

Carlsbad Field Office

OCD Artesia

UNITED STATES
DEPARTMENT OF THE INTERIOR
BUREAU OF LAND MANAGEMENT

APPLICATION FOR PERMIT TO DRILL OR REENTER

NOIL CONSERVATION
ARTESIA DISTRICT

NOV 09 2016

RECEIVED

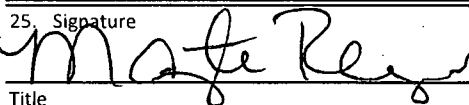
FORM APPROVED
OMB No. 1004-0137
Expires October 31, 2014

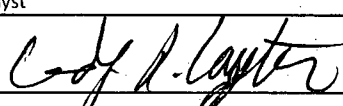
1a. Type of Work: ☒ DRILL ☐ REENTER		5. Lease Serial No. SHL: Fee BHL: NMNM121474	
1b. Type of Well: ☒ Oil Well ☐ Gas Well ☐ Other ☒ Single Zone ☐ Multiple Zone		6. If Indian, Allottee or Tribe Name	
2. Name of Operator COG Production LLC.		7. If Unit or CA Agreement, Name and No.	
3a. Address 2208 West Main Street Artesia, NM 88210		8. Lease Name and Well No. Copperhead 31 Federal Com #3H	
3b. Phone No. (include area code) 575-748-6940		9. API Well No. 30-015-43924	
4. Location of Well (Report location clearly and in accordance with any State requirements. *) At surface 349' FNL & 773' FEL Unit Letter A (SESE) Sec 30-T26S-R29E At proposed prod. Zone 50' FSL & 660' FEL Lot 7 (SENE) Sec 31-T26S-R29E		10. Field and Pool, or Exploratory (98190) Wildcat; Wolfcamp	
14. Distance in miles and direction from nearest town or post office* Approximately 14 miles from Malaga		11. Sec., T.R.M. or Blk and Survey or Area Sec. 30 - T26S - R29E	
15. Distance from proposed* location to nearest property or lease line, ft. (Also to nearest drig. Unit line, if any) 50'		12. County or Parish Eddy	13. State NM
16. No. of acres in lease 51.87		17. Spacing Unit dedicated to this well 225.6	
18. Distance from location* to nearest well, drilling, completed, applied for, on this lease, ft. SHL: 321' BHL: 362'		20. BLM/BIA Bond No. on file NMB000860 & NMB000845	
21. Elevations (Show whether DF, KDB, RT, GL, etc.) 2941.6' GL		22. Approximate date work will start* 10/1/2016	
		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:

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

25. Signature 	Name (Printed/Typed) Mayte Reyes	Date 8-18-16
---	-------------------------------------	-----------------

Regulatory Analyst		
Approved by (Signature) 	Name (Printed/Typed) Cody R. Layton	Date 10/26/16
Title FOR 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)

SEE ATTACHED FOR
CONDITIONS OF APPROVAL

Surface Use Plan
COG Production LLC
Copperhead 31 Federal Com #3H
SHL: 349' FNL & 773' FEL UL A
Section 30, T26S, R29E
BHL: 50' FSL & 660' FEL Lot 7
Section 31, T26S, R29E
Eddy County, New Mexico

OPERATOR CERTIFICATION

I hereby certify that I, or persons under my direct supervision, have inspected the drill site and access road proposed herein; that I am familiar with the conditions that presently exist; that I have full knowledge of State and Federal laws applicable to this operation; that the statements made in this APD package are, to the best of my knowledge, true and correct; and that the work associated with the operations proposed herein will be performed in conformity with this APD package and the terms and conditions under which it is approved. I also certify that I, or COG 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 18th day of August, 2016.

Signed: Melanie J Wilson

Printed Name: Melanie J Wilson

Position: Lead Regulatory Analyst

Address: 2208 W. Main Street, Artesia, NM 88210

Telephone: (575) 748-6940

Field Representative (if not above signatory): Rand French

E-mail: mwilson@concho.com

DISTRICT I
1625 N. FRENCH DR., HOBBS, NM 88240
Phone: (575) 393-6181 Fax: (575) 393-0720

DISTRICT II
811 S. FIRST ST., ARTESIA, NM 88210
Phone: (575) 748-1283 Fax: (575) 748-0720

DISTRICT III
1000 RIO BRAZOS RD., 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) 476-3482

State of New Mexico
Energy, Minerals & Natural Resources Department
OIL CONSERVATION DIVISION
1220 SOUTH ST. FRANCIS DR.
Santa Fe, New Mexico 87505

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

☐ AMENDED REPORT

WELL LOCATION AND ACREAGE DEDICATION PLAT

API Number 30-015- 43924	Pool Code 98190	Pool Name WCO15 G04 52629314; UPR Wolfcamp
Property Code 38529	Property Name COPPERHEAD 31 FEDERAL COM	Well Number 3H
OGRID No. 217955	Operator Name COG PRODUCTION, LLC	Elevation 2941.6'

Surface Location

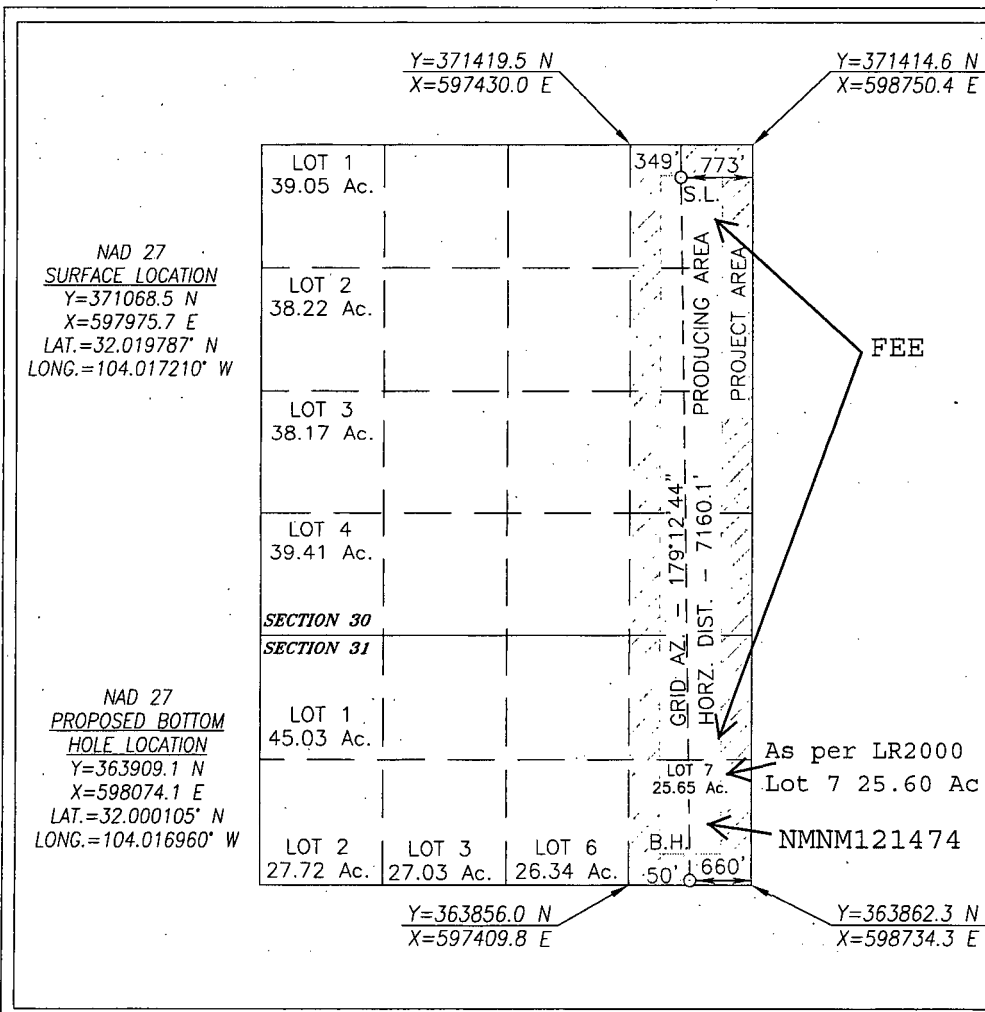
UL or lot No.	Section	Township	Range	Lot Idn	Feet from the	North/South line	Feet from the	East/West line	County
A	30	26-S	29-E		349	NORTH	773	EAST	EDDY

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
7	31	26-S	29-E		50	SOUTH	660	EAST	EDDY

Dedicated Acres	Joint or Infill	Consolidation Code	Order No.
225.60			

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. Wilson 8/18/16
Signature Date

Melanie J. Wilson
Printed Name
mwilson@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.

AUGUST 3, 2016

Date of Survey

Signature & Seal of Professional Surveyor



8/9/16
Certificate No. CHAD HARCROW 17777
W.O. #16-615 DRAWN BY: CF



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

Paper APD Data Report

10/28/2016

Highlight All Changes

Application

Section 1 - General

APD ID: 10400005453 Tie to previous NOS? Submission Date: 09/08/2016
BLM Office: CARLSBAD User: Alana Baker Title: Legal Instruments Examiner
Federal/Indian APD: FED Is the first lease penetrated for production Federal or Indian? FED
Lease number: NMNM121474 Lease Acres: 51.87
Surface access agreement in place? Allotted? Reservation:
Agreement in place? N Federal or Indian agreement:
Agreement number:
Agreement name:
Keep application confidential? N
Permitting Agent? NO APD Operator: COG PRODUCTION LLC
Operator letter of designation:
Keep application confidential? N
Signed By: Mayte Reyes Title: Regulatory Analyst Signed Date: 08/18/2016
APD Form Attachment(s) Copperhead 31 Federal Com 3H_3160 9 1 2016_09-08-2016.pdf
Copperhead 31 Federal Com 3H_3160 8 18 16_09-08-2016.pdf

Operator Info

Operator Organization Name: COG PRODUCTION LLC Zip: 88210
Operator Address: 2208 West Main Street
Operator PO Box:
Operator City: Artesia State: NM
Operator Phone: (575)748-6940
Operator Internet Address: mreyes1@concho.com

Section 2 - Well Information

Well in Master Development Plan? NO Mater Development Plan name:
Well in Master SUPO? NO Master SUPO name:
Well in Master Drilling Plan? NO Master Drilling Plan name:
Well Name: COPPERHEAD 31 FEDERAL COM Well Number: 3H Well API Number:
Field/Pool or Exploratory? Field and Pool Field Name: WILDCAT Pool Name: WOLFCAMP

Is the proposed well in an area containing other mineral resources? NONE

Describe other minerals:

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

Type of Well Pad: SINGLE WELL

Multiple Well Pad Name:

Number:

Well Class: HORIZONTAL

Number of Legs: 1

Well Work Type: Drill

Well Type: OIL WELL

Describe Well Type:

Well sub-Type:

Describe sub-type:

Distance to town: 14 Miles

Distance to nearest well: 321 FT

Distance to lease line: 50 FT

Reservoir well spacing assigned acres Measurement: 225.6 Acres

Well plat: Copperhead 31 Federal Com 3H_C102_09-08-2016.pdf

Well work start Date: 10/01/2016

Duration: 30 DAYS

Surface Owner: PRIVATE OWNERSHIP

Other surface owner description:

BIA Local Office:

BOR Local Office:

COE Local Office:

DOD Local Office:

NPS Local Office:

State Local Office:

Military Local Office:

USFWS Local Office:

Other Local Office:

USFS Region:

USFS Forest/Grassland:

USFS Ranger District:

Fee Owner: Franklin Terry Perkins Jr.

Fee Owner Address: 1921 Autumn Drive

Fee Owner City: Kellar

State: Texas

Zip: 76262

Phone: (575)748-6940

Email:

Section 3 - Well Location Table

Survey Type: RECTANGULAR

Describe Survey Type:

Datum: NAD27

Vertical Datum: NAVD88

Survey number:

	STATE: NEW MEXICO	Meridian: NEW MEXICO PRINCIPAL	County: EDDY
	Latitude: 32.019787	Longitude: -104.01721	
SHL	Elevation: 2941	MD: 0	TVD: 0
Leg #: 1	Lease Type: FEE	Lease #: FEE	
	NS-Foot: 349	NS Indicator: FNL	
	EW-Foot: 773	EW Indicator: FEL	
	Twsp: 26S	Range: 29E	Section: 30
	Aliquot: NENE	Lot:	Tract:
	STATE:	Meridian:	County:
	Latitude:	Longitude:	
KOP	Elevation:	MD:	TVD:
Leg #: 1	Lease Type:	Lease #:	
	NS-Foot:	NS Indicator:	
	EW-Foot:	EW Indicator:	
	Twsp:	Range:	Section:
	Aliquot:	Lot:	Tract:
	STATE: NEW MEXICO	Meridian: NEW MEXICO PRINCIPAL	County: EDDY
	Latitude: 32.000105	Longitude: -104.01696	
PPP	Elevation: -7803	MD: 17697	TVD: 10744
Leg #: 1	Lease Type: FEDERAL	Lease #: NMNM121474	
	NS-Foot: 50	NS Indicator: FSL	
	EW-Foot: 660	EW Indicator: FEL	
	Twsp: 26S	Range: 29E	Section: 31
	Aliquot:	Lot: 7	Tract:
	STATE:	Meridian:	County:
	Latitude:	Longitude:	
EXIT	Elevation:	MD:	TVD:
Leg #: 1	Lease Type:	Lease #:	
	NS-Foot:	NS Indicator:	

EW-Foot:

EW Indicator:

Twsp:

Range:

Section:

Aliquot:

Lot:

Tract:

STATE: NEW MEXICO

Meridian: NEW MEXICO PRINCIPAL **County:** EDDY

Latitude: 32.000105

Longitude: -104.01696

BHL

Elevation: -7803

MD: 17697

TVD: 10744

Leg #: 1

Lease Type: FEDERAL

Lease #: NMNM121474

NS-Foot: 50

NS Indicator: FSL

EW-Foot: 660

EW Indicator: FEL

Twsp: 26S

Range: 29E

Section: 31

Aliquot:

Lot: 7

Tract:

Drilling Plan

Drilling Plan Attachments

Drilling Plan Attachment(s)

Copperhead 31 Federal Com 3H_Drilling Plan_09-08-2016.pdf

Copperhead 31 Federal Com 3H_Standard Planning Report_09-08-2016.pdf

Copperhead 31 Federal Com 3H_Anticollision Report_09-08-2016.pdf

Hydrogen Sulfide Drilling Operations Plan

Copperhead 31 Federal Com 3H_H2S Plan_09-08-2016.pdf

Other Attachments

DP General Comments:

SUPO

SUPO Attachments

Surface Use Plan Attachment(s)

Copperhead 31 Federal Com 3H_SUPO_09-08-2016.pdf

Map or Plat Attachment(s)

Copperhead 31 Federal Com 3H_Maps_09-08-2016.pdf

SUPO General Comments:

PWD

PWD Attachments

Produced Water Disposal Plan Attachment

Produces Water Disposal Plan Map Attachment(s)

PWD General Comments:

Bond Info

Bond Information

Federal/Indian APD: FED

BLM Bond number: NMB000860

BIA Bond number:

Do you have a reclamation bond?

Is the reclamation bond a rider under the BLM bond?

Is the reclamation bond BLM or Forest Service?

BLM reclamation bond number:

Forest Service reclamation bond number:

Forest Service reclamation bond attachment:

Reclamation bond number:

Reclamation bond amount:

Reclamation bond rider amount:

Additional reclamation bond information attachment:

Bond Attachment(s)

BIA Bond Comments:

Operator Certification

Operator Certification

Operator Certification Attachment

Copperhead 31 Federal Com 3H_Operator Certification_09-08-2016.pdf

Payment Info

Payment

APD Fee Payment Method: PAY.GOV

pay.gov Tracking ID: 3633851

Form Attachment(s)

APD Form Attachment(s)

Copperhead 31 Federal Com 3H_3160 9 1 2016_09-08-2016.pdf

Copperhead 31 Federal Com 3H_3160 8 18 16_09-08-2016.pdf

Well Plat Attachment(s)

Copperhead 31 Federal Com 3H_C102_09-08-2016.pdf

Drilling Plan Attachment(s)

Drilling Plan Attachment(s)

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Map or Plat Attachment(s)

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Produce Water Disposal Attachment

Produced Water Disposal Plan Attachment

Produces Water Disposal Plan Map Attachment

Bond Information Attachments

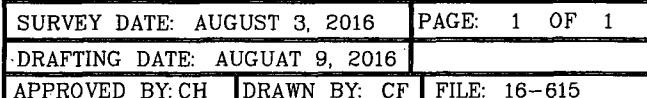
Bond Attachment(s)

Operator Certification Attachment

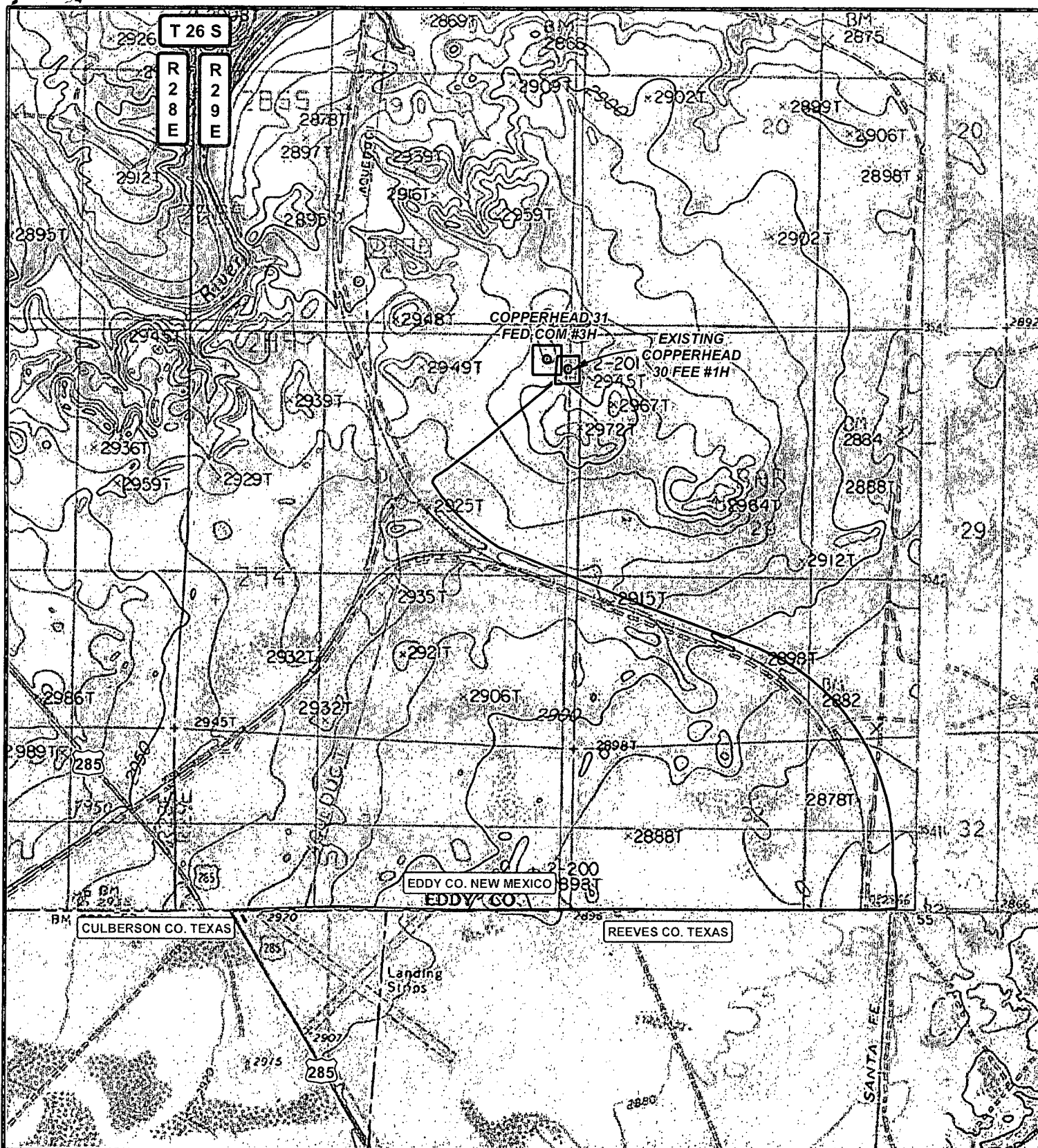
Operator Certification Attachment

Copperhead 31 Federal Com 3H_Operator Certification_09-08-2016.pdf

NEW MEXICO



8/11/16
DATE

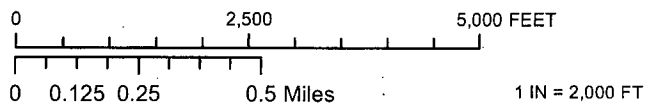


LEGEND

- WELL
- WELLPAD
- EXISTING ROAD

COPPERHEAD 31 FEDERAL COM #3H

SEC: 30 TWP: 26 S. RGE: 29 E. ELEVATION: 2941.6'
 STATE: NEW MEXICO COUNTY: EDDY 349' FNL & 773' FEL
 W.O. # 16-615 LEASE: COPPERHEAD 31 FED COM SURVEY: N.M.P.M



LOCATION MAP TOPO 08/11/2016 A.F

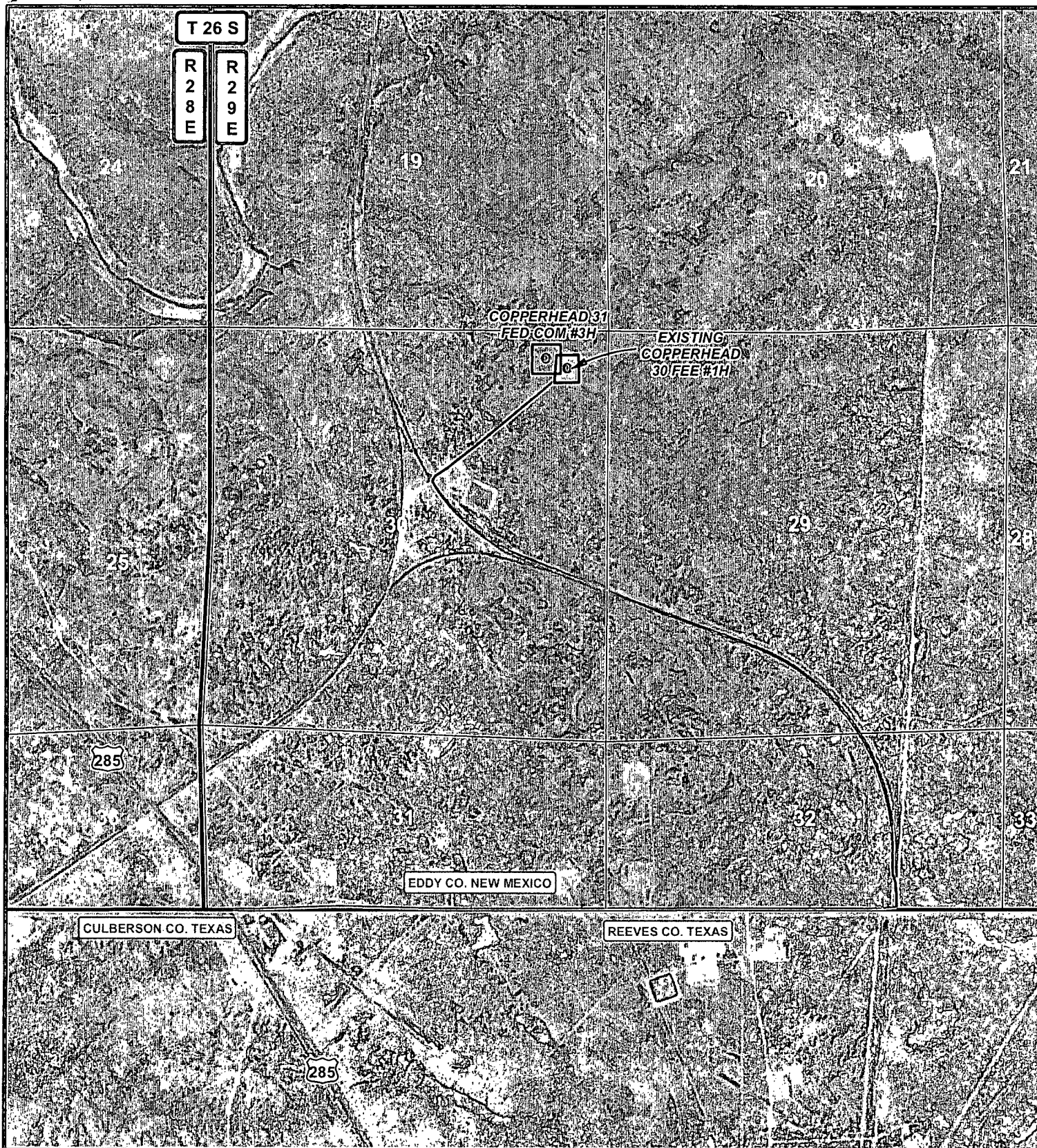
CONCHO

COG OPERATING, LLC



HARCROW SURVEYING, LLC.

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

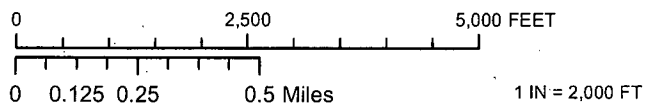


LEGEND

- WELL
- WELLPAD
- EXISTING ROAD

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LOCATION MAP

IMAGERY

03/11/2013

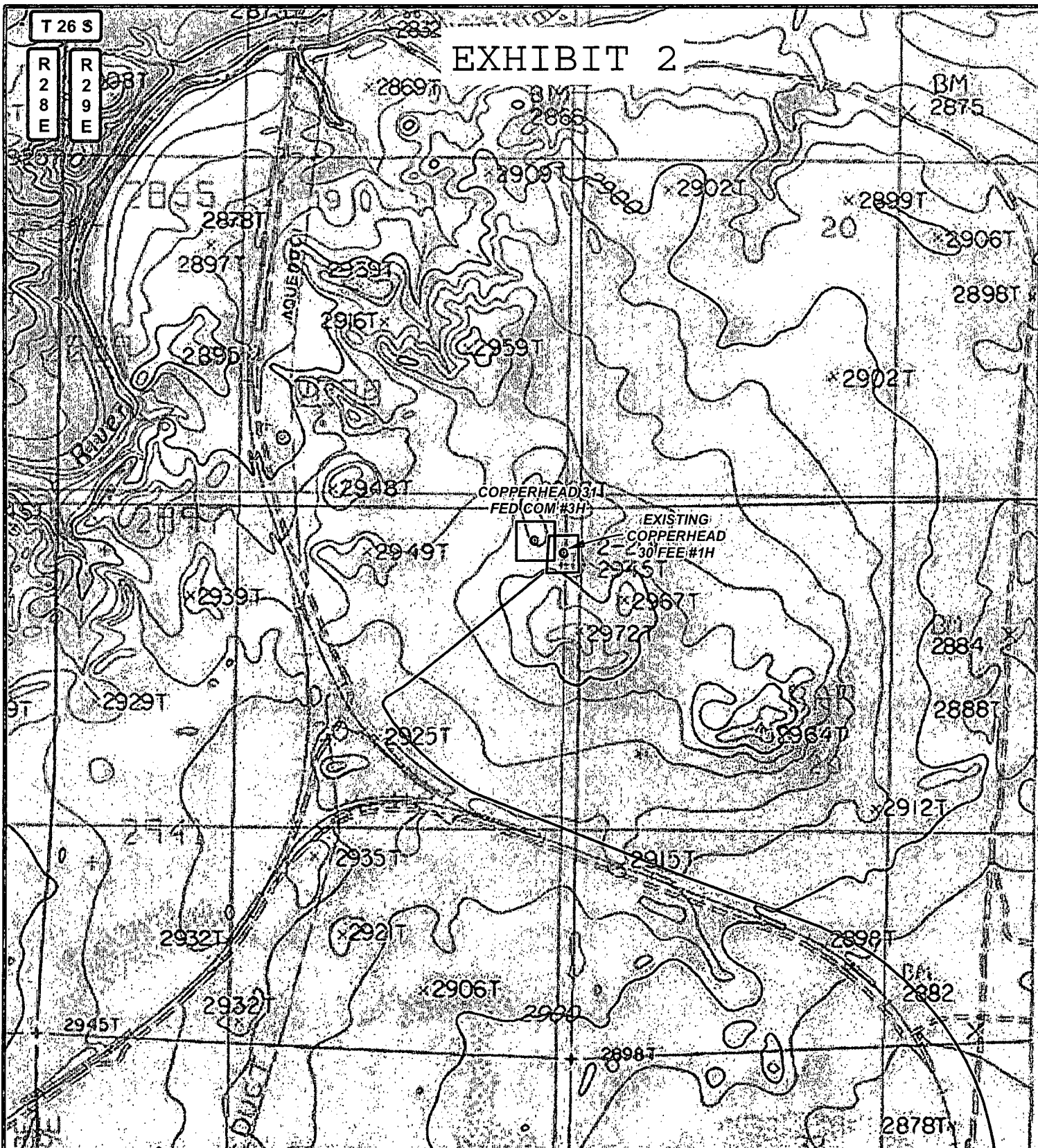
S.P.



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 c.harcrow@harcrowsurveying.com



LEGEND

- WELL
- WELLPAD
- EXISTING ROAD

COPPERHEAD 31 FEDERAL COM #3H

SEC: 30 TWP: 26 S. RGE: 29 E. ELEVATION: 2941.6'
 STATE: NEW MEXICO COUNTY: EDDY 349' FNL & 773' FEL
 W.O. # 16-615 LEASE: COPPERHEAD 31 FED COM SURVEY: N.M.P.M

0 2,500 FEET

0 0.1 0.2 0.4 Miles

1 IN = 1,500 FT

LOCATION MAP

TOPO ROAD

08/11/2016

A.F

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T 26 S

R 29 E

19

20

COPPERHEAD 31
FED COM #3H

EXISTING
COPPERHEAD
30 FEE #1H

30

29

LEGEND



WELL



WELLPAD



EXISTING ROAD

COPPERHEAD 31 FEDERAL COM #3H

SEC: 30 TWP: 26 S. RGE: 29 E. ELEVATION: 2941.6'

STATE: NEW MEXICO COUNTY: EDDY 349' FNL & 773' FEL

W.O. # 16-615 LEASE: COPPERHEAD 31 FED COM SURVEY: N.M.P.M

0 2,500 FEET

0 0.05 0.1 0.2 Miles 1 IN = 1,000 FT

LOCATION MAP

IMAGERY ROAD

08/11/2016

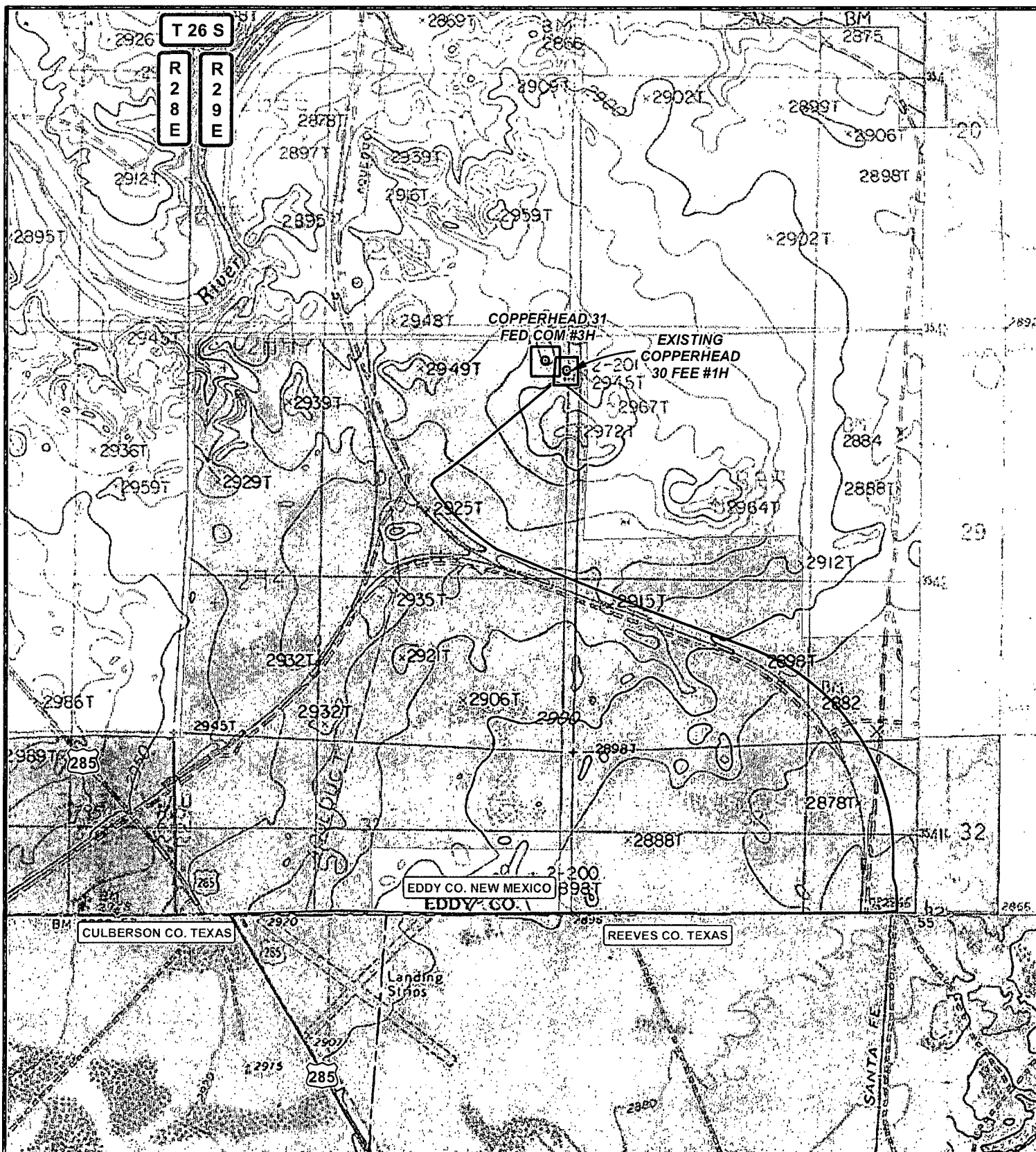
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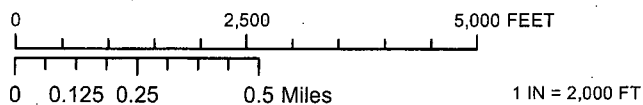


LEGEND

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

COPPERHEAD 31 FEDERAL COM #3H

SEC: 30 TWP: 26 S. RGE: 29 E. ELEVATION: 2941.6'
 STATE: NEW MEXICO COUNTY: EDDY 349' FNL & 773' FEL
 W.O. # 16-615 LEASE: COPPERHEAD 31 FED COM SURVEY: N.M.P.M



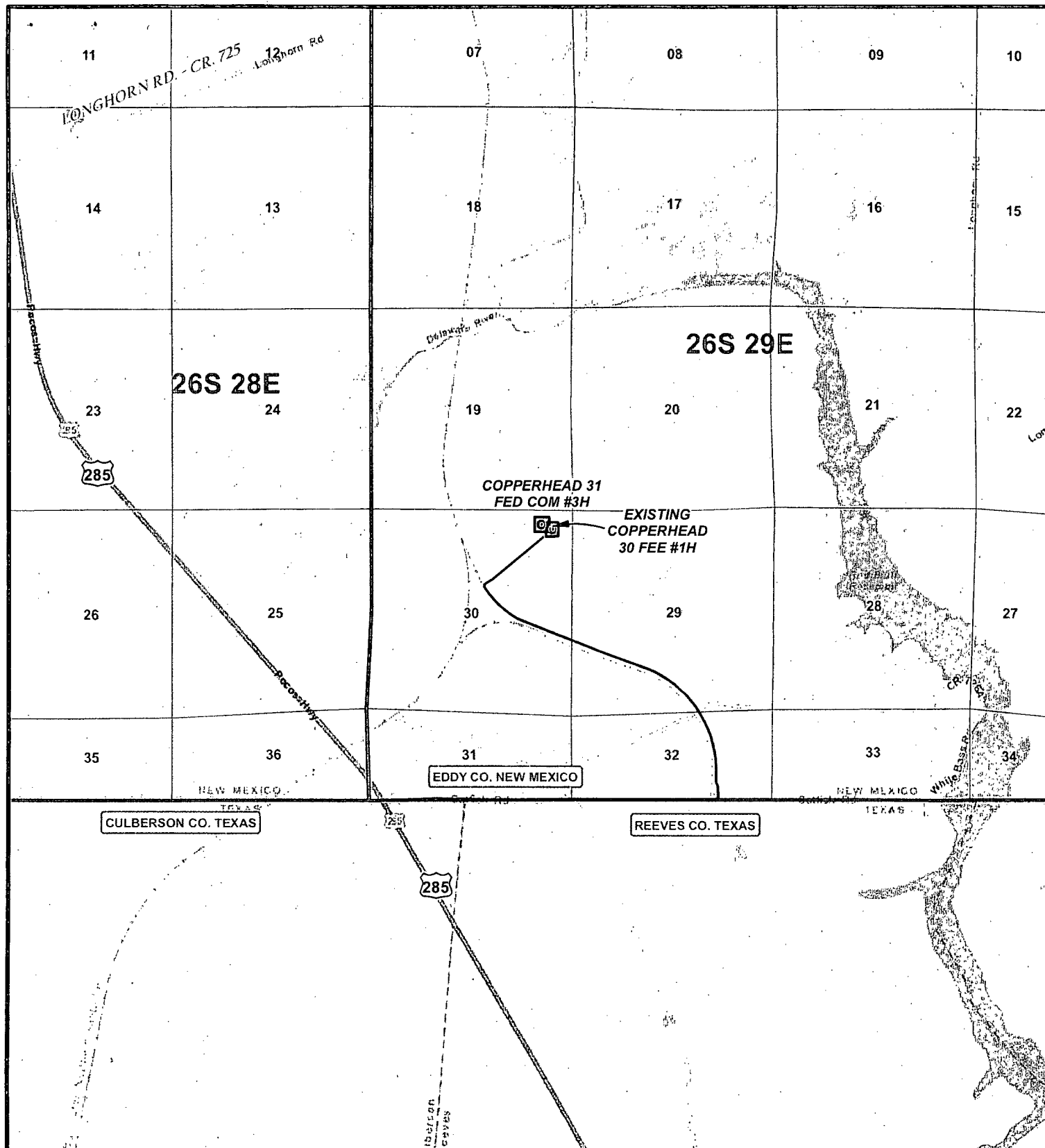
LOCATION MAP LAND STATUS 08/11/2016 S.P.



