ATS-10-83

OCD Artesia

Form 3160-3
(April 2004)

FORM APPROVED
OMB No. 1004-0137
Expires March 31, 2007

UNITED STATES
DEPARTMENT OF THE INTERIOR
BUREAU OF LAND MANAGEMENT

# APPLICATION FOR PERMIT TO DRILL OR REENTER

5. Lease Serial No.
**NMLC-029405B**

6. If Indian, Allotee or Tribe Name
**N/A**

1a. Type of work: ☑ DRILL ☐ REENTER

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

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

8. Lease Name and Well No. <302498>
**G C FEDERAL #46**

2. Name of Operator
**COG Operating LLC** <229137>

9. API Well No.
**30-025-** 40143

3a. Address
**550 W. Texas, Suite 1300 Midland TX 79701**

3b. Phone No. *(include area code)*
**(432) 685-4385**

10. Field and Pool, or Exploratory
**Maljamar; Yeso, West 44500**

4. Location of Well *(Report location clearly and in accordance with any State requirements.*)*
At surface **SHL: ~~606~~ 783 FSL & ~~1222~~ 1220 FEL, UL P**
At proposed prod. zone **BHL: 330' FSL & 990' FEL, UL P** NON-STANDARD LOCATION

11. Sec., T. R. M. or Blk. and Survey or Area
**Sec 20, T17S, R32E**

14. Distance in miles and direction from nearest town or post office*
**3 miles south of Maljamar NM**

12. County or Parish
**Lea**

13. State
**NM**

| 15. Distance from proposed* location to nearest property or lease line, ft. (Also to nearest drig. unit line, if any) | 16. No. of acres in lease | 17. Spacing Unit dedicated to this well |
|---|---|---|
| **606'** | **1602** | **40** |
| 18. Distance from proposed location* to nearest well, drilling, completed, applied for, on this lease, ft. | 19. Proposed Depth | 20. BLM/BIA Bond No. on file |
| **450'** | ~~7000~~ 7119' MD / 7100' VD | **NMB000215** |
| 21. Elevations (Show whether DF, KDB, RT, GL, etc.) | 22. Approximate date work will start* | 23. Estimated duration |
| **3987' GL** | **07/31/2010** | **10 days** |

## 24. Attachments

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

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

| 25. Signature | Name *(Printed/Typed)* | Date |
|---|---|---|
| Title: **Regulatory Analyst** | **Robyn M. Odom** HOBBS OCD | **04/12/2010** |

| Approved by *(Signature)* | Name *(Printed/Typed)* | Date |
|---|---|---|
| **/s/ Don Peterson** | MAY 23 2011 | APR 22 2011 |
| Title: **FIELD MANAGER** | Office: RECEIVED CARLSBAD FIELD OFFICE | |

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. APPROVAL FOR TWO YEARS

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

*(Instructions on page 2)*

KZ 05/25/11

Roswell Controlled Water Basin

RECEIVED
APR 28 2011
NMOCD ARTESIA

Approval Subject to General Requirements & Special Stipulations Attached

SEE ATTACHED FOR CONDITIONS OF APPROVAL

MAY 26 2011

OCD-HOBBS

Form 3160-5
(April 2004)

UNITED STATES
DEPARTMENT OF THE INTERIOR
BUREAU OF LAND MANAGEMENT

FORM APPROVED
OMB No. 1004-0137
Expires: March 31, 2007

## SUNDRY NOTICES AND REPORTS ON WELLS

***Do not use this form for proposals to drill or to re-enter an abandoned well. Use Form 3160-3 (APD) for such proposals.***

***SUBMIT IN TRIPLICATE- Other instructions on reverse side.***

5. Lease Serial No.
**NMLC-029405B**

6. If Indian, Allottee or Tribe Name
**N/A**

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

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

8. Well Name and No.
**GC Federal #46**

2. Name of Operator **COG Operating LLC**

9. API Well No.
**30-025-** 40143

3a. Address
**550 W. Texas Ave., Suite 1300 Midland, TX 79701**

3b. Phone No. *(include area code)*
**432-685-4385**

10. Field and Pool, or Exploratory Area
**Maljamar; Yeso, West 44500**

4. Location of Well *(Footage, Sec., T., R., M., or Survey Description)*
**SHL: 606' FSL & 1222' FEL, SEC. 20, T17S, R32E, Unit P**
**BHL: 330' FSL & 990' FEL, SEC. 20, T17S, R32E, Unit P**

11. County or Parish, State
**Lea, NM**

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

| TYPE OF SUBMISSION | TYPE OF ACTION | | | |
|---|---|---|---|---|
| ☑ Notice of Intent | ☐ Acidize | ☐ Deepen | ☐ Production (Start/Resume) | ☐ Water Shut-Off |
| ☐ Subsequent Report | ☐ Alter Casing | ☐ Fracture Treat | ☐ Reclamation | ☐ Well Integrity |
| ☐ Final Abandonment Notice | ☐ Casing Repair | ☐ New Construction | ☐ Recomplete | ☑ Other **CHANGE LOCATION** |
| | ☐ Change Plans | ☐ Plug and Abandon | ☐ Temporarily Abandon | |
| | ☐ Convert to Injection | ☐ Plug Back | ☐ Water Disposal | |

