

OCD Artesia

ATS-14-745

Form 3160-3
(March 2012)

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

**UNORTHODOX
LOCATION**

UNITED STATES
DEPARTMENT OF THE INTERIOR
BUREAU OF LAND MANAGEMENT

**NM OIL CONSERVATION
ARTESIA DISTRICT**

JUL 07 2014

APPLICATION FOR PERMIT TO DRILL OR REENTER

5. Lease Serial No.

SHL: NMNM120895

TES
78-14

6. If Indian, Allottee or Tribe Name

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

8. Lease Name and Well No.
Cabo Wabo 24 Federal #5H

9. API Well No.
30-015-42482

10. Field and Pool, or Exploratory
Cortall Canyon; BS
Willow Lake; Bone Spring, Southeast

11. Sec., T.R.M. or Blk and Survey or Area
Sec. 24 - T25S - R29E

12. County or Parish
Eddy

13. State
NM

1a. Type of Work: DRILL REENTER

RECEIVED

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

2. Name of Operator

COG Production LLC.

< 217955 >

3a. Address

2208 West Main Street
Artesia, NM 88210

3b. Phone No. (include area code)

575-748-6940

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

At surface 190' FSL & 660' FWL Unit Letter M (SWSW) Sec 24-T25S-R29E
At proposed prod. Zone 330' FNL & 660' FWL Unit Letter D (NWNW) Sec 24-T25S-R29E

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

Approximately 7 miles from Malaga

15. Distance from proposed*
location to nearest
property or lease line, ft.
(Also to nearest drig. Unit line, if any)

190'

16. No. of acres in lease

SHL: 1280

17. Spacing Unit dedicated to this well

160

18. Distance from location*
to nearest well, drilling, completed,
applied for, on this lease, ft.

SHL: 1656'

19. Proposed Depth

TVD: 7,860' MD: 12,451'

20. BLM/BIA Bond No. on file

NMB000860 & NMB000845

21. Elevations (Show whether DF, KDB, RT, GL, etc.)

3082.5' GL

22. Approximate date work will start*

7/1/2014

23. Estimated duration

30 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:

- Well plat certified by a registered surveyor.
- A Drilling Plan
- A Surface Use Plan (if the location is on National Forest System Lands, the SUPO shall be filed with the appropriate Forest Service Office).

- Bond to cover the operations unless covered by an existing bond on file (see Item 20 above).
- Operator certification
- Such other site specific information and/or plans as may be required by the authorized officer.

25. Signature <i>Mayte Reyes</i>	Name (Printed/Typed) Mayte Reyes	Date 4-28-14
-------------------------------------	-------------------------------------	-----------------

Regulatory Analyst Approved by (Signature) Steve Caffey	Name (Printed/Typed) Steve Caffey	Date JUL 2 - 2014
Title FIELD MANAGER	Office CARLSBAD FIELD OFFICE	

Application approval does not warrant or certify that the applicant holds legan 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.

(Continued on page 2)

*(Instructions on page 2)

Carlsbad Controlled Water Basin

Approval Subject to General Requirements
& Special Stipulations Attached

SEE ATTACHED FOR
CONDITIONS OF APPROVAL

Surface Use Plan
COG Production LLC
Cabo Wabo 24 Federal #5H
SHL: 190' FSL & 660' FWL ULM
Section 24, T25S, R29E
BHL: 330' FNL & 660' FWL UL D
Section 24, T25S, 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 Production 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 28th day of April, 2014.

Signed:  _____

Printed Name: Melanie J. Parker
Position: Regulatory Coordinator
Address: 2208 W. Main Street, Artesia, NM 88210
Telephone: (575) 748-6940
Field Representative (if not above signatory): Rand French
E-mail: mparker@concho.com

DISTRICT I
1825 N. FRENCH DR., HOBBS, NM 88240
Phone: (575) 393-6161 Fax: (575) 393-0720

DISTRICT II
1301 W. GRAND AVENUE, ARTESIA, NM 88210
Phone: (575) 748-1283 Fax: (575) 748-9720

DISTRICT III
1000 RIO BRAZOS RD., AZTEC, NM 87410
Phone: (505) 334-6178 Fax: (505) 334-6170

DISTRICT IV
11885 S. ST. FRANCIS DR., SANTA FE, NM 87505
Phone: (505) 476-3480 Fax: (505) 476-3482

State of New Mexico
Energy, Minerals & Natural Resources Department
OIL CONSERVATION DIVISION
11885 SOUTH ST. FRANCIS DR.
Santa Fe, New Mexico 87505

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

AMENDED REPORT

WELL LOCATION AND ACREAGE DEDICATION PLAT

API Number 30-015- 42482	Pool Code 96217	Well Name Willow Lake Corral Canyon Bone Spring, Southeast
Property Code 313450	Property Name CABO WABO 24 FEDERAL	Well Number 5H
OGRID No. 217955	Operator Name COG PRODUCTION, LLC	Elevation 3082.5

Surface Location

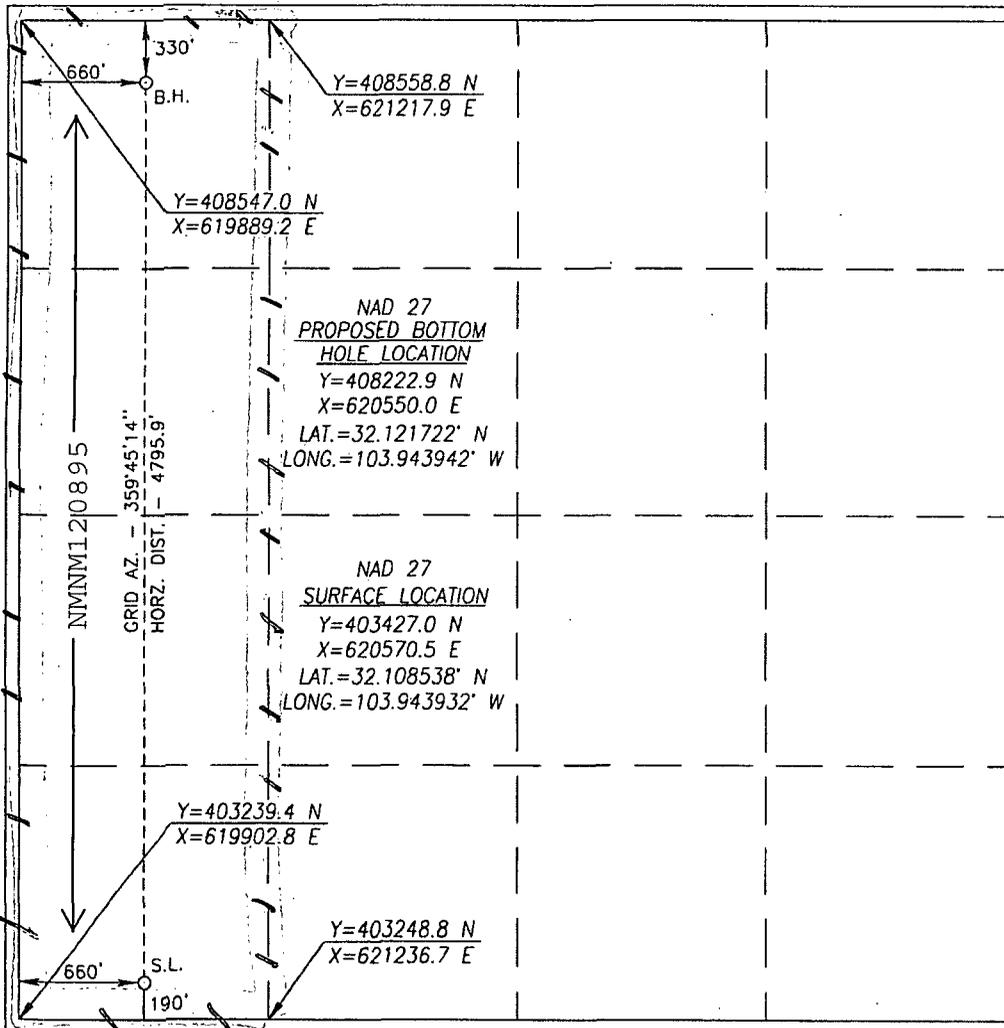
UL or lot No.	Section	Township	Range	Lot Idn	Feet from the	North/South line	Feet from the	East/West line	County
M	24	25-S	29-E		190	SOUTH	660	WEST	EDDY

Bottom Hole Location If Different From Surface

UL or lot No.	Section	Township	Range	Lot Idn	Feet from the	North/South line	Feet from the	East/West line	County
D	24	25-S	29-E		330	NORTH	660	WEST	EDDY

Dedicated Acres 160	Joint or Infill	Consolidation Code	Order No.
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NO ALLOWABLE WILL BE ASSIGNED TO THIS COMPLETION UNTIL ALL INTERESTS HAVE BEEN CONSOLIDATED OR A NON-STANDARD UNIT HAS BEEN APPROVED BY THE DIVISION



OPERATOR CERTIFICATION

I hereby certify that the information herein is true and complete to the best of my knowledge and belief, and that this organization either owns a working interest or unleased mineral interest in the land including the proposed bottom hole location or has a right to drill this well at this location pursuant to a contract with an owner of such mineral or working interest, or to a voluntary pooling agreement or a compulsory pooling order heretofore entered by the division.

Melanie J Parker 4/28/14
Signature Date

Melanie J Parker
Printed Name

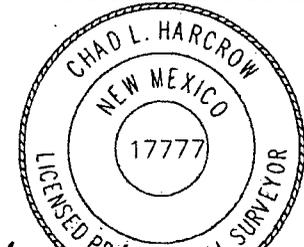
mparker@concho.com
E-mail Address

SURVEYOR CERTIFICATION

I hereby certify that the well location shown on this plat was plotted from field notes of actual surveys made by me or under my supervision, and that the same is true and correct to the best of my belief.

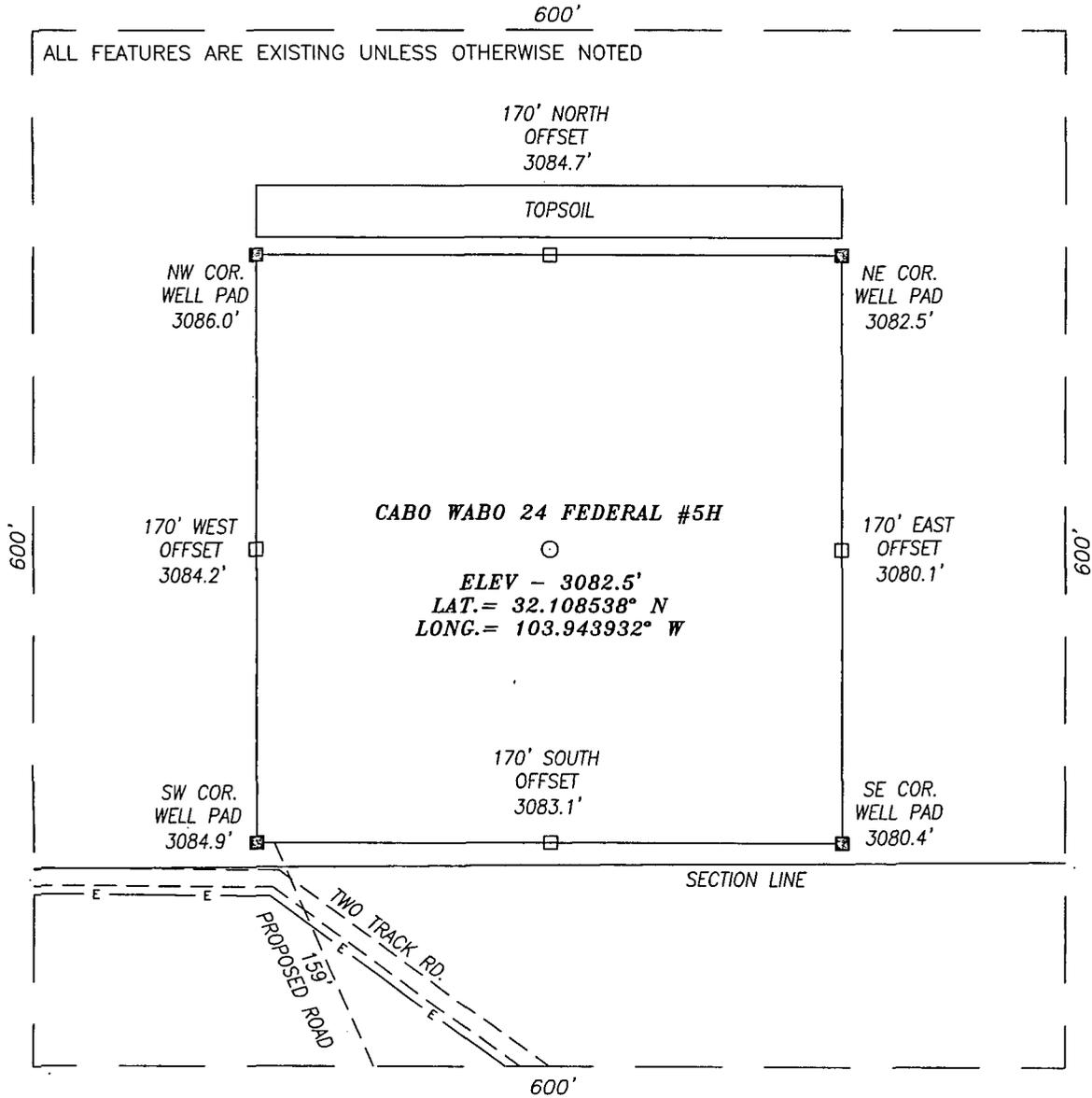
APRIL 24, 2013
Date of Survey

Signature & Seal of Professional Surveyor



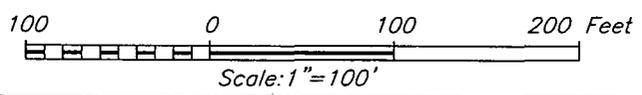
Chad Harcrow 5/11/13
Certificate No. CHAD HARCROW 17777
W.O. # 13-203 DRAWN BY: VD

SECTION 24, TOWNSHIP 25 SOUTH, RANGE 29 EAST, N.M.P.M.,
 EDDY COUNTY NEW MEXICO



DIRECTIONS TO LOCATION

HEADING SOUTH ON HWY 285 TURN LEFT (EAST) ONTO CR #725 (LONGHORN RD) AND GO APPROX. 3.8 MILES; THEN TURN LEFT (NORTHEAST) ONTO PIPELINE RD #1 AND GO APPROX. 4.5 MILES; THEN TURN LEFT (NORTHWEST) AND GO APPROX. 0.2 MILES TO EXISTING CABO WABO 25 #1H PAD; GO TO NORTHERN MOST PAD CORNER AND PROPOSED WELL IS APPROX. 320' NORTH.