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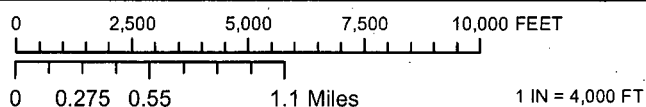


LEGEND

- WELL
- WELLPAD
- EXISTING ROAD

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LOCATION MAP VICINITY 08/11/2016 S.P.

CONCHO

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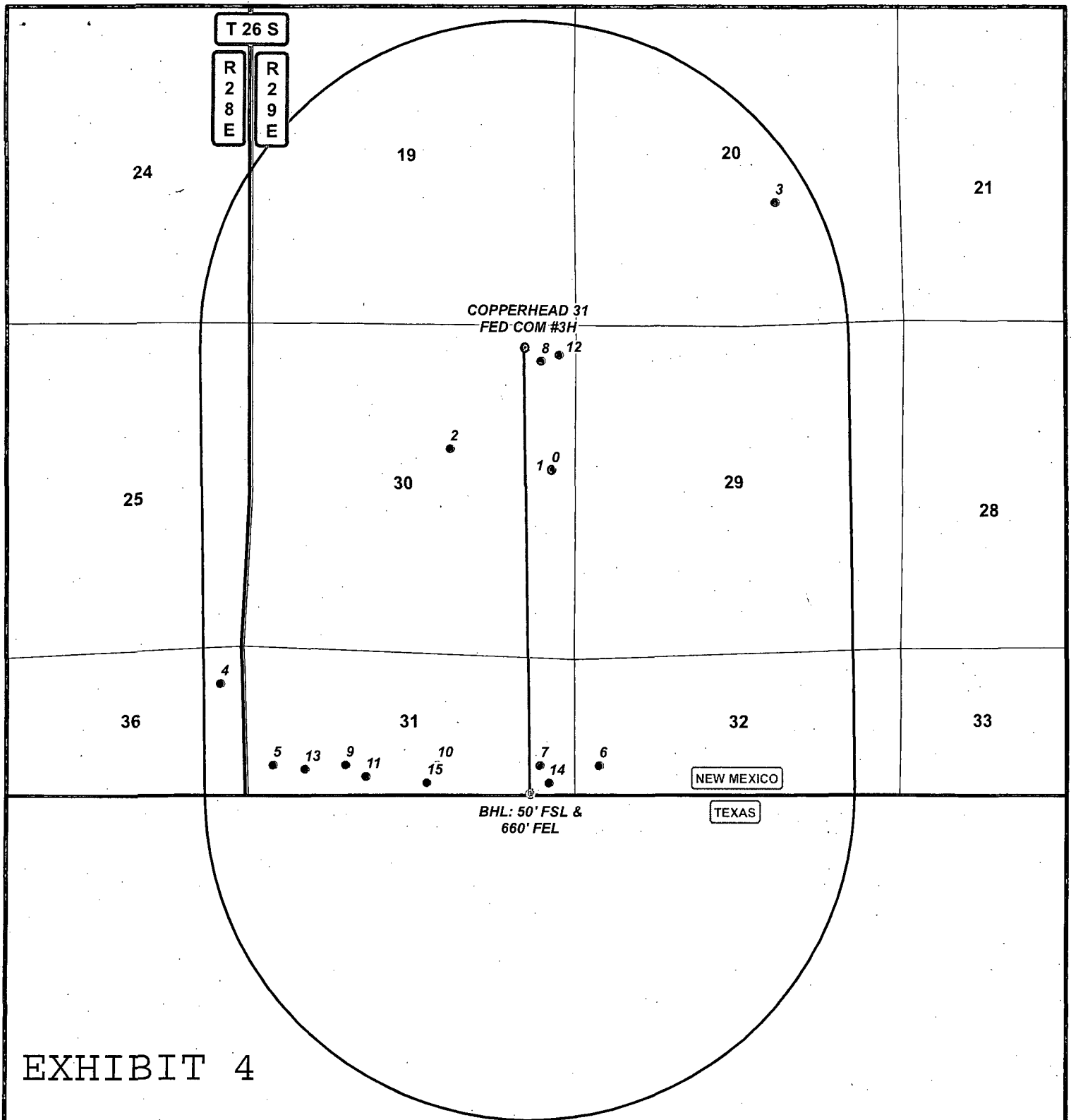


EXHIBIT 4

DATA FOR "WELLS WITHIN 1 MI." IS TAKEN FROM THE NEW MEXICO EMNRD WEBSITE. THE DATA HAS BEEN UPDATED THROUGH JULY 16, 2016.

LEGEND

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

COPPERHEAD 31 FEDERAL COM #3H

SEC: 30 TWP: 26 S. RGE: 29 E. ELEVATION: 2941.6'
 STATE: NEW MEXICO COUNTY: EDDY 349' FNL & 773' FEL
 W.O. # 16-615 LEASE: COPPERHEAD 31 FED COM SURVEY: N.M.P.M

0 2,500 5,000 FEET

0 0.15 0.3 0.6 Miles

1 IN = 2,500 FT

1 MILE MAP

08/11/2016

S.P.



COG OPERATING, LLC



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 c.harcrow@harcrowsurveying.com

COPPERHEAD 31 FED COM #31H (16-615 FED)													
FID	OPERATOR	WELL_NAME	LATITUDE	LONGITUDE	API	SECTION	TOWNSHIP	RANGE	FTG_NS	NS_CD	FTG_EW	EW_CD	COMPL_STAT
0	ALLAR CO	PERKINS 001	32.014497	-104.016297	3001510780		30 26.05	29E	2318 N		330 E		Plugged
1	ALLAR CO	PERKINS 001	32.014566	-104.016296	3001510836		30 26.05	29E	2293 N		330 E		Plugged
2	ORLA PETCO INC	PERKINS 001	32.015457	-104.021637	3001523849		30 26.05	29E	1980 N		1980 E		Plugged
3	SIETE OIL & GAS CORP	NEZ PERCE FED 001	32.026323	-104.004544	3001527274		20 26.05	29E	1980 S		1980 E		Plugged
4	YATES PETROLEUM CORPORATION	BUHO BQH STATE 002	32.00504	-104.033692	3001537941		36 26.05	28E	535 N		330 E		Plugged
5	COG PRODUCTION, LLC	COPPERHEAD FEE A 001H	32.001457	-104.030918	3001538227		31 26.05	29E	480 S		480 W		New (Not drilled or compl)
6	COG PRODUCTION, LLC	SIDEWINDER 001H	32.001453	-104.013837	3001538500		32 26.05	29E	480 S		480 W		New (Not drilled or compl)
7	COG PRODUCTION, LLC	COPPERHEAD 31 FEDERAL COM 001H	32.001454	-104.016949	3001538532		31 26.05	29E	480 S		480 E		New (Not drilled or compl)
8	COG PRODUCTION, LLC	COPPERHEAD 30 FEE 001H	32.019311	-104.016856	3001539542		30 26.05	29E	480 N		480 E		New (Not drilled or compl)
9	COG PRODUCTION, LLC	COPPERHEAD FEE A 002H	32.001456	-104.027122	3001539787		31 26.05	29E	480 S		1650 W		New (Not drilled or compl)
10	COG PRODUCTION, LLC	COPPERHEAD 31 FEDERAL COM 002H	32.001455	-104.022233	3001539791		31 26.05	29E	480 S		2140 E		New (Not drilled or compl)
11	COG PRODUCTION, LLC	COPPERHEAD FEE A 004H	32.000961	-104.02608	3001541210		31 26.05	29E	300 S		1965 W		New (Not drilled or compl)
12	COG PRODUCTION, LLC	COPPERHEAD 30 FEE 002H	32.019583	-104.015915	3001541211		30 26.05	29E	380 N		190 E		New (Not drilled or compl)
13	COG PRODUCTION, LLC	COPPERHEAD FEE A 003H	32.001278	-104.029256	3001542327		31 26.05	29E	415 S		990 W		New (Not drilled or compl)
14	COG PRODUCTION, LLC	COPPERHEAD 31 FEDERAL COM 003H	32.000684	-104.016466	3001542379		31 26.05	29E	200 S		330 E		New (Not drilled or compl)
15	COG PRODUCTION, LLC	RIDGE NOSE FEDERAL COM 001H	32.000686	-104.022885	3001542391		31 26.05	29E	200 S		2310 E		New (Not drilled or compl)

COG Production LLC, Copperhead 31 Fed Com 3H

1. Geologic Formations

TVD of target	10744	Pilot hole depth	NA
MD at TD:	17697	Deepest expected fresh water:	78'

Basin

Formation	Depth (TVD) from KB	Water/Mineral Bearing/ Target Zone?	Hazards*
Quaternary Fill	Surface	Water	
Rustler	909	Water	
Top of Salt	1099	Salt	
Fletcher Anhydrite	2635	Barren	
Lamar (top of Delaware)	2776	Barren	
Bone Spring	6453	Oil/Gas	
Wolfcamp	9470	Oil/Gas	
Wolfcamp B	10193	Oil/Gas	
Wolfcamp C	10320	Oil/Gas	
Wolfcamp D	10681	Target	
Pennsylvanian	11306	Oil/Gas	

2. Casing Program -> See COA

Hole Size	Casing Interval		Csg. Size	Weight (lbs)	Grade	Conn.	SF Collapse	SF Burst	SF Tension
	From	To							
13.5"	0'	1000' 400'	10 3/4"	45.5	J55	STC	4.42	0.74	10.83
9 7/8"	0'	9900'	7 5/8"	29.7	HCP110	BTC	1.37	1.33	2.32
6 3/4"	0'	9800'	5.5"	23	P110	BTC	2.159	1.397	2.215
6 3/4"	9800'	17697'	5"	18	P110	BTC	1.673	1.436	2.076
BLM Minimum Safety Factor							1.125	1.125	1.6 Dry 1.8 Wet

All casing strings will be tested in accordance with Onshore Oil and Gas Order #2 III.B.1.h

- Burst SF on Surf is 0.74 > 0.7.

COG Production LLC, Copperhead 31 Fed Com 3H

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

3. Cementing Program

Casing	# Sks	Wt. lb/gal	Yld ft3/sack	H ₂ O gal/sk	500# Comp. Strength (hours)	Slurry Description
Surf.	450	13.5	1.76	9.37	10-15	Class C + 4% Gel + 1% CaCl
	250	14.8	1.36	6.53	5-8	Class C + 2% CaCl
Inter. (stage 2)	300	13.5	1.72	9.11	10-15	Class C + 4% Gel
	250	14.8	1.33	6.34	5-8	Class C + 1% CaCl
Inter. (stage 1)	700	11.9	2.51	14.7	50-60	50:50:10 H Blend
	400	16.4	1.1	4.45	10-12	Class H
Prod. Csg	300	11.9	2.5	14.7	50-60	50:50:10 H Blend
	950	14.4	1.23	5.52	15-20	50:50:2 H Blend

- Due to this being cave/ karst the lead was specified. This presents an issue with the 1st stage lead due to the time it will take to get to 500 psi. The 11.9# 50:50:10 H cement is the best cement for the 1st stage lead being pumped at 9500' to ensure quality cement for the life of the well and being able to circulate off the stage tool. This 1st stage lead will only be covering the BSS and DLWR It will not be over the Cave / Karst area, the 2nd stage cmt will be covering the cave / karst. The 2nd stage cement will develop 500 psi comp strengths fairly quickly. I am hoping the 1st stage lead will not be specified for 500 psi before testing in this situation, or we will have to tweak the cement that will not suit the situation as good as what is planned above.

COG Production LLC, Copperhead 31 Fed Com 3H

Casing String	TOC	% Excess
Surface	0'	50%
Intermediate Stage 2	0'	50%
Intermediate Stage 1	2680'	50%
Production	2180'	35%

4. Pressure Control Equipment → See COA

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

BOP installed and tested before drilling which hole?	Size?	System Rated WP	Type	✓	Tested to:
9.875"	11"	3M 5M	Annular	X	50% of working pressure
			Blind Ram	X	WP
			Pipe Ram	X	
			Double Ram		
			Other*		
6.75"	11"	5M	Annular	X	50% testing pressure
			Blind Ram	X	WP
			Pipe Ram	X	
			Double Ram		
			Other*		
			Annular	X	
			Blind Ram	X	
			Pipe Ram	X	
			Double Ram		
			Other*		

*Specify if additional ram is utilized.

BOP/BOPE will be tested by an independent service company to 250 psi low and the high pressure indicated above per Onshore Order 2 requirements. The System may be upgraded to a higher pressure but still tested to the working pressure listed in the table above. If the system is upgraded all the components installed will be functional and tested.

Pipe rams will be operationally checked each 24 hour period. Blind rams will be operationally checked on each trip out of the hole. These checks will be noted on the daily tour sheets. Other accessories to the BOP equipment will include a Kelly cock and floor safety valve (inside BOP) and choke lines and choke manifold. See attached schematics.

COG Production LLC, Copperhead 31 Fed Com 3H

see COA	Y	Formation integrity test will be performed per Onshore Order #2. On Exploratory wells or on that portion of any well approved for a 5M BOPE system or greater, a pressure integrity test of each casing shoe shall be performed. Will be tested in accordance with Onshore Oil and Gas Order #2 III.B.1.i.
	Y	A variance is requested for the use of a flexible choke line from the BOP to Choke Manifold. See attached for specs and hydrostatic test chart.
see COA	N	Are anchors required by manufacturer?
	N	A multibowl wellhead is being used. The BOP will be tested per Onshore Order #2 after installation on the surface casing which will cover testing requirements for a maximum of 30 days. If any seal subject to test pressure is broken the system must be tested. See attached schematic.

5. Mud Program

Depth		Type	Weight (ppg)	Viscosity	Water Loss
From	To				
0	Surf. shoe	FW Gel	8.6-8.8	28-34	N/C
Surf csg	Base of salt	Saturated Brine	10.0-10.2	28-34	N/C
Base of salt	Int shoe	Diesel Brine Emulsion	8.8-9.5	28-34	N/C
Int Shoe	TD	OBM	11.0-13.0	40-60	N/C

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

What will be used to monitor the loss or gain of fluid?	PVT/Pason/Visual Monitoring
---	-----------------------------

6. Logging and Testing Procedures - see COA

Logging, Coring and Testing	
Y	Will run GR/CNL from TD to surface (horizontal well – vertical portion of hole). Stated logs run will be in the Completion Report and submitted to the BLM.
N	No Logs are planned based on well control or offset log information.
N	Drill stem test? If yes, explain
N	Coring? If yes, explain – NA

7. Drilling Conditions

Condition	Specify what type and where?
BH Pressure at deepest TVD	7000 psi
Abnormal Temperature	No

COG Production LLC, Copperhead 31 Fed Com 3H

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

N	H ₂ S is present
Y	H ₂ S Plan attached

8. Other facets of operation

Anti-Collision: We have 3 wells in the area along the projected lateral path. Copperhead 30 Fed Com #1H, Perkins #1Y, and Copperhead 31 Fed Com #1H. Anti-C assessments have been made, and are included in the attached anti-collision report. Perkins 1Y is not deep enough to be an AC risk.

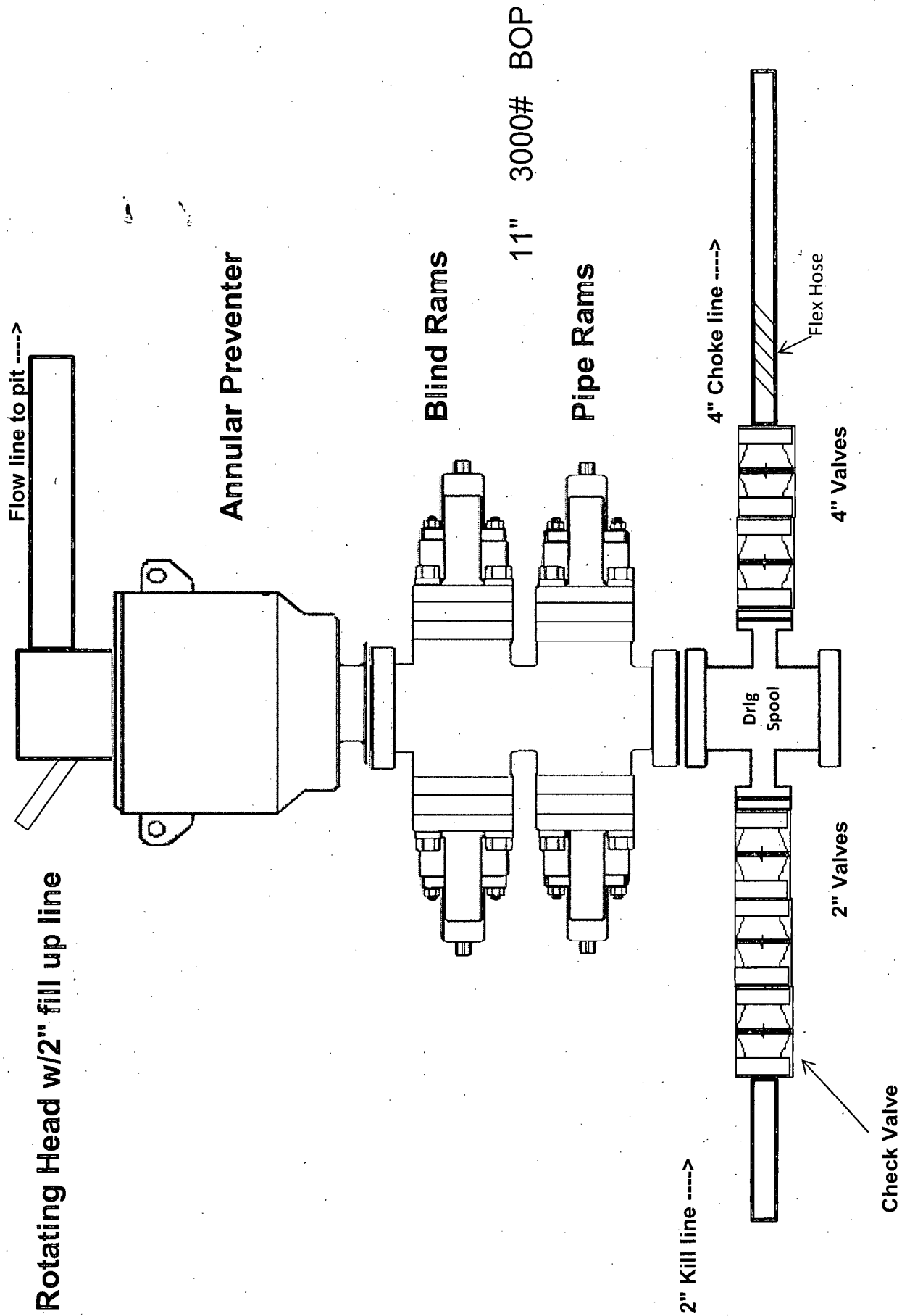
Is this a walking operation? NO. If yes, describe.

Will be pre-setting casing? NO. If yes, describe.

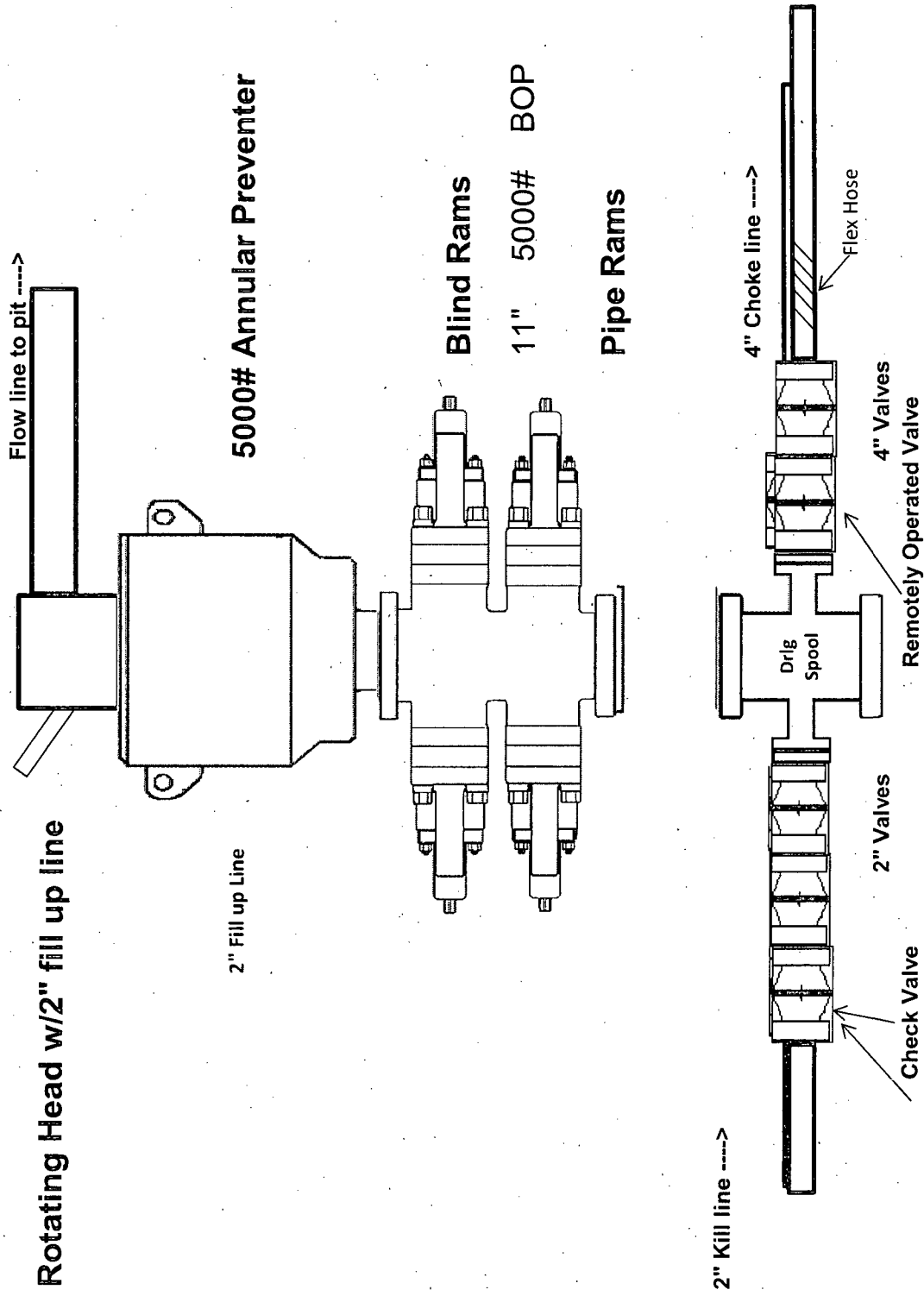
Attachments

- Directional Plan
- Anti-Collision
- BOP & Choke Schematics
- Flex Hose Variance
- C102 and supporting maps
- Rig plat
- H₂S schematic
- H₂S contingency plan
- Interim reclamation plat

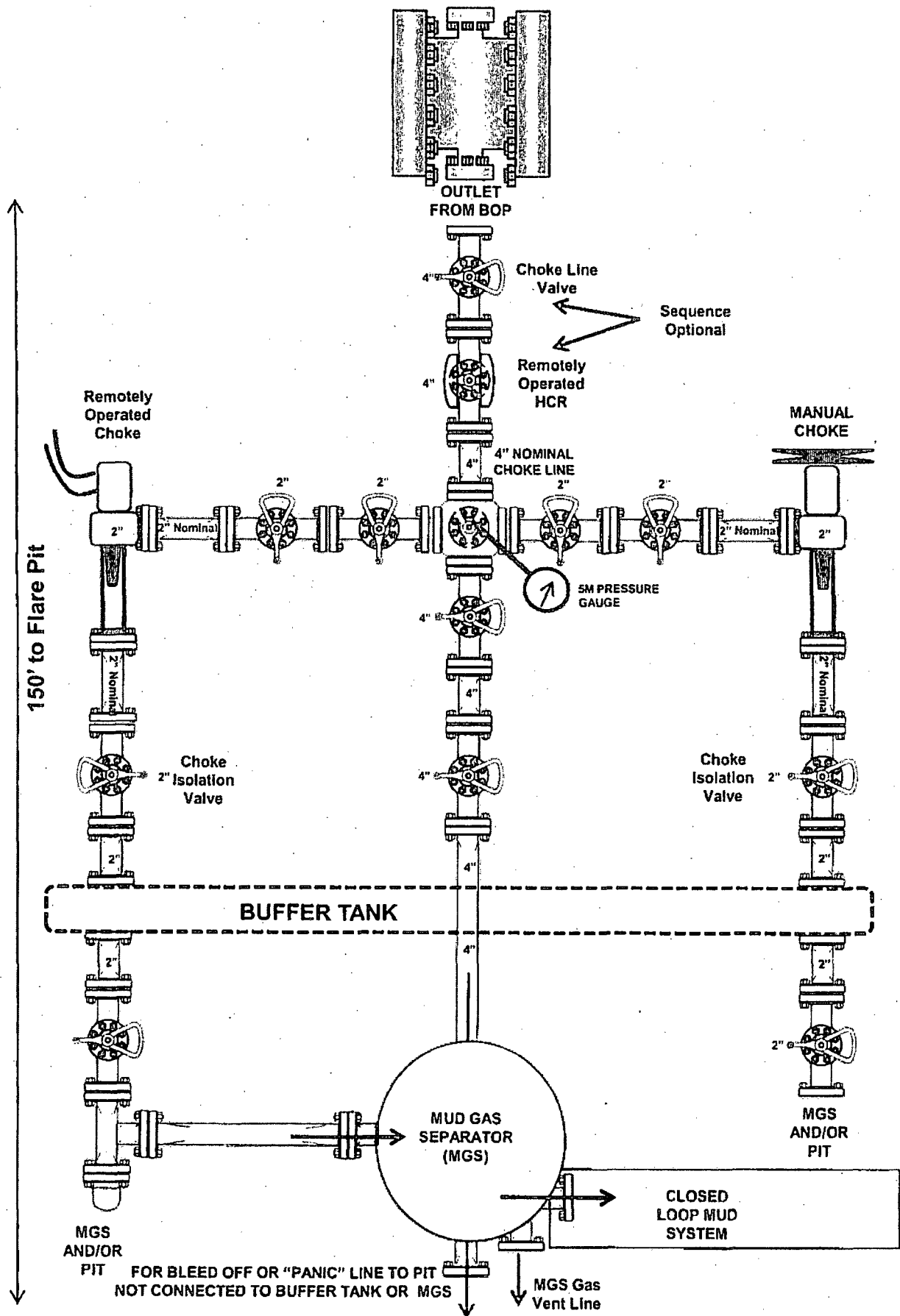
3,000 psi BOP Schematic



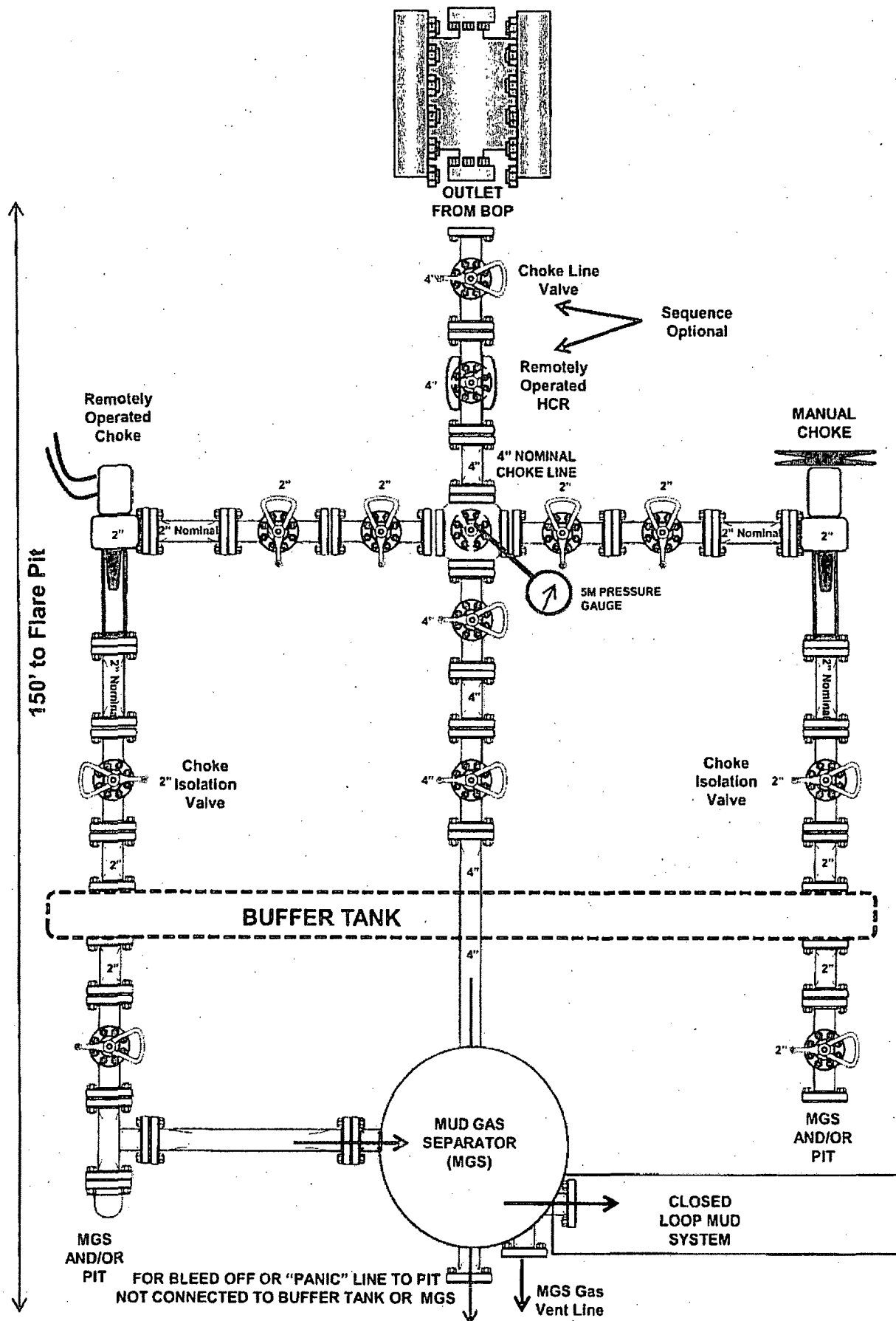
5,000 psi BOP Schematic



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



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



COG Production LLC

Rig Plat & Closed Loop Equipment Diagram

Well pad will be 380' X 380' with cellar in center of pad

Flare Lines will be from both Choke Manifold & Separator to edge of location.

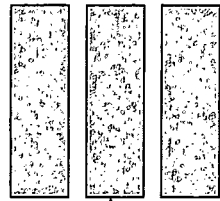
NORTH

180'

200'

200'

180'



Fluid Storage Tanks

Roll Off Cutting Containers on Tracks

Centrifuge or Solids Sep.