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

**The current location of this well is:**
**SHL: 606' FSL & 1222' FEL, SEC. 20, T17S, R32E, Unit P**
**BHL: 330' FSL & 990' FEL, SEC. 20, T17S, R32E, Unit P**

**COG respectfully requests permission to change this location to:**
**733' FSL & 1270' FEL, SEC. 20, T17S, R32E, Unit P**

**This location had to be moved due to sand dunes.**

**A Revised C-102 is attached for your review.**

RECEIVED
APR 28 2011
NMOCD ARTESIA

14. I hereby certify that the foregoing is true and correct
Name *(Printed/Typed)* **Robyn M. Odom** Title **Regulatory Analyst**

Signature Robyn Odom Date **03/07/2011**

**THIS SPACE FOR FEDERAL OR STATE OFFICE USE**

Approved by **/s/ Don Peterson** Title **FIELD MANAGER** Date APR 22 2011

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

Office **CARLSBAD FIELD OFFICE**

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

*(Instructions on page 2)*

MAY 26 2011

COG Operating LLC
Master Drilling Plan Revised 7-22-09
Maljamar ; Yeso
Use for Sections 3-35, T17S, R32E
Lea County, NM

# MASTER DRILLING PROGRAM

## 1. Geologic Name of Surface Formation

Quaternary

## 2. Estimated Tops of Important Geologic Markers:

| | |
|---|---|
| Quaternary | Surface |
| Top of Salt | 900' |
| Base of Salt | 1700' |
| Yates | 2000' |
| Seven Rivers | 2375' |
| Queen | 2975' |
| Grayburg | 3475' |
| San Andres | 3775' |
| Glorietta | 5225' |
| Yeso Group | 5325' |

## 3. Estimated Depths of Anticipated Fresh Water, Oil and Gas

| | | |
|---|---|---|
| Water Sand | 150' | Fresh Water |
| Grayburg | 3475' | Oil/Gas |
| San Andres | 3775' | Oil/Gas |
| Glorietta | 5225' | Oil/Gas |
| Yeso Group | 5325' | Oil/Gas |

No other formations are expected to give up oil, gas or fresh water in measurable quantities. Setting 13 3/8" casing to 650' and circulating cement back to the surface will protect the surface fresh water sand. The Salt Section will be protected by setting 8 5/8" casing to 2100' and circulating cement, in a single or multi-stage job and/or with an ECP, back to the surface. Any shallower zones above TD, which contain commercial quantities of oil and/or gas, will have cement circulated across them. This will be achieved by cementing, with a single or multi-stage job, the 5 1/2" production casing back 200' into the intermediate casing, to be run at TD. (If wellbore conditions arise that require immediate action and/or a change to this program, COG Operating LLC personnel will always react to protect the wellbore and/or the environment.) See COA

## 4. Casing Program

See COA

| Hole Size | Interval | OD Casing | Weight | Grade | Jt., Condition | burst/collapse/tension |
|---|---|---|---|---|---|---|
| 17 ½" | 0-~~650~~ 752 | 13 3/8" | 48# | H-40orJ-55 | ST&C/New | 6.03/2.578/10.32 |
| 11"or~~12 ¼~~" | 0-2100' | 8 5/8" | 24or32# | J-55 | ST&C/New | 1.85/1.241/4.78 |
| 7 7/8" | 0-T.D. | 5 1/2" | 15.5or17# | J-55orL-80 | LT&C/New | 1.59/1.463/2.05 |

## 5. Cement Program

13 3/8" Surface Casing: Class C, 4% Gel, 2% CaCl2, .25 pps CF, 450 sx lead, yield-1.98 + 200 sx tail, yield-1.32.

8 5/8" Intermediate Casing:

**11" Hole:**

**Single Stage:** 50:50:10, 400 sx lead, yield-2.45 + Class C, 200 sx tail, yield-1.32, back to surface.

**Multi-Stage:** Stage 1: Class C, 400 sx, yield - 1.32; Stage 2: Class C, 200 sx, yield – 1.32, back to surface. Multi stage tool to be set at approximately, depending on hole conditions, ~~650~~ 802 - See COA

See COA

5 1/2" Production Casing:

**Single Stage:** 35:65:6, 500 sx Lead, yield-2.05 + 50:50:2, 400 sx Tail, yield-1.37, to 200' minimum tie back to intermediate casing.

**Multi-Stage:** Stage 1: 50:50:2, 400 sx, yield - 1.37; Stage 2: 35:65:6, 500 sx, yield – 2.05, to 200' minimum tie back to intermediate casing. Multi stage tool to be set at approximately, depending on hole conditions, ~~TD~~ - ~~2000~~ 2150. - See COA

See COA

## 6. Minimum Specifications for Pressure Control

The blowout preventer equipment (BOP) shown in Exhibit #9 will consist of a double ram-type (2000 psi WP) preventer. This unit will be hydraulically operated and the ram type preventer will be equipped with blind rams on top of 4 1/2" drill pipe rams on the bottom. The BOP will be nippled up on the 13 3/8" surface casing with BOP equipment and tested ~~together to 1000 psi by rig pump in one test.~~ See COA The BOP will then be nippled up on the 8 5/8" intermediate casing and tested by a third party to 2000 psi and used continuously until total depth is reached. All BOP's and accessory equipment will be tested to 2000 psi before drilling out of the intermediate casing. 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 (Exhibit #10) will include a Kelly cock and floor safety valve, choke lines and a choke manifold (Exhibit #11) with a 2000 psi WP rating.

