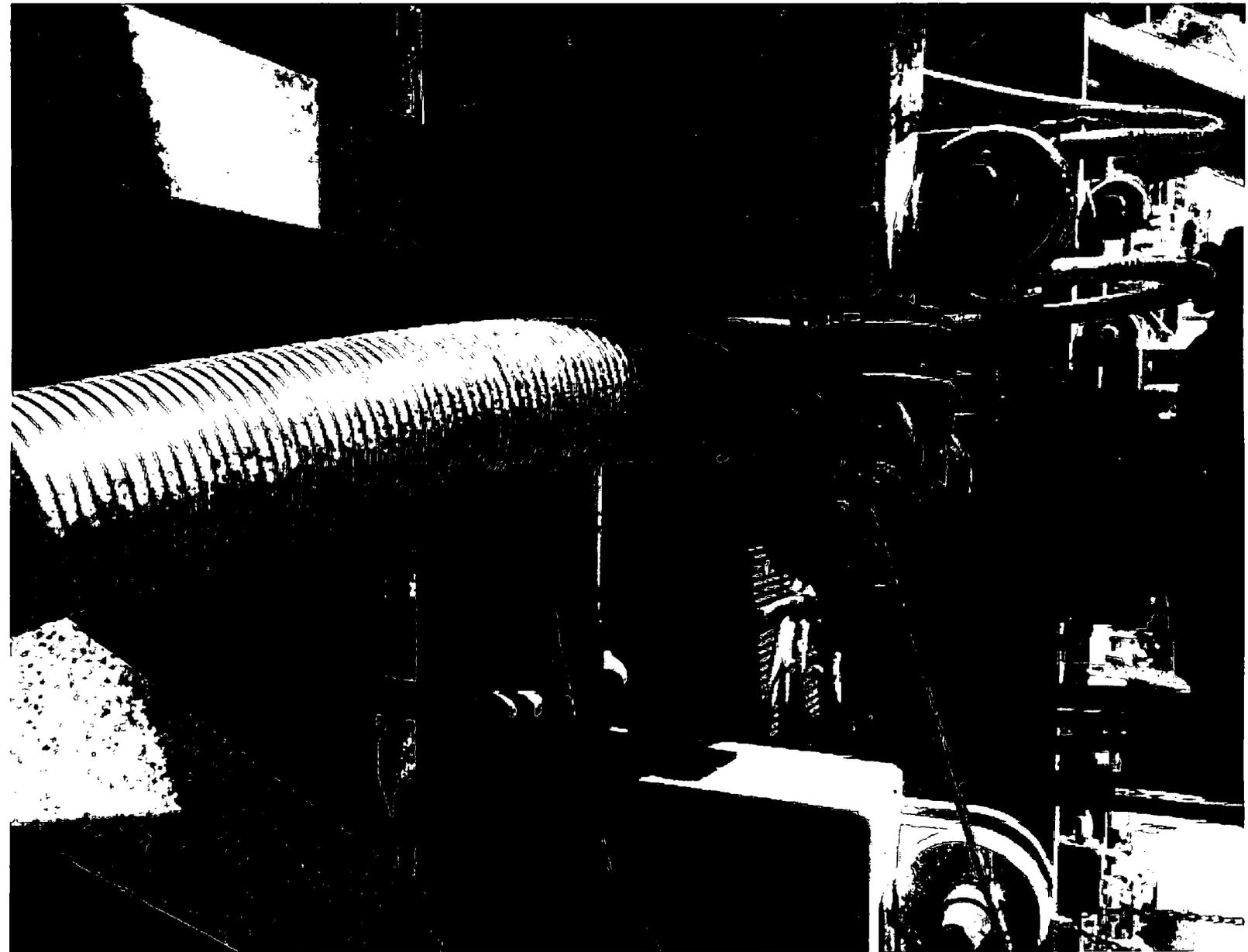
Actual Burst Pressure

Peak Pressure
10400 PSI

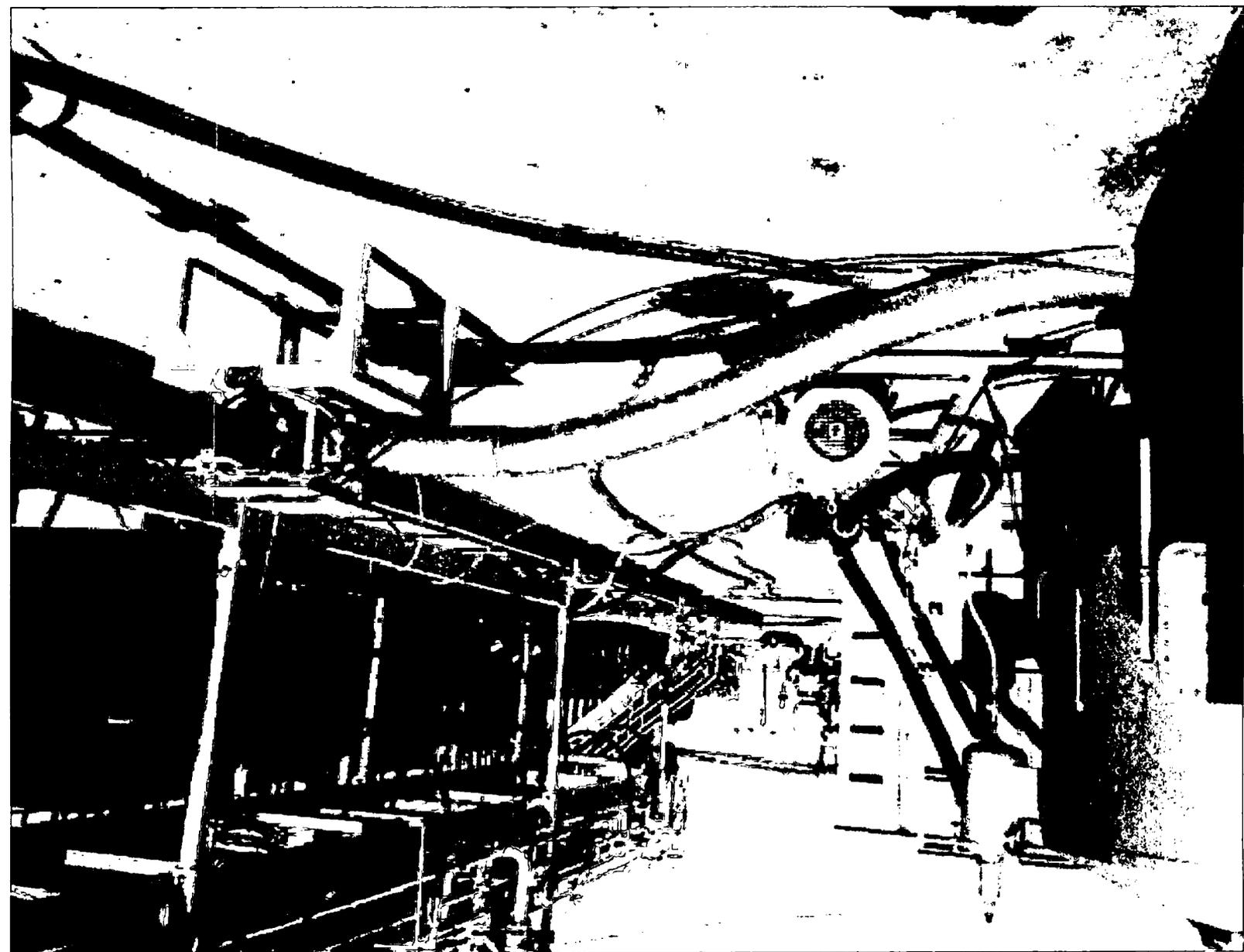
Comments: Hose assembly pressure tested with water at ambient temperature.

Tested By: Rich Tillman

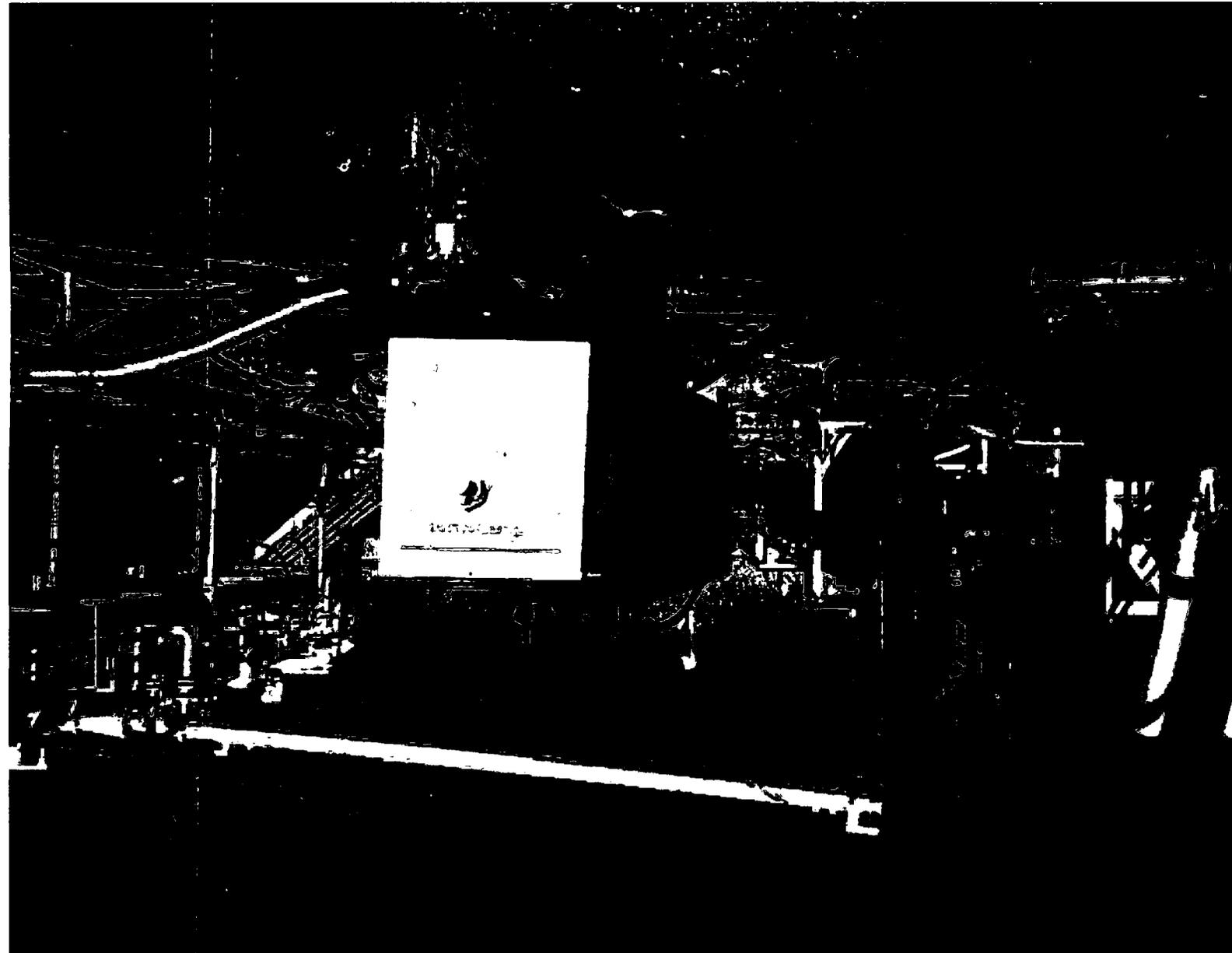
Approved By: James Hawkins













Midwest Hose
& Specialty, Inc.

Certificate of Conformity

Customer: **LATSHAW DRILLING**

Customer P.O.# **RIG#44**

Sales Order # **242739**

Date Assembled: **2/9/2015**

Specifications

Hose Assembly Type: **Choke & Kill**

Assembly Serial # **292614-1**

Hose Lot # and Date Code **10900-08/13**

Hose Working Pressure (psi) **10000**

Test Pressure (psi) **15000**

We hereby certify that the above material supplied for the referenced purchase order to be true according to the requirements of the purchase order and current industry standards.

Supplier:
Midwest Hose & Specialty, Inc.
3312 S I-35 Service Rd
Oklahoma City, OK 73129

Comments:

Approved By

Date

2/10/2015



Midwest Hose
& Specialty, Inc.

Certificate of Conformity

Customer: LATSHAW DRILLING	Customer P.O.# RIG#44
Sales Order # 242739	Date Assembled: 2/9/2015

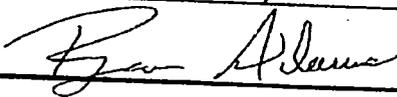
Specifications

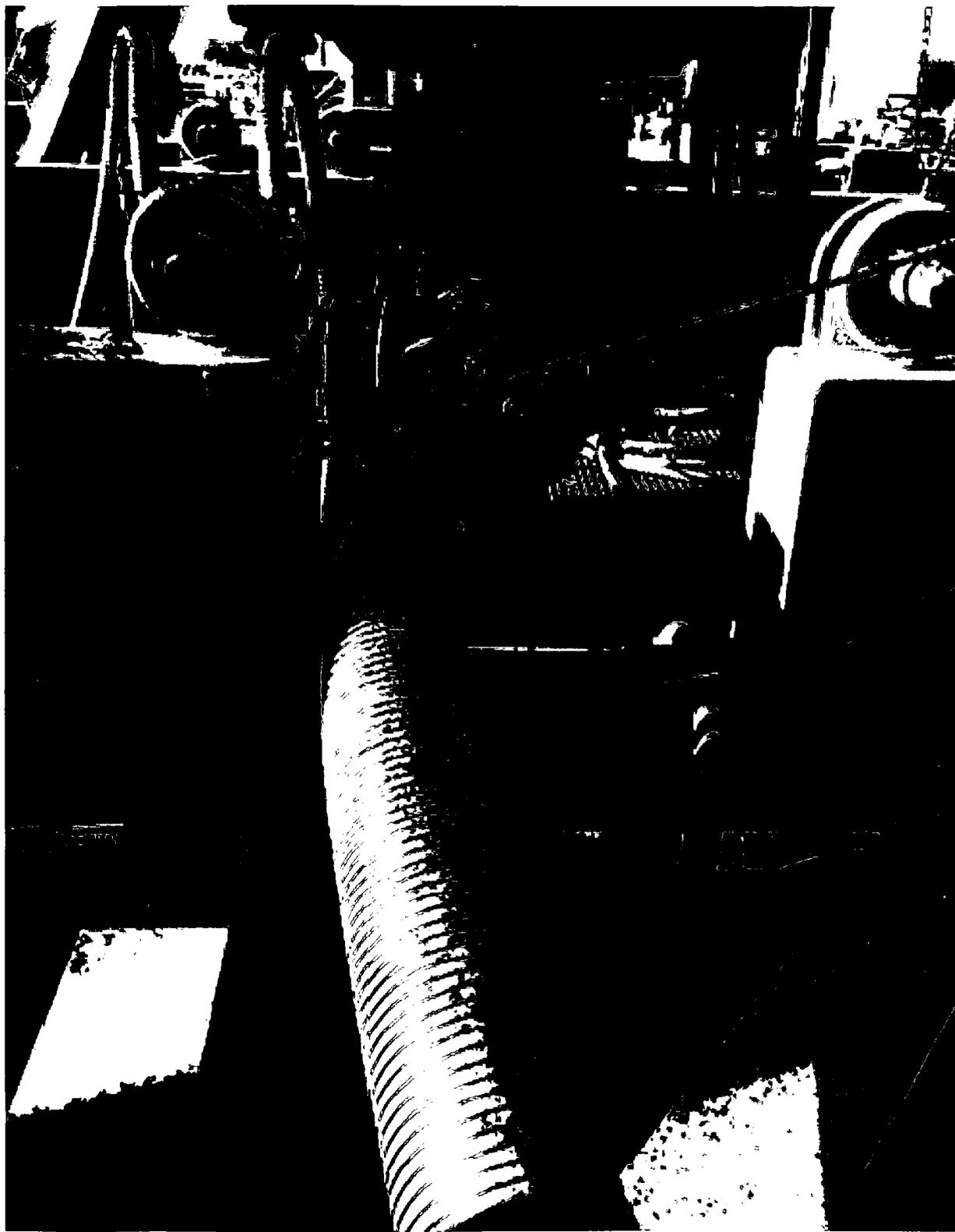
Hose Assembly Type: Choke & Kill	
Assembly Serial # 292614-2	Hose Lot # and Date Code 11794-10/14
Hose Working Pressure (psi) 10000	Test Pressure (psi) 15000

We hereby certify that the above material supplied for the referenced purchase order to be true according to the requirements of the purchase order and current industry standards.

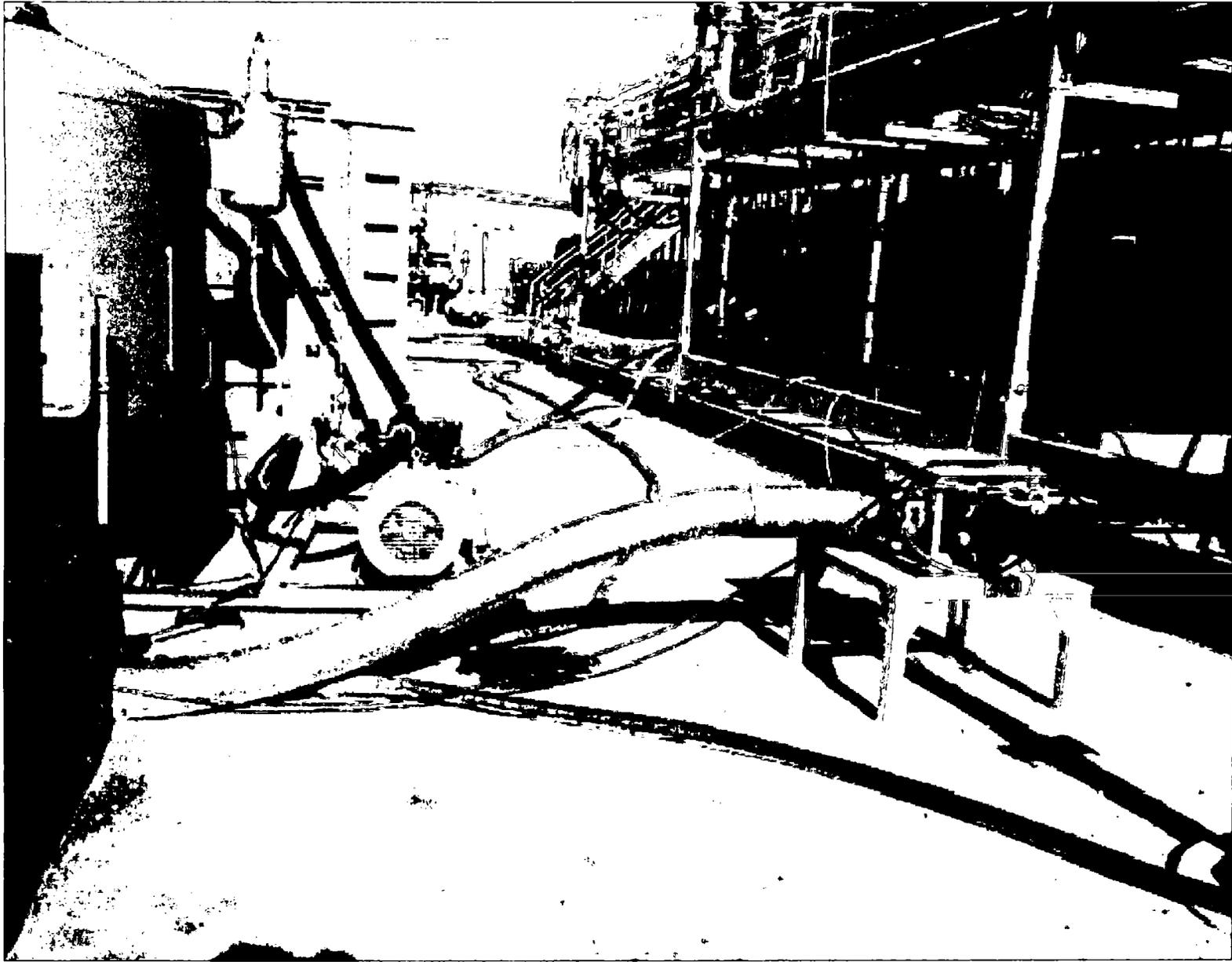
Supplier:
Midwest Hose & Specialty, Inc.
3312 S I-35 Service Rd
Oklahoma City, OK 73129

Comments:

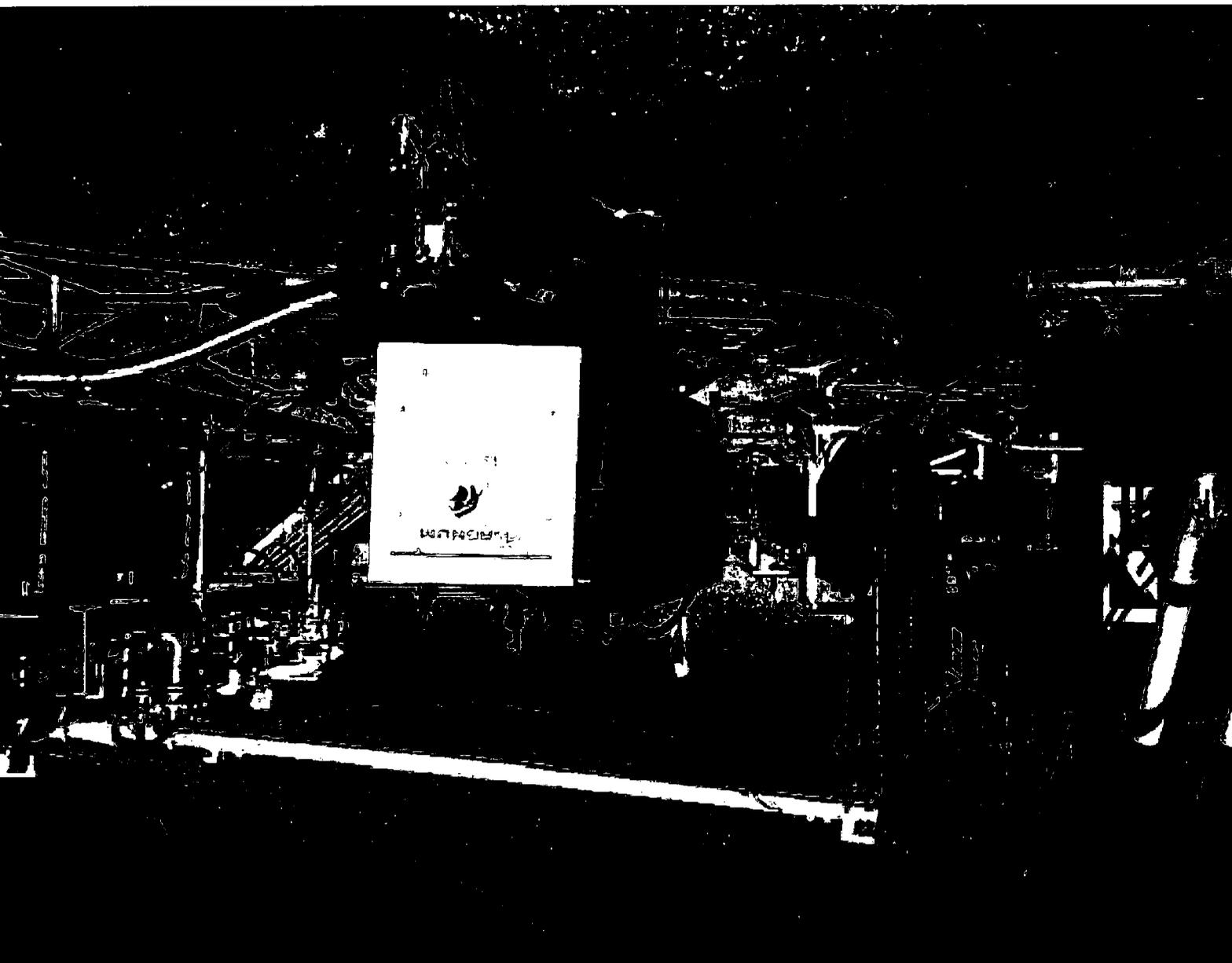
Approved By 	Date 2/10/2015
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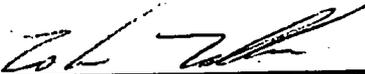
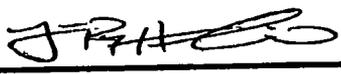






Midwest Hose
& Specialty, Inc.

Internal Hydrostatic Test Certificate

General Information		Hose Specifications	
Customer	LATSHAW DRILLING	Hose Assembly Type	Choke & Kill
MWH Sales Representative	ABYGAIL LOGAN	Certification	API 7K/FSL LEVEL2
Date Assembled	3/16/2018	Hose Grade	MUD
Location Assembled	OKC	Hose Working Pressure	N/A
Sales Order #	368223	Hose Lot # and Date Code	N/A
Customer Purchase Order #	412528	Hose I.D. (Inches)	3.35"
Assembly Serial # (Pick Ticket #)	454857	Hose O.D. (Inches)	5.77"
Hose Assembly Length	58'	Armor (yes/no)	YES
Fittings			
End A		End B	
Stem (Part and Revision #)	R3.5X64-WB	Stem (Part and Revision #)	R3.5X64-WB
Stem (Heat #)	1770131	Stem (Heat #)	1770131
Ferrule (Part and Revision #)	RF3.5X5330	Ferrule (Part and Revision #)	RF3.5X5330
Ferrule (Heat #)	60860852	Ferrule (Heat #)	60860852
Connection - Flange Hammer Union Part	4-1/16 10K	Connection (Part #)	4-1/16 10K
Connection (Heat #)		Connection (Heat #)	
Nut (Part #)		Nut (Part #)	
Nut (Heat #)		Nut (Heat #)	
Dies Used	N/A	Dies Used	5.75"
Hydrostatic Test Requirements			
Test Pressure (psi)	10,000	Hose assembly was tested with ambient water temperature.	
Test Pressure Hold Time (minutes)	16		
Date Tested		Tested By	
3/16/2018			
		Approved By	
			



Midwest Hose
& Specialty, Inc.

Certificate of Conformity

<i>Customer:</i> LATSHAW DRILLING	<i>Customer P.O.#</i> 412528
<i>Sales Order #</i> 368223	<i>Date Assembled:</i> 3/16/2018
Specifications	
<i>Hose Assembly Type:</i> Choke & Kill	<i>Rig #</i> N/A
<i>Assembly Serial #</i> 454857	<i>Hose Lot # and Date Code</i> N/A
<i>Hose Working Pressure (psi)</i> N/A	<i>Test Pressure (psi)</i> 10000
<i>Hose Assembly Description:</i>	CK56-SS-5K-6410K-6410K-58.00' FT-TVM
<p><i>We hereby certify that the above material supplied for the referenced purchase order to be true according to the requirements of the purchase order and current industry standards.</i></p>	
<p><i>Supplier:</i> Midwest Hose & Specialty, Inc. 3312 S I-35 Service Rd Oklahoma City, OK 73129</p>	
<i>Comments:</i>	
<i>Approved By</i>	<i>Date</i>
	3/19/2018

March 16, 2018

Internal Hydrostatic Test Graph



Midwest Hose
& Specialty, Inc.

Customer: Latshaw

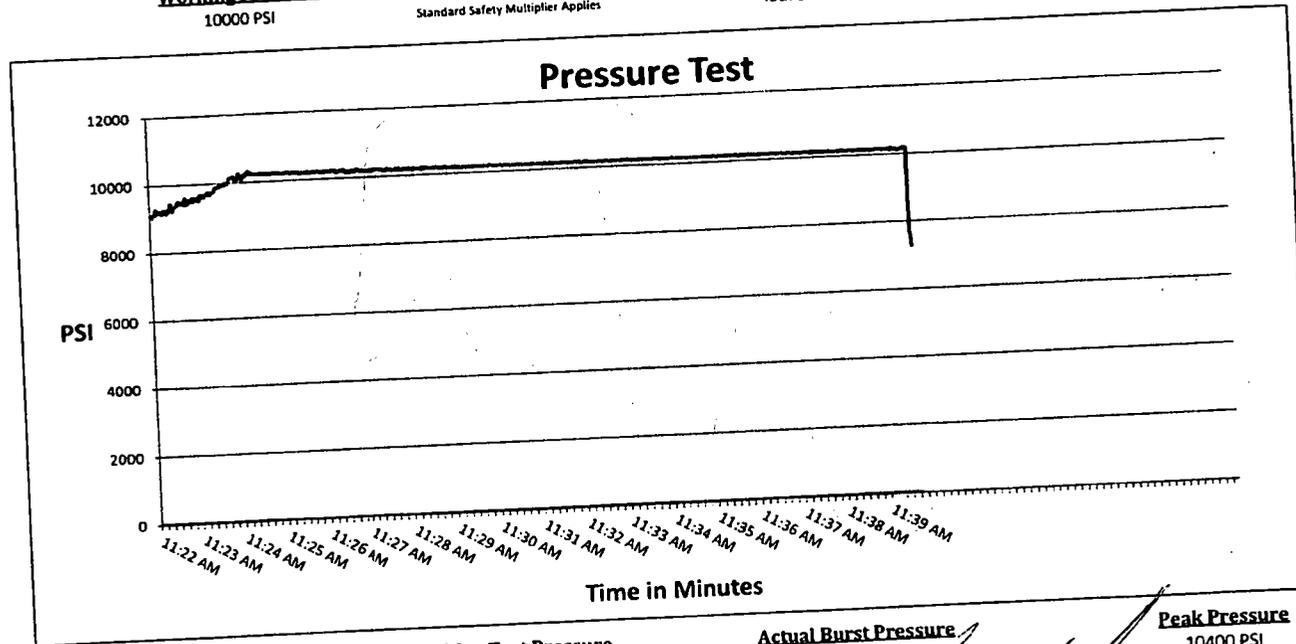
Pick Ticket #: 454857

Hose Specifications

Hose Type C&K	Length 58'
I.D. 3.5"	O.D. 5.22"
Working Pressure 10000 PSI	Burst Pressure Standard Safety Multiplier Applies

Verification

Type of Fitting 4 1/16 10K	Coupling Method Swage
Die Size 5.75"	Final O.D. 5.77"
Hose Serial # 43175	Hose Assembly Serial # 454857



Test Pressure
10000 PSI

Time Held at Test Pressure
16 Minutes

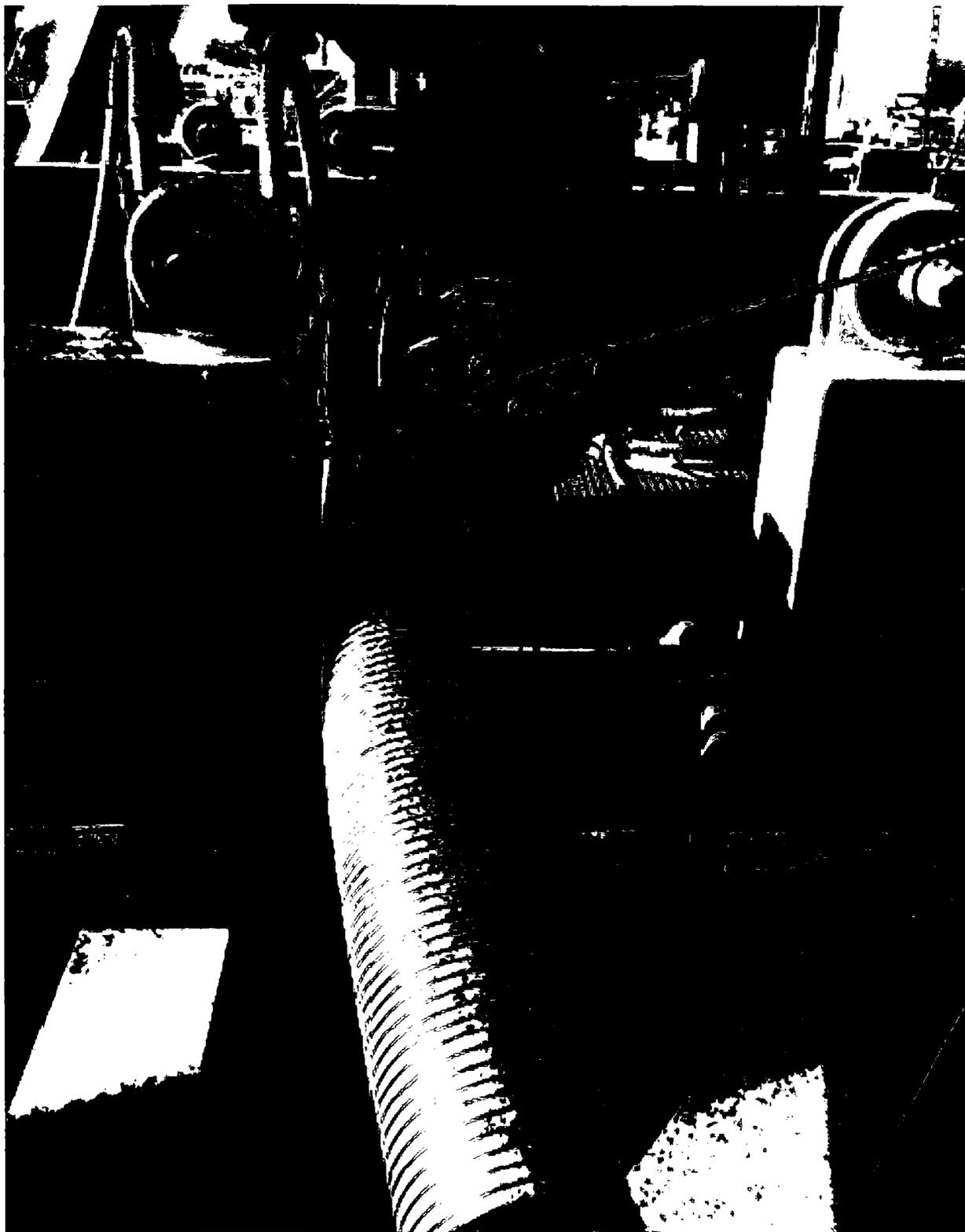
Actual Burst Pressure

Peak Pressure
10400 PSI

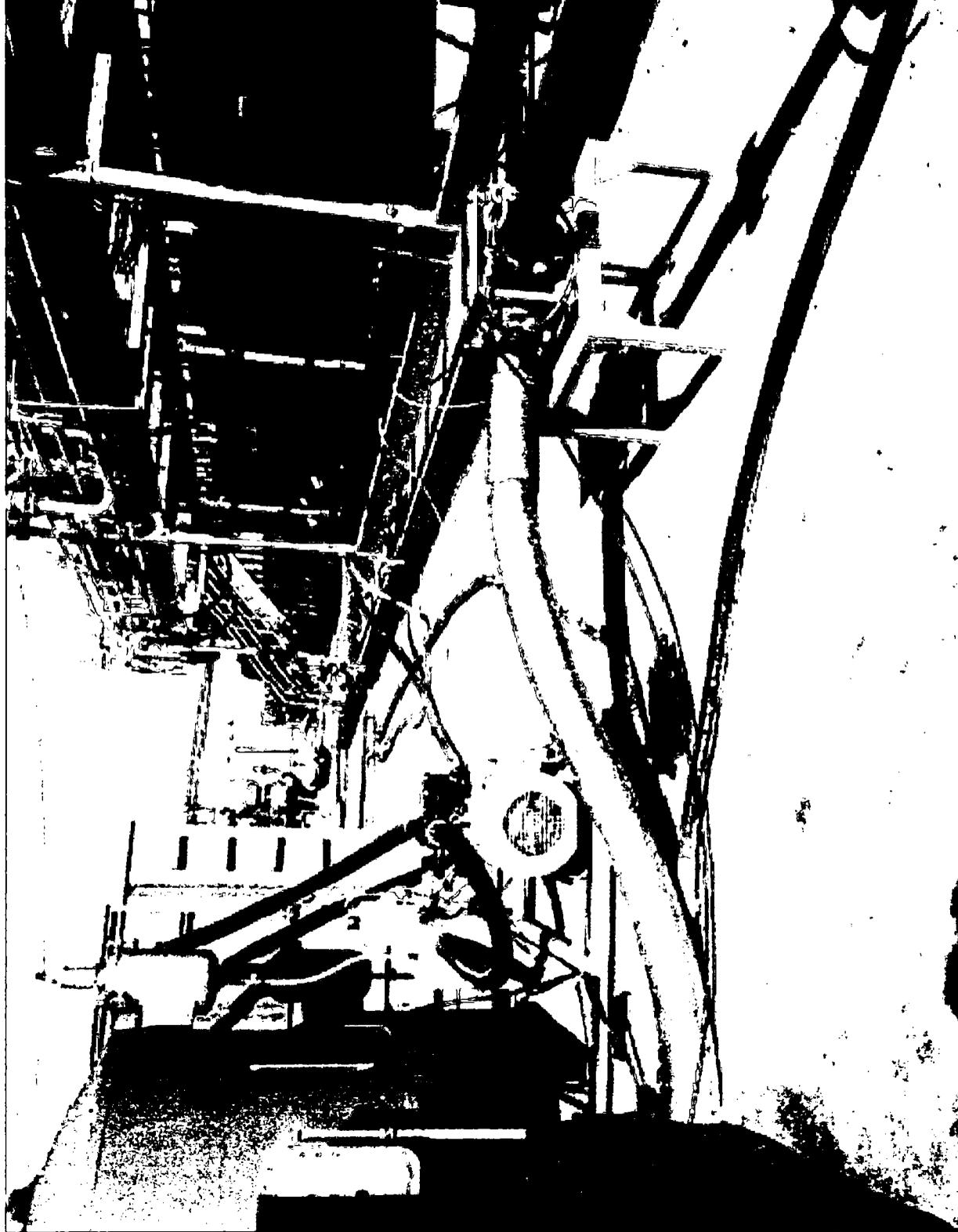
Tested By: Zach Tillman

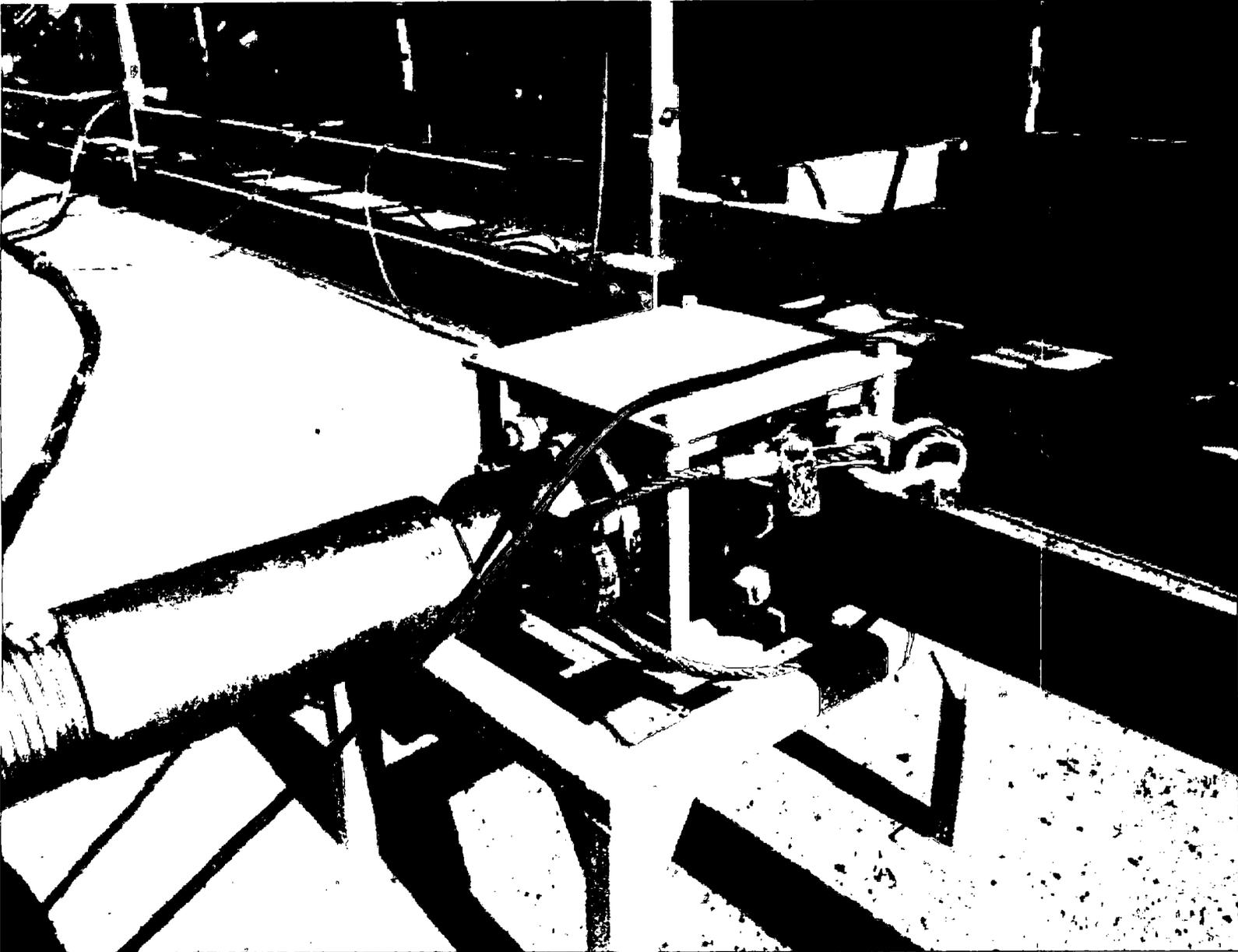
Approved By: James Hawkins

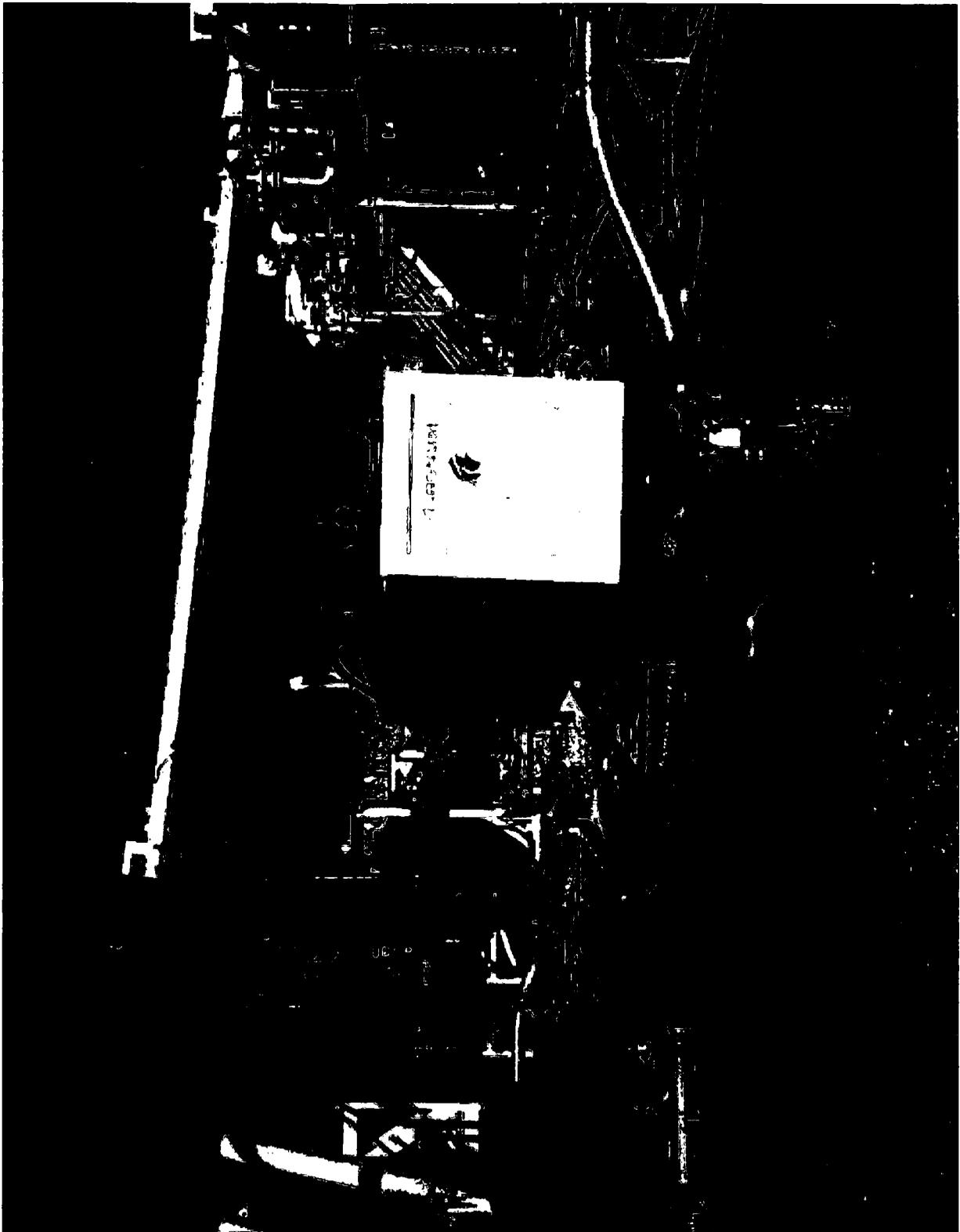
Comments: Hose assembly pressure tested with water at ambient temperature.