Shakers

Flow line

Steel pits

Mud Pumps

Drig Separator

Choke Manifold

Cellar

Water Tanks

Water Tanks

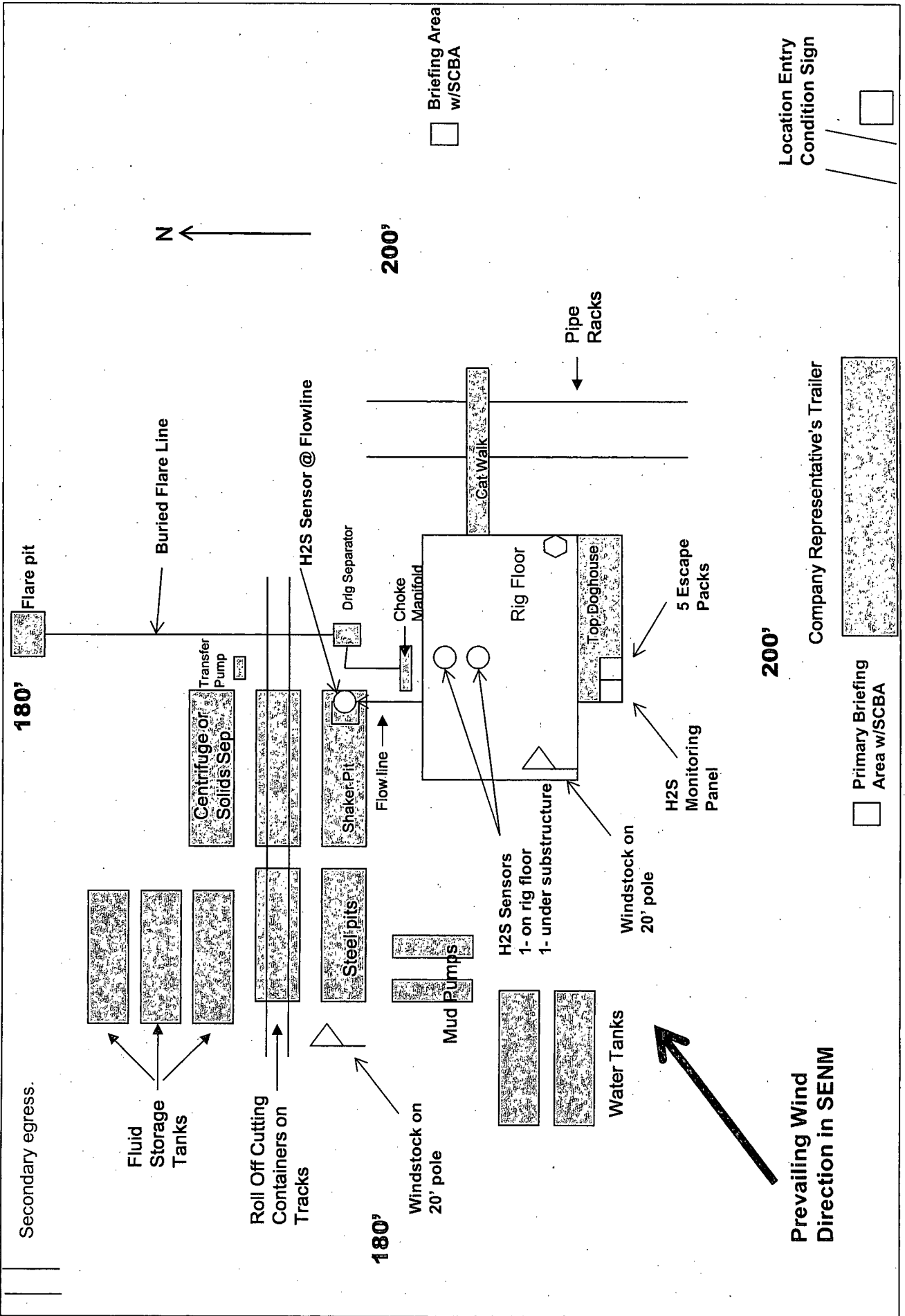
Trailer

Pipe Racks

"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 sand hills.

Well pad will be 380' X 380'
with cellar in center of pad





Midwest Hose
& Specialty, Inc.

Certificate of Conformity

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

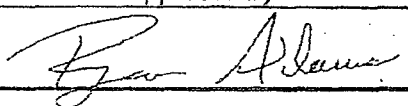
Specifications

Hose Assembly Type:	Choke & Kill		
Assembly Serial #	292614-1	Hose Lot # and Date Code	10900-08/13
Hose Working Pressure (psi)	10000	Test Pressure (psi)	15000

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

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

Comments:

Approved By	Date
	2/10/2015



Midwest Hose
& Specialty, Inc.

Certificate of Conformity

Customer: LATSHAW DRILLING

Customer P.O.# RIG#44

Sales Order # 242739

Date Assembled: 2/9/2015

Specifications

Hose Assembly Type: Choke & Kill

Assembly Serial # 292614-2

Hose Lot # and Date Code 11794-10/14

Hose Working Pressure (psi) 10000

Test Pressure (psi) 15000

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

Supplier:

Midwest Hose & Specialty, Inc.

3312 S I-35 Service Rd

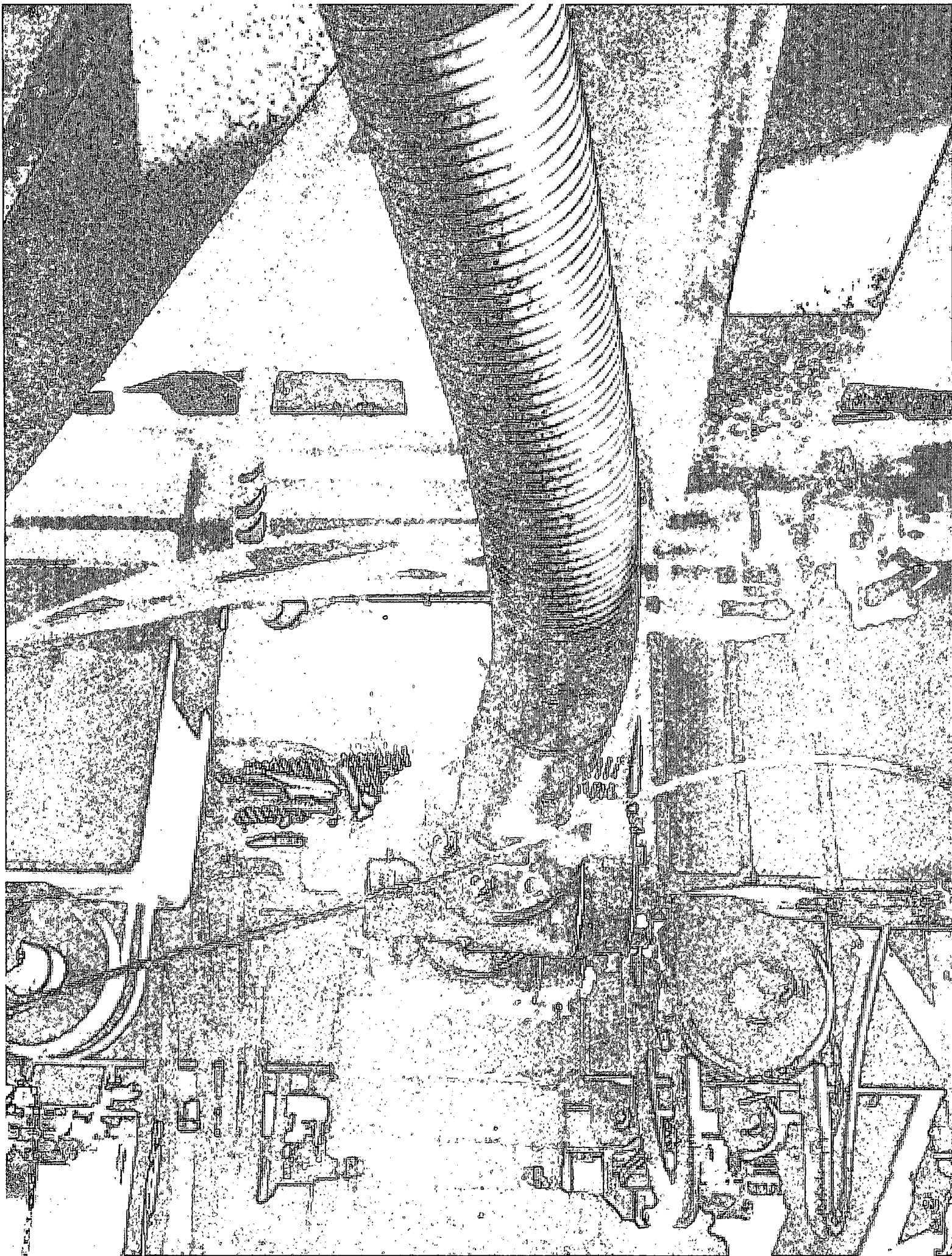
Oklahoma City, OK 73129

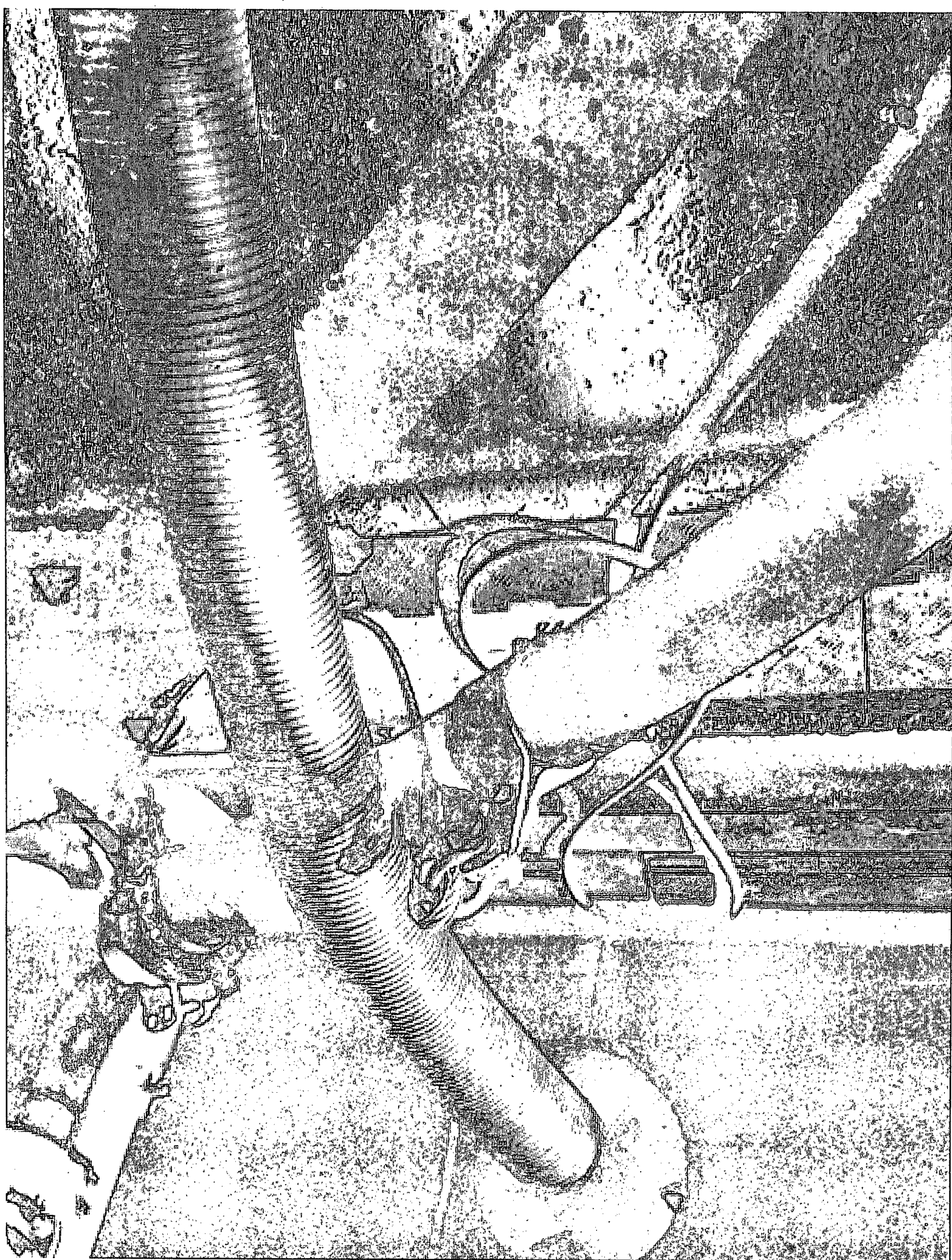
Comments:

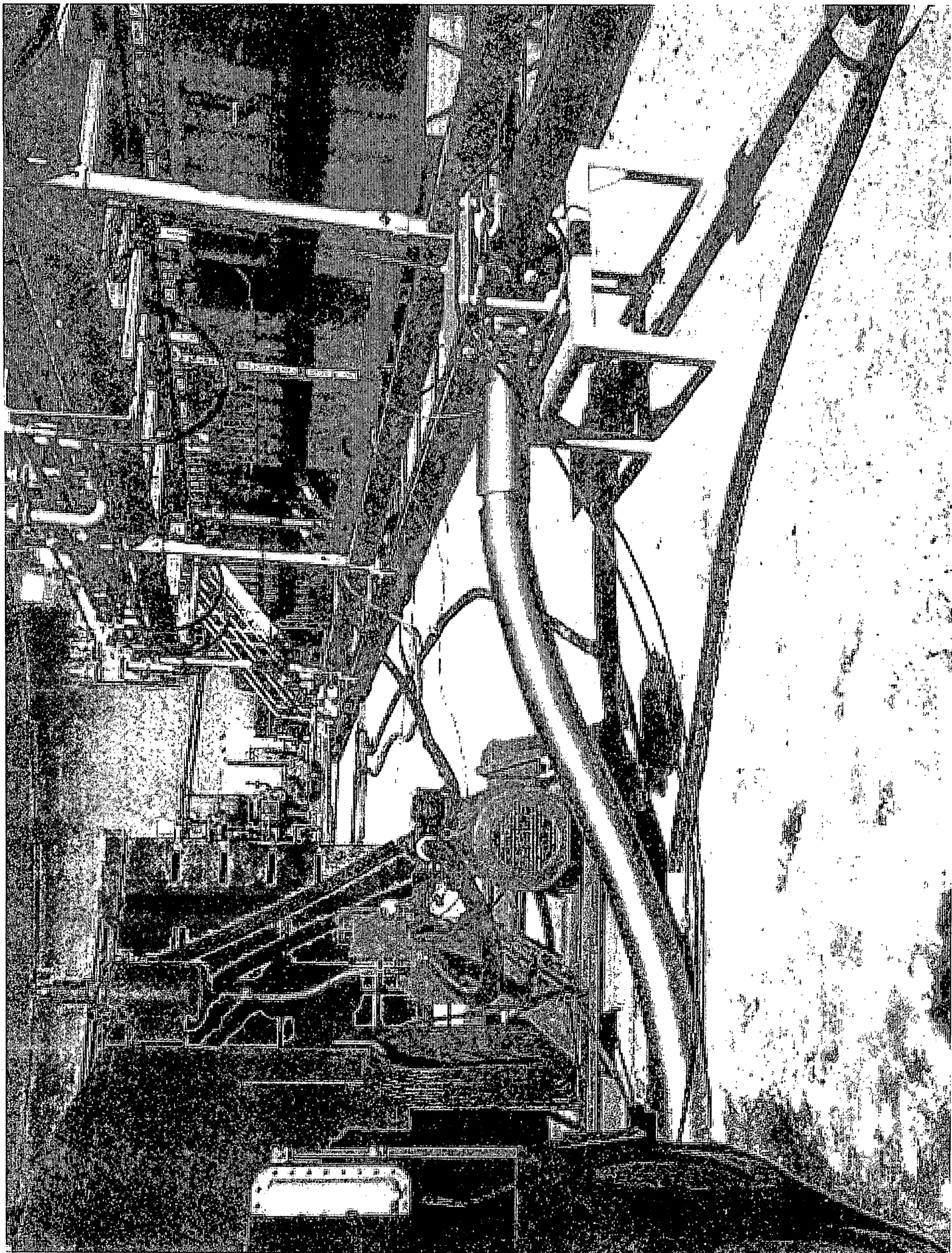
Approved By

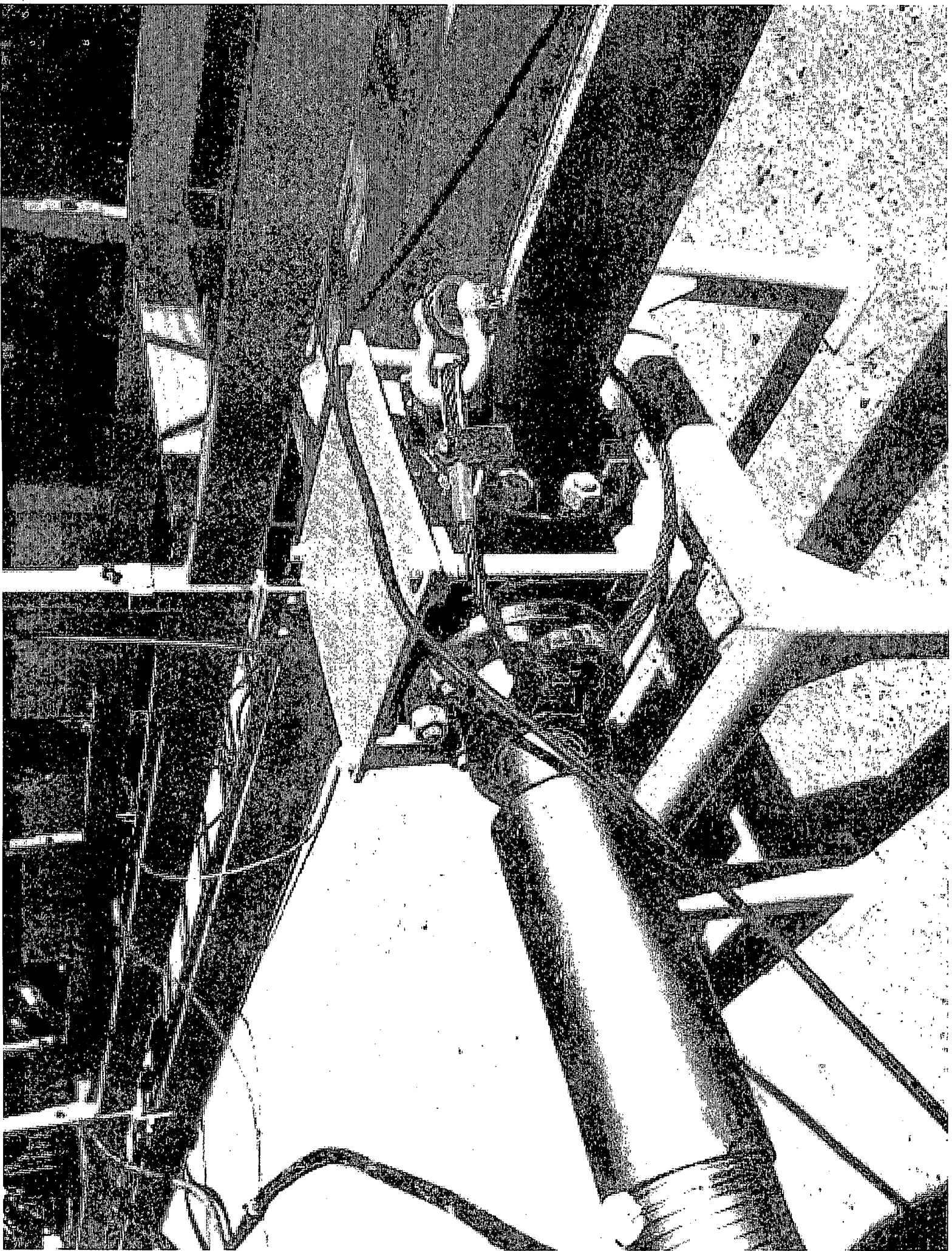
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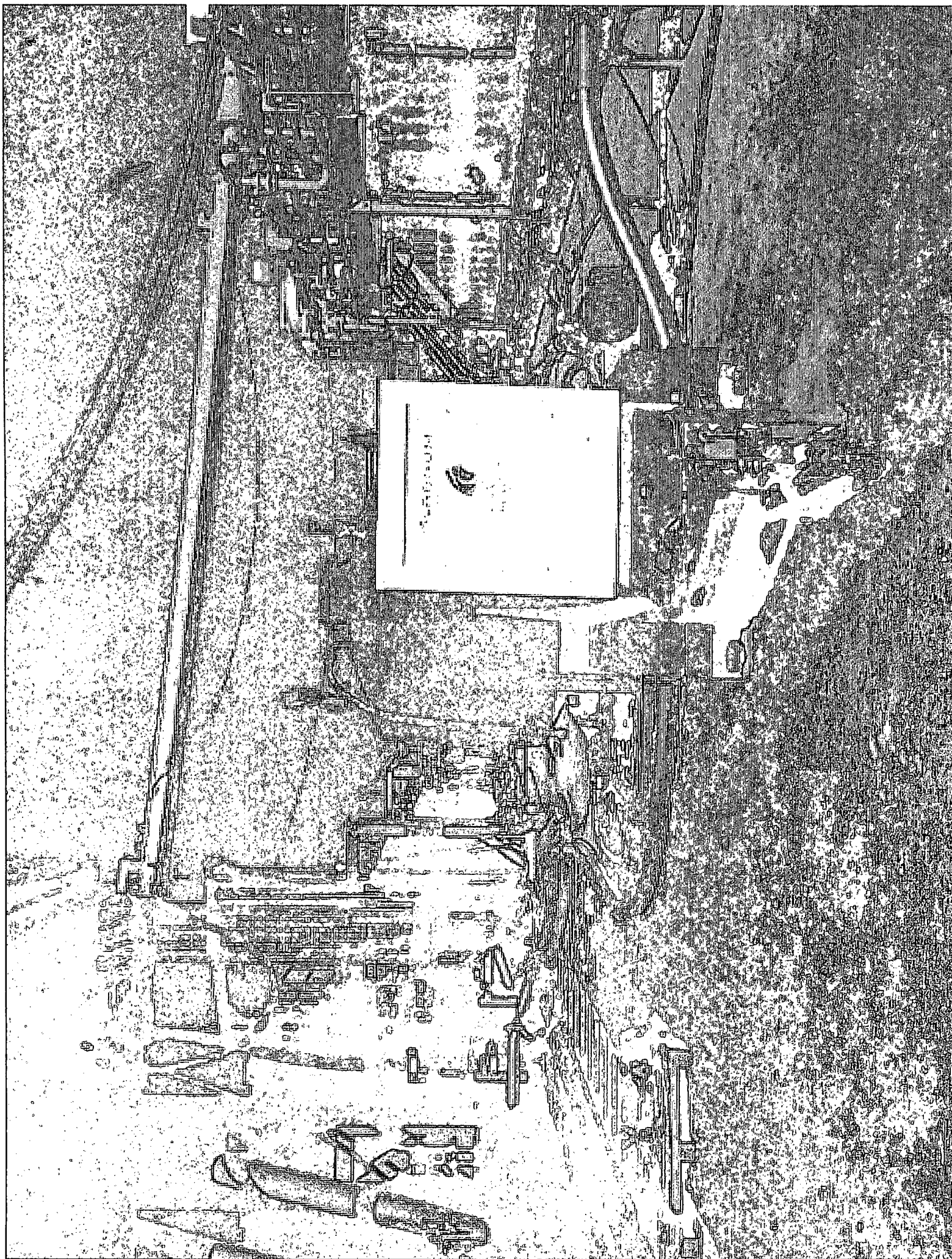
2/10/2015

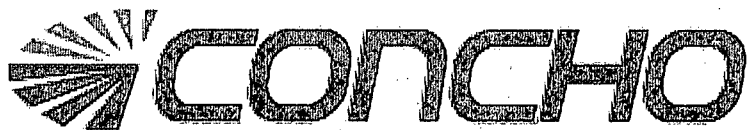












COG Production LLC

Eddy County, NM (NAD-27 2015)

Copperhead 31 Fed Com 3H

Copperhead 31 Fed Com 3H

30-015-42379

Lateral 1

Plan: Design #1

Standard Planning Report

15 August, 2016





TDS
Planning Report



Database:	EDM 5000.1 Single User Db	Local Co-ordinate Reference:	Well Copperhead 31 Fed Com 3H
Company:	COG Production LLC	TVD Reference:	KB @ 2966.60usft
Project:	Eddy County, NM (NAD-27 2015)	MD Reference:	KB @ 2966.60usft
Site:	Copperhead 31 Fed Com 3H	North Reference:	Grid
Well:	Copperhead 31 Fed Com 3H	Survey Calculation Method:	Minimum Curvature
Wellbore:	Lateral 1		
Design:	Design #1		

Project:	Eddy County, NM (NAD-27 2015)		
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:	Copperhead 31 Fed Com 3H, Sec 31, T-26S, R-29E, Unit A		
Site Position:		Northing:	371,068.50 usft
From:	Map	Easting:	597,975.70 usft
Position Uncertainty:	0.00 usft	Slot Radius:	13.20 in
		Latitude:	32° 1' 11.235 N
		Longitude:	104° 1' 1.956 W
		Grid Convergence:	0.17 °

Well:	Copperhead 31 Fed Com 3H		
Well Position	+N/-S	0.00 usft	Northing:
	+E/-W	0.00 usft	Easting:
Position Uncertainty	0.00 usft	Wellhead Elevation:	2,966.60 usft
		Latitude:	32° 1' 11.235 N
		Longitude:	104° 1' 1.956 W
		Ground Level:	2,941.60 usft

Wellbore:	Lateral 1		
Magnetics:	Model Name	Sample Date	Declination
	IGRF2015	8/11/2016	7.24
			Dip Angle
			59.81
			Field Strength
			47,859

Design:	Design #1		
Audit Notes:			
Version:	Phase:	PLAN	Tie On Depth:
			0.00
Vertical Section:	Depth From (TVD)	+N/-S	+E/-W
	(usft)	(usft)	(usft)
	0.00	0.00	0.00
			Direction
			179.21

Plan Sections										
Measured	Inclination	Azimuth	Vertical	+N/-S	+E/-W	Dogleg	Build	Turn	TFO	Target
Depth	(°)	(°)	Depth	(usft)	(usft)	Rate	Rate	Rate	(°)	
(usft)			(usft)			(°/100usft)	(°/100usft)	(°/100usft)		
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	
10,264.20	0.00	0.00	10,264.20	0.00	0.00	0.00	0.00	0.00	0.00	
11,014.04	89.98	179.21	10,741.67	-477.25	6.56	12.00	12.00	0.00	179.21	
17,696.81	89.98	179.21	10,744.00	-7,159.40	98.40	0.00	0.00	0.00	0.00	PBHL-TD-D1(C31FC)



TDS
Planning Report



Database:	EDM 5000.1 Single User Db	Local Co-ordinate Reference:	Well Copperhead 31 Fed Com 3H
Company:	COG Production LLC	TVD Reference:	KB @ 2966.60usft
Project:	Eddy County, NM (NAD-27 2015)	MD Reference:	KB @ 2966.60usft
Site:	Copperhead 31 Fed Com 3H	North Reference:	Grid
Well:	Copperhead 31 Fed Com 3H	Survey Calculation Method:	Minimum Curvature
Wellbore:	Lateral 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)	
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	
100.00	0.00	0.00	100.00	0.00	0.00	0.00	0.00	0.00	0.00	
200.00	0.00	0.00	200.00	0.00	0.00	0.00	0.00	0.00	0.00	
300.00	0.00	0.00	300.00	0.00	0.00	0.00	0.00	0.00	0.00	
400.00	0.00	0.00	400.00	0.00	0.00	0.00	0.00	0.00	0.00	
500.00	0.00	0.00	500.00	0.00	0.00	0.00	0.00	0.00	0.00	
600.00	0.00	0.00	600.00	0.00	0.00	0.00	0.00	0.00	0.00	
700.00	0.00	0.00	700.00	0.00	0.00	0.00	0.00	0.00	0.00	
800.00	0.00	0.00	800.00	0.00	0.00	0.00	0.00	0.00	0.00	
900.00	0.00	0.00	900.00	0.00	0.00	0.00	0.00	0.00	0.00	
1,000.00	0.00	0.00	1,000.00	0.00	0.00	0.00	0.00	0.00	0.00	
1,100.00	0.00	0.00	1,100.00	0.00	0.00	0.00	0.00	0.00	0.00	
1,200.00	0.00	0.00	1,200.00	0.00	0.00	0.00	0.00	0.00	0.00	
1,300.00	0.00	0.00	1,300.00	0.00	0.00	0.00	0.00	0.00	0.00	
1,400.00	0.00	0.00	1,400.00	0.00	0.00	0.00	0.00	0.00	0.00	
1,500.00	0.00	0.00	1,500.00	0.00	0.00	0.00	0.00	0.00	0.00	
1,600.00	0.00	0.00	1,600.00	0.00	0.00	0.00	0.00	0.00	0.00	
1,700.00	0.00	0.00	1,700.00	0.00	0.00	0.00	0.00	0.00	0.00	
1,800.00	0.00	0.00	1,800.00	0.00	0.00	0.00	0.00	0.00	0.00	
1,900.00	0.00	0.00	1,900.00	0.00	0.00	0.00	0.00	0.00	0.00	
2,000.00	0.00	0.00	2,000.00	0.00	0.00	0.00	0.00	0.00	0.00	
2,100.00	0.00	0.00	2,100.00	0.00	0.00	0.00	0.00	0.00	0.00	
2,200.00	0.00	0.00	2,200.00	0.00	0.00	0.00	0.00	0.00	0.00	
2,300.00	0.00	0.00	2,300.00	0.00	0.00	0.00	0.00	0.00	0.00	
2,400.00	0.00	0.00	2,400.00	0.00	0.00	0.00	0.00	0.00	0.00	
2,500.00	0.00	0.00	2,500.00	0.00	0.00	0.00	0.00	0.00	0.00	
2,600.00	0.00	0.00	2,600.00	0.00	0.00	0.00	0.00	0.00	0.00	
2,700.00	0.00	0.00	2,700.00	0.00	0.00	0.00	0.00	0.00	0.00	
2,800.00	0.00	0.00	2,800.00	0.00	0.00	0.00	0.00	0.00	0.00	
2,900.00	0.00	0.00	2,900.00	0.00	0.00	0.00	0.00	0.00	0.00	
3,000.00	0.00	0.00	3,000.00	0.00	0.00	0.00	0.00	0.00	0.00	
3,100.00	0.00	0.00	3,100.00	0.00	0.00	0.00	0.00	0.00	0.00	
3,200.00	0.00	0.00	3,200.00	0.00	0.00	0.00	0.00	0.00	0.00	
3,300.00	0.00	0.00	3,300.00	0.00	0.00	0.00	0.00	0.00	0.00	
3,400.00	0.00	0.00	3,400.00	0.00	0.00	0.00	0.00	0.00	0.00	
3,500.00	0.00	0.00	3,500.00	0.00	0.00	0.00	0.00	0.00	0.00	
3,600.00	0.00	0.00	3,600.00	0.00	0.00	0.00	0.00	0.00	0.00	
3,700.00	0.00	0.00	3,700.00	0.00	0.00	0.00	0.00	0.00	0.00	
3,800.00	0.00	0.00	3,800.00	0.00	0.00	0.00	0.00	0.00	0.00	
3,900.00	0.00	0.00	3,900.00	0.00	0.00	0.00	0.00	0.00	0.00	
4,000.00	0.00	0.00	4,000.00	0.00	0.00	0.00	0.00	0.00	0.00	
4,100.00	0.00	0.00	4,100.00	0.00	0.00	0.00	0.00	0.00	0.00	
4,200.00	0.00	0.00	4,200.00	0.00	0.00	0.00	0.00	0.00	0.00	
4,300.00	0.00	0.00	4,300.00	0.00	0.00	0.00	0.00	0.00	0.00	
4,400.00	0.00	0.00	4,400.00	0.00	0.00	0.00	0.00	0.00	0.00	
4,500.00	0.00	0.00	4,500.00	0.00	0.00	0.00	0.00	0.00	0.00	
4,600.00	0.00	0.00	4,600.00	0.00	0.00	0.00	0.00	0.00	0.00	
4,700.00	0.00	0.00	4,700.00	0.00	0.00	0.00	0.00	0.00	0.00	
4,800.00	0.00	0.00	4,800.00	0.00	0.00	0.00	0.00	0.00	0.00	
4,900.00	0.00	0.00	4,900.00	0.00	0.00	0.00	0.00	0.00	0.00	
5,000.00	0.00	0.00	5,000.00	0.00	0.00	0.00	0.00	0.00	0.00	
5,100.00	0.00	0.00	5,100.00	0.00	0.00	0.00	0.00	0.00	0.00	
5,200.00	0.00	0.00	5,200.00	0.00	0.00	0.00	0.00	0.00	0.00	
5,300.00	0.00	0.00	5,300.00	0.00	0.00	0.00	0.00	0.00	0.00	



TDS
Planning Report



Database	EDM 5000.1 Single User Db	Local Co-ordinate Reference	Well Copperhead 31 Fed Com 3H
Company	COG Production LLC	TVD Reference	KB @ 2966.60usft
Project	Eddy County, NM (NAD-27 2015)	MD Reference	KB @ 2966.60usft
Site	Copperhead 31 Fed Com 3H	North Reference	Grid
Well	Copperhead 31 Fed Com 3H	Survey Calculation Method	Minimum Curvature
Wellbore	Lateral 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)	
5,400.00	0.00	0.00	5,400.00	0.00	0.00	0.00	0.00	0.00	0.00	
5,500.00	0.00	0.00	5,500.00	0.00	0.00	0.00	0.00	0.00	0.00	
5,600.00	0.00	0.00	5,600.00	0.00	0.00	0.00	0.00	0.00	0.00	
5,700.00	0.00	0.00	5,700.00	0.00	0.00	0.00	0.00	0.00	0.00	
5,800.00	0.00	0.00	5,800.00	0.00	0.00	0.00	0.00	0.00	0.00	
5,900.00	0.00	0.00	5,900.00	0.00	0.00	0.00	0.00	0.00	0.00	
6,000.00	0.00	0.00	6,000.00	0.00	0.00	0.00	0.00	0.00	0.00	
6,100.00	0.00	0.00	6,100.00	0.00	0.00	0.00	0.00	0.00	0.00	
6,200.00	0.00	0.00	6,200.00	0.00	0.00	0.00	0.00	0.00	0.00	
6,300.00	0.00	0.00	6,300.00	0.00	0.00	0.00	0.00	0.00	0.00	
6,400.00	0.00	0.00	6,400.00	0.00	0.00	0.00	0.00	0.00	0.00	
6,500.00	0.00	0.00	6,500.00	0.00	0.00	0.00	0.00	0.00	0.00	
6,600.00	0.00	0.00	6,600.00	0.00	0.00	0.00	0.00	0.00	0.00	
6,700.00	0.00	0.00	6,700.00	0.00	0.00	0.00	0.00	0.00	0.00	
6,800.00	0.00	0.00	6,800.00	0.00	0.00	0.00	0.00	0.00	0.00	
6,900.00	0.00	0.00	6,900.00	0.00	0.00	0.00	0.00	0.00	0.00	
7,000.00	0.00	0.00	7,000.00	0.00	0.00	0.00	0.00	0.00	0.00	
7,100.00	0.00	0.00	7,100.00	0.00	0.00	0.00	0.00	0.00	0.00	
7,200.00	0.00	0.00	7,200.00	0.00	0.00	0.00	0.00	0.00	0.00	
7,300.00	0.00	0.00	7,300.00	0.00	0.00	0.00	0.00	0.00	0.00	
7,400.00	0.00	0.00	7,400.00	0.00	0.00	0.00	0.00	0.00	0.00	
7,500.00	0.00	0.00	7,500.00	0.00	0.00	0.00	0.00	0.00	0.00	
7,600.00	0.00	0.00	7,600.00	0.00	0.00	0.00	0.00	0.00	0.00	
7,700.00	0.00	0.00	7,700.00	0.00	0.00	0.00	0.00	0.00	0.00	
7,800.00	0.00	0.00	7,800.00	0.00	0.00	0.00	0.00	0.00	0.00	
7,900.00	0.00	0.00	7,900.00	0.00	0.00	0.00	0.00	0.00	0.00	
8,000.00	0.00	0.00	8,000.00	0.00	0.00	0.00	0.00	0.00	0.00	
8,100.00	0.00	0.00	8,100.00	0.00	0.00	0.00	0.00	0.00	0.00	
8,200.00	0.00	0.00	8,200.00	0.00	0.00	0.00	0.00	0.00	0.00	
8,300.00	0.00	0.00	8,300.00	0.00	0.00	0.00	0.00	0.00	0.00	
8,400.00	0.00	0.00	8,400.00	0.00	0.00	0.00	0.00	0.00	0.00	
8,500.00	0.00	0.00	8,500.00	0.00	0.00	0.00	0.00	0.00	0.00	
8,600.00	0.00	0.00	8,600.00	0.00	0.00	0.00	0.00	0.00	0.00	
8,700.00	0.00	0.00	8,700.00	0.00	0.00	0.00	0.00	0.00	0.00	
8,800.00	0.00	0.00	8,800.00	0.00	0.00	0.00	0.00	0.00	0.00	
8,900.00	0.00	0.00	8,900.00	0.00	0.00	0.00	0.00	0.00	0.00	
9,000.00	0.00	0.00	9,000.00	0.00	0.00	0.00	0.00	0.00	0.00	
9,100.00	0.00	0.00	9,100.00	0.00	0.00	0.00	0.00	0.00	0.00	
9,200.00	0.00	0.00	9,200.00	0.00	0.00	0.00	0.00	0.00	0.00	
9,300.00	0.00	0.00	9,300.00	0.00	0.00	0.00	0.00	0.00	0.00	
9,400.00	0.00	0.00	9,400.00	0.00	0.00	0.00	0.00	0.00	0.00	
9,500.00	0.00	0.00	9,500.00	0.00	0.00	0.00	0.00	0.00	0.00	
9,600.00	0.00	0.00	9,600.00	0.00	0.00	0.00	0.00	0.00	0.00	
9,700.00	0.00	0.00	9,700.00	0.00	0.00	0.00	0.00	0.00	0.00	
9,800.00	0.00	0.00	9,800.00	0.00	0.00	0.00	0.00	0.00	0.00	
9,900.00	0.00	0.00	9,900.00	0.00	0.00	0.00	0.00	0.00	0.00	
10,000.00	0.00	0.00	10,000.00	0.00	0.00	0.00	0.00	0.00	0.00	
10,100.00	0.00	0.00	10,100.00	0.00	0.00	0.00	0.00	0.00	0.00	
10,200.00	0.00	0.00	10,200.00	0.00	0.00	0.00	0.00	0.00	0.00	
10,264.20	0.00	0.00	10,264.20	0.00	0.00	0.00	0.00	0.00	0.00	
Start Build 12.00										
10,275.00	1.30	179.21	10,275.00	-0.12	0.00	0.12	12.00	12.00	0.00	
10,300.00	4.30	179.21	10,299.97	-1.34	0.02	1.34	12.00	12.00	0.00	