## 7. Types and Characteristics of the Proposed Mud System

The well will be drilled to TD with a combination of brine, cut brine and polymer mud system. The applicable depths and properties of this system are as follows:

See COA

| DEPTH | TYPE | WEIGHT | VISCOSITY | WATERLOSS |
|---|---|---|---|---|
| 0-~~650~~ 752 | Fresh Water | 8.5 | 28 | N.C. |
| 650-2100' | Brine | 10 | 30 | N.C. |
| 2100'-TD | Cut Brine | 8.7-9.1 | 29 | N.C. |

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

## 8. Auxiliary Well Control and Monitoring Equipment

A. Kelly cock will be kept in the drill string at all times.

B. A full opening drill pipe-stabbing valve with proper drill pipe connections will be on the rig floor at all times.

## 9. Logging, Testing and Coring Program

See COA — A. The electric logging program will consist of GR-Dual Laterolog, Spectral Density, Dual Spaced Neutron, CSNG Log and will be run from TD to 8 5/8" casing shoe.

B. Drill Stem test is not anticipated.

C. No conventional coring is anticipated.

D. Further testing procedures will be determined after the 5 ½" production casing has been cemented at TD, based on drill shows and log evaluation.

## 10. Abnormal Conditions, Pressure, Temperatures and Potential Hazards

No abnormal pressures or temperatures are anticipated. The estimated bottom hole at TD is 110 degrees and the estimated maximum bottom hold pressure is 2300 psig. Measurable gas volumes or Hydrogen Sulfide levels have not been encountered during drilling operations in this area, although a Hydrogen Sulfide Drilling Operation Plan is attached to this program. No major loss of circulation zones has been reported in offsetting wells.

## 11. Anticipated Starting Date and Duration of Operations

Road and location work will not begin until approval has been received from the BLM. As this is a Master Drilling plan, please refer to the Form 3160-3 for the anticipated start date. Once commenced, drilling operations should be finished in approximately 15 days. If the well is productive, an additional 30 days will be required for completion and testing before a decision is made to install permanent facilities.

CONCHO

# COG Operating LLC

Lea County, NM (NAD27 NME)
GC Federal #46
GC Federal #46

OH

Plan: Plan #1 - 7-7/8" Hole
SHL = 606' FSL & 1222' FEL
BHL = 380' FSL & 980' FEL
Top of Paddock = 225' S of Surf & 244' E of Surf @ 5375' TVD

# Standard Planning Report

20 May, 2010

Scientific Drilling
Directional Drilling Operations

| | | | |
|---|---|---|---|
| **Database:** | EDM 5000.1 Single User Db | **Local Co-ordinate Reference:** | Well GC Federal #46 |
| **Company:** | COG Operating LLC | **TVD Reference:** | GL Elev @ 3987.00ft |
| **Project:** | Lea County, NM (NAD27 NME) | **MD Reference:** | GL Elev @ 3987.00ft |
| **Site:** | GC Federal #46 | **North Reference:** | Grid |
| **Well:** | GC Federal #46 | **Survey Calculation Method:** | Minimum Curvature |
| **Wellbore:** | OH | | |
| **Design:** | Plan #1 - 7-7/8" Hole | | |

**Project** Lea County, NM (NAD27 NME)

| | | | |
|---|---|---|---|
| **Map System:** | US State Plane 1927 (Exact solution) | **System Datum:** | Mean Sea Level |
| **Geo Datum:** | NAD 1927 (NADCON CONUS) | | |
| **Map Zone:** | New Mexico East 3001 | | |

**Site** GC Federal #46

| | | | | | |
|---|---|---|---|---|---|
| **Site Position:** | | **Northing:** | 660,445.40 ft | **Latitude:** | 32° 48' 52.002 N |
| **From:** | Map | **Easting:** | 668,925.00 ft | **Longitude:** | 103° 47' 0.573 W |
| **Position Uncertainty:** | 0.00 ft | **Slot Radius:** | 0 " | **Grid Convergence:** | 0.30 ° |

**Well** GC Federal #46

| | | | | | | |
|---|---|---|---|---|---|---|
| **Well Position** | **+N/-S** | 0.00 ft | **Northing:** | 660,445.40 ft | **Latitude:** | 32° 48' 52.002 N |
| | **+E/-W** | 0.00 ft | **Easting:** | 668,925.00 ft | **Longitude:** | 103° 47' 0.573 W |
| **Position Uncertainty** | | 0.00 ft | **Wellhead Elevation:** | | **Ground Level:** | 3,987.00 ft |

**Wellbore** OH

| Magnetics | Model Name | Sample Date | Declination (°) | Dip Angle (°) | Field Strength (nT) |
|---|---|---|---|---|---|
| | IGRF200510 | 2010/05/20 | 7.85 | 60.74 | 49,084 |