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							
13.5"	0	575	10.75"	45.5	N80	BTC	9.39	1.41	39.75
9.875"	0	10050	7.875"	29.7	P110	BTC	1.51	1.34	3.64
6.75"	0	9550	5.5"	23	P110	BTC	2.33	2.46	3.72
6.75"	9550	18,036	5"	18	P110	BTC	2.33	2.46	3.72
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 Interval		Csg. Size	Weight (lbs)	Grade	Conn.	SF Collapse	SF Burst	SF Body
	From	To							
13.5"	0	575	10.75"	45.5	N80	BTC	9.39	1.41	39.75
9.875"	0	10050	7.875"	29.7	P110	BTC	1.51	1.34	3.64
6.75"	0	9550	5.5"	23	P110	BTC	2.33	2.46	3.72
6.75"	9550	18,036	5"	18	P110	BTC	2.33	2.46	3.72
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 Interval		Csg. Size	Weight (lbs)	Grade	Conn.	SF Collapse	SF Burst	SF Body
	From	To							
13.5"	0	575	10.75"	45.5	N80	BTC	9.39	1.41	39.75
9.875"	0	10050	7.875"	29.7	P110	BTC	1.51	1.34	3.64
6.75"	0	9550	5.5"	23	P110	BTC	2.33	2.46	3.72
6.75"	9550	18,036	5"	18	P110	BTC	2.33	2.46	3.72
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

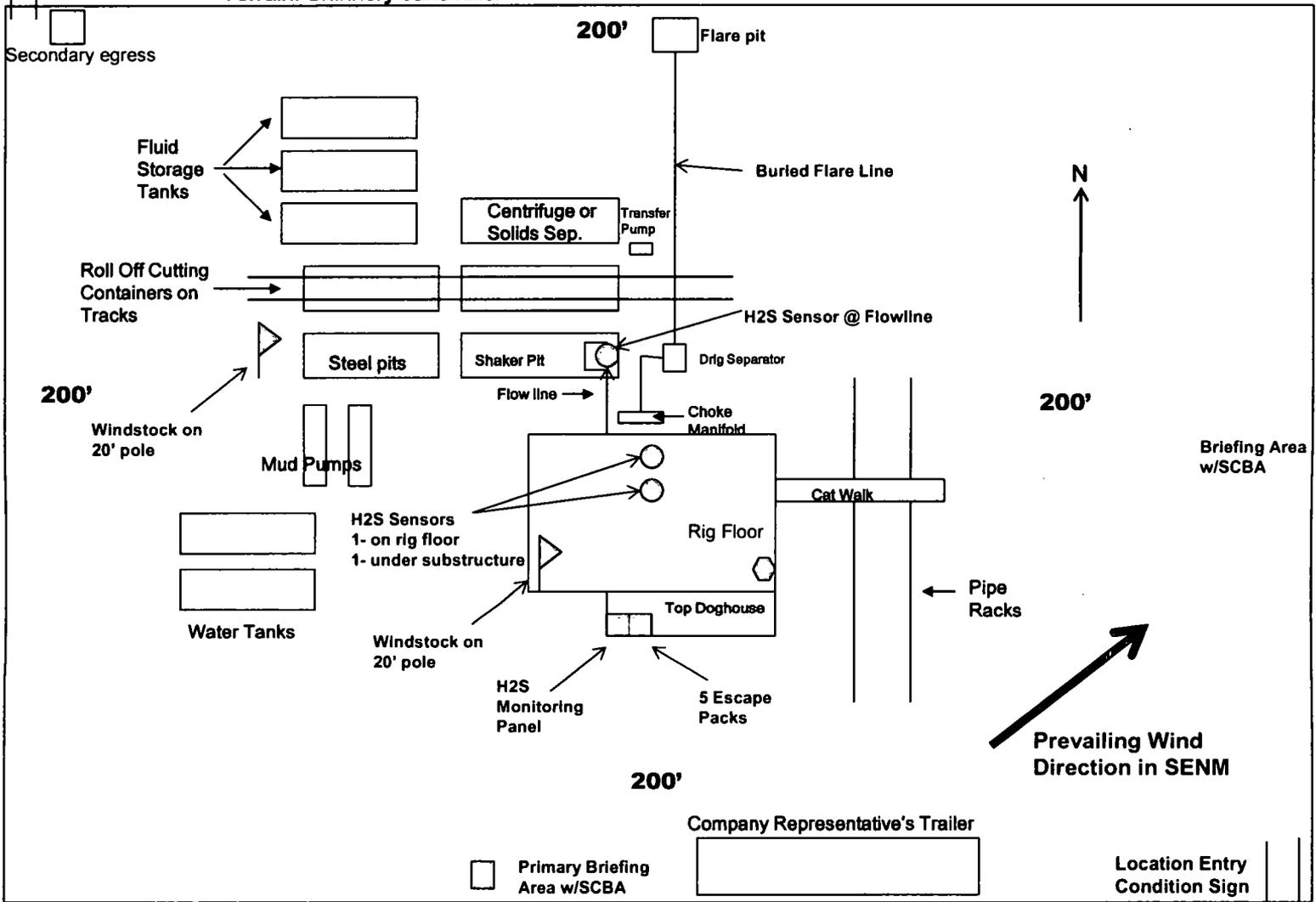
Hole Size	Casing Interval		Csg. Size	Weight (lbs)	Grade	Conn.	SF Collapse	SF Burst	SF Body
	From	To							
13.5"	0	575	10.75"	45.5	N80	BTC	9.39	1.41	39.75
9.875"	0	10050	7.875"	29.7	P110	BTC	1.51	1.34	3.64
6.75"	0	9550	5.5"	23	P110	BTC	2.33	2.46	3.72
6.75"	9550	18,036	5"	18	P110	BTC	2.33	2.46	3.72
BLM 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.

COG Operating LLC
H₂S 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 (H₂S).
- b. The proper use and maintenance of personal protective equipment and life support systems.
- c. The proper use of H₂S 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 H₂S 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. H₂S SAFETY EQUIPMENT AND SYSTEMS

Note: All H₂S safety equipment and systems will be installed, tested, and operational when drilling reaches a depth of 500 feet above, or three days prior to penetrating the first zone containing or 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 H₂S 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

	<u>OFFICE</u>	<u>MOBILE</u>
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

	<u>OFFICE</u>
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



C O N C H O

COG OPERATING LLC
EDDY COUNTY, NM
ATLAS
LITTLEFIELD 33 FED COM #808H

OWB
PWP0

Anticollision Report

25 April, 2018



Anticollision Report

Company: COG OPERATING LLC
Project: EDDY COUNTY, NM
Reference Site: ATLAS
Site Error: 0.0 usft
Reference Well: LITTLEFIELD 33 FED COM #808H
Well Error: 3.0 usft
Reference Wellbore: OWB
Reference Design: PWP0

Local Co-ordinate Reference: Well LITTLEFIELD 33 FED COM #808H
TVD Reference: RKB=2860.5+25 @ 2885.5usft (LASTSHAW 44)
MD Reference: RKB=2860.5+25 @ 2885.5usft (LASTSHAW 44)
North Reference: Grid
Survey Calculation Method: Minimum Curvature
Output errors are at: 2.00 sigma
Database: EDM_Users
Offset TVD Reference: Offset Datum

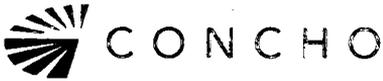
Reference	PWP0		
Filter type:	NO GLOBAL FILTER: Using user defined selection & filtering criteria		
Interpolation Method:	Stations	Error Model:	ISCWSA
Depth Range:	Unlimited	Scan Method:	Closest Approach 3D
Results Limited by:	Maximum center-center distance of 10,000.0 usft	Error Surface:	Major Axis
Warning Levels Evaluated at:	2.00 Sigma	Casing Method:	Not applied

Survey Tool Program	Date 4/25/2018			
From (usft)	To (usft)	Survey (Wellbore)	Tool Name	Description
0.0	18,036.1	PWP0 (OWB)	MWD+IFR1+MS	OWSG MWD + IFR1 + Multi-Station Correction

Site Name	Reference Measured Depth (usft)	Offset Measured Depth (usft)	Distance Between Centres (usft)	Distance Between Ellipses (usft)	Separation Factor	Warning
ATLAS						
LITTLEFIELD 33 FED COM #707H - OWB - PWP0	1,000.0	1,001.7	45.0	36.0	4.993	CC, ES
LITTLEFIELD 33 FED COM #707H - OWB - PWP0	6,800.0	6,800.4	147.3	99.2	3.058	SF
LITTLEFIELD 33 FED COM #708H - OWB - PWP0	1,000.0	999.8	45.0	36.0	4.994	CC
LITTLEFIELD 33 FED COM #708H - OWB - PWP0	5,000.0	4,999.2	59.2	23.8	1.671	Advise and Monitor, ES,
LITTLEFIELD 33 FED COM #807H - OWB - PWP0	1,000.0	1,003.6	89.9	80.9	9.970	CC, ES
LITTLEFIELD 33 FED COM #807H - OWB - PWP0	18,036.1	18,053.1	612.0	475.6	4.487	SF

Offset Design ATLAS - LITTLEFIELD 33 FED COM #707H - OWB - PWP0													Offset Site Error:	0.0 usft
Survey Program: 0-MWD+IFR1+MS													Offset Well Error:	3.0 usft
Reference Measured Depth (usft)	Vertical Depth (usft)	Offset Measured Depth (usft)	Vertical Depth (usft)	Semi Major Axis Reference (usft)	Offset (usft)	Highside Toolface (°)	Offset Wellbore Centre +N/-S (usft)	+E/-W (usft)	Distance Between Centres (usft)	Distance Between Ellipses (usft)	Minimum Separation (usft)	Separation Factor	Warning	
0.0	0.0	1.7	1.7	3.0	3.0	89.86	0.1	45.0	45.0					
100.0	100.0	101.7	101.7	3.0	3.0	89.86	0.1	45.0	45.0	39.0	6.01	7.494		
200.0	200.0	201.7	201.7	3.0	3.0	89.86	0.1	45.0	45.0	38.9	6.08	7.401		
300.0	300.0	301.7	301.7	3.1	3.1	89.86	0.1	45.0	45.0	38.8	6.24	7.215		
400.0	400.0	401.7	401.7	3.2	3.2	89.86	0.1	45.0	45.0	38.5	6.47	6.955		
500.0	500.0	501.7	501.7	3.4	3.4	89.86	0.1	45.0	45.0	38.2	6.77	6.645		
600.0	600.0	601.7	601.7	3.6	3.6	89.86	0.1	45.0	45.0	37.9	7.13	6.309		
700.0	700.0	701.7	701.7	3.8	3.8	89.86	0.1	45.0	45.0	37.5	7.55	5.965		
800.0	800.0	801.7	801.7	4.0	4.0	89.86	0.1	45.0	45.0	37.0	8.00	5.625		
900.0	900.0	901.7	901.7	4.2	4.2	89.86	0.1	45.0	45.0	36.5	8.49	5.300		
1,000.0	1,000.0	1,001.7	1,001.7	4.5	4.5	89.86	0.1	45.0	45.0	36.0	9.01	4.993	CC, ES	
1,050.0	1,050.0	1,051.3	1,051.3	4.6	4.6	-121.10	-0.3	45.2	45.5	36.2	9.27	4.904		
1,100.0	1,100.0	1,101.3	1,101.3	4.8	4.8	-121.09	-1.0	45.7	46.4	36.8	9.52	4.868		
1,200.0	1,200.0	1,201.3	1,201.3	5.0	5.0	-121.06	-2.6	46.5	48.1	38.1	10.05	4.790		
1,300.0	1,300.0	1,301.3	1,301.2	5.3	5.3	-121.04	-4.1	47.4	49.9	39.3	10.59	4.711		
1,400.0	1,399.9	1,401.2	1,401.2	5.6	5.6	-121.03	-5.6	48.3	51.7	40.5	11.16	4.631		
1,500.0	1,499.9	1,501.2	1,501.2	5.9	5.9	-121.01	-7.1	49.2	53.4	41.7	11.74	4.552		
1,600.0	1,599.9	1,601.2	1,601.1	6.2	6.2	-120.99	-8.6	50.0	55.2	42.9	12.33	4.476		
1,700.0	1,699.9	1,701.2	1,701.1	6.5	6.5	-120.98	-10.1	50.9	57.0	44.0	12.94	4.402		
1,800.0	1,799.9	1,801.2	1,801.1	6.8	6.8	-120.96	-11.6	51.8	58.8	45.2	13.56	4.332		

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



Anticollision Report

Company: COG OPERATING LLC
 Project: EDDY COUNTY, NM

Local Co-ordinate Reference: Well LITTLEFIELD 33 FED COM #808H
 TVD Reference: RKB=2860.5+25 @ 2885.5usft (LASTSHAW 44)

Reference Site: ATLAS

MD Reference: RKB=2860.5+25 @ 2885.5usft (LASTSHAW 44)

Site Error: 0.0 usft
 Reference Well: LITTLEFIELD 33 FED COM #808H
 Well Error: 3.0 usft
 Reference Wellbore: OWB
 Reference Design: PWP0

North Reference: Grid
 Survey Calculation Method: Minimum Curvature
 Output errors are at: 2.00 sigma
 Database: EDM_Users
 Offset TVD Reference: Offset Datum

Offset Design ATLAS - LITTLEFIELD 33 FED COM #707H - OWB - PWP0													Offset Site Error:	0.0 usft
Survey Program: 0-MWD+IFR1+MS													Offset Well Error:	3.0 usft
Measured Depth (usft)	Vertical Depth (usft)	Reference		Offset		Semi Major Axis			Distance				Warning	
		Measured Depth (usft)	Vertical Depth (usft)	Reference (usft)	Offset (usft)	Highside Toolface (°)	Offset Wellbore Centre +N/-S (usft)	Offset Wellbore Centre +E/-W (usft)	Between Centres (usft)	Between Ellipses (usft)	Minimum Separation (usft)	Separation Factor		
1,900.0	1,899.9	1,901.2	1,901.0	7.1	7.1	-120.95	-13.1	52.7	60.5	46.3	14.19	4.265		
2,000.0	1,999.9	2,001.2	2,001.0	7.4	7.4	-120.94	-14.6	53.5	62.3	47.5	14.83	4.201		
2,100.0	2,099.8	2,101.1	2,101.0	7.7	7.7	-120.92	-16.2	54.4	64.1	48.6	15.47	4.141		
2,200.0	2,199.8	2,201.1	2,200.9	8.1	8.1	-120.91	-17.7	55.3	65.8	49.7	16.12	4.084		
2,300.0	2,299.8	2,301.1	2,300.9	8.4	8.4	-120.90	-19.2	56.1	67.6	50.8	16.78	4.030		
2,400.0	2,399.8	2,401.1	2,400.9	8.7	8.7	-120.89	-20.7	57.0	69.4	51.9	17.44	3.979		
2,500.0	2,499.8		2,500.9	9.1	9.1	-120.88	-22.2	57.9	71.2	53.0	18.10	3.930		
2,600.0	2,599.8	2,601.1	2,600.8	9.4	9.4	-120.87	-23.7	58.8	72.9	54.2	18.77	3.885		
2,700.0	2,699.7	2,701.0	2,700.8	9.7	9.7	-120.86	-25.2	59.6	74.7	55.2	19.45	3.841		
2,800.0	2,799.7	2,801.0	2,800.8	10.1	10.1	-120.85	-26.7	60.5	76.5	56.3	20.12	3.800		
2,900.0	2,899.7	2,901.0	2,900.7	10.4	10.4	-120.85	-28.2	61.4	78.2	57.4	20.80	3.762		
3,000.0	2,999.7	3,001.0	3,000.7	10.7	10.7	-120.84	-29.8	62.3	80.0	58.5	21.48	3.725		
3,100.0	3,099.7	3,101.0	3,100.7	11.1	11.1	-120.83	-31.3	63.1	81.8	59.6	22.16	3.690		
3,200.0	3,199.7	3,201.0	3,200.6	11.4	11.4	-120.82	-32.8	64.0	83.6	60.7	22.85	3.657		
3,300.0	3,299.7	3,301.0	3,300.6	11.8	11.8	-120.82	-34.3	64.9	85.3	61.8	23.54	3.625		
3,400.0	3,399.6	3,400.9	3,400.6	12.1	12.1	-120.81	-35.8	65.7	87.1	62.9	24.23	3.595		
3,500.0	3,499.6	3,500.9	3,500.5	12.5	12.5	-120.80	-37.3	66.6	88.9	63.9	24.92	3.566		
3,600.0	3,599.6	3,600.9	3,600.5	12.8	12.8	-120.80	-38.8	67.5	90.6	65.0	25.61	3.539		
3,700.0	3,699.6	3,700.9	3,700.5	13.2	13.2	-120.79	-40.3	68.4	92.4	66.1	26.30	3.513		
3,800.0	3,799.6	3,800.9	3,800.5	13.5	13.5	-120.79	-41.8	69.2	94.2	67.2	27.00	3.488		
3,900.0	3,899.6	3,900.9	3,900.4	13.8	13.8	-120.78	-43.4	70.1	96.0	68.3	27.70	3.465		
4,000.0	3,999.5	4,000.8	4,000.4	14.2	14.2	-120.78	-44.9	71.0	97.7	69.3	28.39	3.442		
4,100.0	4,099.5	4,100.8	4,100.4	14.5	14.5	-120.77	-46.4	71.9	99.5	70.4	29.09	3.420		
4,200.0	4,199.5	4,200.8	4,200.3	14.9	14.9	-120.77	-47.9	72.7	101.3	71.5	29.79	3.399		
4,300.0	4,299.5	4,300.8	4,300.3	15.2	15.2	-120.76	-49.4	73.6	103.0	72.5	30.49	3.379		
4,400.0	4,399.5	4,400.8	4,400.3	15.6	15.6	-120.76	-50.9	74.5	104.8	73.6	31.19	3.360		
4,500.0	4,499.5	4,500.8	4,500.2	15.9	15.9	-120.75	-52.4	75.3	106.6	74.7	31.89	3.342		
4,600.0	4,599.5	4,600.7	4,600.2	16.3	16.3	-120.75	-53.9	76.2	108.4	75.8	32.60	3.324		
4,700.0	4,699.4	4,700.7	4,700.2	16.6	16.7	-120.74	-55.4	77.1	110.1	76.8	33.30	3.307		
4,800.0	4,799.4	4,800.7	4,800.1	17.0	17.0	-120.74	-57.0	78.0	111.9	77.9	34.00	3.291		
4,900.0	4,899.4	4,900.7	4,900.1	17.4	17.4	-120.74	-58.5	78.8	113.7	79.0	34.71	3.275		
5,000.0	4,999.4	5,000.7	5,000.1	17.7	17.7	-120.73	-60.0	79.7	115.4	80.0	35.41	3.260		
5,100.0	5,099.4	5,100.7	5,100.0	18.1	18.1	-120.73	-61.5	80.6	117.2	81.1	36.12	3.245		
5,200.0	5,199.4	5,200.7	5,200.0	18.4	18.4	-120.73	-63.0	81.4	119.0	82.2	36.82	3.231		
5,300.0	5,299.4	5,300.6	5,300.0	18.8	18.8	-120.72	-64.5	82.3	120.8	83.2	37.53	3.217		
5,400.0	5,399.3	5,400.6	5,400.0	19.1	19.1	-120.72	-66.0	83.2	122.5	84.3	38.24	3.204		
5,500.0	5,499.3	5,500.6	5,499.9	19.5	19.5	-120.72	-67.5	84.1	124.3	85.4	38.95	3.192		
5,600.0	5,599.3	5,600.6	5,599.9	19.8	19.8	-120.71	-69.0	84.9	126.1	86.4	39.65	3.179		
5,700.0	5,699.3	5,700.6	5,699.9	20.2	20.2	-120.71	-70.6	85.8	127.8	87.5	40.36	3.167		
5,800.0	5,799.3	5,800.6	5,799.8	20.5	20.5	-120.71	-72.1	86.7	129.6	88.5	41.07	3.156		
5,900.0	5,899.3	5,900.5	5,899.8	20.9	20.9	-120.70	-73.6	87.6	131.4	89.6	41.78	3.145		
6,000.0	5,999.2	6,000.5	5,999.8	21.2	21.2	-120.70	-75.1	88.4	133.2	90.7	42.49	3.134		
6,100.0	6,099.2	6,100.5	6,099.7	21.6	21.6	-120.70	-76.6	89.3	134.9	91.7	43.20	3.123		
6,200.0	6,199.2	6,200.5	6,199.7	22.0	22.0	-120.70	-78.1	90.2	136.7	92.8	43.91	3.113		
6,300.0	6,299.2	6,300.5	6,299.7	22.3	22.3	-120.69	-79.6	91.0	138.5	93.9	44.62	3.103		
6,400.0	6,399.2	6,400.5	6,399.6	22.7	22.7	-120.69	-81.1	91.9	140.2	94.9	45.33	3.094		
6,500.0	6,499.2	6,500.4	6,499.6	23.0	23.0	-120.69	-82.6	92.8	142.0	96.0	46.04	3.085		
6,600.0	6,599.2	6,600.4	6,599.6	23.4	23.4	-120.69	-84.2	93.7	143.8	97.0	46.75	3.076		
6,700.0	6,699.1	6,700.4	6,699.6	23.7	23.7	-120.68	-85.7	94.5	145.6	98.1	47.46	3.067		
6,800.0	6,799.1	6,800.4	6,799.5	24.1	24.1	-120.68	-87.2	95.4	147.3	99.2	48.17	3.058 SF		
6,900.0	6,899.1	6,902.3	6,896.8	24.4	24.4	-120.13	-90.1	97.1	150.0	101.1	48.89	3.068		

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



Anticollision Report

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Reference Well: LITTLEFIELD 33 FED COM #808H
Well Error: 3.0 usft
Reference Wellbore: OWB
Reference Design: PWPO

Local Co-ordinate Reference: Well LITTLEFIELD 33 FED COM #808H
TVD Reference: RKB=2860.5+25 @ 2885.5usft (LASTSHAW 44)
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Survey Calculation Method: Minimum Curvature
Output errors are at: 2.00 sigma
Database: EDM_Users
Offset TVD Reference: Offset Datum

Offset Design ATLAS - LITTLEFIELD 33 FED COM #707H - OWB - PWPO													Offset Site Error:	0.0 usft
Survey Program: 0-MWD+IFR1+MS													Offset Well Error:	3.0 usft
Reference		Offset		Semi Major Axis			Distance			Warning				
Measured Depth (usft)	Vertical Depth (usft)	Measured Depth (usft)	Vertical Depth (usft)	Reference (usft)	Offset (usft)	Highside Toolface (°)	Offset Wellbore Centre +N/-S (usft)	+E/-W (usft)	Between Centres (usft)	Between Ellipses (usft)	Minimum Separation (usft)	Separation Factor		
7,000.0	6,999.1	6,997.6	6,996.5	24.8	24.8	-119.02	-94.6	99.7	153.6	104.0	49.59	3.097		
7,100.0	7,099.0	7,102.5	7,096.3	25.2	25.2	-118.44	-99.1	102.3	158.0	107.7	50.32	3.141		
7,200.0	7,198.9	7,202.6	7,196.0	25.5	25.5	-118.50	-103.7	104.9	163.3	112.3	51.03	3.201		
7,300.0	7,298.8	7,302.8	7,295.7	25.9	25.9	-118.56	-108.2	107.5	168.6	116.9	51.75	3.259		
7,400.0	7,398.6	7,402.9	7,395.4	26.2	26.2	-118.62	-112.7	110.2	174.0	121.5	52.46	3.316		
7,500.0	7,498.5	7,503.1	7,495.2	26.6	26.6	-118.68	-117.3	112.8	179.3	126.1	53.18	3.371		
7,600.0	7,598.3	7,603.2	7,594.9	26.9	27.0	-118.73	-121.8	115.4	184.6	130.7	53.89	3.425		
7,700.0	7,698.2	7,703.3	7,694.6	27.3	27.3	-118.78	-126.3	118.0	189.9	135.3	54.61	3.477		
7,800.0	7,798.1	7,803.5	7,794.3	27.7	27.7	-118.82	-130.8	120.6	195.2	139.9	55.33	3.528		
7,900.0	7,897.9	7,903.6	7,894.1	28.0	28.0	-118.87	-135.4	123.2	200.5	144.5	56.04	3.578		
8,000.0	7,997.8	8,003.8	7,993.8	28.4	28.4	-118.91	-139.9	125.8	205.8	149.0	56.76	3.626		
8,100.0	8,097.7	8,103.9	8,093.5	28.7	28.7	-118.95	-144.4	128.4	211.1	153.6	57.48	3.673		
8,200.0	8,197.5	8,204.1	8,193.2	29.1	29.1	-118.98	-148.9	131.1	216.4	158.2	58.19	3.719		
8,300.0	8,297.4	8,304.2	8,292.9	29.4	29.5	-119.02	-153.5	133.7	221.7	162.8	58.91	3.764		
8,400.0	8,397.2	8,404.3	8,392.7	29.8	29.8	-119.05	-158.0	136.3	227.0	167.4	59.63	3.808		
8,500.0	8,497.1	8,504.5	8,492.4	30.2	30.2	-119.08	-162.5	138.9	232.3	172.0	60.35	3.850		
8,600.0	8,597.0	8,604.6	8,592.1	30.5	30.5	-119.12	-167.0	141.5	237.7	176.6	61.06	3.892		
8,700.0	8,696.8	8,704.8	8,691.8	30.9	30.9	-119.15	-171.6	144.1	243.0	181.2	61.78	3.933		
8,800.0	8,796.7	8,804.9	8,791.6	31.2	31.3	-119.17	-176.1	146.7	248.3	185.8	62.50	3.972		
8,900.0	8,896.6	8,905.0	8,891.3	31.6	31.6	-119.20	-180.6	149.4	253.6	190.4	63.22	4.011		
9,000.0	8,996.4	9,005.2	8,991.0	32.0	32.0	-119.23	-185.1	152.0	258.9	195.0	63.94	4.049		
9,100.0	9,096.3	9,105.3	9,090.7	32.3	32.3	-119.25	-189.7	154.6	264.2	199.5	64.65	4.086		
9,200.0	9,196.1	9,194.5	9,190.4	32.7	32.7	-119.28	-194.2	157.2	269.5	204.2	65.33	4.125		
9,300.0	9,296.0	9,299.4	9,295.2	33.0	33.0	-119.61	-197.5	159.1	274.0	207.9	66.07	4.147		
9,400.0	9,395.9	9,401.7	9,397.6	33.4	33.4	-120.49	-197.8	159.3	276.8	210.0	66.77	4.146		
9,500.0	9,495.7	9,501.6	9,497.4	33.8	33.7	-121.42	-197.8	159.3	279.5	212.0	67.46	4.143		
9,600.0	9,595.7	9,600.5	9,596.3	34.1	34.0	-122.59	-195.2	159.3	281.4	213.3	68.14	4.130		
9,650.0	9,645.7	9,648.4	9,643.6	34.3	34.2	86.81	-187.7	159.4	282.1	213.6	68.47	4.120		
9,700.0	9,695.7	9,694.4	9,688.1	34.4	34.3	84.47	-176.2	159.5	283.2	214.4	68.78	4.117		
9,800.0	9,795.7	9,778.2	9,765.4	34.8	34.6	78.17	-144.3	159.8	289.9	220.5	69.36	4.179		
9,900.0	9,895.7	9,849.1	9,825.8	35.1	34.8	71.17	-107.1	160.1	306.8	236.9	69.90	4.389		
10,000.0	9,995.7	9,907.6	9,870.9	35.4	34.9	64.74	-70.0	160.5	337.2	266.8	70.38	4.791		
10,100.0	10,095.7	9,955.2	9,904.1	35.8	35.1	59.38	-35.9	160.8	381.5	310.6	70.83	5.386		
10,200.0	10,195.7	9,994.1	9,928.5	36.1	35.2	55.09	-5.7	161.0	437.7	366.5	71.25	6.144		
10,300.0	10,295.7	10,025.0	9,946.2	36.4	35.2	51.80	19.7	161.3	503.5	431.8	71.65	7.027		
10,358.0	10,353.7	10,041.9	9,955.1	36.6	35.3	50.07	34.0	161.4	545.0	473.1	71.87	7.583		
10,375.0	10,370.7	10,050.0	9,959.2	36.7	35.3	47.14	41.0	161.5	557.4	485.5	71.95	7.748		
10,400.0	10,395.6	10,050.0	9,959.2	36.8	35.3	44.88	41.0	161.5	575.5	503.5	72.03	7.990		
10,425.0	10,420.4	10,060.2	9,964.2	36.8	35.3	41.99	49.9	161.5	593.3	521.2	72.13	8.225		
10,450.0	10,445.1	10,067.4	9,967.7	36.9	35.3	39.58	56.2	161.6	610.7	538.5	72.23	8.456		
10,475.0	10,469.5	10,075.0	9,971.1	37.0	35.3	37.38	63.0	161.7	627.8	555.5	72.32	8.681		
10,500.0	10,493.6	10,082.5	9,974.5	37.1	35.3	35.39	69.7	161.7	644.4	572.0	72.42	8.899		
10,525.0	10,517.3	10,090.3	9,977.9	37.2	35.3	33.58	76.7	161.8	660.6	588.1	72.51	9.111		
10,550.0	10,540.5	10,100.0	9,981.9	37.2	35.4	31.88	85.5	161.9	676.3	603.7	72.60	9.315		
10,575.0	10,563.3	10,106.3	9,984.4	37.3	35.4	30.47	91.3	161.9	691.5	618.8	72.69	9.513		
10,600.0	10,585.4	10,114.5	9,987.6	37.4	35.4	29.13	98.9	162.0	706.1	633.4	72.78	9.703		
10,625.0	10,607.0	10,125.0	9,991.4	37.5	35.4	27.86	108.6	162.1	720.2	647.3	72.87	9.884		
10,650.0	10,627.8	10,125.0	9,991.4	37.5	35.4	26.97	108.6	162.1	733.7	660.8	72.94	10.060		
10,675.0	10,647.9	10,139.8	9,996.5	37.6	35.4	25.83	122.6	162.2	746.5	673.5	73.03	10.222		
10,700.0	10,667.1	10,150.0	9,999.8	37.7	35.4	24.91	132.2	162.3	758.7	685.6	73.11	10.378		

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



Anticollision Report

Company: COG OPERATING LLC
 Project: EDDY COUNTY, NM

Local Co-ordinate Reference: Well LITTLEFIELD 33 FED COM #808H
 TVD Reference: RKB=2860.5+25 @ 2885.5usft (LASTSHAW 44)

Reference Site: ATLAS

MD Reference: RKB=2860.5+25 @ 2885.5usft (LASTSHAW 44)

Site Error: 0.0 usft
 Reference Well: LITTLEFIELD 33 FED COM #808H
 Well Error: 3.0 usft
 Reference Wellbore: OWB
 Reference Design: PWP0

North Reference: Grid
 Survey Calculation Method: Minimum Curvature
 Output errors are at: 2.00 sigma
 Database: EDM_Users
 Offset TVD Reference: Offset Datum

Offset Design ATLAS - LITTLEFIELD 33 FED COM #707H - OWB - PWP0													Offset Site Error:	0.0 usft
Survey Program: 0-MWD+IFR1+MS													Offset Well Error:	3.0 usft
Reference		Offset		Semi Major Axis			Distance						Warning	
Measured Depth (usft)	Vertical Depth (usft)	Measured Depth (usft)	Vertical Depth (usft)	Reference (usft)	Offset (usft)	Highside Toolface (°)	Offset Wellbore Centre +N/-S (usft)	+E/-W (usft)	Between Centres (usft)	Between Ellipses (usft)	Minimum Separation (usft)	Separation Factor		
10,725.0	10,685.6	10,157.2	10,001.9	37.7	35.5	24.14	139.1	162.4	770.3	697.1	73.18	10.525		
10,750.0	10,703.1	10,166.0	10,004.4	37.8	35.5	23.42	147.5	162.4	781.2	707.9	73.26	10.663		
10,775.0	10,719.6	10,175.0	10,006.8	37.8	35.5	22.77	156.2	162.5	791.4	718.1	73.33	10.792		
10,800.0	10,735.2	10,183.7	10,009.0	37.9	35.5	22.19	164.6	162.6	800.9	727.5	73.40	10.912		
10,825.0	10,749.7	10,192.7	10,011.1	38.0	35.5	21.67	173.4	162.7	809.7	736.2	73.46	11.022		
10,850.0	10,763.1	10,200.0	10,012.7	38.0	35.5	21.23	180.5	162.7	817.8	744.3	73.52	11.123		
10,875.0	10,775.4	10,210.8	10,014.8	38.1	35.5	20.81	191.1	162.8	825.1	751.6	73.58	11.214		
10,900.0	10,786.5	10,225.0	10,017.2	38.1	35.5	20.42	205.1	163.0	831.8	758.1	73.65	11.295		
10,925.0	10,796.4	10,225.0	10,017.2	38.1	35.5	20.17	205.1	163.0	837.6	764.0	73.69	11.367		
10,950.0	10,805.2	10,238.2	10,019.1	38.2	35.6	19.88	218.2	163.1	842.7	769.0	73.74	11.428		
10,975.0	10,812.7	10,250.0	10,020.4	38.2	35.6	19.66	229.9	163.2	847.1	773.3	73.79	11.480		
11,000.0	10,818.9	10,250.0	10,020.4	38.3	35.6	19.51	229.9	163.2	850.7	776.9	73.82	11.524		
11,025.0	10,823.8	10,265.9	10,021.8	38.3	35.6	19.35	245.7	163.3	853.5	779.6	73.87	11.554		
11,050.0	10,827.5	10,275.0	10,022.4	38.3	35.6	19.25	254.8	163.4	855.5	781.6	73.90	11.576		
11,075.0	10,829.9	10,284.4	10,022.8	38.3	35.6	19.19	264.2	163.5	856.8	782.8	73.93	11.589		
11,100.0	10,830.9	10,297.0	10,023.0	38.3	35.6	19.17	276.8	163.6	857.3	783.3	73.96	11.591		
11,104.5	10,831.0	10,297.0	10,023.0	38.4	35.6	19.17	276.8	163.6	857.3	783.3	73.97	11.590		
11,107.6	10,831.0	10,297.0	10,023.0	38.4	35.6	19.17	276.8	163.6	857.3	783.3	73.97	11.590		
11,205.6	10,831.7	10,393.7	10,023.5	38.4	35.7	19.16	373.4	164.5	857.4	783.3	74.13	11.566		
11,300.0	10,832.4	10,488.1	10,024.0	38.5	35.8	19.16	467.9	165.3	857.6	783.2	74.32	11.539		
11,400.0	10,833.0	10,588.1	10,024.6	38.6	35.9	19.16	567.9	166.2	857.7	783.2	74.55	11.505		
11,500.0	10,833.7	10,688.1	10,025.1	38.8	36.0	19.15	667.9	167.2	857.9	783.1	74.81	11.467		
11,600.0	10,834.4	10,788.1	10,025.6	38.9	36.2	19.15	767.9	168.1	858.0	782.9	75.10	11.425		
11,700.0	10,835.1	10,888.1	10,026.2	39.1	36.4	19.15	867.9	169.0	858.2	782.7	75.42	11.378		
11,800.0	10,835.8	10,988.1	10,026.7	39.2	36.5	19.15	967.8	169.9	858.3	782.5	75.77	11.328		
11,900.0	10,836.5	11,088.1	10,027.2	39.4	36.7	19.14	1,067.8	170.8	858.5	782.3	76.15	11.273		
12,000.0	10,837.2	11,188.1	10,027.8	39.6	36.9	19.14	1,167.8	171.7	858.6	782.1	76.56	11.215		
12,100.0	10,837.9	11,288.1	10,028.3	39.8	37.2	19.14	1,267.8	172.6	858.8	781.8	76.99	11.154		
12,200.0	10,838.6	11,388.1	10,028.8	40.0	37.4	19.13	1,367.8	173.5	858.9	781.5	77.46	11.089		
12,300.0	10,839.3	11,488.1	10,029.4	40.3	37.7	19.13	1,467.8	174.4	859.1	781.1	77.95	11.021		
12,400.0	10,840.0	11,588.1	10,029.9	40.5	37.9	19.13	1,567.8	175.3	859.2	780.8	78.47	10.950		
12,500.0	10,840.7	11,688.1	10,030.4	40.8	38.2	19.12	1,667.8	176.2	859.4	780.4	79.01	10.877		
12,600.0	10,841.4	11,788.1	10,031.0	41.1	38.5	19.12	1,767.8	177.1	859.5	779.9	79.58	10.801		
12,700.0	10,842.1	11,888.1	10,031.5	41.3	38.8	19.12	1,867.8	178.0	859.7	779.5	80.17	10.723		
12,800.0	10,842.7	11,988.1	10,032.0	41.6	39.1	19.12	1,967.8	178.9	859.8	779.0	80.79	10.642		
12,900.0	10,843.4	12,088.1	10,032.6	42.0	39.5	19.11	2,067.8	179.8	860.0	778.5	81.44	10.560		
13,000.0	10,844.1	12,188.1	10,033.1	42.3	39.8	19.11	2,167.8	180.7	860.1	778.0	82.10	10.476		
13,100.0	10,844.8	12,288.1	10,033.6	42.6	40.2	19.11	2,267.8	181.7	860.3	777.5	82.79	10.391		
13,200.0	10,845.5	12,388.1	10,034.2	43.0	40.5	19.10	2,367.8	182.6	860.4	776.9	83.50	10.304		
13,300.0	10,846.2	12,488.1	10,034.7	43.3	40.9	19.10	2,467.8	183.5	860.6	776.4	84.24	10.216		
13,400.0	10,846.9	12,588.1	10,035.2	43.7	41.3	19.10	2,567.8	184.4	860.7	775.7	84.99	10.127		
13,500.0	10,847.6	12,688.1	10,035.8	44.1	41.7	19.10	2,667.8	185.3	860.9	775.1	85.77	10.038		
13,600.0	10,848.3	12,788.1	10,036.3	44.4	42.1	19.09	2,767.7	186.2	861.0	774.5	86.56	9.947		
13,700.0	10,849.0	12,888.1	10,036.9	44.8	42.5	19.09	2,867.7	187.1	861.2	773.8	87.37	9.856		
13,800.0	10,849.7	12,988.1	10,037.4	45.2	42.9	19.09	2,967.7	188.0	861.3	773.1	88.21	9.765		
13,900.0	10,850.4	13,088.1	10,037.9	45.7	43.4	19.08	3,067.7	188.9	861.5	772.4	89.06	9.673		
14,000.0	10,851.1	13,188.1	10,038.5	46.1	43.8	19.08	3,167.7	189.8	861.6	771.7	89.93	9.581		
14,100.0	10,851.7	13,288.1	10,039.0	46.5	44.3	19.08	3,267.7	190.7	861.8	771.0	90.82	9.489		
14,200.0	10,852.4	13,388.1	10,039.5	47.0	44.7	19.07	3,367.7	191.6	861.9	770.2	91.72	9.398		
14,300.0	10,853.1	13,488.1	10,040.1	47.4	45.2	19.07	3,467.7	192.5	862.1	769.5	92.64	9.306		
14,400.0	10,853.8	13,588.1	10,040.6	47.9	45.7	19.07	3,567.7	193.4	862.3	768.7	93.58	9.214		

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



Anticollision Report

Company: COG OPERATING LLC
Project: EDDY COUNTY, NM
Reference Site: ATLAS
Site Error: 0.0 usft
Reference Well: LITTLEFIELD 33 FED COM #808H
Well Error: 3.0 usft
Reference Wellbore: OWB
Reference Design: PWP0

Local Co-ordinate Reference: Well LITTLEFIELD 33 FED COM #808H
TVD Reference: RKB=2860.5+25 @ 2885.5usft (LASTSHAW 44)
MD Reference: RKB=2860.5+25 @ 2885.5usft (LASTSHAW 44)
North Reference: Grid
Survey Calculation Method: Minimum Curvature
Output errors are at: 2.00 sigma
Database: EDM_Users
Offset TVD Reference: Offset Datum