TDS
Planning Report



Database: EDM 5000.1 Single User Db
Company: COG Production LLC
Project: Eddy County, NM (NAD-27 2015)
Site: Copperhead 31 Fed Com 3H
Well: Copperhead 31 Fed Com 3H
Wellbore: Lateral 1
Design: Design #1

Local Co-ordinate Reference
TVD Reference:
MD Reference:
North Reference:
Survey Calculation Method:

Well Copperhead 31 Fed Com 3H
KB @ 2966.60usft
KB @ 2966.60usft
Grid
Minimum Curvature

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)
10,325.00	7.30	179.21	10,324.84	-3.87	0.05	3.87	12.00	12.00	0.00
10,350.00	10.30	179.21	10,349.54	-7.69	0.11	7.69	12.00	12.00	0.00
10,375.00	13.30	179.21	10,374.01	-12.80	0.18	12.80	12.00	12.00	0.00
10,400.00	16.30	179.21	10,398.18	-19.18	0.26	19.18	12.00	12.00	0.00
10,425.00	19.30	179.21	10,421.98	-26.82	0.37	26.82	12.00	12.00	0.00
10,450.00	22.30	179.21	10,445.35	-35.69	0.49	35.70	12.00	12.00	0.00
10,475.00	25.30	179.21	10,468.22	-45.78	0.63	45.78	12.00	12.00	0.00
10,500.00	28.30	179.21	10,490.53	-57.05	0.78	57.05	12.00	12.00	0.00
10,525.00	31.30	179.21	10,512.22	-69.47	0.95	69.47	12.00	12.00	0.00
10,550.00	34.30	179.21	10,533.24	-83.00	1.14	83.01	12.00	12.00	0.00
10,575.00	37.30	179.21	10,553.51	-97.62	1.34	97.63	12.00	12.00	0.00
10,600.00	40.30	179.21	10,572.99	-113.28	1.56	113.29	12.00	12.00	0.00
10,625.00	43.30	179.21	10,591.63	-129.94	1.79	129.95	12.00	12.00	0.00
10,650.00	46.30	179.21	10,609.37	-147.55	2.03	147.57	12.00	12.00	0.00
10,675.00	49.30	179.21	10,626.16	-166.07	2.28	166.08	12.00	12.00	0.00
10,700.00	52.30	179.21	10,641.96	-185.44	2.55	185.45	12.00	12.00	0.00
10,725.00	55.30	179.21	10,656.73	-205.61	2.83	205.62	12.00	12.00	0.00
10,750.00	58.30	179.21	10,670.42	-226.52	3.11	226.54	12.00	12.00	0.00
10,775.00	61.30	179.21	10,682.99	-248.12	3.41	248.14	12.00	12.00	0.00
10,800.00	64.30	179.21	10,694.42	-270.35	3.72	270.38	12.00	12.00	0.00
10,825.00	67.30	179.21	10,704.67	-293.15	4.03	293.18	12.00	12.00	0.00
10,850.00	70.30	179.21	10,713.71	-316.45	4.35	316.48	12.00	12.00	0.00
10,875.00	73.30	179.21	10,721.52	-340.19	4.68	340.23	12.00	12.00	0.00
10,900.00	76.30	179.21	10,728.07	-364.31	5.01	364.35	12.00	12.00	0.00
10,925.00	79.30	179.21	10,733.36	-388.74	5.34	388.78	12.00	12.00	0.00
10,950.00	82.30	179.21	10,737.36	-413.42	5.68	413.46	12.00	12.00	0.00
10,975.00	85.30	179.21	10,740.06	-438.27	6.02	438.31	12.00	12.00	0.00
11,000.00	88.30	179.21	10,741.46	-463.22	6.37	463.26	12.00	12.00	0.00
11,014.04	89.98	179.21	10,741.67	-477.25	6.56	477.30	12.00	12.00	0.00
Start 6682.78 hold at 11014.04 MD									
11,100.00	89.98	179.21	10,741.70	-563.21	7.74	563.26	0.00	0.00	0.00
11,200.00	89.98	179.21	10,741.73	-663.20	9.12	663.26	0.00	0.00	0.00
11,300.00	89.98	179.21	10,741.77	-763.19	10.49	763.26	0.00	0.00	0.00
11,400.00	89.98	179.21	10,741.80	-863.18	11.86	863.26	0.00	0.00	0.00
11,500.00	89.98	179.21	10,741.84	-963.17	13.24	963.26	0.00	0.00	0.00
11,600.00	89.98	179.21	10,741.87	-1,063.16	14.61	1,063.26	0.00	0.00	0.00
11,700.00	89.98	179.21	10,741.91	-1,163.15	15.99	1,163.26	0.00	0.00	0.00
11,800.00	89.98	179.21	10,741.94	-1,263.14	17.36	1,263.26	0.00	0.00	0.00
11,900.00	89.98	179.21	10,741.98	-1,363.13	18.74	1,363.26	0.00	0.00	0.00
12,000.00	89.98	179.21	10,742.01	-1,463.12	20.11	1,463.26	0.00	0.00	0.00
12,100.00	89.98	179.21	10,742.05	-1,563.11	21.48	1,563.26	0.00	0.00	0.00
12,200.00	89.98	179.21	10,742.08	-1,663.11	22.86	1,663.26	0.00	0.00	0.00
12,300.00	89.98	179.21	10,742.12	-1,763.10	24.23	1,763.26	0.00	0.00	0.00
12,400.00	89.98	179.21	10,742.15	-1,863.09	25.61	1,863.26	0.00	0.00	0.00
12,500.00	89.98	179.21	10,742.19	-1,963.08	26.98	1,963.26	0.00	0.00	0.00
12,600.00	89.98	179.21	10,742.22	-2,063.07	28.36	2,063.26	0.00	0.00	0.00
12,700.00	89.98	179.21	10,742.26	-2,163.06	29.73	2,163.26	0.00	0.00	0.00
12,800.00	89.98	179.21	10,742.29	-2,263.05	31.10	2,263.26	0.00	0.00	0.00
12,900.00	89.98	179.21	10,742.33	-2,363.04	32.48	2,363.26	0.00	0.00	0.00
13,000.00	89.98	179.21	10,742.36	-2,463.03	33.85	2,463.26	0.00	0.00	0.00
13,100.00	89.98	179.21	10,742.40	-2,563.02	35.23	2,563.26	0.00	0.00	0.00
13,200.00	89.98	179.21	10,742.43	-2,663.01	36.60	2,663.26	0.00	0.00	0.00
13,300.00	89.98	179.21	10,742.47	-2,763.00	37.98	2,763.26	0.00	0.00	0.00
13,400.00	89.98	179.21	10,742.50	-2,862.99	39.35	2,863.26	0.00	0.00	0.00



TDS
Planning Report



Database:	EDM 5000.1 Single User Db	Local Co-ordinate Reference:	Well Copperhead 31 Fed Com 3H
Company:	COG Production LLC	TVD Reference:	KB @ 2966.60usft
Project:	Eddy County, NM (NAD-27 2015)	MD Reference:	KB @ 2966.60usft
Site:	Copperhead 31 Fed Com 3H	North Reference:	Grid
Well:	Copperhead 31 Fed Com 3H	Survey Calculation Method:	Minimum Curvature
Wellbore:	Lateral 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)
13,500.00	89.98	179.21	10,742.54	-2,962.98	40.72	2,963.26	0.00	0.00	0.00
13,600.00	89.98	179.21	10,742.57	-3,062.97	42.10	3,063.26	0.00	0.00	0.00
13,700.00	89.98	179.21	10,742.61	-3,162.96	43.47	3,163.26	0.00	0.00	0.00
13,800.00	89.98	179.21	10,742.64	-3,262.95	44.85	3,263.26	0.00	0.00	0.00
13,900.00	89.98	179.21	10,742.67	-3,362.94	46.22	3,363.26	0.00	0.00	0.00
14,000.00	89.98	179.21	10,742.71	-3,462.94	47.60	3,463.26	0.00	0.00	0.00
14,100.00	89.98	179.21	10,742.74	-3,562.93	48.97	3,563.26	0.00	0.00	0.00
14,200.00	89.98	179.21	10,742.78	-3,662.92	50.34	3,663.26	0.00	0.00	0.00
14,300.00	89.98	179.21	10,742.81	-3,762.91	51.72	3,763.26	0.00	0.00	0.00
14,400.00	89.98	179.21	10,742.85	-3,862.90	53.09	3,863.26	0.00	0.00	0.00
14,500.00	89.98	179.21	10,742.88	-3,962.89	54.47	3,963.26	0.00	0.00	0.00
14,600.00	89.98	179.21	10,742.92	-4,062.88	55.84	4,063.26	0.00	0.00	0.00
14,700.00	89.98	179.21	10,742.95	-4,162.87	57.22	4,163.26	0.00	0.00	0.00
14,800.00	89.98	179.21	10,742.99	-4,262.86	58.59	4,263.26	0.00	0.00	0.00
14,900.00	89.98	179.21	10,743.02	-4,362.85	59.96	4,363.26	0.00	0.00	0.00
15,000.00	89.98	179.21	10,743.06	-4,462.84	61.34	4,463.26	0.00	0.00	0.00
15,100.00	89.98	179.21	10,743.09	-4,562.83	62.71	4,563.26	0.00	0.00	0.00
15,200.00	89.98	179.21	10,743.13	-4,662.82	64.09	4,663.26	0.00	0.00	0.00
15,300.00	89.98	179.21	10,743.16	-4,762.81	65.46	4,763.26	0.00	0.00	0.00
15,400.00	89.98	179.21	10,743.20	-4,862.80	66.84	4,863.26	0.00	0.00	0.00
15,500.00	89.98	179.21	10,743.23	-4,962.79	68.21	4,963.26	0.00	0.00	0.00
15,600.00	89.98	179.21	10,743.27	-5,062.78	69.58	5,063.26	0.00	0.00	0.00
15,700.00	89.98	179.21	10,743.30	-5,162.77	70.96	5,163.26	0.00	0.00	0.00
15,800.00	89.98	179.21	10,743.34	-5,262.77	72.33	5,263.26	0.00	0.00	0.00
15,900.00	89.98	179.21	10,743.37	-5,362.76	73.71	5,363.26	0.00	0.00	0.00
16,000.00	89.98	179.21	10,743.41	-5,462.75	75.08	5,463.26	0.00	0.00	0.00
16,100.00	89.98	179.21	10,743.44	-5,562.74	76.46	5,563.26	0.00	0.00	0.00
16,200.00	89.98	179.21	10,743.48	-5,662.73	77.83	5,663.26	0.00	0.00	0.00
16,300.00	89.98	179.21	10,743.51	-5,762.72	79.20	5,763.26	0.00	0.00	0.00
16,400.00	89.98	179.21	10,743.55	-5,862.71	80.58	5,863.26	0.00	0.00	0.00
16,500.00	89.98	179.21	10,743.58	-5,962.70	81.95	5,963.26	0.00	0.00	0.00
16,600.00	89.98	179.21	10,743.62	-6,062.69	83.33	6,063.26	0.00	0.00	0.00
16,700.00	89.98	179.21	10,743.65	-6,162.68	84.70	6,163.26	0.00	0.00	0.00
16,800.00	89.98	179.21	10,743.69	-6,262.67	86.08	6,263.26	0.00	0.00	0.00
16,900.00	89.98	179.21	10,743.72	-6,362.66	87.45	6,363.26	0.00	0.00	0.00
17,000.00	89.98	179.21	10,743.76	-6,462.65	88.82	6,463.26	0.00	0.00	0.00
17,100.00	89.98	179.21	10,743.79	-6,562.64	90.20	6,563.26	0.00	0.00	0.00
17,200.00	89.98	179.21	10,743.83	-6,662.63	91.57	6,663.26	0.00	0.00	0.00
17,300.00	89.98	179.21	10,743.86	-6,762.62	92.95	6,763.26	0.00	0.00	0.00
17,400.00	89.98	179.21	10,743.90	-6,862.61	94.32	6,863.26	0.00	0.00	0.00
17,500.00	89.98	179.21	10,743.93	-6,962.60	95.70	6,963.26	0.00	0.00	0.00
17,600.00	89.98	179.21	10,743.97	-7,062.60	97.07	7,063.26	0.00	0.00	0.00
17,696.81	89.98	179.21	10,744.00	-7,159.40	98.40	7,160.08	0.00	0.00	0.00
TD at 17696.81									



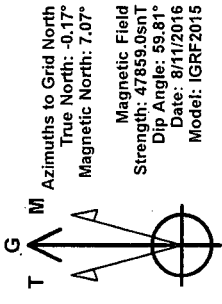
TDS
Planning Report



Database:	EDM 5000.1 Single User Db	Local Co-ordinate Reference:	Well Copperhead 31 Fed Com 3H
Company:	COG Production LLC	TVD Reference:	KB @ 2966.60usft
Project:	Eddy County, NM (NAD-27 2015)	MD Reference:	KB @ 2966.60usft
Site:	Copperhead 31 Fed Com 3H	North Reference:	Grid
Well:	Copperhead 31 Fed Com 3H	Survey Calculation Method:	Minimum Curvature
Wellbore:	Lateral 1		
Design:	Design #1		

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
KOP-D1(C31FC3H)	- plan hits target center - Point	0.00	0.00	10,264.20	0.00	0.00	371,068.50	597,975.70	32° 1' 11.235 N 104° 1' 1.956 W
EOC-D1(C31FedCom3H)	- plan hits target center - Point	0.00	0.00	10,741.67	-477.26	6.56	370,591.24	597,982.26	32° 1' 6.511 N 104° 1' 1.896 W
330' Line-D1(C31FC3H)	- plan hits target center - Point	0.00	0.00	10,743.90	-6,878.61	94.54	364,189.89	598,070.24	32° 0' 3.157 N 104° 1' 1.092 W
PBHL-TD-D1(C31FC3H)	- plan hits target center - Point	0.00	0.00	10,744.00	-7,159.40	98.40	363,909.10	598,074.10	32° 0' 0.378 N 104° 1' 1.057 W

Plan Annotations				
Measured Depth (usft)	Vertical Depth (usft)	Local Coordinates		Comment
		+N/-S (usft)	+E/-W (usft)	
10,264.20	10,264.20	0.00	0.00	Start Build 12.00
11,014.04	10,741.67	-477.25	6.56	Start 6682.78 hold at 11014.04 MD
17,696.81	10,744.00	-7,159.40	98.40	TD at 17696.81



Magnetic Field
Strength: 47859.0snt
Dip Angle: 59.81°
Date: 8/11/2016
Model: IGRF2015

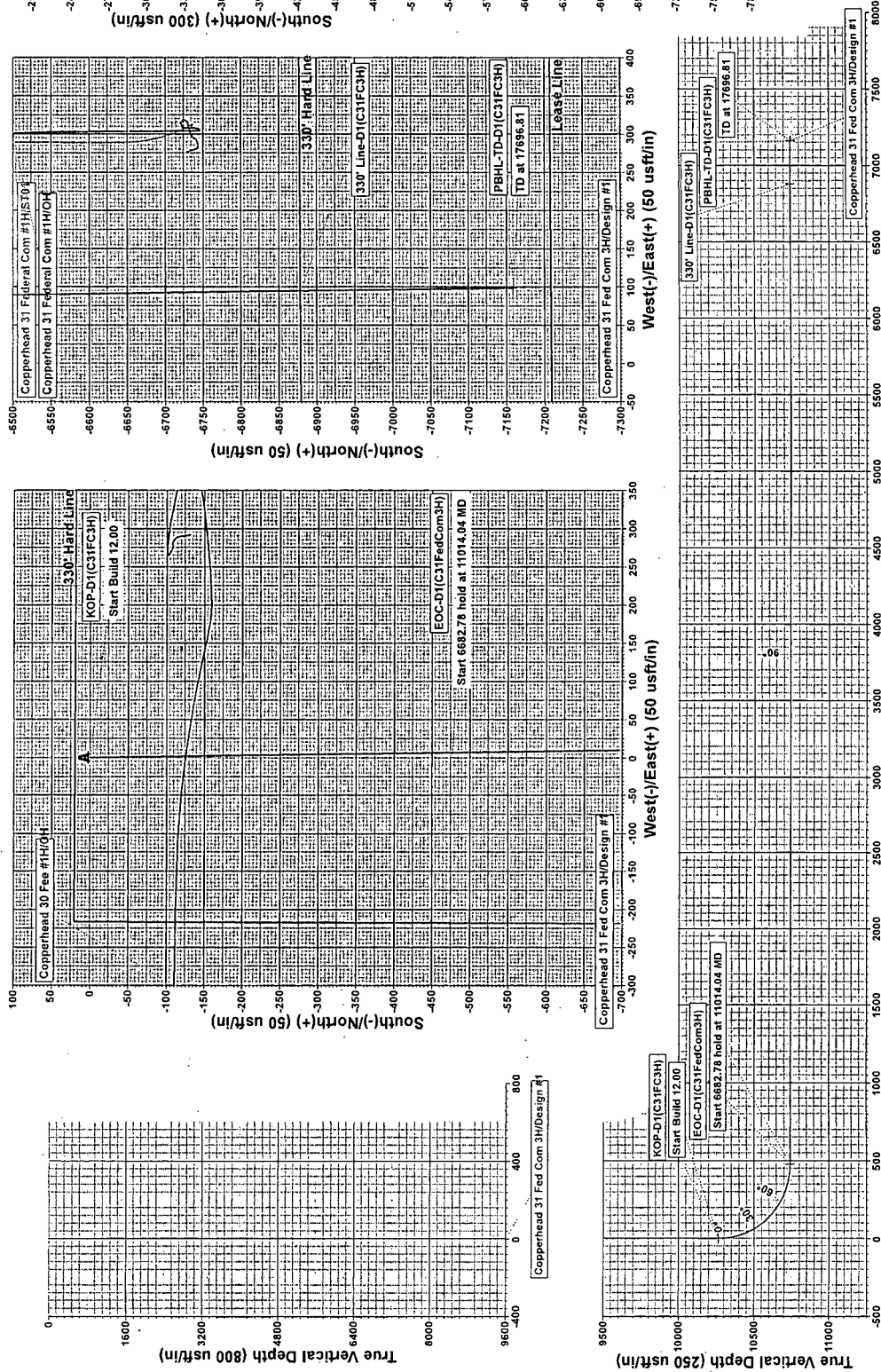
Section Details

Sec	MD	Inc	Azi	TVD	+N/-S	+E/-W	Dleg	TFace	Vsect	Target
1	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	
2	10264.20	0.00	0.00	10264.20	0.00	0.00	0.00	0.00	0.00	
3	11014.04	89.98	179.21	10741.67	-477.25	6.56	12.00	179.21	477.30	
4	17696.81	89.98	179.21	10744.00	-7159.40	98.40	0.00	0.00	7160.08	PBHL-TD-D1(C31FC3H)

COG PRODUCTION LLC
Project: Eddy County, NM (NAD-27 2015)
Site: Copperhead 31 Fed Com 3H
Well: Copperhead 31 Fed Com 3H
Wellbore: Lateral 1
Plan: Design #1 (Copperhead 31 Fed Com 3H/Lateral 1)

Ground Elevation: 2941.60
RKB Elevation: KB @ 2966.60usft

Northing 371088.50 Easting 597975.70
Latitude 32° 1' 11.235 N Longitude 104° 1' 1.956 W



Vertical Section at 179.21° (250 usft/in)

West(-)/East(+) (300 usft/in)

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

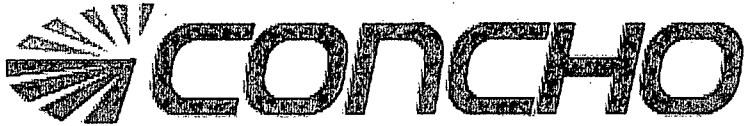
South(-)/North(+) (50 usft/in)

South(-)/North(+) (300 usft/in)



Terra Directional Services LLC
3705 South County Road 1210, Midland, TX 79706
Phone: 432.618.1210

PROJECT DETAILS: Eddy County, NM (NAD-27 2015)
Geodetic System: US State Plane 1927 (Exact solution)
Datum: NAD 1927 (NADCON CONUS)
Ellipsoid: Clarke 1866
System Datum: New Mexico East 3001
Zone: Mean Sea Level
Local North: Grid



COG Production LLC

Eddy County, NM (NAD-27 2015)

Copperhead 31 Fed Com 3H

Copperhead 31 Fed Com 3H

30-015-42379

Lateral 1

Design #1

Anticollision Report

15 August, 2016





TDS
Anticollision Report



Company:	COG Production LLC	Local Co-ordinate Reference:	Well Copperhead 31 Fed Com 3H
Project:	Eddy County, NM (NAD-27 2015)	TVD Reference:	KB @ 2966.60usft
Reference Site:	Copperhead 31 Fed Com 3H	MD Reference:	KB @ 2966.60usft
Site Error:	0.00 usft	North Reference:	Grid
Reference Well:	Copperhead 31 Fed Com 3H	Survey Calculation Method:	Minimum Curvature
Well Error:	0.00 usft	Output errors are at:	2.00 sigma
Reference Wellbore:	Lateral 1	Database:	EDM 5000.1 Single User Db
Reference Design:	Design #1	Offset TVD Reference:	Offset Datum

Reference	Design #1		
Filter type:	NO GLOBAL FILTER: Using user defined selection & filtering criteria		
Interpolation Method:	Stations	Error Model:	ISCWSA
Depth Range:	Unlimited	Scan Method:	Closest Approach 3D
Results Limited by:	Maximum center-center distance of 9,999.98 usft	Error Surface:	Elliptical Conic
Warning Levels Evaluated at:	2.00 Sigma	Casing Method:	Not applied

Survey Tool Program		Date: 8/15/2016			
From (usft)	To (usft)	Survey (Wellbore)	Tool Name	Description	
0.00	17,696.81	Design #1 (Lateral 1)	MWD	MWD - Standard	

Site Name:	Reference Measured Depth (usft)	Offset Measured Depth (usft)	Distance Between Centres (usft)	Distance Between Ellipses (usft)	Separation Factor	Warning
Offset Well - Wellbore - Design						
Copperhead 30 Fee #1H						
Copperhead 30 Fee #1H - OH - OH	7,175.53	7,290.00	124.43	99.10	4.913	CC, ES, SF
Copperhead 31 Fed Com 3H						
Copperhead 31 Federal Com #1H - OH - OH	6,889.24	11,347.00	2,042.39	2,006.81	57.402	CC, ES
Copperhead 31 Federal Com #1H - OH - OH	7,300.00	11,347.00	2,083.29	2,046.72	56.974	SF
Copperhead 31 Federal Com #1H - ST01 - ST01	6,852.03	11,522.00	1,733.37	1,694.79	44.927	CC, ES
Copperhead 31 Federal Com #1H - ST01 - ST01	6,900.00	11,522.00	1,734.04	1,695.43	44.913	SF

Offset Design Copperhead 30 Fee #1H - Copperhead 30 Fee #1H - OH - OH													Offset Site Error: 0.00 usft
Survey Program: 100-Scientific Gyro, 6496-MWD													Offset Well Error: 0.00 usft
Reference	Offset	Sum Major Axis		Offset Wellbore Centre		Distance		Minimum Separation		Separation Factor		Warning	
Measured Depth (usft)	Vertical Depth (usft)	Measured Depth (usft)	Vertical Depth (usft)	Reference (usft)	Offset (usft)	Highside Toolface (°)	N-S (usft)	E-W (usft)	Between Centres (usft)	Between Ellipses (usft)	Minimum Separation (usft)	Separation Factor	Warning
0.00	0.00	0.00	0.00	0.00	0.00	114.31	-131.97	292.20	321.17				
100.00	100.00	82.40	82.40	0.08	0.07	114.31	-131.93	292.06	320.48	320.32	0.16	2,024.496	
200.00	200.00	182.81	182.81	0.31	0.18	114.28	-131.60	291.74	320.05	319.56	0.49	650.258	
300.00	300.00	286.65	286.63	0.53	0.31	114.06	-130.07	291.31	319.07	318.25	0.82	386.896	
400.00	400.00	386.69	386.63	0.76	0.43	113.62	-127.10	290.69	317.31	316.17	1.14	277.668	
500.00	500.00	486.55	486.43	0.98	0.55	113.09	-123.79	290.34	315.67	314.21	1.45	217.094	
600.00	600.00	586.53	586.35	1.21	0.68	112.56	-120.45	289.99	314.05	312.29	1.76	178.029	
700.00	700.00	686.45	686.23	1.43	0.81	112.06	-117.33	289.55	312.46	310.38	2.08	150.542	
800.00	800.00	786.07	787.80	1.66	0.94	111.64	-114.53	288.70	310.66	308.26	2.40	129.563	
900.00	900.00	886.09	888.79	1.88	1.06	111.34	-112.20	287.15	308.38	305.65	2.73	112.831	
1,000.00	1,000.00	986.35	989.01	2.11	1.19	111.16	-110.37	285.19	305.90	302.82	3.08	99.417	
1,100.00	1,100.00	1,086.85	1,088.48	2.33	1.30	111.06	-108.99	283.10	303.44	300.02	3.42	88.597	
1,200.00	1,200.00	1,187.65	1,187.26	2.56	1.41	111.05	-108.21	281.09	301.26	297.48	3.77	79.804	
1,300.00	1,300.00	1,286.14	1,285.73	2.78	1.49	111.17	-108.17	279.28	299.52	295.40	4.12	72.720	
1,400.00	1,400.00	1,385.95	1,385.53	3.01	1.57	111.38	-108.68	277.56	298.11	293.65	4.46	66.880	
1,500.00	1,500.00	1,487.92	1,487.47	3.23	1.67	111.54	-108.81	275.64	296.40	291.60	4.80	61.698	
1,600.00	1,600.00	1,590.34	1,589.86	3.46	1.79	111.55	-107.91	273.25	293.91	288.75	5.16	56.974	
1,700.00	1,700.00	1,689.87	1,689.35	3.68	1.91	111.45	-106.41	270.75	291.02	285.51	5.51	52.822	
1,800.00	1,800.00	1,788.89	1,788.33	3.91	2.04	111.37	-105.05	268.52	288.42	282.56	5.86	49.215	
1,900.00	1,900.00	1,887.63	1,887.05	4.13	2.16	111.33	-104.09	266.53	286.19	279.98	6.21	46.067	
2,000.00	2,000.00	1,986.47	1,985.87	4.35	2.29	111.32	-103.38	264.89	284.39	277.82	6.57	43.315	

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



TDS
Anticollision Report



Company:	COG Production LLC	Local Co-ordinate Reference:	Well Copperhead 31 Fed Com 3H
Project:	Eddy County, NM (NAD-27 2015)	TVD Reference:	KB @ 2966.60usft
Reference Site:	Copperhead 31 Fed Com 3H	MD Reference:	KB @ 2966.60usft
Site Error:	0.00 usft	North Reference:	Grid
Reference Well:	Copperhead 31 Fed Com 3H	Survey Calculation Method:	Minimum Curvature
Well Error:	0.00 usft	Output errors are at	2.00 sigma
Reference Wellbore:	Lateral 1	Database:	EDM 5000.1 Single User Db
Reference Design:	Design #1	Offset TVD Reference:	Offset Datum

Offset Design Copperhead 30 Fee #1H - Copperhead 30 Fee #1H - OH - OH											Offset Site Error: 0.00 usft		
Survey Program: 100-Scientific Gyro 6496-MWD											Offset Well Error: 0.00 usft		
Reference	Offset	Semi Major Axis											
Measured	Vertical	Measured	Vertical	Reference	Offset	Highside	Offset Wellbore Centre	Offset Wellbore Centre	Distance	Distance	Minimum	Separation	Warning
Depth	Depth	Depth	Depth	Depth	Depth	Toolface	N-S	E-W	Between	Between	Separation	Factor	
(usft)	(usft)	(usft)	(usft)	(usft)	(usft)	(°)	(usft)	(usft)	Centres	Ellipses	(usft)		
2,065.35	2,065.35	2,047.25	2,046.65	4.50	2.34	111.28	-102.97	264.43	283.77	277.01	6.76	41.999	
2,100.00	2,100.00	2,078.94	2,078.34	4.58	2.36	111.20	-102.69	264.71	283.95	277.10	6.85	41.446	
2,200.00	2,200.00	2,171.54	2,170.89	4.80	2.37	110.88	-101.98	267.36	286.34	279.27	7.07	40.527	
2,300.00	2,300.00	2,268.46	2,267.71	5.03	2.36	110.54	-101.90	271.93	290.71	283.45	7.26	40.034	
2,400.00	2,400.00	2,362.96	2,362.05	5.25	2.36	110.20	-102.02	277.27	296.07	288.62	7.46	39.704	
2,500.00	2,500.00	2,455.97	2,454.76	5.48	2.35	109.78	-102.42	284.72	303.74	296.09	7.65	39.691	
2,600.00	2,600.00	2,554.37	2,552.70	5.70	2.36	109.40	-103.53	294.07	313.07	305.21	7.86	39.811	
2,700.00	2,700.00	2,657.25	2,655.19	5.93	2.37	109.09	-104.87	302.98	321.68	313.59	8.09	39.751	
2,800.00	2,800.00	2,760.19	2,757.82	6.15	2.38	108.88	-106.28	310.80	329.31	320.98	8.33	39.542	
2,900.00	2,900.00	2,861.49	2,858.89	6.38	2.40	108.74	-107.73	317.58	336.10	327.53	8.57	39.226	
3,000.00	3,000.00	2,962.50	2,959.67	6.60	2.43	108.61	-109.14	324.07	342.64	333.82	8.82	38.868	
3,100.00	3,100.00	3,063.92	3,060.91	6.83	2.46	108.48	-110.33	330.17	348.71	339.64	9.07	38.445	
3,200.00	3,200.00	3,164.88	3,161.70	7.05	2.51	108.34	-111.34	335.86	354.38	345.05	9.33	37.975	
3,300.00	3,300.00	3,266.08	3,262.75	7.28	2.55	108.22	-112.35	341.24	359.74	350.14	9.60	37.473	
3,400.00	3,400.00	3,367.67	3,364.22	7.50	2.61	108.13	-113.36	346.18	364.67	354.79	9.87	36.932	
3,500.00	3,500.00	3,468.53	3,464.97	7.73	2.66	108.06	-114.33	350.66	369.19	359.03	10.16	36.337	
3,600.00	3,600.00	3,570.72	3,567.07	7.95	2.73	107.98	-115.20	354.87	373.37	362.93	10.44	35.748	
3,700.00	3,700.00	3,673.41	3,669.70	8.18	2.79	107.90	-115.77	358.39	376.81	366.07	10.74	35.091	
3,800.00	3,800.00	3,774.29	3,770.54	8.40	2.87	107.81	-116.07	361.37	379.70	368.67	11.03	34.413	
3,900.00	3,900.00	3,875.56	3,871.76	8.63	2.95	107.71	-116.27	364.17	382.40	371.07	11.33	33.739	
4,000.00	4,000.00	3,976.93	3,973.11	8.85	3.03	107.60	-116.29	366.62	384.70	373.07	11.64	33.054	
4,100.00	4,100.00	4,077.93	4,074.09	9.07	3.12	107.49	-116.22	368.74	386.69	374.75	11.95	32.369	
4,200.00	4,200.00	4,179.45	4,175.59	9.30	3.21	107.41	-116.18	370.55	388.38	376.12	12.26	31.685	
4,300.00	4,300.00	4,280.11	4,276.24	9.52	3.30	107.33	-116.09	372.01	389.73	377.16	12.57	31.004	
4,400.00	4,400.00	4,381.67	4,377.79	9.75	3.40	107.27	-116.01	373.23	390.86	377.98	12.89	30.330	
4,500.00	4,500.00	4,483.22	4,479.34	9.97	3.51	107.22	-115.91	374.00	391.55	378.35	13.21	29.652	
4,600.00	4,600.00	4,583.89	4,580.00	10.20	3.61	107.20	-115.88	374.43	391.95	378.43	13.53	28.980	
4,700.00	4,700.00	4,683.89	4,680.01	10.42	3.68	107.21	-116.09	374.70	392.27	378.43	13.84	28.338	
4,800.00	4,800.00	4,784.50	4,780.61	10.65	3.73	107.30	-116.70	374.79	392.54	378.39	14.15	27.743	
4,900.00	4,900.00	4,884.60	4,880.71	10.87	3.76	107.41	-117.52	374.69	392.69	378.24	14.45	27.182	
5,000.00	5,000.00	4,984.37	4,980.48	11.10	3.80	107.54	-118.38	374.60	392.86	378.12	14.74	26.645	
5,100.00	5,100.00	5,084.56	5,080.66	11.32	3.84	107.71	-119.55	374.44	393.06	378.02	15.04	26.133	
5,200.00	5,200.00	5,186.18	5,182.26	11.55	3.88	107.97	-121.26	373.87	393.05	377.71	15.33	25.636	
5,300.00	5,300.00	5,286.81	5,282.87	11.77	3.92	108.26	-123.07	372.92	392.70	377.08	15.62	25.145	
5,400.00	5,400.00	5,387.64	5,383.68	12.00	3.96	108.55	-124.79	371.81	392.20	376.30	15.90	24.665	
5,500.00	5,500.00	5,487.85	5,483.87	12.22	4.00	108.83	-126.40	370.59	391.56	375.38	16.18	24.195	
5,600.00	5,600.00	5,587.84	5,583.84	12.45	4.04	109.13	-128.11	369.31	390.91	374.44	16.47	23.739	
5,700.00	5,700.00	5,688.46	5,684.44	12.67	4.09	109.45	-129.95	367.90	390.19	373.44	16.75	23.293	
5,800.00	5,800.00	5,788.87	5,784.81	12.90	4.15	109.79	-131.79	366.33	389.33	372.30	17.03	22.856	
5,900.00	5,900.00	5,888.80	5,884.72	13.12	4.20	110.13	-133.69	364.69	388.44	371.12	17.32	22.428	
6,000.00	6,000.00	5,988.35	5,984.23	13.35	4.26	110.48	-135.60	363.11	387.62	370.01	17.61	22.017	
6,100.00	6,100.00	6,088.14	6,083.99	13.57	4.32	110.81	-137.46	361.64	386.89	369.00	17.89	21.623	
6,200.00	6,200.00	6,188.34	6,184.17	13.80	4.39	111.15	-139.32	360.16	386.18	368.00	18.18	21.242	
6,300.00	6,300.00	6,288.27	6,284.07	14.02	4.46	111.49	-141.17	358.65	385.45	366.98	18.47	20.871	
6,400.00	6,400.00	6,388.34	6,384.10	14.24	4.54	111.84	-143.14	357.09	384.72	365.97	18.76	20.510	
6,500.00	6,500.00	6,489.75	6,485.48	14.47	4.59	112.21	-145.08	355.37	383.87	364.85	19.02	20.182	
6,600.00	6,600.00	6,589.59	6,585.28	14.69	4.65	112.58	-150.39	353.31	382.91	363.67	19.29	19.866	
6,700.00	6,700.00	6,689.79	6,685.39	14.92	4.70	112.93	-156.93	350.90	381.81	362.45	19.56	19.566	
6,800.00	6,800.00	6,789.96	6,785.46	15.14	4.76	113.28	-163.22	348.15	380.61	361.23	19.83	19.271	
6,900.00	6,900.00	6,889.90	6,885.30	15.37	4.81	113.62	-169.25	345.15	379.31	360.01	20.09	18.976	
7,000.00	7,000.00	6,989.90	6,985.20	15.59	4.87	113.96	-175.02	341.90	377.91	358.71	20.35	18.681	
7,100.00	7,100.00	7,089.90	7,085.10	15.82	4.92	114.29	-180.54	338.40	376.41	357.41	20.61	18.386	