**Design** Plan #1 - 7-7/8" Hole

**Audit Notes:**

| | | | | | |
|---|---|---|---|---|---|
| **Version:** | | **Phase:** | PLAN | **Tie On Depth:** | 0.00 |

| Vertical Section: | Depth From (TVD) (ft) | +N/-S (ft) | +E/-W (ft) | Direction (°) |
|---|---|---|---|---|
| | 0.00 | 0.00 | 0.00 | 132.67 |

**Plan Sections**

| Measured Depth (ft) | Inclination (°) | Azimuth (°) | Vertical Depth (ft) | +N/-S (ft) | +E/-W (ft) | Dogleg Rate (°/100ft) | Build Rate (°/100ft) | Turn Rate (°/100ft) | TFO (°) | Target |
|---|---|---|---|---|---|---|---|---|---|---|
| 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | |
| 2,200.00 | 0.00 | 0.00 | 2,200.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | |
| 2,532.88 | 6.66 | 132.67 | 2,532.13 | -13.09 | 14.20 | 2.00 | 2.00 | 0.00 | 132.67 | |
| 5,060.66 | 6.66 | 132.67 | 5,042.87 | -211.71 | 229.70 | 0.00 | 0.00 | 0.00 | 0.00 | |
| 5,393.54 | 0.00 | 0.00 | 5,375.00 | -224.80 | 243.90 | 2.00 | -2.00 | 0.00 | 180.00 | TG1-GC #46 |
| 7,118.54 | 0.00 | 0.00 | 7,100.00 | -224.80 | 243.90 | 0.00 | 0.00 | 0.00 | 0.00 | PBHL-GC #46 |

| | | | |
|---|---|---|---|
| **Database:** | EDM 5000.1 Single User Db | **Local Co-ordinate Reference:** | Well GC Federal #46 |
| **Company:** | COG Operating LLC | **TVD Reference:** | GL Elev @ 3987.00ft |
| **Project:** | Lea County, NM (NAD27 NME) | **MD Reference:** | GL Elev @ 3987.00ft |
| **Site:** | GC Federal #46 | **North Reference:** | Grid |
| **Well:** | GC Federal #46 | **Survey Calculation Method:** | Minimum Curvature |
| **Wellbore:** | OH | | |
| **Design:** | Plan #1 - 7-7/8" Hole | | |