Offset Design ATLAS - LITTLEFIELD 33 FED COM #707H - OWB - PWP0													Offset Site Error:	0.0 usft
Survey Program: 0-MWD+IFR1+MS													Offset Well Error:	3.0 usft
Reference		Offset		Semi Major Axis			Distance						Warning	
Measured Depth (usft)	Vertical Depth (usft)	Measured Depth (usft)	Vertical Depth (usft)	Reference (usft)	Offset (usft)	Highside Toolface (°)	Offset Wellbore Centre +N/-S (usft)	+E/-W (usft)	Between Centres (usft)	Between Ellipses (usft)	Minimum Separation (usft)	Separation Factor		
14,500.0	10,854.5	13,688.1	10,041.1	48.3	46.2	19.07	3,667.7	194.3	862.4	767.9	94.53	9.123		
14,600.0	10,855.2	13,788.1	10,041.7	48.8	46.7	19.06	3,767.7	195.2	862.6	767.1	95.50	9.032		
14,700.0	10,855.9	13,888.1	10,042.2	49.3	47.2	19.06	3,867.7	196.2	862.7	766.2	96.48	8.942		
14,800.0	10,856.6	13,988.1	10,042.7	49.8	47.7	19.06	3,967.7	197.1	862.9	765.4	97.47	8.852		
14,900.0	10,857.3	14,088.1	10,043.3	50.3	48.2	19.05	4,067.7	198.0	863.0	764.5	98.48	8.763		
15,000.0	10,858.0	14,188.1	10,043.8	50.8	48.7	19.05	4,167.7	198.9	863.2	763.7	99.50	8.675		
15,100.0	10,858.7	14,288.1	10,044.3	51.3	49.2	19.05	4,267.7	199.8	863.3	762.8	100.54	8.587		
15,200.0	10,859.4	14,388.1	10,044.9	51.8	49.8	19.05	4,367.7	200.7	863.5	761.9	101.58	8.500		
15,300.0	10,860.1	14,488.1	10,045.4	52.3	50.3	19.04	4,467.7	201.6	863.6	761.0	102.64	8.414		
15,400.0	10,860.7	14,588.1	10,045.9	52.8	50.9	19.04	4,567.6	202.5	863.8	760.1	103.72	8.328		
15,500.0	10,861.4	14,688.1	10,046.5	53.4	51.4	19.04	4,667.6	203.4	863.9	759.1	104.80	8.244		
15,600.0	10,862.1	14,788.1	10,047.0	53.9	52.0	19.03	4,767.6	204.3	864.1	758.2	105.89	8.160		
15,700.0	10,862.8	14,888.1	10,047.5	54.4	52.5	19.03	4,867.6	205.2	864.2	757.2	106.99	8.077		
15,800.0	10,863.5	14,988.1	10,048.1	55.0	53.1	19.03	4,967.6	206.1	864.4	756.3	108.11	7.995		
15,900.0	10,864.2	15,088.1	10,048.6	55.5	53.7	19.02	5,067.6	207.0	864.5	755.3	109.23	7.914		
16,000.0	10,864.9	15,188.1	10,049.2	56.1	54.2	19.02	5,167.6	207.9	864.7	754.3	110.37	7.835		
16,100.0	10,865.6	15,288.1	10,049.7	56.6	54.8	19.02	5,267.6	208.8	864.8	753.3	111.51	7.756		
16,200.0	10,866.3	15,388.1	10,050.2	57.2	55.4	19.02	5,367.6	209.7	865.0	752.3	112.66	7.678		
16,300.0	10,867.0	15,488.1	10,050.8	57.8	56.0	19.01	5,467.6	210.7	865.1	751.3	113.83	7.601		
16,400.0	10,867.7	15,588.1	10,051.3	58.4	56.6	19.01	5,567.6	211.6	865.3	750.3	115.00	7.525		
16,500.0	10,868.4	15,688.1	10,051.8	58.9	57.2	19.01	5,667.6	212.5	865.4	749.3	116.17	7.449		
16,600.0	10,869.1	15,788.1	10,052.4	59.5	57.8	19.00	5,767.6	213.4	865.6	748.2	117.36	7.375		
16,700.0	10,869.7	15,888.1	10,052.9	60.1	58.4	19.00	5,867.6	214.3	865.7	747.2	118.55	7.302		
16,800.0	10,870.4	15,988.1	10,053.4	60.7	59.0	19.00	5,967.6	215.2	865.9	746.1	119.76	7.230		
16,900.0	10,871.1	16,088.1	10,054.0	61.3	59.6	19.00	6,067.6	216.1	866.0	745.1	120.97	7.159		
17,000.0	10,871.8	16,188.1	10,054.5	61.9	60.2	18.99	6,167.6	217.0	866.2	744.0	122.18	7.089		
17,100.0	10,872.5	16,288.1	10,055.0	62.5	60.8	18.99	6,267.5	217.9	866.3	742.9	123.40	7.020		
17,200.0	10,873.2	16,388.1	10,055.6	63.1	61.5	18.99	6,367.5	218.8	866.5	741.9	124.63	6.952		
17,300.0	10,873.9	16,488.1	10,056.1	63.7	62.1	18.98	6,467.5	219.7	866.6	740.8	125.87	6.885		
17,400.0	10,874.6	16,588.1	10,056.6	64.3	62.7	18.98	6,567.5	220.6	866.8	739.7	127.11	6.819		
17,500.0	10,875.3	16,688.1	10,057.2	64.9	63.4	18.98	6,667.5	221.5	866.9	738.6	128.36	6.754		
17,600.0	10,876.0	16,788.1	10,057.7	65.6	64.0	18.97	6,767.5	222.4	867.1	737.5	129.62	6.690		
17,700.0	10,876.7	16,888.1	10,058.2	66.2	64.6	18.97	6,867.5	223.3	867.3	736.4	130.88	6.626		
17,800.0	10,877.4	16,988.1	10,058.8	66.8	65.3	18.97	6,967.5	224.3	867.4	735.3	132.15	6.564		
17,900.0	10,878.1	17,088.1	10,059.3	67.4	65.9	18.97	7,067.5	225.2	867.6	734.1	133.42	6.503		
18,000.0	10,878.8	17,188.1	10,059.8	68.1	66.6	18.96	7,167.5	226.1	867.7	733.0	134.69	6.442		
18,036.1	10,879.0	17,216.4	10,060.0	68.3	66.7	18.96	7,195.8	226.3	867.8	732.7	135.11	6.423		



Anticollision Report

Company: COG OPERATING LLC
 Project: EDDY COUNTY, NM

Local Co-ordinate Reference: Well LITTLEFIELD 33 FED COM #808H
 TVD Reference: RKB=2860.5+25 @ 2885.5usft (LASTSHAW 44)

Reference Site: ATLAS

MD Reference: RKB=2860.5+25 @ 2885.5usft (LASTSHAW 44)

Site Error: 0.0 usft
 Reference Well: LITTLEFIELD 33 FED COM #808H
 Well Error: 3.0 usft
 Reference Wellbore: OWB
 Reference Design: PWP0

North Reference: Grid
 Survey Calculation Method: Minimum Curvature
 Output errors are at: 2.00 sigma
 Database: EDM_Users
 Offset TVD Reference: Offset Datum

Offset Design ATLAS - LITTLEFIELD 33 FED COM #708H - OWB - PWP0													Offset Site Error:	0.0 usft
Survey Program: 0-MWD+IFR1+MS													Offset Well Error:	3.0 usft
Measured Depth (usft)	Vertical Depth (usft)	Measured Depth (usft)	Vertical Depth (usft)	Semi Major Axis		Highside Toolface (°)	Offset Wellbore Centre			Distance			Warning	
				Reference (usft)	Offset (usft)		+N/-S (usft)	+E/-W (usft)	Between Centres (usft)	Between Ellipses (usft)	Minimum Separation (usft)	Separation Factor		
0.0	0.0	0.2	-0.2	3.0	3.0	-90.09	-0.1	-45.0	45.0					
100.0	100.0	100.2	99.8	3.0	3.0	-90.09	-0.1	-45.0	45.0	39.0	6.01	7.491		
200.0	200.0	200.2	199.8	3.0	3.0	-90.09	-0.1	-45.0	45.0	38.9	6.08	7.399		
300.0	300.0	300.2	299.8	3.1	3.1	-90.09	-0.1	-45.0	45.0	38.8	6.24	7.213		
400.0	400.0	400.2	399.8	3.2	3.2	-90.09	-0.1	-45.0	45.0	38.5	6.47	6.954		
500.0	500.0	500.2	499.8	3.4	3.4	-90.09	-0.1	-45.0	45.0	38.2	6.77	6.645		
600.0	600.0	600.2	599.8	3.6	3.6	-90.09	-0.1	-45.0	45.0	37.9	7.13	6.309		
700.0	700.0	700.2	699.8	3.8	3.8	-90.09	-0.1	-45.0	45.0	37.4	7.54	5.965		
800.0	800.0	800.2	799.8	4.0	4.0	-90.09	-0.1	-45.0	45.0	37.0	8.00	5.625		
900.0	900.0	900.2	899.8	4.2	4.2	-90.09	-0.1	-45.0	45.0	36.5	8.49	5.300		
1,000.0	1,000.0	999.8	999.8	4.5	4.5	-90.09	-0.1	-45.0	45.0	36.0	9.01	4.994 CC		
1,050.0	1,050.0	1,050.8	1,049.2	4.6	4.6	59.00	-0.4	-45.3	45.1	35.8	9.27	4.862		
1,100.0	1,100.0	1,100.8	1,099.2	4.8	4.8	59.17	-1.0	-45.9	45.2	35.7	9.52	4.750		
1,200.0	1,200.0	1,200.8	1,199.2	5.0	5.0	59.49	-2.2	-47.1	45.6	35.5	10.05	4.535		
1,300.0	1,300.0	1,300.8	1,299.2	5.3	5.3	59.82	-3.5	-48.4	45.9	35.3	10.60	4.333		
1,400.0	1,399.9	1,400.8	1,399.2	5.6	5.6	60.13	-4.7	-49.6	46.3	35.1	11.16	4.143		
1,500.0	1,499.9	1,500.8	1,499.2	5.9	5.9	60.45	-5.9	-50.8	46.6	34.8	11.75	3.967		
1,600.0	1,599.9	1,600.8	1,599.2	6.2	6.2	60.76	-7.2	-52.1	46.9	34.6	12.34	3.802		
1,700.0	1,699.9	1,700.8	1,699.1	6.5	6.5	61.06	-8.4	-53.3	47.3	34.3	12.95	3.650		
1,800.0	1,799.9	1,800.8	1,799.1	6.8	6.8	61.36	-9.6	-54.5	47.6	34.0	13.57	3.508		
1,900.0	1,899.9	1,900.8	1,899.1	7.1	7.1	61.66	-10.9	-55.8	48.0	33.8	14.20	3.377		
2,000.0	1,999.9	2,000.8	1,999.1	7.4	7.4	61.95	-12.1	-57.0	48.3	33.5	14.84	3.256		
2,100.0	2,099.8	2,100.8	2,099.1	7.7	7.8	62.24	-13.3	-58.2	48.7	33.2	15.49	3.143		
2,200.0	2,199.8	2,200.8	2,199.1	8.1	8.1	62.52	-14.6	-59.5	49.0	32.9	16.14	3.038		
2,300.0	2,299.8	2,300.8	2,299.0	8.4	8.4	62.80	-15.8	-60.7	49.4	32.6	16.79	2.940		
2,400.0	2,399.8	2,400.8	2,399.0	8.7	8.7	63.08	-17.0	-61.9	49.7	32.3	17.45	2.849		
2,500.0	2,499.8	2,500.8	2,499.0	9.1	9.1	63.35	-18.3	-63.2	50.1	32.0	18.12	2.763		
2,600.0	2,599.8	2,600.8	2,599.0	9.4	9.4	63.62	-19.5	-64.4	50.4	31.6	18.79	2.684		
2,700.0	2,699.7	2,700.8	2,699.0	9.7	9.7	63.88	-20.7	-65.7	50.8	31.3	19.46	2.609		
2,800.0	2,799.7	2,800.8	2,799.0	10.1	10.1	64.14	-22.0	-66.9	51.1	31.0	20.14	2.539		
2,900.0	2,899.7	2,900.8	2,898.9	10.4	10.4	64.40	-23.2	-68.1	51.5	30.7	20.82	2.474		
3,000.0	2,999.7	3,000.8	2,998.9	10.7	10.8	64.65	-24.4	-69.4	51.9	30.4	21.50	2.412		
3,100.0	3,099.7	3,100.8	3,098.9	11.1	11.1	64.90	-25.7	-70.6	52.2	30.0	22.18	2.354		
3,200.0	3,199.7	3,200.8	3,198.9	11.4	11.4	65.15	-26.9	-71.8	52.6	29.7	22.87	2.299		
3,300.0	3,299.7	3,300.8	3,298.9	11.8	11.8	65.39	-28.1	-73.1	52.9	29.4	23.56	2.247		
3,400.0	3,399.6	3,400.8	3,398.9	12.1	12.1	65.63	-29.4	-74.3	53.3	29.1	24.25	2.198		
3,500.0	3,499.6	3,500.8	3,498.8	12.5	12.5	65.87	-30.6	-75.5	53.7	28.7	24.94	2.152		
3,600.0	3,599.6	3,600.8	3,598.8	12.8	12.8	66.10	-31.8	-76.8	54.0	28.4	25.63	2.108		
3,700.0	3,699.6	3,700.8	3,698.8	13.2	13.2	66.33	-33.1	-78.0	54.4	28.1	26.33	2.066		
3,800.0	3,799.6	3,800.8	3,798.8	13.5	13.5	66.56	-34.3	-79.2	54.8	27.7	27.02	2.027		
3,900.0	3,899.6	3,900.8	3,898.8	13.8	13.9	66.78	-35.5	-80.5	55.1	27.4	27.72	1.989 Advise and Monitor		
4,000.0	3,999.5	4,000.8	3,998.8	14.2	14.2	67.00	-36.8	-81.7	55.5	27.1	28.41	1.953 Advise and Monitor		
4,100.0	4,099.5	4,100.8	4,098.7	14.5	14.6	67.22	-38.0	-82.9	55.9	26.8	29.11	1.919 Advise and Monitor		
4,200.0	4,199.5	4,200.8	4,198.7	14.9	14.9	67.43	-39.2	-84.2	56.2	26.4	29.81	1.886 Advise and Monitor		
4,300.0	4,299.5	4,300.8	4,298.7	15.2	15.3	67.65	-40.5	-85.4	56.6	26.1	30.51	1.855 Advise and Monitor		
4,400.0	4,399.5	4,400.8	4,398.7	15.6	15.6	67.86	-41.7	-86.6	57.0	25.8	31.21	1.825 Advise and Monitor		
4,500.0	4,499.5	4,500.8	4,498.7	15.9	16.0	68.06	-42.9	-87.9	57.3	25.4	31.92	1.797 Advise and Monitor		
4,600.0	4,599.5	4,600.8	4,598.7	16.3	16.3	68.27	-44.2	-89.1	57.7	25.1	32.62	1.770 Advise and Monitor		
4,700.0	4,699.4	4,700.8	4,698.7	16.6	16.7	68.47	-45.4	-90.3	58.1	24.8	33.32	1.743 Advise and Monitor		
4,800.0	4,799.4	4,800.8	4,798.6	17.0	17.0	68.67	-46.6	-91.6	58.5	24.4	34.03	1.718 Advise and Monitor		
4,900.0	4,899.4	4,900.8	4,898.6	17.4	17.4	68.87	-47.9	-92.8	58.8	24.1	34.73	1.694 Advise and Monitor		

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



Anticollision Report

Company: COG OPERATING LLC
 Project: EDDY COUNTY, NM

Local Co-ordinate Reference: Well LITTLEFIELD 33 FED COM #808H
 TVD Reference: RKB=2860.5+25 @ 2885.5usft (LASTSHAW 44)

Reference Site: ATLAS

MD Reference: RKB=2860.5+25 @ 2885.5usft (LASTSHAW 44)

Site Error: 0.0 usft
 Reference Well: LITTLEFIELD 33 FED COM #808H
 Well Error: 3.0 usft
 Reference Wellbore: OWB
 Reference Design: PWP0

North Reference: Grid
 Survey Calculation Method: Minimum Curvature
 Output errors are at: 2.00 sigma
 Database: EDM_Users
 Offset TVD Reference: Offset Datum

Offset Design ATLAS - LITTLEFIELD 33 FED COM #708H - OWB - PWP0													Offset Site Error:	0.0 usft
Survey Program: 0-MWD+IFR1+MS													Offset Well Error:	3.0 usft
Reference				Semi Major Axis			Distance			Separation		Warning		
Measured Depth (usft)	Vertical Depth (usft)	Measured Depth (usft)	Vertical Depth (usft)	Reference (usft)	Offset (usft)	Highside Toolface (")	Offset Wellbore Centre +N/-S (usft)	+E/-W (usft)	Between Centres (usft)	Between Ellipses (usft)	Minimum Separation (usft)	Separation Factor		
5,000.0	4,999.4	4,999.2	4,998.6	17.7	17.7	69.06	-49.1	-94.0	59.2	23.8	35.43	1.671	Advise and Monitor, ES, SF	
5,100.0	5,099.4	5,102.0	5,097.3	18.1	18.1	67.95	-51.5	-96.4	60.6	24.4	36.15	1.676	Advise and Monitor	
5,200.0	5,199.4	5,202.1	5,197.1	18.4	18.4	65.57	-55.2	-100.1	63.1	26.2	36.86	1.711	Advise and Monitor	
5,300.0	5,299.4	5,297.9	5,296.9	18.8	18.8	63.38	-58.9	-103.8	65.6	28.1	37.55	1.748	Advise and Monitor	
5,400.0	5,399.3	5,402.2	5,396.7	19.1	19.2	61.35	-62.6	-107.5	68.3	30.0	38.27	1.785	Advise and Monitor	
5,500.0	5,499.3	5,502.3	5,496.5	19.5	19.5	59.48	-66.3	-111.2	71.1	32.1	38.98	1.823	Advise and Monitor	
5,600.0	5,599.3	5,602.3	5,596.3	19.8	19.9	57.75	-70.0	-114.9	73.9	34.2	39.69	1.861	Advise and Monitor	
5,700.0	5,699.3	5,702.4	5,696.1	20.2	20.2	56.15	-73.7	-118.6	76.8	36.4	40.40	1.900	Advise and Monitor	
5,800.0	5,799.3	5,802.5	5,795.9	20.5	20.6	54.67	-77.4	-122.3	79.7	38.6	41.11	1.939	Advise and Monitor	
5,900.0	5,899.3	5,902.5	5,895.7	20.9	20.9	53.29	-81.1	-126.0	82.7	40.9	41.82	1.977	Advise and Monitor	
6,000.0	5,999.2	6,002.6	5,995.5	21.2	21.3	52.01	-84.8	-129.7	85.7	43.2	42.53	2.015		
6,100.0	6,099.2	6,102.7	6,095.3	21.6	21.6	50.82	-88.5	-133.4	88.8	45.5	43.24	2.053		
6,200.0	6,199.2	6,197.3	6,195.1	22.0	22.0	49.70	-92.2	-137.1	91.9	47.9	43.94	2.091		
6,300.0	6,299.2	6,302.8	6,294.9	22.3	22.4	48.67	-95.9	-140.8	95.0	50.4	44.67	2.127		
6,400.0	6,399.2	6,402.8	6,394.7	22.7	22.7	47.69	-99.6	-144.5	98.2	52.8	45.38	2.164		
6,500.0	6,499.2	6,502.9	6,494.5	23.0	23.1	46.78	-103.3	-148.2	101.4	55.3	46.09	2.200		
6,600.0	6,599.2	6,603.0	6,594.3	23.4	23.4	45.92	-107.0	-151.9	104.6	57.8	46.80	2.235		
6,700.0	6,699.1	6,703.0	6,694.1	23.7	23.8	45.12	-110.7	-155.6	107.8	60.3	47.52	2.270		
6,800.0	6,799.1	6,803.1	6,793.9	24.1	24.1	44.36	-114.4	-159.3	111.1	62.9	48.23	2.304		
6,900.0	6,899.1	6,896.8	6,893.7	24.4	24.5	43.65	-118.1	-163.0	114.4	65.5	48.92	2.338		
7,000.0	6,999.1	7,003.2	6,993.5	24.8	24.9	42.97	-121.8	-166.7	117.7	68.0	49.66	2.370		
7,100.0	7,099.0	7,103.3	7,093.3	25.2	25.2	42.87	-125.5	-170.4	119.7	69.3	50.37	2.376		
7,200.0	7,198.9	7,203.3	7,193.2	25.5	25.6	43.36	-129.2	-174.1	120.5	69.4	51.09	2.358		
7,300.0	7,298.8	7,303.3	7,293.0	25.9	25.9	43.85	-132.9	-177.8	121.2	69.4	51.80	2.340		
7,400.0	7,398.6	7,403.3	7,392.9	26.2	26.3	44.33	-136.6	-181.5	122.0	69.5	52.52	2.323		
7,500.0	7,498.5	7,503.3	7,492.8	26.6	26.6	44.80	-140.3	-185.2	122.8	69.5	53.23	2.306		
7,600.0	7,598.3	7,603.3	7,592.6	26.9	27.0	45.27	-144.0	-188.9	123.5	69.6	53.95	2.290		
7,700.0	7,698.2	7,703.3	7,692.5	27.3	27.4	45.73	-147.7	-192.6	124.3	69.7	54.67	2.275		
7,800.0	7,798.1	7,803.3	7,792.3	27.7	27.7	46.18	-151.4	-196.3	125.1	69.8	55.38	2.260		
7,900.0	7,897.9	7,903.3	7,892.2	28.0	28.1	46.63	-155.1	-200.0	126.0	69.9	56.10	2.245		
8,000.0	7,997.8	8,003.3	7,992.0	28.4	28.4	47.08	-158.8	-203.7	126.8	70.0	56.81	2.231		
8,100.0	8,097.7	8,103.3	8,091.9	28.7	28.8	47.52	-162.5	-207.4	127.6	70.1	57.53	2.218		
8,200.0	8,197.5	8,203.3	8,191.7	29.1	29.2	47.95	-166.2	-211.1	128.4	70.2	58.25	2.205		
8,300.0	8,297.4	8,303.4	8,291.6	29.4	29.5	48.38	-169.9	-214.8	129.3	70.3	58.97	2.192		
8,400.0	8,397.2	8,403.4	8,391.5	29.8	29.9	48.80	-173.6	-218.5	130.1	70.4	59.68	2.180		
8,500.0	8,497.1	8,503.4	8,491.3	30.2	30.2	49.21	-177.3	-222.2	131.0	70.6	60.40	2.168		
8,600.0	8,597.0	8,603.4	8,591.2	30.5	30.6	49.62	-181.0	-225.9	131.8	70.7	61.12	2.157		
8,700.0	8,696.8	8,696.6	8,691.0	30.9	30.9	50.03	-184.7	-229.6	132.7	70.9	61.81	2.147		
8,800.0	8,796.7	8,796.6	8,790.9	31.2	31.3	50.43	-188.4	-233.3	133.6	71.0	62.53	2.136		
8,900.0	8,896.6	8,903.4	8,890.7	31.6	31.7	50.82	-192.1	-237.0	134.5	71.2	63.27	2.125		
9,000.0	8,996.4	8,996.6	8,990.6	32.0	32.0	51.21	-195.8	-240.7	135.3	71.4	63.97	2.116		
9,100.0	9,096.3	9,100.3	9,094.2	32.3	32.4	52.07	-199.4	-243.3	134.9	70.2	64.70	2.085		
9,200.0	9,196.1	9,202.0	9,195.9	32.7	32.7	53.77	-198.7	-243.6	132.1	66.7	65.40	2.019		
9,300.0	9,296.0	9,301.9	9,295.8	33.0	33.1	55.65	-198.7	-243.6	129.0	62.9	66.09	1.953	Advise and Monitor	
9,400.0	9,395.9	9,401.8	9,395.7	33.4	33.4	57.61	-198.7	-243.6	126.2	59.4	66.78	1.889	Advise and Monitor	
9,500.0	9,495.7	9,501.6	9,495.5	33.8	33.7	59.66	-198.7	-243.6	123.4	56.0	67.47	1.829	Advise and Monitor	
9,566.1	9,561.8	9,565.9	9,559.8	34.0	33.9	60.91	-198.3	-243.8	122.2	54.3	67.92	1.800	Advise and Monitor	
9,600.0	9,595.7	9,597.0	9,590.8	34.1	34.0	62.26	-196.0	-244.4	122.7	54.6	68.14	1.801	Advise and Monitor	
9,650.0	9,645.7	9,642.0	9,635.2	34.3	34.2	-83.53	-189.3	-246.5	125.5	57.0	68.46	1.833	Advise and Monitor	
9,700.0	9,695.7	9,685.3	9,677.2	34.4	34.3	-79.21	-179.1	-249.6	131.0	62.2	68.77	1.904	Advise and Monitor	

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



Anticollision Report

Company: COG OPERATING LLC
Project: EDDY COUNTY, NM
Reference Site: ATLAS
Site Error: 0.0 usft
Reference Well: LITTLEFIELD 33 FED COM #808H
Well Error: 3.0 usft
Reference Wellbore: OWB
Reference Design: PWP0

Local Co-ordinate Reference: Well LITTLEFIELD 33 FED COM #808H
TVD Reference: RKB=2860.5+25 @ 2885.5usft (LASTSHAW 44)
MD Reference: RKB=2860.5+25 @ 2885.5usft (LASTSHAW 44)
North Reference: Grid
Survey Calculation Method: Minimum Curvature
Output errors are at: 2.00 sigma
Database: EDM_Users
Offset TVD Reference: Offset Datum

Offset Design ATLAS - LITTLEFIELD 33 FED COM #708H - OWB - PWP0													Offset Site Error:	0.0 usft
Survey Program: 0-MWD+IFR1+MS													Offset Well Error:	3.0 usft
Measured Depth (usft)	Vertical Depth (usft)	Measured Depth (usft)	Vertical Depth (usft)	Semi Major Axis			Distance						Warning	
				Reference (usft)	Offset (usft)	Highside Toolface (°)	Offset Wellbore Centre +N/-S (usft)	+E/-W (usft)	Between Centres (usft)	Between Ellipses (usft)	Minimum Separation (usft)	Separation Factor		
9,800.0	9,795.7	9,764.7	9,751.0	34.8	34.6	-68.97	-151.2	-258.1	152.3	82.9	69.34	2.196		
9,900.0	9,895.7	9,833.0	9,809.7	35.1	34.8	-59.70	-118.1	-268.3	189.6	119.8	69.86	2.714		
10,000.0	9,995.7	9,890.1	9,854.7	35.4	34.9	-52.73	-84.5	-278.5	241.7	171.3	70.34	3.436		
10,100.0	10,095.7	9,937.2	9,888.4	35.8	35.0	-47.81	-53.0	-288.2	305.0	234.2	70.78	4.309		
10,200.0	10,195.7	9,975.0	9,913.0	36.1	35.1	-44.43	-25.6	-296.5	376.5	305.3	71.20	5.288		
10,300.0	10,295.7	10,008.4	9,932.8	36.4	35.2	-41.83	0.1	-304.4	454.0	382.4	71.60	6.341		
10,358.0	10,353.7	10,025.0	9,941.9	36.6	35.2	-40.66	13.4	-308.5	501.0	429.2	71.83	6.976		
10,375.0	10,370.7	10,025.0	9,941.9	36.7	35.2	-39.30	13.4	-308.5	515.0	443.1	71.88	7.164		
10,400.0	10,395.6	10,036.0	9,947.7	36.8	35.2	-36.24	22.3	-311.2	535.0	463.1	71.99	7.432		
10,425.0	10,420.4	10,043.1	9,951.3	36.8	35.2	-33.76	28.2	-313.0	554.8	482.7	72.09	7.696		
10,450.0	10,445.1	10,050.0	9,954.8	36.9	35.3	-31.60	33.9	-314.7	574.0	501.9	72.18	7.953		
10,475.0	10,469.5	10,057.8	9,958.5	37.0	35.3	-29.70	40.4	-316.7	592.9	520.6	72.28	8.202		
10,500.0	10,493.6	10,065.3	9,962.1	37.1	35.3	-28.03	46.8	-318.7	611.2	538.8	72.37	8.445		
10,525.0	10,517.3	10,075.0	9,966.4	37.2	35.3	-26.56	55.0	-321.2	629.0	556.5	72.47	8.679		
10,550.0	10,540.5	10,075.0	9,966.4	37.2	35.3	-25.31	55.0	-321.2	646.3	573.7	72.55	8.908		
10,575.0	10,563.3	10,088.8	9,972.4	37.3	35.3	-24.16	67.0	-324.8	662.9	590.2	72.65	9.124		
10,600.0	10,585.4	10,100.0	9,976.9	37.4	35.3	-23.18	76.7	-327.8	678.9	606.2	72.74	9.334		
10,625.0	10,607.0	10,100.0	9,976.9	37.5	35.3	-22.26	76.7	-327.8	694.4	621.6	72.81	9.537		
10,650.0	10,627.8	10,113.2	9,982.0	37.5	35.4	-21.52	88.4	-331.4	709.2	636.3	72.90	9.728		
10,675.0	10,647.9	10,125.0	9,986.2	37.6	35.4	-20.87	98.9	-334.6	723.4	650.4	72.99	9.911		
10,700.0	10,667.1	10,125.0	9,986.2	37.7	35.4	-20.19	98.9	-334.6	737.0	663.9	73.06	10.088		
10,725.0	10,685.6	10,138.3	9,990.7	37.7	35.4	-19.71	110.9	-338.3	749.8	676.7	73.14	10.252		
10,750.0	10,703.1	10,150.0	9,994.3	37.8	35.4	-19.29	121.5	-341.5	762.0	688.8	73.22	10.407		
10,775.0	10,719.6	10,150.0	9,994.3	37.8	35.4	-18.78	121.5	-341.5	773.5	700.2	73.28	10.556		
10,800.0	10,735.2	10,163.9	9,998.3	37.9	35.4	-18.50	134.3	-345.4	784.2	710.9	73.35	10.691		
10,825.0	10,749.7	10,175.0	10,001.1	38.0	35.5	-18.24	144.5	-348.6	794.3	720.9	73.42	10.819		
10,850.0	10,763.1	10,175.0	10,001.1	38.0	35.5	-17.87	144.5	-348.6	803.7	730.2	73.47	10.939		
10,875.0	10,775.4	10,189.9	10,004.6	38.1	35.5	-17.75	158.4	-352.8	812.2	738.7	73.54	11.045		
10,900.0	10,786.5	10,200.0	10,006.7	38.1	35.5	-17.61	167.8	-355.7	820.1	746.5	73.59	11.143		
10,925.0	10,796.4	10,207.4	10,008.1	38.1	35.5	-17.46	174.8	-357.8	827.2	753.5	73.64	11.232		
10,950.0	10,805.2	10,216.1	10,009.6	38.2	35.5	-17.37	183.0	-360.3	833.5	759.9	73.69	11.311		
10,975.0	10,812.7	10,225.0	10,011.0	38.2	35.5	-17.32	191.4	-362.9	839.2	765.4	73.74	11.380		
11,000.0	10,818.9	10,233.7	10,012.1	38.3	35.5	-17.29	199.6	-365.4	844.0	770.2	73.78	11.439		
11,025.0	10,823.8	10,242.5	10,013.2	38.3	35.5	-17.30	208.0	-367.9	848.1	774.3	73.82	11.489		
11,050.0	10,827.5	10,250.0	10,013.9	38.3	35.5	-17.32	215.1	-370.1	851.4	777.6	73.85	11.529		
11,075.0	10,829.9	10,260.0	10,014.8	38.3	35.6	-17.42	224.7	-373.1	854.0	780.1	73.89	11.558		
11,100.0	10,830.9	10,275.0	10,015.6	38.3	35.6	-17.65	239.0	-377.4	855.9	781.9	73.92	11.578		
11,104.5	10,831.0	10,275.0	10,015.6	38.4	35.6	-17.64	239.0	-377.4	856.1	782.2	73.92	11.581		
11,205.6	10,831.7	10,339.6	10,016.3	38.4	35.6	-18.83	301.0	-395.6	864.4	790.4	74.06	11.672		
11,300.0	10,832.4	10,455.8	10,016.9	38.5	35.7	-20.49	414.3	-421.2	872.0	797.8	74.26	11.743		
11,400.0	10,833.0	10,582.9	10,017.5	38.6	35.9	-21.63	540.1	-438.7	877.5	803.0	74.52	11.775		
11,500.0	10,833.7	10,712.3	10,018.2	38.8	36.1	-22.07	669.4	-445.0	879.8	805.0	74.82	11.758		
11,600.0	10,834.4	10,816.4	10,018.8	38.9	36.2	-22.07	773.4	-444.1	880.0	804.8	75.12	11.714		
11,700.0	10,835.1	10,916.4	10,019.3	39.1	36.4	-22.07	873.4	-443.2	880.1	804.7	75.44	11.667		
11,800.0	10,835.8	11,016.4	10,019.9	39.2	36.6	-22.07	973.4	-442.3	880.3	804.5	75.79	11.615		
11,900.0	10,836.5	11,116.4	10,020.4	39.4	36.8	-22.06	1,073.4	-441.4	880.4	804.2	76.16	11.559		
12,000.0	10,837.2	11,216.4	10,020.9	39.6	37.0	-22.06	1,173.4	-440.5	880.5	804.0	76.57	11.500		
12,100.0	10,837.9	11,316.4	10,021.4	39.8	37.2	-22.05	1,273.4	-439.6	880.7	803.7	77.00	11.437		
12,200.0	10,838.6	11,416.4	10,022.0	40.0	37.4	-22.05	1,373.4	-438.6	880.8	803.4	77.46	11.371		
12,300.0	10,839.3	11,516.4	10,022.5	40.3	37.7	-22.04	1,473.4	-437.7	881.0	803.0	77.95	11.302		
12,400.0	10,840.0	11,616.4	10,023.0	40.5	37.9	-22.04	1,573.4	-436.8	881.1	802.7	78.47	11.229		

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



Anticollision Report

Company: COG OPERATING LLC
Project: EDDY COUNTY, NM

Local Co-ordinate Reference: Well LITTLEFIELD 33 FED COM #808H
TVD Reference: RKB=2860.5+25 @ 2885.5usft (LASTSHAW 44)

Reference Site: ATLAS

MD Reference: RKB=2860.5+25 @ 2885.5usft (LASTSHAW 44)

Site Error: 0.0 usft
Reference Well: LITTLEFIELD 33 FED COM #808H
Well Error: 3.0 usft
Reference Wellbore: OWB
Reference Design: PWP0

North Reference: Grid
Survey Calculation Method: Minimum Curvature
Output errors are at: 2.00 sigma
Database: EDM_Users
Offset TVD Reference: Offset Datum

Offset Design ATLAS - LITTLEFIELD 33 FED COM #708H - OWB - PWP0													Offset Site Error:	0.0 usft
Survey Program: 0-MWD+IFR1+MS													Offset Well Error:	3.0 usft
Measured Depth (usft)	Vertical Depth (usft)	Reference		Semi Major Axis			Distance						Warning	
		Measured Depth (usft)	Vertical Depth (usft)	Reference (usft)	Offset (usft)	Highside Toolface (°)	Offset Wellbore Centre +N/-S (usft)	Offset Wellbore Centre +E/-W (usft)	Between Centres (usft)	Between Ellipses (usft)	Minimum Separation (usft)	Separation Factor		
12,500.0	10,840.7	11,716.4	10,023.6	40.8	38.2	-22.03	1,673.4	-435.9	881.3	802.3	79.01	11.154		
12,600.0	10,841.4	11,816.4	10,024.1	41.1	38.5	-22.03	1,773.4	-435.0	881.4	801.8	79.58	11.076		
12,700.0	10,842.1	11,916.4	10,024.6	41.3	38.8	-22.02	1,873.4	-434.1	881.6	801.4	80.17	10.996		
12,800.0	10,842.7	12,016.4	10,025.2	41.6	39.1	-22.02	1,973.4	-433.2	881.7	800.9	80.79	10.913		
12,900.0	10,843.4	12,116.4	10,025.7	42.0	39.5	-22.01	2,073.3	-432.3	881.8	800.4	81.43	10.829		
13,000.0	10,844.1	12,216.4	10,026.2	42.3	39.8	-22.01	2,173.3	-431.4	882.0	799.9	82.10	10.743		
13,100.0	10,844.8	12,316.4	10,026.8	42.6	40.2	-22.01	2,273.3	-430.5	882.1	799.3	82.79	10.655		
13,200.0	10,845.5	12,416.4	10,027.3	43.0	40.5	-22.00	2,373.3	-429.5	882.3	798.8	83.50	10.566		
13,300.0	10,846.2	12,516.4	10,027.8	43.3	40.9	-22.00	2,473.3	-428.6	882.4	798.2	84.23	10.476		
13,400.0	10,846.9	12,616.4	10,028.4	43.7	41.3	-21.99	2,573.3	-427.7	882.6	797.6	84.99	10.385		
13,500.0	10,847.6	12,716.4	10,028.9	44.1	41.7	-21.99	2,673.3	-426.8	882.7	796.9	85.76	10.292		
13,600.0	10,848.3	12,816.4	10,029.4	44.4	42.1	-21.98	2,773.3	-425.9	882.9	796.3	86.56	10.199		
13,700.0	10,849.0	12,916.4	10,030.0	44.8	42.5	-21.98	2,873.3	-425.0	883.0	795.6	87.37	10.106		
13,800.0	10,849.7	13,016.4	10,030.5	45.2	42.9	-21.97	2,973.3	-424.1	883.1	794.9	88.21	10.012		
13,900.0	10,850.4	13,116.4	10,031.0	45.7	43.4	-21.97	3,073.3	-423.2	883.3	794.2	89.06	9.918		
14,000.0	10,851.1	13,216.4	10,031.5	46.1	43.8	-21.96	3,173.3	-422.3	883.4	793.5	89.93	9.824		
14,100.0	10,851.7	13,316.4	10,032.1	46.5	44.3	-21.96	3,273.3	-421.3	883.6	792.8	90.82	9.729		
14,200.0	10,852.4	13,416.4	10,032.6	47.0	44.7	-21.95	3,373.3	-420.4	883.7	792.0	91.72	9.635		
14,300.0	10,853.1	13,516.4	10,033.1	47.4	45.2	-21.95	3,473.3	-419.5	883.9	791.2	92.64	9.541		
14,400.0	10,853.8	13,616.4	10,033.7	47.9	45.7	-21.95	3,573.3	-418.6	884.0	790.4	93.58	9.447		
14,500.0	10,854.5	13,716.4	10,034.2	48.3	46.1	-21.94	3,673.3	-417.7	884.2	789.6	94.53	9.353		
14,600.0	10,855.2	13,816.4	10,034.7	48.8	46.6	-21.94	3,773.3	-416.8	884.3	788.8	95.50	9.260		
14,700.0	10,855.9	13,916.4	10,035.3	49.3	47.1	-21.93	3,873.2	-415.9	884.5	788.0	96.48	9.167		
14,800.0	10,856.6	14,016.4	10,035.8	49.8	47.6	-21.93	3,973.2	-415.0	884.6	787.1	97.48	9.075		
14,900.0	10,857.3	14,116.4	10,036.3	50.3	48.2	-21.92	4,073.2	-414.1	884.7	786.3	98.49	8.983		
15,000.0	10,858.0	14,216.4	10,036.9	50.8	48.7	-21.92	4,173.2	-413.2	884.9	785.4	99.51	8.892		
15,100.0	10,858.7	14,316.4	10,037.4	51.3	49.2	-21.91	4,273.2	-412.2	885.0	784.5	100.55	8.802		
15,200.0	10,859.4	14,416.4	10,037.9	51.8	49.7	-21.91	4,373.2	-411.3	885.2	783.6	101.59	8.713		
15,300.0	10,860.1	14,516.4	10,038.5	52.3	50.3	-21.90	4,473.2	-410.4	885.3	782.7	102.65	8.624		
15,400.0	10,860.7	14,616.4	10,039.0	52.8	50.8	-21.90	4,573.2	-409.5	885.5	781.7	103.73	8.537		
15,500.0	10,861.4	14,716.4	10,039.5	53.4	51.4	-21.89	4,673.2	-408.6	885.6	780.8	104.81	8.450		
15,600.0	10,862.1	14,816.4	10,040.1	53.9	51.9	-21.89	4,773.2	-407.7	885.8	779.8	105.90	8.364		
15,700.0	10,862.8	14,916.4	10,040.6	54.4	52.5	-21.89	4,873.2	-406.8	885.9	778.9	107.01	8.279		
15,800.0	10,863.5	15,016.4	10,041.1	55.0	53.0	-21.88	4,973.2	-405.9	886.0	777.9	108.12	8.195		
15,900.0	10,864.2	15,116.4	10,041.6	55.5	53.6	-21.88	5,073.2	-405.0	886.2	776.9	109.25	8.112		
16,000.0	10,864.9	15,216.4	10,042.2	56.1	54.2	-21.87	5,173.2	-404.0	886.3	775.9	110.39	8.029		
16,100.0	10,865.6	15,316.4	10,042.7	56.6	54.8	-21.87	5,273.2	-403.1	886.5	774.9	111.53	7.948		
16,200.0	10,866.3	15,416.4	10,043.2	57.2	55.4	-21.86	5,373.2	-402.2	886.6	773.9	112.68	7.868		
16,300.0	10,867.0	15,516.4	10,043.8	57.8	55.9	-21.86	5,473.2	-401.3	886.8	772.9	113.85	7.789		
16,400.0	10,867.7	15,616.4	10,044.3	58.4	56.5	-21.85	5,573.1	-400.4	886.9	771.9	115.02	7.711		
16,500.0	10,868.4	15,716.4	10,044.8	58.9	57.1	-21.85	5,673.1	-399.5	887.1	770.9	116.20	7.634		
16,600.0	10,869.1	15,816.4	10,045.4	59.5	57.7	-21.84	5,773.1	-398.6	887.2	769.8	117.38	7.558		
16,700.0	10,869.7	15,916.4	10,045.9	60.1	58.3	-21.84	5,873.1	-397.7	887.3	768.8	118.58	7.483		
16,800.0	10,870.4	16,016.4	10,046.4	60.7	58.9	-21.84	5,973.1	-396.8	887.5	767.7	119.78	7.409		
16,900.0	10,871.1	16,116.4	10,047.0	61.3	59.6	-21.83	6,073.1	-395.9	887.6	766.6	120.99	7.336		
17,000.0	10,871.8	16,216.4	10,047.5	61.9	60.2	-21.83	6,173.1	-394.9	887.8	765.6	122.21	7.264		
17,100.0	10,872.5	16,316.4	10,048.0	62.5	60.8	-21.82	6,273.1	-394.0	887.9	764.5	123.44	7.193		
17,200.0	10,873.2	16,416.4	10,048.6	63.1	61.4	-21.82	6,373.1	-393.1	888.1	763.4	124.67	7.124		
17,300.0	10,873.9	16,516.4	10,049.1	63.7	62.0	-21.81	6,473.1	-392.2	888.2	762.3	125.90	7.055		
17,400.0	10,874.6	16,616.4	10,049.6	64.3	62.7	-21.81	6,573.1	-391.3	888.4	761.2	127.15	6.987		

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



Anticollision Report

Company: COG OPERATING LLC
 Project: EDDY COUNTY, NM

Local Co-ordinate Reference: Well LITTLEFIELD 33 FED COM #808H
 TVD Reference: RKB=2860.5+25 @ 2885.5usft (LASTSHAW 44)

Reference Site: ATLAS

MD Reference: RKB=2860.5+25 @ 2885.5usft (LASTSHAW 44)

Site Error: 0.0 usft
 Reference Well: LITTLEFIELD 33 FED COM #808H
 Well Error: 3.0 usft
 Reference Wellbore: OWB
 Reference Design: PWP0

North Reference: Grid
 Survey Calculation Method: Minimum Curvature
 Output errors are at: 2.00 sigma
 Database: EDM_Users
 Offset TVD Reference: Offset Datum

Offset Design ATLAS - LITTLEFIELD 33 FED COM #708H - OWB - PWP0													Offset Site Error:	0.0 usft
Survey Program: 0-MWD+IFR1+MS													Offset Well Error:	3.0 usft
Reference		Offset		Semi Major Axis			Distance						Warning	
Measured Depth (usft)	Vertical Depth (usft)	Measured Depth (usft)	Vertical Depth (usft)	Reference (usft)	Offset (usft)	Highside Toolface (")	Offset Wellbore Centre +N/-S (usft)	Offset Wellbore Centre +E/-W (usft)	Between Centres (usft)	Between Ellipses (usft)	Minimum Separation (usft)	Separation Factor		
17,500.0	10,875.3	16,716.4	10,050.2	64.9	63.3	-21.80	6,673.1	-390.4	888.5	760.1	128.40	6.920		
17,600.0	10,876.0	16,816.4	10,050.7	65.6	63.9	-21.80	6,773.1	-389.5	888.7	759.0	129.66	6.854		
17,700.0	10,876.7	16,916.4	10,051.2	66.2	64.6	-21.79	6,873.1	-388.6	888.8	757.9	130.92	6.789		
17,800.0	10,877.4	17,016.4	10,051.7	66.8	65.2	-21.79	6,973.1	-387.7	888.9	756.8	132.19	6.725		
17,900.0	10,878.1	17,116.4	10,052.3	67.4	65.9	-21.79	7,073.1	-386.7	889.1	755.6	133.46	6.662		
18,000.0	10,878.8	17,216.4	10,052.8	68.1	66.5	-21.78	7,173.1	-385.8	889.2	754.5	134.74	6.600		
18,036.1	10,879.0	17,252.4	10,053.0	68.3	66.7	-21.78	7,209.1	-385.5	889.3	754.1	135.20	6.578		



Anticollision Report

Company:	COG OPERATING LLC	Local Co-ordinate Reference:	Well LITTLEFIELD 33 FED COM #808H
Project:	EDDY COUNTY, NM	TVD Reference:	RKB=2860.5+25 @ 2885.5usft (LASTSHAW 44)
Reference Site:	ATLAS	MD Reference:	RKB=2860.5+25 @ 2885.5usft (LASTSHAW 44)
Site Error:	0.0 usft	North Reference:	Grid
Reference Well:	LITTLEFIELD 33 FED COM #808H	Survey Calculation Method:	Minimum Curvature
Well Error:	3.0 usft	Output errors are at	2.00 sigma
Reference Wellbore	OWB	Database:	EDM_Users
Reference Design:	PWP0	Offset TVD Reference:	Offset Datum