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



TDS
Anticollision Report



Company	COG Production LLC	Local Co-ordinate Reference:	Well Copperhead 31 Fed Com 3H
Project	Eddy County, NM (NAD-27 2015)	TVD Reference	KB @ 2966.60usft
Reference Site	Copperhead 31 Fed Com 3H	MD Reference	KB @ 2966.60usft
Site Error	0.00 usft	North Reference	Grid
Reference Well	Copperhead 31 Fed Com 3H	Survey Calculation Method	Minimum Curvature
Well Error	0.00 usft	Output errors are at	2.00 sigma
Reference Wellbore	Lateral 1	Database	EDM 5000.1 Single User Db
Reference Design	Design #1	Offset TVD Reference	Offset Datum

Offset Design													Offset Site Error	0.00 usft
Survey Program: 100-Scientific Gyro, 6496-MWD													Offset Well Error	0.00 usft
Reference	Offset	Semi Major Axis	Distance	Warning										
Measured Depth (usft)	Vertical Depth (usft)	Measured Depth (usft)	Vertical Depth (usft)	Reference	Offset	Highside Toolface (°)	Offset Wellbore Centre N-S (usft)	Offset Wellbore Centre E-W (usft)	Between Centres (usft)	Between Ellipses (usft)	Minimum Separation (usft)	Separation Factor		
7,175.53	7,175.53	7,290.00	7,156.83	15.99	9.35	-173.17	-123.55	-14.79	124.43	99.10	25.33	4.913	CC, ES, SF	
7,200.00	7,200.00	7,297.39	7,159.25	16.04	9.51	-169.96	-122.72	-21.72	126.56	101.37	25.19	5.024		
7,300.00	7,300.00	7,322.00	7,165.97	16.27	10.05	-159.37	-120.24	-45.26	172.65	152.06	20.59	8.387		
7,400.00	7,400.00	7,330.61	7,167.81	16.49	10.25	-155.82	-119.47	-53.64	250.46	234.02	16.44	15.237		
7,500.00	7,500.00	7,339.06	7,169.33	16.72	10.45	-152.46	-118.75	-61.91	339.50	325.14	14.36	23.643		
7,600.00	7,600.00	7,353.00	7,171.22	16.94	10.77	-147.24	-117.62	-75.68	433.28	419.85	13.43	32.262		
7,700.00	7,700.00	7,353.00	7,171.22	17.17	10.77	-147.24	-117.62	-75.68	528.91	516.14	12.77	41.414		
7,800.00	7,800.00	7,353.00	7,171.22	17.39	10.77	-147.24	-117.62	-75.68	625.91	613.49	12.42	50.378		
7,900.00	7,900.00	7,353.00	7,171.22	17.62	10.77	-147.24	-117.62	-75.68	723.73	711.47	12.25	59.058		
8,000.00	8,000.00	7,353.00	7,171.22	17.84	10.77	-147.24	-117.62	-75.68	822.07	809.88	12.19	67.428		
8,100.00	8,100.00	7,353.00	7,171.22	18.07	10.77	-147.24	-117.62	-75.68	920.77	908.57	12.20	75.489		
8,200.00	8,200.00	7,353.00	7,171.22	18.29	10.77	-147.24	-117.62	-75.68	1,019.72	1,007.47	12.25	83.251		
8,300.00	8,300.00	7,353.00	7,171.22	18.52	10.77	-147.24	-117.62	-75.68	1,118.86	1,106.53	12.33	90.724		
8,400.00	8,400.00	7,353.00	7,171.22	18.74	10.77	-147.24	-117.62	-75.68	1,218.14	1,205.70	12.44	97.923		
8,500.00	8,500.00	7,353.00	7,171.22	18.96	10.77	-147.24	-117.62	-75.68	1,317.53	1,304.96	12.56	104.858		
8,600.00	8,600.00	7,367.00	7,172.38	19.19	11.10	-142.46	-116.61	-89.59	1,416.58	1,403.80	12.78	110.854		
8,700.00	8,700.00	7,367.89	7,172.43	19.41	11.12	-142.18	-116.55	-90.47	1,516.07	1,503.14	12.93	117.253		
8,800.00	8,800.00	7,368.68	7,172.47	19.64	11.14	-141.93	-116.50	-91.26	1,615.62	1,602.53	13.09	123.425		
8,900.00	8,900.00	7,369.39	7,172.50	19.86	11.16	-141.70	-116.45	-91.97	1,715.23	1,701.97	13.26	129.375		
9,000.00	9,000.00	7,370.04	7,172.54	20.09	11.18	-141.49	-116.41	-92.62	1,814.87	1,801.44	13.43	135.113		
9,100.00	9,100.00	7,370.63	7,172.56	20.31	11.19	-141.31	-116.37	-93.20	1,914.55	1,900.94	13.61	140.644		
9,200.00	9,200.00	7,385.00	7,172.83	20.54	11.53	-137.05	-115.52	-107.55	2,014.66	2,000.80	13.86	145.337		
9,300.00	9,300.00	7,385.00	7,172.83	20.76	11.53	-137.05	-115.52	-107.55	2,114.37	2,100.32	14.05	150.501		
9,400.00	9,400.00	7,385.00	7,172.83	20.99	11.53	-137.05	-115.52	-107.55	2,214.10	2,199.86	14.24	155.476		
9,500.00	9,500.00	7,385.00	7,172.83	21.21	11.53	-137.05	-115.52	-107.55	2,313.86	2,299.42	14.44	160.268		
9,600.00	9,600.00	7,385.00	7,172.83	21.44	11.53	-137.05	-115.52	-107.55	2,413.63	2,398.99	14.64	164.884		
9,700.00	9,700.00	7,385.00	7,172.83	21.66	11.53	-137.05	-115.52	-107.55	2,513.43	2,498.58	14.84	169.328		
9,800.00	9,800.00	7,385.00	7,172.83	21.89	11.53	-137.05	-115.52	-107.55	2,613.24	2,598.18	15.05	173.606		
9,900.00	9,900.00	7,385.00	7,172.83	22.11	11.53	-137.05	-115.52	-107.55	2,713.06	2,697.80	15.27	177.725		
10,000.00	10,000.00	7,385.00	7,172.83	22.34	11.53	-137.05	-115.52	-107.55	2,812.90	2,797.42	15.48	181.688		
10,100.00	10,100.00	7,385.00	7,172.83	22.56	11.53	-137.05	-115.52	-107.55	2,912.75	2,897.04	15.70	185.500		
10,200.00	10,200.00	7,385.00	7,172.83	22.79	11.53	-137.05	-115.52	-107.55	3,012.60	2,996.68	15.93	189.167		
10,264.20	10,264.20	7,385.00	7,172.83	22.93	11.53	-137.05	-115.52	-107.55	3,076.72	3,060.65	16.07	191.447		
10,275.00	10,275.00	7,385.00	7,172.83	22.95	11.53	30.72	-115.52	-107.55	3,087.50	3,071.40	16.10	191.829		
10,300.00	10,299.97	7,385.00	7,172.83	22.99	11.53	17.54	-115.52	-107.55	3,112.39	3,096.24	16.15	192.720		
10,325.00	10,324.84	7,385.00	7,172.83	23.04	11.53	12.14	-115.52	-107.55	3,137.14	3,120.93	16.20	193.623		
10,350.00	10,349.54	7,385.00	7,172.83	23.08	11.53	9.26	-115.52	-107.55	3,161.68	3,145.43	16.25	194.532		
10,375.00	10,374.01	7,385.00	7,172.83	23.12	11.53	7.49	-115.52	-107.55	3,185.95	3,169.65	16.30	195.445		
10,400.00	10,398.18	7,385.00	7,172.83	23.16	11.53	6.29	-115.52	-107.55	3,209.90	3,193.55	16.35	196.358		
10,425.00	10,421.98	7,385.00	7,172.83	23.20	11.53	5.42	-115.52	-107.55	3,233.46	3,217.07	16.39	197.267		
10,450.00	10,445.35	7,385.00	7,172.83	23.24	11.53	4.77	-115.52	-107.55	3,256.58	3,240.15	16.43	198.168		
10,475.00	10,468.22	7,385.00	7,172.83	23.29	11.53	4.27	-115.52	-107.55	3,279.21	3,262.74	16.47	199.057		
10,500.00	10,490.53	7,385.00	7,172.83	23.32	11.53	3.87	-115.52	-107.55	3,301.29	3,284.78	16.51	199.928		
10,525.00	10,512.22	7,385.00	7,172.83	23.36	11.53	3.54	-115.52	-107.55	3,322.78	3,306.23	16.55	200.778		
10,550.00	10,533.24	7,385.00	7,172.83	23.40	11.53	3.27	-115.52	-107.55	3,343.63	3,327.04	16.59	201.601		
10,575.00	10,553.51	7,385.00	7,172.83	23.44	11.53	3.05	-115.52	-107.55	3,363.79	3,347.17	16.62	202.391		
10,600.00	10,572.99	7,385.00	7,172.83	23.49	11.53	2.86	-115.52	-107.55	3,383.22	3,366.57	16.65	203.143		
10,625.00	10,591.63	7,385.00	7,172.83	23.54	11.53	2.69	-115.52	-107.55	3,401.88	3,385.20	16.69	203.851		
10,650.00	10,609.37	7,385.00	7,172.83	23.59	11.53	2.55	-115.52	-107.55	3,419.74	3,403.02	16.72	204.508		
10,675.00	10,626.16	7,385.00	7,172.83	23.65	11.53	2.43	-115.52	-107.55	3,436.75	3,420.00	16.76	205.108		
10,700.00	10,641.96	7,385.00	7,172.83	23.72	11.53	2.33	-115.52	-107.55	3,452.89	3,436.10	16.79	205.645		
10,725.00	10,656.73	7,385.00	7,172.83	23.79	11.53	2.23	-115.52	-107.55	3,468.12	3,451.29	16.83	206.111		

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



TDS
Anticollision Report



Company:	COG Production LLC	Local Co-ordinate Reference:	Well Copperhead 31 Fed Com 3H
Project:	Eddy County, NM (NAD-27 2015)	TVD Reference:	KB @ 2966.60usft
Reference Site:	Copperhead 31 Fed Com 3H	MD Reference:	KB @ 2966.60usft
Site Error:	0.00 usft	North Reference:	Grid
Reference Well:	Copperhead 31 Fed Com 3H	Survey Calculation Method:	Minimum Curvature
Well Error:	0.00 usft	Output errors are at:	2.00 sigma
Reference Wellbore:	Lateral 1	Database:	EDM 5000.1 Single User Db
Reference Design:	Design #1	Offset TVD Reference:	Offset Datum

Offset Design Copperhead 30 Fee #1H - Copperhead 30 Fee #1H - OH - OH														Offset Site Error: 0.00 usft
Survey Program: 100-Scientific Gyro 6496-MWD														Offset Well Error: 0.00 usft
Reference		Offset		Semi Major Axis		Distance		Minimum Separation		Warning				
Measured Depth (usft)	Vertical Depth (usft)	Measured Depth (usft)	Vertical Depth (usft)	Reference (usft)	Offset (usft)	Highside Toolface (°)	Offset Wellbore Centre N-S (usft)	Offset Wellbore Centre E-W (usft)	Between Centres (usft)	Between Ellipses (usft)	Minimum Separation (usft)	Separation Factor		
10,750.00	10,670.42	7,385.00	7,172.83	23.86	11.53	2.15	-115.52	-107.55	3,482.41	3,465.55	16.86	206.501		
10,775.00	10,682.99	7,385.00	7,172.83	23.95	11.53	2.08	-115.52	-107.55	3,495.74	3,478.83	16.90	206.808		
10,800.00	10,694.42	7,385.00	7,172.83	24.04	11.53	2.02	-115.52	-107.55	3,508.07	3,491.13	16.95	207.026		
10,825.00	10,704.67	7,385.00	7,172.83	24.13	11.53	1.97	-115.52	-107.55	3,519.39	3,502.40	16.99	207.150		
10,850.00	10,713.71	7,385.00	7,172.83	24.23	11.53	1.92	-115.52	-107.55	3,529.68	3,512.64	17.04	207.174		
10,875.00	10,721.52	7,385.00	7,172.83	24.34	11.53	1.88	-115.52	-107.55	3,538.91	3,521.82	17.09	207.095		
10,900.00	10,728.07	7,385.00	7,172.83	24.46	11.53	1.85	-115.52	-107.55	3,547.07	3,529.92	17.14	206.908		
10,925.00	10,733.36	7,385.00	7,172.83	24.58	11.53	1.82	-115.52	-107.55	3,554.14	3,536.94	17.20	206.611		
10,950.00	10,737.36	7,385.00	7,172.83	24.71	11.53	1.80	-115.52	-107.55	3,560.12	3,542.85	17.27	206.202		
10,975.00	10,740.06	7,385.00	7,172.83	24.85	11.53	1.78	-115.52	-107.55	3,564.98	3,547.65	17.33	205.680		
11,000.00	10,741.46	7,385.00	7,172.83	24.99	11.53	1.77	-115.52	-107.55	3,568.73	3,551.32	17.40	205.045		
11,014.04	10,741.67	7,385.00	7,172.83	25.07	11.53	1.76	-115.52	-107.55	3,570.34	3,552.89	17.45	204.647		
11,100.00	10,741.70	7,385.00	7,172.83	25.62	11.53	1.76	-115.52	-107.55	3,580.14	3,562.39	17.75	201.750		
11,200.00	10,741.73	7,385.00	7,172.83	26.36	11.53	1.76	-115.52	-107.55	3,594.09	3,575.93	18.16	197.905		
11,300.00	10,741.77	7,385.00	7,172.83	27.21	11.53	1.76	-115.52	-107.55	3,610.76	3,592.12	18.64	193.715		
11,400.00	10,741.80	7,385.00	7,172.83	28.15	11.53	1.76	-115.52	-107.55	3,630.10	3,610.93	19.17	189.336		
11,500.00	10,741.84	7,385.00	7,172.83	29.18	11.53	1.76	-115.52	-107.55	3,652.09	3,632.34	19.75	184.898		
11,600.00	10,741.87	7,369.89	7,172.53	30.28	11.17	1.52	-116.42	-92.47	3,676.26	3,655.98	20.27	181.348		
11,700.00	10,741.91	7,369.29	7,172.50	31.45	11.16	1.51	-116.46	-91.87	3,703.34	3,682.43	20.91	177.140		
11,800.00	10,741.94	7,368.68	7,172.47	32.69	11.14	1.50	-116.50	-91.26	3,732.91	3,711.34	21.56	173.124		
11,900.00	10,741.98	7,368.06	7,172.44	33.97	11.13	1.49	-116.54	-90.64	3,764.89	3,742.66	22.23	169.340		
12,000.00	10,742.01	7,353.00	7,171.22	35.31	10.77	1.25	-117.62	-75.68	3,799.60	3,776.80	22.79	166.698		
12,100.00	10,742.05	7,353.00	7,171.22	36.68	10.77	1.25	-117.62	-75.68	3,836.21	3,812.74	23.48	163.410		
12,200.00	10,742.08	7,353.00	7,171.22	38.10	10.77	1.25	-117.62	-75.68	3,875.06	3,850.90	24.16	160.395		
12,300.00	10,742.12	7,353.00	7,171.22	39.55	10.77	1.25	-117.62	-75.68	3,916.08	3,891.24	24.84	157.651		
12,400.00	10,742.15	7,353.00	7,171.22	41.03	10.77	1.25	-117.62	-75.68	3,959.20	3,933.69	25.52	155.171		
12,500.00	10,742.19	7,353.00	7,171.22	42.53	10.77	1.25	-117.62	-75.68	4,004.36	3,978.17	26.18	152.945		
12,600.00	10,742.22	7,353.00	7,171.22	44.07	10.77	1.25	-117.62	-75.68	4,051.47	4,024.64	26.84	150.963		
12,700.00	10,742.26	7,353.00	7,171.22	45.62	10.77	1.25	-117.62	-75.68	4,100.49	4,073.01	27.48	149.211		
12,800.00	10,742.29	7,353.00	7,171.22	47.19	10.77	1.25	-117.62	-75.68	4,151.34	4,123.23	28.11	147.676		
12,900.00	10,742.33	7,353.00	7,171.22	48.79	10.77	1.25	-117.62	-75.68	4,203.95	4,175.22	28.73	146.344		
13,000.00	10,742.36	7,353.00	7,171.22	50.39	10.77	1.25	-117.62	-75.68	4,258.26	4,228.94	29.33	145.203		
13,100.00	10,742.40	7,353.00	7,171.22	52.02	10.77	1.25	-117.62	-75.68	4,314.21	4,284.30	29.91	144.241		
13,200.00	10,742.43	7,353.00	7,171.22	53.65	10.77	1.25	-117.62	-75.68	4,371.72	4,341.25	30.48	143.444		
13,300.00	10,742.47	7,353.00	7,171.22	55.30	10.77	1.25	-117.62	-75.68	4,430.75	4,399.72	31.03	142.802		
13,400.00	10,742.50	7,353.00	7,171.22	56.96	10.77	1.25	-117.62	-75.68	4,491.23	4,459.67	31.56	142.304		
13,500.00	10,742.54	7,353.00	7,171.22	58.63	10.77	1.25	-117.62	-75.68	4,553.10	4,521.02	32.08	141.940		
13,600.00	10,742.57	7,353.00	7,171.22	60.31	10.77	1.25	-117.62	-75.68	4,616.31	4,583.73	32.58	141.701		
13,700.00	10,742.61	7,353.00	7,171.22	62.00	10.77	1.25	-117.62	-75.68	4,680.80	4,647.74	33.06	141.579		
13,800.00	10,742.64	7,353.00	7,171.22	63.69	10.77	1.25	-117.62	-75.68	4,746.52	4,712.99	33.53	141.564		
13,900.00	10,742.67	7,353.00	7,171.22	65.40	10.77	1.25	-117.62	-75.68	4,813.43	4,779.44	33.98	141.650		
14,000.00	10,742.71	7,353.00	7,171.22	67.11	10.77	1.25	-117.62	-75.68	4,881.46	4,847.04	34.42	141.830		
14,100.00	10,742.74	7,353.00	7,171.22	68.82	10.77	1.25	-117.62	-75.68	4,950.58	4,915.74	34.84	142.097		
14,200.00	10,742.78	7,353.00	7,171.22	70.55	10.77	1.25	-117.62	-75.68	5,020.74	4,985.49	35.25	142.446		
14,300.00	10,742.81	7,353.00	7,171.22	72.27	10.77	1.25	-117.62	-75.68	5,091.90	5,056.26	35.64	142.871		
14,400.00	10,742.85	7,353.00	7,171.22	74.00	10.77	1.25	-117.62	-75.68	5,164.01	5,127.99	36.02	143.367		
14,500.00	10,742.88	7,353.00	7,171.22	75.74	10.77	1.25	-117.62	-75.68	5,237.04	5,200.65	36.39	143.930		
14,600.00	10,742.92	7,353.00	7,171.22	77.48	10.77	1.25	-117.62	-75.68	5,310.95	5,274.21	36.74	144.554		
14,700.00	10,742.95	7,353.00	7,171.22	79.23	10.77	1.25	-117.62	-75.68	5,385.70	5,348.62	37.08	145.237		
14,800.00	10,742.99	7,353.00	7,171.22	80.98	10.77	1.25	-117.62	-75.68	5,461.26	5,423.85	37.41	145.974		
14,900.00	10,743.02	7,353.00	7,171.22	82.73	10.77	1.25	-117.62	-75.68	5,537.59	5,499.86	37.73	146.762		
15,000.00	10,743.06	7,353.00	7,171.22	84.49	10.77	1.25	-117.62	-75.68	5,614.67	5,576.63	38.04	147.598		

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



TDS
Anticollision Report



Company:	COG Production LLC	Local Co-ordinate Reference:	Well Copperhead 31 Fed Com 3H
Project:	Eddy County, NM (NAD-27 2015)	TVD Reference:	KB @ 2966.60usft
Reference Site:	Copperhead 31 Fed Com 3H	MD Reference:	KB @ 2966.60usft
Site Error:	0.00 usft	North Reference:	Grid
Reference Well:	Copperhead 31 Fed Com 3H	Survey Calculation Method:	Minimum Curvature
Well Error:	0.00 usft	Output errors are at:	2.00 sigma
Reference Wellbore:	Lateral 1	Database:	EDM 5000.1 Single User Db
Reference Design:	Design #1	Offset TVD Reference:	Offset Datum

Offset Design Copperhead 30 Fee #1H - Copperhead 30 Fee #1H - OH - OH												Offset Site Error:	0.00 usft
Survey Program: 100-Scientific Gyro 6496-MWD												Offset Well Error:	0.00 usft
Reference													
Semi Major Axis													
Measured	Vertical	Measured	Vertical	Reference	Offset	Highside	Offset Wellbore Centre		Distance		Minimum	Separation	Warning
Depth	Depth	Depth	Depth	(usft)	(usft)	Toolface	N-S	E-W	Between	Between	Separation	Factor	
(usft)	(usft)	(usft)	(usft)			(°)	(usft)	(usft)	Centres	Ellipses	(usft)		
15,100.00	10,743.09	7,353.00	7,171.22	86.25	10.77	1.25	-117.62	-75.68	5,692.46	5,654.12	38.34	148.478	
15,200.00	10,743.13	7,353.00	7,171.22	88.01	10.77	1.25	-117.62	-75.68	5,770.93	5,732.31	38.63	149.400	
15,300.00	10,743.16	7,353.00	7,171.22	89.77	10.77	1.25	-117.62	-75.68	5,850.07	5,811.16	38.91	150.362	
15,400.00	10,743.20	7,353.00	7,171.22	91.54	10.77	1.25	-117.62	-75.68	5,929.83	5,890.65	39.18	151.360	
15,500.00	10,743.23	7,353.00	7,171.22	93.31	10.77	1.25	-117.62	-75.68	6,010.20	5,970.76	39.44	152.393	
15,600.00	10,743.27	7,353.00	7,171.22	95.08	10.77	1.25	-117.62	-75.68	6,091.14	6,051.45	39.69	153.459	
15,700.00	10,743.30	7,353.00	7,171.22	96.86	10.77	1.25	-117.62	-75.68	6,172.65	6,132.71	39.94	154.555	
15,800.00	10,743.34	7,353.00	7,171.22	98.63	10.77	1.25	-117.62	-75.68	6,254.69	6,214.52	40.18	155.680	
15,900.00	10,743.37	7,353.00	7,171.22	100.41	10.77	1.25	-117.62	-75.68	6,337.25	6,296.85	40.41	156.832	
16,000.00	10,743.41	7,353.00	7,171.22	102.19	10.77	1.25	-117.62	-75.68	6,420.31	6,379.68	40.63	158.010	
16,100.00	10,743.44	7,338.13	7,169.17	103.98	10.42	1.01	-118.82	-61.00	6,503.63	6,463.06	40.57	160.314	
16,200.00	10,743.48	7,337.36	7,169.04	105.76	10.41	1.00	-118.89	-60.25	6,587.60	6,546.83	40.76	161.604	
16,300.00	10,743.51	7,336.59	7,168.91	107.55	10.39	0.99	-118.96	-59.49	6,672.01	6,631.06	40.95	162.917	
16,400.00	10,743.55	7,322.00	7,165.97	109.33	10.05	0.76	-120.24	-45.26	6,757.03	6,716.15	40.88	165.309	
16,500.00	10,743.58	7,322.00	7,165.97	111.12	10.05	0.76	-120.24	-45.26	6,842.25	6,801.18	41.07	166.610	
16,600.00	10,743.62	7,322.00	7,165.97	112.91	10.05	0.76	-120.24	-45.26	6,927.87	6,886.61	41.25	167.929	
16,700.00	10,743.65	7,322.00	7,165.97	114.70	10.05	0.76	-120.24	-45.26	7,013.87	6,972.43	41.44	169.264	
16,800.00	10,743.69	7,322.00	7,165.97	116.50	10.05	0.76	-120.24	-45.26	7,100.23	7,058.62	41.62	170.615	
16,900.00	10,743.72	7,322.00	7,165.97	118.29	10.05	0.76	-120.24	-45.26	7,186.95	7,145.16	41.79	171.980	
17,000.00	10,743.76	7,322.00	7,165.97	120.08	10.05	0.76	-120.24	-45.26	7,274.01	7,232.06	41.96	173.359	
17,100.00	10,743.79	7,322.00	7,165.97	121.88	10.05	0.76	-120.24	-45.26	7,361.40	7,319.28	42.13	174.751	
17,200.00	10,743.83	7,322.00	7,165.97	123.68	10.05	0.76	-120.24	-45.26	7,449.11	7,406.82	42.29	176.155	
17,300.00	10,743.86	7,322.00	7,165.97	125.47	10.05	0.76	-120.24	-45.26	7,537.12	7,494.68	42.45	177.570	
17,400.00	10,743.90	7,322.00	7,165.97	127.27	10.05	0.76	-120.24	-45.26	7,625.43	7,582.83	42.60	178.996	
17,500.00	10,743.93	7,322.00	7,165.97	129.07	10.05	0.76	-120.24	-45.26	7,714.03	7,671.27	42.75	180.431	
17,600.00	10,743.97	7,322.00	7,165.97	130.87	10.05	0.76	-120.24	-45.26	7,802.89	7,759.99	42.90	181.876	
17,696.81	10,744.00	7,322.00	7,165.97	132.62	10.05	0.76	-120.24	-45.26	7,889.19	7,846.14	43.04	183.283	



TDS
Anticollision Report



Company:	COG Production LLC	Local Co-ordinate Reference:	Well Copperhead 31 Fed Com 3H
Project:	Eddy County, NM (NAD-27 2015)	TVD Reference:	KB @ 2966.60usft
Reference Site:	Copperhead 31 Fed Com 3H	MD Reference:	KB @ 2966.60usft
Site Error:	0.00 usft	North Reference:	Grid
Reference Well:	Copperhead 31 Fed Com 3H	Survey Calculation Method:	Minimum Curvature
Well Error:	0.00 usft	Output errors are at:	2.00 sigma
Reference Wellbore:	Lateral 1	Database:	EDM 5000.1 Single User Db
Reference Design:	Design #1	Offset TVD Reference:	Offset Datum

Offset Design: Copperhead 31 Fed Com 3H - Copperhead 31 Federal Com #1H - OH - OH												Offset Site Error:	0.00 usft
Survey Program: 100-Scientific Gyro: 6531-MWD												Offset Well Error:	0.00 usft
Reference	Offset	Semi Major Axis		Distance		Offset Wellbore Centre		Between Centres	Between Ellipses	Minimum Separation	Separation Factor	Warning	
Measured Depth (usft)	Vertical Depth (usft)	Measured Depth (usft)	Vertical Depth (usft)	Reference (usft)	Offset (usft)	Highside Footcandle (°)	N-S (usft)	E-W (usft)	(usft)	(usft)	(usft)		
0.00	0.00	0.00	0.00	0.00	0.00	177.65	-6,728.60	276.20	6,734.65				
100.00	100.00	31.15	31.15	0.08	0.03	177.65	-6,728.59	276.18	6,734.26	6,734.15	0.11	N/A	
190.61	190.61	119.01	119.01	0.29	0.11	177.65	-6,728.53	275.93	6,734.19	6,733.82	0.37	N/A	
200.00	200.00	125.42	125.42	0.31	0.12	177.65	-6,728.54	275.90	6,734.19	6,733.79	0.40	N/A	
300.00	300.00	200.00	200.00	0.53	0.20	177.66	-6,728.78	275.54	6,734.47	6,733.80	0.67	9,995.061	
400.00	400.00	296.46	296.45	0.76	0.29	177.66	-6,729.29	275.27	6,734.99	6,734.00	0.99	6,828.072	
500.00	500.00	11,347.00	6,817.64	0.98	82.13	168.34	-2,000.28	412.61	6,707.74	6,671.40	36.34	184.608	
600.00	600.00	11,347.00	6,817.64	1.21	82.13	168.34	-2,000.28	412.61	6,612.56	6,576.26	36.30	182.184	
700.00	700.00	11,347.00	6,817.64	1.43	82.13	168.34	-2,000.28	412.61	6,517.52	6,481.26	36.26	179.747	
800.00	800.00	11,347.00	6,817.64	1.66	82.13	168.34	-2,000.28	412.61	6,422.63	6,386.41	36.22	177.299	
900.00	900.00	11,347.00	6,817.64	1.88	82.13	168.34	-2,000.28	412.61	6,327.90	6,291.71	36.19	174.839	
1,000.00	1,000.00	11,347.00	6,817.64	2.11	82.13	168.34	-2,000.28	412.61	6,233.34	6,197.17	36.16	172.368	
1,100.00	1,100.00	11,347.00	6,817.64	2.33	82.13	168.34	-2,000.28	412.61	6,138.95	6,102.81	36.14	169.885	
1,200.00	1,200.00	11,347.00	6,817.64	2.56	82.13	168.34	-2,000.28	412.61	6,044.73	6,008.62	36.11	167.391	
1,300.00	1,300.00	11,347.00	6,817.64	2.78	82.13	168.34	-2,000.28	412.61	5,950.71	5,914.62	36.09	164.886	
1,400.00	1,400.00	11,347.00	6,817.64	3.01	82.13	168.34	-2,000.28	412.61	5,856.89	5,820.81	36.07	162.370	
1,500.00	1,500.00	11,347.00	6,817.64	3.23	82.13	168.34	-2,000.28	412.61	5,763.27	5,727.21	36.06	159.843	
1,600.00	1,600.00	11,347.00	6,817.64	3.46	82.13	168.34	-2,000.28	412.61	5,669.87	5,633.83	36.04	157.306	
1,700.00	1,700.00	11,347.00	6,817.64	3.68	82.13	168.34	-2,000.28	412.61	5,576.70	5,540.66	36.03	154.760	
1,800.00	1,800.00	11,347.00	6,817.64	3.91	82.13	168.34	-2,000.28	412.61	5,483.77	5,447.74	36.03	152.205	
1,900.00	1,900.00	11,347.00	6,817.64	4.13	82.13	168.34	-2,000.28	412.61	5,391.09	5,355.06	36.03	149.642	
2,000.00	2,000.00	11,347.00	6,817.64	4.35	82.13	168.34	-2,000.28	412.61	5,298.68	5,262.65	36.03	147.072	
2,100.00	2,100.00	11,347.00	6,817.64	4.58	82.13	168.34	-2,000.28	412.61	5,206.55	5,170.52	36.03	144.495	
2,200.00	2,200.00	11,347.00	6,817.64	4.80	82.13	168.34	-2,000.28	412.61	5,114.72	5,078.68	36.04	141.913	
2,300.00	2,300.00	11,347.00	6,817.64	5.03	82.13	168.34	-2,000.28	412.61	5,023.19	4,987.14	36.05	139.328	
2,400.00	2,400.00	11,347.00	6,817.64	5.25	82.13	168.34	-2,000.28	412.61	4,932.00	4,895.93	36.07	136.740	
2,500.00	2,500.00	11,347.00	6,817.64	5.48	82.13	168.34	-2,000.28	412.61	4,841.15	4,805.07	36.09	134.152	
2,600.00	2,600.00	11,347.00	6,817.64	5.70	82.13	168.34	-2,000.28	412.61	4,750.68	4,714.57	36.11	131.564	
2,700.00	2,700.00	11,347.00	6,817.64	5.93	82.13	168.34	-2,000.28	412.61	4,660.59	4,624.45	36.13	128.978	
2,800.00	2,800.00	11,347.00	6,817.64	6.15	82.13	168.34	-2,000.28	412.61	4,570.91	4,534.75	36.16	126.397	
2,900.00	2,900.00	11,347.00	6,817.64	6.38	82.13	168.34	-2,000.28	412.61	4,481.67	4,445.48	36.19	123.822	
3,000.00	3,000.00	11,347.00	6,817.64	6.60	82.13	168.34	-2,000.28	412.61	4,392.90	4,356.67	36.23	121.255	
3,100.00	3,100.00	11,347.00	6,817.64	6.83	82.13	168.34	-2,000.28	412.61	4,304.61	4,268.35	36.27	118.697	
3,200.00	3,200.00	11,347.00	6,817.64	7.05	82.13	168.34	-2,000.28	412.61	4,216.85	4,180.55	36.30	116.152	
3,300.00	3,300.00	11,347.00	6,817.64	7.28	82.13	168.34	-2,000.28	412.61	4,129.65	4,093.30	36.35	113.622	
3,400.00	3,400.00	11,347.00	6,817.64	7.50	82.13	168.34	-2,000.28	412.61	4,043.04	4,006.65	36.39	111.108	
3,500.00	3,500.00	11,347.00	6,817.64	7.73	82.13	168.34	-2,000.28	412.61	3,957.06	3,920.62	36.43	108.613	
3,600.00	3,600.00	11,347.00	6,817.64	7.95	82.13	168.34	-2,000.28	412.61	3,871.75	3,835.27	36.48	106.140	
3,700.00	3,700.00	11,347.00	6,817.64	8.18	82.13	168.34	-2,000.28	412.61	3,787.16	3,750.64	36.52	103.691	
3,800.00	3,800.00	11,347.00	6,817.64	8.40	82.13	168.34	-2,000.28	412.61	3,703.34	3,666.77	36.57	101.268	
3,900.00	3,900.00	11,347.00	6,817.64	8.63	82.13	168.34	-2,000.28	412.61	3,620.35	3,583.73	36.62	98.875	
4,000.00	4,000.00	11,347.00	6,817.64	8.85	82.13	168.34	-2,000.28	412.61	3,538.23	3,501.57	36.66	96.514	
4,100.00	4,100.00	11,347.00	6,817.64	9.07	82.13	168.34	-2,000.28	412.61	3,457.05	3,420.35	36.70	94.189	
4,200.00	4,200.00	11,347.00	6,817.64	9.30	82.13	168.34	-2,000.28	412.61	3,376.89	3,340.14	36.74	91.902	
4,300.00	4,300.00	11,347.00	6,817.64	9.52	82.13	168.34	-2,000.28	412.61	3,297.81	3,261.02	36.78	89.657	
4,400.00	4,400.00	11,347.00	6,817.64	9.75	82.13	168.34	-2,000.28	412.61	3,219.89	3,183.07	36.82	87.457	
4,500.00	4,500.00	11,347.00	6,817.64	9.97	82.13	168.34	-2,000.28	412.61	3,143.22	3,106.37	36.85	85.305	
4,600.00	4,600.00	11,347.00	6,817.64	10.20	82.13	168.34	-2,000.28	412.61	3,067.89	3,031.02	36.87	83.206	
4,700.00	4,700.00	11,347.00	6,817.64	10.42	82.13	168.34	-2,000.28	412.61	2,994.02	2,957.13	36.89	81.163	
4,800.00	4,800.00	11,347.00	6,817.64	10.65	82.13	168.34	-2,000.28	412.61	2,921.69	2,884.79	36.90	79.181	
4,900.00	4,900.00	11,347.00	6,817.64	10.87	82.13	168.34	-2,000.28	412.61	2,851.04	2,814.14	36.90	77.264	
5,000.00	5,000.00	11,347.00	6,817.64	11.10	82.13	168.34	-2,000.28	412.61	2,782.19	2,745.30	36.89	75.416	