**Planned Survey**

| Measured Depth (ft) | Inclination (°) | Azimuth (°) | Vertical Depth (ft) | +N/-S (ft) | +E/-W (ft) | Vertical Section (ft) | Dogleg Rate (°/100ft) | Build Rate (°/100ft) | Turn Rate (°/100ft) |
|---|---|---|---|---|---|---|---|---|---|
| 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| **East HL-GC #46 - South HL-GC #46** | | | | | | | | | |
| 2,100.00 | 0.00 | 0.00 | 2,100.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| **8-5/8" Casing** | | | | | | | | | |
| 2,200.00 | 0.00 | 0.00 | 2,200.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| **KOP Start Build 2.00°/100'** | | | | | | | | | |
| 2,300.00 | 2.00 | 132.67 | 2,299.98 | -1.18 | 1.28 | 1.75 | 2.00 | 2.00 | 0.00 |
| 2,400.00 | 4.00 | 132.67 | 2,399.84 | -4.73 | 5.13 | 6.98 | 2.00 | 2.00 | 0.00 |
| 2,500.00 | 6.00 | 132.67 | 2,499.45 | -10.64 | 11.54 | 15.69 | 2.00 | 2.00 | 0.00 |
| 2,532.88 | 6.66 | 132.67 | 2,532.13 | -13.09 | 14.20 | 19.32 | 2.00 | 2.00 | 0.00 |
| **EOC Hold 6.66°** | | | | | | | | | |
| 2,600.00 | 6.66 | 132.67 | 2,598.80 | -18.37 | 19.93 | 27.10 | 0.00 | 0.00 | 0.00 |
| 2,700.00 | 6.66 | 132.67 | 2,698.12 | -26.22 | 28.45 | 38.69 | 0.00 | 0.00 | 0.00 |
| 2,800.00 | 6.66 | 132.67 | 2,797.45 | -34.08 | 36.98 | 50.29 | 0.00 | 0.00 | 0.00 |
| 2,900.00 | 6.66 | 132.67 | 2,896.78 | -41.94 | 45.50 | 61.88 | 0.00 | 0.00 | 0.00 |
| 3,000.00 | 6.66 | 132.67 | 2,996.10 | -49.80 | 54.03 | 73.47 | 0.00 | 0.00 | 0.00 |
| 3,100.00 | 6.66 | 132.67 | 3,095.43 | -57.65 | 62.55 | 85.07 | 0.00 | 0.00 | 0.00 |
| 3,200.00 | 6.66 | 132.67 | 3,194.75 | -65.51 | 71.08 | 96.66 | 0.00 | 0.00 | 0.00 |
| 3,300.00 | 6.66 | 132.67 | 3,294.08 | -73.37 | 79.60 | 108.25 | 0.00 | 0.00 | 0.00 |
| 3,400.00 | 6.66 | 132.67 | 3,393.40 | -81.22 | 88.13 | 119.85 | 0.00 | 0.00 | 0.00 |
| 3,500.00 | 6.66 | 132.67 | 3,492.73 | -89.08 | 96.65 | 131.44 | 0.00 | 0.00 | 0.00 |
| 3,600.00 | 6.66 | 132.67 | 3,592.06 | -96.94 | 105.18 | 143.04 | 0.00 | 0.00 | 0.00 |
| 3,700.00 | 6.66 | 132.67 | 3,691.38 | -104.80 | 113.70 | 154.63 | 0.00 | 0.00 | 0.00 |
| 3,800.00 | 6.66 | 132.67 | 3,790.71 | -112.65 | 122.23 | 166.22 | 0.00 | 0.00 | 0.00 |
| 3,900.00 | 6.66 | 132.67 | 3,890.03 | -120.51 | 130.75 | 177.82 | 0.00 | 0.00 | 0.00 |
| 4,000.00 | 6.66 | 132.67 | 3,989.36 | -128.37 | 139.27 | 189.41 | 0.00 | 0.00 | 0.00 |
| 4,100.00 | 6.66 | 132.67 | 4,088.68 | -136.23 | 147.80 | 201.00 | 0.00 | 0.00 | 0.00 |
| 4,200.00 | 6.66 | 132.67 | 4,188.01 | -144.08 | 156.32 | 212.60 | 0.00 | 0.00 | 0.00 |
| 4,300.00 | 6.66 | 132.67 | 4,287.34 | -151.94 | 164.85 | 224.19 | 0.00 | 0.00 | 0.00 |
| 4,400.00 | 6.66 | 132.67 | 4,386.66 | -159.80 | 173.37 | 235.78 | 0.00 | 0.00 | 0.00 |
| 4,500.00 | 6.66 | 132.67 | 4,485.99 | -167.65 | 181.90 | 247.38 | 0.00 | 0.00 | 0.00 |
| 4,600.00 | 6.66 | 132.67 | 4,585.31 | -175.51 | 190.42 | 258.97 | 0.00 | 0.00 | 0.00 |
| 4,700.00 | 6.66 | 132.67 | 4,684.64 | -183.37 | 198.95 | 270.56 | 0.00 | 0.00 | 0.00 |
| 4,800.00 | 6.66 | 132.67 | 4,783.96 | -191.23 | 207.47 | 282.16 | 0.00 | 0.00 | 0.00 |
| 4,900.00 | 6.66 | 132.67 | 4,883.29 | -199.08 | 216.00 | 293.75 | 0.00 | 0.00 | 0.00 |
| 5,000.00 | 6.66 | 132.67 | 4,982.62 | -206.94 | 224.52 | 305.34 | 0.00 | 0.00 | 0.00 |
| 5,060.66 | 6.66 | 132.67 | 5,042.87 | -211.71 | 229.69 | 312.38 | 0.00 | 0.00 | 0.00 |
| **Start DLS 2.00°/100'** | | | | | | | | | |
| 5,100.00 | 5.87 | 132.67 | 5,081.97 | -214.62 | 232.85 | 316.67 | 2.00 | -2.00 | 0.00 |
| 5,200.00 | 3.87 | 132.67 | 5,181.60 | -220.37 | 239.09 | 325.16 | 2.00 | -2.00 | 0.00 |
| 5,300.00 | 1.87 | 132.67 | 5,281.47 | -223.77 | 242.78 | 330.17 | 2.00 | -2.00 | 0.00 |
| 5,393.54 | 0.00 | 0.00 | 5,375.00 | -224.80 | 243.90 | 331.70 | 2.00 | -2.00 | -141.83 |
| **EOC Hold 0.00° - TG1-GC #46** | | | | | | | | | |
| 7,118.54 | 0.00 | 0.00 | 7,100.00 | -224.80 | 243.90 | 331.70 | 0.00 | 0.00 | 0.00 |
| **PBHL-GC #46** | | | | | | | | | |

| | | | |
|---|---|---|---|
| **Database:** | EDM 5000.1 Single User Db | **Local Co-ordinate Reference:** | Well GC Federal #46 |
| **Company:** | COG Operating LLC | **TVD Reference:** | GL Elev @ 3987.00ft |
| **Project:** | Lea County, NM (NAD27 NME) | **MD Reference:** | GL Elev @ 3987.00ft |
| **Site:** | GC Federal #46 | **North Reference:** | Grid |
| **Well:** | GC Federal #46 | **Survey Calculation Method:** | Minimum Curvature |
| **Wellbore:** | OH | | |
| **Design:** | Plan #1 - 7-7/8" Hole | | |