Offset Design ATLAS - LITTLEFIELD 33 FED COM #807H - OWB - PWP0													Offset Site Error:	0.0 usft
Survey Program: 0-MWD+IFR1+MS													Offset Well Error:	3.0 usft
Measured Depth (usft)	Vertical Depth (usft)	Offset		Semi Major Axis		Highside Toolface (°)	Offset Wellbore Centre		Distance		Minimum Separation (usft)	Separation Factor	Warning	
		Measured Depth (usft)	Vertical Depth (usft)	Reference (usft)	Offset (usft)		+N/-S (usft)	+E/-W (usft)	Between Centres (usft)	Between Ellipses (usft)				
0.0	0.0	3.6	3.6	3.0	3.0	89.92	0.1	89.9	89.9					
100.0	100.0	103.6	103.6	3.0	3.0	89.92	0.1	89.9	89.9	83.9	6.01	14.970		
200.0	200.0	203.6	203.6	3.0	3.0	89.92	0.1	89.9	89.9	83.8	6.08	14.783		
300.0	300.0	303.6	303.6	3.1	3.1	89.92	0.1	89.9	89.9	83.7	6.24	14.409		
400.0	400.0	403.6	403.6	3.2	3.2	89.92	0.1	89.9	89.9	83.4	6.47	13.889		
500.0	500.0	503.6	503.6	3.4	3.4	89.92	0.1	89.9	89.9	83.1	6.78	13.270		
600.0	600.0	603.6	603.6	3.6	3.6	89.92	0.1	89.9	89.9	82.8	7.14	12.598		
700.0	700.0	703.6	703.6	3.8	3.8	89.92	0.1	89.9	89.9	82.4	7.55	11.909		
800.0	800.0	803.6	803.6	4.0	4.0	89.92	0.1	89.9	89.9	81.9	8.01	11.232		
900.0	900.0	903.6	903.6	4.2	4.3	89.92	0.1	89.9	89.9	81.4	8.50	10.582		
1,000.0	1,000.0	1,003.6	1,003.6	4.5	4.5	89.92	0.1	89.9	89.9	80.9	9.02	9.970 CC, ES		
1,050.0	1,050.0	1,052.4	1,052.4	4.6	4.6	-121.11	-0.2	90.3	90.5	81.2	9.27	9.760		
1,100.0	1,100.0	1,102.4	1,102.4	4.8	4.8	-121.22	-0.7	91.0	91.6	82.1	9.53	9.618		
1,200.0	1,200.0	1,202.4	1,202.3	5.0	5.0	-121.45	-1.9	92.3	93.9	83.8	10.05	9.337		
1,300.0	1,300.0	1,302.3	1,302.3	5.3	5.3	-121.66	-3.0	93.6	96.1	85.5	10.60	9.065		
1,400.0	1,399.9	1,402.3	1,402.2	5.6	5.6	-121.86	-4.1	95.0	98.4	87.2	11.17	8.805		
1,500.0	1,499.9	1,502.3	1,502.2	5.9	5.9	-122.06	-5.2	96.3	100.6	88.8	11.75	8.559		
1,600.0	1,599.9	1,602.3	1,602.2	6.2	6.2	-122.24	-6.3	97.6	102.8	90.5	12.35	8.326		
1,700.0	1,699.9	1,702.2	1,702.1	6.5	6.5	-122.42	-7.5	99.0	105.1	92.1	12.96	8.107		
1,800.0	1,799.9	1,802.2	1,802.1	6.8	6.8	-122.59	-8.6	100.3	107.3	93.7	13.58	7.902		
1,900.0	1,899.9	1,902.2	1,902.0	7.1	7.1	-122.75	-9.7	101.6	109.6	95.4	14.21	7.709		
2,000.0	1,999.9	2,002.1	2,002.0	7.4	7.4	-122.91	-10.8	103.0	111.8	97.0	14.85	7.529		
2,100.0	2,099.8	2,102.1	2,102.0	7.7	7.8	-123.06	-12.0	104.3	114.1	98.6	15.50	7.361		
2,200.0	2,199.8	2,202.1	2,201.9	8.1	8.1	-123.20	-13.1	105.7	116.3	100.2	16.15	7.203		
2,300.0	2,299.8	2,302.1	2,301.9	8.4	8.4	-123.34	-14.2	107.0	118.6	101.8	16.80	7.056		
2,400.0	2,399.8	2,402.0	2,401.8	8.7	8.7	-123.48	-15.3	108.3	120.8	103.3	17.47	6.917		
2,500.0	2,499.8	2,502.0	2,501.8	9.1	9.1	-123.61	-16.4	109.7	123.1	104.9	18.13	6.787		
2,600.0	2,599.8	2,602.0	2,601.8	9.4	9.4	-123.73	-17.6	111.0	125.3	106.5	18.80	6.665		
2,700.0	2,699.7	2,702.0	2,701.7	9.7	9.8	-123.85	-18.7	112.3	127.6	108.1	19.47	6.551		
2,800.0	2,799.7	2,801.9	2,801.7	10.1	10.1	-123.97	-19.8	113.7	129.8	109.7	20.15	6.443		
2,900.0	2,899.7	2,901.9	2,901.6	10.4	10.4	-124.08	-20.9	115.0	132.1	111.2	20.83	6.341		
3,000.0	2,999.7	3,001.9	3,001.6	10.7	10.8	-124.19	-22.0	116.3	134.3	112.8	21.51	6.244		
3,100.0	3,099.7	3,101.9	3,101.6	11.1	11.1	-124.29	-23.2	117.7	136.6	114.4	22.19	6.154		
3,200.0	3,199.7	3,201.8	3,201.5	11.4	11.5	-124.39	-24.3	119.0	138.8	115.9	22.88	6.068		
3,300.0	3,299.7	3,301.8	3,301.5	11.8	11.8	-124.49	-25.4	120.4	141.1	117.5	23.57	5.986		
3,400.0	3,399.6	3,401.8	3,401.4	12.1	12.1	-124.58	-26.5	121.7	143.3	119.1	24.26	5.909		
3,500.0	3,499.6	3,501.8	3,501.4	12.5	12.5	-124.68	-27.7	123.0	145.6	120.6	24.95	5.836		
3,600.0	3,599.6	3,601.7	3,601.3	12.8	12.8	-124.76	-28.8	124.4	147.8	122.2	25.64	5.766		
3,700.0	3,699.6	3,701.7	3,701.3	13.2	13.2	-124.85	-29.9	125.7	150.1	123.8	26.34	5.700		
3,800.0	3,799.6	3,801.7	3,801.3	13.5	13.5	-124.94	-31.0	127.0	152.4	125.3	27.03	5.636		
3,900.0	3,899.6	3,901.7	3,901.2	13.8	13.9	-125.02	-32.1	128.4	154.6	126.9	27.73	5.576		
4,000.0	3,999.5	4,001.6	4,001.2	14.2	14.2	-125.10	-33.3	129.7	156.9	128.4	28.43	5.519		
4,100.0	4,099.5	4,101.6	4,101.1	14.5	14.6	-125.17	-34.4	131.1	159.1	130.0	29.12	5.464		
4,200.0	4,199.5	4,201.6	4,201.1	14.9	14.9	-125.25	-35.5	132.4	161.4	131.6	29.82	5.411		
4,300.0	4,299.5	4,301.6	4,301.1	15.2	15.3	-125.32	-36.6	133.7	163.6	133.1	30.52	5.361		
4,400.0	4,399.5	4,401.5	4,401.0	15.6	15.6	-125.39	-37.7	135.1	165.9	134.7	31.23	5.313		
4,500.0	4,499.5	4,501.5	4,501.0	15.9	16.0	-125.46	-38.9	136.4	168.2	136.2	31.93	5.267		
4,600.0	4,599.5	4,601.5	4,600.9	16.3	16.3	-125.53	-40.0	137.7	170.4	137.8	32.63	5.223		
4,700.0	4,699.4	4,701.5	4,700.9	16.6	16.7	-125.59	-41.1	139.1	172.7	139.3	33.33	5.180		
4,800.0	4,799.4	4,801.4	4,800.9	17.0	17.0	-125.65	-42.2	140.4	174.9	140.9	34.04	5.139		
4,900.0	4,899.4	4,901.4	4,900.8	17.4	17.4	-125.72	-43.4	141.7	177.2	142.5	34.74	5.100		

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



Anticollision Report

Company: COG OPERATING LLC
 Project: EDDY COUNTY, NM

Local Co-ordinate Reference: Well LITTLEFIELD 33 FED COM #808H
 TVD Reference: RKB=2860.5+25 @ 2885.5usft (LASTSHAW 44)

Reference Site: ATLAS

MD Reference: RKB=2860.5+25 @ 2885.5usft (LASTSHAW 44)

Site Error: 0.0 usft
 Reference Well: LITTLEFIELD 33 FED COM #808H
 Well Error: 3.0 usft
 Reference Wellbore: OWB
 Reference Design: PWP0

North Reference: Grid
 Survey Calculation Method: Minimum Curvature
 Output errors are at: 2.00 sigma
 Database: EDM_Users
 Offset TVD Reference: Offset Datum

Offset Design ATLAS - LITTLEFIELD 33 FED COM #807H - OWB - PWP0													Offset Site Error:	0.0 usft
Survey Program: 0-MWD+IFR1+MS													Offset Well Error:	3.0 usft
Reference				Semi Major Axis			Distance						Warning	
Measured Depth (usft)	Vertical Depth (usft)	Measured Depth (usft)	Vertical Depth (usft)	Reference (usft)	Offset (usft)	Highside Toolface (°)	Offset Wellbore Centre +N/-S (usft)	+E/-W (usft)	Between Centres (usft)	Between Ellipses (usft)	Minimum Separation (usft)	Separation Factor		
5,000.0	4,999.4	5,001.4	5,000.8	17.7	17.7	-125.78	-44.5	143.1	179.5	144.0	35.45	5.063		
5,100.0	5,099.4	5,103.2	5,096.1	18.1	18.1	-125.47	-46.6	145.6	182.9	146.8	36.16	5.059		
5,200.0	5,199.4	5,203.3	5,195.9	18.4	18.5	-124.79	-50.0	149.6	187.7	150.8	36.87	5.091		
5,300.0	5,299.4	5,303.5	5,295.6	18.8	18.8	-124.13	-53.3	153.6	192.5	154.9	37.58	5.122		
5,400.0	5,399.3	5,403.6	5,395.3	19.1	19.2	-123.51	-56.7	157.6	197.3	159.0	38.28	5.153		
5,500.0	5,499.3	5,496.3	5,495.0	19.5	19.5	-122.92	-60.0	161.6	202.1	163.2	38.97	5.187		
5,600.0	5,599.3	5,603.9	5,594.8	19.8	19.9	-122.36	-63.4	165.6	207.0	167.3	39.70	5.213		
5,700.0	5,699.3	5,704.0	5,694.5	20.2	20.2	-121.82	-66.8	169.6	211.8	171.4	40.41	5.242		
5,800.0	5,799.3	5,804.2	5,794.2	20.5	20.6	-121.31	-70.1	173.6	216.7	175.6	41.12	5.270		
5,900.0	5,899.3	5,904.3	5,893.9	20.9	20.9	-120.82	-73.5	177.6	221.6	179.8	41.83	5.298		
6,000.0	5,999.2	6,004.4	5,993.7	21.2	21.3	-120.35	-76.8	181.6	226.6	184.0	42.55	5.325		
6,100.0	6,099.2	6,104.6	6,093.4	21.6	21.7	-119.90	-80.2	185.6	231.5	188.2	43.26	5.352		
6,200.0	6,199.2	6,204.7	6,193.1	22.0	22.0	-119.47	-83.6	189.6	236.4	192.5	43.97	5.378		
6,300.0	6,299.2	6,304.8	6,292.9	22.3	22.4	-119.06	-86.9	193.7	241.4	196.7	44.68	5.403		
6,400.0	6,399.2	6,405.0	6,392.6	22.7	22.7	-118.66	-90.3	197.7	246.4	201.0	45.39	5.428		
6,500.0	6,499.2	6,505.1	6,492.3	23.0	23.1	-118.28	-93.6	201.7	251.4	205.3	46.11	5.452		
6,600.0	6,599.2	6,605.3	6,592.0	23.4	23.4	-117.92	-97.0	205.7	256.4	209.5	46.82	5.476		
6,700.0	6,699.1	6,705.4	6,691.8	23.7	23.8	-117.57	-100.3	209.7	261.4	213.8	47.53	5.499		
6,800.0	6,799.1	6,794.5	6,791.5	24.1	24.1	-117.23	-103.7	213.7	266.4	218.2	48.20	5.526		
6,900.0	6,899.1	6,905.7	6,891.2	24.4	24.5	-116.90	-107.1	217.7	271.4	222.4	48.96	5.544		
7,000.0	6,999.1	7,005.8	6,990.9	24.8	24.9	-116.59	-110.4	221.7	276.4	226.8	49.67	5.565		
7,100.0	7,099.0	7,106.0	7,090.6	25.2	25.2	-116.50	-113.8	225.7	281.3	231.9	50.39	5.602		
7,200.0	7,199.9	7,193.8	7,190.2	25.5	25.5	-116.82	-117.1	229.7	286.2	237.8	51.06	5.657		
7,300.0	7,299.8	7,306.4	7,289.9	25.9	25.9	-117.14	-120.5	233.7	291.1	243.6	51.82	5.702		
7,400.0	7,399.6	7,393.3	7,389.5	26.2	26.3	-117.43	-123.9	237.7	302.1	249.6	52.49	5.755		
7,500.0	7,499.5	7,506.9	7,489.1	26.6	26.7	-117.72	-127.2	241.7	308.7	255.4	53.25	5.797		
7,600.0	7,599.3	7,607.1	7,588.8	26.9	27.0	-117.99	-130.6	245.7	315.3	261.4	53.97	5.843		
7,700.0	7,699.2	7,707.4	7,688.4	27.3	27.4	-118.25	-133.9	249.7	322.0	267.3	54.68	5.888		
7,800.0	7,799.1	7,807.6	7,788.0	27.7	27.7	-118.50	-137.3	253.7	328.6	273.2	55.40	5.932		
7,900.0	7,899.9	7,907.8	7,887.7	28.0	28.1	-118.74	-140.6	257.7	335.3	279.1	56.12	5.974		
8,000.0	7,999.8	8,008.1	7,987.3	28.4	28.5	-118.97	-144.0	261.7	341.9	285.1	56.84	6.016		
8,100.0	8,099.7	8,108.3	8,086.9	28.7	28.8	-119.19	-147.3	265.7	348.6	291.0	57.55	6.057		
8,200.0	8,199.5	8,208.5	8,186.6	29.1	29.2	-119.41	-150.7	269.7	355.2	297.0	58.27	6.096		
8,300.0	8,299.4	8,291.2	8,286.2	29.4	29.5	-119.62	-154.1	273.7	361.9	303.0	58.93	6.142		
8,400.0	8,399.2	8,409.0	8,385.8	29.8	29.9	-119.81	-157.4	277.7	368.6	308.9	59.71	6.173		
8,500.0	8,499.1	8,490.8	8,485.5	30.2	30.2	-120.01	-160.8	281.7	375.3	314.9	60.36	6.217		
8,600.0	8,599.0	8,609.4	8,585.1	30.5	30.6	-120.19	-164.1	285.7	382.0	320.8	61.14	6.247		
8,700.0	8,699.8	8,709.7	8,684.7	30.9	31.0	-120.37	-167.5	289.7	388.6	326.8	61.86	6.282		
8,800.0	8,799.7	8,809.9	8,784.4	31.2	31.3	-120.54	-170.8	293.7	395.3	332.8	62.58	6.317		
8,900.0	8,899.6	8,889.9	8,884.0	31.6	31.6	-120.71	-174.2	297.7	402.0	338.8	63.23	6.359		
9,000.0	8,999.4	8,989.6	8,983.6	32.0	32.0	-120.87	-177.6	301.7	408.7	344.8	63.94	6.392		
9,100.0	9,099.3	9,089.4	9,083.3	32.3	32.3	-121.03	-180.9	305.7	415.4	350.8	64.66	6.425		
9,200.0	9,199.1	9,189.2	9,182.9	32.7	32.7	-121.18	-184.3	309.7	422.1	356.8	65.38	6.457		
9,300.0	9,299.0	9,288.9	9,282.5	33.0	33.1	-121.32	-187.6	313.7	428.8	362.7	66.09	6.488		
9,400.0	9,399.9	9,388.7	9,382.2	33.4	33.4	-121.47	-191.0	317.7	435.5	368.7	66.81	6.519		
9,500.0	9,499.7	9,488.5	9,481.8	33.8	33.8	-121.60	-194.3	321.7	442.3	374.7	67.53	6.549		
9,600.0	9,599.5	9,600.1	9,593.4	34.1	34.2	-121.76	-197.0	324.8	446.9	378.6	68.29	6.544		
9,650.0	9,645.7	9,656.8	9,650.1	34.3	34.4	89.21	-197.2	325.1	447.4	378.7	68.65	6.517		
9,652.1	9,647.8	9,658.1	9,651.4	34.3	34.4	89.21	-197.2	325.1	447.4	378.7	68.66	6.516		
9,700.0	9,695.7	9,706.0	9,699.3	34.4	34.5	89.21	-197.2	325.1	447.4	378.4	68.98	6.486		

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



Anticollision Report

Company: COG OPERATING LLC
Project: EDDY COUNTY, NM

Local Co-ordinate Reference: Well LITTLEFIELD 33 FED COM #808H
TVD Reference: RKB=2860.5+25 @ 2885.5usft (LASTSHAW 44)

Reference Site: ATLAS

MD Reference: RKB=2860.5+25 @ 2885.5usft (LASTSHAW 44)

Site Error: 0.0 usft
Reference Well: LITTLEFIELD 33 FED COM #808H
Well Error: 3.0 usft
Reference Wellbore: OWB
Reference Design: PWP0

North Reference: Grid
Survey Calculation Method: Minimum Curvature
Output errors are at: 2.00 sigma
Database: EDM_Users
Offset TVD Reference: Offset Datum

Offset Design ATLAS - LITTLEFIELD 33 FED COM #807H - OWB - PWP0													Offset Site Error:	0.0 usft
Survey Program: 0-MWD+IFR1+MS													Offset Well Error:	3.0 usft
Reference		Offset		Semi Major Axis			Distance						Warning	
Measured Depth (usft)	Vertical Depth (usft)	Measured Depth (usft)	Vertical Depth (usft)	Reference (usft)	Offset (usft)	Highside Toolface (°)	Offset Wellbore Centre +N/-S (usft)	Offset Wellbore Centre +E/-W (usft)	Between Centres (usft)	Between Ellipses (usft)	Minimum Separation (usft)	Separation Factor		
9,800.0	9,795.7	9,806.0	9,799.3	34.8	34.9	89.21	-197.2	325.1	447.4	377.8	69.64	6.425		
9,900.0	9,895.7	9,906.0	9,899.3	35.1	35.2	89.21	-197.2	325.1	447.4	377.1	70.30	6.364		
10,000.0	9,995.7	10,006.0	9,999.3	35.4	35.5	89.21	-197.2	325.1	447.4	376.4	70.96	6.305		
10,100.0	10,095.7	10,106.0	10,099.3	35.8	35.9	89.21	-197.2	325.1	447.4	375.8	71.63	6.246		
10,200.0	10,195.7	10,206.0	10,199.3	36.1	36.2	89.21	-197.2	325.1	447.4	375.1	72.29	6.189		
10,300.0	10,295.7	10,306.0	10,299.3	36.4	36.5	89.21	-197.2	325.1	447.4	374.5	72.96	6.133		
10,358.0	10,353.7	10,364.0	10,357.3	36.6	36.7	89.21	-197.2	325.1	447.4	374.1	73.34	6.100		
10,369.1	10,364.8	10,374.9	10,368.2	36.7	36.8	88.71	-197.2	325.1	447.4	374.0	73.42	6.094		
10,375.0	10,370.7	10,379.6	10,372.8	36.7	36.8	88.72	-197.2	325.2	447.4	374.0	73.45	6.091		
10,400.0	10,395.6	10,400.0	10,393.2	36.8	36.8	88.78	-196.6	325.3	447.6	374.0	73.60	6.081		
10,425.0	10,420.4	10,419.5	10,412.6	36.8	36.9	88.83	-195.2	325.7	448.0	374.3	73.75	6.075		
10,450.0	10,445.1	10,439.4	10,432.5	36.9	37.0	88.89	-192.9	326.3	448.7	374.8	73.90	6.072		
10,475.0	10,469.5	10,459.4	10,452.2	37.0	37.0	88.94	-189.9	327.1	449.7	375.7	74.05	6.073		
10,500.0	10,493.6	10,479.4	10,471.8	37.1	37.1	88.99	-186.0	328.2	450.9	376.7	74.19	6.077		
10,525.0	10,517.3	10,499.4	10,491.2	37.2	37.2	89.05	-181.4	329.4	452.4	378.0	74.34	6.085		
10,550.0	10,540.5	10,519.5	10,510.5	37.2	37.2	89.10	-176.0	330.8	454.1	379.6	74.48	6.097		
10,575.0	10,563.3	10,539.6	10,529.5	37.3	37.3	89.14	-169.8	332.5	456.1	381.4	74.62	6.112		
10,600.0	10,585.4	10,559.7	10,548.3	37.4	37.4	89.19	-162.8	334.4	458.3	383.5	74.76	6.130		
10,625.0	10,607.0	10,579.9	10,566.8	37.5	37.4	89.23	-155.0	336.5	460.8	385.9	74.89	6.152		
10,650.0	10,627.8	10,600.0	10,584.9	37.5	37.5	89.27	-146.5	338.8	463.5	388.5	75.02	6.178		
10,675.0	10,647.9	10,620.3	10,602.8	37.6	37.6	89.30	-137.1	341.3	466.4	391.3	75.15	6.207		
10,700.0	10,667.1	10,640.7	10,620.2	37.7	37.6	89.33	-127.1	343.9	469.6	394.4	75.27	6.239		
10,725.0	10,685.6	10,661.0	10,637.2	37.7	37.7	89.35	-116.3	346.8	473.1	397.7	75.40	6.275		
10,750.0	10,703.1	10,681.5	10,653.8	37.8	37.7	89.37	-104.7	349.9	476.7	401.2	75.51	6.313		
10,775.0	10,719.6	10,702.0	10,670.0	37.8	37.8	89.38	-92.5	353.2	480.6	405.0	75.62	6.355		
10,800.0	10,735.2	10,722.6	10,685.6	37.9	37.8	89.39	-79.5	356.7	484.7	409.0	75.73	6.400		
10,825.0	10,749.7	10,743.3	10,700.7	38.0	37.9	89.39	-65.8	360.4	489.0	413.2	75.84	6.448		
10,850.0	10,763.1	10,764.1	10,715.3	38.0	37.9	89.38	-51.5	364.2	493.6	417.6	75.94	6.499		
10,875.0	10,775.4	10,785.1	10,729.2	38.1	38.0	89.37	-36.4	368.2	498.3	422.2	76.04	6.553		
10,900.0	10,786.5	10,806.1	10,742.6	38.1	38.0	89.35	-20.7	372.4	503.2	427.1	76.13	6.610		
10,925.0	10,796.4	10,827.3	10,755.2	38.1	38.1	89.32	-4.3	376.8	508.3	432.1	76.22	6.669		
10,950.0	10,805.2	10,848.6	10,767.2	38.2	38.1	89.29	12.7	381.4	513.5	437.2	76.30	6.730		
10,975.0	10,812.7	10,870.1	10,778.5	38.2	38.2	89.25	30.4	386.1	518.9	442.6	76.38	6.795		
11,000.0	10,818.9	10,891.8	10,789.1	38.3	38.2	89.20	48.6	391.0	524.5	448.1	76.45	6.861		
11,025.0	10,823.8	10,913.6	10,798.8	38.3	38.2	89.15	67.5	396.1	530.2	453.7	76.52	6.929		
11,050.0	10,827.5	10,935.7	10,807.7	38.3	38.3	89.10	87.0	401.3	536.1	459.5	76.58	7.000		
11,075.0	10,829.9	10,958.0	10,815.8	38.3	38.3	89.04	107.1	406.7	542.0	465.4	76.64	7.072		
11,100.0	10,830.9	10,980.5	10,822.9	38.3	38.3	88.98	127.8	412.2	548.1	471.4	76.69	7.146		
11,104.5	10,831.0	10,984.6	10,824.1	38.4	38.3	88.97	131.5	413.2	549.2	472.5	76.70	7.160		
11,205.6	10,831.7	11,080.6	10,842.1	38.4	38.4	90.81	222.4	437.6	574.4	497.5	76.88	7.471		
11,300.0	10,832.4	11,210.5	10,844.6	38.5	38.5	90.93	348.5	468.4	596.3	519.3	77.07	7.738		
11,400.0	10,833.0	11,381.8	10,845.8	38.6	38.7	90.89	518.1	492.1	609.3	531.9	77.33	7.879		
11,500.0	10,833.7	11,524.3	10,846.8	38.8	38.8	90.89	660.5	496.8	611.3	533.7	77.61	7.876		
11,600.0	10,834.4	11,624.3	10,847.5	38.9	39.0	90.89	760.4	497.7	611.3	533.4	77.88	7.849		
11,700.0	10,835.1	11,724.3	10,848.2	39.1	39.1	90.89	860.4	498.6	611.3	533.1	78.18	7.819		
11,800.0	10,835.8	11,824.3	10,848.9	39.2	39.3	90.89	960.4	499.5	611.3	532.8	78.51	7.787		
11,900.0	10,836.5	11,924.3	10,849.6	39.4	39.4	90.89	1,060.4	500.5	611.3	532.5	78.86	7.752		
12,000.0	10,837.2	12,024.3	10,850.3	39.6	39.6	90.89	1,160.4	501.4	611.3	532.1	79.25	7.714		
12,100.0	10,837.9	12,124.3	10,851.0	39.8	39.8	90.89	1,260.4	502.3	611.3	531.7	79.66	7.674		
12,200.0	10,838.6	12,224.3	10,851.7	40.0	40.0	90.89	1,360.4	503.2	611.4	531.3	80.10	7.633		
12,300.0	10,839.3	12,324.3	10,852.4	40.3	40.3	90.89	1,460.4	504.1	611.4	530.8	80.56	7.589		

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



Anticollision Report

Company: COG OPERATING LLC
 Project: EDDY COUNTY, NM

Local Co-ordinate Reference: Well LITTLEFIELD 33 FED COM #808H
 TVD Reference: RKB=2860.5+25 @ 2885.5usft (LASTSHAW 44)

Reference Site: ATLAS

MD Reference: RKB=2860.5+25 @ 2885.5usft (LASTSHAW 44)

Site Error: 0.0 usft
 Reference Well: LITTLEFIELD 33 FED COM #808H
 Well Error: 3.0 usft
 Reference Wellbore: OWB
 Reference Design: PWP0

North Reference: Grid
 Survey Calculation Method: Minimum Curvature
 Output errors are at: 2.00 sigma
 Database: EDM_Users
 Offset TVD Reference: Offset Datum

Offset Design ATLAS - LITTLEFIELD 33 FED COM #807H - OWB - PWP0													Offset Site Error:	0.0 usft
Survey Program: 0-MWD+IFR1+MS													Offset Well Error:	3.0 usft
Reference		Offset		Semi Major Axis			Distance						Warning	
Measured Depth (usft)	Vertical Depth (usft)	Measured Depth (usft)	Vertical Depth (usft)	Reference (usft)	Offset (usft)	Highside Toolface (°)	Offset Wellbore Centre +N/-S (usft)	+E/-W (usft)	Between Centres (usft)	Between Ellipses (usft)	Minimum Separation (usft)	Separation Factor		
12,400.0	10,840.0	12,424.3	10,853.1	40.5	40.5	90.89	1,560.4	505.0	611.4	530.3	81.05	7.543		
12,500.0	10,840.7	12,524.3	10,853.7	40.8	40.8	90.89	1,660.4	505.9	611.4	529.8	81.57	7.495		
12,600.0	10,841.4	12,624.3	10,854.4	41.1	41.0	90.89	1,760.4	506.8	611.4	529.3	82.11	7.446		
12,700.0	10,842.1	12,724.3	10,855.1	41.3	41.3	90.89	1,860.4	507.7	611.4	528.7	82.68	7.395		
12,800.0	10,842.7	12,824.3	10,855.8	41.6	41.6	90.89	1,960.4	508.6	611.4	528.1	83.27	7.342		
12,900.0	10,843.4	12,924.3	10,856.5	42.0	41.9	90.89	2,060.4	509.6	611.4	527.5	83.89	7.289		
13,000.0	10,844.1	13,024.3	10,857.2	42.3	42.2	90.89	2,160.4	510.5	611.4	526.9	84.52	7.234		
13,100.0	10,844.8	13,124.3	10,857.9	42.6	42.5	90.89	2,260.4	511.4	611.5	526.3	85.19	7.178		
13,200.0	10,845.5	13,224.3	10,858.6	43.0	42.9	90.89	2,360.3	512.3	611.5	525.6	85.87	7.121		
13,300.0	10,846.2	13,324.3	10,859.3	43.3	43.2	90.89	2,460.3	513.2	611.5	524.9	86.57	7.063		
13,400.0	10,846.9	13,424.3	10,860.0	43.7	43.6	90.89	2,560.3	514.1	611.5	524.2	87.30	7.004		
13,500.0	10,847.6	13,524.3	10,860.7	44.1	43.9	90.89	2,660.3	515.0	611.5	523.5	88.05	6.945		
13,600.0	10,848.3	13,624.3	10,861.4	44.4	44.3	90.89	2,760.3	515.9	611.5	522.7	88.81	6.885		
13,700.0	10,849.0	13,724.3	10,862.0	44.8	44.7	90.89	2,860.3	516.8	611.5	521.9	89.60	6.825		
13,800.0	10,849.7	13,824.3	10,862.7	45.2	45.1	90.89	2,960.3	517.7	611.5	521.1	90.40	6.764		
13,900.0	10,850.4	13,924.3	10,863.4	45.7	45.5	90.89	3,060.3	518.7	611.5	520.3	91.23	6.703		
14,000.0	10,851.1	14,024.3	10,864.1	46.1	45.9	90.89	3,160.3	519.6	611.6	519.5	92.07	6.642		
14,100.0	10,851.7	14,124.3	10,864.8	46.5	46.3	90.89	3,260.3	520.5	611.6	518.6	92.93	6.581		
14,200.0	10,852.4	14,224.3	10,865.5	47.0	46.8	90.89	3,360.3	521.4	611.6	517.8	93.80	6.520		
14,300.0	10,853.1	14,324.3	10,866.2	47.4	47.2	90.89	3,460.3	522.3	611.6	516.9	94.70	6.458		
14,400.0	10,853.8	14,424.3	10,866.9	47.9	47.7	90.89	3,560.3	523.2	611.6	516.0	95.61	6.397		
14,500.0	10,854.5	14,524.3	10,867.6	48.3	48.1	90.89	3,660.3	524.1	611.6	515.1	96.53	6.336		
14,600.0	10,855.2	14,624.3	10,868.3	48.8	48.6	90.89	3,760.3	525.0	611.6	514.1	97.47	6.275		
14,700.0	10,855.9	14,724.3	10,869.0	49.3	49.1	90.89	3,860.2	525.9	611.6	513.2	98.43	6.214		
14,800.0	10,856.6	14,824.3	10,869.7	49.8	49.5	90.89	3,960.2	526.8	611.6	512.2	99.40	6.153		
14,900.0	10,857.3	14,924.3	10,870.4	50.3	50.0	90.89	4,060.2	527.8	611.7	511.3	100.38	6.093		
15,000.0	10,858.0	15,024.3	10,871.0	50.8	50.5	90.89	4,160.2	528.7	611.7	510.3	101.38	6.034		
15,100.0	10,858.7	15,124.3	10,871.7	51.3	51.0	90.89	4,260.2	529.6	611.7	509.3	102.39	5.974		
15,200.0	10,859.4	15,224.3	10,872.4	51.8	51.5	90.89	4,360.2	530.5	611.7	508.3	103.41	5.915		
15,300.0	10,860.1	15,324.3	10,873.1	52.3	52.0	90.89	4,460.2	531.4	611.7	507.2	104.45	5.857		
15,400.0	10,860.7	15,424.3	10,873.8	52.8	52.5	90.89	4,560.2	532.3	611.7	506.2	105.49	5.799		
15,500.0	10,861.4	15,524.3	10,874.5	53.4	53.1	90.89	4,660.2	533.2	611.7	505.2	106.55	5.741		
15,600.0	10,862.1	15,624.3	10,875.2	53.9	53.6	90.89	4,760.2	534.1	611.7	504.1	107.62	5.684		
15,700.0	10,862.8	15,724.3	10,875.9	54.4	54.1	90.89	4,860.2	535.0	611.7	503.0	108.70	5.628		
15,800.0	10,863.5	15,824.3	10,876.6	55.0	54.7	90.89	4,960.2	535.9	611.7	502.0	109.80	5.572		
15,900.0	10,864.2	15,924.3	10,877.3	55.5	55.2	90.89	5,060.2	536.9	611.8	500.9	110.90	5.516		
16,000.0	10,864.9	16,024.3	10,878.0	56.1	55.8	90.89	5,160.2	537.8	611.8	499.8	112.01	5.462		
16,100.0	10,865.6	16,124.3	10,878.7	56.6	56.3	90.89	5,260.2	538.7	611.8	498.6	113.13	5.408		
16,200.0	10,866.3	16,224.3	10,879.3	57.2	56.9	90.89	5,360.1	539.6	611.8	497.5	114.27	5.354		
16,300.0	10,867.0	16,324.3	10,880.0	57.8	57.5	90.89	5,460.1	540.5	611.8	496.4	115.41	5.301		
16,400.0	10,867.7	16,424.3	10,880.7	58.4	58.0	90.89	5,560.1	541.4	611.8	495.3	116.56	5.249		
16,500.0	10,868.4	16,524.3	10,881.4	58.9	58.6	90.89	5,660.1	542.3	611.8	494.1	117.72	5.197		
16,600.0	10,869.1	16,624.3	10,882.1	59.5	59.2	90.89	5,760.1	543.2	611.8	493.0	118.88	5.146		
16,700.0	10,869.7	16,724.3	10,882.8	60.1	59.8	90.89	5,860.1	544.1	611.8	491.8	120.06	5.096		
16,800.0	10,870.4	16,824.3	10,883.5	60.7	60.4	90.89	5,960.1	545.0	611.9	490.6	121.24	5.047		
16,900.0	10,871.1	16,924.3	10,884.2	61.3	61.0	90.89	6,060.1	545.9	611.9	489.4	122.43	4.998		
17,000.0	10,871.8	17,024.3	10,884.9	61.9	61.5	90.89	6,160.1	546.9	611.9	488.2	123.63	4.949		
17,100.0	10,872.5	17,124.3	10,885.6	62.5	62.1	90.89	6,260.1	547.8	611.9	487.1	124.84	4.901		
17,200.0	10,873.2	17,224.3	10,886.3	63.1	62.7	90.89	6,360.1	548.7	611.9	485.9	126.05	4.854		
17,300.0	10,873.9	17,324.3	10,887.0	63.7	63.4	90.89	6,460.1	549.6	611.9	484.6	127.27	4.808		

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



Anticollision Report

Company: COG OPERATING LLC
Project: EDDY COUNTY, NM
Reference Site: ATLAS
Site Error: 0.0 usft
Reference Well: LITTLEFIELD 33 FED COM #808H
Well Error: 3.0 usft
Reference Wellbore: OWB
Reference Design: PWP0

Local Co-ordinate Reference: Well LITTLEFIELD 33 FED COM #808H
TVD Reference: RKB=2860.5+25 @ 2885.5usft (LASTSHAW 44)
MD Reference: RKB=2860.5+25 @ 2885.5usft (LASTSHAW 44)
North Reference: Grid
Survey Calculation Method: Minimum Curvature
Output errors are at: 2.00 sigma
Database: EDM_Users
Offset TVD Reference: Offset Datum

Offset Design ATLAS - LITTLEFIELD 33 FED COM #807H - OWB - PWP0													Offset Site Error:	0.0 usft
Survey Program: 0-MWD+IFR1+MS													Offset Well Error:	3.0 usft
Reference		Offset		Semi Major Axis			Distance						Warning	
Measured Depth (usft)	Vertical Depth (usft)	Measured Depth (usft)	Vertical Depth (usft)	Reference (usft)	Offset (usft)	Highside Toolface (°)	Offset Wellbore Centre +N/-S (usft)	+E/-W (usft)	Between Centres (usft)	Between Ellipses (usft)	Minimum Separation (usft)	Separation Factor		
17,400.0	10,874.6	17,424.3	10,887.6	64.3	64.0	90.89	6,560.1	550.5	611.9	483.4	128.50	4.762		
17,500.0	10,875.3	17,524.3	10,888.3	64.9	64.6	90.89	6,660.1	551.4	611.9	482.2	129.73	4.717		
17,600.0	10,876.0	17,624.3	10,889.0	65.6	65.2	90.89	6,760.1	552.3	611.9	481.0	130.97	4.672		
17,700.0	10,876.7	17,724.3	10,889.7	66.2	65.8	90.89	6,860.1	553.2	612.0	479.7	132.22	4.628		
17,800.0	10,877.4	17,824.3	10,890.4	66.8	66.4	90.88	6,960.0	554.1	612.0	478.5	133.47	4.585		
17,900.0	10,878.1	17,924.3	10,891.1	67.4	67.1	90.88	7,060.0	555.0	612.0	477.3	134.73	4.542		
18,000.0	10,878.8	18,024.3	10,891.8	68.1	67.7	90.88	7,160.0	556.0	612.0	476.0	135.99	4.500		
18,000.8	10,878.8	18,025.0	10,891.8	68.1	67.7	90.88	7,160.8	556.0	612.0	476.0	136.00	4.500		
18,036.1	10,879.0	18,053.1	10,892.0	68.3	67.9	90.88	7,188.9	556.2	612.0	475.6	136.40	4.487 SF		

Company: COG OPERATING LLC
 Project: EDDY COUNTY, NM

Local Co-ordinate Reference: Well LITTLEFIELD 33 FED COM #808H
 TVD Reference: RKB=2860.5+25 @ 2885.5usft (LASTSHAW 44)

Reference Site: ATLAS

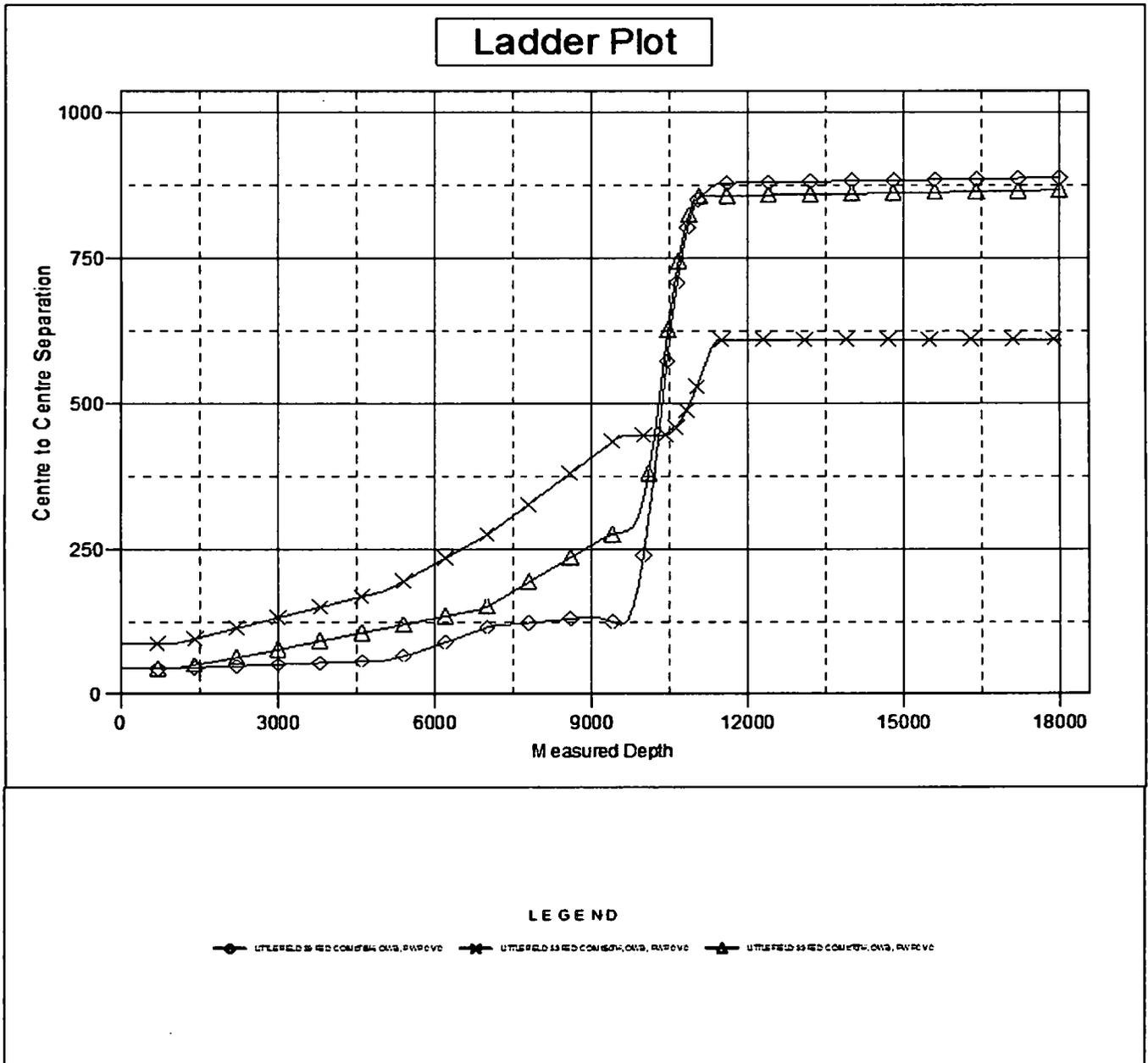
MD Reference: RKB=2860.5+25 @ 2885.5usft (LASTSHAW 44)

Site Error: 0.0 usft
 Reference Well: LITTLEFIELD 33 FED COM #808H
 Well Error: 3.0 usft
 Reference Wellbore: OWB
 Reference Design: PWP0

North Reference: Grid
 Survey Calculation Method: Minimum Curvature
 Output errors are at: 2.00 sigma
 Database: EDM_Users
 Offset TVD Reference: Offset Datum

Reference Depths are relative to RKB=2860.5+25 @ 2885.5usft (LAST
 Offset Depths are relative to Offset Datum
 Central Meridian is 104° 20' 0.000 W

Coordinates are relative to: LITTLEFIELD 33 FED COM #808H
 Coordinate System is US State Plane 1927 (Exact solution), New Mexico East 30
 Grid Convergence at Surface is: 0.18°



Company: COG OPERATING LLC
 Project: EDDY COUNTY, NM

Local Co-ordinate Reference: Well LITTLEFIELD 33 FED COM #808H
 TVD Reference: RKB=2860.5+25 @ 2885.5usft (LASTSHAW 44)