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



TDS
Anticollision Report



Company:	COG Production LLC	Local Co-ordinate Reference:	Well Copperhead 31 Fed Com 3H
Project:	Eddy County, NM (NAD-27 2015)	TVD Reference:	KB @ 2966.60usft
Reference Site:	Copperhead 31 Fed Com 3H	MD Reference:	KB @ 2966.60usft
Site Error:	0.00 usft	North Reference:	Grid
Reference Well:	Copperhead 31 Fed Com 3H	Survey Calculation Method:	Minimum Curvature
Well Error:	0.00 usft	Output errors are at:	2.00 sigma
Reference Wellbore:	Lateral 1	Database:	EDM 5000.1 Single User Db
Reference Design:	Design #1	Offset TVD Reference:	Offset Datum

Copperhead 31 Fed Com 3H - Copperhead 31 Federal Com #1H - OH - OH												Offset Site Error:	0.00 usft
Survey Program: 100-Scientific Gyro: 6531-MWD												Offset Well Error:	0.00 usft
Reference	Measured	Vertical	Measured	Vertical	Semi Major Axis	Offset	Highside	Offset Wellbore Centre	Distance	Between	Minimum	Separation	Warning
Depth	Depth	Depth	Depth	Depth	Reference	Offset	Toolface	W-S	Centres	Centres	Separation	Factor	
(usft)	(usft)	(usft)	(usft)	(usft)	(usft)	(usft)	(°)	(usft)	(usft)	(usft)	(usft)		
5,100.00	5,100.00	11,347.00	6,817.64	11.32	82.13	168.34		-2,000.28	412.61	2,715.28	2,678.41	36.87	73.641
5,200.00	5,200.00	11,347.00	6,817.64	11.55	82.13	168.34		-2,000.28	412.61	2,650.45	2,613.61	36.84	71.945
5,300.00	5,300.00	11,347.00	6,817.64	11.77	82.13	168.34		-2,000.28	412.61	2,587.86	2,551.07	36.80	70.332
5,400.00	5,400.00	11,347.00	6,817.64	12.00	82.13	168.34		-2,000.28	412.61	2,527.69	2,490.95	36.74	68.806
5,500.00	5,500.00	11,347.00	6,817.64	12.22	82.13	168.34		-2,000.28	412.61	2,470.09	2,433.43	36.66	67.372
5,600.00	5,600.00	11,347.00	6,817.64	12.45	82.13	168.34		-2,000.28	412.61	2,415.26	2,378.69	36.58	66.035
5,700.00	5,700.00	11,347.00	6,817.64	12.67	82.13	168.34		-2,000.28	412.61	2,363.40	2,326.92	36.47	64.797
5,800.00	5,800.00	11,347.00	6,817.64	12.90	82.13	168.34		-2,000.28	412.61	2,314.69	2,278.33	36.36	63.661
5,900.00	5,900.00	11,347.00	6,817.64	13.12	82.13	168.34		-2,000.28	412.61	2,269.35	2,233.12	36.23	62.630
6,000.00	6,000.00	11,347.00	6,817.64	13.35	82.13	168.34		-2,000.28	412.61	2,227.58	2,191.48	36.10	61.705
6,100.00	6,100.00	11,347.00	6,817.64	13.57	82.13	168.34		-2,000.28	412.61	2,189.58	2,153.62	35.96	60.883
6,200.00	6,200.00	11,347.00	6,817.64	13.80	82.13	168.34		-2,000.28	412.61	2,155.55	2,119.73	35.83	60.163
6,300.00	6,300.00	11,347.00	6,817.64	14.02	82.13	168.34		-2,000.28	412.61	2,125.69	2,089.99	35.70	59.540
6,400.00	6,400.00	11,347.00	6,817.64	14.24	82.13	168.34		-2,000.28	412.61	2,100.17	2,064.58	35.59	59.007
6,500.00	6,500.00	11,347.00	6,817.64	14.47	82.13	168.34		-2,000.28	412.61	2,079.15	2,043.64	35.51	58.556
6,600.00	6,600.00	11,347.00	6,817.64	14.69	82.13	168.34		-2,000.28	412.61	2,062.77	2,027.31	35.46	58.176
6,700.00	6,700.00	11,347.00	6,817.64	14.92	82.13	168.34		-2,000.28	412.61	2,051.14	2,015.69	35.45	57.860
6,800.00	6,800.00	11,347.00	6,817.64	15.14	82.13	168.34		-2,000.28	412.61	2,044.34	2,008.85	35.49	57.597
6,889.24	6,889.24	11,347.00	6,817.64	15.34	82.13	168.34		-2,000.28	412.61	2,042.39	2,006.81	35.58	57.402 CC, ES
6,900.00	6,900.00	11,347.00	6,817.64	15.37	82.13	168.34		-2,000.28	412.61	2,042.42	2,006.83	35.59	57.381
7,000.00	7,000.00	11,347.00	6,817.64	15.59	82.13	168.34		-2,000.28	412.61	2,045.39	2,009.64	35.75	57.209
7,100.00	7,100.00	11,347.00	6,817.64	15.82	82.13	168.34		-2,000.28	412.61	2,053.24	2,017.27	35.97	57.081
7,200.00	7,200.00	11,347.00	6,817.64	16.04	82.13	168.34		-2,000.28	412.61	2,065.90	2,029.65	36.24	57.001
7,300.00	7,300.00	11,347.00	6,817.64	16.27	82.13	168.34		-2,000.28	412.61	2,083.29	2,046.72	36.57	56.974 SF
7,400.00	7,400.00	11,347.00	6,817.64	16.49	82.13	168.34		-2,000.28	412.61	2,105.29	2,068.36	36.93	57.008
7,500.00	7,500.00	11,347.00	6,817.64	16.72	82.13	168.34		-2,000.28	412.61	2,131.76	2,094.43	37.33	57.112
7,600.00	7,600.00	11,347.00	6,817.64	16.94	82.13	168.34		-2,000.28	412.61	2,162.53	2,124.79	37.75	57.293
7,700.00	7,700.00	11,347.00	6,817.64	17.17	82.13	168.34		-2,000.28	412.61	2,197.43	2,159.25	38.18	57.557
7,800.00	7,800.00	11,347.00	6,817.64	17.39	82.13	168.34		-2,000.28	412.61	2,236.26	2,197.64	38.62	57.910
7,900.00	7,900.00	11,347.00	6,817.64	17.62	82.13	168.34		-2,000.28	412.61	2,278.82	2,239.76	39.05	58.351
8,000.00	8,000.00	11,347.00	6,817.64	17.84	82.13	168.34		-2,000.28	412.61	2,324.90	2,285.42	39.48	58.883
8,100.00	8,100.00	11,347.00	6,817.64	18.07	82.13	168.34		-2,000.28	412.61	2,374.30	2,334.40	39.90	59.503
8,200.00	8,200.00	11,347.00	6,817.64	18.29	82.13	168.34		-2,000.28	412.61	2,426.82	2,386.51	40.31	60.210
8,300.00	8,300.00	11,347.00	6,817.64	18.52	82.13	168.34		-2,000.28	412.61	2,482.26	2,441.56	40.69	60.998
8,400.00	8,400.00	11,347.00	6,817.64	18.74	82.13	168.34		-2,000.28	412.61	2,540.43	2,499.36	41.06	61.864
8,500.00	8,500.00	11,347.00	6,817.64	18.96	82.13	168.34		-2,000.28	412.61	2,601.14	2,559.72	41.42	62.802
8,600.00	8,600.00	11,347.00	6,817.64	19.19	82.13	168.34		-2,000.28	412.61	2,664.22	2,622.47	41.75	63.808
8,700.00	8,700.00	11,347.00	6,817.64	19.41	82.13	168.34		-2,000.28	412.61	2,729.51	2,687.44	42.07	64.875
8,800.00	8,800.00	11,347.00	6,817.64	19.64	82.13	168.34		-2,000.28	412.61	2,796.85	2,754.47	42.38	65.999
8,900.00	8,900.00	11,347.00	6,817.64	19.86	82.13	168.34		-2,000.28	412.61	2,866.10	2,823.43	42.67	67.174
9,000.00	9,000.00	11,347.00	6,817.64	20.09	82.13	168.34		-2,000.28	412.61	2,937.12	2,894.18	42.94	68.395
9,100.00	9,100.00	11,347.00	6,817.64	20.31	82.13	168.34		-2,000.28	412.61	3,009.79	2,966.58	43.21	69.658
9,200.00	9,200.00	11,347.00	6,817.64	20.54	82.13	168.34		-2,000.28	412.61	3,083.99	3,040.52	43.46	70.957
9,300.00	9,300.00	11,347.00	6,817.64	20.76	82.13	168.34		-2,000.28	412.61	3,159.61	3,115.90	43.71	72.288
9,400.00	9,400.00	11,347.00	6,817.64	20.99	82.13	168.34		-2,000.28	412.61	3,236.55	3,192.61	43.95	73.647
9,500.00	9,500.00	11,347.00	6,817.64	21.21	82.13	168.34		-2,000.28	412.61	3,314.73	3,270.55	44.18	75.030
9,600.00	9,600.00	11,347.00	6,817.64	21.44	82.13	168.34		-2,000.28	412.61	3,394.05	3,349.65	44.41	76.434
9,700.00	9,700.00	11,347.00	6,817.64	21.66	82.13	168.34		-2,000.28	412.61	3,474.44	3,429.81	44.63	77.854
9,800.00	9,800.00	11,347.00	6,817.64	21.89	82.13	168.34		-2,000.28	412.61	3,555.83	3,510.98	44.85	79.289
9,900.00	9,900.00	11,347.00	6,817.64	22.11	82.13	168.34		-2,000.28	412.61	3,638.14	3,593.07	45.06	80.735
10,000.00	10,000.00	11,347.00	6,817.64	22.34	82.13	168.34		-2,000.28	412.61	3,721.32	3,676.04	45.28	82.189
10,100.00	10,100.00	11,347.00	6,817.64	22.56	82.13	168.34		-2,000.28	412.61	3,805.31	3,759.81	45.49	83.649

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



TDS
Anticollision Report



Company:	COG Production LLC	Local Co-ordinate Reference:	Well Copperhead 31 Fed Com 3H
Project:	Eddy County, NM (NAD-27 2015)	TVD Reference:	KB @ 2966.60usft
Reference Site:	Copperhead 31 Fed Com 3H	MD Reference:	KB @ 2966.60usft
Site Error:	0.00 usft	North Reference:	Grid
Reference Well:	Copperhead 31 Fed Com 3H	Survey Calculation Method:	Minimum Curvature
Well Error:	0.00 usft	Output errors are at:	2.00 sigma
Reference Wellbore:	Lateral 1	Database:	EDM 5000.1 Single User Db
Reference Design:	Design #1	Offset-TVD Reference:	Offset Datum

Offset Design: Copperhead 31 Fed Com 3H - Copperhead 31 Federal Com #1H - OH - OH														Offset Site Error:	0.00 usft
Survey Program: 100-Scientific Gyro, 6531-MWD														Offset Well Error:	0.00 usft
Reference	Offset	Semi Major Axis	Reference	Offset	Highside	Offset Wellbore Centre	Distance	Minimum	Separation	Warning					
Measured	Vertical	Measured	Vertical	Reference	Offset	Toolface	Between	Between	Separation	Factor					
Depth	Depth	Depth	Depth	(usft)	(usft)	(°)	Centres	Ellipses	(usft)						
(usft)	(usft)	(usft)	(usft)	(usft)	(usft)	(°)	(usft)	(usft)	(usft)						
10,200.00	10,200.00	11,347.00	6,817.64	22.79	82.13	168.34	-2,000.28	412.61	3,890.05	3,844.35	45.70	85.113			
10,264.20	10,264.20	11,347.00	6,817.64	22.93	82.13	168.34	-2,000.28	412.61	3,944.84	3,899.00	45.84	86.054			
10,275.00	10,275.00	11,347.00	6,817.64	22.95	82.13	-10.48	-2,000.28	412.61	3,954.02	3,908.15	45.86	86.216			
10,300.00	10,299.97	11,347.00	6,817.64	22.99	82.13	-9.69	-2,000.28	412.61	3,974.80	3,928.90	45.91	86.587			
10,325.00	10,324.84	11,347.00	6,817.64	23.04	82.13	-9.03	-2,000.28	412.61	3,994.90	3,948.95	45.95	86.944			
10,350.00	10,349.54	11,347.00	6,817.64	23.08	82.13	-8.47	-2,000.28	412.61	4,014.26	3,968.27	45.99	87.282			
10,375.00	10,374.01	11,347.00	6,817.64	23.12	82.13	-8.00	-2,000.28	412.61	4,032.84	3,986.80	46.04	87.600			
10,400.00	10,398.18	11,347.00	6,817.64	23.16	82.13	-7.59	-2,000.28	412.61	4,050.61	4,004.53	46.08	87.899			
10,425.00	10,421.98	11,347.00	6,817.64	23.20	82.13	-7.23	-2,000.28	412.61	4,067.52	4,021.39	46.13	88.177			
10,450.00	10,445.35	11,347.00	6,817.64	23.24	82.13	-6.92	-2,000.28	412.61	4,083.55	4,037.37	46.18	88.435			
10,475.00	10,468.22	11,347.00	6,817.64	23.29	82.13	-6.65	-2,000.28	412.61	4,098.65	4,052.42	46.22	88.671			
10,500.00	10,490.53	11,347.00	6,817.64	23.32	82.13	-6.42	-2,000.28	412.61	4,112.79	4,066.52	46.27	88.886			
10,525.00	10,512.22	11,347.00	6,817.64	23.36	82.13	-6.21	-2,000.28	412.61	4,125.96	4,079.64	46.32	89.079			
10,550.00	10,533.24	11,347.00	6,817.64	23.40	82.13	-6.04	-2,000.28	412.61	4,138.11	4,091.75	46.37	89.250			
10,575.00	10,553.51	11,347.00	6,817.64	23.44	82.13	-5.88	-2,000.28	412.61	4,149.23	4,102.82	46.41	89.399			
10,600.00	10,572.99	11,347.00	6,817.64	23.49	82.13	-5.75	-2,000.28	412.61	4,159.30	4,112.84	46.46	89.525			
10,625.00	10,591.63	11,347.00	6,817.64	23.54	82.13	-5.63	-2,000.28	412.61	4,168.29	4,121.78	46.51	89.627			
10,650.00	10,609.37	11,347.00	6,817.64	23.59	82.13	-5.54	-2,000.28	412.61	4,176.19	4,129.63	46.55	89.706			
10,675.00	10,626.16	11,347.00	6,817.64	23.65	82.13	-5.45	-2,000.28	412.61	4,182.98	4,136.38	46.60	89.762			
10,700.00	10,641.96	11,347.00	6,817.64	23.72	82.13	-5.39	-2,000.28	412.61	4,188.64	4,142.00	46.65	89.793			
10,725.00	10,656.73	11,347.00	6,817.64	23.79	82.13	-5.34	-2,000.28	412.61	4,193.18	4,146.48	46.69	89.799			
10,750.00	10,670.42	11,347.00	6,817.64	23.86	82.13	-5.30	-2,000.28	412.61	4,196.57	4,149.83	46.74	89.781			
10,775.00	10,682.99	11,347.00	6,817.64	23.95	82.13	-5.27	-2,000.28	412.61	4,198.82	4,152.03	46.79	89.739			
10,800.00	10,694.42	11,347.00	6,817.64	24.04	82.13	-5.26	-2,000.28	412.61	4,199.91	4,153.07	46.84	89.671			
10,825.00	10,704.67	11,347.00	6,817.64	24.13	82.13	-5.26	-2,000.28	412.61	4,199.85	4,152.96	46.88	89.578			
10,850.00	10,713.71	11,347.00	6,817.64	24.23	82.13	-5.28	-2,000.28	412.61	4,198.63	4,151.70	46.93	89.460			
10,875.00	10,721.52	11,347.00	6,817.64	24.34	82.13	-5.30	-2,000.28	412.61	4,196.27	4,149.29	46.98	89.317			
10,900.00	10,728.07	11,347.00	6,817.64	24.46	82.13	-5.34	-2,000.28	412.61	4,192.75	4,145.72	47.03	89.149			
10,925.00	10,733.36	11,347.00	6,817.64	24.58	82.13	-5.39	-2,000.28	412.61	4,188.10	4,141.02	47.08	88.956			
10,950.00	10,737.36	11,347.00	6,817.64	24.71	82.13	-5.46	-2,000.28	412.61	4,182.31	4,135.18	47.13	88.740			
10,975.00	10,740.06	11,347.00	6,817.64	24.85	82.13	-5.55	-2,000.28	412.61	4,175.41	4,128.23	47.18	88.499			
11,000.00	10,741.46	11,347.00	6,817.64	24.99	82.13	-5.64	-2,000.28	412.61	4,167.39	4,120.16	47.23	88.235			
11,014.04	10,741.67	11,347.00	6,817.64	25.07	82.13	-5.71	-2,000.28	412.61	4,162.41	4,115.15	47.26	88.074			
11,100.00	10,741.70	11,347.00	6,817.64	25.62	82.13	-5.71	-2,000.28	412.61	4,131.65	4,084.22	47.43	87.118			
11,200.00	10,741.73	11,347.00	6,817.64	26.36	82.13	-5.71	-2,000.28	412.61	4,097.84	4,050.19	47.65	85.996			
11,300.00	10,741.77	11,347.00	6,817.64	27.21	82.13	-5.71	-2,000.28	412.61	4,066.21	4,018.29	47.92	84.862			
11,400.00	10,741.80	11,347.00	6,817.64	28.15	82.13	-5.71	-2,000.28	412.61	4,036.81	3,988.59	48.22	83.716			
11,500.00	10,741.84	11,347.00	6,817.64	29.18	82.13	-5.71	-2,000.28	412.61	4,009.69	3,961.12	48.57	82.563			
11,600.00	10,741.87	11,347.00	6,817.64	30.28	82.13	-5.71	-2,000.28	412.61	3,984.89	3,935.94	48.95	81.407			
11,700.00	10,741.91	11,347.00	6,817.64	31.45	82.13	-5.71	-2,000.28	412.61	3,962.47	3,913.09	49.37	80.255			
11,800.00	10,741.94	11,347.00	6,817.64	32.69	82.13	-5.71	-2,000.28	412.61	3,942.45	3,892.62	49.83	79.115			
11,900.00	10,741.98	11,347.00	6,817.64	33.97	82.13	-5.71	-2,000.28	412.61	3,924.88	3,874.56	50.32	77.993			
12,000.00	10,742.01	11,347.00	6,817.64	35.31	82.13	-5.71	-2,000.28	412.61	3,909.79	3,858.94	50.84	76.897			
12,100.00	10,742.05	11,347.00	6,817.64	36.68	82.13	-5.71	-2,000.28	412.61	3,897.21	3,845.82	51.39	75.836			
12,200.00	10,742.08	11,347.00	6,817.64	38.10	82.13	-5.71	-2,000.28	412.61	3,887.16	3,835.20	51.95	74.818			
12,300.00	10,742.12	11,347.00	6,817.64	39.55	82.13	-5.71	-2,000.28	412.61	3,879.66	3,827.12	52.54	73.848			
12,400.00	10,742.15	11,347.00	6,817.64	41.03	82.13	-5.71	-2,000.28	412.61	3,874.73	3,821.60	53.13	72.934			
12,500.00	10,742.19	11,299.91	6,818.71	42.53	81.31	-5.67	-2,047.31	410.49	3,871.84	3,818.50	53.34	72.583			
12,600.00	10,742.22	11,241.14	6,819.42	44.07	80.29	-5.63	-2,106.04	408.47	3,870.16	3,816.68	53.48	72.366			
12,700.00	10,742.26	11,147.89	6,820.09	45.62	78.70	-5.57	-2,199.24	405.59	3,869.03	3,815.68	53.35	72.516			
12,800.00	10,742.29	11,054.65	6,820.60	47.19	77.11	-5.51	-2,292.43	402.67	3,868.09	3,814.85	53.24	72.655			
12,900.00	10,742.33	10,961.42	6,820.95	48.79	75.52	-5.44	-2,385.62	399.69	3,867.32	3,814.19	53.13	72.784			

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



TDS
Anticollision Report



Company:	COG Production LLC	Local Co-ordinate Reference:	Well Copperhead 31 Fed Com 3H
Project:	Eddy County, NM (NAD-27 2015)	TVD Reference:	KB @ 2966.60usft
Reference Site:	Copperhead 31 Fed Com 3H	MD Reference:	KB @ 2966.60usft
Site Error:	0.00 usft	North Reference:	Grid
Reference Well:	Copperhead 31 Fed Com 3H	Survey Calculation Method:	Minimum Curvature
Well Error:	0.00 usft	Output errors are at:	2.00 sigma
Reference Wellbore:	Lateral 1	Database:	EDM 5000.1 Single User Db
Reference Design:	Design #1	Offset TVD Reference:	Offset Datum

Offset Design Copperhead 31 Fed Com 3H - Copperhead 31 Federal Com #1H - OH - OH													Offset Site Error:
Survey Program: 100-Scientific Gyro, 6531-MWD													Offset Well Error:
Reference													0.00 usft
Offset													0.00 usft
Semi Major Axis													
Measured	Vertical	Measured	Vertical	Reference	Offset	Highside	Offset Wellbore Centre	Distance	Between	Between	Minimum	Separation	Warning
Depth	Depth	Depth	Depth	Depth	Depth	Depth	Depth	Between	Centres	Ellipses	Separation	Factor	
(usft)	(usft)	(usft)	(usft)	(usft)	(usft)	(usft)	(usft)	(usft)	(usft)	(usft)	(usft)		
13,000.00	10,742.36	10,859.86	6,821.15	50.39	73.79	-5.37	-2,487.12	396.38	3,866.72	3,813.75	52.97	72.997	
13,100.00	10,742.40	10,744.91	6,821.99	52.02	71.80	-5.29	-2,602.00	392.18	3,865.52	3,812.81	52.71	73.340	
13,200.00	10,742.43	10,692.00	6,822.28	53.65	70.86	-5.26	-2,654.89	390.96	3,864.83	3,811.88	52.95	72.989	
13,222.30	10,742.44	10,667.48	6,822.30	54.02	70.44	-5.25	-2,679.41	390.60	3,864.76	3,811.86	52.91	73.048	
13,300.00	10,742.47	10,629.62	6,822.01	55.30	69.78	-5.24	-2,717.26	390.24	3,865.21	3,812.08	53.13	72.752	
13,400.00	10,742.50	10,540.79	6,820.43	56.96	68.25	-5.21	-2,806.07	389.71	3,866.80	3,813.69	53.11	72.808	
13,500.00	10,742.54	10,370.85	6,819.02	58.63	65.35	-5.10	-2,975.93	384.88	3,867.28	3,814.83	52.45	73.738	
13,600.00	10,742.57	10,213.29	6,820.03	60.31	62.65	-4.93	-3,133.20	375.51	3,865.98	3,814.13	51.85	74.555	
13,700.00	10,742.61	10,131.00	6,820.88	62.00	61.24	-4.84	-3,215.33	370.34	3,864.33	3,812.45	51.88	74.493	
13,800.00	10,742.64	10,037.00	6,821.61	63.69	59.63	-4.75	-3,309.18	365.11	3,863.01	3,811.19	51.82	74.542	
13,900.00	10,742.67	9,968.94	6,821.87	65.40	58.43	-4.69	-3,377.17	361.96	3,862.16	3,810.17	51.98	74.298	
13,943.12	10,742.69	9,943.00	6,821.86	66.13	57.97	-4.67	-3,403.09	361.11	3,862.04	3,809.96	52.08	74.155	
14,000.00	10,742.71	9,900.42	6,821.69	67.11	57.23	-4.64	-3,445.66	360.00	3,862.12	3,809.97	52.15	74.064	
14,100.00	10,742.74	9,831.92	6,820.99	68.82	56.05	-4.61	-3,514.14	358.68	3,862.90	3,810.58	52.31	73.840	
14,200.00	10,742.78	9,756.00	6,819.62	70.55	54.74	-4.58	-3,590.04	357.90	3,864.50	3,812.07	52.43	73.706	
14,300.00	10,742.81	9,685.08	6,817.44	72.27	51.82	-4.49	-3,760.89	354.29	3,865.64	3,813.82	51.81	74.610	
14,400.00	10,742.85	9,394.11	6,818.79	74.00	48.56	-4.30	-3,951.57	343.96	3,864.44	3,813.45	51.00	75.781	
14,500.00	10,742.88	9,332.63	6,819.66	75.74	47.49	-4.22	-4,012.89	339.68	3,862.49	3,811.26	51.23	75.398	
14,600.00	10,742.92	9,278.30	6,819.80	77.48	46.54	-4.16	-4,067.12	336.37	3,861.72	3,810.20	51.52	74.955	
14,614.76	10,742.92	9,270.27	6,819.77	77.74	46.40	-4.16	-4,075.14	335.92	3,861.71	3,810.15	51.56	74.892	
14,700.00	10,742.95	9,197.00	6,818.88	79.23	45.12	-4.09	-4,148.31	332.27	3,862.31	3,810.71	51.60	74.850	
14,800.00	10,742.99	9,158.57	6,818.07	80.98	44.47	-4.05	-4,186.70	330.70	3,863.67	3,811.65	52.02	74.271	
14,900.00	10,743.02	9,072.45	6,815.92	82.73	43.01	-3.99	-4,272.75	327.88	3,865.85	3,813.78	52.07	74.238	
15,000.00	10,743.06	8,959.03	6,813.18	84.49	41.08	-3.90	-4,386.06	323.66	3,867.95	3,816.03	51.92	74.502	
15,100.00	10,743.09	8,868.59	6,811.11	86.25	39.56	-3.83	-4,476.39	319.67	3,869.89	3,817.95	51.94	74.509	
15,200.00	10,743.13	8,779.43	6,808.65	88.01	38.07	-3.75	-4,565.44	316.15	3,872.31	3,820.34	51.98	74.503	
15,300.00	10,743.16	8,668.03	6,805.72	89.77	36.22	-3.66	-4,676.71	311.60	3,874.63	3,822.78	51.84	74.735	
15,400.00	10,743.20	8,495.12	6,803.36	91.54	33.27	-3.54	-4,849.50	305.96	3,875.64	3,824.39	51.25	75.615	
15,500.00	10,743.23	8,401.03	6,802.86	93.31	31.66	-3.49	-4,943.57	304.13	3,876.01	3,824.74	51.28	75.592	
15,600.00	10,743.27	8,269.66	6,802.43	95.08	29.45	-3.45	-5,074.93	303.07	3,876.30	3,825.28	51.02	75.969	
15,700.00	10,743.30	8,166.00	6,803.14	96.86	27.74	-3.44	-5,178.59	303.96	3,875.60	3,824.61	51.00	75.999	
15,800.00	10,743.34	8,070.82	6,803.72	98.63	26.11	-3.43	-5,273.78	304.04	3,874.97	3,823.93	51.04	75.924	
15,862.50	10,743.36	8,021.14	6,803.76	99.75	25.27	-3.41	-5,323.44	303.62	3,874.86	3,823.73	51.13	75.778	
15,900.00	10,743.37	7,991.34	6,803.69	100.41	24.76	-3.40	-5,353.24	303.22	3,874.90	3,823.71	51.19	75.694	
16,000.00	10,743.41	7,884.00	6,802.90	102.19	22.93	-3.34	-5,460.55	300.83	3,875.49	3,824.35	51.14	75.788	
16,100.00	10,743.44	7,822.92	6,802.19	103.98	21.88	-3.30	-5,521.60	299.32	3,876.28	3,824.85	51.43	75.370	
16,200.00	10,743.48	7,746.74	6,801.15	105.76	20.61	-3.27	-5,597.76	297.98	3,877.53	3,825.90	51.62	75.113	
16,300.00	10,743.51	7,679.85	6,799.67	107.55	19.50	-3.23	-5,664.63	296.65	3,879.59	3,827.70	51.88	74.774	
16,400.00	10,743.55	7,613.00	6,797.60	109.33	18.40	-3.20	-5,731.43	295.09	3,882.50	3,830.36	52.14	74.460	
16,500.00	10,743.58	7,542.00	6,794.77	111.12	17.24	-3.15	-5,802.34	293.18	3,886.27	3,833.90	52.37	74.210	
16,600.00	10,743.62	7,369.05	6,788.89	112.91	14.53	-3.05	-5,975.14	289.05	3,889.56	3,837.55	52.01	74.792	
16,700.00	10,743.65	7,191.78	6,786.62	114.70	11.76	-2.98	-6,152.38	286.58	3,890.69	3,839.07	51.62	75.372	
16,800.00	10,743.69	7,186.00	6,786.60	116.50	11.67	-2.97	-6,158.15	286.54	3,892.06	3,839.75	52.31	74.408	
16,900.00	10,743.72	7,186.00	6,786.60	118.29	11.67	-2.97	-6,158.15	286.54	3,895.99	3,842.99	53.01	73.501	
17,000.00	10,743.76	7,131.42	6,784.75	120.08	10.77	-2.97	-6,212.69	286.83	3,900.46	3,847.03	53.43	73.008	
17,100.00	10,743.79	7,112.64	6,783.38	121.88	10.47	-2.97	-6,231.42	287.22	3,907.87	3,853.86	54.00	72.363	
17,200.00	10,743.83	7,061.00	6,777.62	123.68	9.62	-2.98	-6,282.70	289.05	3,918.07	3,863.67	54.40	72.018	
17,300.00	10,743.86	7,061.00	6,777.62	125.47	9.62	-2.98	-6,282.70	289.05	3,929.00	3,873.97	55.03	71.399	
17,400.00	10,743.90	7,061.00	6,777.62	127.27	9.62	-2.98	-6,282.70	289.05	3,942.43	3,886.80	55.63	70.871	
17,500.00	10,743.93	7,061.00	6,777.62	129.07	9.62	-2.98	-6,282.70	289.05	3,958.34	3,902.14	56.20	70.432	
17,600.00	10,743.97	7,061.00	6,777.62	130.87	9.62	-2.98	-6,282.70	289.05	3,976.70	3,919.95	56.75	70.078	
17,696.81	10,744.00	7,061.00	6,777.62	132.62	9.62	-2.98	-6,282.70	289.05	3,996.78	3,939.53	57.25	69.814	

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



TDS
Anticollision Report



Company:	COGProduction LLC	Local Co-ordinate Reference:	Well Copperhead 31 Fed Com 3H
Project:	Eddy County, NM (NAD-27 2015)	TVD Reference:	KB @ 2966.60usft
Reference Site:	Copperhead 31 Fed Com 3H	MD Reference:	KB @ 2966.60usft
Site Error:	0.00 usft	North Reference:	Grid
Reference Well:	Copperhead 31 Fed Com 3H	Survey Calculation Method:	Minimum Curvature
Well Error:	0.00 usft	Output errors are at:	2.00 sigma
Reference Wellbore:	Lateral 1	Database:	EDM 5000.1 Single User Db
Reference Design:	Design #1	Offset TVD Reference:	Offset Datum



TDS
Anticollision Report



Company: COG Production LLC
Project: Eddy County, NM (NAD-27 2015)
Reference Site: Copperhead 31 Fed Com 3H
Site Error: 0.00 usft
Reference Well: Copperhead 31 Fed Com 3H
Well Error: 0.00 usft
Reference Wellbore: Lateral 1
Reference Design: Design #1

Local Co-ordinate Reference:
TVD Reference: KB @ 2966.60usft
MD Reference: KB @ 2966.60usft
North Reference: Grid
Survey Calculation Method: Minimum Curvature
Output errors are at: 2.00 sigma
Database: EDM 5000.1 Single User Db
Offset TVD Reference: Offset Datum