**Design Targets**

| Target Name - hit/miss target - Shape | Dip Angle (°) | Dip Dir. (°) | TVD (ft) | +N/-S (ft) | +E/-W (ft) | Northing (ft) | Easting (ft) | Latitude | Longitude |
|---|---|---|---|---|---|---|---|---|---|
| East HL-GC #46 | 0.00 | 0.00 | 0.00 | -274.80 | 233.90 | 660,170.60 | 669,158.90 | 32° 48' 49.271 N | 103° 46' 57.849 W |
| - plan misses target center by 360.87ft at 0.00ft MD (0.00 TVD, 0.00 N, 0.00 E) | | | | | | | | | |
| - Rectangle (sides W0.00 H200.00 D0.00) | | | | | | | | | |
| South HL-GC #46 | 0.00 | 0.00 | 0.00 | -274.80 | 233.90 | 660,170.60 | 669,158.90 | 32° 48' 49.271 N | 103° 46' 57.849 W |
| - plan misses target center by 360.87ft at 0.00ft MD (0.00 TVD, 0.00 N, 0.00 E) | | | | | | | | | |
| - Rectangle (sides W100.00 H0.00 D0.00) | | | | | | | | | |
| TG1-GC #46 | 0.00 | 0.01 | 5,375.00 | -224.80 | 243.90 | 660,220.60 | 669,168.90 | 32° 48' 49.765 N | 103° 46' 57.729 W |
| - plan hits target center | | | | | | | | | |
| - Point | | | | | | | | | |
| PBHL-GC #46 | 0.00 | 0.00 | 7,100.00 | -224.80 | 243.90 | 660,220.60 | 669,168.90 | 32° 48' 49.765 N | 103° 46' 57.729 W |
| - plan hits target center | | | | | | | | | |
| - Circle (radius 50.00) | | | | | | | | | |

**Casing Points**

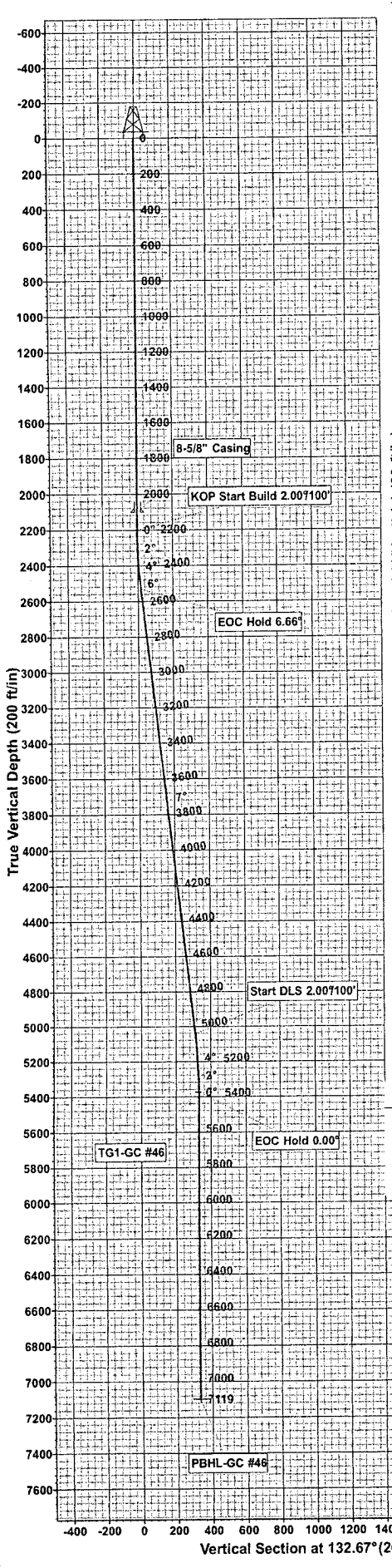
| Measured Depth (ft) | Vertical Depth (ft) | Name | Casing Diameter (") | Hole Diameter (") |
|---|---|---|---|---|
| 2,100.00 | 2,100.00 | 8-5/8" Casing | 8-5/8 | 12-1/4 |