Reference Site: ATLAS

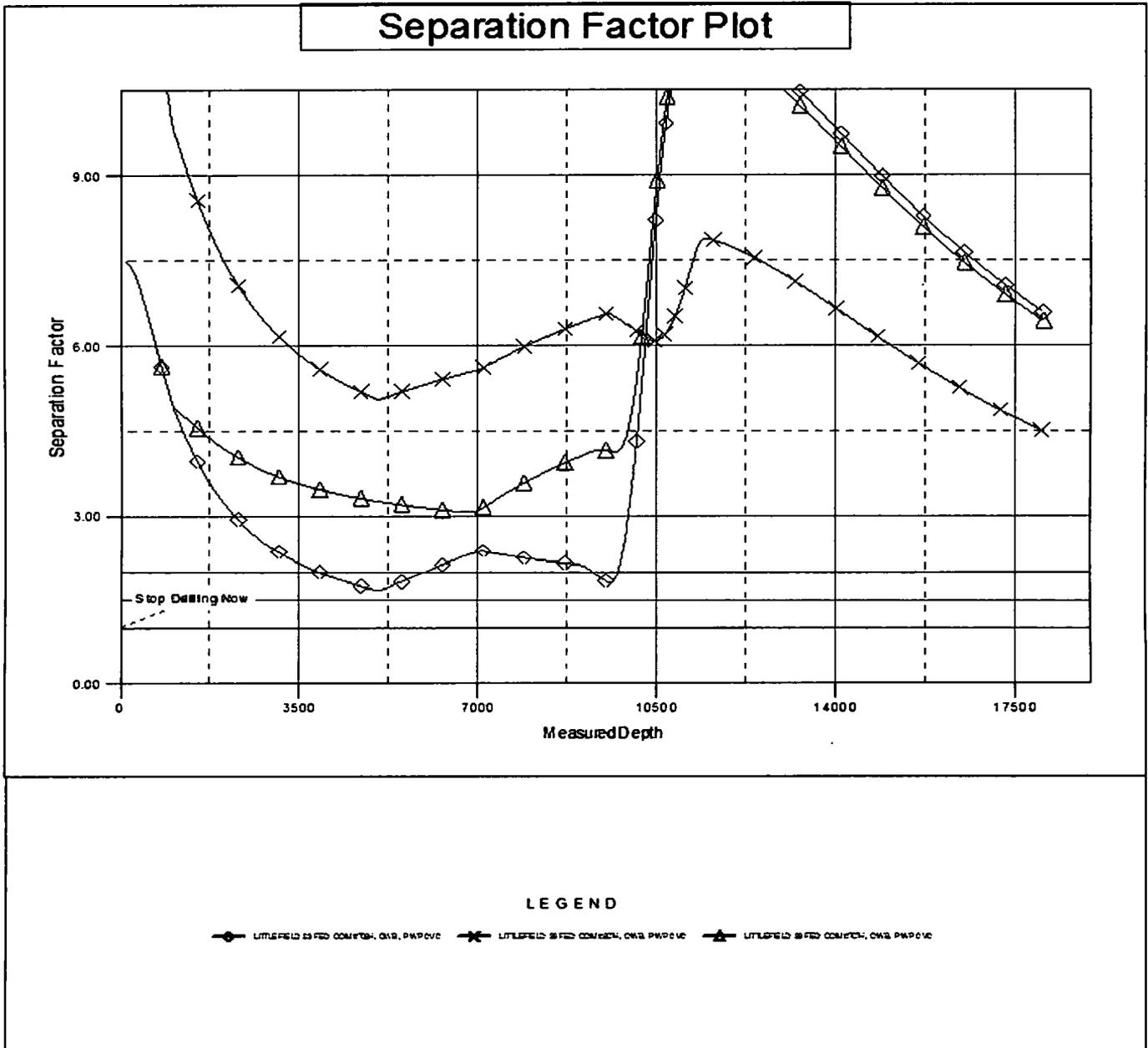
MD Reference: RKB=2860.5+25 @ 2885.5usft (LASTSHAW 44)

Site Error: 0.0 usft
 Reference Well: LITTLEFIELD 33 FED COM #808H
 Well Error: 3.0 usft
 Reference Wellbore: OWB
 Reference Design: PWP0

North Reference: Grid
 Survey Calculation Method: Minimum Curvature
 Output errors are at: 2.00 sigma
 Database: EDM_Users
 Offset TVD Reference: Offset Datum

Reference Depths are relative to RKB=2860.5+25 @ 2885.5usft (LAST
 Offset Depths are relative to Offset Datum
 Central Meridian is 104° 20' 0.000 W

Coordinates are relative to: LITTLEFIELD 33 FED COM #808H
 Coordinate System is US State Plane 1927 (Exact solution), New Mexico East 30
 Grid Convergence at Surface is: 0.18°





C O N C H O

COG OPERATING LLC

EDDY COUNTY, NM

ATLAS

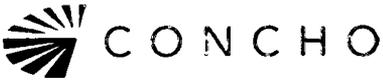
LITTLEFIELD 33 FED COM #808H

OWB

Plan: PWP0

Standard Survey Report

25 April, 2018



Survey Report

Company: COG OPERATING LLC
 Project: EDDY COUNTY, NM
 Site: ATLAS
 Well: LITTLEFIELD 33 FED COM #808H
 Wellbore: OWB
 Design: PWP0

Local Co-ordinate Reference: Well LITTLEFIELD 33 FED COM #808H
 TVD Reference: RKB=2860.5+25 @ 2885.5usft (LASTSHAW 44)
 MD Reference: RKB=2860.5+25 @ 2885.5usft (LASTSHAW 44)
 North Reference: Grid
 Survey Calculation Method: Minimum Curvature
 Database: EDM_Users

Project	EDDY COUNTY, NM		
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	ATLAS				
Site Position:		Northing:	371,480.80 usft	Latitude:	32° 1' 15.933 N
From:	Map	Easting:	573,599.60 usft	Longitude:	104° 5' 45.086 W
Position Uncertainty:	0.0 usft	Slot Radius:	13-3/16 "	Grid Convergence:	0.13 °

Well	LITTLEFIELD 33 FED COM #808H					
Well Position	+N/-S	0.0 usft	Northing:	364,135.91 usf	Latitude:	32° 0' 2.421 N
	+E/-W	0.0 usft	Easting:	604,820.42 usf	Longitude:	103° 59' 42.704 W
Position Uncertainty		3.0 usft	Wellhead Elevation:	usf	Ground Level:	2,860.5 usf

Wellbore	OWB				
Magnetics	Model Name	Sample Date	Declination (°)	Dip Angle (°)	Field Strength (nT)
	WMM2015	4/25/2018	7.07	59.76	47,662.31941485

Design	PWP0				
Audit Notes:					
Version:	Phase:	PLAN	Tie On Depth:	0.0	
Vertical Section:	Depth From (TVD) (usft)	+N/-S (usft)	+E/-W (usft)	Direction (°)	
	0.0	0.0	0.0	359.56	

Survey Tool Program	Date	4/25/2018			
From (usft)	To (usft)	Survey (Wellbore)	Tool Name	Description	
0.0	18,036.1	PWP0 (OWB)	MWD+IFR1+MS	OWSG MWD + IFR1 + Multi-Station Correction	

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)
0.0	0.00	0.00	0.0	0.0	0.0	0.0	0.00	0.00	0.00
100.0	0.00	0.00	100.0	0.0	0.0	0.0	0.00	0.00	0.00
200.0	0.00	0.00	200.0	0.0	0.0	0.0	0.00	0.00	0.00
300.0	0.00	0.00	300.0	0.0	0.0	0.0	0.00	0.00	0.00
400.0	0.00	0.00	400.0	0.0	0.0	0.0	0.00	0.00	0.00
500.0	0.00	0.00	500.0	0.0	0.0	0.0	0.00	0.00	0.00
600.0	0.00	0.00	600.0	0.0	0.0	0.0	0.00	0.00	0.00
700.0	0.00	0.00	700.0	0.0	0.0	0.0	0.00	0.00	0.00
800.0	0.00	0.00	800.0	0.0	0.0	0.0	0.00	0.00	0.00
900.0	0.00	0.00	900.0	0.0	0.0	0.0	0.00	0.00	0.00



Survey Report

Company:	COG OPERATING LLC	Local Co-ordinate Reference:	Well LITTLEFIELD 33 FED COM #808H
Project:	EDDY COUNTY, NM	TVD Reference:	RKB=2860.5+25 @ 2885.5usft (LASTSHAW 44)
Site:	ATLAS	MD Reference:	RKB=2860.5+25 @ 2885.5usft (LASTSHAW 44)
Well:	LITTLEFIELD 33 FED COM #808H	North Reference:	Grid
Wellbore:	OWB	Survey Calculation Method:	Minimum Curvature
Design:	PWP0	Database:	EDM_Users

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)
1,000.0	0.00	0.00	1,000.0	0.0	0.0	0.0	0.00	0.00	0.00
1,050.0	1.00	211.00	1,050.0	-0.4	-0.2	-0.4	2.00	2.00	0.00
1,100.0	1.00	211.00	1,100.0	-1.1	-0.7	-1.1	0.00	0.00	0.00
1,200.0	1.00	211.00	1,200.0	-2.6	-1.6	-2.6	0.00	0.00	0.00
1,300.0	1.00	211.00	1,300.0	-4.1	-2.5	-4.1	0.00	0.00	0.00
1,400.0	1.00	211.00	1,399.9	-5.6	-3.4	-5.6	0.00	0.00	0.00
1,500.0	1.00	211.00	1,499.9	-7.1	-4.3	-7.1	0.00	0.00	0.00
1,600.0	1.00	211.00	1,599.9	-8.6	-5.2	-8.6	0.00	0.00	0.00
1,700.0	1.00	211.00	1,699.9	-10.1	-6.1	-10.1	0.00	0.00	0.00
1,800.0	1.00	211.00	1,799.9	-11.6	-7.0	-11.5	0.00	0.00	0.00
1,900.0	1.00	211.00	1,899.9	-13.1	-7.9	-13.0	0.00	0.00	0.00
2,000.0	1.00	211.00	1,999.9	-14.6	-8.8	-14.5	0.00	0.00	0.00
2,100.0	1.00	211.00	2,099.8	-16.1	-9.7	-16.0	0.00	0.00	0.00
2,200.0	1.00	211.00	2,199.8	-17.6	-10.6	-17.5	0.00	0.00	0.00
2,300.0	1.00	211.00	2,299.8	-19.1	-11.5	-19.0	0.00	0.00	0.00
2,400.0	1.00	211.00	2,399.8	-20.6	-12.4	-20.5	0.00	0.00	0.00
2,500.0	1.00	211.00	2,499.8	-22.1	-13.3	-22.0	0.00	0.00	0.00
2,600.0	1.00	211.00	2,599.8	-23.6	-14.2	-23.5	0.00	0.00	0.00
2,700.0	1.00	211.00	2,699.7	-25.1	-15.1	-24.9	0.00	0.00	0.00
2,800.0	1.00	211.00	2,799.7	-26.6	-16.0	-26.4	0.00	0.00	0.00
2,900.0	1.00	211.00	2,899.7	-28.0	-16.9	-27.9	0.00	0.00	0.00
3,000.0	1.00	211.00	2,999.7	-29.5	-17.8	-29.4	0.00	0.00	0.00
3,100.0	1.00	211.00	3,099.7	-31.0	-18.7	-30.9	0.00	0.00	0.00
3,200.0	1.00	211.00	3,199.7	-32.5	-19.6	-32.4	0.00	0.00	0.00
3,300.0	1.00	211.00	3,299.7	-34.0	-20.4	-33.9	0.00	0.00	0.00
3,400.0	1.00	211.00	3,399.6	-35.5	-21.3	-35.4	0.00	0.00	0.00
3,500.0	1.00	211.00	3,499.6	-37.0	-22.2	-36.9	0.00	0.00	0.00
3,600.0	1.00	211.00	3,599.6	-38.5	-23.1	-38.3	0.00	0.00	0.00
3,700.0	1.00	211.00	3,699.6	-40.0	-24.0	-39.8	0.00	0.00	0.00
3,800.0	1.00	211.00	3,799.6	-41.5	-24.9	-41.3	0.00	0.00	0.00
3,900.0	1.00	211.00	3,899.6	-43.0	-25.8	-42.8	0.00	0.00	0.00
4,000.0	1.00	211.00	3,999.5	-44.5	-26.7	-44.3	0.00	0.00	0.00
4,100.0	1.00	211.00	4,099.5	-46.0	-27.6	-45.8	0.00	0.00	0.00
4,200.0	1.00	211.00	4,199.5	-47.5	-28.5	-47.3	0.00	0.00	0.00
4,300.0	1.00	211.00	4,299.5	-49.0	-29.4	-48.8	0.00	0.00	0.00
4,400.0	1.00	211.00	4,399.5	-50.5	-30.3	-50.3	0.00	0.00	0.00
4,500.0	1.00	211.00	4,499.5	-52.0	-31.2	-51.7	0.00	0.00	0.00
4,600.0	1.00	211.00	4,599.5	-53.5	-32.1	-53.2	0.00	0.00	0.00
4,700.0	1.00	211.00	4,699.4	-55.0	-33.0	-54.7	0.00	0.00	0.00
4,800.0	1.00	211.00	4,799.4	-56.5	-33.9	-56.2	0.00	0.00	0.00
4,900.0	1.00	211.00	4,899.4	-58.0	-34.8	-57.7	0.00	0.00	0.00
5,000.0	1.00	211.00	4,999.4	-59.5	-35.7	-59.2	0.00	0.00	0.00
5,100.0	1.00	211.00	5,099.4	-61.0	-36.6	-60.7	0.00	0.00	0.00
5,200.0	1.00	211.00	5,199.4	-62.5	-37.5	-62.2	0.00	0.00	0.00



Survey Report

Company: COG OPERATING LLC
 Project: EDDY COUNTY, NM
 Site: ATLAS
 Well: LITTLEFIELD 33 FED COM #808H
 Wellbore: OWB
 Design: PWP0

Local Co-ordinate Reference: Well LITTLEFIELD 33 FED COM #808H
 TVD Reference: RKB=2860.5+25 @ 2885.5usft (LASTSHAW 44)
 MD Reference: RKB=2860.5+25 @ 2885.5usft (LASTSHAW 44)
 North Reference: Grid
 Survey Calculation Method: Minimum Curvature
 Database: EDM_Users

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)
5,300.0	1.00	211.00	5,299.4	-64.0	-38.4	-63.7	0.00	0.00	0.00
5,400.0	1.00	211.00	5,399.3	-65.4	-39.3	-65.1	0.00	0.00	0.00
5,500.0	1.00	211.00	5,499.3	-66.9	-40.2	-66.6	0.00	0.00	0.00
5,600.0	1.00	211.00	5,599.3	-68.4	-41.1	-68.1	0.00	0.00	0.00
5,700.0	1.00	211.00	5,699.3	-69.9	-42.0	-69.6	0.00	0.00	0.00
5,800.0	1.00	211.00	5,799.3	-71.4	-42.9	-71.1	0.00	0.00	0.00
5,900.0	1.00	211.00	5,899.3	-72.9	-43.8	-72.6	0.00	0.00	0.00
6,000.0	1.00	211.00	5,999.2	-74.4	-44.7	-74.1	0.00	0.00	0.00
6,100.0	1.00	211.00	6,099.2	-75.9	-45.6	-75.6	0.00	0.00	0.00
6,200.0	1.00	211.00	6,199.2	-77.4	-46.5	-77.1	0.00	0.00	0.00
6,300.0	1.00	211.00	6,299.2	-78.9	-47.4	-78.5	0.00	0.00	0.00
6,400.0	1.00	211.00	6,399.2	-80.4	-48.3	-80.0	0.00	0.00	0.00
6,500.0	1.00	211.00	6,499.2	-81.9	-49.2	-81.5	0.00	0.00	0.00
6,600.0	1.00	211.00	6,599.2	-83.4	-50.1	-83.0	0.00	0.00	0.00
6,700.0	1.00	211.00	6,699.1	-84.9	-51.0	-84.5	0.00	0.00	0.00
6,800.0	1.00	211.00	6,799.1	-86.4	-51.9	-86.0	0.00	0.00	0.00
6,900.0	1.00	211.00	6,899.1	-87.9	-52.8	-87.5	0.00	0.00	0.00
7,000.0	1.00	211.00	6,999.1	-89.4	-53.7	-89.0	0.00	0.00	0.00
7,100.0	3.00	211.00	7,099.0	-92.4	-55.5	-91.9	2.00	2.00	0.00
7,200.0	3.00	211.00	7,198.9	-96.9	-58.2	-96.4	0.00	0.00	0.00
7,300.0	3.00	211.00	7,298.8	-101.3	-60.9	-100.9	0.00	0.00	0.00
7,400.0	3.00	211.00	7,398.6	-105.8	-63.6	-105.3	0.00	0.00	0.00
7,500.0	3.00	211.00	7,498.5	-110.3	-66.3	-109.8	0.00	0.00	0.00
7,600.0	3.00	211.00	7,598.3	-114.8	-69.0	-114.3	0.00	0.00	0.00
7,700.0	3.00	211.00	7,698.2	-119.3	-71.7	-118.7	0.00	0.00	0.00
7,800.0	3.00	211.00	7,798.1	-123.8	-74.4	-123.2	0.00	0.00	0.00
7,900.0	3.00	211.00	7,897.9	-128.3	-77.1	-127.7	0.00	0.00	0.00
8,000.0	3.00	211.00	7,997.8	-132.7	-79.8	-132.1	0.00	0.00	0.00
8,100.0	3.00	211.00	8,097.7	-137.2	-82.5	-136.6	0.00	0.00	0.00
8,200.0	3.00	211.00	8,197.5	-141.7	-85.2	-141.1	0.00	0.00	0.00
8,300.0	3.00	211.00	8,297.4	-146.2	-87.9	-145.5	0.00	0.00	0.00
8,400.0	3.00	211.00	8,397.2	-150.7	-90.5	-150.0	0.00	0.00	0.00
8,500.0	3.00	211.00	8,497.1	-155.2	-93.2	-154.5	0.00	0.00	0.00
8,600.0	3.00	211.00	8,597.0	-159.7	-95.9	-158.9	0.00	0.00	0.00
8,700.0	3.00	211.00	8,696.8	-164.2	-98.6	-163.4	0.00	0.00	0.00
8,800.0	3.00	211.00	8,796.7	-168.6	-101.3	-167.9	0.00	0.00	0.00
8,900.0	3.00	211.00	8,896.6	-173.1	-104.0	-172.3	0.00	0.00	0.00
9,000.0	3.00	211.00	8,996.4	-177.6	-106.7	-176.8	0.00	0.00	0.00
9,100.0	3.00	211.00	9,096.3	-182.1	-109.4	-181.2	0.00	0.00	0.00
9,200.0	3.00	211.00	9,196.1	-186.6	-112.1	-185.7	0.00	0.00	0.00
9,300.0	3.00	211.00	9,296.0	-191.1	-114.8	-190.2	0.00	0.00	0.00
9,400.0	3.00	211.00	9,395.9	-195.6	-117.5	-194.6	0.00	0.00	0.00
9,500.0	3.00	211.00	9,495.7	-200.0	-120.2	-199.1	0.00	0.00	0.00

Company:	COG OPERATING LLC	Local Co-ordinate Reference:	Well LITTLEFIELD 33 FED COM #808H
Project:	EDDY COUNTY, NM	TVD Reference:	RKB=2860.5+25 @ 2885.5usft (LASTSHAW 44)
Site:	ATLAS	MD Reference:	RKB=2860.5+25 @ 2885.5usft (LASTSHAW 44)
Well:	LITTLEFIELD 33 FED COM #808H	North Reference:	Grid
Wellbore:	OWB	Survey Calculation Method:	Minimum Curvature
Design:	PWP0	Database:	EDM_Users

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)
9,600.0	1.00	211.00	9,595.7	-203.0	-122.0	-202.1	2.00	-2.00	0.00
9,650.0	0.00	0.00	9,645.7	-203.4	-122.2	-202.5	2.00	-2.00	0.00
9,700.0	0.00	0.00	9,695.7	-203.4	-122.2	-202.5	0.00	0.00	0.00
9,800.0	0.00	0.00	9,795.7	-203.4	-122.2	-202.5	0.00	0.00	0.00
9,900.0	0.00	0.00	9,895.7	-203.4	-122.2	-202.5	0.00	0.00	0.00
10,000.0	0.00	0.00	9,995.7	-203.4	-122.2	-202.5	0.00	0.00	0.00
10,100.0	0.00	0.00	10,095.7	-203.4	-122.2	-202.5	0.00	0.00	0.00
10,200.0	0.00	0.00	10,195.7	-203.4	-122.2	-202.5	0.00	0.00	0.00
10,300.0	0.00	0.00	10,295.7	-203.4	-122.2	-202.5	0.00	0.00	0.00
10,358.0	0.00	0.00	10,353.7	-203.4	-122.2	-202.5	0.00	0.00	0.00
10,400.0	5.04	0.52	10,395.6	-201.6	-122.2	-200.6	12.00	12.00	0.00
10,500.0	17.04	0.52	10,493.6	-182.4	-122.0	-181.5	12.00	12.00	0.00
10,600.0	29.05	0.52	10,585.4	-143.4	-121.7	-142.4	12.00	12.00	0.00
10,700.0	41.05	0.52	10,667.1	-86.0	-121.2	-85.1	12.00	12.00	0.00
10,800.0	53.05	0.52	10,735.2	-13.0	-120.5	-12.1	12.00	12.00	0.00
10,900.0	65.06	0.52	10,786.5	72.6	-119.7	73.5	12.00	12.00	0.00
11,000.0	77.06	0.52	10,818.9	167.0	-118.9	167.9	12.00	12.00	0.00
11,100.0	89.06	0.52	10,830.9	266.1	-118.0	267.0	12.00	12.00	0.00
11,104.5	89.60	0.52	10,831.0	270.6	-117.9	271.5	12.00	12.00	0.00
11,200.0	89.60	0.52	10,831.7	366.1	-117.1	367.0	0.01	0.00	0.00
11,205.6	89.60	0.52	10,831.7	371.7	-117.0	372.6	0.01	0.00	0.00
11,300.0	89.60	0.52	10,832.4	466.1	-116.2	467.0	0.00	0.00	0.00
11,400.0	89.60	0.52	10,833.0	566.1	-115.3	567.0	0.00	0.00	0.00
11,500.0	89.60	0.52	10,833.7	666.1	-114.4	666.9	0.00	0.00	0.00
11,600.0	89.60	0.52	10,834.4	766.1	-113.5	766.9	0.00	0.00	0.00
11,700.0	89.60	0.52	10,835.1	866.1	-112.6	866.9	0.00	0.00	0.00
11,800.0	89.60	0.52	10,835.8	966.1	-111.7	966.9	0.00	0.00	0.00
11,900.0	89.60	0.52	10,836.5	1,066.1	-110.8	1,066.9	0.00	0.00	0.00
12,000.0	89.60	0.52	10,837.2	1,166.1	-109.9	1,166.9	0.00	0.00	0.00
12,100.0	89.60	0.52	10,837.9	1,266.0	-109.0	1,266.8	0.00	0.00	0.00
12,200.0	89.60	0.52	10,838.6	1,366.0	-108.1	1,366.8	0.00	0.00	0.00
12,300.0	89.60	0.52	10,839.3	1,466.0	-107.2	1,466.8	0.00	0.00	0.00
12,400.0	89.60	0.52	10,840.0	1,566.0	-106.3	1,566.8	0.00	0.00	0.00
12,500.0	89.60	0.52	10,840.7	1,666.0	-105.4	1,666.8	0.00	0.00	0.00
12,600.0	89.60	0.52	10,841.4	1,766.0	-104.5	1,766.8	0.00	0.00	0.00
12,700.0	89.60	0.52	10,842.1	1,866.0	-103.6	1,866.7	0.00	0.00	0.00
12,800.0	89.60	0.52	10,842.7	1,966.0	-102.7	1,966.7	0.00	0.00	0.00
12,900.0	89.60	0.52	10,843.4	2,066.0	-101.8	2,066.7	0.00	0.00	0.00
13,000.0	89.60	0.52	10,844.1	2,166.0	-100.9	2,166.7	0.00	0.00	0.00
13,100.0	89.60	0.52	10,844.8	2,266.0	-100.0	2,266.7	0.00	0.00	0.00
13,200.0	89.60	0.52	10,845.5	2,366.0	-99.1	2,366.7	0.00	0.00	0.00
13,300.0	89.60	0.52	10,846.2	2,466.0	-98.2	2,466.7	0.00	0.00	0.00
13,400.0	89.60	0.52	10,846.9	2,566.0	-97.3	2,566.6	0.00	0.00	0.00



Survey Report

Company: COG OPERATING LLC
 Project: EDDY COUNTY, NM
 Site: ATLAS
 Well: LITTLEFIELD 33 FED COM #808H
 Wellbore: OWB
 Design: PWP0

Local Co-ordinate Reference: Well LITTLEFIELD 33 FED COM #808H
 TVD Reference: RKB=2860.5+25 @ 2885.5usft (LASTSHAW 44)
 MD Reference: RKB=2860.5+25 @ 2885.5usft (LASTSHAW 44)
 North Reference: Grid
 Survey Calculation Method: Minimum Curvature
 Database: EDM_Users

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)
13,500.0	89.60	0.52	10,847.6	2,666.0	-96.4	2,666.6	0.00	0.00	0.00
13,600.0	89.60	0.52	10,848.3	2,765.9	-95.5	2,766.6	0.00	0.00	0.00
13,700.0	89.60	0.52	10,849.0	2,865.9	-94.6	2,866.6	0.00	0.00	0.00
13,800.0	89.60	0.52	10,849.7	2,965.9	-93.7	2,966.6	0.00	0.00	0.00
13,900.0	89.60	0.52	10,850.4	3,065.9	-92.8	3,066.6	0.00	0.00	0.00
14,000.0	89.60	0.52	10,851.1	3,165.9	-91.9	3,166.5	0.00	0.00	0.00
14,100.0	89.60	0.52	10,851.7	3,265.9	-91.0	3,266.5	0.00	0.00	0.00
14,200.0	89.60	0.52	10,852.4	3,365.9	-90.1	3,366.5	0.00	0.00	0.00
14,300.0	89.60	0.52	10,853.1	3,465.9	-89.2	3,466.5	0.00	0.00	0.00
14,400.0	89.60	0.52	10,853.8	3,565.9	-88.3	3,566.5	0.00	0.00	0.00
14,500.0	89.60	0.52	10,854.5	3,665.9	-87.4	3,666.5	0.00	0.00	0.00
14,600.0	89.60	0.52	10,855.2	3,765.9	-86.5	3,766.4	0.00	0.00	0.00
14,700.0	89.60	0.52	10,855.9	3,865.9	-85.6	3,866.4	0.00	0.00	0.00
14,800.0	89.60	0.52	10,856.6	3,965.9	-84.7	3,966.4	0.00	0.00	0.00
14,900.0	89.60	0.52	10,857.3	4,065.9	-83.8	4,066.4	0.00	0.00	0.00
15,000.0	89.60	0.52	10,858.0	4,165.9	-82.9	4,166.4	0.00	0.00	0.00
15,100.0	89.60	0.52	10,858.7	4,265.9	-82.0	4,266.4	0.00	0.00	0.00
15,200.0	89.60	0.52	10,859.4	4,365.8	-81.1	4,366.3	0.00	0.00	0.00
15,300.0	89.60	0.52	10,860.1	4,465.8	-80.2	4,466.3	0.00	0.00	0.00
15,400.0	89.60	0.52	10,860.7	4,565.8	-79.3	4,566.3	0.00	0.00	0.00
15,500.0	89.60	0.52	10,861.4	4,665.8	-78.4	4,666.3	0.00	0.00	0.00
15,600.0	89.60	0.52	10,862.1	4,765.8	-77.5	4,766.3	0.00	0.00	0.00
15,700.0	89.60	0.52	10,862.8	4,865.8	-76.6	4,866.3	0.00	0.00	0.00
15,800.0	89.60	0.52	10,863.5	4,965.8	-75.7	4,966.2	0.00	0.00	0.00
15,900.0	89.60	0.52	10,864.2	5,065.8	-74.8	5,066.2	0.00	0.00	0.00
16,000.0	89.60	0.52	10,864.9	5,165.8	-73.9	5,166.2	0.00	0.00	0.00
16,100.0	89.60	0.52	10,865.6	5,265.8	-73.0	5,266.2	0.00	0.00	0.00
16,200.0	89.60	0.52	10,866.3	5,365.8	-72.1	5,366.2	0.00	0.00	0.00
16,300.0	89.60	0.52	10,867.0	5,465.8	-71.2	5,466.2	0.00	0.00	0.00
16,400.0	89.60	0.52	10,867.7	5,565.8	-70.3	5,566.1	0.00	0.00	0.00
16,500.0	89.60	0.52	10,868.4	5,665.8	-69.4	5,666.1	0.00	0.00	0.00
16,600.0	89.60	0.52	10,869.1	5,765.8	-68.5	5,766.1	0.00	0.00	0.00
16,700.0	89.60	0.52	10,869.7	5,865.7	-67.6	5,866.1	0.00	0.00	0.00
16,800.0	89.60	0.52	10,870.4	5,965.7	-66.7	5,966.1	0.00	0.00	0.00
16,900.0	89.60	0.52	10,871.1	6,065.7	-65.8	6,066.1	0.00	0.00	0.00
17,000.0	89.60	0.52	10,871.8	6,165.7	-64.9	6,166.0	0.00	0.00	0.00
17,100.0	89.60	0.52	10,872.5	6,265.7	-64.0	6,266.0	0.00	0.00	0.00
17,200.0	89.60	0.52	10,873.2	6,365.7	-63.1	6,366.0	0.00	0.00	0.00
17,300.0	89.60	0.52	10,873.9	6,465.7	-62.2	6,466.0	0.00	0.00	0.00
17,400.0	89.60	0.52	10,874.6	6,565.7	-61.3	6,566.0	0.00	0.00	0.00
17,500.0	89.60	0.52	10,875.3	6,665.7	-60.4	6,666.0	0.00	0.00	0.00
17,600.0	89.60	0.52	10,876.0	6,765.7	-59.5	6,765.9	0.00	0.00	0.00
17,700.0	89.60	0.52	10,876.7	6,865.7	-58.6	6,865.9	0.00	0.00	0.00
17,800.0	89.60	0.52	10,877.4	6,965.7	-57.7	6,965.9	0.00	0.00	0.00

Company:	COG OPERATING LLC	Local Co-ordinate Reference:	Well LITTLEFIELD 33 FED COM #808H
Project:	EDDY COUNTY, NM	TVD Reference:	RKB=2860.5+25 @ 2885.5usft (LASTSHAW 44)
Site:	ATLAS	MD Reference:	RKB=2860.5+25 @ 2885.5usft (LASTSHAW 44)
Well:	LITTLEFIELD 33 FED COM #808H	North Reference:	Grid
Wellbore:	OWB	Survey Calculation Method:	Minimum Curvature
Design:	PWP0	Database:	EDM_Users

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)
17,900.0	89.60	0.52	10,878.1	7,065.7	-56.8	7,065.9	0.00	0.00	0.00
18,000.0	89.60	0.52	10,878.8	7,165.7	-55.9	7,165.9	0.00	0.00	0.00
18,036.1	89.60	0.52	10,879.0	7,201.7	-55.6	7,201.9	0.00	0.00	0.00

Design Targets

Target Name	Dip Angle (°)	Dip Dir. (°)	TVD (usft)	+N/-S (usft)	+E/-W (usft)	Northing (usft)	Easting (usft)	Latitude	Longitude
FTP-Littlefield #808H - hit/miss target - Shape - Point	0.00	0.00	10,829.0	79.5	-120.9	364,215.41	604,699.51	32° 0' 3.212 N	103° 59' 44.105 W
- plan misses target center by 36.3usft at 10920.3usft MD (10794.7 TVD, 91.2 N, -119.5 E)									
PBHL-Littlefield 33 - plan hits target center - Point	0.00	0.00	10,879.0	7,201.7	-55.6	371,337.63	604,764.81	32° 1' 13.695 N	103° 59' 43.088 W

Checked By: _____ Approved By: _____ Date: _____



WELL DETAILS: **LITTLEFIELD 33 FED COM #808H**
2880.5

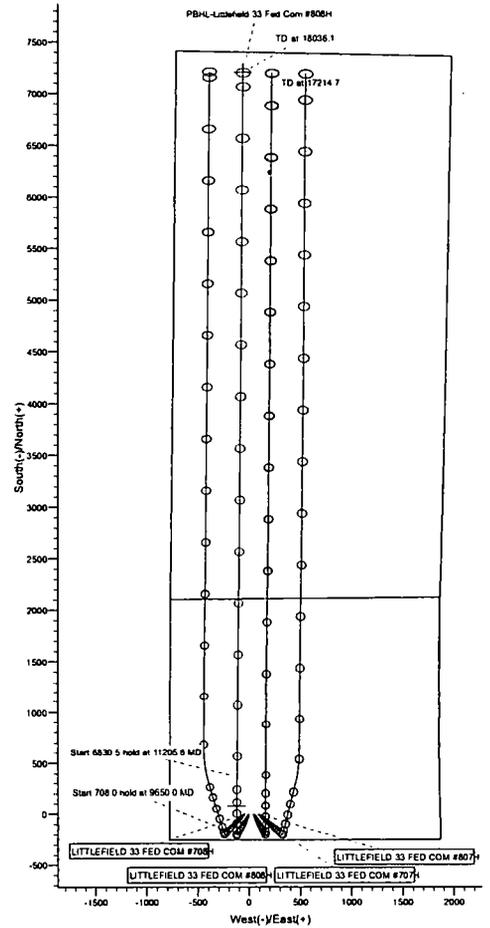
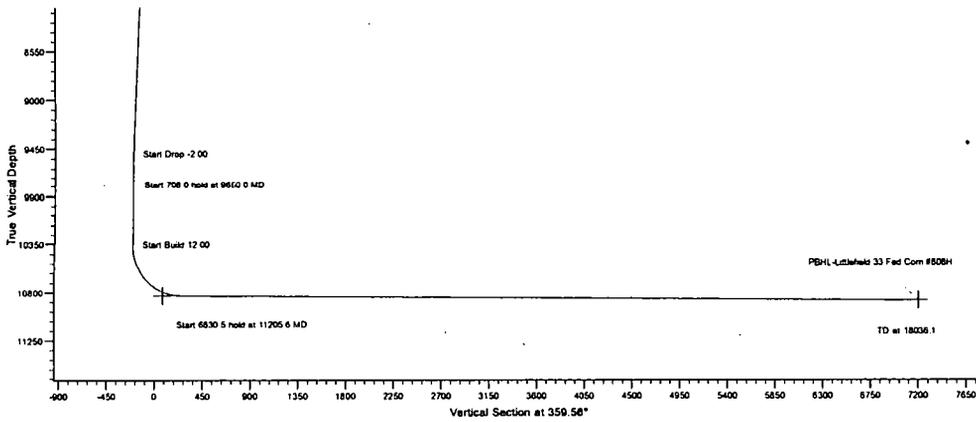
+N/-S	+E/-W	Northing	Easting	Latitude	Longitude
0.0	0.0	384135.91	604820.42	32° 0' 2.421" N 103° 59' 42.704" W	

Sec	MD	Inc	Azi	TVD	SECTION DETAILS						
					+N/-S	+E/-W	Dleg	TFace	VSect	Annotation	
1	0.0	0.00	0.00	0.0	0.0	0.0	0.0	0.00	0.00	0.0	
2	1000.0	0.00	0.00	1000.0	0.0	0.0	0.0	0.00	0.00	0.0	
3	1050.0	1.00	211.00	1050.0	-0.4	-0.2	2.00	211.00	-0.4		
4	7000.0	1.00	211.00	6999.1	-89.4	-53.7	0.00	0.00	-89.0		
5	7100.0	3.00	211.00	7099.0	-82.4	-55.5	2.00	0.00	-81.9		
6	9500.0	3.00	211.00	9495.7	-200.0	-120.2	0.00	0.00	-199.1		
7	9650.0	0.00	0.00	9645.7	-203.4	-122.2	2.00	180.00	-202.5		
8	10358.0	0.00	0.00	10353.7	-203.4	-122.2	0.00	0.00	-202.5		
9	11104.5	89.80	0.52	10831.0	270.0	-117.9	12.00	0.52	271.5		
10	11205.6	89.80	0.52	10831.7	371.7	-117.0	0.01	-56.89	372.6		
11	18036.1	89.80	0.52	10879.0	7201.7	-55.6	0.00	0.00	7201.9		

Project: EDDY COUNTY, NM
Site: ATLAS
Well: LITTLEFIELD 33 FED COM #808H
Wellbore: OWB
Design: PWP0

LEGEND

- +— LITTLEFIELD 33 FED COM #708H, OWB, PWP0 V0
- LITTLEFIELD 33 FED COM #807H, OWB, PWP0 V0
- ◇— LITTLEFIELD 33 FED COM #707H, OWB, PWP0 V0
- △— PWP0



COG Operating, LLC - Littlefield 33 Federal Com 808H

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

COG Operating, LLC - Littlefield 33 Federal Com 808H

3. Cementing Program

Casing	# Sks	Wt. lb/ gal	Yld ft3/ sack	H₂O gal/sk	500# Comp. Strength (hours)	Slurry Description
Surf.	20	13.5	1.75	9	12	Lead: Class C + 4% Gel + 1% CaCl ₂
	250	14.8	1.34	6.34	8	Tail: Class C + 2% CaCl ₂
Inter.	820	10.3	3.6	21.48	16	Tuned Light Blend
	250	16.4	1.08	4.32	8	Tail: Class H
Prod	160	11.9	2.5	19	72	Lead: 50:50:10 H Blend
	940	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'	75%
1 st Intermediate	0'	50%
Production	9,550'	35% OH in Lateral (KOP to EOL)

COG Operating, LLC - Littlefield 33 Federal Com 808H

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:
9-7/8"	13-5/8"	3M	Annular	x	3000 psi
			Blind Ram		3M
			Pipe Ram		
			Double Ram		
			Other*		
6-3/4"	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.

COG Operating, LLC - Littlefield 33 Federal Com 808H

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
7-5/8" Int shoe	Lateral TD	OBM	9.6 - 11	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	

COG Operating, LLC - Littlefield 33 Federal Com 808H

7. Drilling Conditions

Condition	Specify what type and where?
BH Pressure at deepest TVD	6225 psi at 10879' TVD
Abnormal Temperature	NO 165 Deg. F.

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

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

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

8. Other Facets of Operation

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

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

APD ID: 10400029967

Submission Date: 05/03/2018

Operator Name: COG OPERATING LLC

Well Name: LITTLEFIELD 33 FEDERAL COM

Well Number: 808H

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_Littlefield_808H_Exist_Rd_20180503103710.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_Littlefield_808H_MapsPlats_20180503103739.pdf

New road type: TWO-TRACK

Length: 35 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:

Operator Name: COG OPERATING LLC

Well Name: LITTLEFIELD 33 FEDERAL COM

Well Number: 808H

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_Littlefield_808H_1Mile_Data_20180503103801.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: Production will be sent to the proposed Littlefield 33 CTB 2. A tank battery and facilities will be constructed adjacent to the north side of the Littlefield 33 Federal Com 707H, 708H, 807H and 808H as shown on the production facility layout. The tank battery and facilities will be installed according to API specifications. No flow lines are anticipated at this time.

Production Facilities map:

COG_Littlefield_808H_CTB2_20180503103824.pdf

COG_Littlefield_808H_Prod_Facility_20180503103831.pdf

Operator Name: COG OPERATING LLC

Well Name: LITTLEFIELD 33 FEDERAL COM

Well Number: 808H

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 H2O	
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): 22500	Source volume (acre-feet): 2.9000947
Source volume (gal): 945000	
Water source use type: STIMULATION, SURFACE CASING	Water source type: OTHER
Describe type: Fresh H2O	
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): 337500	Source volume (acre-feet): 43.50142
Source volume (gal): 14175000	

Water source and transportation map:

COG_Littlefield_808H_BrineH2O_20180503103848.pdf

COG_Littlefield_808H_Fresh_H2O_20180503103858.pdf

Water source comments: Fresh water will be obtained from High Roller Wells, LLC CP-417610 water well located in Section 1. 58 T1. 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:

Operator Name: COG OPERATING LLC

Well Name: LITTLEFIELD 33 FEDERAL COM

Well Number: 808H

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 Brantley caliche pit located in Section 14, T26S, R28E.

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:

Operator Name: COG OPERATING LLC

Well Name: LITTLEFIELD 33 FEDERAL COM

Well Number: 808H

Section 8 - Ancillary Facilities

Are you requesting any Ancillary Facilities?: NO

Ancillary Facilities attachment:

Comments: GCP attached.

Section 9 - Well Site Layout

Well Site Layout Diagram:

COG_Littlefield_808H_CTB2_20180503103935.pdf

COG_Littlefield_808H_Prod_Facility_20180503103944.pdf

Comments: Production will be sent to the proposed Littlefield 33 CTB 2. A tank battery and facilities will be constructed adjacent to the north side of the Littlefield 33 Federal Com 707H, 708H, 807H and 808H as shown on the production facility layout. The tank battery and facilities will be installed according to API specifications. No flow lines are anticipated at this time.

Section 10 - Plans for Surface Reclamation

Type of disturbance: New Surface Disturbance

Multiple Well Pad Name: LITTLEFIELD 33 FEDERAL COM

Multiple Well Pad Number: 707H, 708H, 807H AND 808H

Recontouring attachment:

Drainage/Erosion control construction: If needed, immediately following pad construction approximately 400' of straw waddles will be placed on the south of the location to reduce sediment impacts to fragile/sensitive soils.

Drainage/Erosion control reclamation: Reclaim west side 80'

Well pad proposed disturbance (acres): 3.67	Well pad interim reclamation (acres): 0.01	Well pad long term disturbance (acres): 2.94
Road proposed disturbance (acres): 0.03	Road interim reclamation (acres): 0.03	Road long term disturbance (acres): 0.03
Powerline proposed disturbance (acres): 0	Powerline interim reclamation (acres): 0	Powerline long term disturbance (acres): 0
Pipeline proposed disturbance (acres): 0	Pipeline interim reclamation (acres): 0	Pipeline long term disturbance (acres): 0
Other proposed disturbance (acres): 0	Other interim reclamation (acres): 0	Other long term disturbance (acres): 0
Total proposed disturbance: 3.7	Total interim reclamation: 0.04	Total long term disturbance: 2.97

Disturbance Comments:

Reconstruction method: New construction of pad.

Topsoil redistribution: West 80'

Soil treatment: None

Operator Name: COG OPERATING LLC

Well Name: LITTLEFIELD 33 FEDERAL COM

Well Number: 808H

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
------------------	--------------------

Operator Name: COG OPERATING LLC

Well Name: LITTLEFIELD 33 FEDERAL COM

Well Number: 808H

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_Littlefield_808H_Closed_Loop_20180503104003.pdf

Section 11 - Surface Ownership

Disturbance type: WELL PAD

Describe:

Surface Owner: BUREAU OF LAND MANAGEMENT

Other surface owner description:

BIA Local Office:

BOR Local Office:

COE Local Office:

DOD Local Office:

NPS Local Office:

State Local Office:

Military Local Office:

Operator Name: COG OPERATING LLC

Well Name: LITTLEFIELD 33 FEDERAL COM

Well Number: 808H

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:

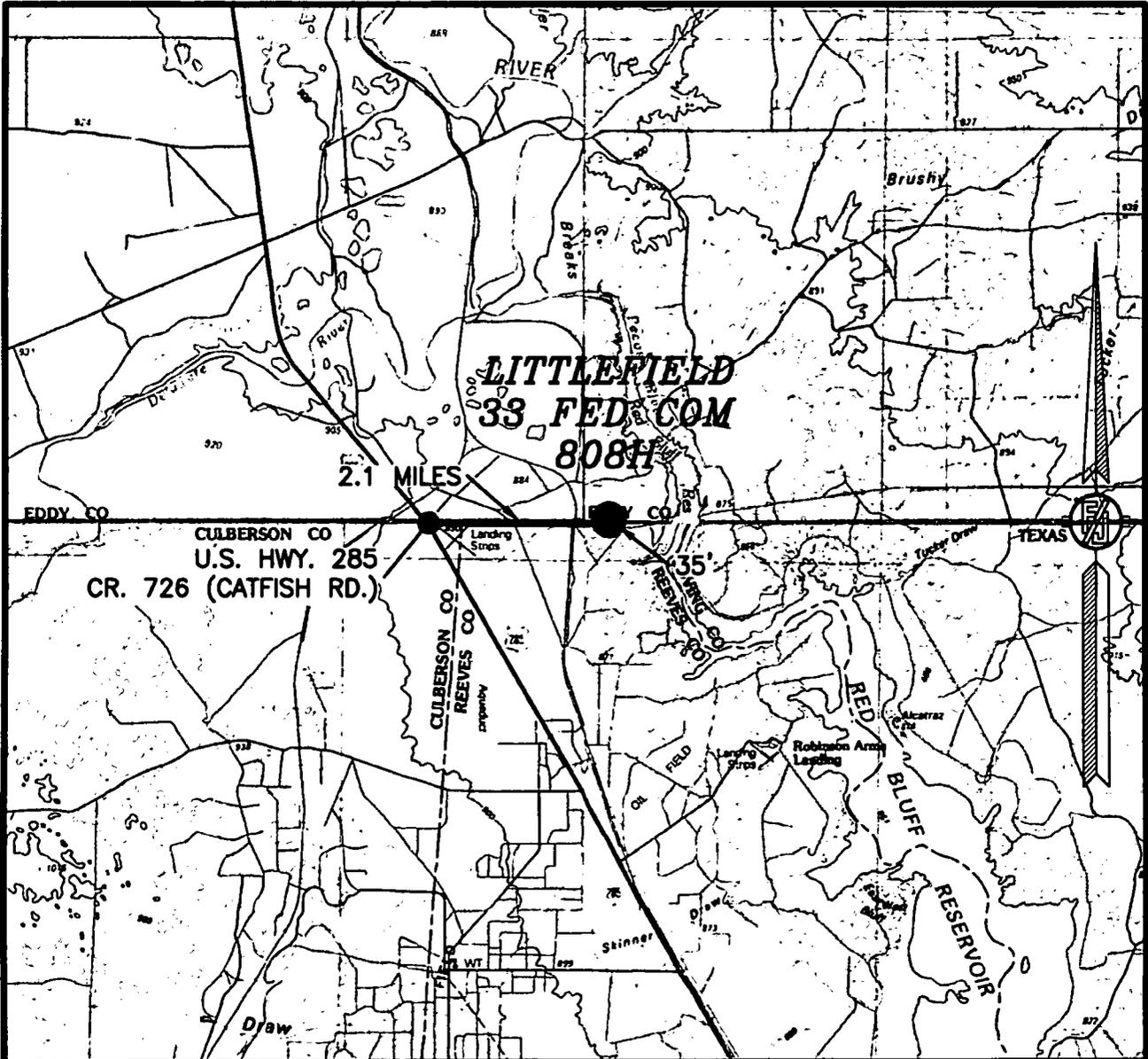
Use a previously conducted onsite? YES

Previous Onsite information: Onsite completed on 1/16/2018 by Rand French (COG) and Jeff Robertson (BLM).