Offset Design: Copperhead 31 Fed Com 3H - Copperhead 31 Federal Com #1H - ST01 - ST01													
Survey Program: 100-Scientific Gyro 5631-MWD													
Offset Well Error: 0.00 usft													
Reference	Offset	Semi Major Axis	Distance	Offset Wellbore Centre	Between Centres	Between Ellipses	Minimum Separation	Separation Factor	Warning				
Measured Depth (usft)	Vertical Depth (usft)	Measured Depth (usft)	Vertical Depth (usft)	Reference (usft)	Offset (usft)	Highside Toolface (°)	N-S (usft)	E-W (usft)					
0.00	0.00	0.00	0.00	0.00	0.00	177.65	-6,728.60	276.20	6,734.65				
100.00	100.00	31.15	31.15	0.08	0.03	177.65	-6,728.59	276.18	6,734.26	6,734.15	0.11	N/A	
190.61	190.61	119.01	119.01	0.29	0.11	177.65	-6,728.53	275.93	6,734.19	6,733.82	0.37	N/A	
200.00	200.00	125.42	125.42	0.31	0.12	177.65	-6,728.54	275.90	6,734.19	6,733.79	0.40	N/A	
300.00	300.00	200.00	200.00	0.53	0.20	177.66	-6,728.78	275.54	6,734.47	6,733.80	0.67	9,995.061	
400.00	400.00	11,522.00	6,780.43	0.76	87.28	166.45	-1,685.15	406.04	6,680.82	6,642.17	38.65	172.849	
500.00	500.00	11,522.00	6,780.43	0.98	87.28	166.45	-1,685.15	406.04	6,584.29	6,545.67	38.62	170.490	
600.00	600.00	11,522.00	6,780.43	1.21	87.28	166.45	-1,685.15	406.04	6,487.87	6,449.28	38.59	168.122	
700.00	700.00	11,522.00	6,780.43	1.43	87.28	166.45	-1,685.15	406.04	6,391.57	6,353.00	38.56	165.745	
800.00	800.00	11,522.00	6,780.43	1.66	87.28	166.45	-1,685.15	406.04	6,295.37	6,256.83	38.54	163.359	
900.00	900.00	11,522.00	6,780.43	1.88	87.28	166.45	-1,685.15	406.04	6,199.30	6,160.78	38.51	160.965	
1,000.00	1,000.00	11,522.00	6,780.43	2.11	87.28	166.45	-1,685.15	406.04	6,103.35	6,064.86	38.49	158.562	
1,100.00	1,100.00	11,522.00	6,780.43	2.33	87.28	166.45	-1,685.15	406.04	6,007.54	5,969.06	38.47	156.150	
1,200.00	1,200.00	11,522.00	6,780.43	2.56	87.28	166.45	-1,685.15	406.04	5,911.86	5,873.40	38.46	153.730	
1,300.00	1,300.00	11,522.00	6,780.43	2.78	87.28	166.45	-1,685.15	406.04	5,816.33	5,777.89	38.44	151.302	
1,400.00	1,400.00	11,522.00	6,780.43	3.01	87.28	166.45	-1,685.15	406.04	5,720.95	5,682.52	38.43	148.866	
1,500.00	1,500.00	11,522.00	6,780.43	3.23	87.28	166.45	-1,685.15	406.04	5,625.73	5,587.31	38.42	146.421	
1,600.00	1,600.00	11,522.00	6,780.43	3.46	87.28	166.45	-1,685.15	406.04	5,530.68	5,492.27	38.42	143.969	
1,700.00	1,700.00	11,522.00	6,780.43	3.68	87.28	166.45	-1,685.15	406.04	5,435.81	5,397.40	38.41	141.509	
1,800.00	1,800.00	11,522.00	6,780.43	3.91	87.28	166.45	-1,685.15	406.04	5,341.13	5,302.71	38.41	139.043	
1,900.00	1,900.00	11,522.00	6,780.43	4.13	87.28	166.45	-1,685.15	406.04	5,246.64	5,208.22	38.42	136.569	
2,000.00	2,000.00	11,522.00	6,780.43	4.35	87.28	166.45	-1,685.15	406.04	5,152.36	5,113.94	38.42	134.090	
2,100.00	2,100.00	11,522.00	6,780.43	4.58	87.28	166.45	-1,685.15	406.04	5,058.30	5,019.87	38.44	131.604	
2,200.00	2,200.00	11,522.00	6,780.43	4.80	87.28	166.45	-1,685.15	406.04	4,964.47	4,926.02	38.45	129.114	
2,300.00	2,300.00	11,522.00	6,780.43	5.03	87.28	166.45	-1,685.15	406.04	4,870.89	4,832.42	38.47	126.620	
2,400.00	2,400.00	11,522.00	6,780.43	5.25	87.28	166.45	-1,685.15	406.04	4,777.57	4,739.08	38.49	124.122	
2,500.00	2,500.00	11,522.00	6,780.43	5.48	87.28	166.45	-1,685.15	406.04	4,684.53	4,646.01	38.52	121.622	
2,600.00	2,600.00	11,522.00	6,780.43	5.70	87.28	166.45	-1,685.15	406.04	4,591.77	4,553.23	38.55	119.121	
2,700.00	2,700.00	11,522.00	6,780.43	5.93	87.28	166.45	-1,685.15	406.04	4,499.33	4,460.75	38.58	116.620	
2,800.00	2,800.00	11,522.00	6,780.43	6.15	87.28	166.45	-1,685.15	406.04	4,407.22	4,368.60	38.62	114.120	
2,900.00	2,900.00	11,522.00	6,780.43	6.38	87.28	166.45	-1,685.15	406.04	4,315.46	4,276.79	38.66	111.623	
3,000.00	3,000.00	11,522.00	6,780.43	6.60	87.28	166.45	-1,685.15	406.04	4,224.07	4,185.36	38.71	109.130	
3,100.00	3,100.00	11,522.00	6,780.43	6.83	87.28	166.45	-1,685.15	406.04	4,133.08	4,094.32	38.76	106.643	
3,200.00	3,200.00	11,522.00	6,780.43	7.05	87.28	166.45	-1,685.15	406.04	4,042.52	4,003.71	38.81	104.164	
3,300.00	3,300.00	11,522.00	6,780.43	7.28	87.28	166.45	-1,685.15	406.04	3,952.41	3,913.54	38.87	101.694	
3,400.00	3,400.00	11,522.00	6,780.43	7.50	87.28	166.45	-1,685.15	406.04	3,862.79	3,823.86	38.93	99.235	
3,500.00	3,500.00	11,522.00	6,780.43	7.73	87.28	166.45	-1,685.15	406.04	3,773.69	3,734.70	38.99	96.790	
3,600.00	3,600.00	11,522.00	6,780.43	7.95	87.28	166.45	-1,685.15	406.04	3,685.15	3,646.09	39.05	94.360	
3,700.00	3,700.00	11,522.00	6,780.43	8.18	87.28	166.45	-1,685.15	406.04	3,597.21	3,558.09	39.12	91.948	
3,800.00	3,800.00	11,522.00	6,780.43	8.40	87.28	166.45	-1,685.15	406.04	3,509.91	3,470.72	39.19	89.555	
3,900.00	3,900.00	11,522.00	6,780.43	8.63	87.28	166.45	-1,685.15	406.04	3,423.32	3,384.05	39.26	87.185	
4,000.00	4,000.00	11,522.00	6,780.43	8.85	87.28	166.45	-1,685.15	406.04	3,337.47	3,298.13	39.34	84.840	
4,100.00	4,100.00	11,522.00	6,780.43	9.07	87.28	166.45	-1,685.15	406.04	3,252.43	3,213.01	39.41	82.522	
4,200.00	4,200.00	11,522.00	6,780.43	9.30	87.28	166.45	-1,685.15	406.04	3,168.26	3,128.77	39.49	80.235	
4,300.00	4,300.00	11,522.00	6,780.43	9.52	87.28	166.45	-1,685.15	406.04	3,085.04	3,045.48	39.56	77.982	
4,400.00	4,400.00	11,522.00	6,780.43	9.75	87.28	166.45	-1,685.15	406.04	3,002.84	2,963.21	39.63	75.765	
4,500.00	4,500.00	11,522.00	6,780.43	9.97	87.28	166.45	-1,685.15	406.04	2,921.75	2,882.05	39.70	73.588	
4,600.00	4,600.00	11,522.00	6,780.43	10.20	87.28	166.45	-1,685.15	406.04	2,841.87	2,802.10	39.77	71.456	
4,700.00	4,700.00	11,522.00	6,780.43	10.42	87.28	166.45	-1,685.15	406.04	2,763.30	2,723.47	39.83	69.371	
4,800.00	4,800.00	11,522.00	6,780.43	10.65	87.28	166.45	-1,685.15	406.04	2,686.15	2,646.26	39.89	67.338	
4,900.00	4,900.00	11,522.00	6,780.43	10.87	87.28	166.45	-1,685.15	406.04	2,610.56	2,570.62	39.94	65.361	
5,000.00	5,000.00	11,522.00	6,780.43	11.10	87.28	166.45	-1,685.15	406.04	2,536.65	2,496.67	39.98	63.445	

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



TDS
Anticollision Report



Company:	COG Production LLC	Local Co-ordinate Reference:	Well Copperhead 31 Fed Com 3H
Project:	Eddy County, NM (NAD-27 2015)	TVD Reference:	KB @ 2966.60usft
Reference Site:	Copperhead 31 Fed Com 3H	MD Reference:	KB @ 2966.60usft
Site Error:	0.00 usft	North Reference:	Grid
Reference Well:	Copperhead 31 Fed Com 3H	Survey Calculation Method:	Minimum Curvature
Well Error:	0.00 usft	Output errors are at:	2.00 sigma
Reference Wellbore:	Lateral 1	Database:	EDM 5000.1 Single User Db
Reference Design:	Design #1	Offset-TVD Reference:	Offset Datum

Offset Design: Copperhead 31 Fed Com 3H - Copperhead 31 Federal Com #1H - ST01 - ST01													Offset Site Error:
Survey Program: 1100-Scientific Gyro 5631-MWD													Offset Well Error:
Reference	Offset	Semi Major Axis	Distance										
Measured Depth (usft)	Vertical Depth (usft)	Measured Depth (usft)	Vertical Depth (usft)	Reference (usft)	Offset (usft)	Highside Toolface (°)	Offset Wellbore Centre N-S (usft)	Offset Wellbore Centre E-W (usft)	Between Centres (usft)	Between Ellipses (usft)	Minimum Separation (usft)	Separation Factor	Warning
5,100.00	5,100.00	11,522.00	6,780.43	11.32	87.28	166.45	-1,685.15	406.04	2,464.59	2,424.58	40.01	61.596	
5,200.00	5,200.00	11,522.00	6,780.43	11.55	87.28	166.45	-1,685.15	406.04	2,394.54	2,354.50	40.03	59.818	
5,300.00	5,300.00	11,522.00	6,780.43	11.77	87.28	166.45	-1,685.15	406.04	2,326.67	2,286.64	40.03	58.116	
5,400.00	5,400.00	11,522.00	6,780.43	12.00	87.28	166.45	-1,685.15	406.04	2,261.19	2,221.17	40.02	56.498	
5,500.00	5,500.00	11,522.00	6,780.43	12.22	87.28	166.45	-1,685.15	406.04	2,198.31	2,158.32	39.99	54.968	
5,600.00	5,600.00	11,522.00	6,780.43	12.45	87.28	166.45	-1,685.15	406.04	2,138.26	2,098.32	39.94	53.532	
5,700.00	5,700.00	11,522.00	6,780.43	12.67	87.28	166.45	-1,685.15	406.04	2,081.29	2,041.42	39.87	52.198	
5,800.00	5,800.00	11,522.00	6,780.43	12.90	87.28	166.45	-1,685.15	406.04	2,027.65	1,987.87	39.78	50.969	
5,900.00	5,900.00	11,522.00	6,780.43	13.12	87.28	166.45	-1,685.15	406.04	1,977.61	1,937.94	39.67	49.852	
6,000.00	6,000.00	11,522.00	6,780.43	13.35	87.28	166.45	-1,685.15	406.04	1,931.46	1,891.92	39.54	48.850	
6,100.00	6,100.00	11,522.00	6,780.43	13.57	87.28	166.45	-1,685.15	406.04	1,889.48	1,850.09	39.39	47.968	
6,200.00	6,200.00	11,522.00	6,780.43	13.80	87.28	166.45	-1,685.15	406.04	1,851.95	1,812.72	39.23	47.205	
6,300.00	6,300.00	11,522.00	6,780.43	14.02	87.28	166.45	-1,685.15	406.04	1,819.15	1,780.08	39.07	46.561	
6,400.00	6,400.00	11,522.00	6,780.43	14.24	87.28	166.45	-1,685.15	406.04	1,791.34	1,752.43	38.91	46.034	
6,500.00	6,500.00	11,522.00	6,780.43	14.47	87.28	166.45	-1,685.15	406.04	1,768.76	1,729.99	38.77	45.619	
6,600.00	6,600.00	11,522.00	6,780.43	14.69	87.28	166.45	-1,685.15	406.04	1,751.60	1,712.94	38.66	45.307	
6,700.00	6,700.00	11,522.00	6,780.43	14.92	87.28	166.45	-1,685.15	406.04	1,740.03	1,701.44	38.59	45.091	
6,800.00	6,800.00	11,522.00	6,780.43	15.14	87.28	166.45	-1,685.15	406.04	1,734.15	1,695.58	38.57	44.962	
6,852.03	6,852.03	11,522.00	6,780.43	15.26	87.28	166.45	-1,685.15	406.04	1,733.37	1,694.79	38.58	44.927 CC, ES	
6,900.00	6,900.00	11,522.00	6,780.43	15.37	87.28	166.45	-1,685.15	406.04	1,734.04	1,695.43	38.61	44.913 SF	
7,000.00	7,000.00	11,522.00	6,780.43	15.59	87.28	166.45	-1,685.15	406.04	1,739.68	1,700.96	38.71	44.938	
7,100.00	7,100.00	11,522.00	6,780.43	15.82	87.28	166.45	-1,685.15	406.04	1,751.02	1,712.14	38.88	45.034	
7,200.00	7,200.00	11,522.00	6,780.43	16.04	87.28	166.45	-1,685.15	406.04	1,767.95	1,728.84	39.11	45.202	
7,300.00	7,300.00	11,522.00	6,780.43	16.27	87.28	166.45	-1,685.15	406.04	1,790.32	1,750.93	39.39	45.446	
7,400.00	7,400.00	11,522.00	6,780.43	16.49	87.28	166.45	-1,685.15	406.04	1,817.92	1,778.21	39.72	45.770	
7,500.00	7,500.00	11,522.00	6,780.43	16.72	87.28	166.45	-1,685.15	406.04	1,850.52	1,810.45	40.07	46.177	
7,600.00	7,600.00	11,522.00	6,780.43	16.94	87.28	166.45	-1,685.15	406.04	1,887.86	1,847.42	40.45	46.672	
7,700.00	7,700.00	11,522.00	6,780.43	17.17	87.28	166.45	-1,685.15	406.04	1,929.67	1,888.84	40.83	47.257	
7,800.00	7,800.00	11,522.00	6,780.43	17.39	87.28	166.45	-1,685.15	406.04	1,975.66	1,934.44	41.22	47.931	
7,900.00	7,900.00	11,522.00	6,780.43	17.62	87.28	166.45	-1,685.15	406.04	2,025.54	1,983.94	41.60	48.694	
8,000.00	8,000.00	11,522.00	6,780.43	17.84	87.28	166.45	-1,685.15	406.04	2,079.04	2,037.07	41.96	49.542	
8,100.00	8,100.00	11,522.00	6,780.43	18.07	87.28	166.45	-1,685.15	406.04	2,135.88	2,093.57	42.32	50.472	
8,200.00	8,200.00	11,522.00	6,780.43	18.29	87.28	166.45	-1,685.15	406.04	2,195.81	2,153.16	42.65	51.479	
8,300.00	8,300.00	11,522.00	6,780.43	18.52	87.28	166.45	-1,685.15	406.04	2,258.58	2,215.61	42.97	52.557	
8,400.00	8,400.00	11,522.00	6,780.43	18.74	87.28	166.45	-1,685.15	406.04	2,323.96	2,280.68	43.28	53.700	
8,500.00	8,500.00	11,522.00	6,780.43	18.96	87.28	166.45	-1,685.15	406.04	2,391.73	2,348.17	43.56	54.902	
8,600.00	8,600.00	11,522.00	6,780.43	19.19	87.28	166.45	-1,685.15	406.04	2,461.70	2,417.86	43.83	56.159	
8,700.00	8,700.00	11,522.00	6,780.43	19.41	87.28	166.45	-1,685.15	406.04	2,533.68	2,489.59	44.09	57.463	
8,800.00	8,800.00	11,522.00	6,780.43	19.64	87.28	166.45	-1,685.15	406.04	2,607.52	2,563.18	44.34	58.810	
8,900.00	8,900.00	11,522.00	6,780.43	19.86	87.28	166.45	-1,685.15	406.04	2,683.05	2,638.47	44.57	60.194	
9,000.00	9,000.00	11,522.00	6,780.43	20.09	87.28	166.45	-1,685.15	406.04	2,760.13	2,715.33	44.80	61.611	
9,100.00	9,100.00	11,522.00	6,780.43	20.31	87.28	166.45	-1,685.15	406.04	2,838.65	2,793.63	45.02	63.056	
9,200.00	9,200.00	11,522.00	6,780.43	20.54	87.28	166.45	-1,685.15	406.04	2,918.48	2,873.25	45.23	64.524	
9,300.00	9,300.00	11,522.00	6,780.43	20.76	87.28	166.45	-1,685.15	406.04	2,999.52	2,954.08	45.44	66.013	
9,400.00	9,400.00	11,522.00	6,780.43	20.99	87.28	166.45	-1,685.15	406.04	3,081.67	3,036.03	45.64	67.518	
9,500.00	9,500.00	11,522.00	6,780.43	21.21	87.28	166.45	-1,685.15	406.04	3,164.85	3,119.01	45.84	69.036	
9,600.00	9,600.00	11,522.00	6,780.43	21.44	87.28	166.45	-1,685.15	406.04	3,248.98	3,202.94	46.04	70.563	
9,700.00	9,700.00	11,522.00	6,780.43	21.66	87.28	166.45	-1,685.15	406.04	3,333.99	3,287.75	46.24	72.098	
9,800.00	9,800.00	11,522.00	6,780.43	21.89	87.28	166.45	-1,685.15	406.04	3,419.81	3,373.37	46.44	73.638	
9,900.00	9,900.00	11,522.00	6,780.43	22.11	87.28	166.45	-1,685.15	406.04	3,506.38	3,459.74	46.64	75.180	
10,000.00	10,000.00	11,522.00	6,780.43	22.34	87.28	166.45	-1,685.15	406.04	3,593.64	3,546.80	46.84	76.722	
10,100.00	10,100.00	11,522.00	6,780.43	22.56	87.28	166.45	-1,685.15	406.04	3,681.56	3,634.52	47.04	78.262	

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



TDS
Anticollision Report



Company: COG Production LLC
Project: Eddy County, NM (NAD-27 2015)
Reference Site: Copperhead 31 Fed Com 3H
Site Error: 0.00 usft
Reference Well: Copperhead 31 Fed Com 3H
Well Error: 0.00 usft
Reference Wellbore: Lateral 1
Reference Design: Design #1

Local Co-ordinate Reference: Well Copperhead 31 Fed Com 3H
TVD Reference: KB @ 2966.60usft
MD Reference: KB @ 2966.60usft
North Reference: Grid
Survey Calculation Method: Minimum Curvature
Output errors are at: 2.00 sigma
Database: EDM 5000.1 Single User Db
Offset TVD Reference: Offset Datum

Offset Design: Copperhead 31 Fed Com 3H - Copperhead 31 Federal Com #1H - ST01 - ST01												Offset Site Error:	0.00 usft
Survey Program: 100-Scientific Gyro 5631-MWD												Offset Well Error:	0.00 usft
Reference	Offset	Semi Major Axis		Distance		Minimum Separation		Warning					
Measured Depth (usft)	Vertical Depth (usft)	Measured Depth (usft)	Vertical Depth (usft)	Reference (usft)	Offset (usft)	Highside Toolface (°)	Offset Wellbore Centre N-S (usft)	E-W (usft)	Between Centres (usft)	Between Ellipses (usft)	Minimum Separation (usft)	Separation Factor	Warning
10,200.00	10,200.00	11,522.00	6,780.43	22.79	87.28	166.45	-1,685.15	406.04	3,770.07	3,722.83	47.25	79.798	
10,264.20	10,264.20	11,522.00	6,780.43	22.93	87.28	166.45	-1,685.15	406.04	3,827.20	3,779.82	47.38	80.782	
10,275.00	10,275.00	11,522.00	6,780.43	22.95	87.28	-12.22	-1,685.15	406.04	3,836.78	3,789.38	47.40	80.951	
10,300.00	10,299.97	11,522.00	6,780.43	22.99	87.28	-11.15	-1,685.15	406.04	3,858.53	3,811.09	47.44	81.336	
10,325.00	10,324.84	11,522.00	6,780.43	23.04	87.28	-10.26	-1,685.15	406.04	3,879.67	3,832.19	47.48	81.708	
10,350.00	10,349.54	11,522.00	6,780.43	23.08	87.28	-9.53	-1,685.15	406.04	3,900.15	3,852.63	47.53	82.064	
10,375.00	10,374.01	11,522.00	6,780.43	23.12	87.28	-8.91	-1,685.15	406.04	3,919.92	3,872.35	47.57	82.402	
10,400.00	10,398.18	11,522.00	6,780.43	23.16	87.28	-8.38	-1,685.15	406.04	3,938.94	3,891.32	47.62	82.722	
10,425.00	10,421.98	11,522.00	6,780.43	23.20	87.28	-7.93	-1,685.15	406.04	3,957.16	3,909.50	47.66	83.023	
10,450.00	10,445.35	11,522.00	6,780.43	23.24	87.28	-7.53	-1,685.15	406.04	3,974.55	3,926.84	47.71	83.306	
10,475.00	10,468.22	11,522.00	6,780.43	23.29	87.28	-7.20	-1,685.15	406.04	3,991.07	3,943.32	47.76	83.569	
10,500.00	10,490.53	11,522.00	6,780.43	23.32	87.28	-6.90	-1,685.15	406.04	4,006.69	3,958.89	47.81	83.812	
10,525.00	10,512.22	11,522.00	6,780.43	23.36	87.28	-6.64	-1,685.15	406.04	4,021.38	3,973.53	47.85	84.034	
10,550.00	10,533.24	11,522.00	6,780.43	23.40	87.28	-6.42	-1,685.15	406.04	4,035.10	3,987.20	47.90	84.236	
10,575.00	10,553.51	11,522.00	6,780.43	23.44	87.28	-6.22	-1,685.15	406.04	4,047.83	3,999.88	47.95	84.417	
10,600.00	10,572.99	11,522.00	6,780.43	23.49	87.28	-6.05	-1,685.15	406.04	4,059.54	4,011.55	48.00	84.576	
10,625.00	10,591.63	11,522.00	6,780.43	23.54	87.28	-5.91	-1,685.15	406.04	4,070.22	4,022.17	48.05	84.713	
10,650.00	10,609.37	11,522.00	6,780.43	23.59	87.28	-5.78	-1,685.15	406.04	4,079.83	4,031.73	48.10	84.827	
10,675.00	10,626.16	11,522.00	6,780.43	23.65	87.28	-5.67	-1,685.15	406.04	4,088.36	4,040.21	48.14	84.919	
10,700.00	10,641.96	11,522.00	6,780.43	23.72	87.28	-5.58	-1,685.15	406.04	4,095.79	4,047.60	48.19	84.988	
10,725.00	10,656.73	11,522.00	6,780.43	23.79	87.28	-5.50	-1,685.15	406.04	4,102.11	4,053.87	48.24	85.033	
10,750.00	10,670.42	11,522.00	6,780.43	23.86	87.28	-5.44	-1,685.15	406.04	4,107.31	4,059.02	48.29	85.053	
10,775.00	10,682.99	11,522.00	6,780.43	23.95	87.28	-5.40	-1,685.15	406.04	4,111.37	4,063.03	48.34	85.050	
10,800.00	10,694.42	11,522.00	6,780.43	24.04	87.28	-5.36	-1,685.15	406.04	4,114.30	4,065.91	48.39	85.022	
10,825.00	10,704.67	11,522.00	6,780.43	24.13	87.28	-5.34	-1,685.15	406.04	4,116.07	4,067.63	48.44	84.970	
10,850.00	10,713.71	11,522.00	6,780.43	24.23	87.28	-5.34	-1,685.15	406.04	4,116.70	4,068.21	48.49	84.893	
10,875.00	10,721.52	11,522.00	6,780.43	24.34	87.28	-5.34	-1,685.15	406.04	4,116.17	4,067.63	48.55	84.791	
10,900.00	10,728.07	11,522.00	6,780.43	24.46	87.28	-5.36	-1,685.15	406.04	4,114.50	4,065.90	48.60	84.664	
10,925.00	10,733.36	11,522.00	6,780.43	24.58	87.28	-5.39	-1,685.15	406.04	4,111.68	4,063.03	48.65	84.512	
10,950.00	10,737.36	11,522.00	6,780.43	24.71	87.28	-5.44	-1,685.15	406.04	4,107.71	4,059.01	48.71	84.336	
10,975.00	10,740.06	11,522.00	6,780.43	24.85	87.28	-5.50	-1,685.15	406.04	4,102.62	4,053.85	48.76	84.136	
11,000.00	10,741.46	11,522.00	6,780.43	24.99	87.28	-5.57	-1,685.15	406.04	4,096.39	4,047.58	48.82	83.913	
11,014.04	10,741.67	11,522.00	6,780.43	25.07	87.28	-5.62	-1,685.15	406.04	4,092.41	4,043.56	48.85	83.775	
11,100.00	10,741.70	11,522.00	6,780.43	25.62	87.28	-5.62	-1,685.15	406.04	4,067.78	4,018.74	49.04	82.947	
11,200.00	10,741.73	11,522.00	6,780.43	26.36	87.28	-5.62	-1,685.15	406.04	4,041.25	3,991.95	49.30	81.975	
11,300.00	10,741.77	11,522.00	6,780.43	27.21	87.28	-5.62	-1,685.15	406.04	4,017.02	3,967.43	49.60	80.992	
11,400.00	10,741.80	11,522.00	6,780.43	28.15	87.28	-5.62	-1,685.15	406.04	3,995.16	3,945.22	49.94	80.002	
11,500.00	10,741.84	11,522.00	6,780.43	29.18	87.28	-5.62	-1,685.15	406.04	3,975.69	3,925.37	50.32	79.008	
11,600.00	10,741.87	11,522.00	6,780.43	30.28	87.28	-5.62	-1,685.15	406.04	3,958.65	3,907.91	50.74	78.018	
11,700.00	10,741.91	11,522.00	6,780.43	31.45	87.28	-5.62	-1,685.15	406.04	3,944.07	3,892.88	51.20	77.040	
11,800.00	10,741.94	11,522.00	6,780.43	32.69	87.28	-5.62	-1,685.15	406.04	3,931.99	3,880.31	51.68	76.080	
11,900.00	10,741.98	11,522.00	6,780.43	33.97	87.28	-5.62	-1,685.15	406.04	3,922.42	3,870.22	52.20	75.147	
12,000.00	10,742.01	11,522.00	6,780.43	35.31	87.28	-5.62	-1,685.15	406.04	3,915.37	3,862.64	52.73	74.248	
12,100.00	10,742.05	11,522.00	6,780.43	36.68	87.28	-5.62	-1,685.15	406.04	3,910.88	3,857.59	53.29	73.392	
12,200.00	10,742.08	11,489.40	6,780.80	38.10	86.72	-5.60	-1,717.73	405.14	3,908.80	3,855.21	53.59	72.941	
12,300.00	10,742.12	11,347.00	6,783.82	39.55	84.26	-5.49	-1,859.98	399.37	3,905.96	3,852.96	53.00	73.697	
12,400.00	10,742.15	11,278.42	6,785.22	41.03	83.08	-5.44	-1,928.48	396.44	3,903.53	3,850.50	53.04	73.601	
12,500.00	10,742.19	11,206.65	6,785.84	42.53	81.83	-5.39	-2,000.21	394.08	3,902.23	3,849.17	53.06	73.539	
12,600.00	10,742.22	11,160.00	6,786.08	44.07	81.03	-5.36	-2,046.82	392.37	3,901.59	3,848.29	53.31	73.192	
12,620.65	10,742.23	11,126.71	6,786.09	44.39	80.45	-5.33	-2,080.09	391.25	3,901.43	3,848.26	53.17	73.381	
12,700.00	10,742.26	11,067.00	6,785.46	45.62	79.42	-5.30	-2,139.79	390.15	3,901.94	3,848.76	53.19	73.360	
12,800.00	10,742.29	10,932.71	6,784.46	47.19	77.14	-5.21	-2,274.00	385.82	3,902.40	3,849.66	52.74	73.990	

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



TDS
Anticollision Report



Company	COG Production LLC	Local Co-ordinate Reference:	Well Copperhead 31 Fed Com 3H
Project	Eddy County, NM (NAD-27 2015)	TVD Reference:	KB @ 2966.60usft
Reference Site	Copperhead 31 Fed Com 3H	MD Reference:	KB @ 2966.60usft
Site Error	0.00 usft	North Reference:	Grid
Reference Well	Copperhead 31 Fed Com 3H	Survey Calculation Method:	Minimum Curvature
Well Error	0.00 usft	Output errors are at:	2.00 sigma
Reference Wellbore	Lateral 1	Database:	EDM 5000.1 Single User Db
Reference Design	Design #1	Offset/TVD Reference:	Offset Datum

Offset Design Copperhead 31 Fed Com 3H - Copperhead 31 Federal Com #1H - ST01 - ST01														Offset Site Error: 0.00 usft	
Survey Program: 100-Scientific Gyro 5631-MWD														Offset Well Error: 0.00 usft	
Reference		Offset		Semi Major Axis		Distance		Offset Wellbore Centre		Minimum Separation		Separation Factor		Warning	
Measured Depth (usft)	Vertical Depth (usft)	Measured Depth (usft)	Vertical Depth (usft)	Reference (usft)	Offset (usft)	Highside Toolface (°)	N-S (usft)	E-W (usft)	Between Centres (usft)	Between Ellipses (usft)	Minimum Separation (usft)	Separation Factor			
12,900.00	10,742.33	10,793.55	6,784.92	48.79	74.78	-5.11	-2,413.07	380.77	3,901.70	3,849.44	52.26	74.656			
13,000.00	10,742.36	10,715.29	6,785.54	50.39	73.43	-5.06	-2,491.27	378.25	3,900.56	3,848.26	52.29	74.590			
13,083.24	10,742.39	10,666.97	6,785.66	51.74	72.58	-5.04	-2,539.59	377.43	3,900.20	3,847.74	52.47	74.337			
13,100.00	10,742.40	10,658.84	6,785.62	52.02	72.44	-5.03	-2,547.72	377.34	3,900.23	3,847.72	52.51	74.270			
13,200.00	10,742.43	10,597.00	6,784.82	53.65	71.35	-5.02	-2,609.55	376.94	3,901.25	3,848.55	52.70	74.028			
13,300.00	10,742.47	10,597.00	6,784.82	55.30	71.35	-5.02	-2,609.55	376.94	3,903.81	3,850.44	53.37	73.143			
13,400.00	10,742.50	10,504.00	6,781.09	56.96	69.74	-4.99	-2,702.47	376.54	3,907.69	3,854.37	53.32	73.286			
13,500.00	10,742.54	10,179.67	6,774.94	58.63	64.22	-4.70	-3,026.29	362.21	3,909.75	3,858.36	51.38	76.087			
13,600.00	10,742.57	10,094.48	6,775.70	60.31	62.76	-4.61	-3,111.33	357.18	3,908.29	3,856.90	51.39	76.049			
13,700.00	10,742.61	10,009.88	6,776.29	62.00	61.31	-4.53	-3,195.79	352.55	3,907.09	3,855.68	51.41	75.998			
13,800.00	10,742.64	9,943.00	6,776.39	63.69	60.16	-4.48	-3,262.63	349.98	3,906.59	3,855.00	51.59	75.730			
13,835.49	10,742.65	9,909.99	6,776.31	64.30	59.59	-4.46	-3,295.62	348.97	3,906.56	3,854.99	51.57	75.746			
13,900.00	10,742.67	9,850.00	6,776.03	65.40	58.56	-4.41	-3,355.57	346.85	3,906.63	3,855.08	51.55	75.778			
14,000.00	10,742.71	9,796.14	6,775.46	67.11	57.63	-4.38	-3,409.40	345.29	3,907.37	3,855.53	51.84	75.371			
14,100.00	10,742.74	9,723.68	6,774.00	68.82	56.39	-4.35	-3,481.85	344.49	3,909.17	3,857.18	51.99	75.192			
14,200.00	10,742.78	9,462.65	6,774.11	70.55	51.98	-4.16	-3,742.64	334.74	3,908.24	3,857.64	50.61	77.225			
14,300.00	10,742.81	9,384.00	6,775.52	72.27	50.63	-4.07	-3,821.14	330.03	3,906.06	3,855.36	50.71	77.035			
14,400.00	10,742.85	9,323.29	6,776.12	74.00	49.58	-4.01	-3,881.72	326.24	3,904.74	3,853.79	50.95	76.635			
14,454.45	10,742.87	9,290.00	6,776.00	74.95	49.00	-3.98	-3,914.98	324.72	3,904.68	3,853.59	51.09	76.431			
14,500.00	10,742.88	9,272.24	6,775.83	75.74	48.69	-3.96	-3,932.72	324.01	3,904.88	3,853.60	51.28	76.145			
14,600.00	10,742.92	9,197.00	6,774.69	77.48	47.39	-3.90	-4,007.89	320.83	3,906.01	3,854.59	51.42	75.967			
14,700.00	10,742.95	9,128.89	6,773.19	79.23	46.22	-3.85	-4,075.92	318.19	3,907.86	3,856.25	51.61	75.716			
14,800.00	10,742.99	9,033.88	6,770.72	80.98	44.61	-3.78	-4,170.85	315.09	3,910.18	3,858.58	51.60	75.780			
14,900.00	10,743.02	8,915.00	6,767.84	82.73	42.57	-3.68	-4,289.60	310.15	3,912.27	3,860.88	51.40	76.118			
15,000.00	10,743.06	8,839.10	6,765.98	84.49	41.28	-3.62	-4,365.40	306.90	3,914.40	3,862.86	51.54	75.951			
15,100.00	10,743.09	8,717.94	6,762.88	86.25	39.23	-3.51	-4,486.42	301.76	3,916.66	3,865.33	51.33	76.306			
15,200.00	10,743.13	8,594.12	6,760.14	88.01	37.17	-3.41	-4,610.09	296.43	3,918.64	3,867.53	51.10	76.682			
15,300.00	10,743.16	8,430.06	6,759.59	89.77	34.44	-3.31	-4,774.08	291.75	3,918.52	3,867.95	50.57	77.481			
15,342.45	10,743.18	8,400.60	6,759.59	90.52	33.95	-3.29	-4,803.53	290.99	3,918.45	3,867.79	50.67	77.337			
15,400.00	10,743.20	8,353.00	6,759.39	91.54	33.15	-3.27	-4,851.12	290.09	3,918.59	3,867.86	50.73	77.238			
15,500.00	10,743.23	8,215.50	6,759.57	93.31	30.89	-3.24	-4,988.61	290.29	3,918.45	3,868.01	50.44	77.683			
15,600.00	10,743.27	8,131.24	6,760.20	95.08	29.46	-3.24	-5,072.87	290.97	3,917.74	3,867.18	50.57	77.479			
15,627.54	10,743.28	8,115.46	6,760.23	95.57	29.19	-3.24	-5,088.64	291.14	3,917.70	3,867.04	50.66	77.338			
15,700.00	10,743.30	8,072.00	6,760.06	96.86	28.45	-3.24	-5,132.10	291.71	3,917.99	3,867.11	50.88	77.002			
15,800.00	10,743.34	7,924.44	6,760.54	98.63	25.90	-3.20	-5,279.65	291.43	3,917.36	3,866.83	50.54	77.514			
15,859.31	10,743.36	7,883.65	6,760.60	99.69	25.18	-3.19	-5,320.44	290.95	3,917.22	3,866.54	50.69	77.282			
15,900.00	10,743.37	7,855.67	6,760.52	100.41	24.68	-3.18	-5,348.42	290.58	3,917.29	3,866.50	50.79	77.129			
16,000.00	10,743.41	7,791.00	6,759.99	102.19	23.54	-3.15	-5,413.08	289.63	3,918.02	3,866.95	51.07	76.720			
16,100.00	10,743.44	7,731.78	6,758.91	103.98	22.50	-3.12	-5,472.28	288.52	3,919.72	3,868.33	51.39	76.270			
16,200.00	10,743.48	7,674.06	6,757.18	105.76	21.50	-3.09	-5,529.96	287.16	3,922.54	3,870.82	51.73	75.834			
16,300.00	10,743.51	7,604.00	6,754.31	107.55	20.31	-3.05	-5,599.94	285.47	3,926.41	3,874.44	51.97	75.549			
16,400.00	10,743.55	7,249.44	6,749.17	109.33	14.85	-2.82	-5,954.19	275.37	3,928.67	3,878.34	50.33	78.059			
16,500.00	10,743.58	7,207.17	6,749.93	111.12	14.14	-2.81	-5,996.44	274.60	3,926.92	3,876.08	50.84	77.241			
16,556.18	10,743.60	7,186.00	6,749.97	112.13	13.78	-2.80	-6,017.61	274.40	3,926.71	3,875.57	51.14	76.781			
16,600.00	10,743.62	7,172.66	6,749.89	112.91	13.55	-2.79	-6,030.95	274.33	3,926.90	3,875.51	51.40	76.404			
16,700.00	10,743.65	7,134.75	6,749.31	114.70	12.91	-2.79	-6,068.85	274.27	3,928.44	3,876.51	51.93	75.648			
16,800.00	10,743.69	7,123.00	6,749.00	116.50	12.71	-2.78	-6,080.60	274.34	3,931.82	3,879.22	52.60	74.750			
16,900.00	10,743.72	7,092.00	6,747.28	118.29	12.19	-2.78	-6,111.54	274.89	3,937.33	3,884.18	53.15	74.074			
17,000.00	10,743.76	7,092.00	6,747.28	120.08	12.19	-2.78	-6,111.54	274.89	3,944.94	3,891.09	53.85	73.261			
17,100.00	10,743.79	7,077.41	6,745.89	121.88	11.94	-2.79	-6,126.06	275.36	3,954.84	3,900.39	54.45	72.632			
17,200.00	10,743.83	7,061.00	6,743.86	123.68	11.67	-2.79	-6,142.33	276.04	3,966.97	3,911.94	55.02	72.094			
17,300.00	10,743.86	7,061.00	6,743.86	125.47	11.67	-2.79	-6,142.33	276.04	3,981.29	3,925.64	55.65	71.547			