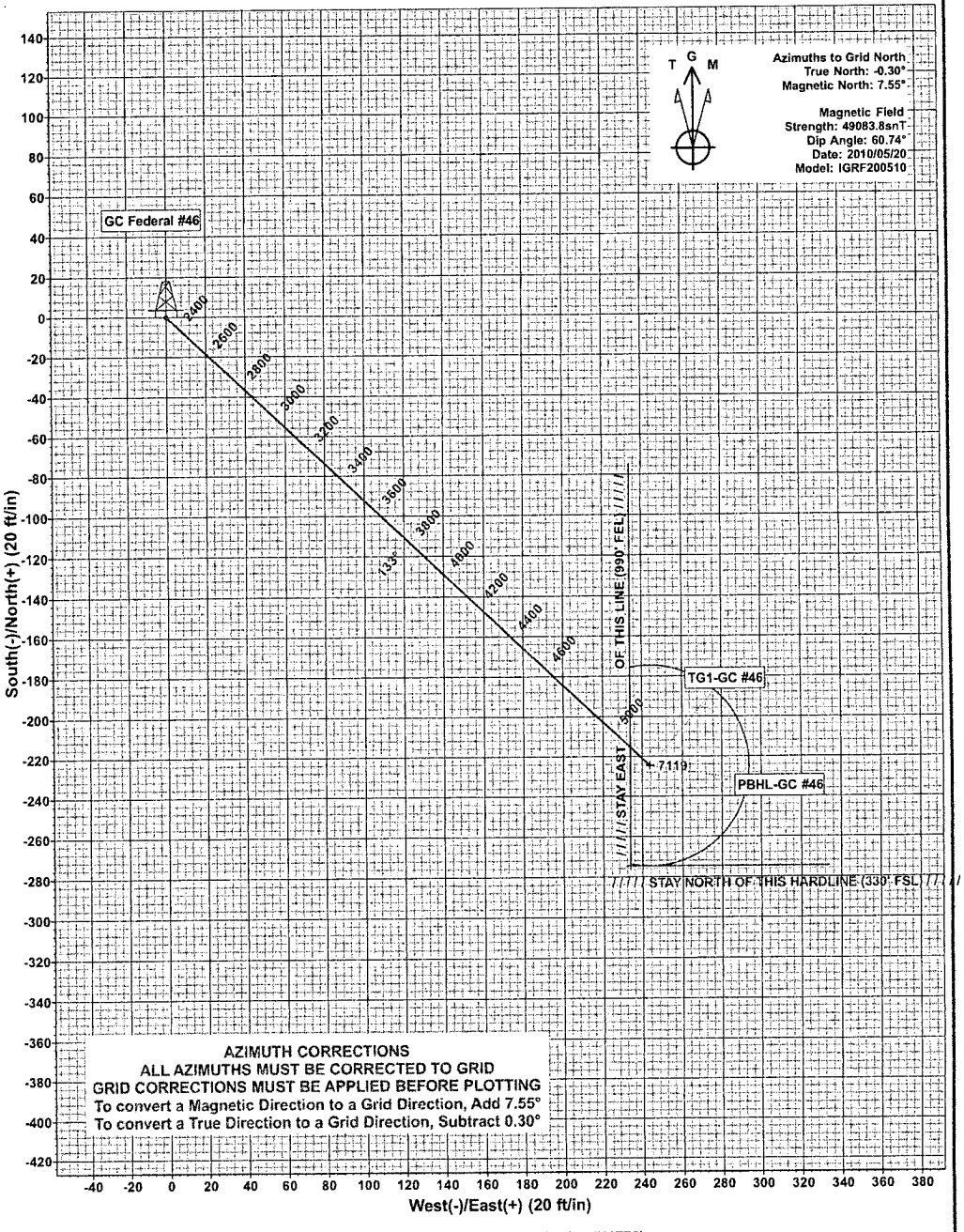
**Plan Annotations**

| Measured Depth (ft) | Vertical Depth (ft) | Local Coordinates +N/-S (ft) | Local Coordinates +E/-W (ft) | Comment |
|---|---|---|---|---|
| 2,200.00 | 2,200.00 | 0.00 | 0.00 | KOP Start Build 2.00°/100' |
| 2,532.88 | 2,532.13 | -13.09 | 14.20 | EOC Hold 6.66° |
| 5,060.66 | 5,042.87 | -211.71 | 229.69 | Start DLS 2.00°/100' |
| 5,393.54 | 5,375.00 | -224.80 | 243.90 | EOC Hold 0.00° |

Scientific Drilling for COG Operating LLC
Site: Lea County, NM (NAD27 NME)
Well: GC Federal #46
Wellbore: OH
Design: Plan #1 - 7-7/8" Hole

Scientific Drilling
Directional Drilling Operations




AZIMUTH CORRECTIONS
ALL AZIMUTHS MUST BE CORRECTED TO GRID
GRID CORRECTIONS MUST BE APPLIED BEFORE PLOTTING
To convert a Magnetic Direction to a Grid Direction, Add 7.55°
To convert a True Direction to a Grid Direction, Subtract 0.30°

WELLBORE TARGET DETAILS (MAP CO-ORDINATES)

| Name | TVD | +N/-S | +E/-W | Northing | Easting | Latitude | Longitude | Shape |
|---|---|---|---|---|---|---|---|---|
| East HL-GC #46 | 0.00 | -274.80 | 233.90 | 660170.60 | 669158.90 | 32° 48' 49.271 N | 103° 46' 57.849 W | Rectangle (Sides: L2 00.00 W0.00) |
| South HL-GC #46 | 0.00 | -274.80 | 233.90 | 660170.60 | 669158.90 | 32° 48' 49.271 N | 103° 46' 57.849 W | Rectangle (Sides: L 0.00 W100.00) |
| TG1-GC #46 | 5375.00 | -224.80 | 243.90 | 660220.60 | 669168.90 | 32° 48' 49.765 N | 103° 46' 57.729 W | Point |
| PBHL-GC #46 | 7100.00 | -224.80 | 243.90 | 660220.60 | 669168.90 | 32° 48' 49.765 N | 103° 46' 57.729 W | Circle (Radius: 50.0 0) |

