OCD Artesia

Form 3160-5
(August 2007)

UNITED STATES
DEPARTMENT OF THE INTERIOR
BUREAU OF LAND MANAGEMENT

FORM APPROVED
OMB NO. 1004-0135
Expires: July 31, 2010

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.
NMNM103595

6. If Indian, Allottee or Tribe Name

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

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

8. Well Name and No.
CALI ROLL 24 FEDERAL 2H

2. Name of Operator
COG OPERATING LLC
Contact: MAYTE X REYES
E-Mail: mreyes1@concho.com

9. API Well No.
30-015-39388-00-X1

3a. Address
ONE CONCHO CENTER 600 W ILLINOIS AVENUE
MIDLAND, TX 79701

3b. Phone No. (include area code)
Ph: 575-748-6945

10. Field and Pool, or Exploratory
WILDCAT

4. Location of Well *(Footage, Sec., T., R., M., or Survey Description)*
Sec 24 T26S R25E NENE Lot A 330FNL 430FEL

11. County or Parish, and State
EDDY COUNTY, 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 to Original APD
	☐ 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.)

COG Operating LLC respectfully requests approval for the following changes to the original approved APD.

Drilling Change:

See attached:
Drilling program
Directional Plan
Plat
BOP and Choke Manifold

NM OIL CONSERVATION
ARTESIA DISTRICT
JUL 25 2014
RECEIVED

Accepted for record
NMOCD 7/25/14

SEE ATTACHED FOR
CONDITIONS OF APPROVAL

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

Electronic Submission #245379 verified by the BLM Well Information System
For COG OPERATING LLC, sent to the Carlsbad
Committed to AFMSS for processing by CATHY QUEEN on 06/09/2014 (14CQ0289SE)

Name *(Printed/Typed)* MAYTE X REYES — Title REGULATORY ANALYST

Signature (Electronic Submission) — Date 05/12/2014

APPROVED
JUL 18 2014
BUREAU OF LAND MANAGEMENT
CARLSBAD FIELD OFFICE

THIS SPACE FOR FEDERAL OR STATE OFFICE USE

Approved By _____ Title _____ Date

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

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.

**** BLM REVISED ** BLM REVISED ** BLM REVISED ** BLM REVISED ** BLM REVISED ****

District I
1625 N. French Dr., Hobbs, NM 88240
Phone: (575) 393-6161 Fax: (575) 393-0720
District II
811 S. First St., Artesia, NM 88210
Phone: (575) 748-1283 Fax: (575) 748-9720
District III
1000 Rio Brazos Road, Aztec, NM 87410
Phone: (505) 334-6178 Fax: (505) 334-6170
District IV
1220 S. St. Francis Dr., Santa Fe, NM 87505
Phone: (505) 476-3460 Fax: (505) 476-3462

State of New Mexico
Energy, Minerals & Natural Resources Department
OIL CONSERVATION DIVISION
1220 South St. Francis Dr.
Santa Fe, NM 87505

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

☐ AMENDED REPORT

WELL LOCATION AND ACREAGE DEDICATION PLAT

[1] API Number	[2] Pool Code	[3] Pool Name
30-015-39388	96403	Wildcat; Bone Spring

[4] Property Code	[5] Property Name	[6] Well Number
	CALI ROLL 24 FEDERAL COM	2H

[7] OGRID No.	[8] Operator Name	[9] Elevation
229137	COG OPERATING, LLC.	3546.8

[10] Surface Location

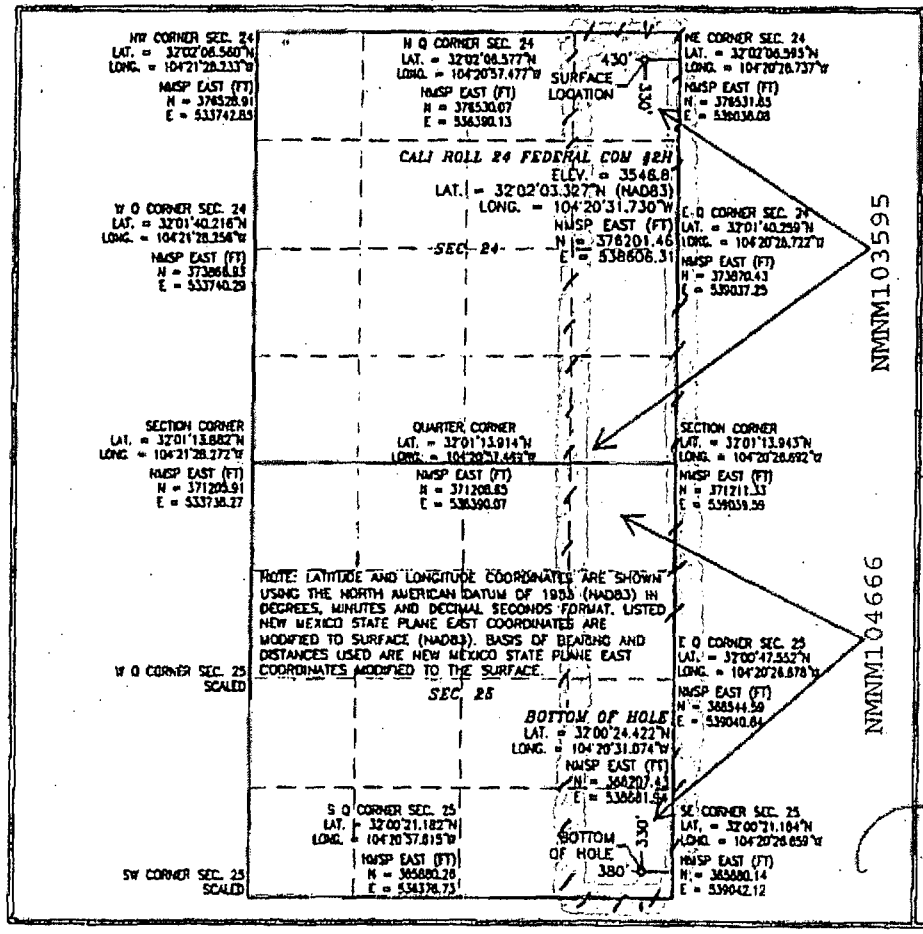
UL or lot no.	Section	Township	Range	Lot Idn	Feet from the	North/South line	Feet from the	East/West line	County
A	24	26 S	25 E		330	NORTH	430	EAST	EDDY

[11] 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
P	25	26 S	25 E		330	SOUTH	380	EAST	EDDY

[12] Dedicated Acres	[13] Joint or Infill	[14] Consolidation Code	[15] Order No.
320			

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.



[17] OPERATOR CERTIFICATION

I hereby certify that the information contained 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 a mineral or working interest, or to a voluntary pooling agreement or a compulsory pooling order heretofore entered by the division.

Melanie Parker 5/12/14
Signature Date

Melanie J Parker
Printed Name

mparker@concho.com
E-mail Address

[18] 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 30, 2014
Date of Survey

12797

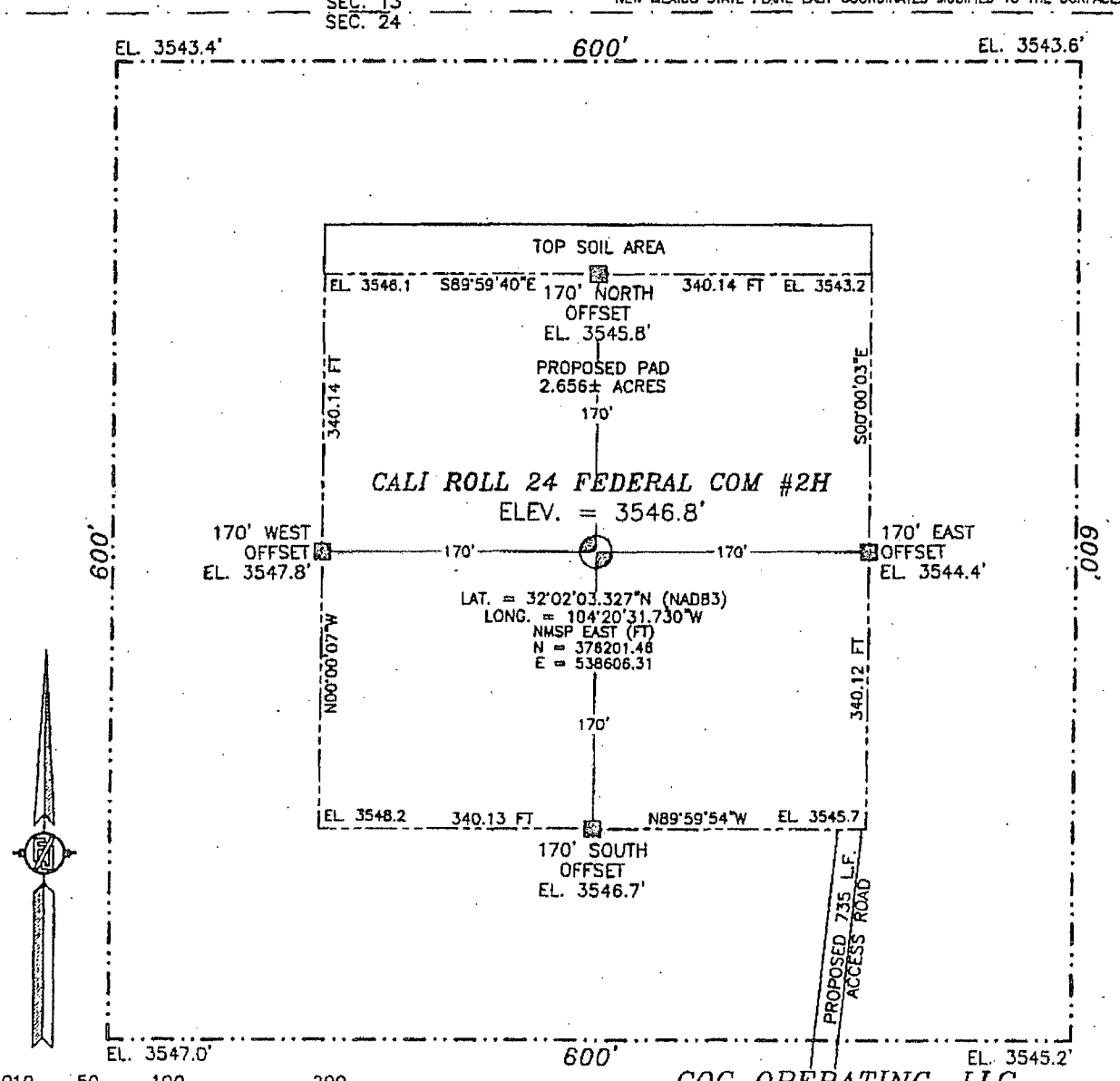
Signature and Seal of Professional Surveyor:

Certificate Number: FILIMON F. JARAMILLO, PLS 12797

SURVEY NO. 359D

SECTION 24, TOWNSHIP 26 SOUTH, RANGE 25 EAST, N.M.P.M.
EDDY COUNTY, STATE OF NEW MEXICO
SITE MAP

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



0 10 50 100 200

SCALE 1" = 100'

DIRECTIONS TO LOCATION

FROM MILE MARKER 6 ON U.S. HIGHWAY 62/180 GO SOUTH 0.8 MILES TURN LEFT (EAST) ON TO CALICHE ROAD GO 1.7 MILES TO FORK IN ROAD TURN LEFT (EAST) PAST FRAC TANK GO 3.4 MILES TO FORK IN ROAD TAKE RIGHT (SOUTH) GO 2.7 MILES TO FORK IN ROAD TAKE LEFT (EAST) GO 0.3 MILES SITE IS ON LEFT FOLLOW FLAGS 735 FT TO PROPOSED SE. CORNER OF PAD.

COG OPERATING, LLC
CALI ROLL 24 FEDERAL COM #2H
LOCATED 330 FT. FROM THE NORTH LINE AND 430 FT. FROM THE EAST LINE OF SECTION 24, TOWNSHIP 26 SOUTH, RANGE 25 EAST, N.M.P.M. EDDY COUNTY, STATE OF NEW MEXICO

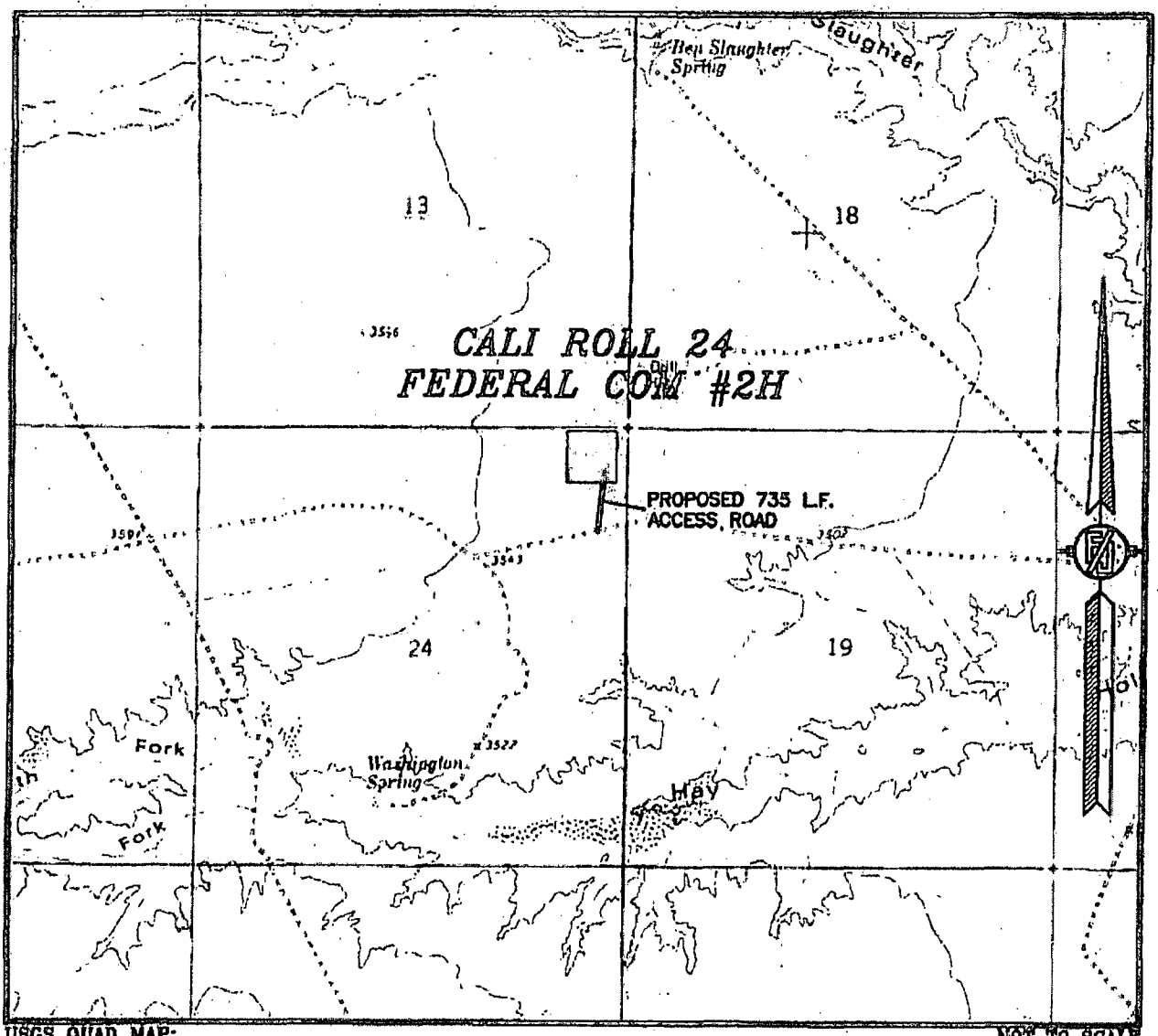
APRIL 30, 2014

SURVEY NO. 359D

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

SECTION 24, TOWNSHIP 26 SOUTH, RANGE 25 EAST, N.M.P.M.
EDDY COUNTY, STATE OF NEW MEXICO

LOCATION VERIFICATION MAP



USGS QUAD MAP:
JUMPING SPRING

NOT TO SCALE

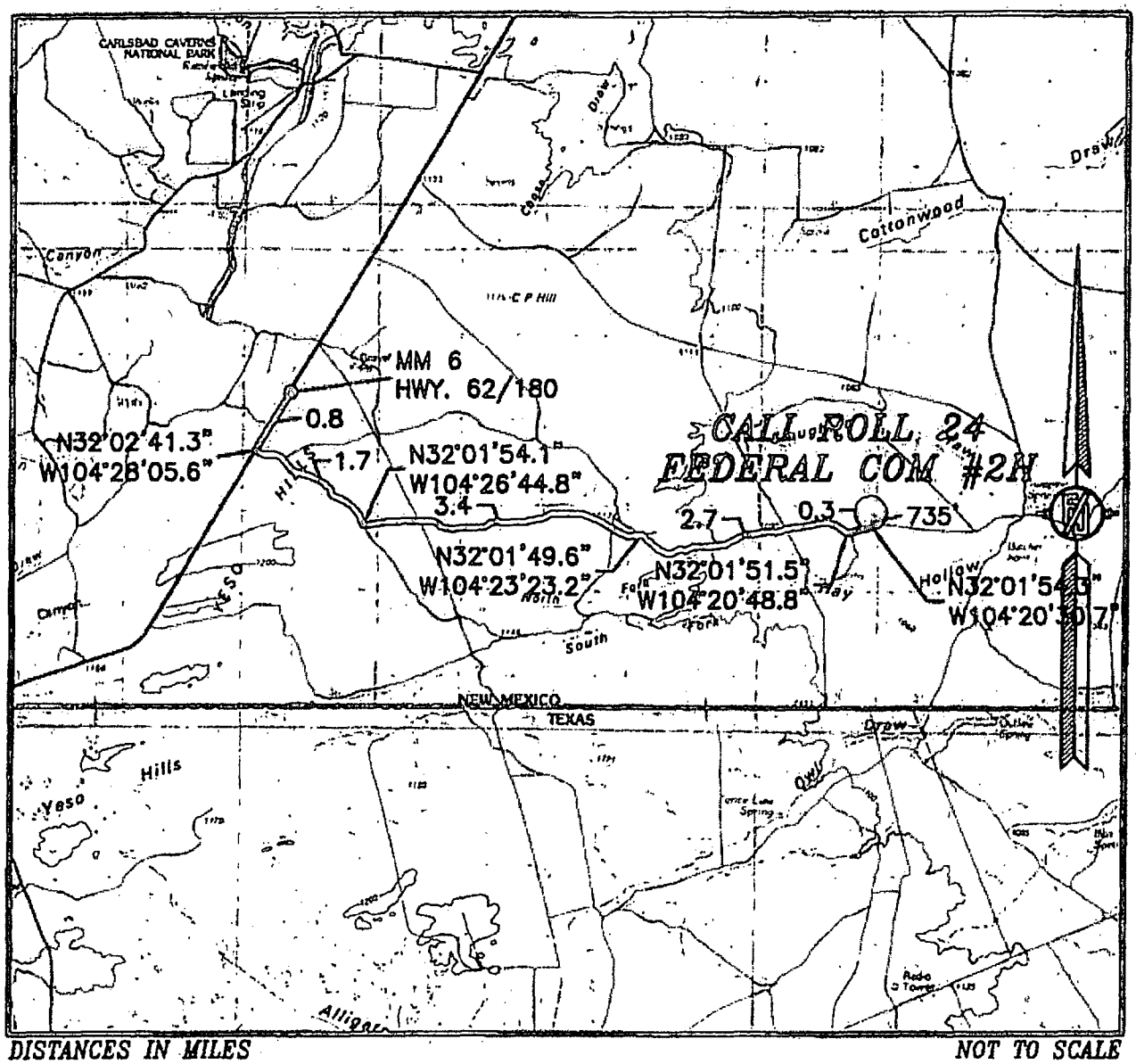
COG OPERATING, LLC
CALI ROLL 24 FEDERAL COM #2H
LOCATED 330 FT. FROM THE NORTH LINE
AND 430 FT. FROM THE EAST LINE OF
SECTION 24, TOWNSHIP 26 SOUTH,
RANGE 25 EAST, N.M.P.M.
EDDY COUNTY, STATE OF NEW MEXICO

APRIL 30, 2014

SURVEY NO. 359D

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

SECTION 24, TOWNSHIP 26 SOUTH, RANGE 25 EAST, N.M.P.M.
EDDY COUNTY, STATE OF NEW MEXICO
VICINITY MAP



DISTANCES IN MILES *NOT TO SCALE*

DIRECTIONS TO LOCATION
FROM MILE MARKER 6 ON U.S. HIGHWAY 62/180 GO SOUTH 0.8 MILES TURN LEFT (EAST) ON TO CALICHE ROAD GO 1.7 MILES TO FORK IN ROAD TURN LEFT (EAST) PAST FRAC TANK GO 3.4 MILES TO FORK IN ROAD TAKE RIGHT (SOUTH) GO 2.7 MILES TO FORK IN ROAD TAKE LEFT (EAST) GO 0.3 MILES SITE IS ON LEFT FOLLOW FLAGS 735 FT TO PROPOSED SE. CORNER OF PAD.

COG OPERATING, LLC
CALI ROLL 24 FEDERAL COM #2H
LOCATED 330 FT. FROM THE NORTH LINE AND 430 FT. FROM THE EAST LINE OF SECTION 24, TOWNSHIP 26 SOUTH, RANGE 25 EAST, N.M.P.M.
EDDY COUNTY, STATE OF NEW MEXICO

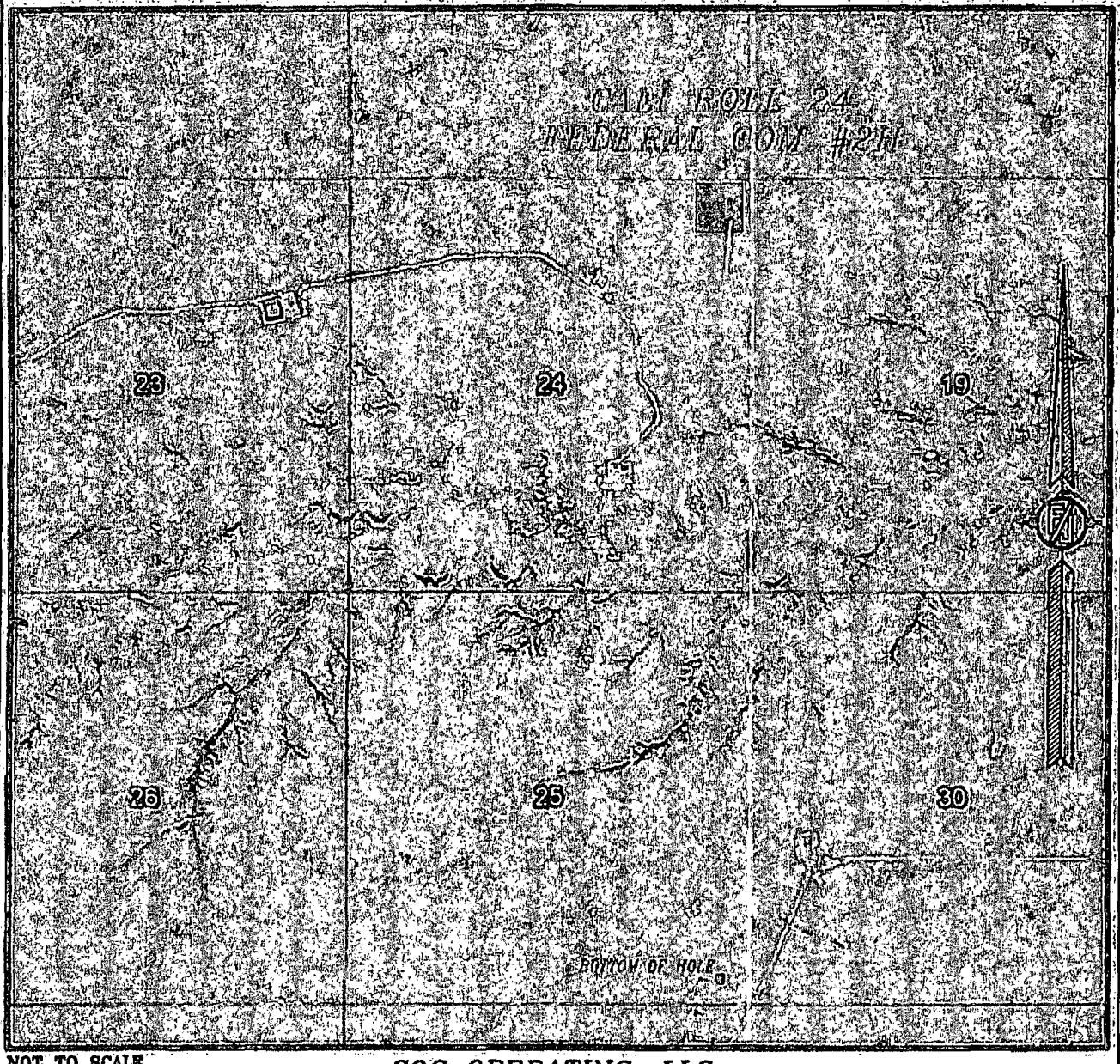
APRIL 30, 2014

SURVEY NO. 359D

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

SECTION 24, TOWNSHIP 26 SOUTH, RANGE 25 EAST, N.M.P.M.
EDDY COUNTY, STATE OF NEW MEXICO

AERIAL PHOTO



NOT TO SCALE
AERIAL PHOTO:
GOOGLE EARTH
JANUARY 2013

COG OPERATING, LLC
CALI ROLL 24 FEDERAL COM #2H
LOCATED 330 FT. FROM THE NORTH LINE
AND 430 FT. FROM THE EAST LINE OF
SECTION 24, TOWNSHIP 26 SOUTH,
RANGE 25 EAST, N.M.P.M.
EDDY COUNTY, STATE OF NEW MEXICO

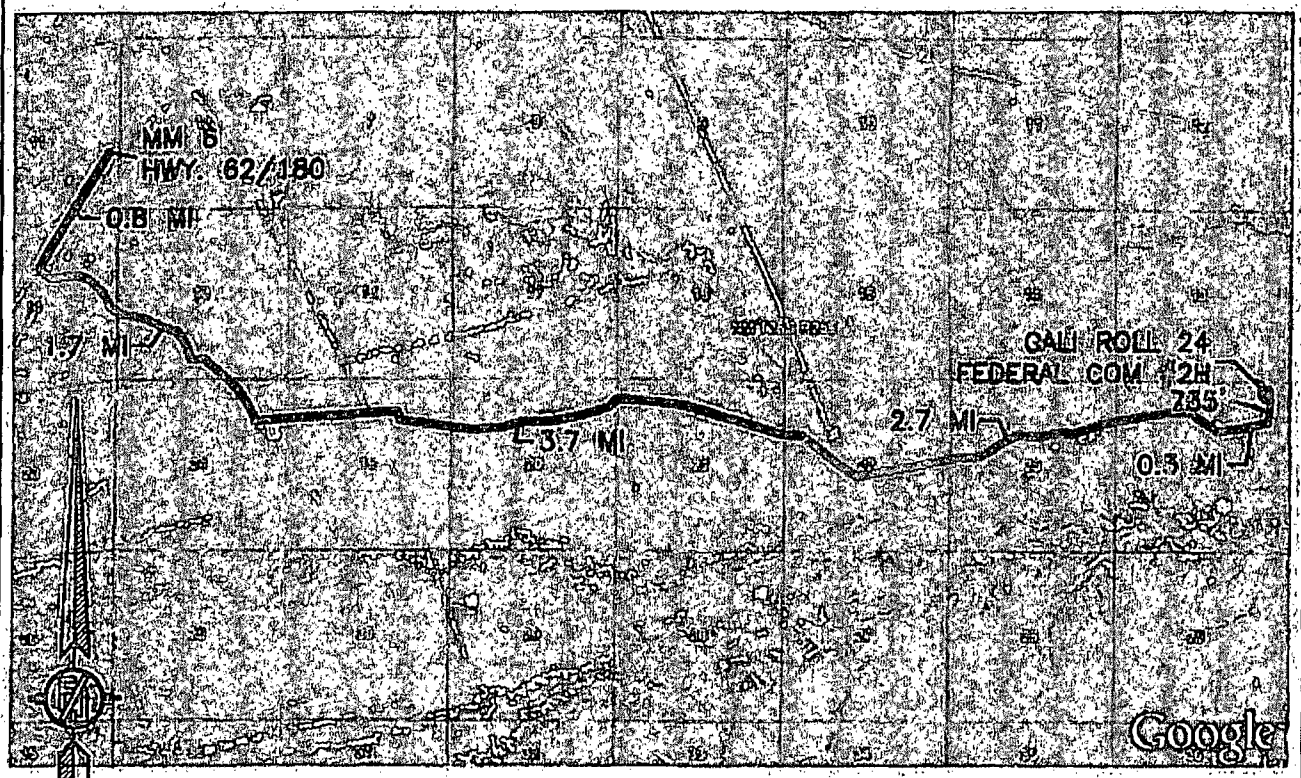
APRIL 30, 2014

SURVEY NO. 359D

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

SECTION 24, TOWNSHIP 26 SOUTH, RANGE 25 EAST, N.M.P.M.
EDDY COUNTY, STATE OF NEW MEXICO

AERIAL ACCESS ROUTE MAP



NOT TO SCALE
AERIAL PHOTO:
GOOGLE EARTH
JANUARY 2013

COG OPERATING, LLC
CALI ROLL 24 FEDERAL COM #2H
LOCATED 330 FT. FROM THE NORTH LINE
AND 430 FT. FROM THE EAST LINE OF
SECTION 24, TOWNSHIP 26 SOUTH,
RANGE 25 EAST, N.M.P.M.
EDDY COUNTY, STATE OF NEW MEXICO

APRIL 30, 2014

SURVEY NO. 359D

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

COG Operating LLC
DRILLING AND OPERATIONS PROGRAM
Cali Roll 24 Federal COM #2H
SHL: 330' FNL & 430' FEL, Section 24
BHL: 330' FSL & 380' FEL, Section 25
T26S, R25E
Eddy County, New Mexico

COG Operating LLC submits the following requested changes to the approved drilling plan.

1. No change

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:

TD (Pilot)	No Pilot Hole
Lateral TD MD	17,765'
Lateral TD TVD	7,800'

Other intervals will be isolated by setting 5 1/2" casing to total depth and circulating cement back to 1200' (300' overlap into 9-5/8" intermediate casing).

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
8 3/4"	0' – 17,765'	Production Curve & Lateral	5 1/2"	New	17#	BTC	P-110	1.125	1.125	1.6

- Will run one centralizer every other joint in lateral section of well.

4. **Proposed Cement Program**

5 1/2" Production

Lead: 950 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 ft^3/sk)

Tail: 2900 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 ft^3/sk)

**Calculated w/45% excess on OH volumes

- The production string will be cemented in one stage with the planned TOC 300' up into the 9-5/8" casing.
- Pilot hole will not be drilled. The estimated KOP is 7498'.

5. **Minimum Specifications for Pressure Control:**

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.

6. **Estimated BHP & BHT:**

Lateral TD = 3407 psi
Lateral TD = 141° F

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

Depth	Type System	Mud Weight	Viscosity (sec)	Waterloss (cc)
1,500' - 17,765' (Lateral)	Cut Brine	8.8 – 9.3	29	N.C.

8. **Auxiliary Well Control and Monitoring Equipment:**

No changes.

9. **Testing, Logging and Coring Program:**

No changes.

10. **Potential Hazards:**

No changes.

11. **Anticipated starting date and Duration of Operations:**

No changes.

CONCHO

COG Production, LLC

Eddy County, NM (NAD 83)
Sec 24, T26S, R25E
Cali Roll 24 Federal Com #2H

Wellbore #1

Plan: Design #1

DDC Well Planning Report

08 May, 2014

DDC
The DIRECTIONAL DRILLING COMPANY

Database:	EDM 5000.1 Single User Db	Local Co-ordinate Reference:	Well Cali Roll 24 Federal #2H
Company:	COG Production, LLC	TVD Reference:	Well @ 3577.0usft (Precision #77)
Project:	Eddy County, NM (NAD 83)	MD Reference:	Well @ 3577.0usft (Precision #77)
Site:	Sec 24 T26S R25E	North Reference:	Grid
Well:	Cali Roll 24 Federal Com #2H	Survey Calculation Method:	Minimum Curvature
Wellbore:	Wellbore #1		
Design:	Design #1		

Project Eddy County, NM (NAD 83)

Map System:	US State Plane 1983	System Datum:	Mean Sea Level
Geo Datum:	North American Datum 1983		
Map Zone:	New Mexico Eastern Zone		

Site Sec 24 T26S R25E

Site Position:		Northing:	376,201.46 usft	Latitude:	32° 2' 3.327 N
From:	Map	Easting:	538,606.31 usft	Longitude:	104° 20' 31.730 W
Position Uncertainty:	0.0 usft	Slot Radius:	13-3/16 "	Grid Convergence:	0.00 °

Well Cali Roll 24 Federal #2H

Well Position	+N/-S	0.0 usft	Northing:	376,201.46 usft	Latitude:	32° 2' 3.327 N
	+E/-W	0.0 usft	Easting:	538,606.31 usft	Longitude:	104° 20' 31.730 W
Position Uncertainty		0.0 usft	Wellhead Elevation:	0.0 usft	Ground Level:	3,547.0 usft

Wellbore Wellbore #1

Magnetics	Model Name	Sample Date	Declination (°)	Dip Angle (°)	Field Strength (nT)
	IGRF2010	5/7/2014	7.57	59.81	48,127

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	179.68

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	
7,497.7	0.00	0.00	7,497.7	0.0	0.0	0.00	0.00	0.00	0.00	
8,259.7	91.44	179.68	7,975.0	-489.4	2.7	12.00	12.00	23.58	179.68	
15,200.5	91.44	179.68	7,800.9	-7,428.0	41.5	0.00	0.00	0.00	0.00	Start Drop Cali Roll 2
15,272.4	90.00	179.68	7,800.0	-7,499.8	41.9	2.00	-2.00	0.01	179.83	
17,764.7	90.00	179.68	7,800.0	-9,992.1	55.6	0.00	0.00	0.00	0.00	PBHL Cali Roll '24' Fe

Database:	EDM 5000.1 Single User Db	Local Co-ordinate Reference:	Well Cali Roll 24 Federal #2H
Company:	COG Production, LLC	TVD Reference:	Well @ 3577.0usft (Precision #7.7)
Project:	Eddy County, NM (NAD 83)	MD Reference:	Well @ 3577.0usft (Precision #7.7)
Site:	Sec 24 - T26S - R25E	North Reference:	Grid
Well:	Cali Roll 24 Federal Com #2H	Survey Calculation Method:	Minimum Curvature
Wellbore:	Wellbore #1		
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
Rustler									
65.0	0.00	0.00	65.0	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
TOS									
393.0	0.00	0.00	393.0	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
BOS (Fletcher)									
1,437.0	0.00	0.00	1,437.0	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
LMAR (Top Delaware)									
1,624.0	0.00	0.00	1,624.0	0.0	0.0	0.0	0.00	0.00	0.00
BLCN									
1,668.0	0.00	0.00	1,668.0	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
CYCN									
2,527.0	0.00	0.00	2,527.0	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
BYCN									
3,636.0	0.00	0.00	3,636.0	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

Database:	EDM 5000.1 Single User Db	Local Co-ordinate Reference:	Well Cali Roll 24 Federal #2H
Company:	COG Production, LLC	TVD Reference:	Well @ 3577.0usft (Precision #77)
Project:	Eddy County, NM (NAD 83)	MD Reference:	Well @ 3577.0usft (Precision #77)
Site:	Sec 24, T26S, R25E	North Reference:	Grid
Well:	Cali Roll 24 Federal Com #2H	Survey Calculation Method:	Minimum Curvature
Wellbore:	Wellbore #1		
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)
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
Bone Springs									
5,133.0	0.00	0.00	5,133.0	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
Upper Avalon Shale									
5,240.0	0.00	0.00	5,240.0	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
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
Lower Avalon Shale									
5,557.0	0.00	0.00	5,557.0	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
First Bone Spring Sand									
6,021.0	0.00	0.00	6,021.0	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
Second Bone Spring Sand									
6,722.0	0.00	0.00	6,722.0	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
7,400.0	0.00	0.00	7,400.0	0.0	0.0	0.0	0.00	0.00	0.00
Curve KOP / Build 12°/100									
7,497.7	0.00	0.00	7,497.7	0.0	0.0	0.0	0.00	0.00	0.00
7,500.0	0.28	179.68	7,500.0	0.0	0.0	0.0	12.00	12.00	0.00
7,525.0	3.28	179.68	7,525.0	-0.8	0.0	0.8	12.00	12.00	0.00
7,550.0	6.28	179.68	7,549.9	-2.9	0.0	2.9	12.00	12.00	0.00
7,575.0	9.28	179.68	7,574.7	-6.2	0.0	6.2	12.00	12.00	0.00
7,600.0	12.28	179.68	7,599.2	-10.9	0.1	10.9	12.00	12.00	0.00

Database:	EDM 5000.1 Single User Db	Local Co-ordinate Reference:	Well Cali Roll 24 Federal #2H
Company:	COG Production, LLC	TVD Reference:	Well @ 3577.0usft (Precision #77)
Project:	Eddy County, NM (NAD 83)	MD Reference:	Well @ 3577.0usft (Precision #77)
Site:	Sec 24 T26S R25E	North Reference:	Grid
Well:	Cali Roll 24 Federal Com #2H	Survey Calculation Method:	Minimum Curvature
Wellbore:	Wellbore #1		
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)
7,625.0	15.28	179.68	7,623.5	-16.9	0.1	16.9	12.00	12.00	0.00
7,650.0	18.28	179.68	7,647.4	-24.1	0.1	24.1	12.00	12.00	0.00
7,675.0	21.28	179.68	7,671.0	-32.5	0.2	32.5	12.00	12.00	0.00
7,700.0	24.28	179.68	7,694.0	-42.2	0.2	42.2	12.00	12.00	0.00
7,725.0	27.28	179.68	7,716.5	-53.1	0.3	53.1	12.00	12.00	0.00
7,750.0	30.28	179.68	7,738.4	-65.1	0.4	65.1	12.00	12.00	0.00
7,775.0	33.28	179.68	7,759.7	-78.3	0.4	78.3	12.00	12.00	0.00
7,800.0	36.28	179.68	7,780.2	-92.5	0.5	92.5	12.00	12.00	0.00
Third Bone Spring Sand									
7,805.5	36.93	179.68	7,784.6	-95.8	0.5	95.8	12.00	12.00	0.00
7,825.0	39.28	179.68	7,800.0	-107.9	0.6	107.9	12.00	12.00	0.00
7,850.0	42.28	179.68	7,818.9	-124.2	0.7	124.2	12.00	12.00	0.00
7,875.0	45.28	179.68	7,836.9	-141.5	0.8	141.5	12.00	12.00	0.00
7,900.0	48.28	179.68	7,854.1	-159.7	0.9	159.7	12.00	12.00	0.00
7,925.0	51.28	179.68	7,870.2	-178.8	1.0	178.8	12.00	12.00	0.00
7,950.0	54.28	179.68	7,885.3	-198.7	1.1	198.7	12.00	12.00	0.00
7,975.0	57.28	179.68	7,899.4	-219.3	1.2	219.4	12.00	12.00	0.00
8,000.0	60.28	179.68	7,912.3	-240.7	1.3	240.7	12.00	12.00	0.00
8,025.0	63.28	179.68	7,924.2	-262.7	1.5	262.8	12.00	12.00	0.00
8,050.0	66.28	179.68	7,934.8	-285.4	1.6	285.4	12.00	12.00	0.00
8,075.0	69.28	179.68	7,944.3	-308.5	1.7	308.5	12.00	12.00	0.00
8,100.0	72.28	179.68	7,952.5	-332.1	1.9	332.1	12.00	12.00	0.00
8,125.0	75.28	179.68	7,959.5	-356.1	2.0	356.1	12.00	12.00	0.00
8,150.0	78.28	179.68	7,965.2	-380.4	2.1	380.4	12.00	12.00	0.00
8,175.0	81.28	179.68	7,969.6	-405.0	2.3	405.0	12.00	12.00	0.00
8,200.0	84.28	179.68	7,972.8	-429.8	2.4	429.8	12.00	12.00	0.00
8,225.0	87.28	179.68	7,974.6	-454.8	2.5	454.8	12.00	12.00	0.00
8,250.0	90.28	179.68	7,975.2	-479.8	2.7	479.8	12.00	12.00	0.00
End of Curve @ 8260' MD / 91.44° Inc. / 7975' TVD									
8,259.7	91.44	179.68	7,975.0	-489.4	2.7	489.4	12.00	12.00	0.00
8,300.0	91.44	179.68	7,974.0	-529.7	3.0	529.8	0.00	0.00	0.00
8,400.0	91.44	179.68	7,971.5	-629.7	3.5	629.7	0.00	0.00	0.00
8,500.0	91.44	179.68	7,969.0	-729.7	4.1	729.7	0.00	0.00	0.00
8,600.0	91.44	179.68	7,966.5	-829.6	4.6	829.7	0.00	0.00	0.00
8,700.0	91.44	179.68	7,964.0	-929.6	5.2	929.6	0.00	0.00	0.00
8,800.0	91.44	179.68	7,961.5	-1,029.6	5.8	1,029.6	0.00	0.00	0.00
8,900.0	91.44	179.68	7,959.0	-1,129.5	6.3	1,129.6	0.00	0.00	0.00
9,000.0	91.44	179.68	7,956.4	-1,229.5	6.9	1,229.5	0.00	0.00	0.00
9,100.0	91.44	179.68	7,953.9	-1,329.5	7.4	1,329.5	0.00	0.00	0.00
9,200.0	91.44	179.68	7,951.4	-1,429.4	8.0	1,429.5	0.00	0.00	0.00
9,300.0	91.44	179.68	7,948.9	-1,529.4	8.5	1,529.4	0.00	0.00	0.00
9,400.0	91.44	179.68	7,946.4	-1,629.4	9.1	1,629.4	0.00	0.00	0.00
9,500.0	91.44	179.68	7,943.9	-1,729.3	9.7	1,729.4	0.00	0.00	0.00
9,600.0	91.44	179.68	7,941.4	-1,829.3	10.2	1,829.3	0.00	0.00	0.00
9,700.0	91.44	179.68	7,938.9	-1,929.3	10.8	1,929.3	0.00	0.00	0.00
9,800.0	91.44	179.68	7,936.4	-2,029.2	11.3	2,029.3	0.00	0.00	0.00
9,900.0	91.44	179.68	7,933.9	-2,129.2	11.9	2,129.2	0.00	0.00	0.00
10,000.0	91.44	179.68	7,931.4	-2,229.2	12.5	2,229.2	0.00	0.00	0.00
10,100.0	91.44	179.68	7,928.8	-2,329.1	13.0	2,329.2	0.00	0.00	0.00
10,200.0	91.44	179.68	7,926.3	-2,429.1	13.6	2,429.2	0.00	0.00	0.00
10,300.0	91.44	179.68	7,923.8	-2,529.1	14.1	2,529.1	0.00	0.00	0.00
10,400.0	91.44	179.68	7,921.3	-2,629.0	14.7	2,629.1	0.00	0.00	0.00
10,500.0	91.44	179.68	7,918.8	-2,729.0	15.2	2,729.1	0.00	0.00	0.00
10,600.0	91.44	179.68	7,916.3	-2,829.0	15.8	2,829.0	0.00	0.00	0.00

Database:	EDM 5000.1 Single User Db	Local Co-ordinate Reference:	Well Cali Roll 24 Federal #2H
Company:	COG Production, LLC	TVD Reference:	Well @ 3577.0usft (Precision #77)
Project:	Eddy County, NM (NAD 83)	MD Reference:	Well @ 3577.0usft (Precision #77)
Site:	Sec 24 T26S R25E	North Reference:	Grid
Well:	Cali Roll 24 Federal Com #2H	Survey Calculation Method:	Minimum Curvature
Wellbore:	Wellbore #1		
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)
10,700.0	91.44	179.68	7,913.8	-2,928.9	16.4	2,929.0	0.00	0.00	0.00
10,800.0	91.44	179.68	7,911.3	-3,028.9	16.9	3,029.0	0.00	0.00	0.00
10,900.0	91.44	179.68	7,908.8	-3,128.9	17.5	3,128.9	0.00	0.00	0.00
11,000.0	91.44	179.68	7,906.3	-3,228.9	18.0	3,228.9	0.00	0.00	0.00
11,100.0	91.44	179.68	7,903.8	-3,328.8	18.6	3,328.9	0.00	0.00	0.00
11,200.0	91.44	179.68	7,901.3	-3,428.8	19.2	3,428.8	0.00	0.00	0.00
11,300.0	91.44	179.68	7,898.7	-3,528.8	19.7	3,528.8	0.00	0.00	0.00
11,400.0	91.44	179.68	7,896.2	-3,628.7	20.3	3,628.8	0.00	0.00	0.00
11,500.0	91.44	179.68	7,893.7	-3,728.7	20.8	3,728.7	0.00	0.00	0.00
11,600.0	91.44	179.68	7,891.2	-3,828.7	21.4	3,828.7	0.00	0.00	0.00
11,700.0	91.44	179.68	7,888.7	-3,928.6	21.9	3,928.7	0.00	0.00	0.00
11,800.0	91.44	179.68	7,886.2	-4,028.6	22.5	4,028.6	0.00	0.00	0.00
11,900.0	91.44	179.68	7,883.7	-4,128.6	23.1	4,128.6	0.00	0.00	0.00
12,000.0	91.44	179.68	7,881.2	-4,228.5	23.6	4,228.6	0.00	0.00	0.00
12,100.0	91.44	179.68	7,878.7	-4,328.5	24.2	4,328.6	0.00	0.00	0.00
12,200.0	91.44	179.68	7,876.2	-4,428.5	24.7	4,428.5	0.00	0.00	0.00
12,300.0	91.44	179.68	7,873.7	-4,528.4	25.3	4,528.5	0.00	0.00	0.00
12,400.0	91.44	179.68	7,871.2	-4,628.4	25.9	4,628.5	0.00	0.00	0.00
12,500.0	91.44	179.68	7,868.6	-4,728.4	26.4	4,728.4	0.00	0.00	0.00
12,600.0	91.44	179.68	7,866.1	-4,828.3	27.0	4,828.4	0.00	0.00	0.00
12,700.0	91.44	179.68	7,863.6	-4,928.3	27.5	4,928.4	0.00	0.00	0.00
12,800.0	91.44	179.68	7,861.1	-5,028.3	28.1	5,028.3	0.00	0.00	0.00
12,900.0	91.44	179.68	7,858.6	-5,128.2	28.6	5,128.3	0.00	0.00	0.00
13,000.0	91.44	179.68	7,856.1	-5,228.2	29.2	5,228.3	0.00	0.00	0.00
13,100.0	91.44	179.68	7,853.6	-5,328.2	29.8	5,328.2	0.00	0.00	0.00
13,200.0	91.44	179.68	7,851.1	-5,428.1	30.3	5,428.2	0.00	0.00	0.00
13,300.0	91.44	179.68	7,848.6	-5,528.1	30.9	5,528.2	0.00	0.00	0.00
13,400.0	91.44	179.68	7,846.1	-5,628.1	31.4	5,628.1	0.00	0.00	0.00
13,500.0	91.44	179.68	7,843.6	-5,728.0	32.0	5,728.1	0.00	0.00	0.00
13,600.0	91.44	179.68	7,841.0	-5,828.0	32.5	5,828.1	0.00	0.00	0.00
13,700.0	91.44	179.68	7,838.5	-5,928.0	33.1	5,928.1	0.00	0.00	0.00
13,800.0	91.44	179.68	7,836.0	-6,027.9	33.7	6,028.0	0.00	0.00	0.00
13,900.0	91.44	179.68	7,833.5	-6,127.9	34.2	6,128.0	0.00	0.00	0.00
14,000.0	91.44	179.68	7,831.0	-6,227.9	34.8	6,228.0	0.00	0.00	0.00
14,100.0	91.44	179.68	7,828.5	-6,327.8	35.3	6,327.9	0.00	0.00	0.00
14,200.0	91.44	179.68	7,826.0	-6,427.8	35.9	6,427.9	0.00	0.00	0.00
14,300.0	91.44	179.68	7,823.5	-6,527.8	36.5	6,527.9	0.00	0.00	0.00
14,400.0	91.44	179.68	7,821.0	-6,627.7	37.0	6,627.8	0.00	0.00	0.00
14,500.0	91.44	179.68	7,818.5	-6,727.7	37.6	6,727.8	0.00	0.00	0.00
14,600.0	91.44	179.68	7,816.0	-6,827.7	38.1	6,827.8	0.00	0.00	0.00
14,700.0	91.44	179.68	7,813.5	-6,927.6	38.7	6,927.7	0.00	0.00	0.00
14,800.0	91.44	179.68	7,810.9	-7,027.6	39.2	7,027.7	0.00	0.00	0.00
14,900.0	91.44	179.68	7,808.4	-7,127.6	39.8	7,127.7	0.00	0.00	0.00
15,000.0	91.44	179.68	7,805.9	-7,227.5	40.4	7,227.6	0.00	0.00	0.00
15,100.0	91.44	179.68	7,803.4	-7,327.5	40.9	7,327.6	0.00	0.00	0.00
Drop Inc.									
15,200.5	91.44	179.68	7,800.9	-7,428.0	41.5	7,428.1	0.00	0.00	0.00
End of Drop @ 90° Inc. / 7800' TVD / 7500' VS									
15,272.4	90.00	179.68	7,800.0	-7,499.8	41.9	7,500.0	2.00	-2.00	0.01
15,300.0	90.00	179.68	7,800.0	-7,527.5	42.0	7,527.6	0.00	0.00	0.00
15,400.0	90.00	179.68	7,800.0	-7,627.5	42.6	7,627.6	0.00	0.00	0.00
15,500.0	90.00	179.68	7,800.0	-7,727.5	43.1	7,727.6	0.00	0.00	0.00
15,600.0	90.00	179.68	7,800.0	-7,827.4	43.7	7,827.6	0.00	0.00	0.00

Database:	EDM 5000.1 Single User Db	Local Co-ordinate Reference:	Well Cali Roll 24 Federal #2H
Company:	COG Production LLC	TVD Reference:	Well @ 3577.0usft (Precision #77)
Project:	Eddy County, NM (NAD 83)	MD Reference:	Well @ 3577.0usft (Precision #77)
Site:	Sec 24 T26S R25E	North Reference:	Grid
Well:	Cali Roll 24 Federal Com #2H	Survey Calculation Method:	Minimum Curvature
Wellbore:	Wellbore #1		
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)
15,700.0	90.00	179.68	7,800.0	-7,927.4	44.2	7,927.6	0.00	0.00	0.00
15,800.0	90.00	179.68	7,800.0	-8,027.4	44.8	8,027.6	0.00	0.00	0.00
15,900.0	90.00	179.68	7,800.0	-8,127.4	45.3	8,127.6	0.00	0.00	0.00
16,000.0	90.00	179.68	7,800.0	-8,227.4	45.9	8,227.6	0.00	0.00	0.00
16,100.0	90.00	179.68	7,800.0	-8,327.4	46.4	8,327.6	0.00	0.00	0.00
16,200.0	90.00	179.68	7,800.0	-8,427.4	47.0	8,427.6	0.00	0.00	0.00
16,300.0	90.00	179.68	7,800.0	-8,527.4	47.5	8,527.6	0.00	0.00	0.00
16,400.0	90.00	179.68	7,800.0	-8,627.4	48.1	8,627.6	0.00	0.00	0.00
16,500.0	90.00	179.68	7,800.0	-8,727.4	48.6	8,727.6	0.00	0.00	0.00
16,600.0	90.00	179.68	7,800.0	-8,827.4	49.2	8,827.6	0.00	0.00	0.00
16,700.0	90.00	179.68	7,800.0	-8,927.4	49.8	8,927.6	0.00	0.00	0.00
16,800.0	90.00	179.68	7,800.0	-9,027.4	50.3	9,027.6	0.00	0.00	0.00
16,900.0	90.00	179.68	7,800.0	-9,127.4	50.9	9,127.6	0.00	0.00	0.00
17,000.0	90.00	179.68	7,800.0	-9,227.4	51.4	9,227.6	0.00	0.00	0.00
17,100.0	90.00	179.68	7,800.0	-9,327.4	52.0	9,327.6	0.00	0.00	0.00
17,200.0	90.00	179.68	7,800.0	-9,427.4	52.5	9,427.6	0.00	0.00	0.00
17,300.0	90.00	179.68	7,800.0	-9,527.4	53.1	9,527.6	0.00	0.00	0.00
17,400.0	90.00	179.68	7,800.0	-9,627.4	53.6	9,627.6	0.00	0.00	0.00
17,500.0	90.00	179.68	7,800.0	-9,727.4	54.2	9,727.6	0.00	0.00	0.00
17,600.0	90.00	179.68	7,800.0	-9,827.4	54.7	9,827.6	0.00	0.00	0.00
17,700.0	90.00	179.68	7,800.0	-9,927.4	55.3	9,927.6	0.00	0.00	0.00
PBHL @ 17765' MD / 7800' TVD									
17,764.7	90.00	179.68	7,800.0	-9,992.1	55.6	9,992.2	0.00	0.00	0.00

Design Targets

Target Name - hit/miss target - Shape	Dip Angle (°)	Dip Dir. (°)	TVD (usft)	+N/-S (usft)	+E/-W (usft)	Northing (usft)	Easting (usft)	Latitude	Longitude
PBHL Cali Roll '24' Fede - plan hits target center - Point	0.00	0.01	7,800.0	-9,992.1	55.6	366,209.38	538,661.93	32° 0' 24.442 N	104° 20' 31.075 W
Start Drop Cali Roll 24 F - plan hits target center - Point	0.00	0.01	7,800.9	-7,428.0	41.5	368,773.47	538,647.80	32° 0' 49.817 N	104° 20' 31.241 W

Database:	EDM 5000.1 Single User Db	Local Co-ordinate Reference:	Well Cali Roll 24 Federal #2H
Company:	COG Production, LLC	TVD Reference:	Well @ 3577.0usft (Precision #7.7)
Project:	Eddy County, NM (NAD 83)	MD Reference:	Well @ 3577.0usft (Precision #7.7)
Site:	Sec 24 T26S R25E	North Reference:	Grid
Well:	Cali Roll 24 Federal Com #2H	Survey Calculation Method:	Minimum Curvature
Wellbore:	Wellbore #1		
Design:	Design #1		

Formations

Measured Depth (usft)	Vertical Depth (usft)	Name	Lithology	Dip (°)	Dip Direction (°)
65.0	65.0	Rustler		-1.44	179.68
393.0	393.0	TOS		-1.44	179.68
1,437.0	1,437.0	BOS (Fletcher)		-1.44	179.68
1,624.0	1,624.0	LMAR (Top Delaware)		-1.44	179.68
1,668.0	1,668.0	BLCN		-1.44	179.68
2,527.0	2,527.0	CYCN		-1.44	179.68
3,636.0	3,636.0	BYCN		-1.44	179.68
5,133.0	5,133.0	Bone Springs		-1.44	179.68
5,240.0	5,240.0	Upper Avalon Shale		-1.44	179.68
5,557.0	5,557.0	Lower Avalon Shale		-1.44	179.68
6,021.0	6,021.0	First Bone Spring Sand		-1.44	179.68
6,722.0	6,722.0	Second Bone Spring Sand		-1.44	179.68
7,805.5	7,784.6	Third Bone Spring Sand		-1.44	179.68

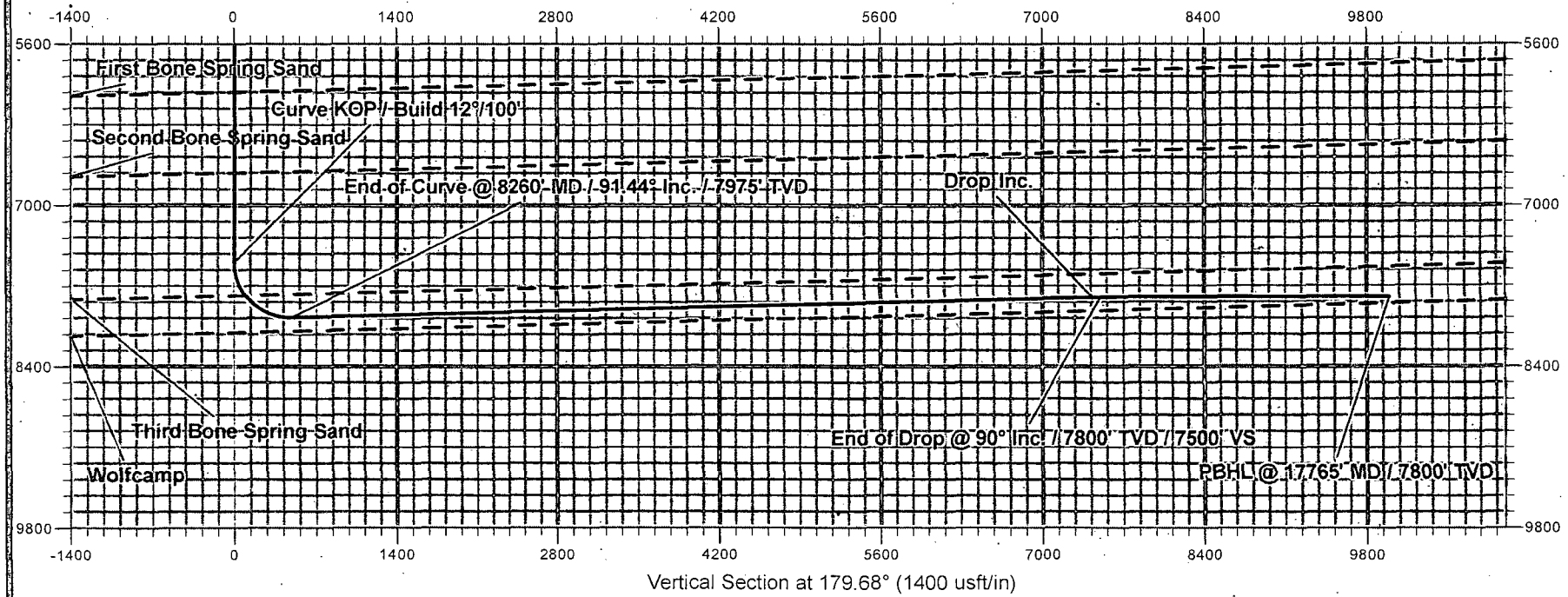
Plan Annotations

Measured Depth (usft)	Vertical Depth (usft)	Local Coordinates +N/-S (usft)	Local Coordinates +E/-W (usft)	Comment
7,497.7	7,497.7	0.0	0.0	Curve KOP / Build 12°/100'
8,259.7	7,975.0	-489.4	2.7	End of Curve @ 8260' MD / 91.44° Inc. / 7975' TVD
15,200.5	7,800.9	-7,428.0	41.5	Drop Inc.
15,272.4	7,800.0	-7,499.8	41.9	End of Drop @ 90° Inc. / 7800' TVD / 7500' VS
17,764.7	7,800.0	-9,992.1	55.6	PBHL @ 17765' MD / 7800' TVD

CONCHO

Eddy County, NM (NAD 83)
Sec 24, T26S, R25E
Cali Roll 24 Federal COM #2H
Design #1

DDC
The DIRECTIONAL DRILLING COMPANY

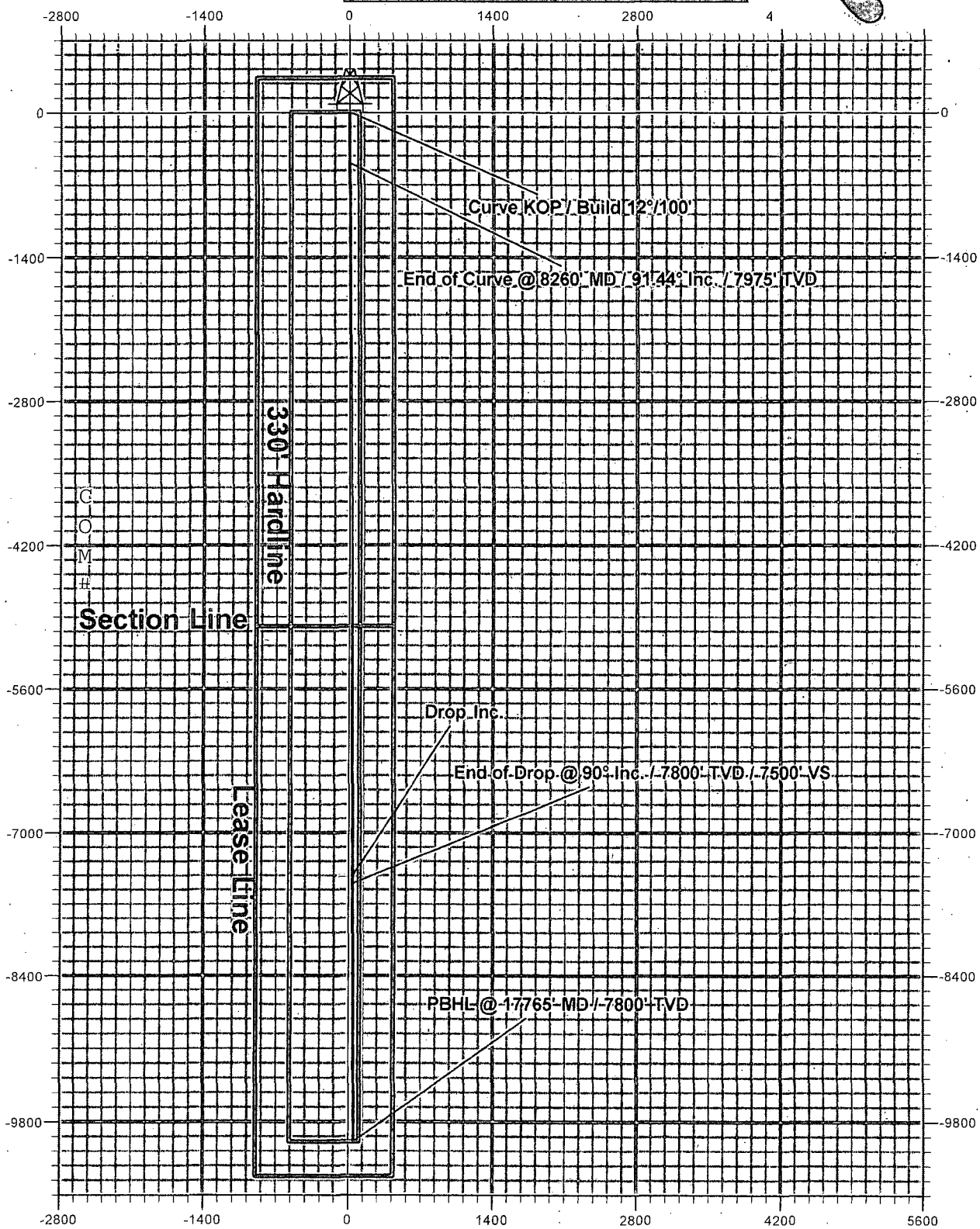


Vertical Section at 179.68° (1400 usft/in)

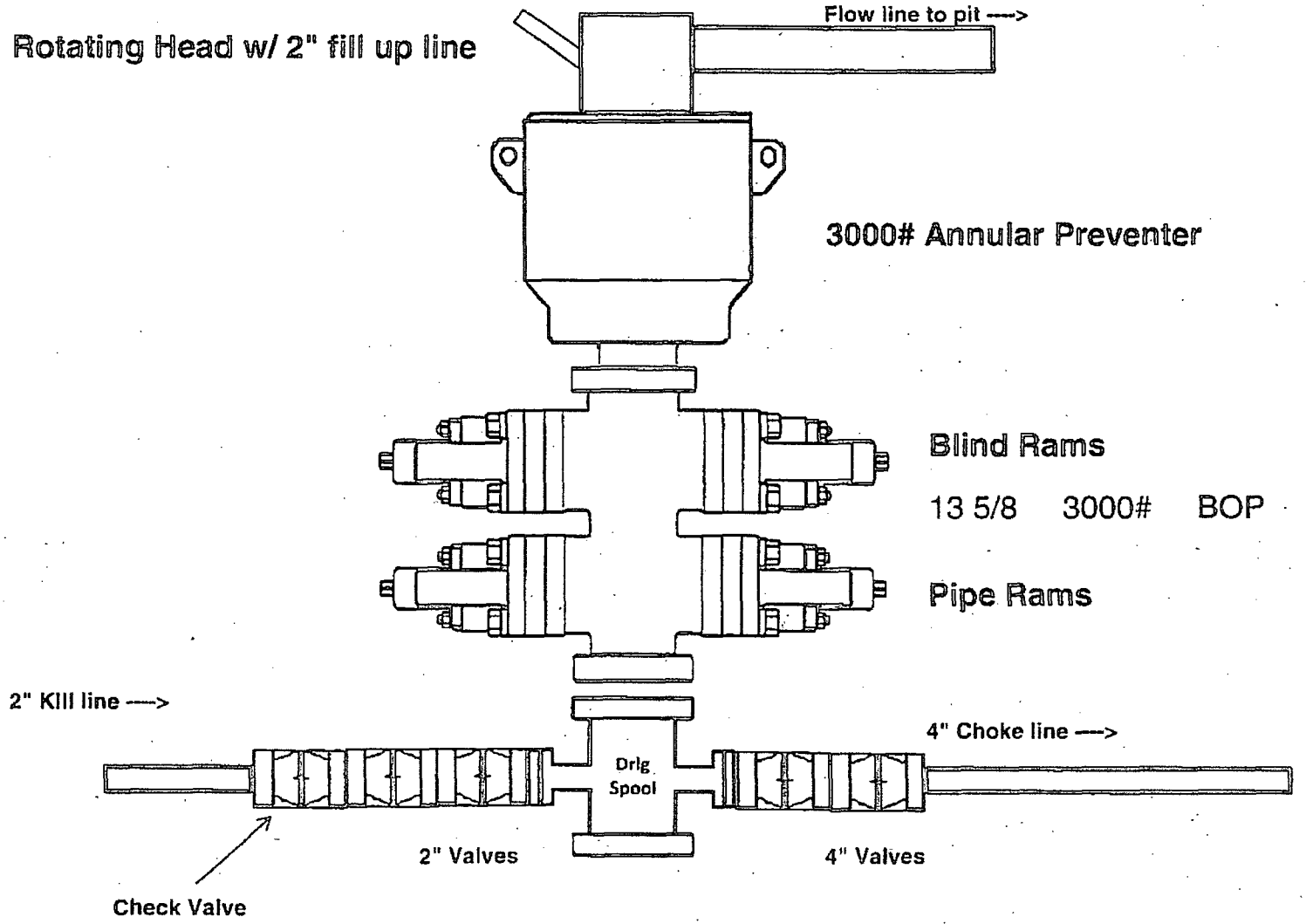
CONCHO

Eddy County, NM (NAD 83)
Sec 24, T26S, R25E
Cali Roll 24 Federal COM #2H
Design #1

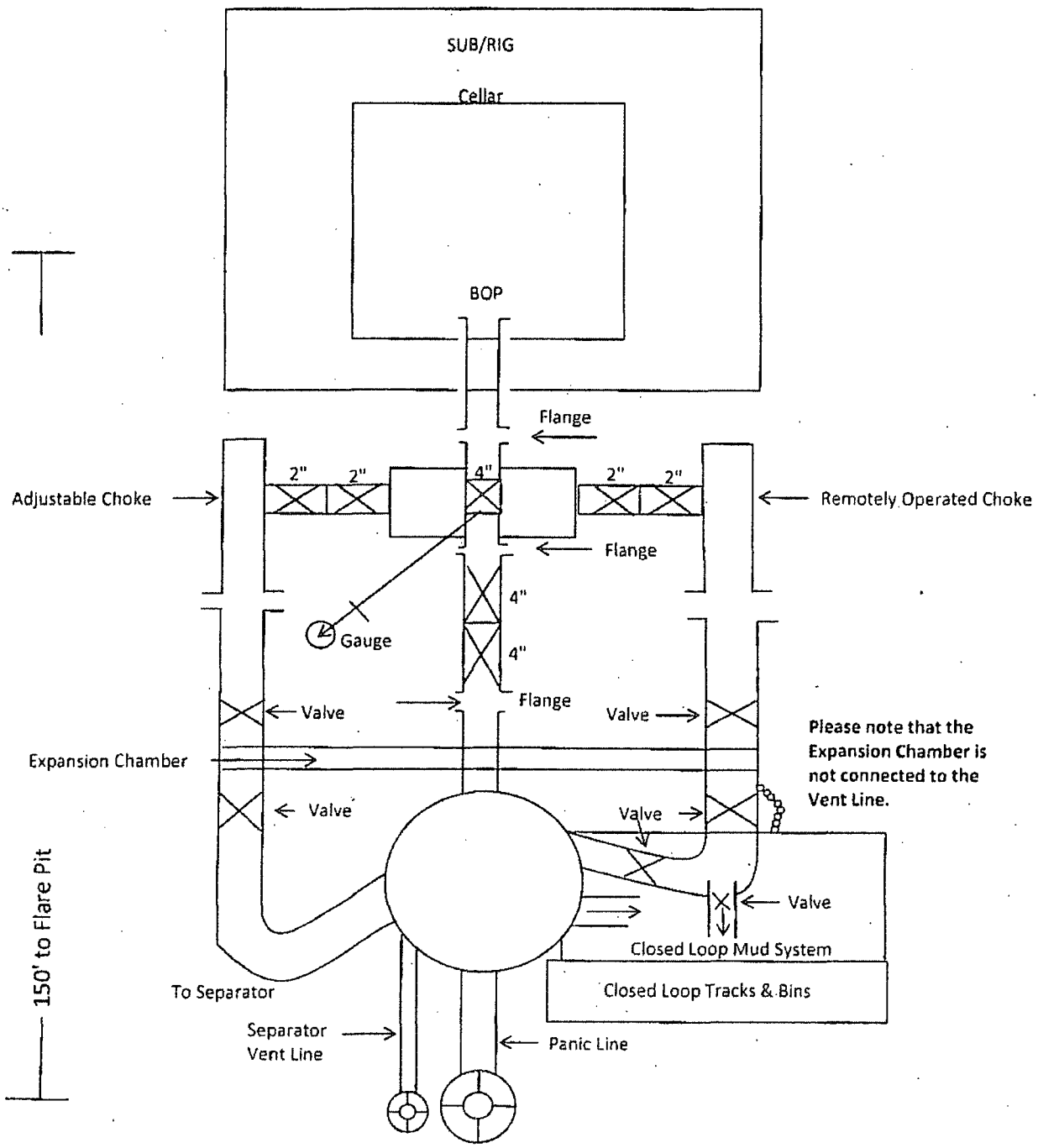
RDC
The DIRECTIONAL DRILLING COMPANY



3,000 psi BOP Schematic



3M Choke Manifold Equipment



PECOS DISTRICT
CONDITIONS OF APPROVAL

OPERATOR'S NAME:	COG Operating, LLC
LEASE NO.:	NMNM-104666
WELL NAME & NO.:	Cali Roll 24 Federal Com 2H
SURFACE HOLE FOOTAGE:	0330' FNL & 0430' FEL
BOTTOM HOLE FOOTAGE	0330' FSL & 0380' FEL Sec. 25, T. 26 S., R. 25 E.
LOCATION:	Section 24, T. 26 S., R. 25 E., NMPM
COUNTY:	Eddy County, New Mexico

The original COAs still stand with the following drilling modifications:

Special Requirements:

Communitization Agreement

A Communitization Agreement covering the acreage dedicated to this well must be filed for approval with the BLM. The effective date of the agreement shall be prior to any sales. In addition, the well sign shall include the surface and bottom hole lease numbers. If the Communitization Agreement number is known, it shall also be on the sign. If not, it shall be placed on the sign when the sign is replaced.

I. 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. 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 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.

CRITICAL CAVE/KARST
Possible sulfur water flows within the Castile formation.
Possible loss of circulation in the Delaware.
Possible abnormally high pressures in the Wolfcamp.

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

1. The **13-3/8** inch surface casing shall be set at approximately **400** 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 should tie-back at least 300 feet into previous casing string. Operator shall provide method of verification.

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

    a. **For surface casing only:** If the BOP/BOPE is to be tested against casing, the wait on cement (WOC) time for that casing is to be met (see WOC statement at start of casing section). Independent service company required.

3. 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**. The operator also has the option of utilizing an independent tester to test without a plug (i.e. against the casing) pursuant to Onshore Order 2 with the pressure not to exceed 70% of the burst rating for the casing. Any test against the casing must meet the WOC time for water basin (18 hours) or potash (24 hours) or 500 pounds compressive strength, whichever is greater, prior to initiating the test (see casing segment as lead cement may be critical item).

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.

JAM 071814