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



TDS
Anticollision Report



Company: COG Production LLC
Project: Eddy County, NM (NAD-27 2015)
Reference Site: Copperhead 31 Fed Com 3H
Site Error: 0.00 usft
Reference Well: Copperhead 31 Fed Com 3H
Well Error: 0.00 usft
Reference Wellbore: Lateral 1
Reference Design: Design #1

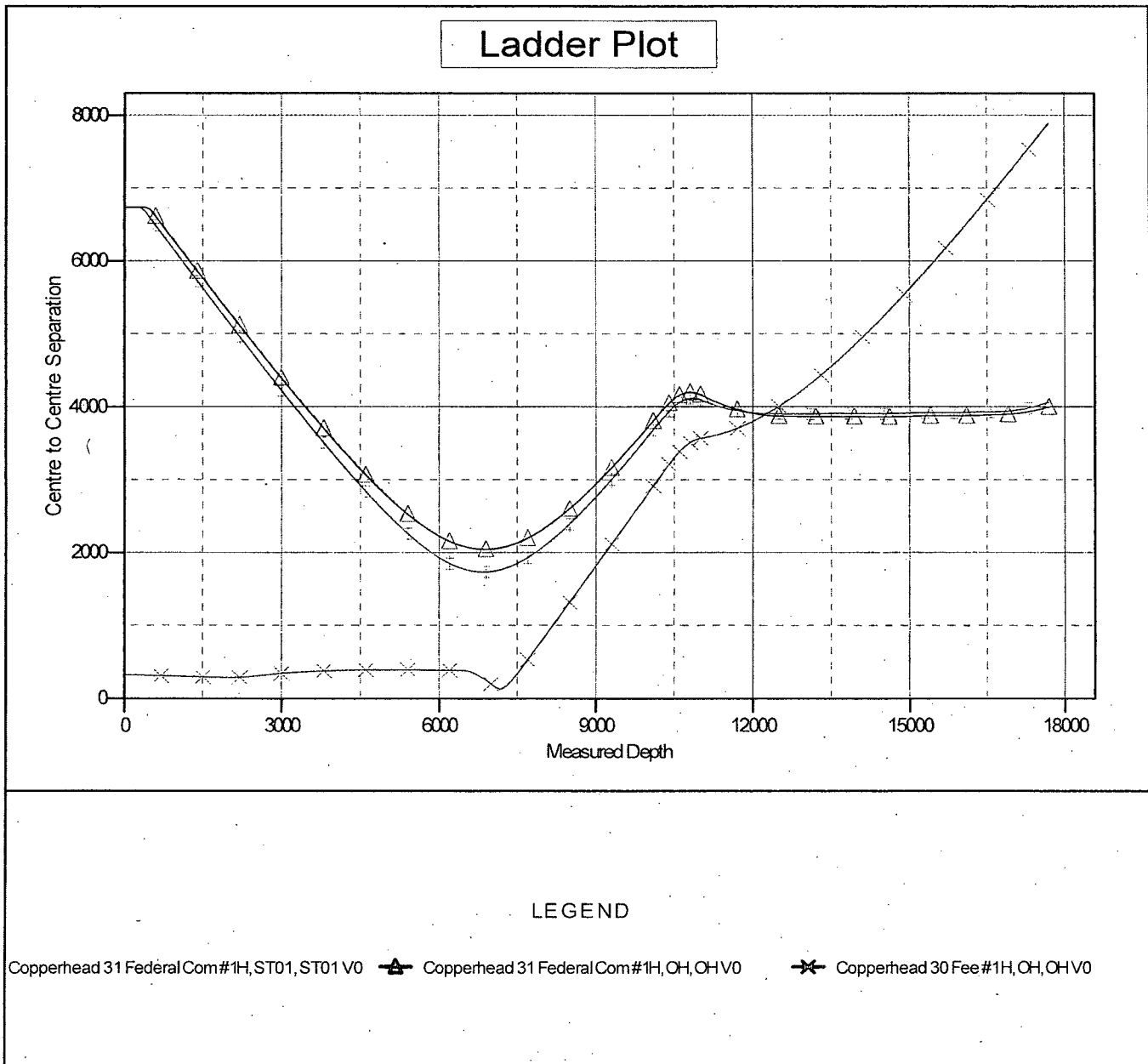
Local Co-ordinate Reference: Well Copperhead 31 Fed Com 3H
TVD Reference: KB @ 2966.60usft
MD Reference: KB @ 2966.60usft
North Reference: Grid
Survey Calculation Method: Minimum Curvature
Output errors are at: 2.00 sigma
Database: EDM 5000.1 Single User Db
Offset TVD Reference: Offset Datum

Offset Design: Copperhead 31 Fed Com 3H - Copperhead 31 Federal Com #1H - ST01 - ST01												Offset Site Error: 0.00 usft
Survey Program: 100-Scientific Gyro 5631-MWD												Offset Well Error: 0.00 usft
Reference	Offset	Semi Major Axis		Distance		Minimum Separation		Warning				
Measured Depth (usft)	Vertical Depth (usft)	Measured Depth (usft)	Vertical Depth (usft)	Reference (usft)	Offset (usft)	Highside Toolface (°)	Offset Wellbore Centre (usft)	Between Centres (usft)	Between Ellipses (usft)	Minimum Separation (usft)	Separation Factor	
17,400.00	10,743.90	7,030.00	6,738.74	127.27	11.15	-2.80	-6,172.86	277.53	3,997.77	3,941.65	56.12	71.230
17,500.00	10,743.93	7,030.00	6,738.74	129.07	11.15	-2.80	-6,172.86	277.53	4,016.20	3,959.51	56.70	70.837
17,600.00	10,743.97	6,999.00	6,732.38	130.87	10.65	-2.82	-6,203.16	279.14	4,036.74	3,979.60	57.14	70.643
17,696.81	10,744.00	6,999.00	6,732.38	132.62	10.65	-2.82	-6,203.16	279.14	4,058.43	4,000.78	57.65	70.400

Company:	COG Production LLC	Local Co-ordinate Reference:	Well Copperhead 31 Fed Com 3H
Project:	Eddy County, NM (NAD-27 2015)	TVD Reference:	KB @ 2966.60usft
Reference Site:	Copperhead 31 Fed Com 3H	MD Reference:	KB @ 2966.60usft
Site Error:	0.00 usft	North Reference:	Grid
Reference Well:	Copperhead 31 Fed Com 3H	Survey Calculation Method:	Minimum Curvature
Well Error:	0.00 usft	Output errors are at:	2.00 sigma
Reference Wellbore:	Lateral 1	Database:	EDM 5000.1 Single User Db
Reference Design:	Design #1	Offset TVD Reference:	Offset Datum

Reference Depths are relative to KB @ 2966.60usft
Offset Depths are relative to Offset Datum
Central Meridian is 104° 20' 0.000 W

Coordinates are relative to: Copperhead 31 Fed Com 3H
Coordinate System is US State Plane 1927 (Exact solution), New Mexico East 30
Grid Convergence at Surface is: 0.17°



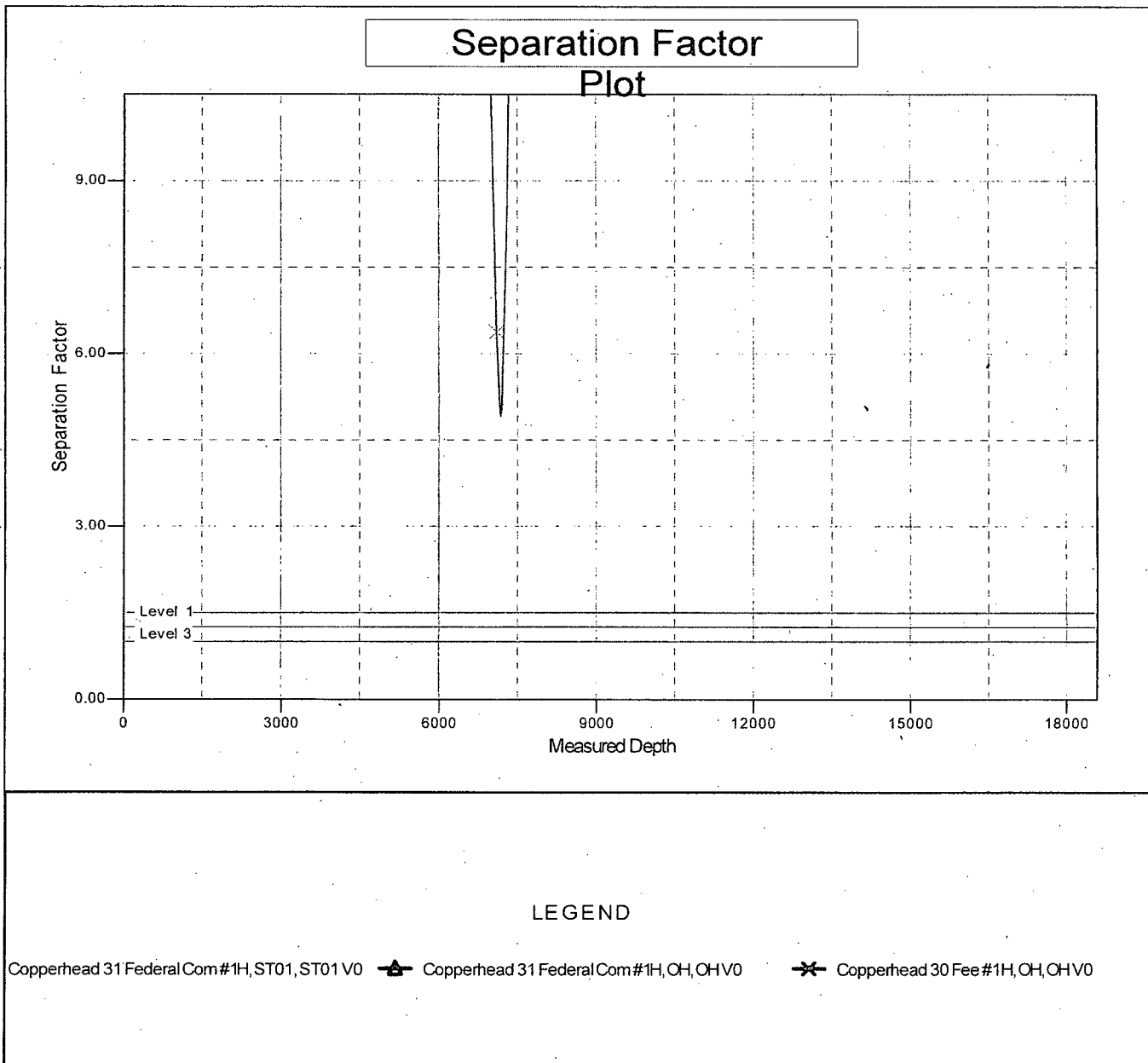
Company: COG Production LLC
Project: Eddy County, NM (NAD-27 2015)
Reference Site: Copperhead 31 Fed Com 3H
Site Error: 0.00 usft
Reference Well: Copperhead 31 Fed Com 3H
Well Error: 0.00 usft
Reference Wellbore: Lateral 1
Reference Design: Design #1

Local Co-ordinate Reference:
TVD Reference:
MD Reference:
North Reference:
Survey Calculation Method:
Output errors are at:
Database:
Offset TVD Reference:

Well Copperhead 31 Fed Com 3H
KB @ 2966.60usft
KB @ 2966.60usft
Grid
Minimum Curvature
2.00 sigma
EDM 5000.1 Single User Db
Offset Datum

Reference Depths are relative to KB @ 2966.60usft
Offset Depths are relative to Offset Datum
Central Meridian is 104° 20' 0.000 W

Coordinates are relative to: Copperhead 31 Fed Com 3H
Coordinate System is US State Plane 1927 (Exact solution), New Mexico East 30
Grid Convergence at Surface is: 0.17°



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
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

Surface Use & Operating Plan

Copperhead 31 Federal Com #3H

- Surface Owner: Franklin Terry Perkins, Jr. 1921 Autumn Drive, Kellar, TX 76262
- New Road: No new road will be needed.
- Flow Line: On well pad (which shares part of well pad with Copperhead 30 Fee #1H)
- Facilities: Will be constructed on well pad – see Exhibit 3
- **Well Site Information**
 - V Door: East
 - Topsoil: South
 - Interim Reclamation: West

Notes

Onsite: On-site was done by Jeff Robertson (BLM); Stan Allison (BLM); Rand French (COG); Gerald Herrera (COG) on August 1, 2016.

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. Based on current road maintenance performed on other roads serving existing wells, we anticipate maintaining the lease roads leading to the proposed well pad at least once a year on dry conditions and twice a year in wetter conditions.

2. Proposed Access Road:

The Location Verification Map shows that no 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 cattleguard, culvert, 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 caliche pit from Draper Brantley, 706 Riverside Drive, Carlsbad, NM 88220. (575) 706-3169.

3. Location of Existing Well:

The One-Mile Radius Map Exhibit 4 shows existing wells within a one-mile radius of the proposed wellbore.

4. Location of Existing and/or Proposed Facilities:

- A. COG Production LLC does 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 will be constructed as shown on Exhibit 3.
 - 2) The tank battery and facilities including all flow line 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 caliche pit from Draper Brantley, 706 Riverside Drive, Carlsbad, NM 88220. (575) 706-3169. 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 a private source, Glenn's Water Well Service P O Box 692, Tatum, New Mexico. (575) 398-2424. No water well will be drilled on the location.

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. If caliche does not exist or is not plentiful from the well site, the caliche will be hauled caliche pit from Draper

Brantley, 706 Riverside Drive, Carlsbad, NM 88220. (575) 706-3169. Amount will vary for each pad. The procedure below has been approved by BLM personnel:

- A. Equipment that is needed to construct the proposed location will be as follows: Two dozers to flip the site for caliche and to move topsoil, one blade to level the surface, one morograder to roll and compact this site, one backhoe to dig the cellar, one water truck to water location and dust abatement and two dump trucks to haul surface material. If caliche is not available onsite and have to haul caliche from a private pit, in addition to equipment mentioned above we will have 10 belly dumps and one front end loader.
- B. The time line to complete construction will be approximately 10 days.
- C. The top 6 inches of topsoil is pushed off and stockpiled along the side of the location.
- D. An approximate 160' X 160' area is used within the proposed well site to remove caliche.
- E. Subsoil is removed and stockpiled within the surveyed well pad.
- F. When caliche is found, material will be stock piled within the pad site to build the location and road.
- G. Then subsoil is pushed back in the hole and caliche is spread accordingly across entire location and road.
- H. 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.
- I. 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 caliche pit from Draper Brantley, 706 Riverside Drive, Carlsbad, NM 88220. (575) 706-3169.

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 R360's disposal site located at 4507 West Carlsbad Highway, Hobbs, NM 88240.
- B. Drilling fluids will be contained in steel mud pits and taken to R360's disposal site located at 4507 West Carlsbad Highway, Hobbs, NM 88240.

- 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. R360's disposal site located at 4507 West Carlsbad Highway, Hobbs, NM 88240.
- D. It is anticipated that the disposal of produced water will be trucked to the Turquoise 30 Federal 1 SWD (30-24S-32E) or Gold Coast 26 Federal SWD 1 (26-24S-32E). Might also be trucked to unspecified commercial SWD wells in this area.
- E. Garbage and trash produced during drilling or completion operations will be collected in a trash bin and hauled to an approved landfill-Lea Landfill LLC. Located at Mile Marker 64, Highway 62-180 East, P O Box 3247, Carlsbad, NM 88221. No toxic waste or hazardous chemicals will be produced by this operation.
- F. 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).
- G. 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 within six months 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.
- 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 within six months. 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. When required by BLM, the well pad site will be restored to match pre-construction grades.

11. Sedimentation and Erosion Control

Immediately following pad construction approximately 380' of straw waddles will be placed on the West side and 100' will be placed on the South side of the location to reduce sediment impacts to fragile/sensitive soils.

12. Surface Ownership:

- A. The surface is owned Franklin Terry Perkins, Jr. 1921 Autumn Drive, Kellar, TX 76262. 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 proposed road routes and surface location will be restored as directed by the BLM.

13. 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.

Surface Use Plan
COG Production LLC
Copperhead 31 Federal Com #3H
SHL: 349' FNL & 773' FEL UL A
Section 30, T26S, R29E
BHL: 50' FSL & 660' FEL Lot 7
Section 31, T26S, R29E
Eddy County, New Mexico

- 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.**

14. Bond Coverage:

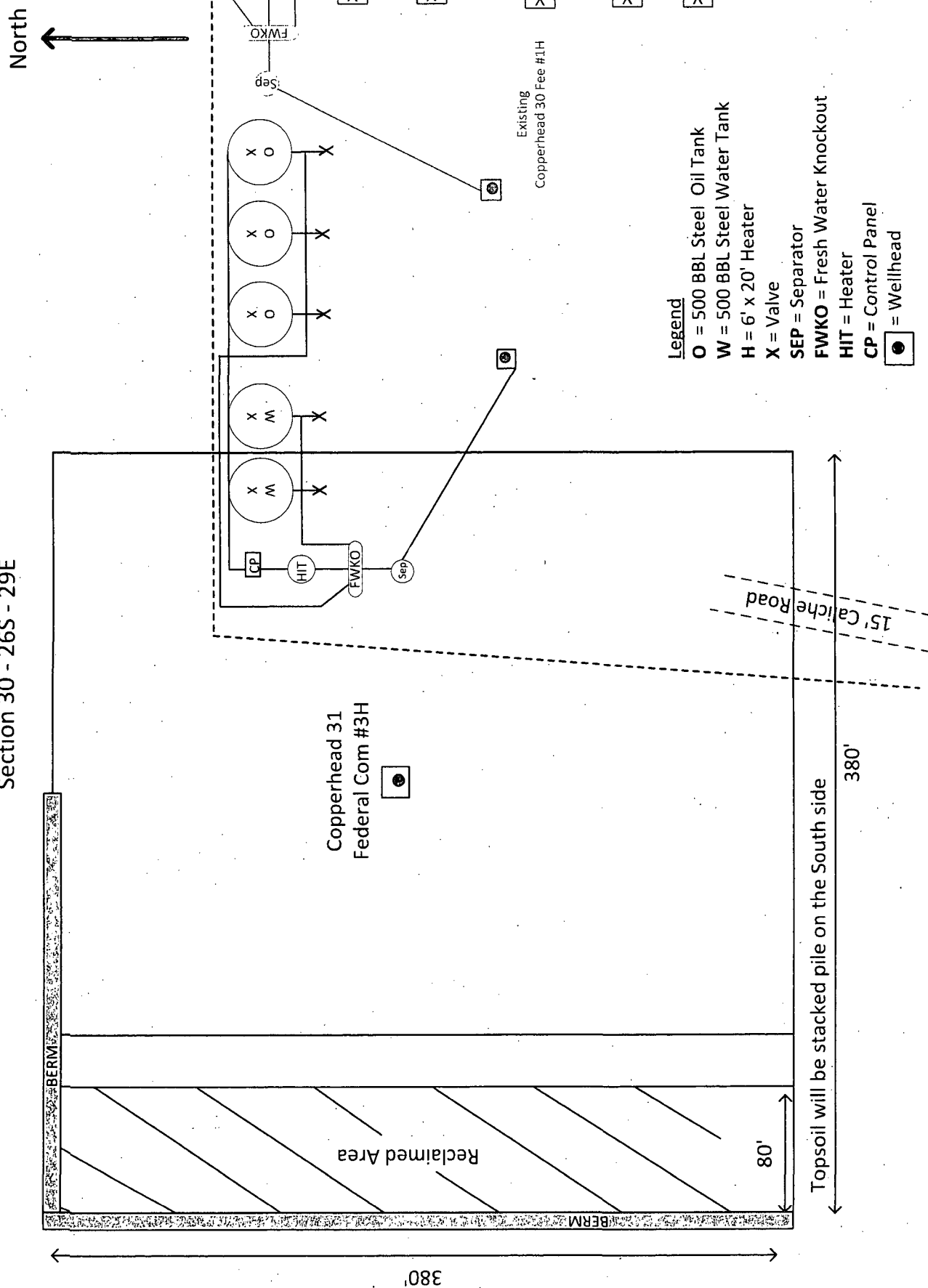
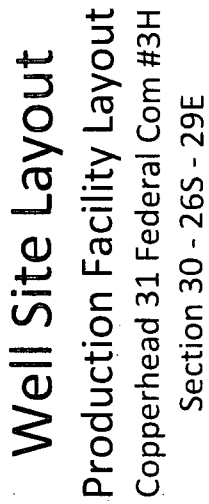
Bond Coverage is Statewide Bonds # NMB000860 and NMB000845

15. 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
DRILLING OPERATIONS
CONDITIONS OF APPROVAL**

OPERATOR'S NAME:	COG Production, LLC
LEASE NO.:	NMNM121474
WELL NAME & NO.:	3H-Copperhead 31 Federal Com
SURFACE HOLE FOOTAGE:	349'/N & 773'/E
BOTTOM HOLE FOOTAGE:	50'/S & 660'/E
LOCATION:	Section 30, T.26 S., R.29 E., NMPM
COUNTY:	Eddy County, New Mexico

SPECIAL REQUIREMENTS

The bottom hole location (BHL) is proposed to be 50 ft. from the section line, the BLM does not approve the last perforation to be less than 330 ft. from the section line. Submit a sundry, consistent with other recent approvals, to change the BHL to 230 ft. from the south line and the last take point to be 330 ft. from the south line.

Communitization Agreement

- The operator will submit a Communitization Agreement to the Carlsbad Field Office, 620 E Greene St. Carlsbad, New Mexico 88220, at least 90 days before the anticipated date of first production from a well subject to a spacing order issued by the New Mexico Oil Conservation Division. The Communitization Agreement will include the signatures of all working interest owners in all Federal and Indian leases subject to the Communitization Agreement (i.e., operating rights owners and lessees of record), or certification that the operator has obtained the written signatures of all such owners and will make those signatures available to the BLM immediately upon request.
- If the operator does not comply with this condition of approval, the BLM may take enforcement actions that include, but are not limited to, those specified in 43 CFR 3163.1.
- In addition, the well sign shall include the surface and bottom hole lease numbers. When the Communitization Agreement number is known, it shall also be on the sign.

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. It is recommended that monitoring equipment be onsite for potential Hydrogen Sulfide. If H₂S is detected in concentrations greater than 100 ppm, the Hydrogen Sulfide area shall meet Onshore Order 6 requirements, which includes equipment and personnel/public protection items. If Hydrogen Sulfide is encountered, 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.). The initial wellhead installed on the well will remain on the well with spools used as needed.

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

Wait on cement (WOC) for Water Basin:

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

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 Castile and Salado

Possibility of lost circulation in the Rustler and Delaware

Abnormal pressure may be encountered within the 3rd Bone Spring Sandstone and Wolfcamp formations.

1. The **10 3/4 inch** surface casing shall be set at approximately **400 feet** 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.

Formation below the 10 3/4 inch shoe to be tested according to Onshore Order

2.III.B.1.i. Test to be done as a mud equivalency test using the mud weight necessary for the pore pressure of the formation below the shoe (not the mud weight required to prevent dissolving the salt formation) and the mud weight for the bottom of the hole. Report results to BLM office.

2. The minimum required fill of cement behind the **7 5/8 inch** intermediate casing is:

Operator has proposed DV tool at depth of 2680', but will adjust cement proportionately if moved. DV tool shall be set a minimum of 50' below previous shoe and a minimum of 200' above current shoe. Operator shall submit sundry if DV tool depth cannot be set in this range. If an ECP is used, it is to be set a minimum of 50' below the shoe to provide cement across the shoe. If it cannot be set below the shoe, a CBL shall be run to verify cement coverage.

a. First stage to DV tool:

- ☒ Cement to circulate. If cement does not circulate, contact the appropriate BLM office before proceeding with second stage cement job: Operator should have plans as to how they will achieve circulation or approved top of cement on the next stage.

b. Second stage above DV tool:

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

Formation below the 7 5/8 inch shoe to be tested according to Onshore Order 2.III.B.1.i. Test to be done as a mud equivalency test using the mud weight necessary for the pore pressure of the formation below the shoe (not the mud weight required to prevent dissolving the salt formation) and the mud weight for the bottom of the hole. Report results to BLM office.

If cement does not circulate to surface on the intermediate casing, the cement on the production casing must come to surface.

3. The minimum required fill of cement behind the 5 1/2 X 5.0 inch production casing is:

- ☒ Cement should tie-back at least 200 feet into the previous 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 53.
2. Variance approved to use flex line from BOP to choke manifold. Check condition of flexible line from BOP to choke manifold, replace if exterior is damaged or if line

fails test. Line to be as straight as possible with no hard bends and is to be anchored according to Manufacturer's requirements. The flexible hose can be exchanged with a hose of equal size and equal or greater pressure rating. **Anchor requirements, specification sheet and hydrostatic pressure test certification matching the hose in service, to be onsite for review. These documents shall be posted in the company man's trailer and on the rig floor.** If the BLM inspector questions the straightness of the hose, a BLM engineer will be contacted and will review in the field or via picture supplied by inspector to determine if changes are required (operator shall expect delays if this occurs).

3. 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.**
4. Minimum working pressure of the blowout preventer (BOP) and related equipment (BOPE) required for drilling below the 7-5/8" intermediate casing shoe shall be 5000 (5M) psi. **5M system requires an HCR valve, remote kill line and annular to match. The remote kill line is to be installed prior to testing the system and tested to stack pressure.**
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**. The operator also has the option of utilizing an independent tester to test without a plug (i.e. against the casing) pursuant to Onshore Order 2 with the pressure not to exceed 70% of the burst rating for the casing. Any test against the casing must meet the WOC time for water basin (8 hours) or potash (24 hours) or 500 pounds compressive strength, whichever is greater, prior to initiating the test (see casing segment as lead cement may be critical item).
 - 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.
- g. BOP/BOPE must be tested by an independent service company within 500 feet of the top of the **Wolfcamp** formation if the time between the setting of the intermediate casing and reaching this depth exceeds 20 days. This test does not exclude the test prior to drilling out the casing shoe as per Onshore Order No. 2.

D. DRILLING MUD

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

E. DRILL STEM TEST

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

F. 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.

MHH 1028201

**PECOS DISTRICT
SURFACE USE
CONDITIONS OF APPROVAL**

OPERATOR'S NAME:	COG Production, LLC
LEASE NO.:	NMNM121474
WELL NAME & NO.:	3H-Copperhead 31 Federal Com
SURFACE HOLE FOOTAGE:	349'/N & 773'/E
BOTTOM HOLE FOOTAGE	50'/S & 660'/E
LOCATION:	Section 30, T.26 S., R.29 E., NMPM
COUNTY:	Eddy County, New Mexico

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

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

I. GENERAL PROVISIONS

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

II. PERMIT EXPIRATION

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

III. ARCHAEOLOGICAL, PALEONTOLOGY & HISTORICAL SITES

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

IV. NOXIOUS WEEDS

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

V. SPECIAL REQUIREMENT(S)

Cave and Karst

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

Cave/Karst Surface Mitigation

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

Construction:

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

No Blasting:

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

Pad Berming:

The entire perimeter of the well pad will be bermed to prevent oil, salt, and other chemical contaminants from leaving the well pad.

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

Tank Battery Liners and Berms:

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

Leak Detection System:

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

Automatic Shut-off Systems:

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

Cave/Karst Subsurface Mitigation

The following stipulations will be applied to protect cave/karst and ground water concerns:

Rotary Drilling with Fresh Water:

Fresh water will be used as a circulating medium in zones where caves or karst features are expected. SEE ALSO: Drilling COAs for this well.

Directional Drilling:

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

Lost Circulation:

ALL lost circulation zones from the surface to the base of the cave occurrence zone will be logged and reported in the drilling report.

Regardless of the type of drilling machinery used, if a void of four feet or more and circulation losses greater than 70 percent occur simultaneously while drilling in any cave-bearing zone, the BLM will be notified immediately by the operator. The BLM will assess the situation and work with the operator on corrective actions to resolve the problem.

Abandonment Cementing:

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

Pressure Testing:

Annual pressure monitoring will be performed by the operator on all casing annuli and reported in a sundry notice. If the test results indicated a casing failure has occurred, remedial action will be undertaken to correct the problem to the BLM's approval.

Berm Location

A berm must be installed on the west and north side to prevent fluids from running off to the drainage.

VI. CONSTRUCTION

A. NOTIFICATION

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

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

B. TOPSOIL

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

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

C. CLOSED LOOP SYSTEM

Tanks are required for drilling operations: No Pits.

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

D. FEDERAL MINERAL MATERIALS PIT

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

E. WELL PAD SURFACING

Surfacing of the well pad is not required.

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

F. EXCLOSURE FENCING (CELLARS & PITS)

Exclosure Fencing

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

G. ON LEASE ACCESS ROADS**Road Width**

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

Surfacing

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

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

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

Crowning

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

Ditching

Ditching shall be required on both sides of the road.

Turnouts

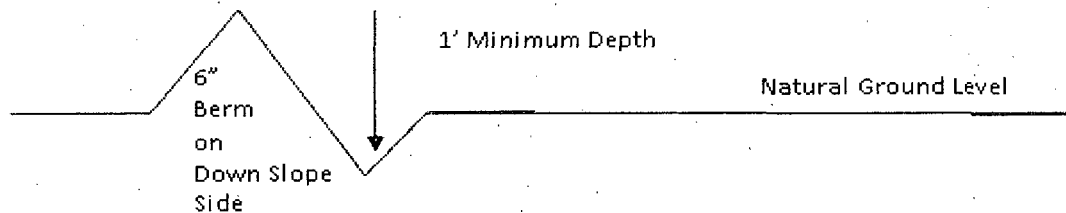
Vehicle turnouts shall be constructed on the road. Turnouts shall be intervisible with interval spacing distance less than 1000 feet. Turnouts shall conform to Figure 1; cross section and plans for typical road construction.

Drainage

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

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

Cross Section of a Typical Lead-off Ditch



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

Formula for Spacing Interval of Lead-off Ditches

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

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

Cattle guards

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

Fence Requirement

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

Public Access

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

Construction Steps

1. Salvage topsoil
2. Construct road

3. Redistribute topsoil
4. Revegetate slopes

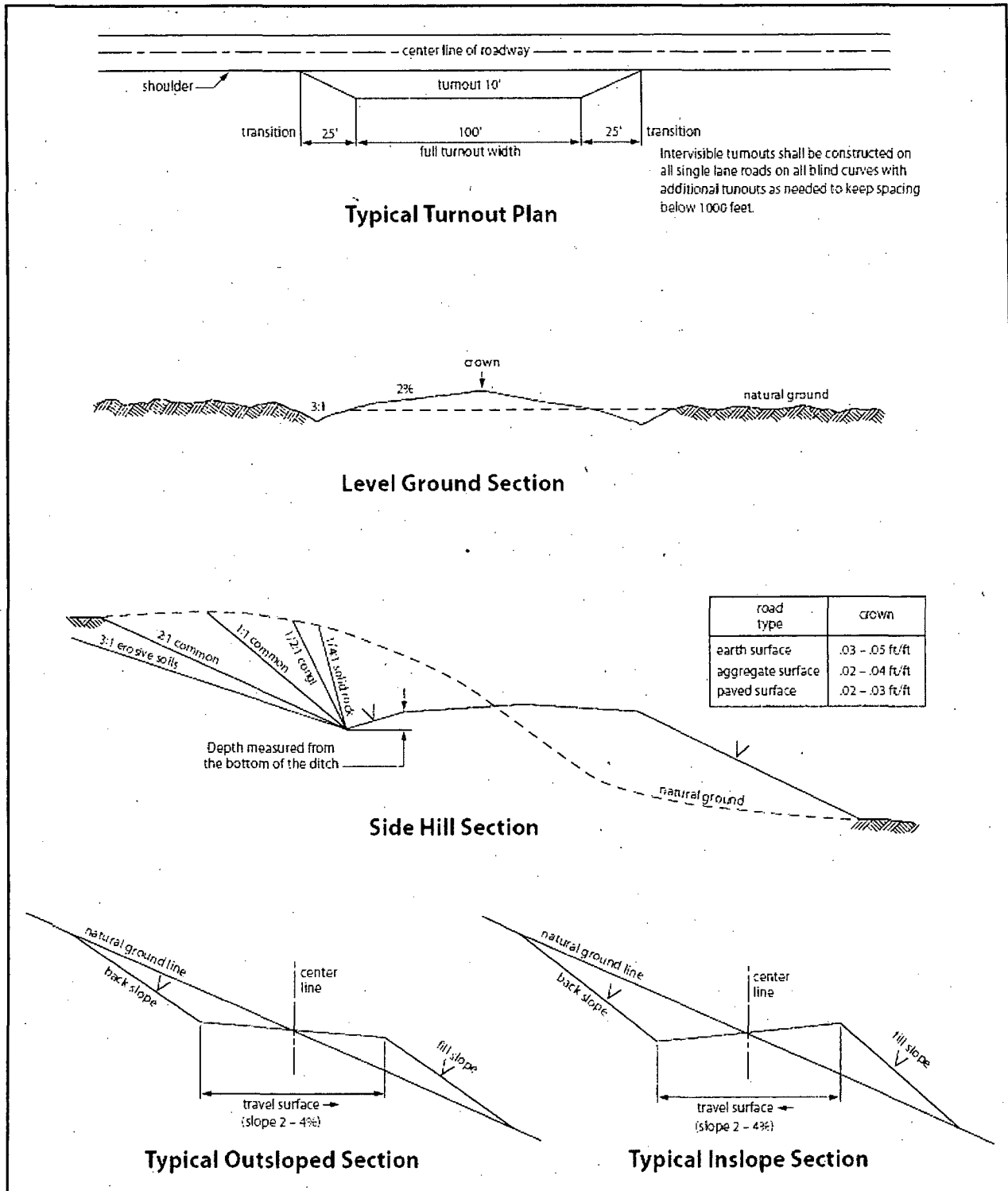


Figure 1. Cross-sections and plans for typical road sections representative of BLM resource or FS local and higher-class roads.

VII. PRODUCTION (POST DRILLING)

A. WELL STRUCTURES & FACILITIES

Placement of Production Facilities

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

Exclosure Netting (Open-top Tanks)

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

Chemical and Fuel Secondary Containment and Exclosure Screening

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

Open-Vent Exhaust Stack Exclosures

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

Containment Structures

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

Painting Requirement

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

VIII. INTERIM RECLAMATION

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

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

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

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

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

IX. FINAL ABANDONMENT & RECLAMATION

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

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

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

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

Seed Mixture 1 for Loamy Sites

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

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

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

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

*Pounds of pure live seed:

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

NMOCD CONDITION OF APPROVAL

The *New!* Gas Capture Plan (GCP) notice is posted on the NMOCD website under Announcements. The Plan became effective May 1, 2016. A copy of the GCP form is included with the NOTICE and is also in our FORMS section under Unnumbered Forms. Please review filing dates for all applicable activities currently approved or pending and submit accordingly. Failure to file a GCP may jeopardize the operator's ability to obtain C-129 approval to flare gas after the initial 60-day completion period.