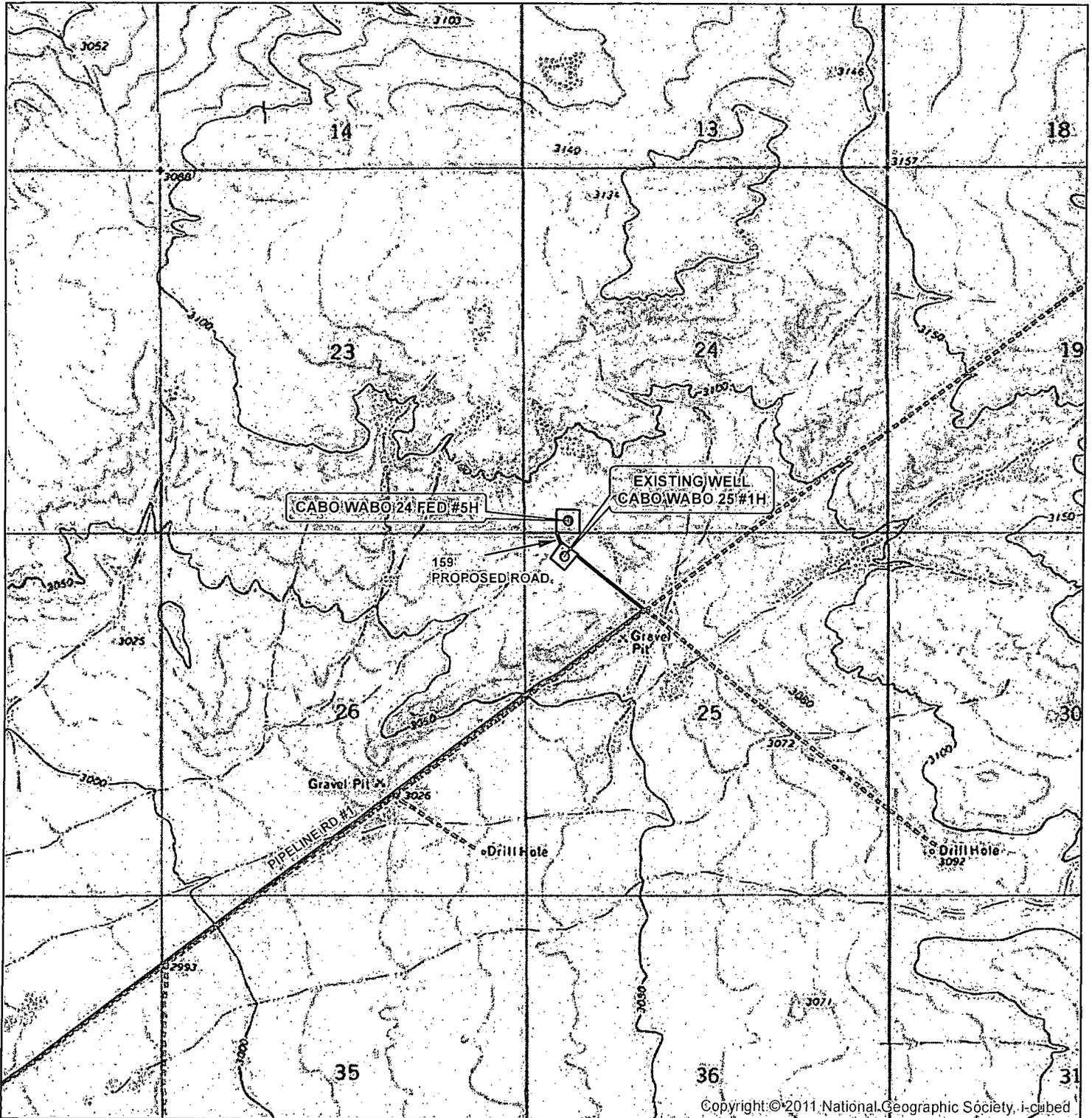
HARCROW SURVEYING, LLC
 1107 WATSON, ARTESIA, N.M. 88210
 PH: (575) 513-2570 FAX: (575) 746-2158
 chad_harcrow77@yahoo.com



COG PRODUCTION, LLC	
CABO WABO 24 FEDERAL #5H WELL LOCATED 190 FEET FROM THE SOUTH LINE AND 660 FEET FROM THE WEST LINE OF SECTION 24, TOWNSHIP 25 SOUTH, RANGE 29 EAST, N.M.P.M., EDDY COUNTY, NEW MEXICO	
SURVEY DATE: 04/24/2013	PAGE: 1 OF 1
DRAFTING DATE: 05/07/2013	
APPROVED BY: CH	DRAWN BY: VD
	FILE: 13-203

EXHIBIT 2

LOCATION VERIFICATION MAP



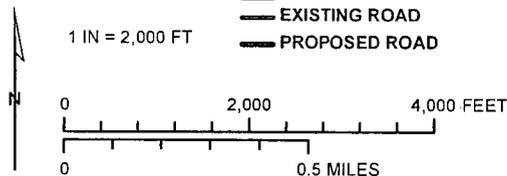
Copyright © 2011 National Geographic Society, i-cubed

SEC. 24, TWP. 25S, RGE. 29E
 SURVEY: N.M.P.M
 COUNTY: EDDY STATE: NEW MEXICO
 DESCRIPTION: CABO WABO 25 FED #5H
 190' FSL, 660' FWL

ELEVATION: 3082.5'
 OPERATOR: COG PRODUCTION LLC
 LEASE: CABO WABO 25 FED

W.O. # 13-203

- WELL
- WELL PAD
- EXISTING ROAD
- PROPOSED ROAD

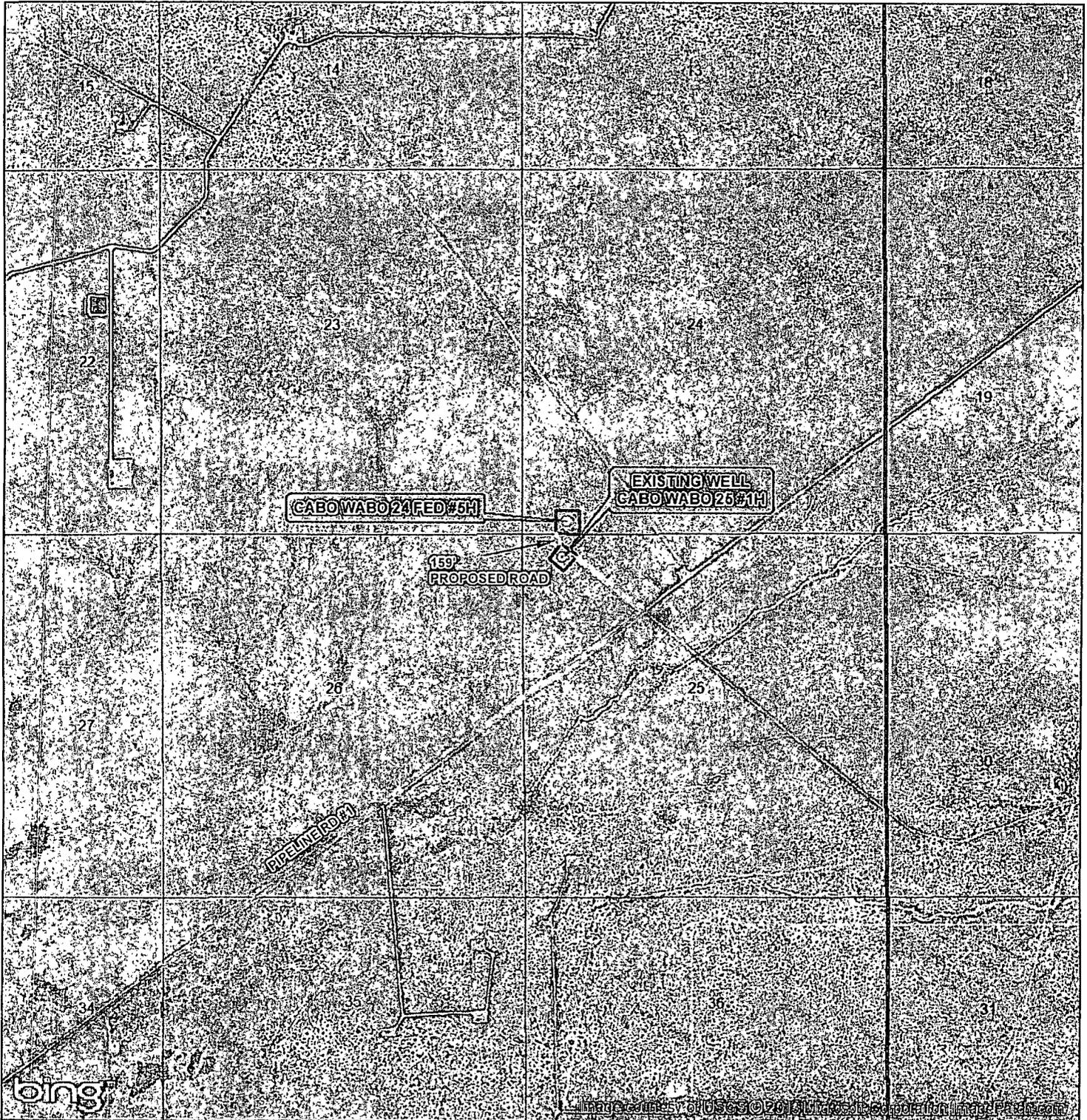


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 chad_harcrow77@yahoo.com



MAP DATE: 5/6/2013

LOCATION VERIFICATION MAP

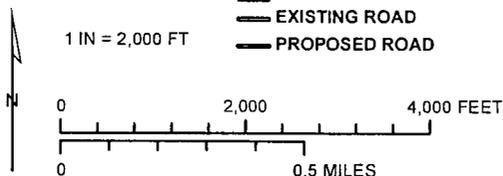


SEC. 24, TWP. 25S, RGE. 29E
 SURVEY: N.M.P.M
 COUNTY: EDDY STATE: NEW MEXICO
 DESCRIPTION: CABO WABO 25 FED #5H
 190' FSL, 660' FWL

ELEVATION: 3082.5'
 OPERATOR: COG PRODUCTION LLC
 LEASE: CABO WABO 25 FED

W.O. # 13-203

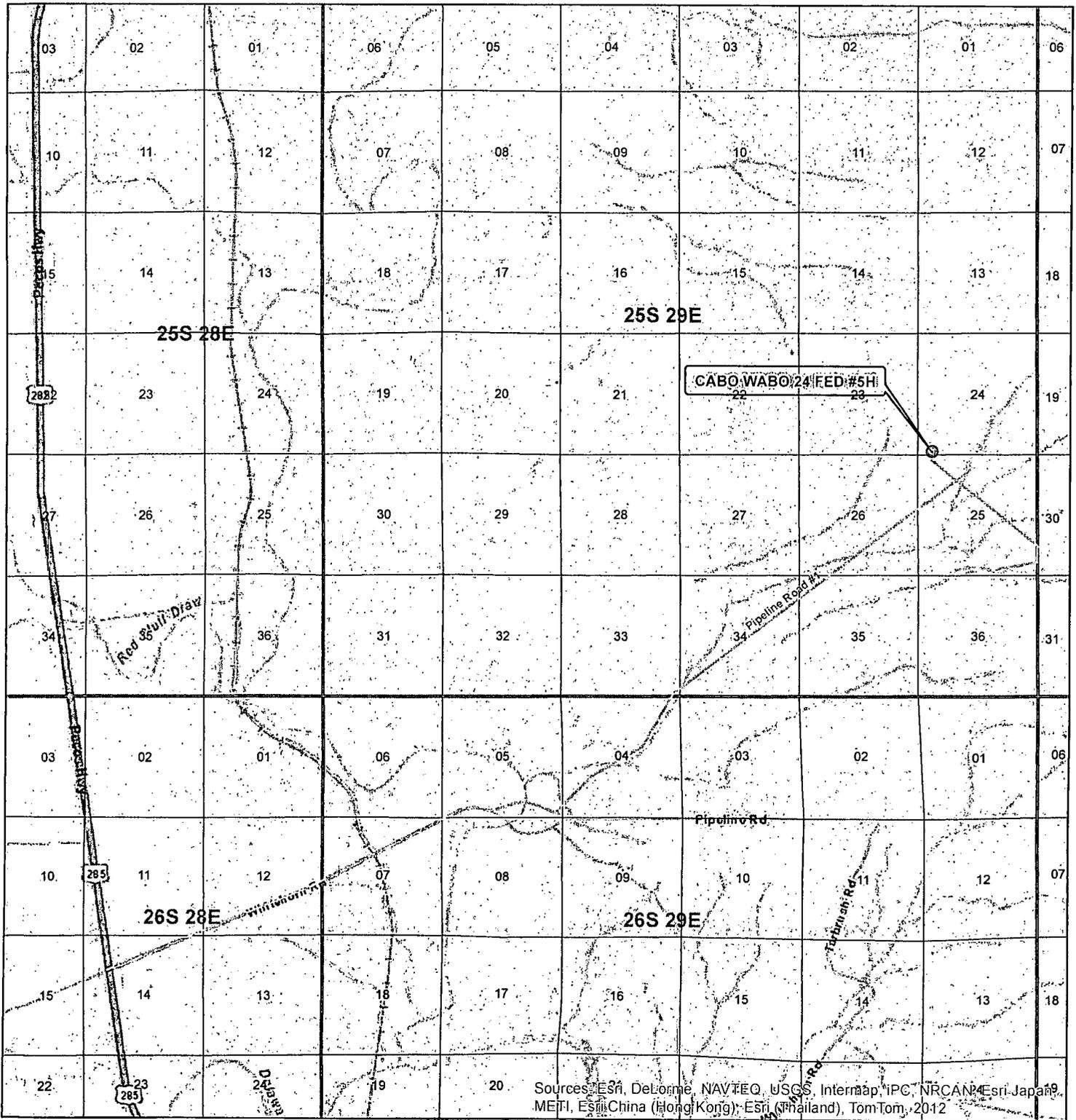
- WELL
- WELL PAD
- EXISTING ROAD
- PROPOSED ROAD



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VICINITY MAP



Sources: Esri, DeLorme, NAVTEQ, USGS, Intermap, IPC, NRCAN, Esri Japan, METI, Esri China (Hong Kong), Esri Thailand, TomTom, 2012

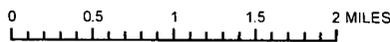
SEC. 24, TWP. 25S, RGE. 29E
 SURVEY: N.M.P.M
 COUNTY: EDDY STATE: NEW MEXICO
 DESCRIPTION: CABO WABO 25 FED #5H
 190' FSL, 660' FWL