Other SUPO Attachment

COG_Littlefield_808H_Certification_20180503104017.pdf

SECTION 33, TOWNSHIP 26 SOUTH, RANGE 29 EAST, N.M.P.M.
 EDDY COUNTY, STATE OF NEW MEXICO
 VICINITY MAP



DISTANCES IN MILES

NOT TO SCALE

DIRECTIONS TO LOCATION

FROM U.S. HWY 285 AND CALICHE CR. 726 (CATFISH RD.) GO EAST ON CR. 726 2.1 MILES TO A ROAD SURVEY AND FOLLOW FLAGS NORTH 35° TO THE SOUTHEAST PAD CORNER FOR THIS LOCATION.

COG OPERATING, LLC
LITTLEFIELD 33 FED COM 808H
 LOCATED 250 FT. FROM THE SOUTH LINE
 AND 781 FT. FROM THE WEST LINE OF
 SECTION 33, TOWNSHIP 26 SOUTH,
 RANGE 29 EAST, N.M.P.M.
 EDDY COUNTY, STATE OF NEW MEXICO

JANUARY 16, 2018

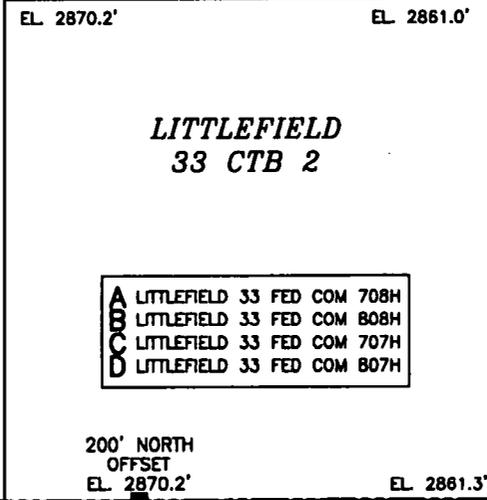
SURVEY NO. 5783

MADRON SURVEYING, INC. 301 SOUTH CANAL CARLSBAD, NEW MEXICO
 (575) 234-3341

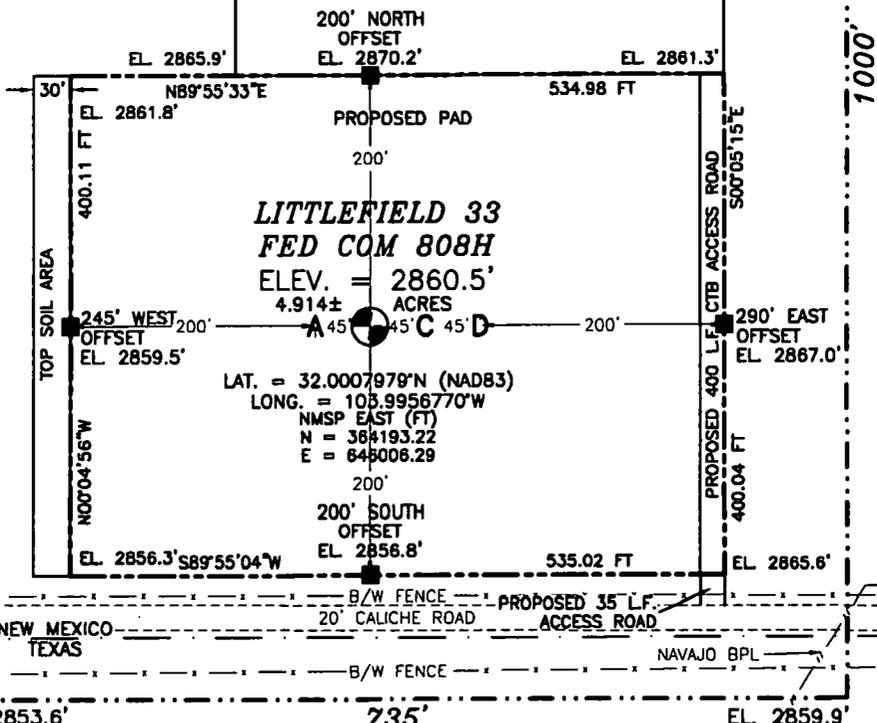
SITE MAP

EL. 2867.4' 735' EL. 2861.7'

NOTE: LATITUDE AND LONGITUDE COORDINATES ARE SHOWN USING THE NORTH AMERICAN DATUM OF 1983 (NAD83) IN DECIMAL DEGREE FORMAT. LISTED NEW MEXICO STATE PLANE EAST COORDINATES ARE GRID (NAD83), ELEVATION VALUES ARE NAVD88. BASIS OF BEARING AND DISTANCES USED ARE NEW MEXICO STATE PLANE EAST COORDINATES MODIFIED TO THE SURFACE.



- | | |
|---|-----------------------------|
| A | LITTLEFIELD 33 FED COM 708H |
| B | LITTLEFIELD 33 FED COM 808H |
| C | LITTLEFIELD 33 FED COM 707H |
| D | LITTLEFIELD 33 FED COM 807H |



SCALE 1" = 150'
 DIRECTIONS TO LOCATION
 FROM U.S. HWY 285 AND CALICHE CR. 726 (CATFISH RD.) GO EAST ON CR. 726 2.1 MILES TO A ROAD SURVEY AND FOLLOW FLAGS NORTH 35' TO THE SOUTHEAST PAD CORNER FOR THIS LOCATION.

COG OPERATING, LLC
LITTLEFIELD 33 FED COM 808H
 LOCATED 250 FT. FROM THE SOUTH LINE
 AND 781 FT. FROM THE WEST LINE OF
 SECTION 33, TOWNSHIP 26 SOUTH,
 RANGE 29 EAST, N.M.P.M.
 EDDY COUNTY, STATE OF NEW MEXICO

APRIL 9, 2018

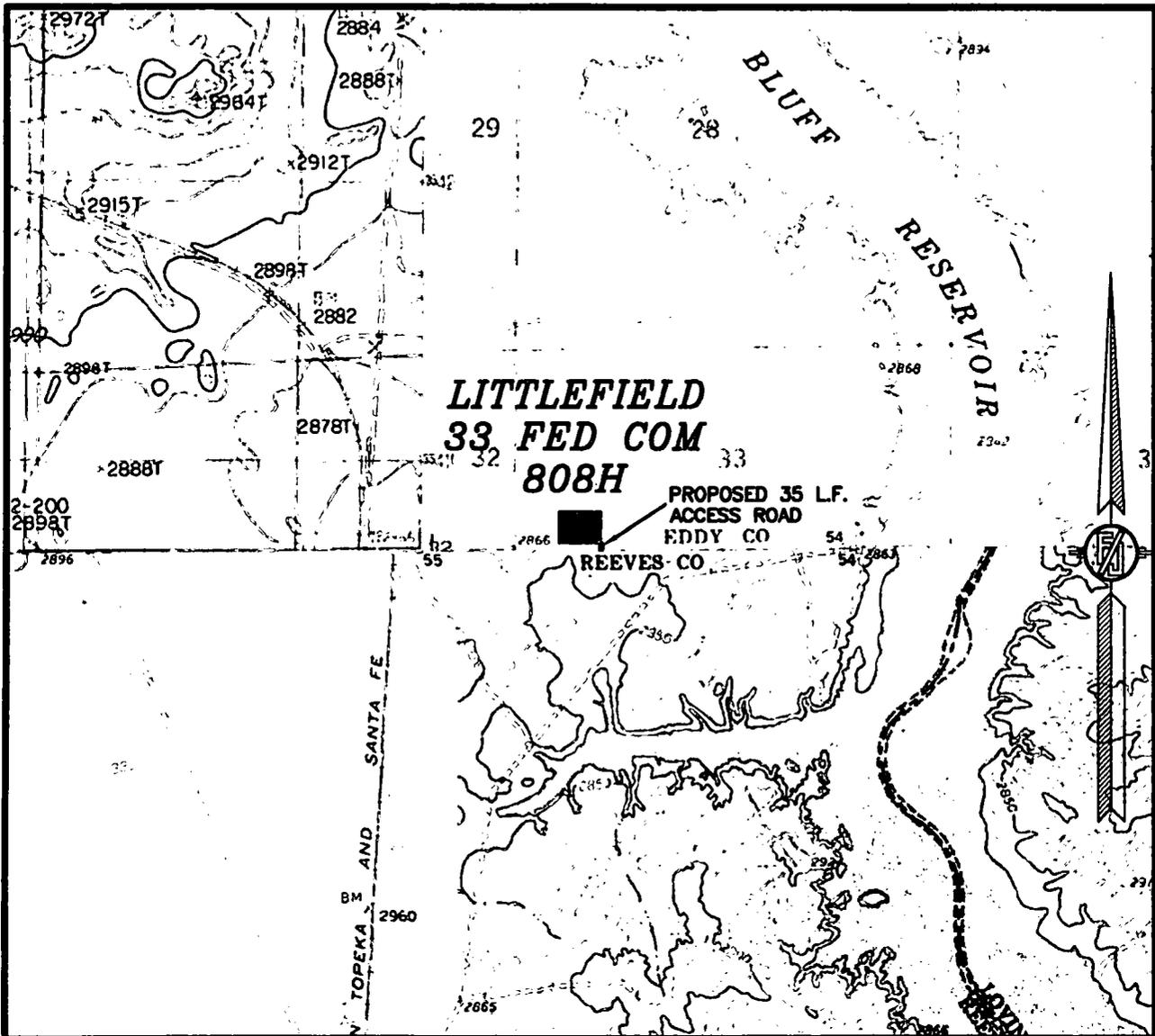
I, FILIMON F. JARAMILLO, A NEW MEXICO REGISTERED PROFESSIONAL SURVEYOR CERTIFY THAT I DIRECTED AND AM RESPONSIBLE FOR THIS SURVEY, THAT THIS SURVEY IS TRUE AND CORRECT TO THE BEST OF MY KNOWLEDGE AND BELIEF, AND THAT THIS SURVEY AND PLAT MEET THE MINIMUM STANDARDS FOR SURVEYING IN NEW MEXICO.

FILIMON F. JARAMILLO, P.L.S. 12797
 DATE

SURVEY NO. 5783A

MADRON SURVEYING, INC. 301 SOUTH CANAL (575) 234-3341 **CARLSBAD, NEW MEXICO**

SECTION 33, TOWNSHIP 26 SOUTH, RANGE 29 EAST, N.M.P.M.
 EDDY COUNTY, STATE OF NEW MEXICO
 LOCATION VERIFICATION MAP



USGS QUAD MAP:
 ROSS RANCH
 RED BLUFF

NOT TO SCALE

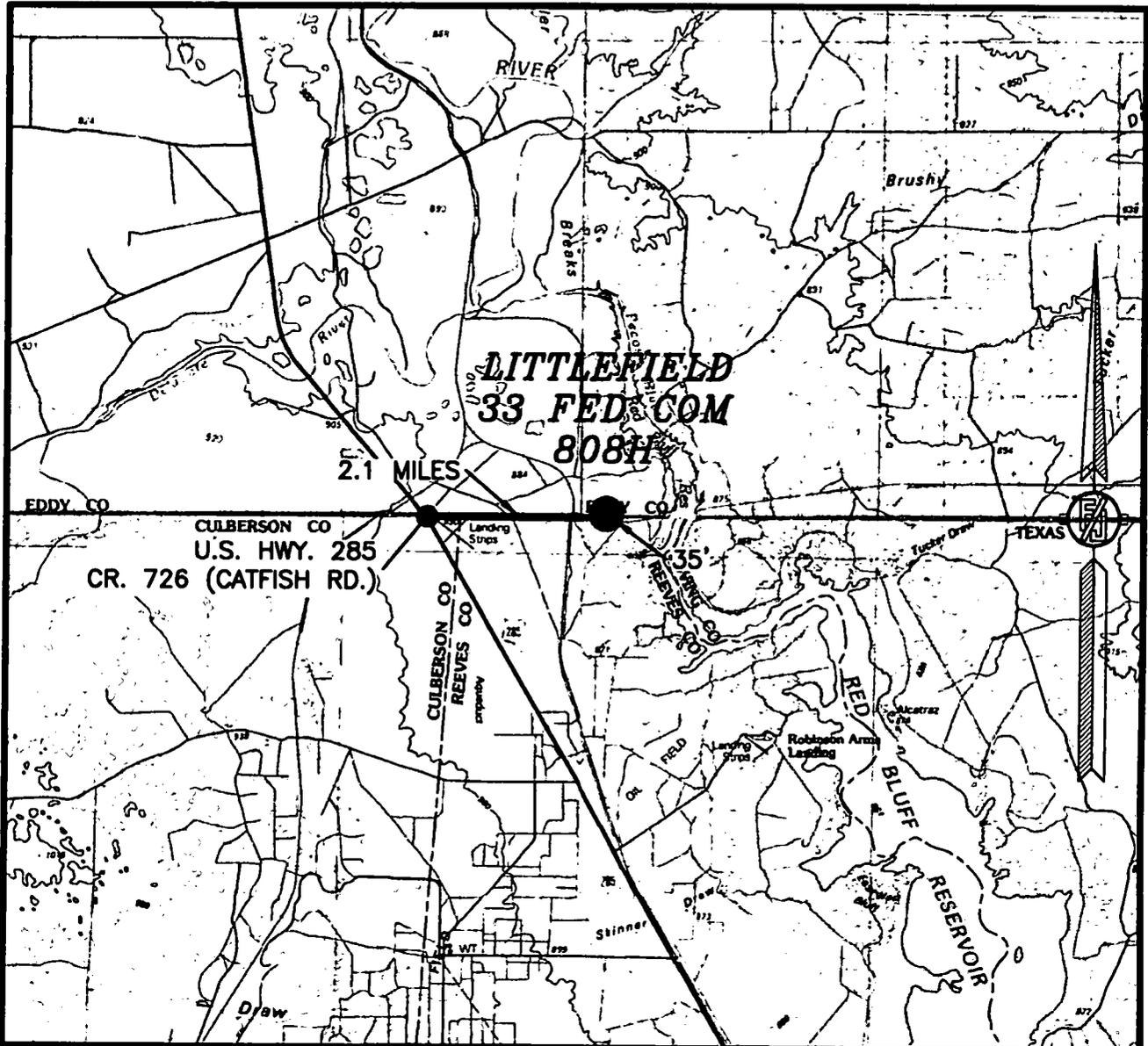
COG OPERATING, LLC
LITTLEFIELD 33 FED COM 808H
 LOCATED 250 FT. FROM THE SOUTH LINE
 AND 781 FT. FROM THE WEST LINE OF
 SECTION 33, TOWNSHIP 26 SOUTH,
 RANGE 29 EAST, N.M.P.M.
 EDDY COUNTY, STATE OF NEW MEXICO

JANUARY 16, 2018

SURVEY NO. 5783

MADRON SURVEYING, INC. 301 SOUTH CANAL CARLSBAD, NEW MEXICO
 (575) 234-3341

SECTION 33, TOWNSHIP 26 SOUTH, RANGE 29 EAST, N.M.P.M.
 EDDY COUNTY, STATE OF NEW MEXICO
 VICINITY MAP



DISTANCES IN MILES

NOT TO SCALE

DIRECTIONS TO LOCATION
 FROM U.S. HWY 285 AND CALICHE CR. 726 (CATFISH RD.) GO EAST ON CR. 726 2.1 MILES TO A ROAD SURVEY AND FOLLOW FLAGS NORTH 35' TO THE SOUTHEAST PAD CORNER FOR THIS LOCATION.

COG OPERATING, LLC
LITTLEFIELD 33 FED COM 808H
 LOCATED 250 FT. FROM THE SOUTH LINE
 AND 781 FT. FROM THE WEST LINE OF
 SECTION 33, TOWNSHIP 26 SOUTH,
 RANGE 29 EAST, N.M.P.M.
 EDDY COUNTY, STATE OF NEW MEXICO

JANUARY 16, 2018

MADRON SURVEYING, INC. 301 SOUTH CANAL CARLSBAD, NEW MEXICO
 (575) 234-3341 SURVEY NO. 5783

SECTION 33, TOWNSHIP 26 SOUTH, RANGE 29 EAST, N.M.P.M.
EDDY COUNTY, STATE OF NEW MEXICO
AERIAL PHOTO



NOT TO SCALE
AERIAL PHOTO:
GOOGLE EARTH
NOV. 2015

COG OPERATING, LLC
LITTLEFIELD 33 FED COM 808H
LOCATED 250 FT. FROM THE SOUTH LINE
AND 781 FT. FROM THE WEST LINE OF
SECTION 33, TOWNSHIP 26 SOUTH,
RANGE 29 EAST, N.M.P.M.
EDDY COUNTY, STATE OF NEW MEXICO

JANUARY 16, 2018

SURVEY NO. 5783

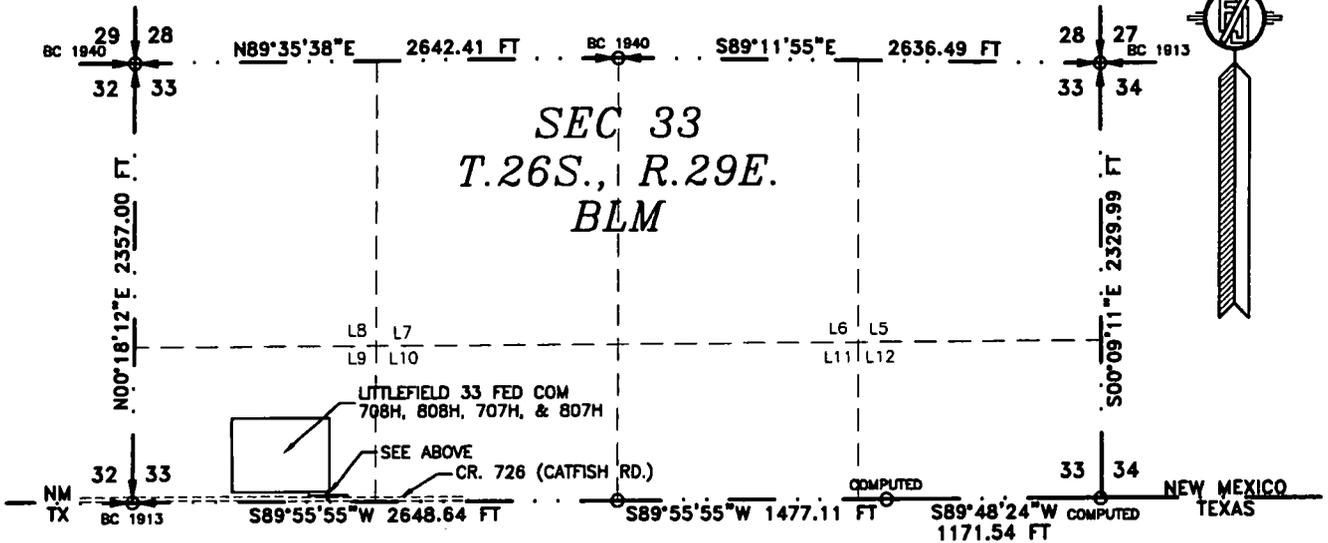
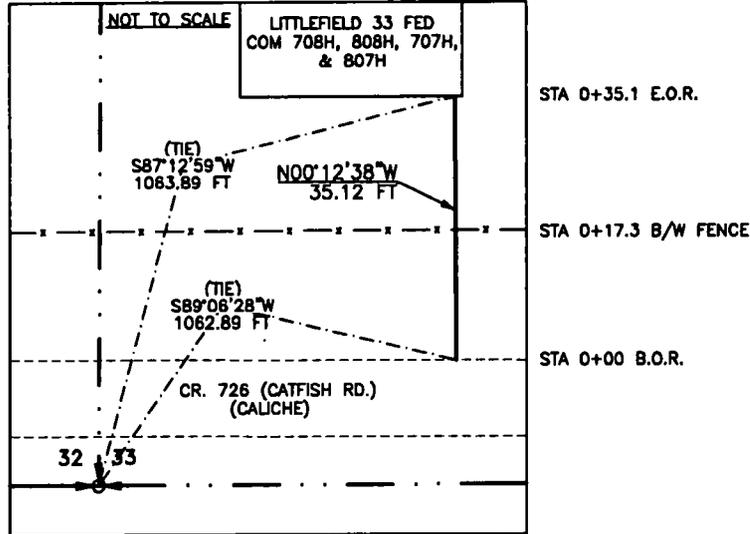
MADRON SURVEYING, INC. 301 SOUTH CANAL (575) 234-3341 CARLSBAD, NEW MEXICO

ACCESS ROAD PLAT

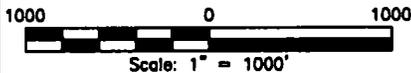
ACCESS ROAD FROM CR. 726 (CATFISH RD.) TO LITTLEFIELD 33 FED COM 708H, 808H, 707H, & 807H

COG OPERATING, LLC

**CENTERLINE SURVEY OF AN ACCESS ROAD CROSSING
SECTION 33, TOWNSHIP 26 SOUTH, RANGE 29 EAST, N.M.P.M.
EDDY COUNTY, STATE OF NEW MEXICO
MARCH 28, 2018**



SEE NEXT SHEET (2-5) FOR DESCRIPTION



GENERAL NOTES

- 1.) THE INTENT OF THIS ROUTE SURVEY IS TO ACQUIRE AN EASEMENT.
- 2.) BASIS OF BEARING AND DISTANCE IS NMSP EAST (NAD83) MODIFIED TO SURFACE COORDINATES. NAD 83 (FEET) AND NAVD 88 (FEET) COORDINATE SYSTEMS USED IN THE SURVEY.

SHEET: 1-5

MADRON SURVEYING, INC. CARLSBAD, NEW MEXICO

SURVEYOR CERTIFICATE

I, FILIMON F. JARAMILLO, A NEW MEXICO PROFESSIONAL SURVEYOR NO. 12797, HEREBY CERTIFY THAT I HAVE CONDUCTED AND AM RESPONSIBLE FOR THIS SURVEY. THAT THIS SURVEY IS TRUE AND CORRECT TO THE BEST OF MY KNOWLEDGE AND BELIEF, AND THAT THIS SURVEY AND PLAT MEET THE MINIMUM STANDARDS FOR LAND SURVEYING IN THE STATE OF NEW MEXICO.

IN WITNESS WHEREOF THIS CERTIFICATE IS EXECUTED AT CARLSBAD, NEW MEXICO, THIS 28TH DAY OF MARCH 2018

(Signature of Filimon F. Jaramillo)
 FILIMON F. JARAMILLO, P.S. 12797
 PROFESSIONAL SURVEYOR

MADRON SURVEYING, INC.
 301 SOUTH CANAL
 CARLSBAD, NEW MEXICO 88220
 Phone (575) 234-3341

SURVEY NO. 6134

ACCESS ROAD PLAT

ACCESS ROAD FROM CR. 726 (CATFISH RD.) TO LITTLEFIELD 33 FED COM 708H, 808H, 707H, & 807H

COG OPERATING, LLC

**CENTERLINE SURVEY OF AN ACCESS ROAD CROSSING
SECTION 33, TOWNSHIP 26 SOUTH, RANGE 29 EAST, N.M.P.M.
EDDY COUNTY, STATE OF NEW MEXICO
MARCH 28, 2018**

DESCRIPTION

A STRIP OF LAND 30 FEET WIDE CROSSING BUREAU OF LAND MANAGEMENT LAND IN SECTION 33, TOWNSHIP 26 SOUTH, RANGE 29 EAST, N.M.P.M., EDDY COUNTY, STATE OF NEW MEXICO AND BEING 15 FEET EACH SIDE OF THE FOLLOWING DESCRIBED CENTERLINE SURVEY:

BEGINNING AT A POINT WITHIN LOT 9 OF SAID SECTION 33, TOWNSHIP 26 SOUTH, RANGE 29 EAST, N.M.P.M., WHENCE THE SOUTHWEST CLOSING CORNER OF SAID SECTION 33, TOWNSHIP 26 SOUTH, RANGE 29 EAST, N.M.P.M. BEARS S89°06'28"W, A DISTANCE OF 1062.89 FEET;
THENCE N00°12'38"W A DISTANCE OF 35.12 FEET THE TERMINUS OF THIS CENTERLINE SURVEY, WHENCE THE SOUTHWEST CLOSING CORNER OF SAID SECTION 33, TOWNSHIP 26 SOUTH, RANGE 29 EAST, N.M.P.M. BEARS S87°12'59"W, A DISTANCE OF 1063.89 FEET;

SAID STRIP OF LAND BEING 35.12 FEET OR 2.13 RODS IN LENGTH, CONTAINING 0.024 ACRES MORE OR LESS AND BEING ALLOCATED BY FORTIES AS FOLLOWS:

LOT 9 35.12 L.F. 2.13 RODS 0.024 ACRES

GENERAL NOTES

- 1.) THE INTENT OF THIS ROUTE SURVEY IS TO ACQUIRE AN EASEMENT.
- 2.) BASIS OF BEARING AND DISTANCE IS NMSP EAST (NAD83) MODIFIED TO SURFACE COORDINATES. NAD 83 (FEET) AND NAVD 88 (FEET) COORDINATE SYSTEMS USED IN THE SURVEY.

SURVEYOR CERTIFICATE

I, FILIMON F. JARAMILLO, A NEW MEXICO PROFESSIONAL SURVEYOR NO. 12797, HEREBY CERTIFY THAT I HAVE CONDUCTED AND AM RESPONSIBLE FOR THIS SURVEY, THAT THIS SURVEY IS TRUE AND CORRECT TO THE BEST OF MY KNOWLEDGE AND BELIEF, AND THAT THIS SURVEY AND PLAT MEET THE MINIMUM STANDARDS FOR LAND SURVEYING IN THE STATE OF NEW MEXICO.

IN WITNESS WHEREOF, THIS CERTIFICATE IS EXECUTED AT CARLSBAD, NEW MEXICO, THIS 28th DAY OF MARCH 2018.

FILIMON F. JARAMILLO PLS 12797

MADRON SURVEYING, INC.
301 SOUTH CANAL
CARLSBAD, NEW MEXICO 88220
Phone (575) 234-3341

SURVEY NO. 6134

SHEET: 2-5

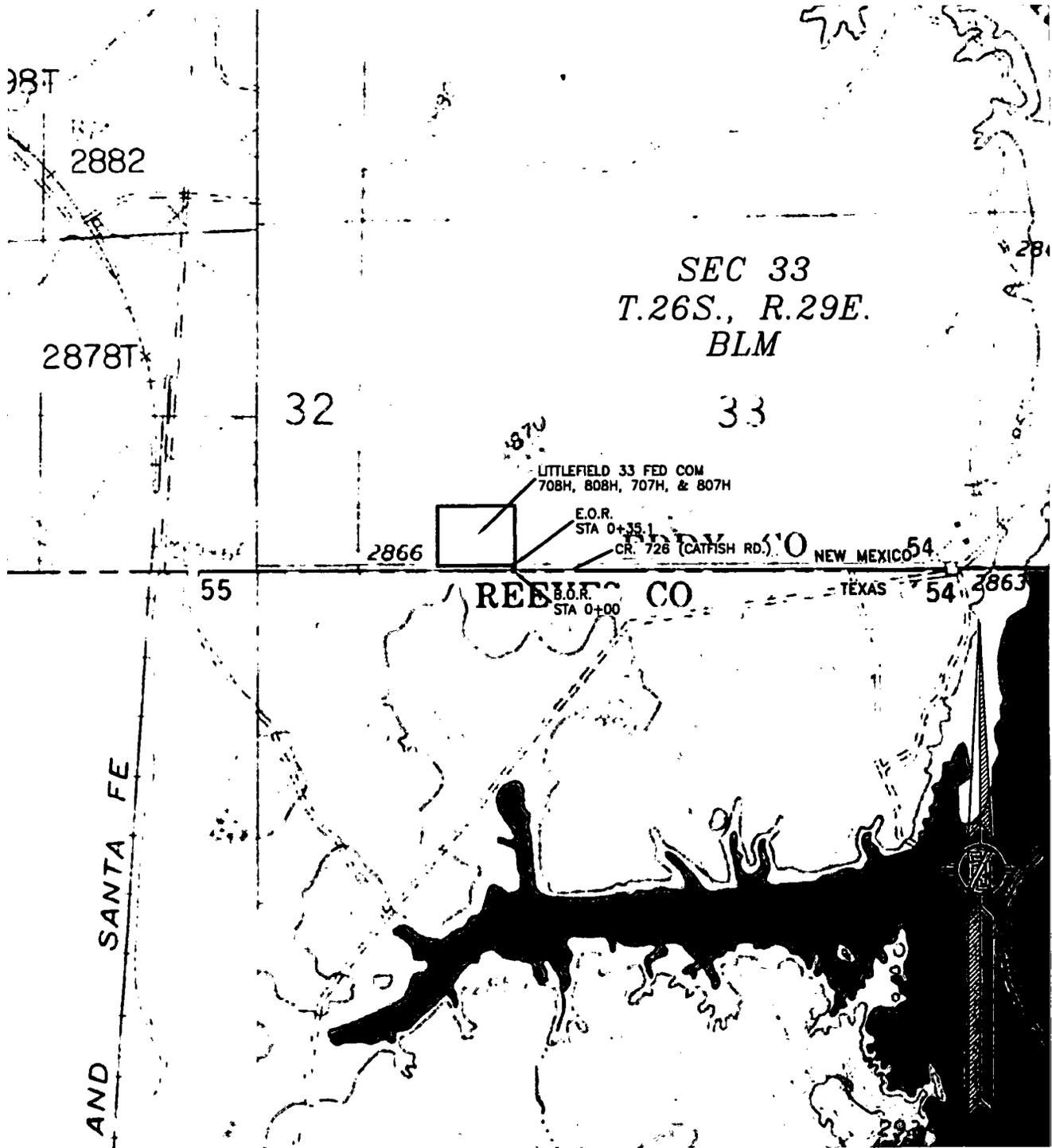
MADRON SURVEYING, INC. 301 SOUTH CANAL CARLSBAD, NEW MEXICO
(575) 234-3341

ACCESS ROAD PLAT

ACCESS ROAD FROM CR. 726 (CATFISH RD.) TO LITTLEFIELD 33 FED COM 708H, 808H, 707H, & 807H

COG OPERATING, LLC

**CENTERLINE SURVEY OF AN ACCESS ROAD CROSSING
SECTION 33, TOWNSHIP 26 SOUTH, RANGE 29 EAST, N.M.P.M.
EDDY COUNTY, STATE OF NEW MEXICO
MARCH 28, 2018**



SHEET: 3-5

SURVEY NO. 6134

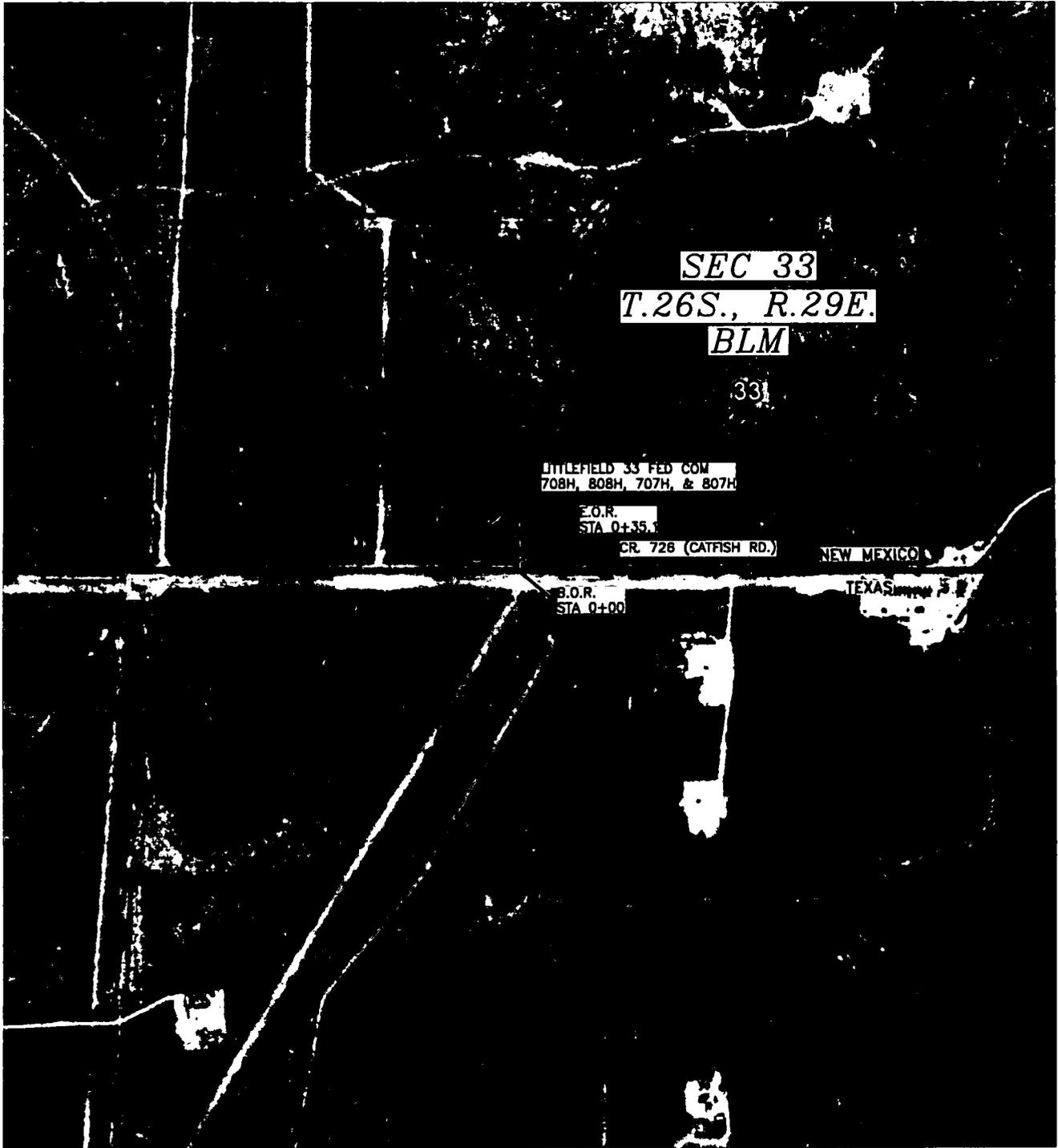
MADRON SURVEYING, INC. 301 SOUTH CANAL (575) 234-3341 CARLSBAD, NEW MEXICO

ACCESS ROAD PLAT

ACCESS ROAD FROM CR. 726 (CATFISH RD.) TO LITTLEFIELD 33 FED COM 708H, 808H, 707H, & 807H

COG OPERATING, LLC

CENTERLINE SURVEY OF AN ACCESS ROAD CROSSING
SECTION 33, TOWNSHIP 26 SOUTH, RANGE 29 EAST, N.M.P.M.
EDDY COUNTY, STATE OF NEW MEXICO
MARCH 28, 2018

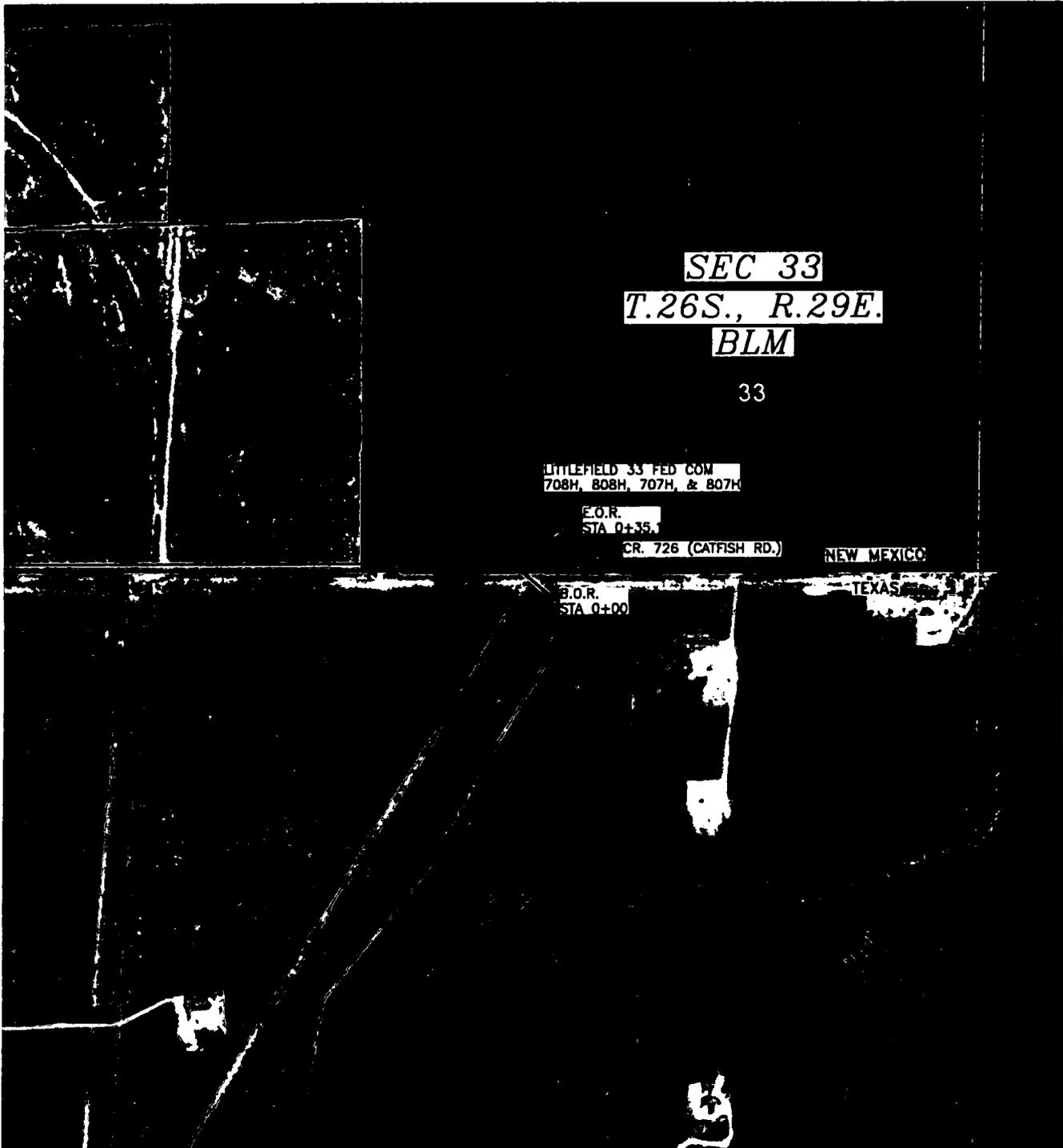


ACCESS ROAD PLAT

ACCESS ROAD FROM CR. 726 (CATFISH RD.) TO LITTLEFIELD 33 FED COM 708H, 808H, 707H, & 807H

COG OPERATING, LLC

**CENTERLINE SURVEY OF AN ACCESS ROAD CROSSING
SECTION 33, TOWNSHIP 26 SOUTH, RANGE 29 EAST, N.M.P.M.
EDDY COUNTY, STATE OF NEW MEXICO
MARCH 28, 2018**



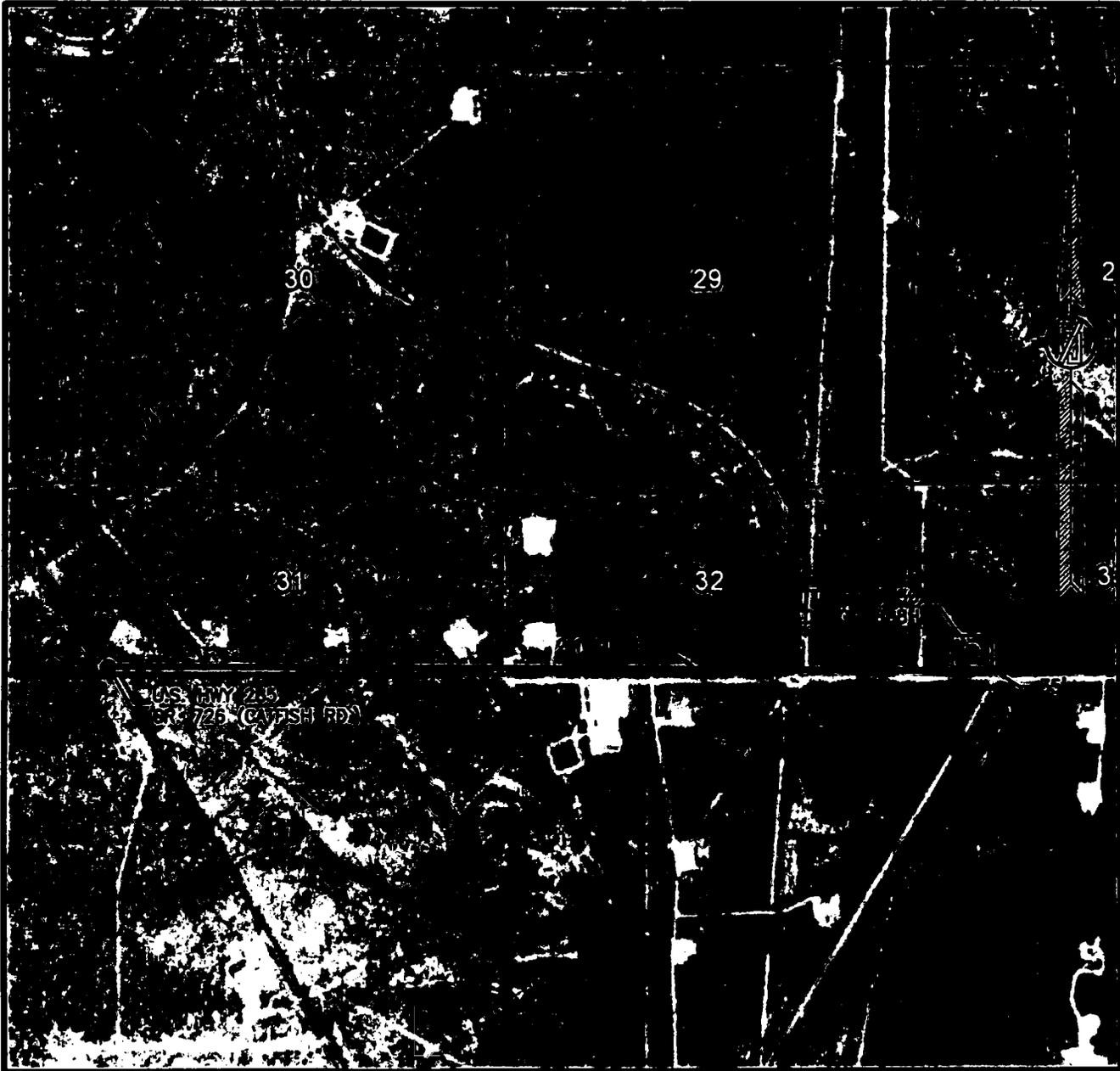
■ BLM LAND ■ STATE LAND □ FEE LAND

SHEET: 5-5

MADRON SURVEYING, INC. 301 SOUTH CANAL (575) 234-3341 CARLSBAD, NEW MEXICO

SURVEY NO. 6134

SECTION 33, TOWNSHIP 26 SOUTH, RANGE 29 EAST, N.M.P.M.
EDDY COUNTY, STATE OF NEW MEXICO
AERIAL ACCESS ROUTE MAP



NOT TO SCALE
AERIAL PHOTO:
GOOGLE EARTH
NOV. 2015

COG OPERATING, LLC
LITTLEFIELD 33 FED COM 808H
LOCATED 250 FT. FROM THE SOUTH LINE
AND 781 FT. FROM THE WEST LINE OF
SECTION 33, TOWNSHIP 26 SOUTH,
RANGE 29 EAST, N.M.P.M.
EDDY COUNTY, STATE OF NEW MEXICO

JANUARY 16, 2018

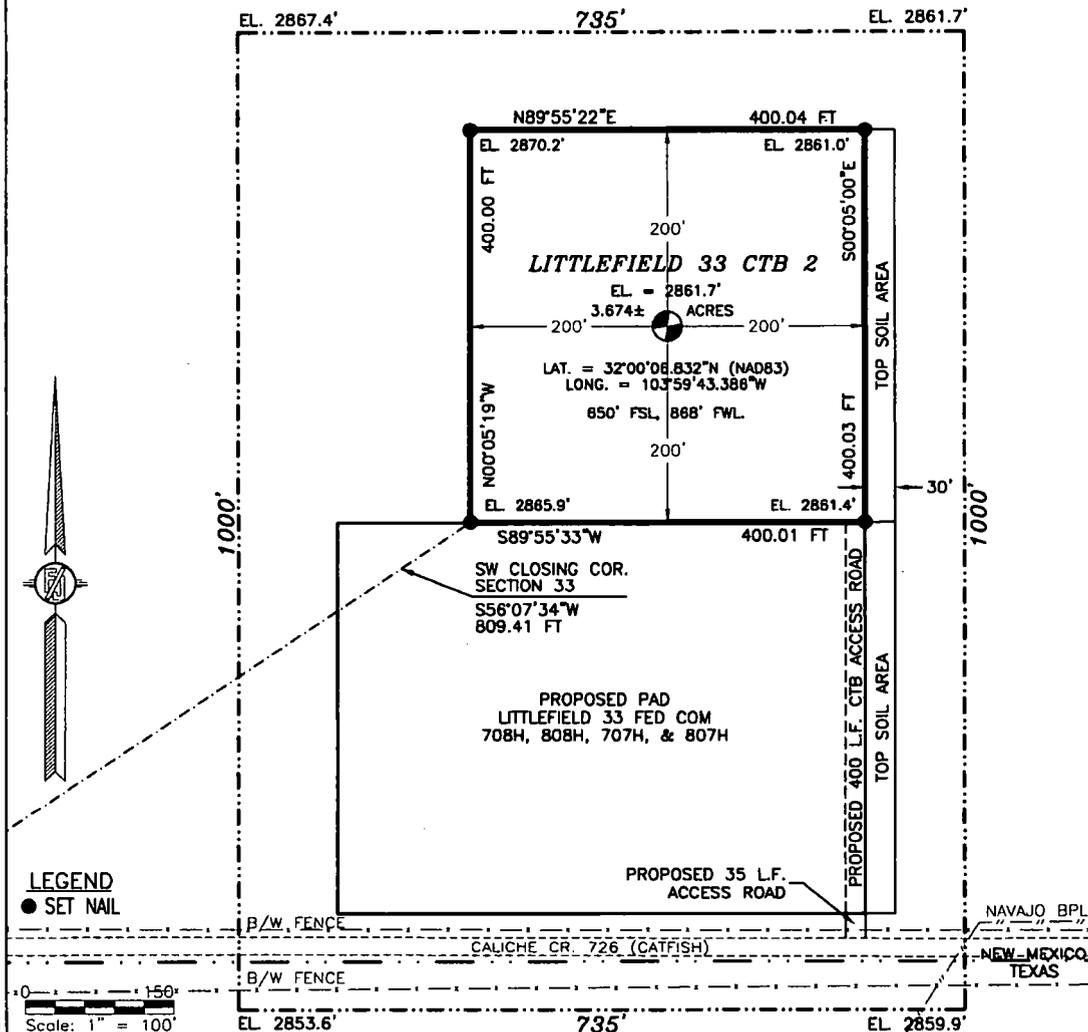
SURVEY NO. 5783

MADRON SURVEYING, INC. 301 SOUTH CANAL CARLSBAD, NEW MEXICO
(575) 234-3341

LITTLEFIELD 33 CTB 2

COG OPERATING, LLC
 IN THE NE/4 LOT 9 & SE/4 LOT 8 OF
 SECTION 33, TOWNSHIP 26 SOUTH, RANGE 29 EAST, N.M.P.M.
 EDDY COUNTY, STATE OF NEW MEXICO

APRIL 9, 2018



DESCRIPTION

A CERTAIN PIECE OR PARCEL OF LAND AND REAL ESTATE LYING IN BUREAU OF LAND MANAGEMENT LAND IN THE NE/4 LOT 9 & SE/4 LOT 8 OF SECTION 33, TOWNSHIP 26 SOUTH, RANGE 29 EAST, N.M.P.M., EDDY COUNTY, NEW MEXICO.