SECTION DETAILS

| Sec | MD | Inc | Azi | TVD | +N/-S | +E/-W | Dleg | TFace | VSect | Target |
|---|---|---|---|---|---|---|---|---|---|---|
| 1 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | |
| 2 | 2200.00 | 0.00 | 0.00 | 2200.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | |
| 3 | 2532.88 | 6.66 | 132.67 | 2532.13 | -13.09 | 14.20 | 2.00 | 132.67 | 19.32 | |
| 4 | 5060.66 | 6.66 | 132.67 | 5042.87 | -211.71 | 229.70 | 0.00 | 0.00 | 312.38 | |
| 5 | 5393.54 | 0.00 | 0.00 | 5375.00 | -224.80 | 243.90 | 2.00 | 180.00 | 331.70 | TG1-GC #46 |
| 6 | 7118.54 | 0.00 | 0.00 | 7100.00 | -224.80 | 243.90 | 0.00 | 0.00 | 331.70 | PBHL-GC #46 |

WELL DETAILS: GC Federal #46

Ground Level: 3987.00

| +N/-S | +E/-W | Northing | Easting | Latitude | Longitude | Slot |
|---|---|---|---|---|---|---|
| 0.00 | 0.00 | 660445.40 | 668925.00 | 32° 48' 52.002 N | 103° 47' 0.573 W | |

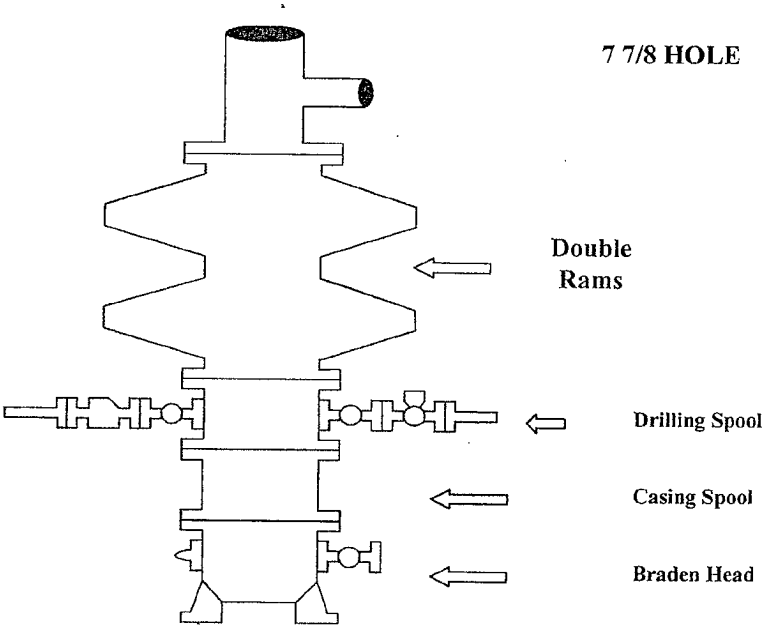
PROJECT DETAILS: Lea County, NM (NAD27 NME)

Plan: Plan #1 - 7-7/8" Hole (GC Federal #46/OH)

Geodetic System: US State Plane 1927 (Exact solution)
Datum: NAD 1927 (NADCON CONUS)
Ellipsoid: Clarke 1866
Zone: New Mexico East 3001
System Datum: Mean Sea Level

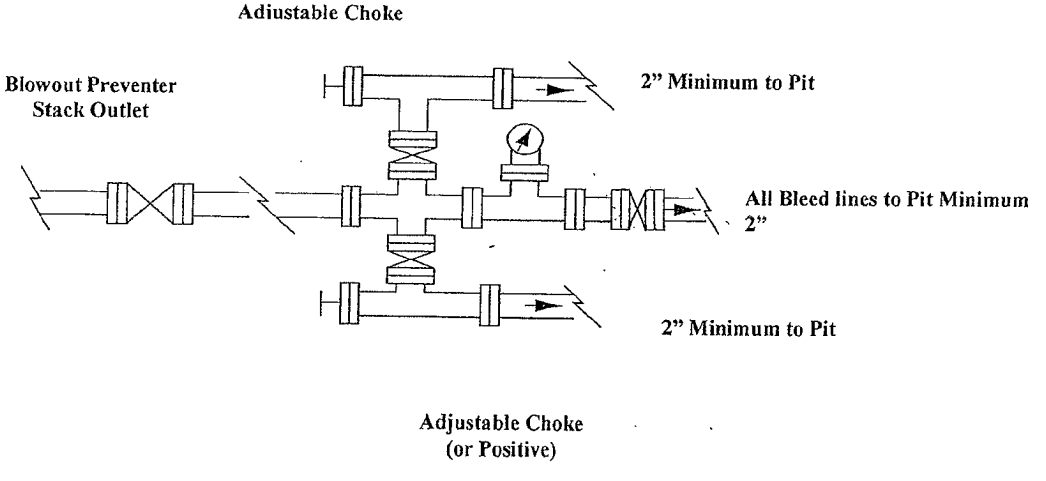
Created By: Julio Pina Date: 20-May-10
Checked: _____ Date: _____
Reviewed: _____ Date: _____
Approved: _____ Date: _____

# COG Operating LLC
## Exhibit #9
## BOPE and Choke Schematic




Minimum 4" Nominal choke and kill lines

Choke Manifold Requirement (2000 psi WP)
No Annular Required



**NOTES REGARDING THE BLOWOUT PREVENTERS**
**Master Drilling Plan**
**Eddy County, New Mexico**

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