ELEVATION: 3082.5'
 OPERATOR: COG PRODUCTION LLC
 LEASE: CABO WABO 25 FED

W.O. # 13-203



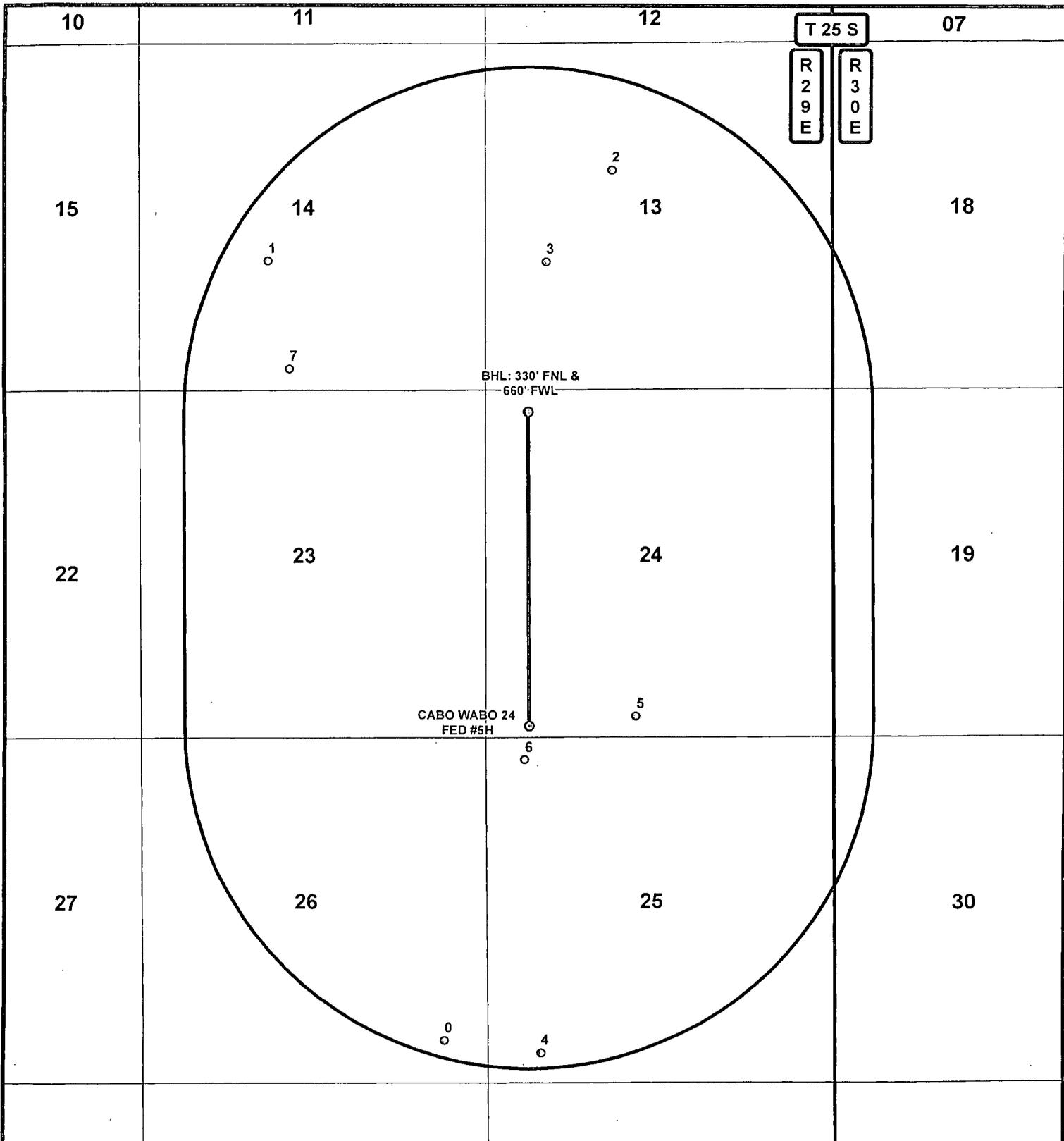
1 IN = 6,000 FT



- ⊙ WELL
- ▭ TOWNSHIP
- ▭ SECTION

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 chad_harcrow77@yahoo.com





DATA FOR "WELLS WITHIN 1 MI." IS TAKEN FROM THE NEW MEXICO EMNRD WEBSITE. THE DATA HAS BEEN UPDATED THROUGH MARCH 9, 2014.

LEGEND

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

CABO WABO 24 FED #5H			
SEC: 24	TWP: 25 S.	RGE: 29 E.	ELEVATION: 3082.5'
STATE: NEW MEXICO		COUNTY: EDDY	
W.O. # 14-147		LEASE: CABO WABO 24 FED	
SURVEY: N.M.P.M			
			1 IN = 2,000 FT

T 25 S
R 29 E
R 30 E



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FID	OPERATOR	WELL_NAME	LATITUDE	LONGITUDE	API	SECTION	TOWNSHIP	RANGE	FTG_NS	NS_CD	FTG_EW	EW_CD	TVD_DEPTH	COMPL_STAT
0	BENNETT J	SUPERIOR 26 001	32.095345	-103.948634	3001503718	26	25.0S	29E	660	S	660	E	0	Plugged
1	ENDEAVOR ENERGY RESOURCES, LP	CORRAL DRAW UNIT 001	32.128208	-103.957337	3001521054	14	25.0S	29E	1980	S	1980	W	0	Active
2	OXY USA INC	BRADLY 13 FEDERAL 001	32.131998	-103.940267	3001529256	13	25.0S	29E	1970	N	1949	W	6500	Active
3	POGO PRODUCING CO	BRADLY 13 FEDERAL 002	32.128143	-103.943553	3001529257	13	25.0S	29E	1955	S	936	W	6000	Plugged
4	COG PRODUCTION, LLC	25 FEDERAL 001	32.094818	-103.943859	3001535618	25	25.0S	29E	467	S	810	W	3420	Active
5	ATLANTIC OPERATING, INC.	24 FEDERAL 001	32.109073	-103.939096	3001535925	24	25.0S	29E	330	S	2310	W	0	New (Not drilled or compl)
6	COG PRODUCTION, LLC	CABO WABO 25 FEDERAL 001H	32.10724	-103.94464	3001540440	25	25.0S	29E	330	N	600	W	7825	New (Not drilled or compl)
7	EOG RESOURCES INC	HERD BULL 14 FEDERAL 003H	32.123671	-103.956257	3001538994	14	25.0S	29E	330	S	2310	W	0	New (Not drilled or compl)

COG Production, LLC
DRILLING AND OPERATIONS PROGRAM
Cabo Wabo 24 Federal Com 5H
SHL: 190' FSL & 660' FWL
BHL: 330' FNL & 660' FWL
Section 24, T25S, R29E
Eddy County, New Mexico

In conjunction with Form 3160-3, Application for Permit to Drill subject well, COG Production LLC submits the following eleven items of pertinent information in accordance with BLM requirements.

1. Geological surface formation: Permian
2. The estimated tops of geologic markers & estimated depths at which anticipated water, oil or gas formations are expected to be encountered are as follows:

Fresh Water	NP	
Rustler	681'	
Salado	1,185'	
Fletcher	3,039'	
Lamar Lime	3,254'	
Bell Canyon	3,302'	Oil
Cherry Canyon	4,192'	Oil
Brushy Canyon	5,492'	Oil
Bone Spring	7,077'	Oil
U Avalon Shale	7,413'	Oil
L Avalon Shale	7,629'	Oil
1 st BS Sand	8,010'	Oil
Lateral TD MD	12,451'	
Lateral TD TVD	7,860'	

No other formations are expected to give up oil, gas or fresh water in measurable quantities.

The surface fresh water sands will be protected by setting 13-3/8" casing at 750' and circulating cement back to surface.

The salt sections will be isolated by setting 9-5/8" casing at 3,270' and circulating cement back to surface.

Other intervals will be isolated by setting 5 1/2" casing to total depth and circulating cement back to surface.

3. Proposed Casing Program: All casing is new and API approved

Hole Size	Depths	Section	OD Casing	New/Used	Wt	Collar	Grade	Collapse Design Factor	Burst Design Factor	Tension Design Factor
17 1/2"	0' – 750'	Surface	13 3/8"	New	54.5#	STC	J-55	1.125	1.125	1.6
12 1/4"	0' – 3,270'	Intrmd	9 5/8"	New	36#	LTC	J-55	1.125	1.125	1.6
8 3/4"	0' – 8,133'	Production & Curve	5 1/2"	New	17#	LTC	P-110	1.125	1.125	1.6
7 7/8"	0' – 12,451'	Lateral	5 1/2"	New	17#	LTC	P-110	1.125	1.125	1.6

- While running all casing strings, the pipe will be kept a minimum of 1/3 full at all times to avoid approaching the collapse pressure of casing.
- Will run one centralizer every other joint in lateral section of well.

4. Proposed Cement Program

a. 13-3/8" Surface

Lead: 340 sx Class C + 4% Gel + 2% CaCl₂
(13.5 ppg / 9.2 gal/sk / 1.75 ft³/sk)

Tail: 250 sx Class C + 2% CaCl₂
(14.8 ppg / 6.35 gal/sk / 1.34 ft³/sk)

**Calculated w/75% excess on OH volumes based on offset wells

b. 9 5/8" Intermediate:

Lead: 920 sx Class C + 4% Gel + 1% CaCl₂
(13.5 ppg / 9.2 gal/sk / 1.75 ft³/sk)

Tail: 200 sx Class C + 2% CaCl₂
(14.8 ppg / 6.35 gal/sk / 1.34 ft³/sk)

**Calculated w/100% excess on OH volumes

c. 5 1/2" Production

Lead: 1000 sx 50:50:10 H w/ 8# salt, 5# kolseal, 0.5% Halad-322, 0.3% HR-601 & 1/4# D-Air 5000 (11.9 ppg / 14.07 gal/sk / 2.51 ft³/sk)

Tail: 1190 sx 50:50:2 H w/ 1% salt, 0.4% GasStop, 0.3% CFR-3 & 0.1% HR601, & CFR-3 (14.4 ppg / 5.66 gal/sk 1.25 ft³/sk)

**Calculated w/55% excess on OH volumes

- The above cement volumes could be revised pending caliper measurements.
- All casing strings are designed to circulate cement to surface.

5. Minimum Specifications for Pressure Control:

See
COA

Nipple up on 13 3/8" with minimum 2M annular preventer. Annular will be tested to 50% of WP and remainder of system tested to 2000 psi by independent tester.

Nipple up on 9 5/8" with minimum 3M annular and double ram preventers. Annular will be tested to 50% of WP and remainder of system tested to 3000 psi by independent tester.

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.

A 2" kill line and a minimum 3" choke line will be included in the drilling spool located below the ram-type BOP. Other accessories to the BOP equipment will include a Kelly cock and floor safety valve (inside BOP) and choke lines and choke manifold with 5000 psi WP rating.

All casing strings below the conductor shall be pressure tested to 0.22 psi per foot of casing string depth or 1500 psig, whichever is greater, but not to exceed 70 percent of casing's minimum internal yield. If pressure declines more than 10 percent in 30 minutes, corrective action will be taken.

While drilling the intermediate section, if a reading of H2S is greater than 100 ppm, well will be shut-in and a remote operated choke will be installed.

6. Estimated BHP & BHT:

Lateral TD = 3433 psi

Lateral TD = 133° F

7. Mud Program: The applicable depths and properties of this system are as follows:

Depth	Type System	Mud Weight	Viscosity (sec)	Waterloss (cc)
0' - 750'	Fresh Water	8.4 - 9.0	29	N.C.
750' - 3,270'	Brine	10.0 - 10.3	29	N.C.
3,270' - 12,451' (Lateral)	Cut Brine	8.5 - 8.7	29	N.C.

- The necessary mud products for weight addition and fluid loss control will be on location at all times.
- A visual and electronic mud monitoring system will be rigged up prior to spud to detect changes in the volume of mud system. The electronic system consists of a pit volume totalizer, stroke counter and flow sensor at flow line.
- If weight and/or viscosity are introduced to the mud system a daily mud check will be performed by mud contractor, along with tourly check by rig personnel.
- After setting intermediate casing, a third party gas unit detection system will be installed at the flow line.

8. Auxiliary Well Control and Monitoring Equipment:

- a. A Kelly cock will be in the drill string at all times.
- b. A full opening drill pipe stabbing valve having the appropriate connections will be on the rig floor at all times.
- c. Hydrogen Sulfide detection equipment will be in operation after drilling out the 13 3/8" casing shoe until the 5 1/2" casing is cemented. Breathing equipment will be on location upon drilling the 13 3/8" shoe until total depth is reached.

9. Testing, Logging and Coring Program:

- a. Drill stem tests will be based on geological sample shows.
- b. If open hole electrical logging is performed, the program will be:
 - i. Total Depth to Intermediate Casing: Dual Laterolog-Micro Laterolog and Gamma Ray. Compensated Neutron – Z Density log with Gamma Ray and Caliper.
 - ii. Total Depth to Surface: Compensated Neutron with Gamma Ray
 - iii. No cores are planned.
 - iv. Additional testing will be initiated subsequent to setting the 5 1/2" production casing. Specific intervals will be targeted based on log evaluation, geological sample shows and drill stem tests.

10. Potential Hazards:

- a. No abnormal pressures or temperatures are expected. There is no known presence of H₂S in this area. If H₂S is encountered the operator will comply with the provisions of Onshore Oil and Gas Order No. 6. All personnel will be familiar with all aspects of safe operation of equipment being used to drill this well. No H₂S is anticipated to be encountered.

11. Anticipated starting date and Duration of Operations:

- a. Road and location construction will begin after the BLM has approved the APD. Anticipated spud date will be as soon as possible after BLM approval and as soon as a rig will be available. Move in operations and drilling is expected to take 30 days.



COG Production LLC

Eddy County, NM

Cabo Wabo 24 Federal

#5H

OH

Plan: Design #1

Standard Planning Report

20 February, 2014



**Wellplanning
Planning Report**

Database:	EDM 5000.1 Single User Db	Local Co-ordinate Reference:	Well #5H:
Company:	COG Production LLC	TVD Reference:	WELL @ 3100.5usft (Original Well Elev)
Project:	Eddy County, NM	MD Reference:	WELL @ 3100.5usft (Original Well Elev)
Site:	Cabo Wabo 24 Federal	North Reference:	Grid
Well:	#5H	Survey Calculation Method:	Minimum Curvature
Wellbore:	OH		
Design:	Design #1		

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:	Cabo Wabo 24 Federal				
Site Position:		Northing:	403,427.00 usft	Latitude:	32° 6' 30.738 N
From:	Map	Easting:	620,570.50 usft	Longitude:	103° 56' 38.153 W
Position Uncertainty:	0.0 usft	Slot Radius:	13-3/16 "	Grid Convergence:	0.21 °

Well:	#5H					
Well Position	+N-S	0.0 usft	Northing:	403,427.00 usft	Latitude:	32° 6' 30.738 N
	+E-W	0.0 usft	Easting:	620,570.50 usft	Longitude:	103° 56' 38.153 W
Position Uncertainty		0.0 usft	Wellhead Elevation:		Ground Level:	3,082.5 usft

Wellbore:	OH				
Magnetics	Model Name	Sample Date	Declination (°)	Dip Angle (°)	Field Strength (nT)
	IGRF2010	2/20/2014	7.42	59.95	48,240

Design:	Design #1			
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	359.75

Plan Sections										
Measured Depth (usft)	Inclination (°)	Azimuth (°)	Vertical Depth (usft)	+N-S (usft)	+E-W (usft)	Dogleg Rate (°/100usft)	Build Rate (°/100usft)	Turn Rate (°/100usft)	TFO (°)	Target
0.0	0.00	0.00	0.0	0.0	0.0	0.00	0.00	0.00	0.00	
7,382.5	0.00	0.00	7,382.5	0.0	0.0	0.00	0.00	0.00	0.00	
8,132.6	90.00	359.75	7,860.0	477.5	-2.1	12.00	12.00	0.00	359.75	
12,451.0	90.00	359.75	7,860.0	4,795.9	-20.9	0.00	0.00	0.00	0.00	PBHL(CW24#5H)



Wellplanning
Planning Report

Database:	EDM 5000.1 Single User Db	Local Co-ordinate Reference:	Well #5H
Company:	COG Production LLC	TVD Reference:	WELL @ 3100.5usft (Original Well Elev)
Project:	Eddy County, NM	MD Reference:	WELL @ 3100.5usft (Original Well Elev)
Site:	Cabo Wabo 24 Federal	North Reference:	Grid:
Well:	#5H	Survey Calculation Method:	Minimum Curvature
Wellbore:	OH		
Design:	Design #1		

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	
1,000.0	0.00	0.00	1,000.0	0.0	0.0	0.0	0.00	0.00	0.00	
1,100.0	0.00	0.00	1,100.0	0.0	0.0	0.0	0.00	0.00	0.00	
1,200.0	0.00	0.00	1,200.0	0.0	0.0	0.0	0.00	0.00	0.00	
1,300.0	0.00	0.00	1,300.0	0.0	0.0	0.0	0.00	0.00	0.00	
1,400.0	0.00	0.00	1,400.0	0.0	0.0	0.0	0.00	0.00	0.00	
1,500.0	0.00	0.00	1,500.0	0.0	0.0	0.0	0.00	0.00	0.00	
1,600.0	0.00	0.00	1,600.0	0.0	0.0	0.0	0.00	0.00	0.00	
1,700.0	0.00	0.00	1,700.0	0.0	0.0	0.0	0.00	0.00	0.00	
1,800.0	0.00	0.00	1,800.0	0.0	0.0	0.0	0.00	0.00	0.00	
1,900.0	0.00	0.00	1,900.0	0.0	0.0	0.0	0.00	0.00	0.00	
2,000.0	0.00	0.00	2,000.0	0.0	0.0	0.0	0.00	0.00	0.00	
2,100.0	0.00	0.00	2,100.0	0.0	0.0	0.0	0.00	0.00	0.00	
2,200.0	0.00	0.00	2,200.0	0.0	0.0	0.0	0.00	0.00	0.00	
2,300.0	0.00	0.00	2,300.0	0.0	0.0	0.0	0.00	0.00	0.00	
2,400.0	0.00	0.00	2,400.0	0.0	0.0	0.0	0.00	0.00	0.00	
2,500.0	0.00	0.00	2,500.0	0.0	0.0	0.0	0.00	0.00	0.00	
2,600.0	0.00	0.00	2,600.0	0.0	0.0	0.0	0.00	0.00	0.00	
2,700.0	0.00	0.00	2,700.0	0.0	0.0	0.0	0.00	0.00	0.00	
2,800.0	0.00	0.00	2,800.0	0.0	0.0	0.0	0.00	0.00	0.00	
2,900.0	0.00	0.00	2,900.0	0.0	0.0	0.0	0.00	0.00	0.00	
3,000.0	0.00	0.00	3,000.0	0.0	0.0	0.0	0.00	0.00	0.00	
3,100.0	0.00	0.00	3,100.0	0.0	0.0	0.0	0.00	0.00	0.00	
3,200.0	0.00	0.00	3,200.0	0.0	0.0	0.0	0.00	0.00	0.00	
3,300.0	0.00	0.00	3,300.0	0.0	0.0	0.0	0.00	0.00	0.00	
3,400.0	0.00	0.00	3,400.0	0.0	0.0	0.0	0.00	0.00	0.00	
3,500.0	0.00	0.00	3,500.0	0.0	0.0	0.0	0.00	0.00	0.00	
3,600.0	0.00	0.00	3,600.0	0.0	0.0	0.0	0.00	0.00	0.00	
3,700.0	0.00	0.00	3,700.0	0.0	0.0	0.0	0.00	0.00	0.00	
3,800.0	0.00	0.00	3,800.0	0.0	0.0	0.0	0.00	0.00	0.00	
3,900.0	0.00	0.00	3,900.0	0.0	0.0	0.0	0.00	0.00	0.00	
4,000.0	0.00	0.00	4,000.0	0.0	0.0	0.0	0.00	0.00	0.00	
4,100.0	0.00	0.00	4,100.0	0.0	0.0	0.0	0.00	0.00	0.00	
4,200.0	0.00	0.00	4,200.0	0.0	0.0	0.0	0.00	0.00	0.00	
4,300.0	0.00	0.00	4,300.0	0.0	0.0	0.0	0.00	0.00	0.00	
4,400.0	0.00	0.00	4,400.0	0.0	0.0	0.0	0.00	0.00	0.00	
4,500.0	0.00	0.00	4,500.0	0.0	0.0	0.0	0.00	0.00	0.00	
4,600.0	0.00	0.00	4,600.0	0.0	0.0	0.0	0.00	0.00	0.00	
4,700.0	0.00	0.00	4,700.0	0.0	0.0	0.0	0.00	0.00	0.00	
4,800.0	0.00	0.00	4,800.0	0.0	0.0	0.0	0.00	0.00	0.00	
4,900.0	0.00	0.00	4,900.0	0.0	0.0	0.0	0.00	0.00	0.00	
5,000.0	0.00	0.00	5,000.0	0.0	0.0	0.0	0.00	0.00	0.00	
5,100.0	0.00	0.00	5,100.0	0.0	0.0	0.0	0.00	0.00	0.00	
5,200.0	0.00	0.00	5,200.0	0.0	0.0	0.0	0.00	0.00	0.00	
5,300.0	0.00	0.00	5,300.0	0.0	0.0	0.0	0.00	0.00	0.00	



Wellplanning
Planning Report

Database:	EDM 5000.1 Single User Db	Local Co-ordinate Reference:	Well #5H
Company:	COG Production, LLC	TVD Reference:	WELL @ 3100.5usft (Original Well Elev)
Project:	Eddy County, NM	MD Reference:	WELL @ 3100.5usft (Original Well Elev)
Site:	Cabo Wabo 24 Federal	North Reference:	Grid:
Well:	#5H	Survey Calculation Method:	Minimum Curvature
Wellbore:	OH		
Design:	Design #1		

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)	
5,400.0	0.00	0.00	5,400.0	0.0	0.0	0.0	0.00	0.00	0.00	
5,500.0	0.00	0.00	5,500.0	0.0	0.0	0.0	0.00	0.00	0.00	
5,600.0	0.00	0.00	5,600.0	0.0	0.0	0.0	0.00	0.00	0.00	
5,700.0	0.00	0.00	5,700.0	0.0	0.0	0.0	0.00	0.00	0.00	
5,800.0	0.00	0.00	5,800.0	0.0	0.0	0.0	0.00	0.00	0.00	
5,900.0	0.00	0.00	5,900.0	0.0	0.0	0.0	0.00	0.00	0.00	
6,000.0	0.00	0.00	6,000.0	0.0	0.0	0.0	0.00	0.00	0.00	
6,100.0	0.00	0.00	6,100.0	0.0	0.0	0.0	0.00	0.00	0.00	
6,200.0	0.00	0.00	6,200.0	0.0	0.0	0.0	0.00	0.00	0.00	
6,300.0	0.00	0.00	6,300.0	0.0	0.0	0.0	0.00	0.00	0.00	
6,400.0	0.00	0.00	6,400.0	0.0	0.0	0.0	0.00	0.00	0.00	
6,500.0	0.00	0.00	6,500.0	0.0	0.0	0.0	0.00	0.00	0.00	
6,600.0	0.00	0.00	6,600.0	0.0	0.0	0.0	0.00	0.00	0.00	
6,700.0	0.00	0.00	6,700.0	0.0	0.0	0.0	0.00	0.00	0.00	
6,800.0	0.00	0.00	6,800.0	0.0	0.0	0.0	0.00	0.00	0.00	
6,900.0	0.00	0.00	6,900.0	0.0	0.0	0.0	0.00	0.00	0.00	
7,000.0	0.00	0.00	7,000.0	0.0	0.0	0.0	0.00	0.00	0.00	
7,100.0	0.00	0.00	7,100.0	0.0	0.0	0.0	0.00	0.00	0.00	
7,200.0	0.00	0.00	7,200.0	0.0	0.0	0.0	0.00	0.00	0.00	
7,300.0	0.00	0.00	7,300.0	0.0	0.0	0.0	0.00	0.00	0.00	
7,382.5	0.00	0.00	7,382.5	0.0	0.0	0.0	0.00	0.00	0.00	
KOP - 7382.5 'MD, 0.00° INC; 0.00° AZI										
7,400.0	2.10	359.75	7,400.0	0.3	0.0	0.3	12.00	12.00	0.00	
7,425.0	5.10	359.75	7,424.9	1.9	0.0	1.9	12.00	12.00	0.00	
7,450.0	8.10	359.75	7,449.8	4.8	0.0	4.8	12.00	12.00	0.00	
7,475.0	11.10	359.75	7,474.4	8.9	0.0	8.9	12.00	12.00	0.00	
7,500.0	14.10	359.75	7,498.8	14.4	-0.1	14.4	12.00	12.00	0.00	
7,525.0	17.10	359.75	7,522.9	21.1	-0.1	21.1	12.00	12.00	0.00	
7,550.0	20.10	359.75	7,546.6	29.1	-0.1	29.1	12.00	12.00	0.00	
7,575.0	23.10	359.75	7,569.8	38.3	-0.2	38.3	12.00	12.00	0.00	
7,600.0	26.10	359.75	7,592.6	48.7	-0.2	48.7	12.00	12.00	0.00	
7,625.0	29.10	359.75	7,614.7	60.3	-0.3	60.3	12.00	12.00	0.00	
7,650.0	32.10	359.75	7,636.2	73.0	-0.3	73.0	12.00	12.00	0.00	
7,675.0	35.10	359.75	7,657.0	86.8	-0.4	86.8	12.00	12.00	0.00	
7,700.0	38.10	359.75	7,677.1	101.7	-0.4	101.7	12.00	12.00	0.00	
7,725.0	41.10	359.75	7,696.4	117.7	-0.5	117.7	12.00	12.00	0.00	
7,750.0	44.10	359.75	7,714.8	134.6	-0.6	134.6	12.00	12.00	0.00	
7,775.0	47.10	359.75	7,732.3	152.4	-0.7	152.4	12.00	12.00	0.00	
7,800.0	50.10	359.75	7,748.8	171.2	-0.7	171.2	12.00	12.00	0.00	
7,825.0	53.10	359.75	7,764.3	190.8	-0.8	190.8	12.00	12.00	0.00	
7,850.0	56.10	359.75	7,778.8	211.1	-0.9	211.1	12.00	12.00	0.00	
7,875.0	59.10	359.75	7,792.2	232.3	-1.0	232.3	12.00	12.00	0.00	
7,900.0	62.10	359.75	7,804.5	254.0	-1.1	254.0	12.00	12.00	0.00	
7,925.0	65.10	359.75	7,815.6	276.4	-1.2	276.4	12.00	12.00	0.00	
7,950.0	68.09	359.75	7,825.5	299.4	-1.3	299.4	12.00	12.00	0.00	
7,975.0	71.09	359.75	7,834.2	322.8	-1.4	322.8	12.00	12.00	0.00	
8,000.0	74.09	359.75	7,841.7	346.6	-1.5	346.6	12.00	12.00	0.00	
8,025.0	77.09	359.75	7,847.9	370.8	-1.6	370.9	12.00	12.00	0.00	
8,050.0	80.09	359.75	7,852.9	395.4	-1.7	395.4	12.00	12.00	0.00	
8,075.0	83.09	359.75	7,856.5	420.1	-1.8	420.1	12.00	12.00	0.00	
8,100.0	86.09	359.75	7,858.9	445.0	-1.9	445.0	12.00	12.00	0.00	
8,125.0	89.09	359.75	7,859.9	469.9	-2.1	469.9	12.00	12.00	0.00	
8,132.6	90.00	359.75	7,860.0	477.5	-2.1	477.5	12.00	12.00	0.00	



Wellplanning
Planning Report

Database:	EDM 5000.1 Single User Db	Local Co-ordinate Reference:	Well #5H:
Company:	COG Production LLC	TVD Reference:	WELL @ 3100.5usft (Original Well Elev)
Project:	Eddy County, NM	MD Reference:	WELL @ 3100.5usft (Original Well Elev)
Site:	Cabo Wabo 24 Federal	North Reference:	Grid
Well:	#5H	Survey Calculation Method:	Minimum Curvature
Wellbore:	OH		
Design:	Design #1		

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)	
EOC: 8132.6 MD, 90.00° INC, 359.75° AZI										
8,200.0	90.00	359.75	7,860.0	544.9	-2.4	544.9	0.00	0.00	0.00	
8,300.0	90.00	359.75	7,860.0	644.9	-2.8	644.9	0.00	0.00	0.00	
8,400.0	90.00	359.75	7,860.0	744.9	-3.3	744.9	0.00	0.00	0.00	
8,500.0	90.00	359.75	7,860.0	844.9	-3.7	844.9	0.00	0.00	0.00	
8,600.0	90.00	359.75	7,860.0	944.9	-4.1	944.9	0.00	0.00	0.00	
8,700.0	90.00	359.75	7,860.0	1,044.9	-4.6	1,044.9	0.00	0.00	0.00	
8,800.0	90.00	359.75	7,860.0	1,144.9	-5.0	1,144.9	0.00	0.00	0.00	
8,900.0	90.00	359.75	7,860.0	1,244.9	-5.4	1,244.9	0.00	0.00	0.00	
9,000.0	90.00	359.75	7,860.0	1,344.9	-5.9	1,344.9	0.00	0.00	0.00	
9,100.0	90.00	359.75	7,860.0	1,444.9	-6.3	1,444.9	0.00	0.00	0.00	
9,200.0	90.00	359.75	7,860.0	1,544.9	-6.7	1,544.9	0.00	0.00	0.00	
9,300.0	90.00	359.75	7,860.0	1,644.9	-7.2	1,644.9	0.00	0.00	0.00	
9,400.0	90.00	359.75	7,860.0	1,744.9	-7.6	1,744.9	0.00	0.00	0.00	
9,500.0	90.00	359.75	7,860.0	1,844.9	-8.1	1,844.9	0.00	0.00	0.00	
9,600.0	90.00	359.75	7,860.0	1,944.9	-8.5	1,944.9	0.00	0.00	0.00	
9,700.0	90.00	359.75	7,860.0	2,044.9	-8.9	2,044.9	0.00	0.00	0.00	
9,800.0	90.00	359.75	7,860.0	2,144.9	-9.4	2,144.9	0.00	0.00	0.00	
9,900.0	90.00	359.75	7,860.0	2,244.9	-9.8	2,244.9	0.00	0.00	0.00	
10,000.0	90.00	359.75	7,860.0	2,344.9	-10.2	2,344.9	0.00	0.00	0.00	
10,100.0	90.00	359.75	7,860.0	2,444.9	-10.7	2,444.9	0.00	0.00	0.00	
10,200.0	90.00	359.75	7,860.0	2,544.9	-11.1	2,544.9	0.00	0.00	0.00	
10,300.0	90.00	359.75	7,860.0	2,644.9	-11.5	2,644.9	0.00	0.00	0.00	
10,400.0	90.00	359.75	7,860.0	2,744.9	-12.0	2,744.9	0.00	0.00	0.00	
10,500.0	90.00	359.75	7,860.0	2,844.9	-12.4	2,844.9	0.00	0.00	0.00	
10,600.0	90.00	359.75	7,860.0	2,944.9	-12.8	2,944.9	0.00	0.00	0.00	
10,700.0	90.00	359.75	7,860.0	3,044.9	-13.3	3,044.9	0.00	0.00	0.00	
10,800.0	90.00	359.75	7,860.0	3,144.9	-13.7	3,144.9	0.00	0.00	0.00	
10,900.0	90.00	359.75	7,860.0	3,244.9	-14.2	3,244.9	0.00	0.00	0.00	
11,000.0	90.00	359.75	7,860.0	3,344.9	-14.6	3,344.9	0.00	0.00	0.00	
11,100.0	90.00	359.75	7,860.0	3,444.9	-15.0	3,444.9	0.00	0.00	0.00	
11,200.0	90.00	359.75	7,860.0	3,544.9	-15.5	3,544.9	0.00	0.00	0.00	
11,300.0	90.00	359.75	7,860.0	3,644.9	-15.9	3,644.9	0.00	0.00	0.00	
11,400.0	90.00	359.75	7,860.0	3,744.9	-16.3	3,744.9	0.00	0.00	0.00	
11,500.0	90.00	359.75	7,860.0	3,844.9	-16.8	3,844.9	0.00	0.00	0.00	
11,600.0	90.00	359.75	7,860.0	3,944.9	-17.2	3,944.9	0.00	0.00	0.00	
11,700.0	90.00	359.75	7,860.0	4,044.9	-17.6	4,044.9	0.00	0.00	0.00	
11,800.0	90.00	359.75	7,860.0	4,144.9	-18.1	4,144.9	0.00	0.00	0.00	
11,900.0	90.00	359.75	7,860.0	4,244.9	-18.5	4,244.9	0.00	0.00	0.00	
12,000.0	90.00	359.75	7,860.0	4,344.9	-19.0	4,344.9	0.00	0.00	0.00	
12,100.0	90.00	359.75	7,860.0	4,444.9	-19.4	4,444.9	0.00	0.00	0.00	
12,200.0	90.00	359.75	7,860.0	4,544.9	-19.8	4,544.9	0.00	0.00	0.00	
12,300.0	90.00	359.75	7,860.0	4,644.9	-20.3	4,644.9	0.00	0.00	0.00	
12,400.0	90.00	359.75	7,860.0	4,744.9	-20.7	4,744.9	0.00	0.00	0.00	
12,451.0	90.00	359.75	7,860.0	4,795.9	-20.9	4,795.9	0.00	0.00	0.00	
TD at 12451.0 - PBHL(CW24#5H)										



Wellplanning
Planning Report

Database:	EDM 5000.1 Single User.Db	Local Co-ordinate Reference:	Well #5H
Company:	COG Production.LLC	TVD Reference:	WELL @ 3100.5usft (Original Well Elev)
Project:	Eddy County, NM	MD Reference:	WELL @ 3100.5usft (Original Well Elev)
Site:	Cabo Wabo 24 Federal	North Reference:	Grid
Well:	#5H	Survey Calculation Method:	Minimum Curvature
Wellbore:	OH		
Design:	Design #1		

Design Targets										
Target Name	hit/miss target	Dip Angle (°)	Dip Dir (°)	TVD (usft)	+N/S (usft)	+E/W (usft)	Northing (usft)	Easting (usft)	Latitude	Longitude
PBHL(CW24#5H)		0.00	0.00	7,860.0	4,795.9	-20.5	408,222.90	620,550.00	32° 7' 18.201 N	103° 56' 38.190 W
- plan misses target center by 0.4usft at 12451.0usft MD (7860.0 TVD, 4795.9 N, -20.9 E)										
- Point										

Plan Annotations					
Measured Depth (usft)	Vertical Depth (usft)	Local Coordinates		Comment	
		+N/S (usft)	+E/W (usft)		
7,382.5	7,382.5	0.0	0.0	KOP - 7382.5 'MD, 0.00° INC, 0.00° AZI	
8,132.6	7,860.0	477.5	-2.1	EOC- 8132.6 'MD, 90.00° INC, 359.75° AZI	
12,451.0	7,860.0	4,795.9	-20.9	TD at 12451.0	



Section Details

Sec	MD	Inc	Azi	TVD	+N/-S	+E/-W	Dleg	TFace	Vsect	
1	0.0	0.00	0.00	0.0	0.0	0.0	0.00	0.00	0.0	
2	7382.5	0.00	0.00	7382.5	0.0	0.0	0.00	0.00	0.0	
3	8132.6	90.00	359.75	7860.0	477.5	-2.1	12.00	359.75	477.5	
4	12451.0	90.00	359.75	7860.0	4795.9	-20.9	0.00	0.00	4795.9	PBHL(CW24#5H)

COG Production LLC
 Project: Eddy County, NM
 Well: #5H
 Wellbore: OH
 Well Design: Design #1 (#5H/OH)

WELL DETAILS: #5H

Ground Elevation: 3082.5
 RKB Elevation: WELL @ 3100.5usft (Original Well Elev)
 Rig Name: Original Well Elev

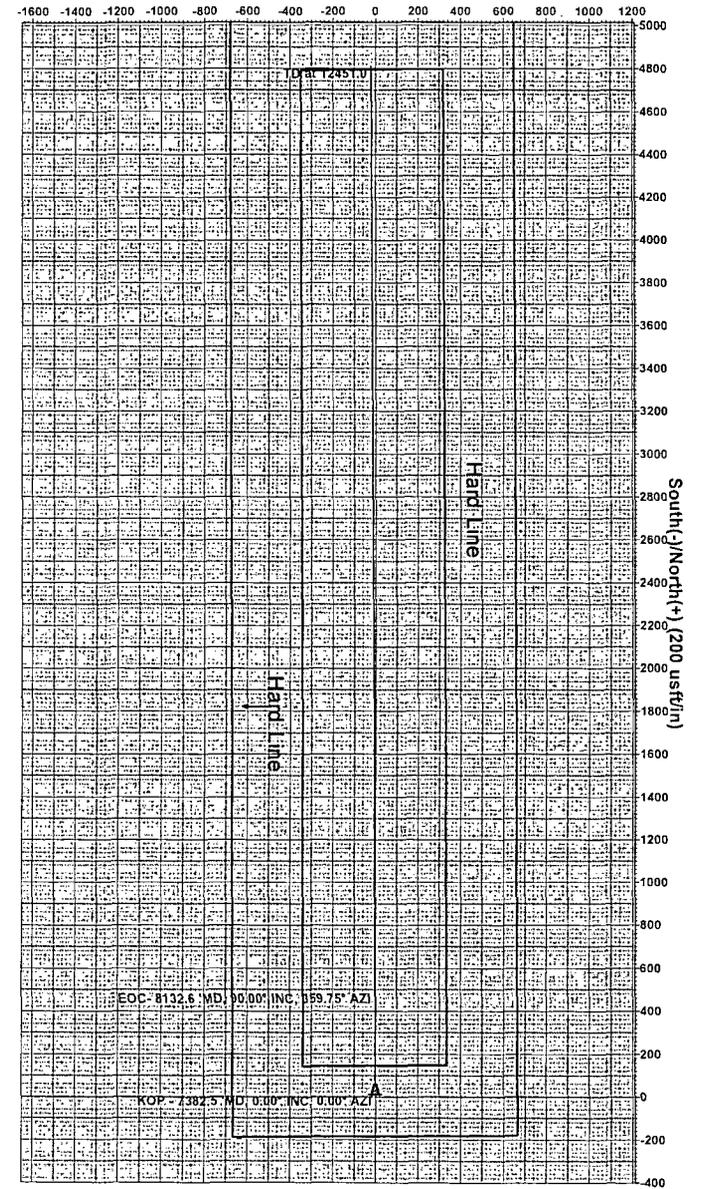
Northing: 403427.00
 Easting: 620570.50
 Latitude: 32° 6' 30.738 N
 Longitude: 103° 56' 38.153 W



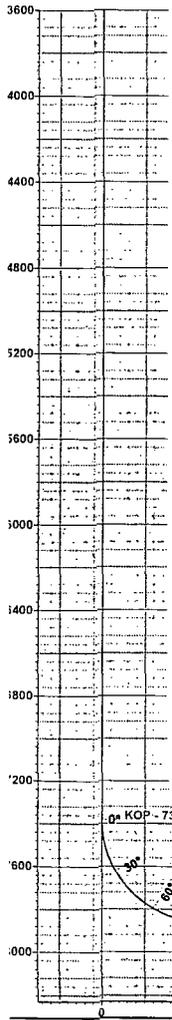
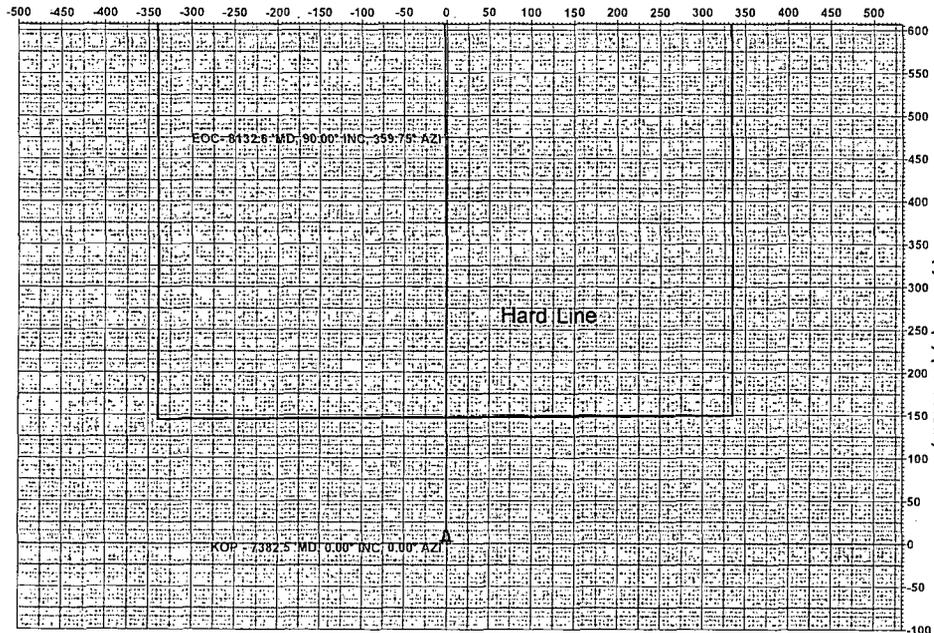
Azimuths to Grid North
 True North: -0.21°
 Magnetic North: 7.21°

Magnetic Field
 Strength: 48240.3nT
 Dip Angle: 59.95°
 Date: 2/20/2014
 Model: IGRF2010

West(-)/East(+) (200 usft/in)



West(-)/East(+) (50 usft/in)



Vertical Section at 359.75° (200 usft/in)
 Terra Directional Services
 322 Spring Hill Drive, Suite A100, Spring, Texas 77386
 432.425.7532

PROJECT DETAILS: Eddy County, NM
 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
 Local North: Grid

Plan: Design #1 (#5H/OH)
 Created By: Well Planner Date: 10:45, February 20 2014





New Mexico Office of the State Engineer Water Column/Average Depth to Water

(A CLW##### in the POD suffix indicates the POD has been replaced & no longer serves a water right file.)

(R=POD has been replaced,
O=orphaned,
C=the file is closed)

(quarters are 1=NW 2=NE 3=SW 4=SE)

(quarters are smallest to largest) (NAD83 UTM in meters)

(In feet)

POD Number	POD Sub-Code	basin	County	64	16	4	Sec	Tws.	Rng	X	Y	Depth Well	Depth Water	Water Column
<u>C 01337</u>	C	ED		2	1	30	25S	29E		591926	3552642*	180	30	150
<u>C 01880</u>	C	ED		3	3	2	06	25S	29E	592161	3558605*	85	40	45
<u>C 02371</u>	C	ED		2	3	15	25S	29E		596741	3555106*	200	60	140
<u>C 02459</u>	C	ED		4	4	1	02	25S	29E	598422	3558663*	150		
<u>C 02518</u>	C	ED		3	4	08	25S	29E		593895	3556300*	462		
<u>C 02680</u>	C	ED		2	3	15	25S	29E		596741	3555106*	200		
<u>RA 07162 EXP2</u>		ED		1	3	1	10	25S	29E	596214	3557222*	55	40	15

Average Depth to Water: **42 feet**

Minimum Depth: **30 feet**

Maximum Depth: **60 feet**

Record Count: 7

PLSS Search:

Township: 25S

Range: 29E

*UTM location was derived from PLSS - see Help

The data is furnished by the NMOSE/ISC and is accepted by the recipient with the expressed understanding that the OSE/ISC make no warranties, expressed or implied, concerning the accuracy, completeness, reliability, usability, or suitability for any particular purpose of the data.



New Mexico Office of the State Engineer
Water Column/Average Depth to Water

No records found.

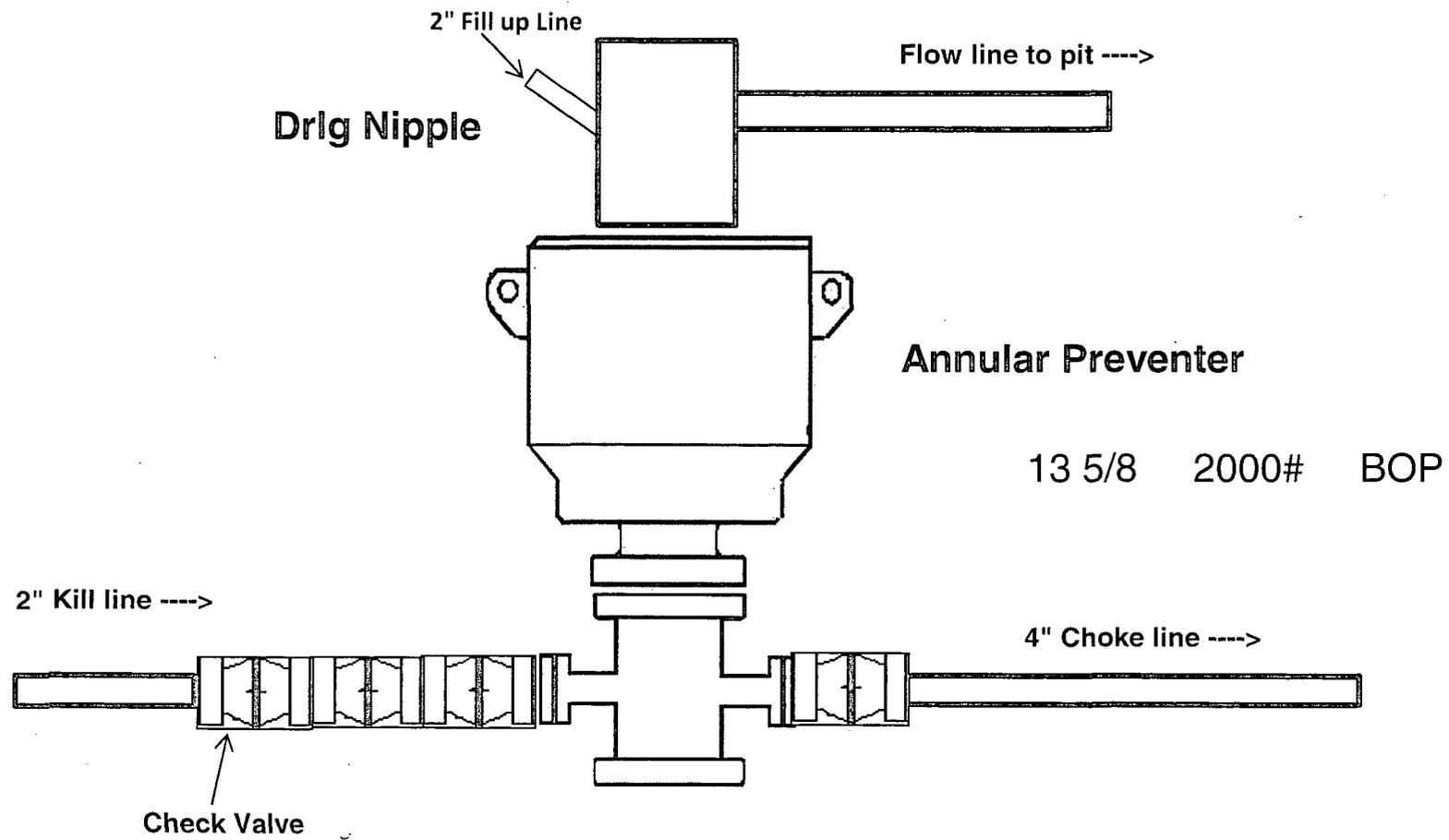
PLSS Search:

Section(s): 24

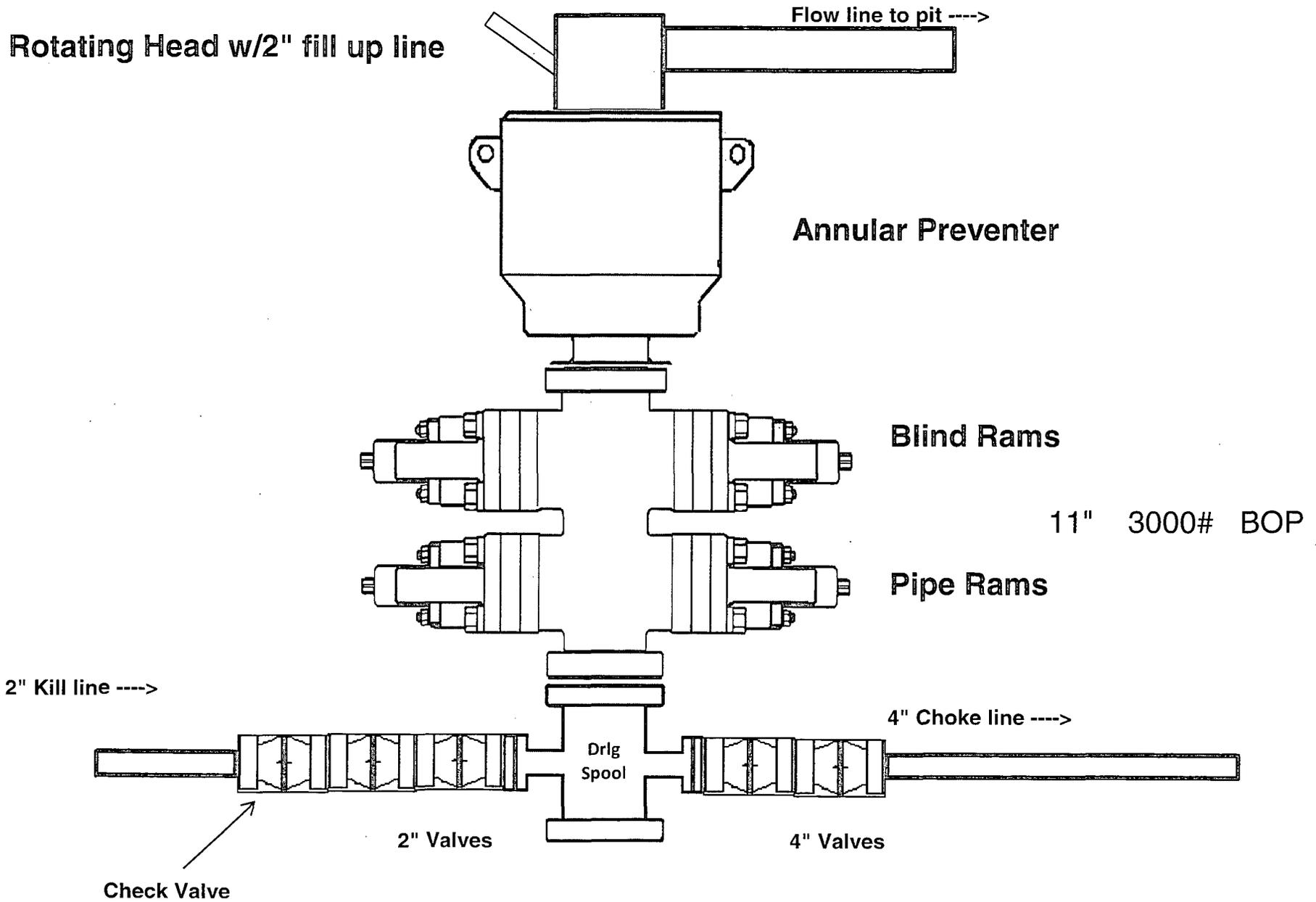
Township: 25S

Range: 29E

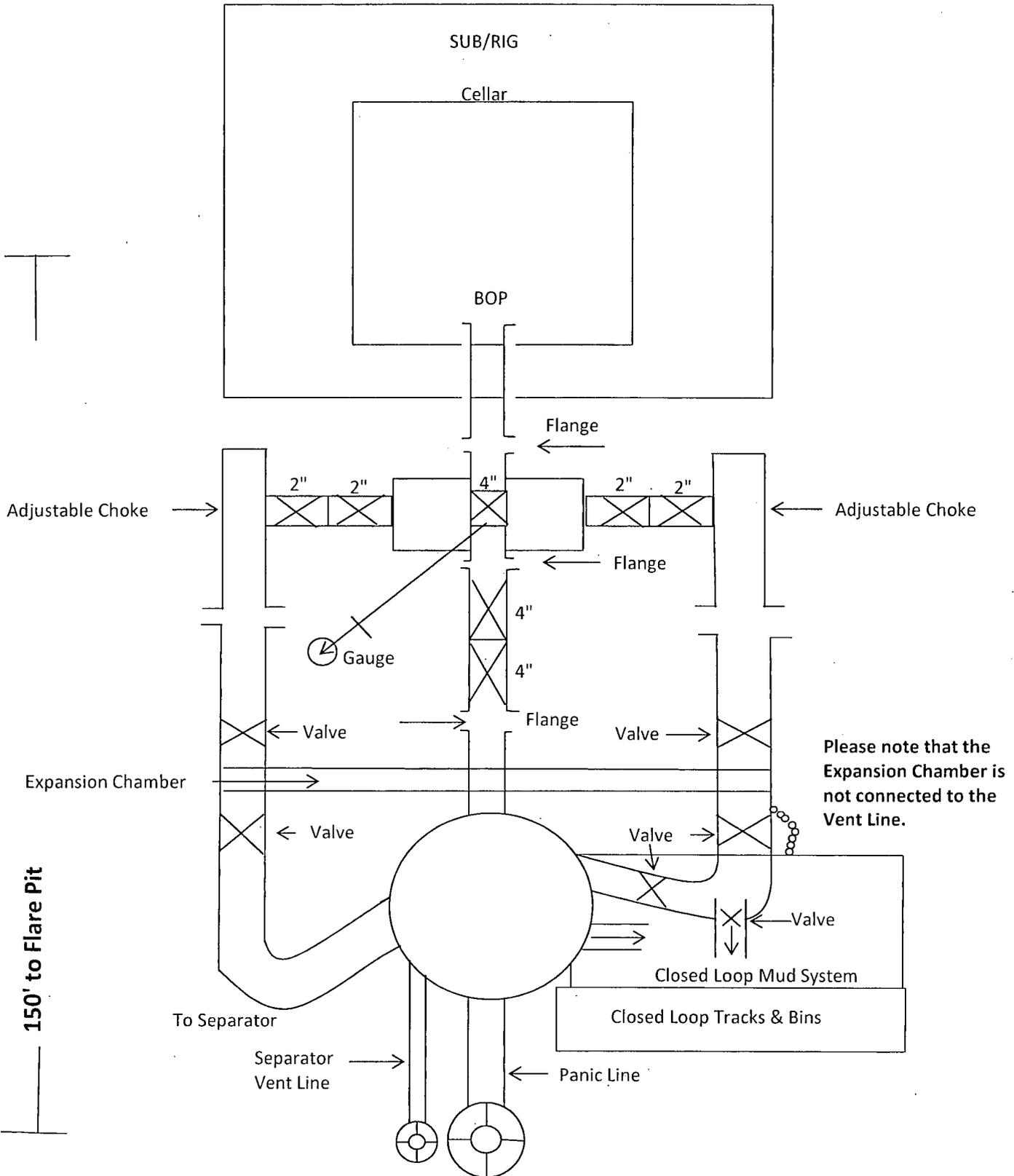
2,000 psi BOP Schematic



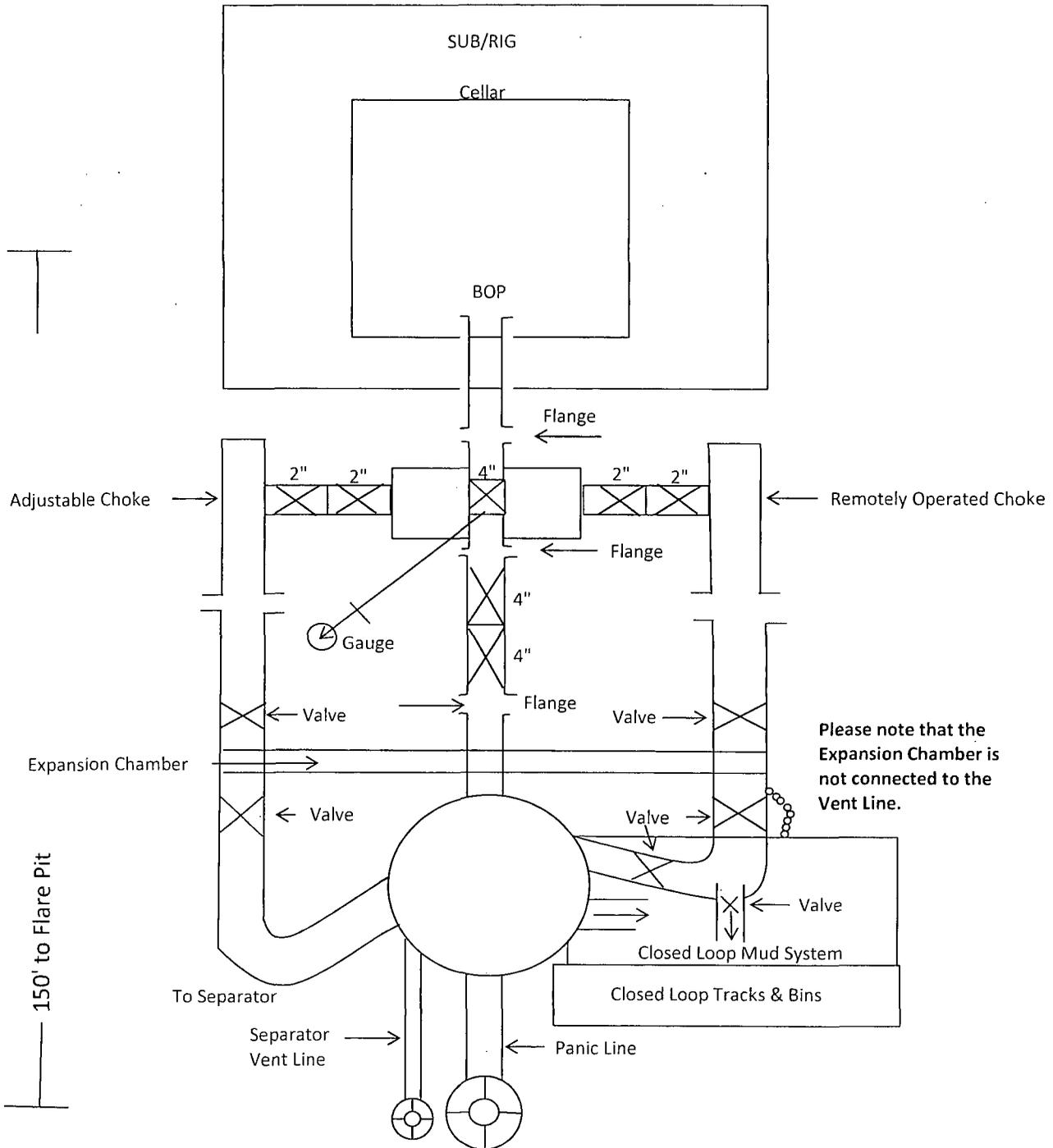
3,000 psi BOP Schematic



2M Choke Manifold Equipment



3M Choke Manifold Equipment



COG Production LLC
Rig Plat & Closed Loop Equipment Diagram

Well pad will be 340' X 340'
with cellar in center of pad

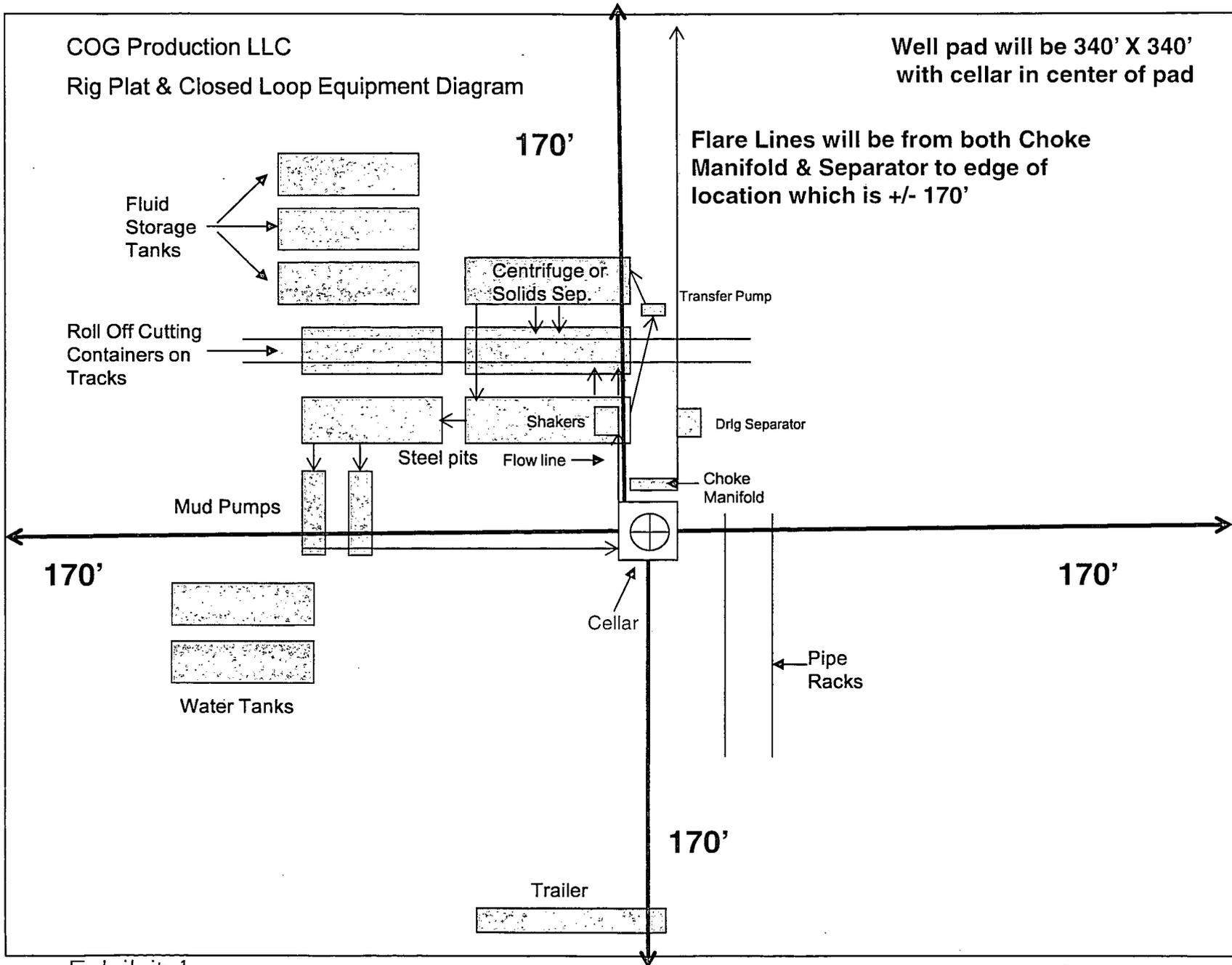
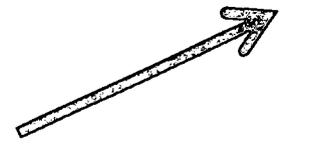


Exhibit 1

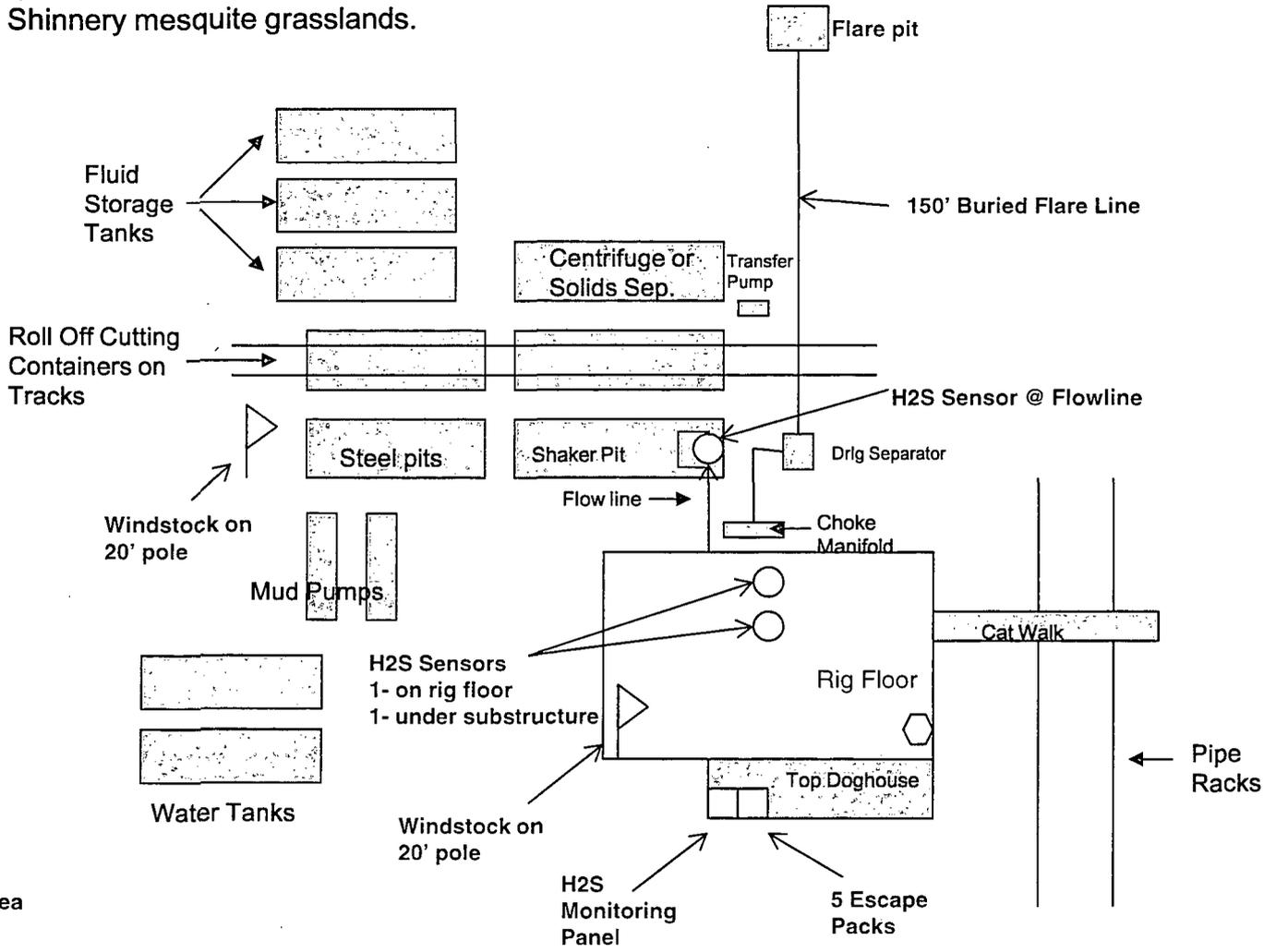
"I further certify that COG will comply with Rule 19.15.17 NMAC by using a Closed Loop System."

COG Production, LLC
 H₂S Equipment Schematic
 Terrain: Shinnery mesquite grasslands.

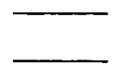
Well pad will be 340' X 340'
 with cellar in center of pad



Prevailing Wind
 Direction in SENM



Secondary Egress



Briefing Area
 w/SCBA



Location Entry
 Condition Sign



Primary Briefing
 Area w/SCBA



Company Representative's Trailer



COG PRODUCTION 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 PRODUCTION 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 PRODUCTION LLC

1-575-748-6940

EMERGENCY CALL LIST

	<u>OFFICE</u>	<u>MOBILE</u>
COG PRODUCTION LLC OFFICE	575-748-6940	
SHERYL BAKER	575-748-6940	432-934-1873
KENT GREENWAY	575-746-2010	432-557-1694
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

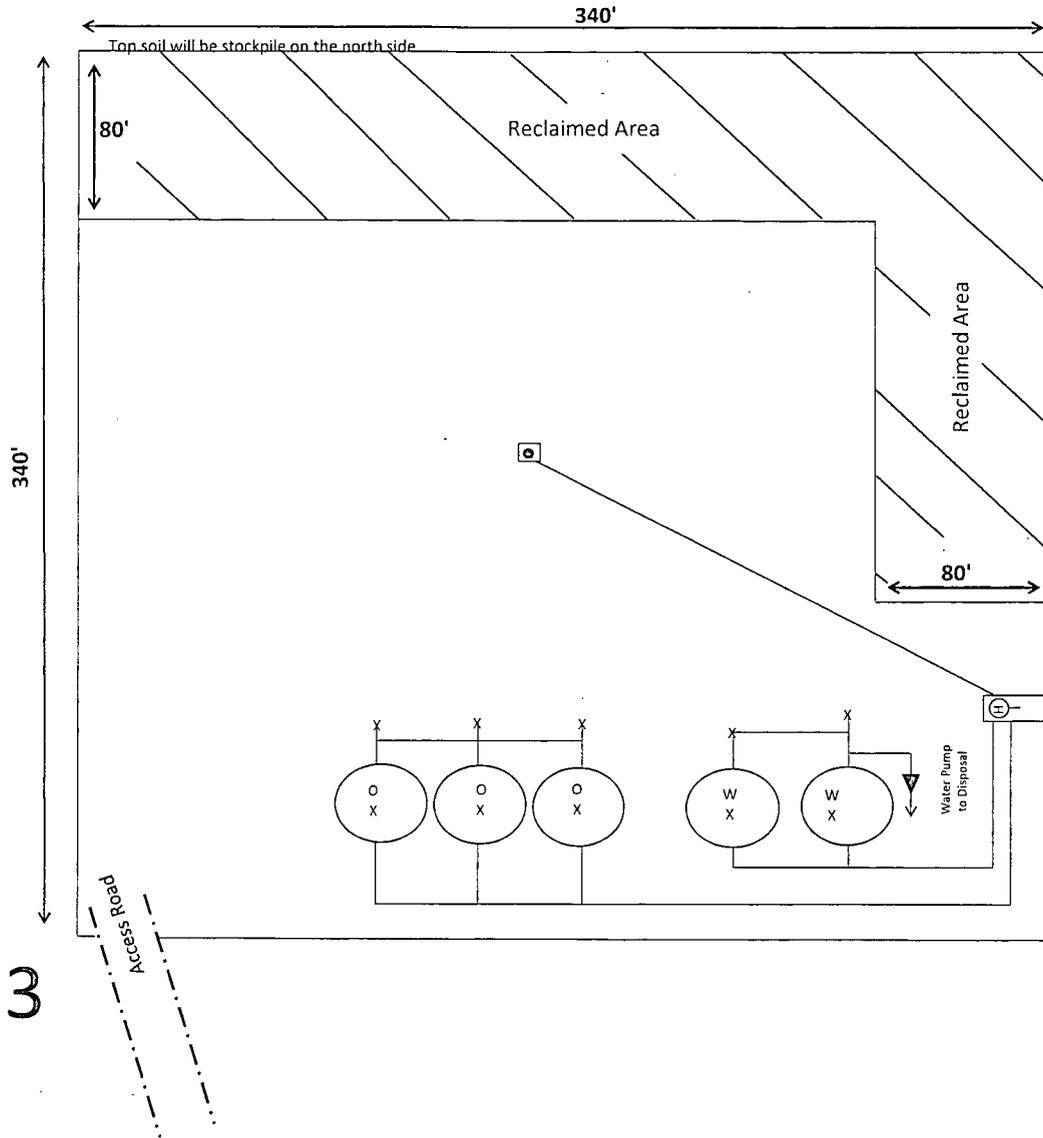


COG Production LLC
2208 West Main
Artesia, NM 88210

Production Facility Layout

Cabo Wabo 24 Federal #5H

Section 24-T25S-R29E



Scale
⊗ = 5' x 5'

Legend
○ = 500 BBL Steel Oil Tank
⊗ = 500 BBL Steel Water Tank
⊕ = 6' x 20' Heater

Exhibit 3

Surface Use Plan
COG Production LLC
Cabo Wabo 24 Federal #5H
SHL: 190' FSL & 660' FWL ULM
Section 24, T25S, R29E
BHL: 330' FNL & 660' FWL ULD
Section 24, T25S, R29E
Eddy County, New Mexico

Surface Use & Operating Plan

Cabo Wabo 24 Federal #5H

- Surface Tenant: Byron or Janie Paschal, P O Box 992, Pecos, TX 79772.
- New Road: 159'
- Flow Line: On well pad
- Facilities: Will be constructed on well pad – see Exhibit 3

Well Site Information

V Door: East

Topsoil: North

Interim Reclamation: North & East

Notes

Onsite: On-site was done by Tanner Nygren (BLM); Rand French (COG) on June 25, 2014.

Surface Use Plan
COG Production LLC
Cabo Wabo 24 Federal #5H
SHL: 190' FSL & 660' FWL ULM
Section 24, T25S, R29E
BHL: 330' FNL & 660' FWL UL D
Section 24, T25S, R29E
Eddy County, New Mexico

SURFACE USE AND OPERATING PLAN

1. Existing & Proposed Access Roads

- A. The well site survey and elevation plat for the proposed well is attached with this application. It was staked by Harcrow Surveying, Artesia, NM.
- B. All roads to the location are shown on the Location Verification Map Exhibit 2. The existing lease roads are illustrated and are adequate for travel during drilling and production operations. Upgrading existing roads prior to drilling the well will be done where necessary. The road route to the well site is depicted in Exhibit #2. The road shown in Exhibit #2 will be used to access the well.
- C. Directions to location: See 600 x 600 plat
- D. Routine grading and maintenance of existing roads will be conducted as necessary to maintain their condition as long as any operations continue on this lease. Roads will be maintained according to specifications in section 2 of this Surface Use and Operating Plan.

2. Proposed Access Road:

The Location Verification Map shows that 159' of new access road will be required for this location. If any road is required it will be constructed as follows:

The maximum width of the running surface will be 14'. The road will be crowned, ditched and constructed of 6" rolled and compacted caliche. Ditches will be at 3:1 slope and 4 feet wide. Water will be diverted where necessary to avoid ponding, prevent erosion, maintain good drainage, and to be consistent with local drainage patterns.

- A. The average grade will be less than 1%.
- B. No turnouts are planned.
- C. No culvert, cattle guard, gates, low water crossings or fence cuts are necessary.
- D. Surfacing material will consist of native caliche. Caliche will be obtained from the actual well site if available. If not available onsite, caliche will be hauled from the nearest BLM approved caliche pit.

Surface Use Plan
COG Production LLC
Cabo Wabo 24 Federal #5H
SHL: 190' FSL & 660' FWL U L M
Section 24, T25S, R29E
BHL: 330' FNL & 660' FWL U L D
Section 24, T25S, R29E
Eddy County, New Mexico

3. Location of Existing Well:

The One-Mile Radius Map shows existing wells within a one-mile radius of proposed wellbore.

4. Location of Existing and/or Proposed Facilities:

- A. COG Production LLC does not operate an oil production facility on this Lease.
- B. If the well is productive, contemplated facilities will be as follows:
 - 1) A tank battery and facilities and facilities will be constructed as shown on Exhibit 3.
 - 2) The tank battery and facilities including all flow lines and piping will be installed according to API specifications.
 - 3) Any additional caliche will be obtained from the actual well site. If caliche does not exist or is not plentiful from the well site, the caliche will be hauled from a BLM approved caliche pit. Any additional construction materials will be purchased from contractors.
 - 4) It will be necessary to run electric power if this well is productive. Power will be provided by Xcel Energy and they will submit a separate plan and ROW for service to the well location.
 - 5) If the well is productive, rehabilitation plans will include the following:
 - The original topsoil from the well site will be returned to the location, and the site will be re-contoured as close as possible to the original site.

5. Location and Type of Water Supply:

The well will be drilled with combination brine and fresh water mud system as outlined in the drilling program. The water will be obtained from commercial water stations in the area and hauled to location by transport truck over the existing and proposed access roads shown in Exhibit #2. If a commercial fresh water source is nearby, fast line may be laid along existing road ROW's and fresh water pumped to the well. No water well will be drilled on the location.

Surface Use Plan
COG Production LLC
Cabo Wabo 24 Federal #5H
SHL: 190' FSL & 660' FWL ULM
Section 24, T25S, R29E
BHL: 330' FNL & 660' FWL UL D
Section 24, T25S, R29E
Eddy County, New Mexico

6. Source of Construction Materials and Location "Turn-Over" Procedure:

Obtaining caliche: One primary way of obtaining caliche to build locations and roads will be by "turning over" the location. This means, caliche will be obtained from the actual well site. A caliche permit will be obtained from BLM prior to obtaining caliche. 2400 cubic yards is the maximum amount of caliche needed for pad and roads. Amount will vary for each pad. The procedure below has been approved by BLM personnel:

- A. The top 6 inches of topsoil is pushed off and stockpiled along the side of the location.
- B. An approximate 160' X 160' area is used within the proposed well site to remove caliche.
- C. Subsoil is removed and stockpiled within the surveyed well pad.
- D. When caliche is found, material will be stock piled within the pad site to build the location and road.
- E. Then subsoil is pushed back in the hole and caliche is spread accordingly across entire location and road.
- F. Once well is drilled, the stock piled top soil will be used for interim reclamation and spread along areas where caliche is picked up and the location size is reduced.
- G. Neither caliche, nor subsoil will be stock piled outside of the well pad. Topsoil will be stockpiled along the edge of the pad as depicted in the Well Site Layout or survey plat.

In the event that no caliche is found onsite, caliche will be hauled in from a BLM approved caliche pit or other established mineral pit. A BLM mineral material permit will be acquired prior to obtaining any mineral material from BLM pits or land.

7. Methods of Handling Water Disposal:

- A. The well will be drilled utilizing a closed loop mud system. Drill cuttings will be held in roll-off style mud boxes and taken to an NMOCD approved disposal site.
- B. Drilling fluids will be contained in steel mud pits.
- C. Water produced from the well during completion will be held temporarily in steel tanks and then taken to an NMOCD approved commercial disposal facility.

Surface Use Plan
COG Production LLC
Cabo Wabo 24 Federal #5H
SHL: 190' FSL & 660' FWL ULM
Section 24, T25S, R29E
BHL: 330' FNL & 660' FWL UL D
Section 24, T25S, R29E
Eddy County, New Mexico

- D. Garbage and trash produced during drilling or completion operations will be collected in a trash bin and hauled to an approved landfill. No toxic waste or hazardous chemicals will be produced by this operation.
- E. Human waste and grey water will need to be properly contained and disposed of. Proper disposal and elimination of waste and grey water may include but are not limited to portable septic systems and/or portable waste gathering systems (i.e. portable toilets).
- F. After the rig is moved out and the well is either completed or abandoned, all waste materials will be cleaned up within 30 days. In the event of a dry hole only a dry hole marker will remain.

8. Ancillary Facilities:

No airstrip, campsite or other facilities will be built as a result of the operation on this well.

9. Well Site Layout:

- A. The drill pad layout, with elevations staked by Harcrow Surveying, is shown in the Elevation Plat. Dimensions of the pad and pits are shown on the Rig Layout. V door direction is East. Topsoil, if available, will be stockpiled per BLM specifications. Because the pad is almost level no major cuts will be required.
- B. The Rig Layout Closed-Loop exhibit shows the proposed orientation of closed loop system and access road. No permanent living facilities are planned, but a temporary foreman/toolpusher's trailer will be on location during the drilling operations.

10. Plans for Restoration of the Surface:

- A. Interim Reclamation will take place after the well has been completed. The pad will be downsized by reclaiming the areas not needed for production operations. The portions of the pad that are not needed for production operations will be re-contoured to its original state as much as possible. The caliche that is removed will be reused to either build another pad site or for road repairs within the lease. The stockpiled topsoil will then be spread out reclaimed area and reseeded with a BLM approved seed mixture. In the event that the well must be worked over or maintained, it may be necessary to drive, park, and/or operate machinery on reclaimed land. This area will be repaired or reclaimed after work is complete.

Surface Use Plan
COG Production LLC
Cabo Wabo 24 Federal #5H
SHL: 190' FSL & 660' FWL ULM
Section 24, T25S, R29E
BHL: 330' FNL & 660' FWL UL D
Section 24, T25S, R29E
Eddy County, New Mexico

- B. Final Reclamation: Upon plugging and abandoning the well all caliche for well pad and lease road will be removed and surface will be recountoured to reflect its surroundings as much as possible. Caliche will be recycled for road repair or reused for another well pad within the lease. If any topsoil remains, it will be spread out and the area will be re-seeded with a BLM approved mixture and re-vegetated as per BLM orders.

11. Surface Ownership:

- A. The surface is owned by the U.S. Government and is administered by the Bureau of Land Management. The surface is multiple uses with the primary uses of the region for grazing of livestock and the production of oil and gas.
- B. The surface tenant is Byron or Janie Paschal, P O Box 992, Pecos, TX 79772.
- C. The proposed road routes and surface location will be restored as directed by the BLM.

12. Other Information:

- A. The area around the well site is grassland and the topsoil is sandy. The vegetation is moderately sparse with native prairie grasses, some mesquite and shinnery oak. No wildlife was observed but it is likely that mule deer, rabbits, coyotes and rodents traverse the area.
- B. There is no permanent or live water in the immediate area.
- C. There are no dwellings within 2 miles of this location.
- D. If needed, a Cultural Resources Examination is being prepared by Boone Arch Services of NM, LLC., 2030 North Canal, Carlsbad, New Mexico, 88220, phone # 575-885-1352 and the results will be forwarded to your office in the near future. **Otherwise, COG will be participating in the Permian Basin MOA Program.**

13. Bond Coverage:

Bond Coverage is Statewide Bonds # NMB000860 and NMB000845

Surface Use Plan
COG Production LLC
Cabo Wabo 24 Federal #5H
SHL: 190' FSL & 660' FWL UL M
Section 24, T25S, R29E
BHL: 330' FNL & 660' FWL UL D
Section 24, T25S, R29E
Eddy County, New Mexico

14. Lessee's and Operator's Representative:

The COG Production LLC representative responsible for assuring compliance with the surface use plan is as follows:

Sheryl Baker
Drilling Superintendent
COG Production LLC
2208 West Main Street
Artesia, NM 88210
Phone (575) 748-6940 (office)
(432) 934-1873 (cell)

Ray Peterson
Drilling Manager
COG Production LLC
One Concho Center
600 W Illinois Ave
Midland, TX 79701
Phone (432) 685-4304 (office)
(432) 818-2254 (business)

PECOS DISTRICT CONDITIONS OF APPROVAL

OPERATOR'S NAME:	COG Production, LLC
LEASE NO.:	NMNM-120895
WELL NAME & NO.:	Cabo Wabo 24 Federal 5H
SURFACE HOLE FOOTAGE:	0190' FSL & 0660' FWL
BOTTOM HOLE FOOTAGE:	0330' FNL & 0660' FWL
LOCATION:	Section 24, T. 25 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**
 - Lesser Prairie-Chicken Timing Stipulations
 - Ground-level Abandoned Well Marker
 - Aplomado Falcon
 - Cave/Karst
 - VRM
 - Cultural
- Construction**
 - Notification
 - Topsoil
 - Closed Loop System
 - Federal Mineral Material Pits
 - Well Pads
 - Roads
- Road Section Diagram**
- Drilling**
 - Cement Requirements
 - Medium Cave/Karst
 - Logging Requirements
 - Waste Material and Fluids
- Production (Post Drilling)**
 - Well Structures & Facilities
 - Pipelines
 - Electric Lines
- 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)

Timing Limitation Stipulation / Condition of Approval for lesser prairie-chicken:

Oil and gas activities including 3-D geophysical exploration, and drilling will not be allowed in lesser prairie-chicken habitat during the period from March 1st through June 15th annually. During that period, other activities that produce noise or involve human activity, such as the maintenance of oil and gas facilities, pipeline, road, and well pad construction, will be allowed except between 3:00 am and 9:00 am. The 3:00 am to 9:00 am restriction will not apply to normal, around-the-clock operations, such as venting, flaring, or pumping, which do not require a human presence during this period.

Additionally, no new drilling will be allowed within up to 200 meters of leks known at the time of permitting. Normal vehicle use on existing roads will not be restricted.

Exhaust noise from pump jack engines must be muffled or otherwise controlled so as not to exceed 75 db measured at 30 feet from the source of the noise.

Ground-level Abandoned Well Marker to avoid raptor perching: Upon the plugging and subsequent abandonment of the well, the well marker will be installed at ground level on a plate containing the pertinent information for the plugged well. For more installation details, contact the Carlsbad Field Office at 575-234-5972.

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

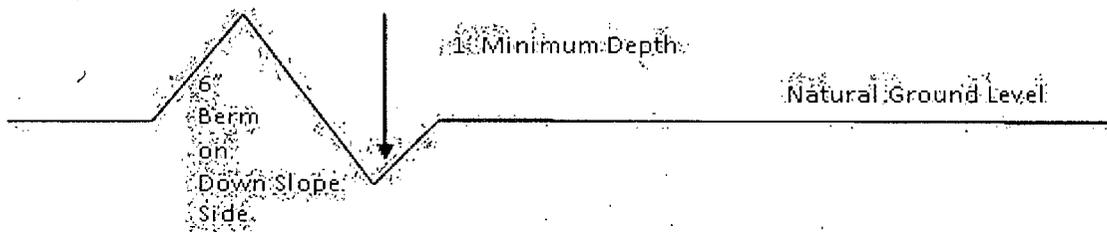
Vehicle turnouts shall be constructed on the road. Turnouts shall be intervisible with interval spacing distance less than 1000 feet. Turnouts shall conform to Figure 1; cross section and plans for typical road construction.

Drainage

Drainage control systems shall be constructed on the entire length of road (e.g. ditches, sidehill outloping 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:

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

Cattleguards

An appropriately sized cattleguard sufficient to carry out the project shall be installed and maintained at fence/road crossings. Any existing cattleguards 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 cattleguards 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

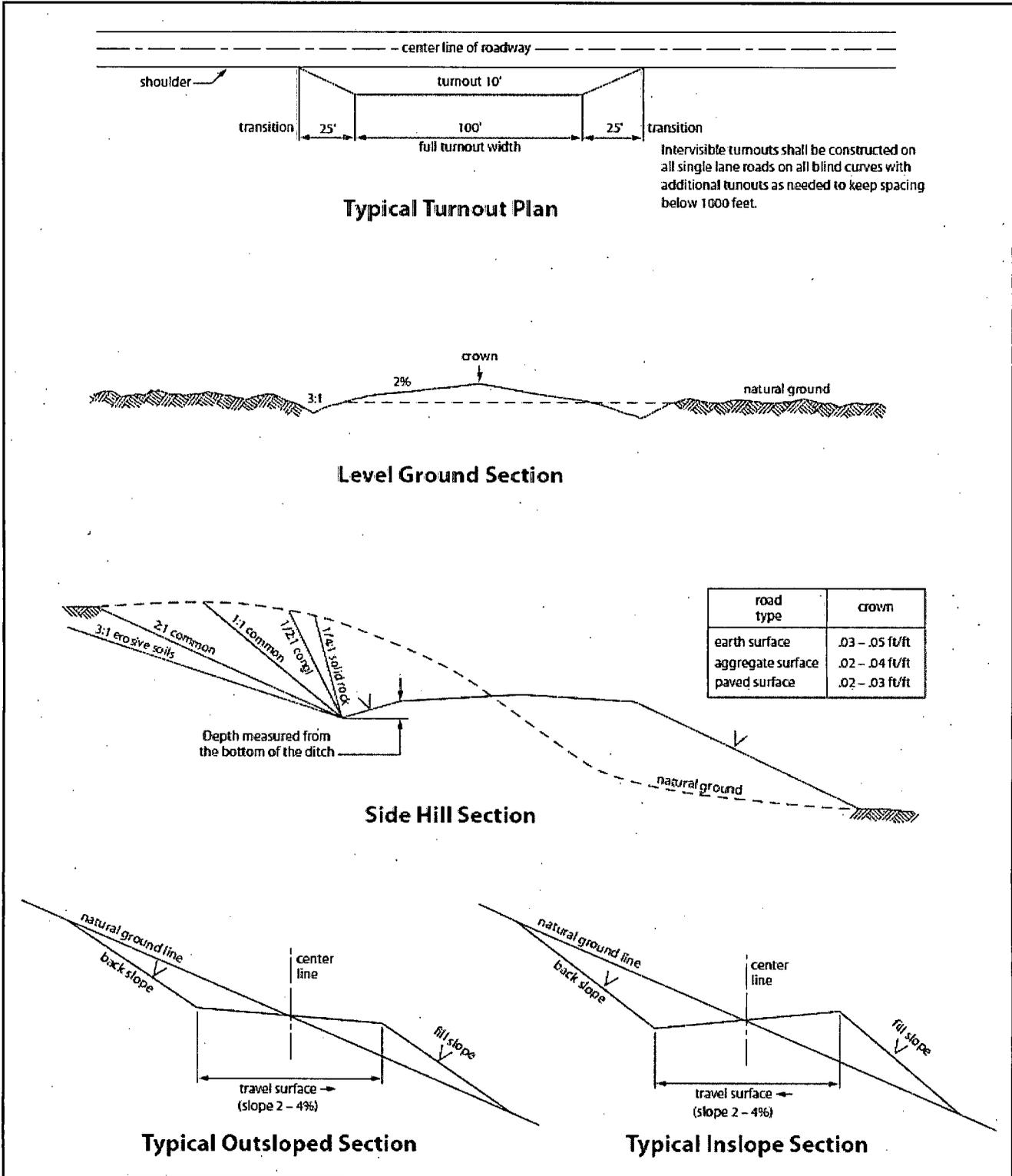


Figure 1. Cross-sections and plans for typical road sections representative of BLM resource or FS local and higher-class roads.

VII. DRILLING

A. DRILLING OPERATIONS 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)

Eddy County

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

1. **Although Hydrogen Sulfide has not been reported in the area, it is always a potential hazard. Operator has stated that they will have monitoring equipment in place prior to drilling out of the surface shoe. If Hydrogen Sulfide is encountered, report measured amounts and formations to the BLM.**
2. 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. **If the drilling rig is removed without approval – an Incident of Non-Compliance will be written and will be a “Major” violation.**
3. 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 is located, this does not include the dog house or stairway area.
4. **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.**

B. CASING

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.).

Centralizers required on surface casing per Onshore Order 2.III.B.1.f.

Wait on cement (WOC) time prior to drilling out for a primary cement job will be a minimum 18 hours for a water basin, 24 hours in the potash area, or 500 pounds compressive strength, whichever is greater for all casing strings. DURING THIS WOC TIME, NO DRILL PIPE, ETC. SHALL BE RUN IN THE HOLE. Provide compressive strengths including hours to reach required 500 pounds compressive strength prior to cementing each casing string. IF OPERATOR DOES NOT HAVE THE WELL SPECIFIC CEMENT DETAILS ONSITE PRIOR TO PUMPING THE CEMENT FOR EACH CASING STRING, THE WOC WILL BE 30 HOURS. See individual casing strings for details regarding lead cement slurry requirements.

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

Medium Cave/Karst

Possibility of water flows in the Salado and Castile.

Possibility of lost circulation in the Rustler and Delaware.

1. The 13-3/8 inch surface casing shall be set at approximately 750 feet (a minimum of 25 feet into the Rustler Anhydrite and above the salt) and cemented to the surface. **If salt is encountered, set casing at least 25 feet above the salt.**
 - 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 is to include the lead cement slurry.**
 - 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 9-5/8 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.**

Centralizers required on horizontal leg, must be type for horizontal service and a minimum of one every other joint.

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

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

4. 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.

C. 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. **In the case where the only BOP installed is an annular preventer, it shall be tested to a minimum of 2000 psi (which may require upgrading to 3M or 5M annular).**

3. Minimum working pressure of the blowout preventer (BOP) and related equipment (BOPE) required for drilling below the surface casing shoe shall be **2000 (2M)** psi.

4. Minimum working pressure of the blowout preventer (BOP) and related equipment (BOPE) required for drilling below the 9-5/8 intermediate casing shoe shall be **3000 (3M)** psi.

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. The tests shall be done by an independent service company utilizing a test plug **not a cup or J-packer**.
- c. 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.
- d. The results of the test shall be reported to the appropriate BLM office.
- e. 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.**
- f. 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.

D. DRILL STEM TEST

If drill stem tests are performed, Onshore Order 2.III.D shall be followed.

E. 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.

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VIII. 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).

VRM Facility Requirement

Low-profile tanks not greater than eight-feet-high shall be used.

B. PIPELINES

C. ELECTRIC LINES

IX. 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).

X. 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).

Ground-level Abandoned Well Marker to avoid raptor perching: Upon the plugging and subsequent abandonment of the well, the well marker will be installed at ground level on a plate containing the pertinent information for the plugged well.

(Insert Seed Mixture Here)