BEGINNING AT THE SOUTHWEST CORNER OF THE PARCEL, WHENCE THE SOUTHWEST CLOSING CORNER OF SECTION 33, TOWNSHIP 26 SOUTH, RANGE 29 EAST, N.M.P.M. BEARS S56°07'34"W, A DISTANCE OF 809.41 FEET;
 THENCE N00°05'19"W A DISTANCE OF 400.00 FEET TO THE NORTHWEST CORNER OF THE PARCEL;
 THENCE N89°55'22"E A DISTANCE OF 400.04 FEET TO THE NORTHEAST CORNER OF THE PARCEL;
 THENCE S00°05'00"E A DISTANCE OF 400.03 FEET TO THE SOUTHEAST CORNER OF THE PARCEL;
 THENCE S89°55'33"W A DISTANCE OF 400.01 FEET TO THE SOUTHWEST CORNER OF THE PARCEL, THE POINT OF BEGINNING;
 CONTAINING 3.674 ACRES MORE OR LESS.

GENERAL NOTES

- 1.) THE INTENT OF THIS SURVEY IS TO ACQUIRE A BUSINESS LEASE FOR THE PURPOSE OF BUILDING A CENTRAL TANK BATTERY
 - 2.) BASIS OF BEARING IS NEW MEXICO STATE PLANE EAST ZONE MODIFIED TO THE SURFACE (NAD83), COORDINATES ARE NAD 83, ELEVATIONS ARE NAVD 88
- DRIVING DIRECTIONS: FROM U.S. HWY 285 AND CALICHE CR. 726 (CATFISH RD.) GO EAST ON CR. 726 2.1 MILES TO A ROAD SURVEY AND FOLLOW FLAGS NORTH 435' TO THE SOUTHWEST PAD CORNER FOR THIS LOCATION.

SURVEYOR CERTIFICATE

I, FILMON F. SARAMILLO, A NEW MEXICO PROFESSIONAL SURVEYOR NO. 12787, HEREBY CERTIFY THAT I HAVE CONDUCTED AND AM RESPONSIBLE FOR THIS SURVEY, THAT THIS SURVEY IS TRUE AND CORRECT TO THE BEST OF MY KNOWLEDGE AND BELIEF, AND THAT THIS SURVEY AND PLAN MEET THE MINIMUM STANDARDS FOR LAND SURVEYING IN THE STATE OF NEW MEXICO.

IN WITNESS WHEREOF THIS CERTIFICATE IS EXECUTED AT CARLSBAD, NEW MEXICO, THIS 18th DAY OF APRIL, 2018.

FILMON F. SARAMILLO, PLS. 12787
 MADRON SURVEYING, INC.
 301 SOUTH CANAL
 CARLSBAD, NEW MEXICO 88220
 Phone (575) 234-3341

SHEET: 1-3

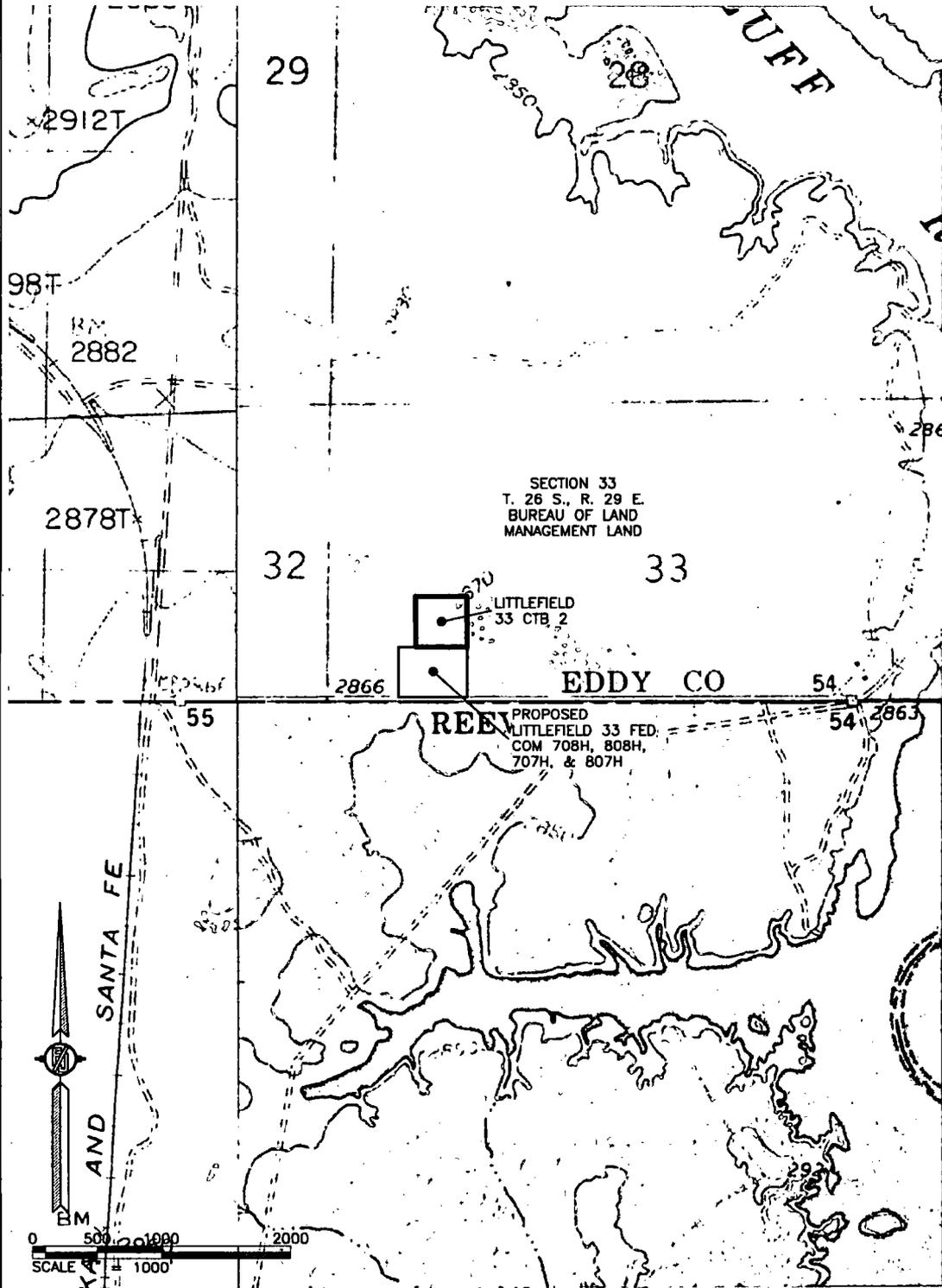
MADRON SURVEYING, INC. CARLSBAD, NEW MEXICO SURVEY NO. 6133

LITTLEFIELD 33 CTB 2

COG OPERATING, LLC
IN THE NE/4 LOT 9 & SE/4 LOT 8 OF
SECTION 33, TOWNSHIP 26 SOUTH, RANGE 29 EAST, N.M.P.M.
EDDY COUNTY, STATE OF NEW MEXICO

APRIL 9, 2018

QUAD MAP



SECTION 33
T. 26 S., R. 29 E.
BUREAU OF LAND
MANAGEMENT LAND

LITTLEFIELD
33 CTB 2

PROPOSED
LITTLEFIELD 33 FED.
CANAL 708H, 808H,
707H, & 807H

SHEET: 2-3

SURVEY NO. 6133

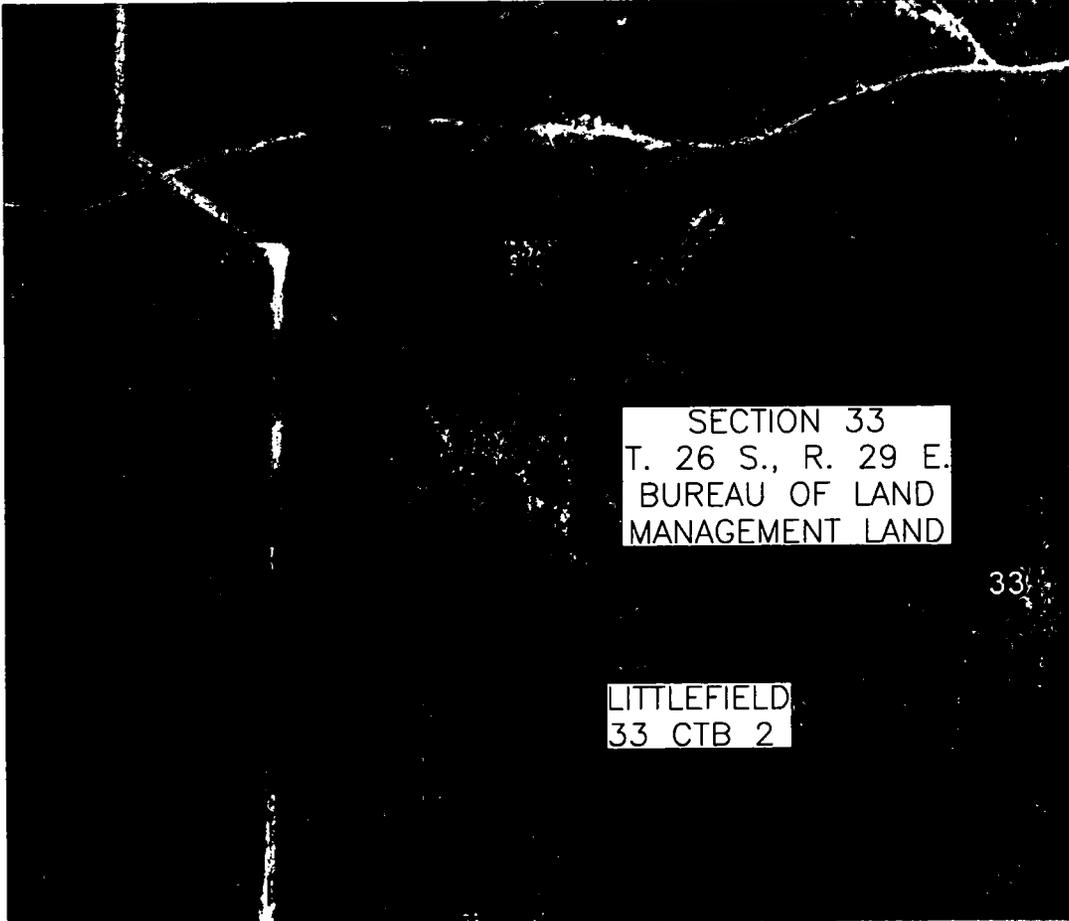
MADRON SURVEYING, INC. 301 SOUTH CANAL CARLSBAD, NEW MEXICO
(575) 234-3341

LITTLEFIELD 33 CTB 2

COG OPERATING, LLC
IN THE NE/4 LOT 9 & SE/4 LOT 8 OF
SECTION 33, TOWNSHIP 26 SOUTH, RANGE 29 EAST, N.M.P.M.
EDDY COUNTY, STATE OF NEW MEXICO

APRIL 9, 2018

AERIAL PHOTO



SECTION 33
T. 26 S., R. 29 E.
BUREAU OF LAND
MANAGEMENT LAND

33

LITTLEFIELD
33 CTB 2

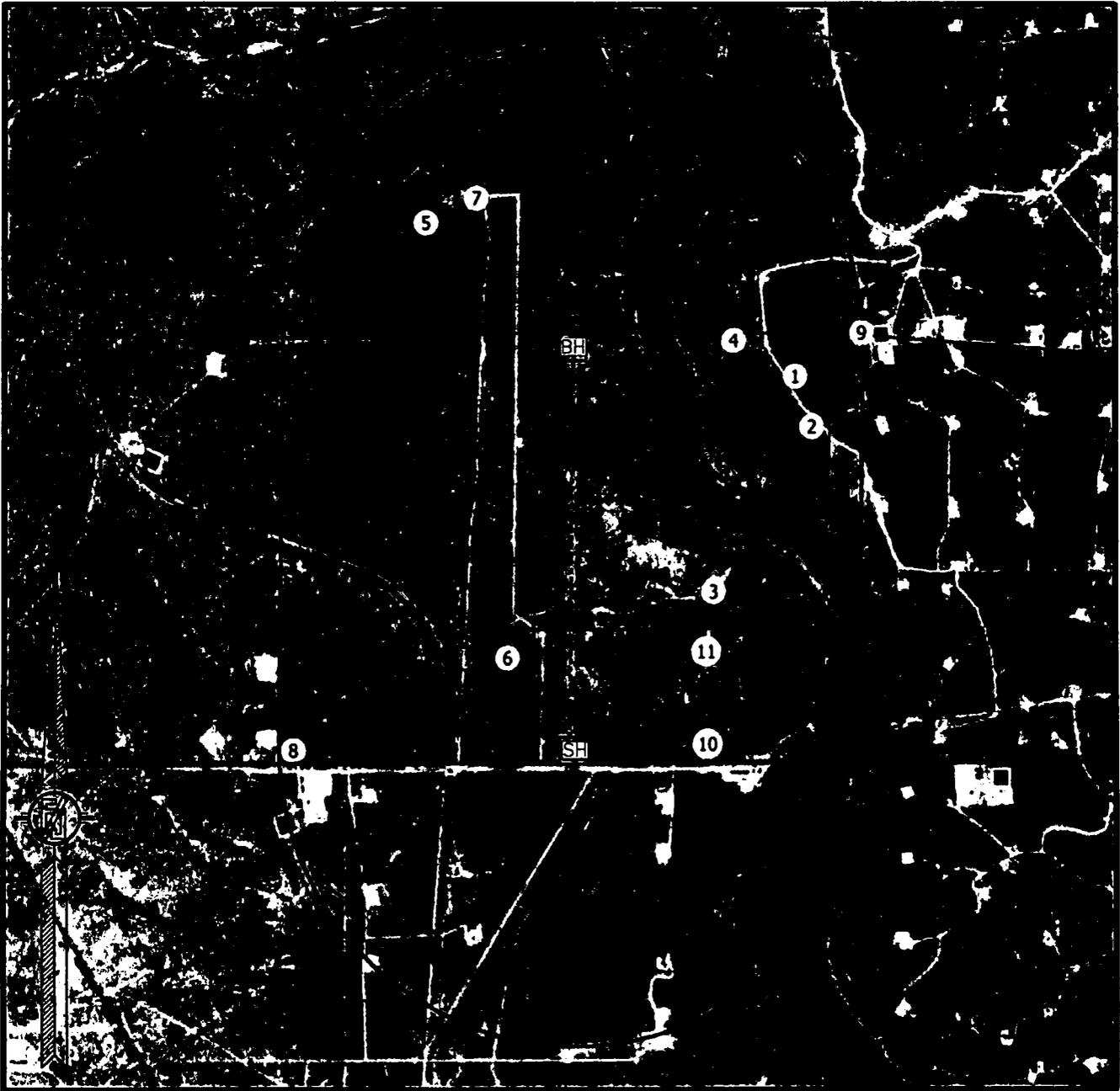
PROPOSED
LITTLEFIELD 33 FED
COM 708H, 808H,
707H, & 807H

SHEET: 3-3

SURVEY NO. 6133

MADRON SURVEYING, INC. 301 SOUTH CANAL (575) 234-3341 CARLSBAD, NEW MEXICO

1-MILE MAP



- SH** SURFACE LOCATION
- BH** BOTTOM OF HOLE
- XX** WELLS WITHIN 1 MILE

COG OPERATING, LLC
LITTLEFIELD 33 FED COM 808H
LOCATED 250 FT. FROM THE SOUTH LINE
AND 781 FT. FROM THE WEST LINE OF
SECTION 33, TOWNSHIP 26 SOUTH,
RANGE 29 EAST, N.M.P.M.
EDDY COUNTY, STATE OF NEW MEXICO

JANUARY 16, 2018

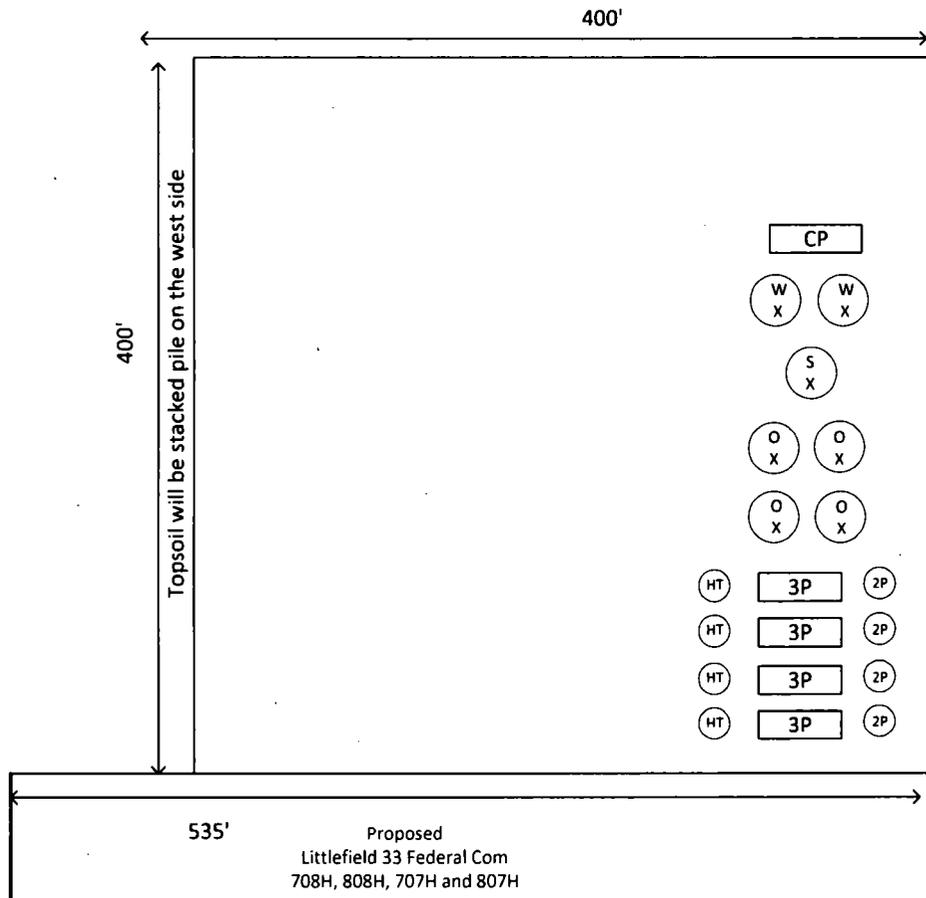
SURVEY NO. 5783

MADRON SURVEYING, INC. 301 SOUTH CANAL CARLSBAD, NEW MEXICO
(575) 234-3341

CONCHO
 COG Operating LLC
 2208 West Main Street
 Artesia, NM 88210

Well Site Layout
 Production Facility Layout
 Littlefield 33 CTB 2
 Section 33- T26S- R29E

Exhibit 3

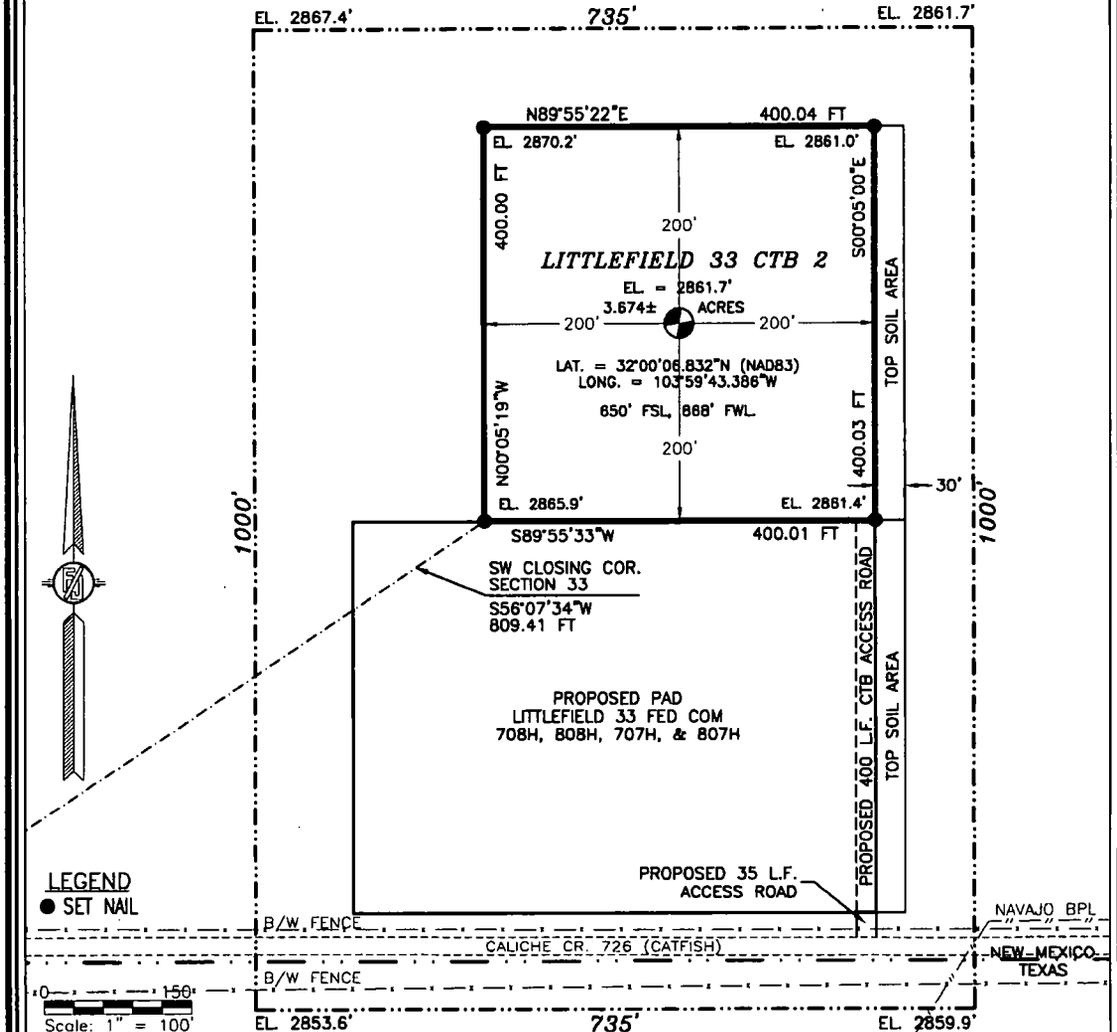


- Legend**
- O = 750 BBL Steel Oil Tank
 - W = 750 BBL Steel Water Tank
 - S = 1000 BBL Steel Water Tank
 - 2P = 2 Phase Separator
 - 3P = 3Phase Separator
 - HT = Heater Treater
 - X = Valve
 - G = Gas Scrubber
 - CP = Control Panel

LITTLEFIELD 33 CTB 2

COG OPERATING, LLC
 IN THE NE/4 LOT 9 & SE/4 LOT 8 OF
 SECTION 33, TOWNSHIP 26 SOUTH, RANGE 29 EAST, N.M.P.M.
 EDDY COUNTY, STATE OF NEW MEXICO

APRIL 9, 2018



LEGEND
 ● SET NAIL

Scale: 1" = 100'

DESCRIPTION

A CERTAIN PIECE OR PARCEL OF LAND AND REAL ESTATE LYING IN BUREAU OF LAND MANAGEMENT LAND IN THE NE/4 LOT 9 & SE/4 LOT 8 OF SECTION 33, TOWNSHIP 26 SOUTH, RANGE 29 EAST, N.M.P.M., EDDY COUNTY, NEW MEXICO.

BEGINNING AT THE SOUTHWEST CORNER OF THE PARCEL, WHENCE THE SOUTHWEST CLOSING CORNER OF SECTION 33, TOWNSHIP 26 SOUTH, RANGE 29 EAST, N.M.P.M. BEARS S56°07'34"W, A DISTANCE OF 809.41 FEET;
 THENCE N00°05'19"W A DISTANCE OF 400.00 FEET TO THE NORTHWEST CORNER OF THE PARCEL;
 THENCE N89°55'22"E A DISTANCE OF 400.04 FEET TO THE NORTHEAST CORNER OF THE PARCEL;
 THENCE S00°05'00"E A DISTANCE OF 400.03 FEET TO THE SOUTHEAST CORNER OF THE PARCEL;
 THENCE S89°55'33"W A DISTANCE OF 400.01 FEET TO THE SOUTHWEST CORNER OF THE PARCEL, THE POINT OF BEGINNING;
 CONTAINING 3.674 ACRES MORE OR LESS.

GENERAL NOTES

- 1.) THE INTENT OF THIS SURVEY IS TO ACQUIRE A BUSINESS LEASE FOR THE PURPOSE OF BUILDING A CENTRAL TANK BATTERY
 - 2.) BASIS OF BEARING IS NEW MEXICO STATE PLANE EAST ZONE MODIFIED TO THE SURFACE (NAD83), COORDINATES ARE NAD 83, ELEVATIONS ARE NAVD 88
- DRIVING DIRECTIONS: FROM U.S. HWY 285 AND CALICHE CR. 726 (CATFISH RD.) GO EAST ON CR. 726 2.1 MILES TO A ROAD SURVEY AND FOLLOW FLAGS NORTH 435' TO THE SOUTHWEST PAD CORNER FOR THIS LOCATION.

SURVEYOR CERTIFICATE

I, FILMON F. SARAMILLO, A NEW MEXICO PROFESSIONAL SURVEYOR NO. 12787, HEREBY CERTIFY THAT I HAVE CONDUCTED AND AM RESPONSIBLE FOR THIS SURVEY, THAT THIS SURVEY IS TRUE AND CORRECT TO THE BEST OF MY KNOWLEDGE AND BELIEF, AND THAT THIS SURVEY AND PLAN MEET THE MINIMUM STANDARDS FOR LAND SURVEYING IN THE STATE OF NEW MEXICO.

IN WITNESS WHEREOF, THIS CERTIFICATE IS EXECUTED AT CARLSBAD, NEW MEXICO, THIS 18th DAY OF APRIL 2018.

FILMON F. SARAMILLO, DES. 12787
 MADRON SURVEYING, INC.
 301 SOUTH CANAL
 CARLSBAD, NEW MEXICO 88220
 Phone (575) 234-3341

SHEET: 1-3

MADRON SURVEYING, INC. CARLSBAD, NEW MEXICO

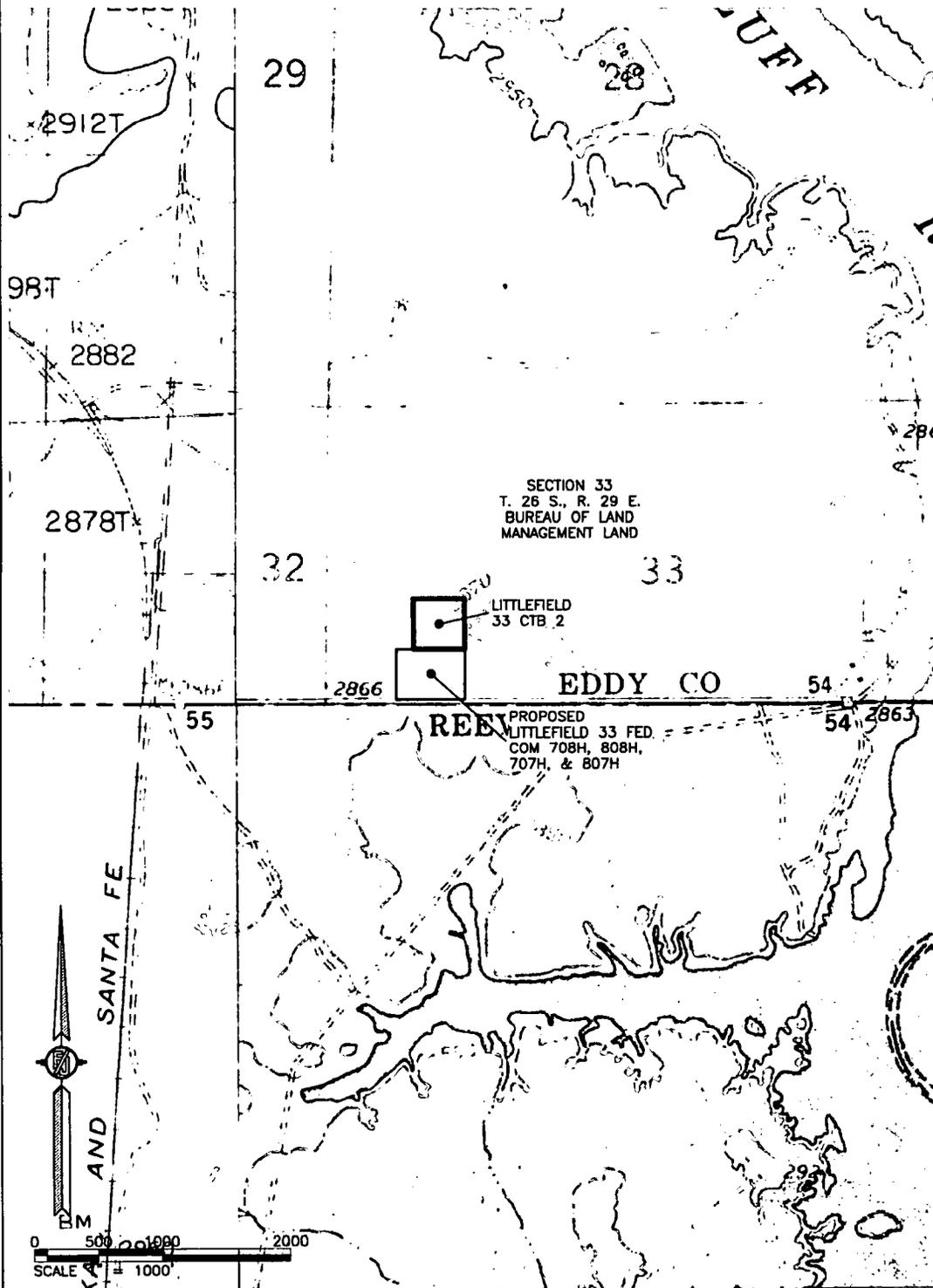
SURVEY NO. 6133

LITTLEFIELD 33 CTB 2

COG OPERATING, LLC
IN THE NE/4 LOT 9 & SE/4 LOT 8 OF
SECTION 33, TOWNSHIP 26 SOUTH, RANGE 29 EAST, N.M.P.M.
EDDY COUNTY, STATE OF NEW MEXICO

APRIL 9, 2018

QUAD MAP



SHEET: 2-3

MADRON SURVEYING, INC. 301 SOUTH CANAL CARLSBAD, NEW MEXICO
(575) 234-3341

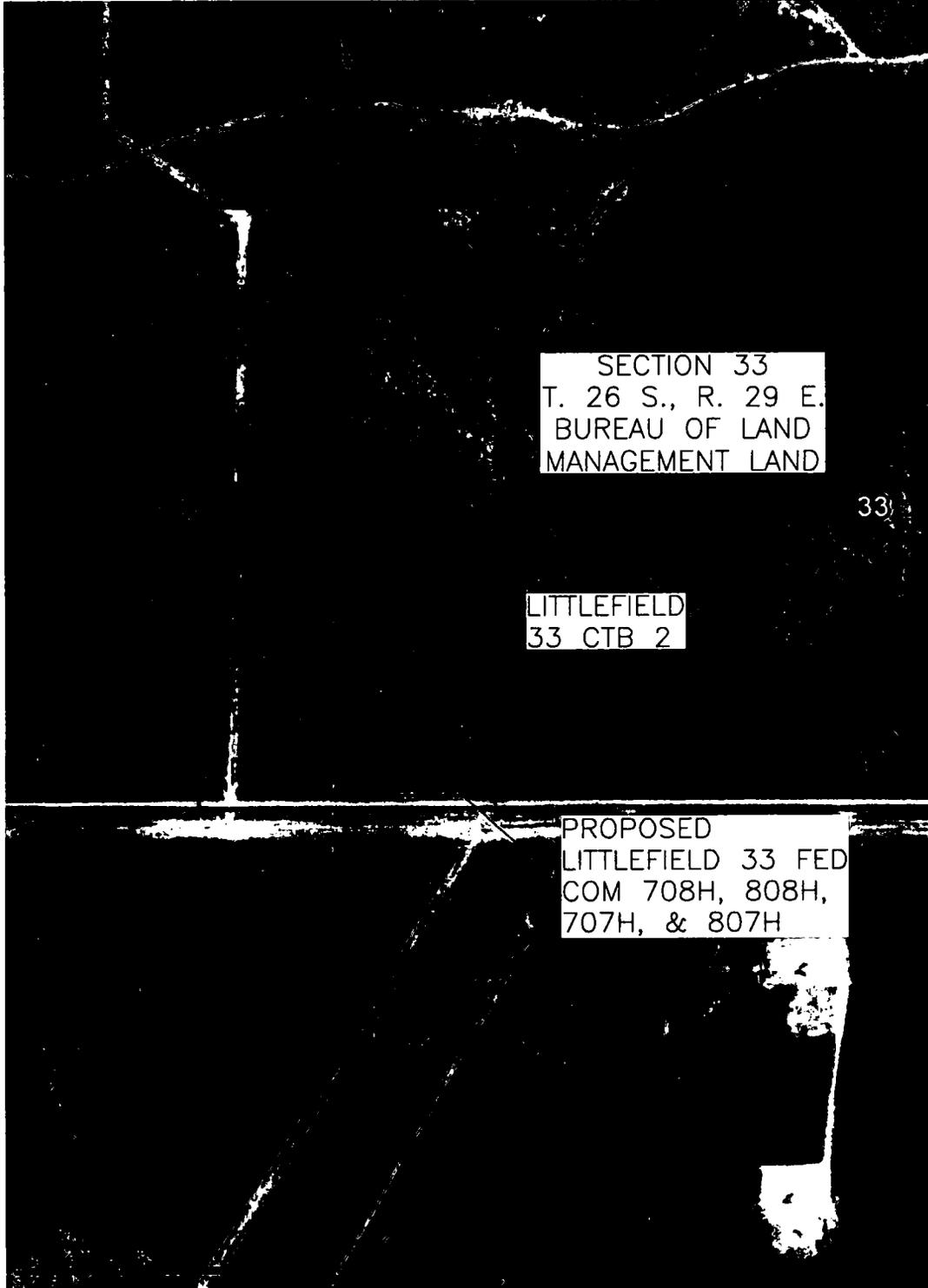
SURVEY NO. 6133

LITTLEFIELD 33 CTB 2

COC OPERATING, LLC
IN THE NE/4 LOT 9 & SE/4 LOT 8 OF
SECTION 33, TOWNSHIP 26 SOUTH, RANGE 29 EAST, N.M.P.M.
EDDY COUNTY, STATE OF NEW MEXICO

APRIL 9, 2018

AERIAL PHOTO



SECTION 33
T. 26 S., R. 29 E.
BUREAU OF LAND
MANAGEMENT LAND

33

LITTLEFIELD
33 CTB 2

PROPOSED
LITTLEFIELD 33 FED
COM 708H, 808H,
707H, & 807H

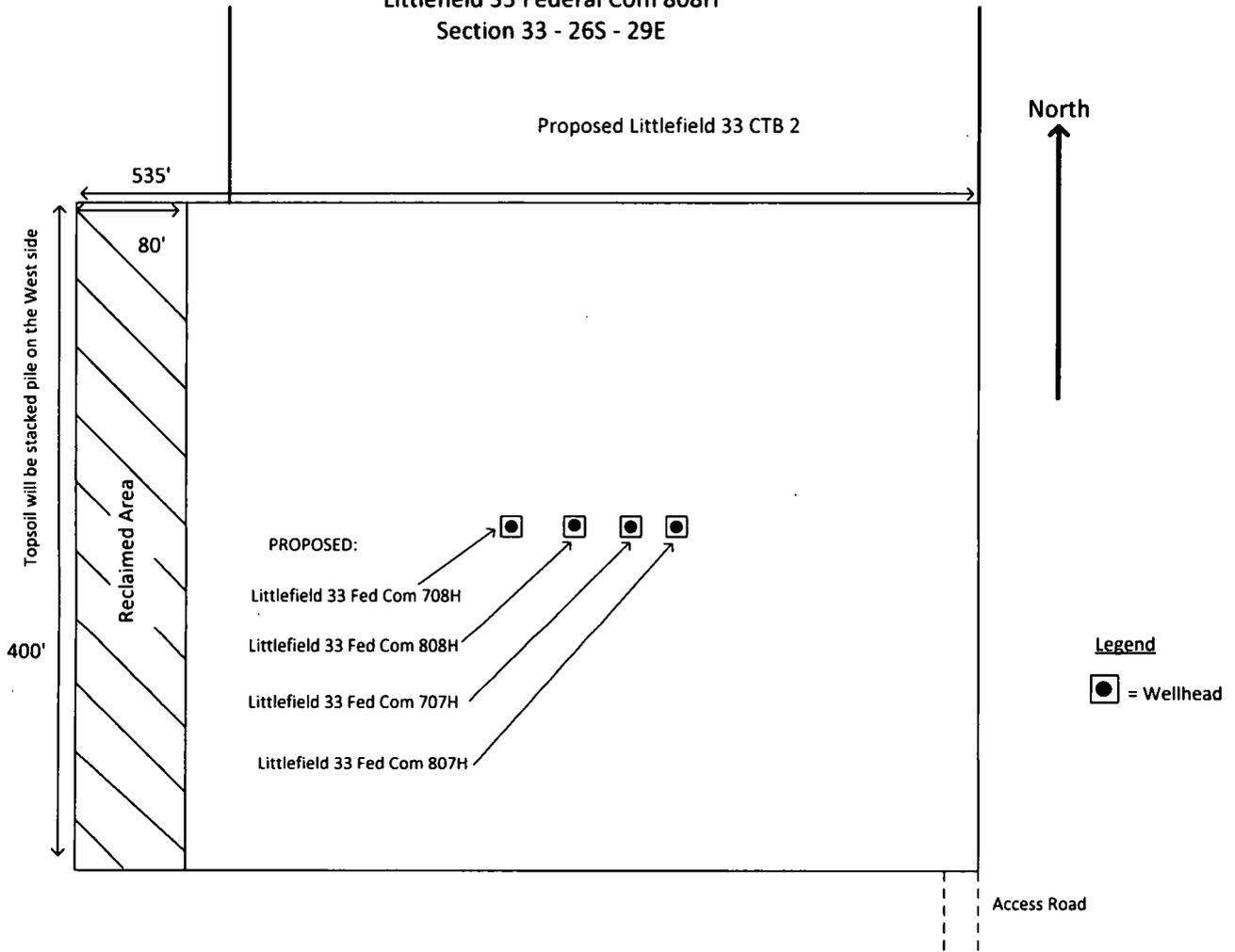
SHEET: 3-3

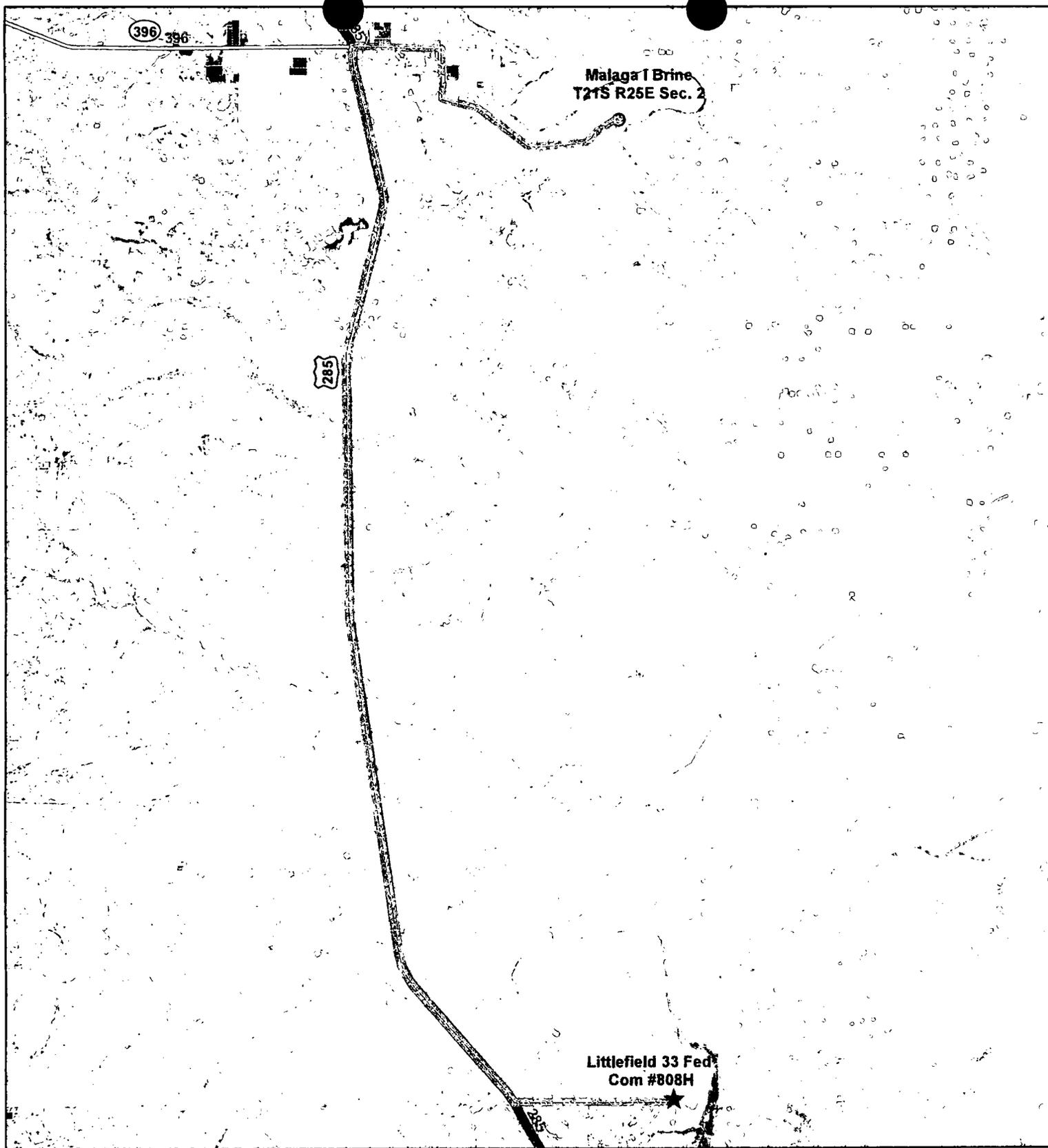
MADRON SURVEYING, INC. 361 SOUTH CANAL
(575) 234-3341 CARLSBAD, NEW MEXICO

SURVEY NO. 6133

**Well Site Layout
Production Facility Layout**
Littlefield 33 Federal Com 808H
Section 33 - 26S - 29E

Exhibit 3





 **CONCHO**

**Littlefield 33 Fed Com #808H
To Malaga 1 Brine**

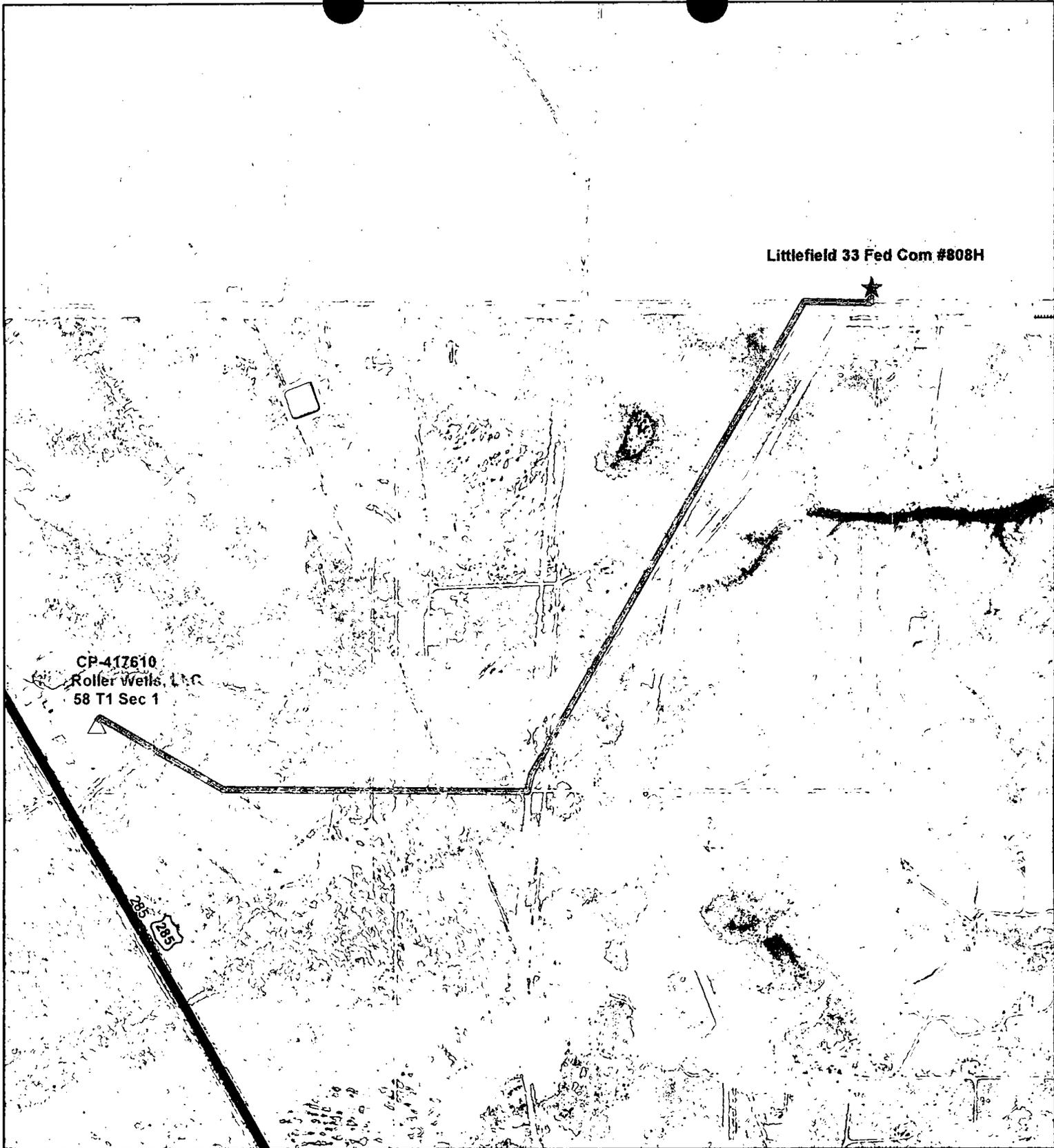
Date: 3/27/2018
Author: Whyte McDonald
State: New Mexico
County: Eddy

Disclaimer: This is not a legal survey document

Map Legend

 Route





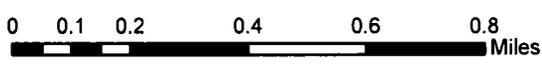


**Littlefield 33 Fed Com #808H
Water Transfer Route**

Date: 4/20/2018
Author: Whyte-McDonald
State: New Mexico
County: Eddy
Disclaimer: This is not a legal survey document

Map Legend

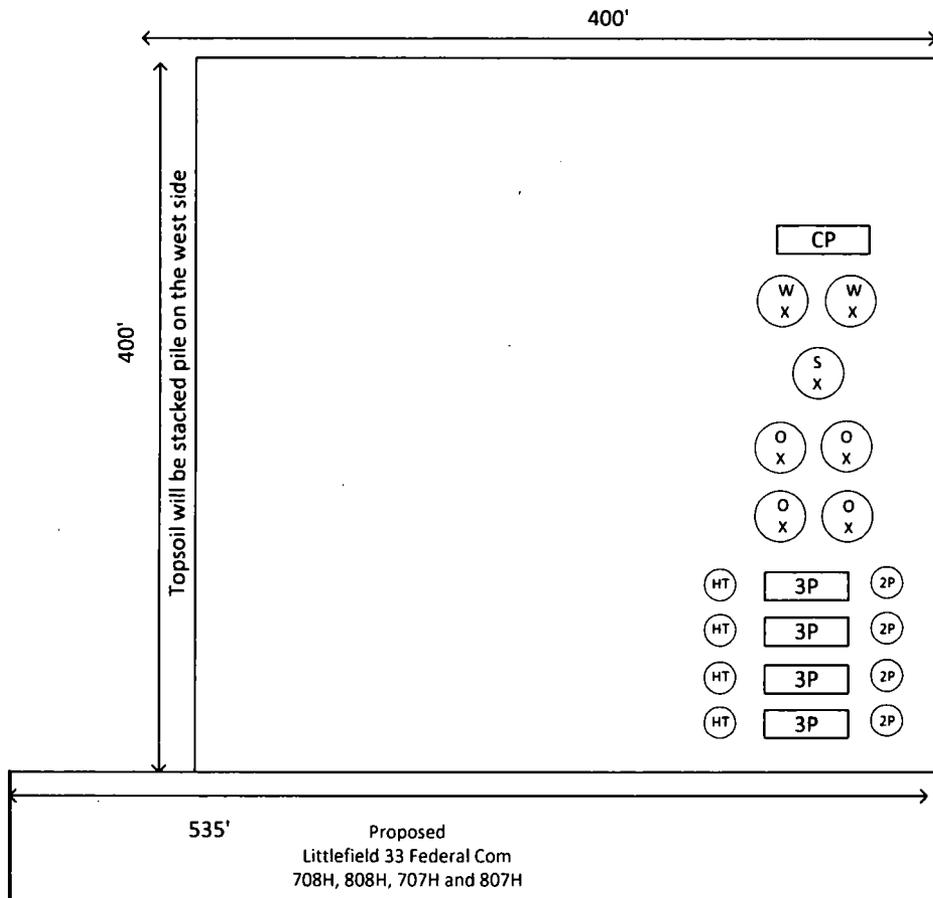
 Route



CONCHO
 COG Operating LLC
 2208 West Main Street
 Artesia, NM 88210

Well Site Layout
 Production Facility Layout
 Littlefield 33 CTB 2
 Section 33- T26S- R29E

Exhibit 3

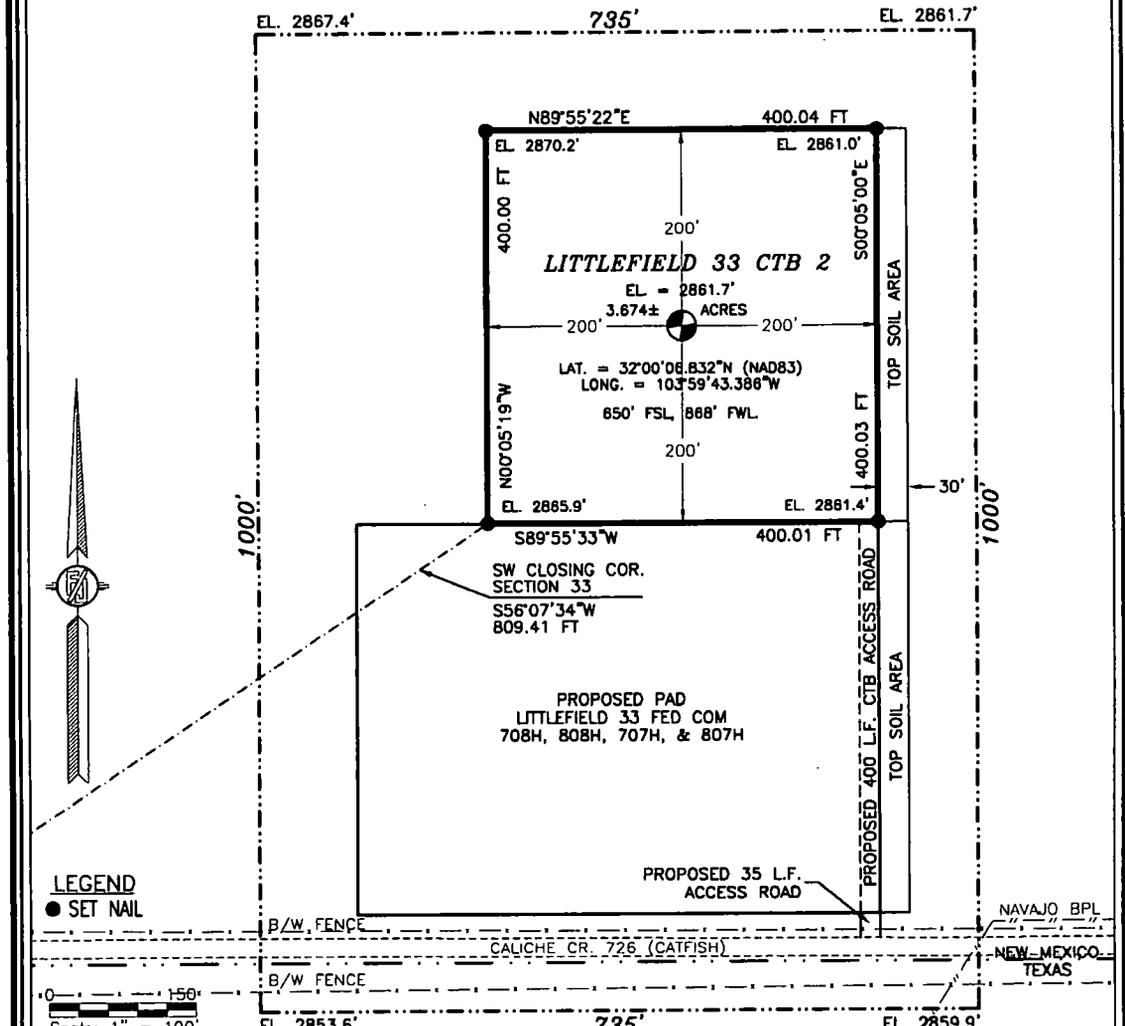


- Legend**
- O = 750 BBL Steel Oil Tank
 - W = 750 BBL Steel Water Tank
 - S = 1000 BBL Steel Water Tank
 - 2P = 2 Phase Separator
 - 3P = 3Phase Separator
 - HT = Heater Treater
 - X = Valve
 - G = Gas Scrubber
 - CP = Control Panel

LITTLEFIELD 33 CTB 2

COG OPERATING, LLC
 IN THE NE/4 LOT 9 & SE/4 LOT 8 OF
 SECTION 33, TOWNSHIP 26 SOUTH, RANGE 29 EAST, N.M.P.M.
 EDDY COUNTY, STATE OF NEW MEXICO

APRIL 9, 2018



LEGEND
 ● SET NAIL

Scale: 1" = 100'

DESCRIPTION

A CERTAIN PIECE OR PARCEL OF LAND AND REAL ESTATE LYING IN BUREAU OF LAND MANAGEMENT LAND IN THE NE/4 LOT 9 & SE/4 LOT 8 OF SECTION 33, TOWNSHIP 26 SOUTH, RANGE 29 EAST, N.M.P.M., EDDY COUNTY, NEW MEXICO.

BEGINNING AT THE SOUTHWEST CORNER OF THE PARCEL, WHENCE THE SOUTHWEST CLOSING CORNER OF SECTION 33, TOWNSHIP 26 SOUTH, RANGE 29 EAST, N.M.P.M. BEARS S56°07'34"W, A DISTANCE OF 809.41 FEET;
 THENCE N00°05'19"W A DISTANCE OF 400.00 FEET TO THE NORTHWEST CORNER OF THE PARCEL;
 THENCE N89°55'22"E A DISTANCE OF 400.04 FEET TO THE NORTHEAST CORNER OF THE PARCEL;
 THENCE S00°05'00"E A DISTANCE OF 400.03 FEET TO THE SOUTHEAST CORNER OF THE PARCEL;
 THENCE S89°55'33"W A DISTANCE OF 400.01 FEET TO THE SOUTHWEST CORNER OF THE PARCEL, THE POINT OF BEGINNING;
 CONTAINING 3.674 ACRES MORE OR LESS.

GENERAL NOTES

- 1.) THE INTENT OF THIS SURVEY IS TO ACQUIRE A BUSINESS LEASE FOR THE PURPOSE OF BUILDING A CENTRAL TANK BATTERY
 - 2.) BASIS OF BEARING IS NEW MEXICO STATE PLANE EAST ZONE MODIFIED TO THE SURFACE (NAD83), COORDINATES ARE NAD 83, ELEVATIONS ARE NAVD 88
- DRIVING DIRECTIONS: FROM U.S. HWY 285 AND CALICHE CR. 726 (CATFISH RD.) GO EAST ON CR. 726 2.1 MILES TO A ROAD SURVEY AND FOLLOW FLAGS NORTH 435' TO THE SOUTHWEST PAD CORNER FOR THIS LOCATION.

SURVEYOR CERTIFICATE

I, FILMON F. JARAMILLO, A NEW MEXICO PROFESSIONAL SURVEYOR NO. 12797, HEREBY CERTIFY THAT I HAVE CONDUCTED AND AM RESPONSIBLE FOR THIS SURVEY, THAT THIS SURVEY IS TRUE AND CORRECT TO THE BEST OF MY KNOWLEDGE AND BELIEF, AND THAT THIS SURVEY AND PLAN MEET THE MINIMUM STANDARDS FOR LAND SURVEYING IN THE STATE OF NEW MEXICO.

IN WITNESS WHEREOF THIS CERTIFICATE IS EXECUTED AT CARLSBAD, NEW MEXICO, THIS 12 DAY OF APRIL 2018.

FILMON F. JARAMILLO, PLS. 12797

MADRON SURVEYING, INC.
 301 SOUTH CANAL
 CARLSBAD, NEW MEXICO 88220
 Phone (575) 234-3341

SHEET: 1-3

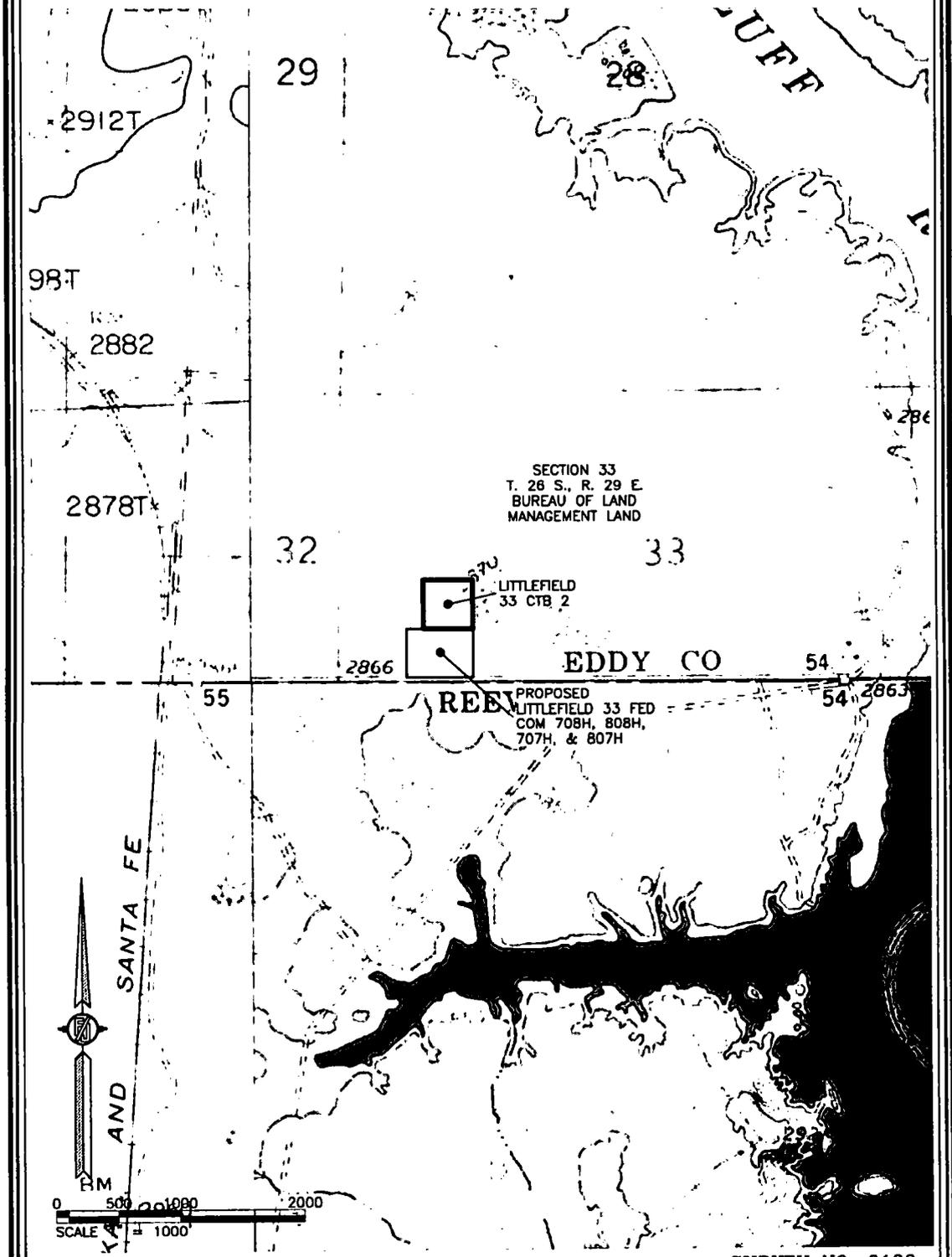
MADRON SURVEYING, INC. CARLSBAD, NEW MEXICO SURVEY NO. 6133

LITTLEFIELD 33 CTB 2

COG OPERATING, LLC
IN THE NE/4 LOT 9 & SE/4 LOT 8 OF
SECTION 33, TOWNSHIP 26 SOUTH, RANGE 29 EAST, N.M.P.M.
EDDY COUNTY, STATE OF NEW MEXICO

APRIL 9, 2018

QUAD MAP

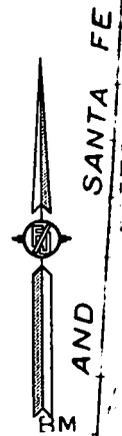


SECTION 33
T. 26 S., R. 29 E.
BUREAU OF LAND
MANAGEMENT LAND

LITTLEFIELD
33 CTB 2

EDDY CO

PROPOSED
LITTLEFIELD 33 FED
COM 708H, 808H,
707H, & 807H



SHEET: 2-3

SURVEY NO. 6133

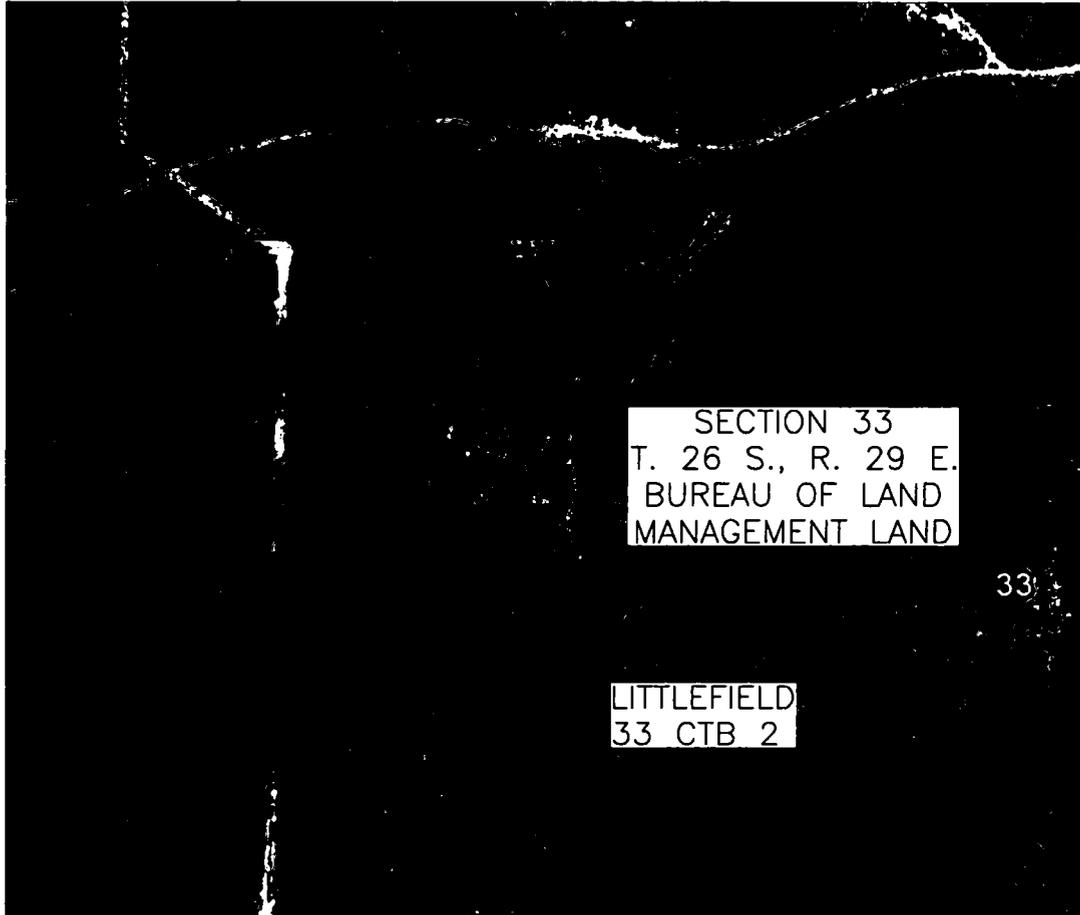
MADRON SURVEYING, INC. 301 SOUTH CANAL CARLSBAD, NEW MEXICO
(575) 234-3341

LITTLEFIELD 33 CTB 2

COG OPERATING, LLC
IN THE NE/4 LOT 9 & SE/4 LOT 8 OF
SECTION 33, TOWNSHIP 26 SOUTH, RANGE 29 EAST, N.M.P.M.
EDDY COUNTY, STATE OF NEW MEXICO

APRIL 9, 2018

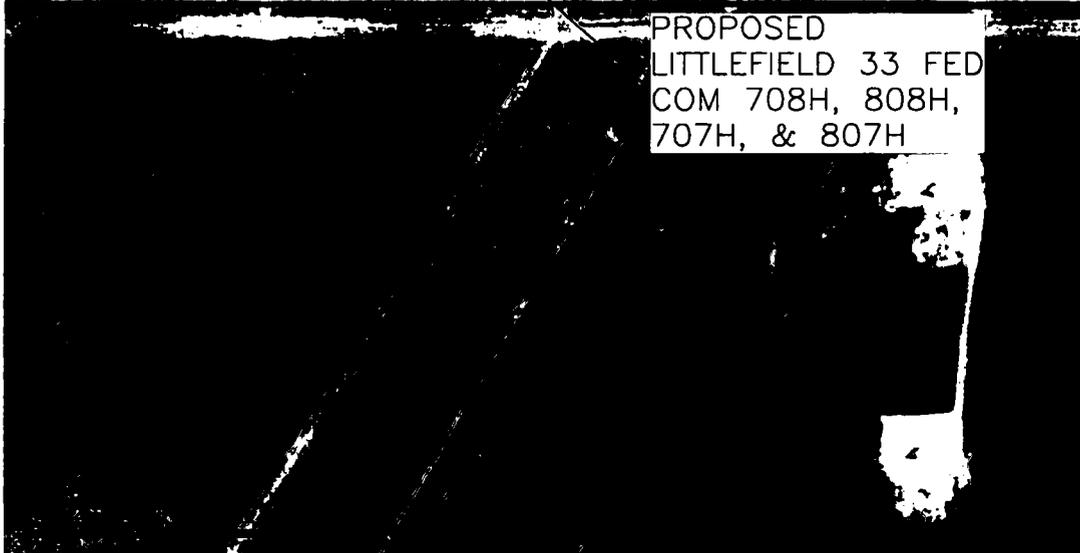
AERIAL PHOTO



SECTION 33
T. 26 S., R. 29 E.
BUREAU OF LAND
MANAGEMENT LAND

33

LITTLEFIELD
33 CTB 2



PROPOSED
LITTLEFIELD 33 FED
COM 708H, 808H,
707H, & 807H

SHEET: 3-3

MADRON SURVEYING, INC.

301 SOUTH CANAL
(575) 734-3341

CARLSBAD, NEW MEXICO

SURVEY NO. 6133

SITE MAP

EL. 2867.4' 735' EL. 2861.7'

NOTE: LATITUDE AND LONGITUDE COORDINATES ARE SHOWN USING THE NORTH AMERICAN DATUM OF 1983 (NAD83) IN DECIMAL DEGREE FORMAT. LISTED NEW MEXICO STATE PLANE EAST COORDINATES ARE GRID (NAD83), ELEVATION VALUES ARE NAVD88. BASIS OF BEARING AND DISTANCES USED ARE NEW MEXICO STATE PLANE EAST COORDINATES MODIFIED TO THE SURFACE.

EL 2870.2' EL 2861.0'

**LITTLEFIELD
33 CTB 2**

A	LITTLEFIELD 33 FED COM 708H
B	LITTLEFIELD 33 FED COM 808H
C	LITTLEFIELD 33 FED COM 707H
D	LITTLEFIELD 33 FED COM 807H

200' NORTH
OFFSET
EL 2868.1'

EL 2865.9' EL 2861.3'

1000'

1000'

30' EL 2881.8' N89°55'33"E 534.98 FT

PROPOSED PAD

200'

**LITTLEFIELD 33
FED COM 708H**
ELEV. = 2860.3'
4.914± ACRES

LAT. = 32.0007981°N (NAD83)
LONG. = 103.9958222°W
NMSPL EAST (FT)
N = 364193.15
E = 645961.30

200'

200' SOUTH
OFFSET
EL 2856.3'

S89°55'04"W 535.02 FT

TOP SOIL AREA
400.11 FT
N00°04'56"W

PROPOSED 400 LF CTB ACCESS ROAD
500°05'15"E
400.04 FT

200' WEST OFFSET EL 2859.5' 45° B 45° C 45° D 200' 335' EAST OFFSET EL 2867.0'

EL 2859.3' B/W FENCE PROPOSED 35 LF ACCESS ROAD EL 2865.6'

NEW MEXICO TEXAS 20' CALICHE ROAD NAVAJO BPL

EL. 2853.6' 735' EL. 2859.9'

015 75 150 300

SCALE 1" = 150'

DIRECTIONS TO LOCATION

FROM U.S. HWY 285 AND CALICHE CR. 726 (CATFISH RD.) GO EAST ON CR. 726 2.1 MILES TO A ROAD SURVEY AND FOLLOW FLAGS NORTH 35° TO THE SOUTHEAST PAD CORNER FOR THIS LOCATION.

COG OPERATING, LLC
LITTLEFIELD 33 FED COM 708H
LOCATED 250 FT. FROM THE SOUTH LINE
AND 736 FT. FROM THE WEST LINE OF
SECTION 33, TOWNSHIP 26 SOUTH,
RANGE 29 EAST, N.M.P.M.
EDDY COUNTY, STATE OF NEW MEXICO

APRIL 9, 2018

I, FILIMON F. JARAMILLO, 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.

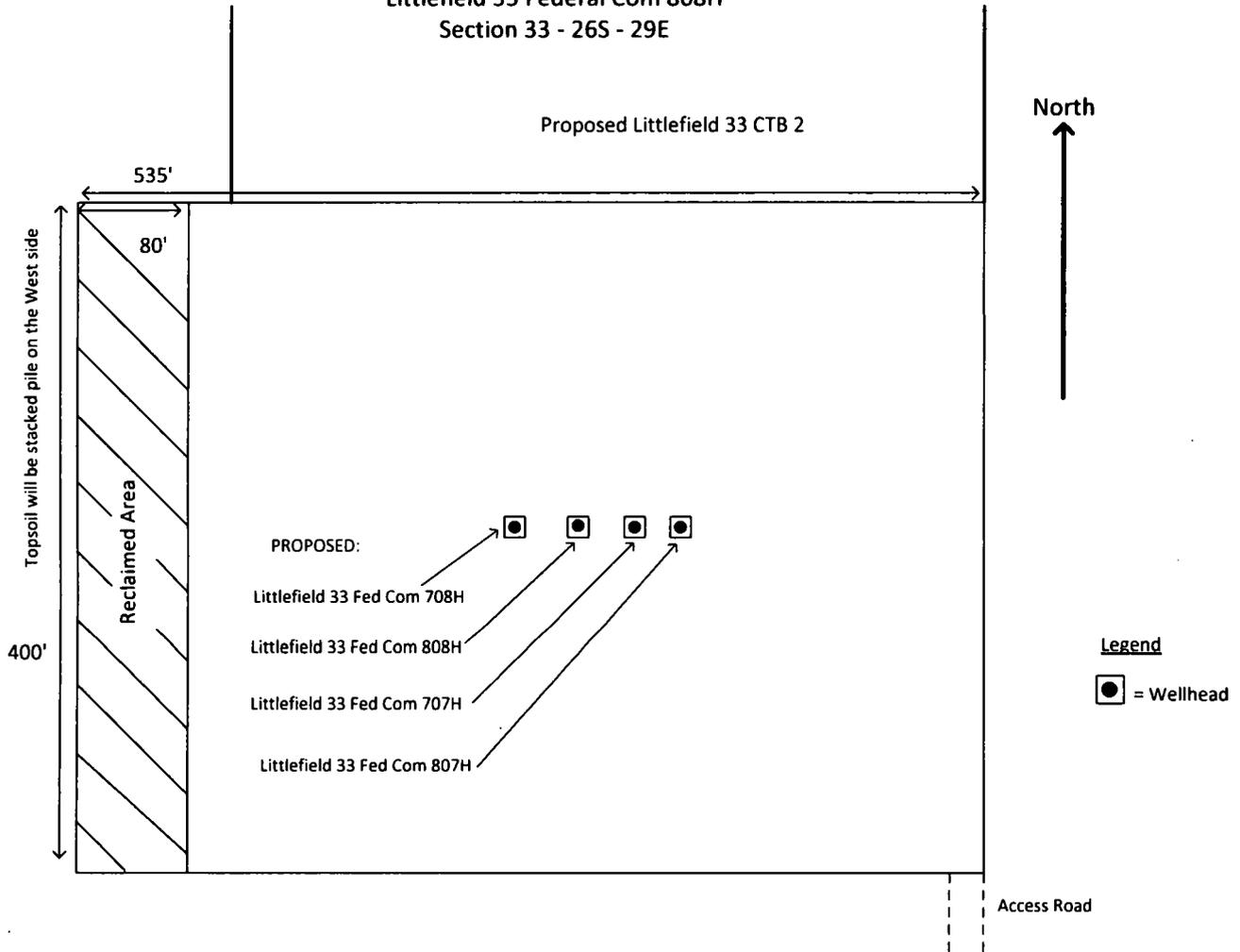
Filimon F. Jaramillo
DATE 4/9/18

SURVEY NO. 5782A

MADRON SURVEYING, INC. 301 SOUTH CANAL CARLSBAD, NEW MEXICO
(575) 234-3341

**Well Site Layout
Production Facility Layout**
Littlefield 33 Federal Com 808H
Section 33 - 26S - 29E

Exhibit 3



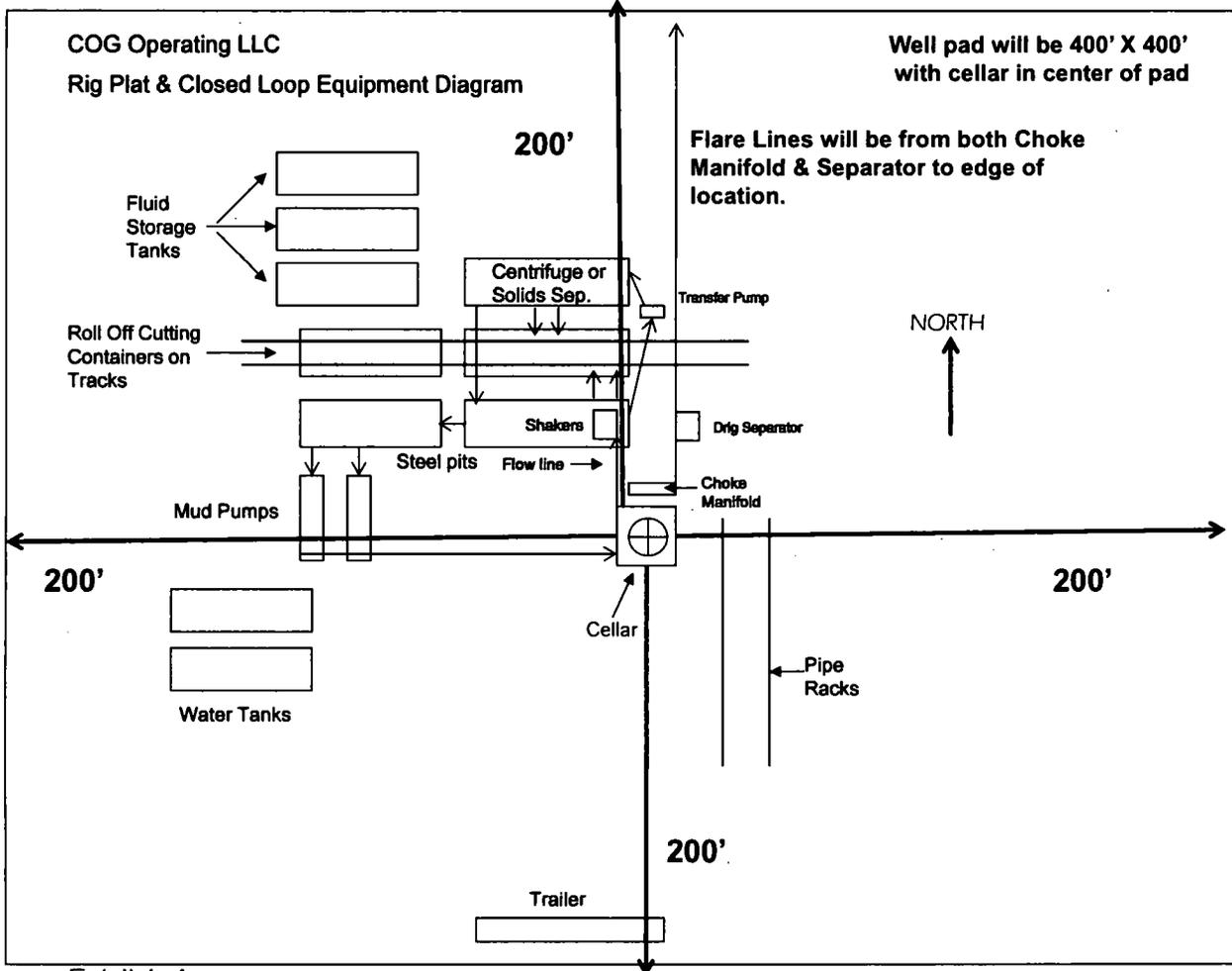


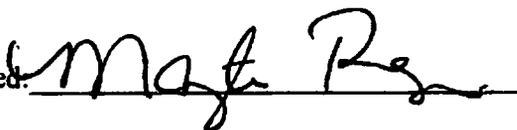
Exhibit 1

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

Surface Use Plan
COG Operating LLC
Littlefield 33 Federal Com 808H
SHL: 250' FSL & 781' FWL Lot 9
Section 33, T26S, R29E
BHL: 200' FNL & 660' FWL UL D
Section 28, T26S, R29E
Eddy County, New Mexico

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 22nd day of MARCH, 2018.

Signed: 

Printed Name: Mayte Reyes

Position: Senior 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:

Describe precipitated solids disposal:

Precipitated solids disposal permit:

Lined pit precipitated solids disposal schedule:

Lined pit precipitated solids disposal schedule attachment:

Lined pit reclamation description:

Lined pit reclamation attachment:

Leak detection system description:

Leak detection system attachment:

Lined pit Monitor description:

Lined pit Monitor attachment:

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

Is the reclamation bond a rider under the BLM bond?

Lined pit bond number:

Lined pit bond amount:

Additional bond information attachment:

Section 3 - Unlined Pits

Would you like to utilize Unlined Pit PWD options? NO

Produced Water Disposal (PWD) Location:

PWD surface owner:

PWD disturbance (acres):

Unlined pit PWD on or off channel:

Unlined pit PWD discharge volume (bbl/day):

Unlined pit specifications:

Precipitated solids disposal:

Describe precipitated solids disposal:

Precipitated solids disposal permit:

Unlined pit precipitated solids disposal schedule:

Unlined pit precipitated solids disposal schedule attachment:

Unlined pit reclamation description:

Unlined pit reclamation attachment:

Unlined pit Monitor description:

Unlined pit Monitor attachment:

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

Beneficial use user confirmation:

Estimated depth of the shallowest aquifer (feet):

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

TDS lab results:

Geologic and hydrologic evidence:

State authorization:

Unlined Produced Water Pit Estimated percolation:

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

Is the reclamation bond a rider under the BLM bond?

Unlined pit bond number:

Unlined pit bond amount:

Additional bond information attachment:

Section 4 - Injection

Would you like to utilize Injection PWD options? NO

Produced Water Disposal (PWD) Location:

PWD surface owner:

PWD disturbance (acres):

Injection PWD discharge volume (bbl/day):

Injection well mineral owner:

Injection well type:

Injection well number:

Assigned injection well API number?

Injection well new surface disturbance (acres):

Minerals protection information:

Mineral protection attachment:

Underground Injection Control (UIC) Permit?

UIC Permit attachment:

Injection well name:

Injection well API number:

Section 5 - Surface Discharge

Would you like to utilize Surface Discharge PWD options? NO

Produced Water Disposal (PWD) Location:

PWD surface owner:

PWD disturbance (acres):

Surface discharge PWD discharge volume (bbl/day):

Surface Discharge NPDES Permit?

Surface Discharge NPDES Permit attachment:

Surface Discharge site facilities information:

Surface discharge site facilities map:

Section 6 - Other

Would you like to utilize Other PWD options? NO

Produced Water Disposal (PWD) Location:

PWD surface owner:

PWD disturbance (acres):

Other PWD discharge volume (bbl/day):

Other PWD type description:

Other PWD type attachment:

Have other regulatory requirements been met?

Other regulatory requirements attachment:



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

Bond 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: