NM OIL CONSERVATION
ARTESIA DISTRICT
MAY 16 2016
RECEIVED

Form 3160-5
(August 2007)

UNITED STATES
DEPARTMENT OF THE INTERIOR
BUREAU OF LAND MANAGEMENT

OCD Artesia

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

SUNDRY NOTICES AND REPORTS ON WELLS

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

SUBMIT IN TRIPLICATE - Other instructions on reverse side.

5. Lease Serial No.
NMNM121474

6. If Indian, Allottee or Tribe Name

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

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

8. Well Name and No.
COPPERHEAD 31 FEDERAL COM 3H

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

9. API Well No.
30-015-42379

3a. Address
2208 WEST MAIN STREET
ARTESIA, NM 88210

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

10. Field and Pool, or Exploratory
WILDCAT G-04 S262931H;U W

4. Location of Well *(Footage, Sec., T., R., M., or Survey Description)*
Sec 31 T26S R29E SENE 200FSL 330FEL

11. County or Parish, and State
EDDY COUNTY, NM

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

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

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

COG Production LLC, respectfully requests approval for the following drilling and BHL changes and to add a flex hose variance to the original approved APD.

BHL
From: 1650' FNL & 380' FEL Section 30. T26S. R29E
To: 330' FNL & 660' FEL Section 30. T26S. R29E

Formation
From: Wildcat G-03 S262932E; Bone Spring
To: Wildcat G-04 S262931H; UPR Wolfcamp

SUBJECT TO LIKE APPROVAL BY STATE

SEE ATTACHED FOR CONDITIONS OF APPROVAL

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

Electronic Submission #335649 verified by the BLM Well Information System
For COG PRODUCTION LLC, sent to the Carlsbad
Committed to AFMSS for processing by KENNETH RENNICK on 04/11/2016 ()

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

Signature (Electronic Submission) — Date 04/05/2016

THIS SPACE FOR FEDERAL OR STATE OFFICE USE

Approved By Kenneth Rennick — Title Petroleum Engineer — Date 5/9/2016

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

Office Carlsbad Field Office

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

**** OPERATOR-SUBMITTED ** OPERATOR-SUBMITTED ** OPERATOR-SUBMITTED ****

Additional data for EC transaction #335649 that would not fit on the form

32. Additional remarks, continued

Drilling changes

Attached:
Drilling program
Directional plan
3M and 5M BOP
3M and 5M Choke manifolds
AC report
Flex Hose Variance report

Copperhead 31 Federal Com 3H
30-015-42379
COG Operating LLC
Section 31, T. 26 S., R 29 E.
Eddy County
Conditions of Approval

Original COA still applies except for the replacement of the Communitization Agreement Requirement, the Casing Section and the Pressure Control Section. Also the addition of a Drilling Mud Section. Please see the following:

A. COMMUNITIZATION AGREEMENT

1. 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.

2. 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.

3. 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.

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. DURING THIS WOC TIME, NO DRILL PIPE, ETC. SHALL BE RUN IN THE HOLE.

Provide compressive strengths including hours to reach required 500 pounds compressive strength prior to cementing each casing string. Have well specific cement details onsite prior to pumping the cement for each casing string.

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

Risks:
Medium Cave/ Karst
Possibility of water flows in the Salado and in the Castile.
Possibility of lost circulation in the Rustler and in the Delaware.
Abnormal pressures may be encountered when penetrating the Third (3rd) Bone Spring Lime and subsequent formations.

1. The **10 3/4 inch** surface casing shall be set at approximately **870** feet **(a minimum of 25 feet into the Rustler Anhydrite and above the salt)** and cemented to the surface.

   a. If cement does not circulate to the surface, the appropriate BLM office shall be notified and a temperature survey utilizing an electronic type temperature survey with surface log readout will be used or a cement bond log shall be run to verify the top of the cement. Temperature survey will be run a minimum of six hours after pumping cement and ideally between 8-10 hours after completing the cement job.

   b. Wait on cement (WOC) time for a primary cement job 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:

DV tool option: Operator is to submit sundry if DV tool depth varies by more than 100 feet from approved depth.

   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 on the next stage.

   b. Second stage above DV tool:

   ☒ Cement to surface. If cement does not circulate see B.1.a, c-d above. **Wait on cement (WOC) time for a primary cement job is to include the lead cement slurry due to cave/karst.**

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 inch** production casing is:

   ☒ Cement should tie-back at least **500 feet** into previous casing string. Operator shall provide method of verification.

4. If hardband drill pipe is rotated inside casing, returns will be monitored for metal. If metal is found in samples, drill pipe will be pulled and rubber protectors which have a larger diameter than the tool joints of the drill pipe will be installed prior to continuing drilling operations.

C. PRESSURE CONTROL

1. All blowout preventer (BOP) and related equipment (BOPE) shall comply with well control requirements as described in Onshore Oil and Gas Order No. 2 and API 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 **5000 (5M)** psi **(required below the surface casing shoe since drilling into same Wolfcamp formation zone that requires the minimum 5M system). 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.**

4. The appropriate BLM office shall be notified a minimum of 4 hours in advance for a representative to witness the tests.

   a. In a water basin, for all casing strings utilizing slips, these are to be set as soon as the crew and rig are ready and any fallback cement remediation has been done. The casing cut-off and BOP installation can be initiated four hours after installing the slips, which will be approximately six hours after bumping the plug. For those casing strings not using slips, the minimum wait time before cut-off is eight hours after bumping the plug. BOP/BOPE testing can begin after cut-off or once cement reaches 500 psi compressive strength (including lead when specified), whichever is greater. However, if the float does not hold, cut-off cannot be initiated until cement reaches 500 psi compressive strength (including lead when specified).

   b. The tests shall be done by an independent service company utilizing a test plug **not a cup or J-packer**.

   c. The test shall be run on a 5000 psi chart for a 2-3M BOP/BOP, on a 10000 psi chart for a 5M BOP/BOPE and on a 15000 psi chart for a 10M BOP/BOPE. If a linear chart is used, it shall be a one hour chart. A circular chart shall have a maximum 2 hour clock. If a twelve hour or twenty-four hour chart is used, tester shall make a notation that it is run with a two hour clock.

   d. The results of the test shall be reported to the appropriate BLM office.

   e. All tests are required to be recorded on a calibrated test chart. **A copy of the BOP/BOPE test chart and a copy of independent service company test will be submitted to the appropriate BLM office.**

   f. The BOP/BOPE test shall include a low pressure test from 250 to 300 psi. The test will be held for a minimum of 10 minutes if test is done with a test plug and 30 minutes without a test plug. This test shall be performed prior to the test at full stack pressure.

   g. BOP/BOPE must be tested by an independent service company within **500** feet of the top of the **Third (3rd) Bone Spring Lime** 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 **Third (3rd) Bone Spring Lime** and **Wolfcamp formation**, and shall be used until production casing is run and cemented.

Proposed mud weight may not be adequate for drilling through **Wolfcamp formation**.

KGR 05092016

Rennick, Kenneth <krennick@blm.gov>

Copperhead 31 Federal Com #3H Sundry: Clearance Issues

Rennick, Kenneth <krennick@blm.gov> Mon, Apr 11, 2016 at 2:42 PM
To: Mayte Reyes <MReyes1@concho.com>
Cc: Edward Fernandez <efernand@blm.gov>

Hello Ms Mayte Reyes,

I am looking at the Sundry NOI that you sent me last week. It seems like there is a clearance issue with the 7-5/8 inch casing and the 5-1/2 inch casing.

I have that the the ID for the 7-5/8 inch casing is 6.875 inch, and the Coupling OD for the 5-1/2 inch casing is 6.050 inch.

This will result in a clearance calculations being 6.875 - 6.050 = 0.4125. This is less than the regulated 0.422.

Because of this, I am requesting a review of the casing design to address this issue.

Feel free to contact me if you have any questions.

Best Regards,

Kenneth Rennick

--
Kenneth Rennick

Petroleum Engineer
Bureau of Land Management
Carlsbad Field Office
(575) 234-5964
krennick@blm.gov

Rennick, Kenneth <krennick@blm.gov>

Copperhead 31 Federal Com #3H Sundry: Clearance Issues

Dallas Daley <DDaley@concho.com> Mon, Apr 25, 2016 at 2:31 PM
To: "krennick@blm.gov" <krennick@blm.gov>
Cc: Mayte Reyes <MReyes1@concho.com>, Timothy Smith <TSmith@concho.com>

Mr. Rennick –

If your concern is to have sufficient cement bond thickness between our production string and 7 5/8" intermediate, we would be happy to run the 5" higher, and have more overlap, as shown below. This would equal 500' of tie-back at a thickness of 0.656" per side.

Hole Size	Casing Interval		Csg. Size	Weight (lbs)	Grade	Conn.
	From	To				
13.5"	0'	870'	10 ¾"	45.5	J55	STC
9 7/8"	0'	10063'	7 5/8"	29.7	HCP110	BTC
6 ¾"	0'	9563'	5.5"	23	P110	BTC
6 ¾"	~~9463'~~ 9563	17466'	5"	18	P110	BTC

Thanks,

Dallas Daley

Drilling Engineer

ddaley@concho.com

cell: 432-631-6977

- [Quoted text hidden]

Rennick, Kenneth <krennick@blm.gov>

Copperhead 31 Federal Com #3H Sundry: Clearance Issues

Rennick, Kenneth <krennick@blm.gov> Tue, Apr 26, 2016 at 10:40 AM
To: Dallas Daley <DDaley@concho.com>, Timothy Smith <TSmith@concho.com>, Mayte Reyes <MReyes1@concho.com>
Cc: Edward Fernandez <efernand@blm.gov>, Christopher Walls <cwalls@blm.gov>

Hello Everyone,

We are discussing this casing design, hopefully we will get back with you soon if it is appropriate or not.

However, I just noticed that there is no BOP Diagrams for drilling below the Surface Casing. It seems like there is an error during the initial submission that did not include these diagrams.

We are also requesting information about the anticipated pressure on the 7-5/8 shoe. This submission should be in the form of anticipated pore pressure versus depth.

In addition, more information is needed on the mud program. More specific our concern is how do you expect to prevent dissolving the salt with this mud program.

So if you may please send in this information that will greatly appreciated and will expedite the approval process.

Thank You in Advance!!

Kenneth Rennick
[Quoted text hidden]

Rennick, Kenneth <krennick@blm.gov>

Copperhead 31 Federal Com #3H Sundry: Clearance Issues

Dallas Daley <DDaley@concho.com> Fri, May 6, 2016 at 9:39 AM
To: "Rennick, Kenneth" <krennick@blm.gov>
Cc: Mayte Reyes <MReyes1@concho.com>

Morning Kenneth

1) BOP diagrams – attached in Mayte's email this morning.

2) Highest anticipated pressure at 7 5/8" shoe = 12 ppge or 6280 psig.

3) Mud program –

   a. We plan to drill through the salt with a saturated brine system, as we normally do.

   b. After getting past the salt; we plan on diluting the brine with diesel to a ratio of 65/35 – 70/40 (brine/diesel) and a weight of 8.9-9.1 ppg.

      i. The system designed is using a saturated brine at 186,000 ppm chloride. The only free water available for leaching would be the miniscule amount of water that diesel contains and that water will be encapsulated in the emulsion as this is an oil in water emulsion.

Dallas Daley

From: Rennick, Kenneth [mailto:krennick@blm.gov]
Sent: Tuesday, May 03, 2016 12:13
To: Dallas Daley
Subject: Re: FW: [External] Copperhead 31 Federal Com #3H Sundry: Clearance Issues

[Quoted text hidden]

DISTRICT I
1625 N. FRENCH DR., HOBBS, NM 88240
Phone: (575) 393-6161 Fax: (575) 393-0720

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

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

DISTRICT IV
1220 S. ST. FRANCIS DR., SANTA FE, NM 87505
Phone: (505) 476-3460 Fax: (505) 476-3462

State of New Mexico
Energy, Minerals & Natural Resources Department

OIL CONSERVATION DIVISION

11885 SOUTH ST. FRANCIS DR.
Santa Fe, New Mexico 87505

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

☐ AMENDED REPORT

WELL LOCATION AND ACREAGE DEDICATION PLAT

API Number	Pool Code	Pool Name
30-015-42379	98190	Wildcat G-04 S262931H; UPR Wolfcamp

Property Code	Property Name	Well Number
	COPPERHEAD 31 FEDERAL COM.	3H

OGRID No.	Operator Name	Elevation
217955	COG PRODUCTION, LLC	2894.6

Surface Location

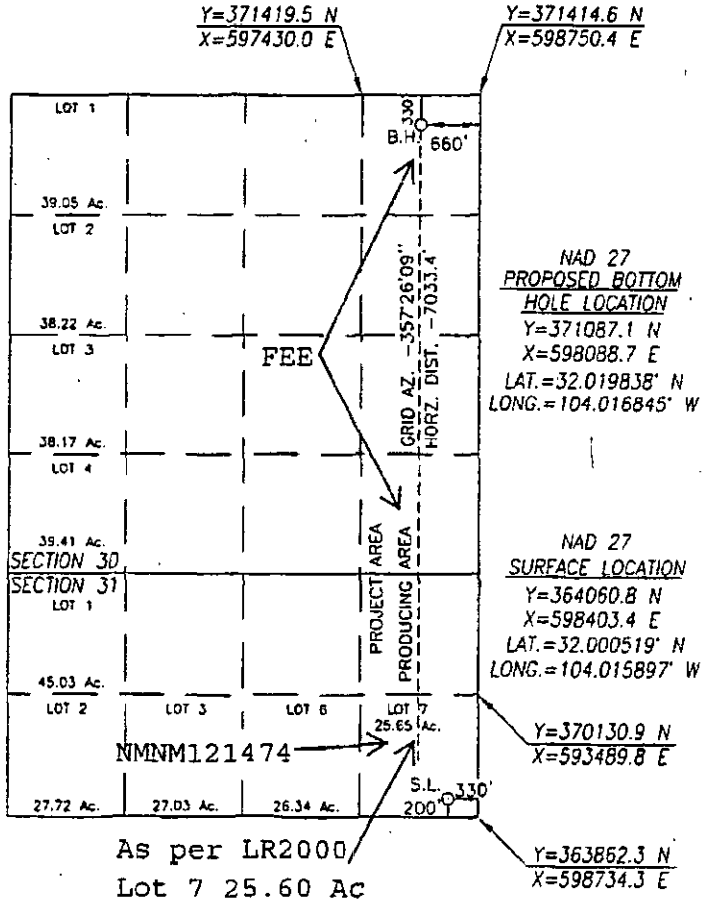
UL or lot No.	Section	Township	Range	Lot Idn	Feet from the	North/South line	Feet from the	East/West line	County
7	31	26-S	29-E		200	SOUTH	330	EAST	EDDY

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
A	30	26-S	29-E		330	NORTH	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 Wilson 2/3/16
Signature Date

Melanie J WIlson
Printed Name

mwilsonconcho.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.

JANUARY 18, 2013
Date of Survey

Signature & Seal of Professional Surveyor

CHAD L. HARCROW
NEW MEXICO
17777
LICENSED PROFESSIONAL SURVEYOR

Chad Harcrow 2/23/16

Certificate No. CHAD HARCROW 17777

W.O. # 16-116 DRAWN BY: AF

COG Production LLC, Copperhead 31 Fed Com #3H

1. Geologic Formations

TVD of target	10679	Pilot hole depth	NA
MD at TD:	17466	Deepest expected fresh water:	78'

Basin

Formation	Depth (TVD) from KB	Water/Mineral Bearing/ Target Zone?	Hazards*
Quaternary Fill	Surface	Water	
Rustler	845	Water	
Top of Salt	897	Salt	
Fletcher Anhydrite	2478		
Lamar (top of Delaware)	2657	Barren	
Bone Spring	6353	Oil/Gas	
3rd Bone Spring Lime	9131	Oil/Gas	
Wolfcamp	9470	Target Zone	
Penn Shale	11196		

2. Casing Program

Hole Size	Casing Interval From	Casing Interval To	Csg. Size	Weight (lbs)	Grade	Conn.	SF Collapse	SF Burst	SF Tension
13.5"	0'	870'	10 ¾"	45.5	J55	STC	5.077	0.953	3.454
9 7/8"	0'	10063'	7 5/8"	29.7	HCP110	BTC	1.392	1.779	2.357
~~6 ¾"~~	0'	~~9963'~~	5.5"	23	P110	BTC	2.159	1.397	2.215
6 ¾"	~~9963'~~	17466'	5"	18	P110	BTC	1.673	1.436	2.076
				BLM Minimum Safety Factor			1.125	1.125	1.6 Dry 1.8 Wet

3 3/4" OK

1563

Per Operator, See Email Conversation

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

- 10.75" shoe will break down before csg reaches burst based on an assumed 16 ppge shoe strength.

Must have table for contingency casing

	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 3rd 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 2nd string set 100' to 600' below the base of salt?	
Is well located in high Cave/Karst?	Y
If yes, are there two strings cemented to surface?	Y
(For 2 string wells) If yes, is there a contingency casing if lost circulation occurs?	
Is well located in critical Cave/Karst?	Y
If yes, are there three strings cemented to surface?	N

3. Cementing Program SEE COA

Casing	# Sks	Wt. lb/ gal	Yld ft3/ sack	H_20 gal/sk	500# Comp. Strength (hours)	Slurry Description
Surf.	290	13.5	1.76	9.37	10-15	HALCEM (TM) SYSTEM 94 lbm/sk Premium Plus Cement 2 % Calcium Chloride, Pellet 4 % Bentonite 9.37 Gal/sk FRESH WATER
	120	14.8	1.36	6.53	5-8	HALCEM (TM) SYSTEM 2 % Calcium Chloride, Pellet
Inter. (stage 2)	520	13.5	1.72	9.11	10-15	HALCEM (TM) SYSTEM 4 % Bentonite
	215	14.8	1.33	6.34	5-8	HALCEM (TM) SYSTEM
Inter. (stage 1)	745	11.9	2.48	13.95	50-60	ECONOCEM (TM) SYSTEM 3 lbm/sk Kol-Seal 0.50 % Halad(R)-322 0.30 % HR-601 0.25 lbm/sk D-AIR 5000
	585	16.4	1.08	4.45	10-12	HALCEM (TM) SYSTEM 0.20 % HR-601 0.50 % CFR-3 0.50 % Halad(R)-344
Prod. Csg	290	11.9	2.48	13.95	50-60	ECONOCEM (TM) SYSTEM 3 lbm/sk Kol-Seal 0.50 % Halad(R)-322 0.30 % HR-601 0.25 lbm/sk D-AIR 5000
	915	14.4	1.23	5.52	15-20	VERSACEM (TM) SYSTEM 0.50 % Halad(R)-9 0.0250 % SA-1015 1 % Salt 0.20 % HR-601

- 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 a 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.

SEE COA

Casing String	TOC	% Excess
Surface	0'	10%
Intermediate Stage 2	0'	150% lead, 150% tail
Intermediate Stage 1	2680'	60% lead, 40% tail
Production	2180'	30% tail

Include Pilot Hole Cementing specs:
Pilot hole depth NA'
KOP 10163' MD

Plug top	Plug Bottom	% Excess	No. Sacks	Wt. lb/gal	Yld ft3/sack	Water gal/sk	Slurry Description and Cement Type

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:
SEE COA 9.875"	11"	~~5M~~ 5M	Annular	X	50% of working pressure
			Blind Ram		WP
			Pipe Ram		
			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.

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

SEE COA

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	~~9 5/8~~" shoe 9 7/8	Cut Brine/ Prehydrated Bentonite/ Diesel Brine Emulsion	9.0-9.5	28-34	N/C
~~9 5/8~~" Shoe	TD	OBM	11.0-12.0	40-60	N/C
9 7/8					

Per Casing Program

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

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

6. Logging and Testing Procedures

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

Additional logs planned		Interval
	Resistivity	Int. shoe to KOP
	Density	Int. shoe to KOP
	CBL	Production casing
	Mud log	4,000' to TD
	PEX	Intermediate shoe to TD

7. Drilling Conditions

SEE COA

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

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

8. Other facets of operation

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.

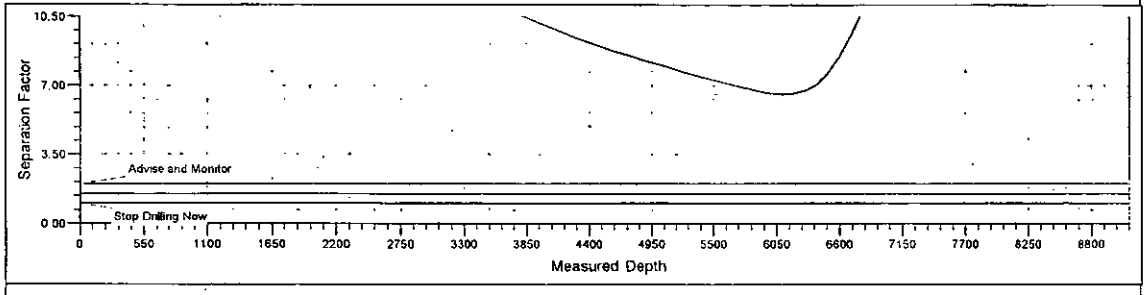
Is this a walking operation? NO. If yes, describe.
Will be pre-setting casing? NO. If yes, describe.

Attachments

- Directional Plan
- Anti-collision assessment
- BOP & Choke Schematics
- C102 and supporting maps
- Flex Hose Variance

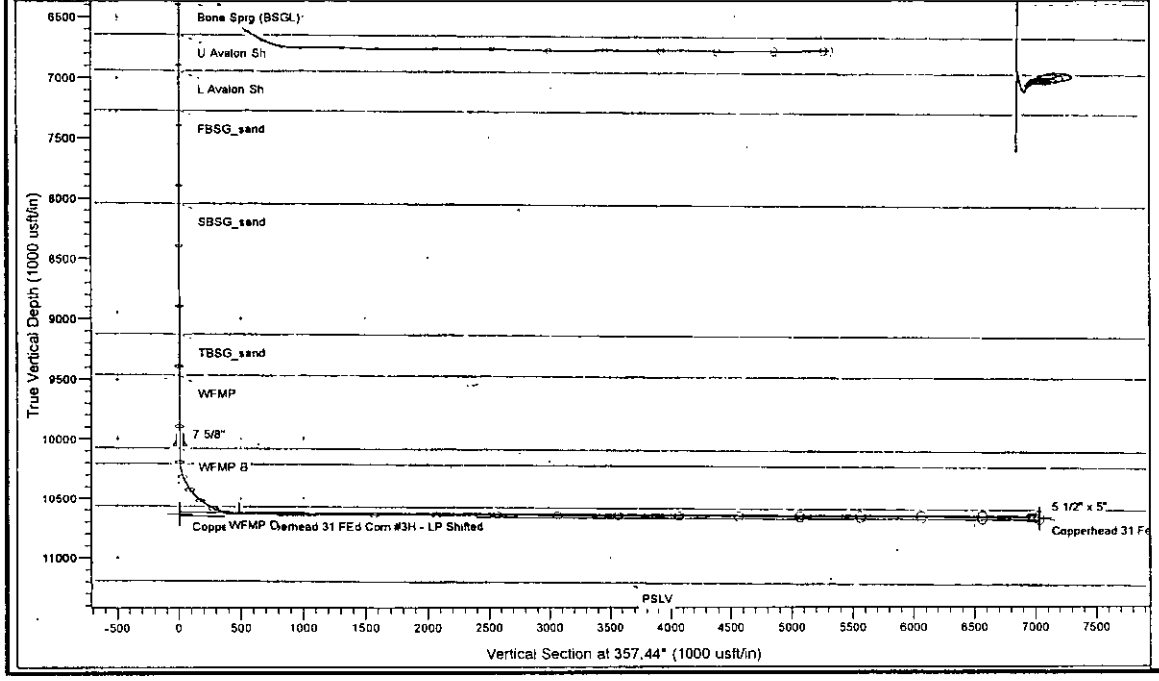
CONCHO

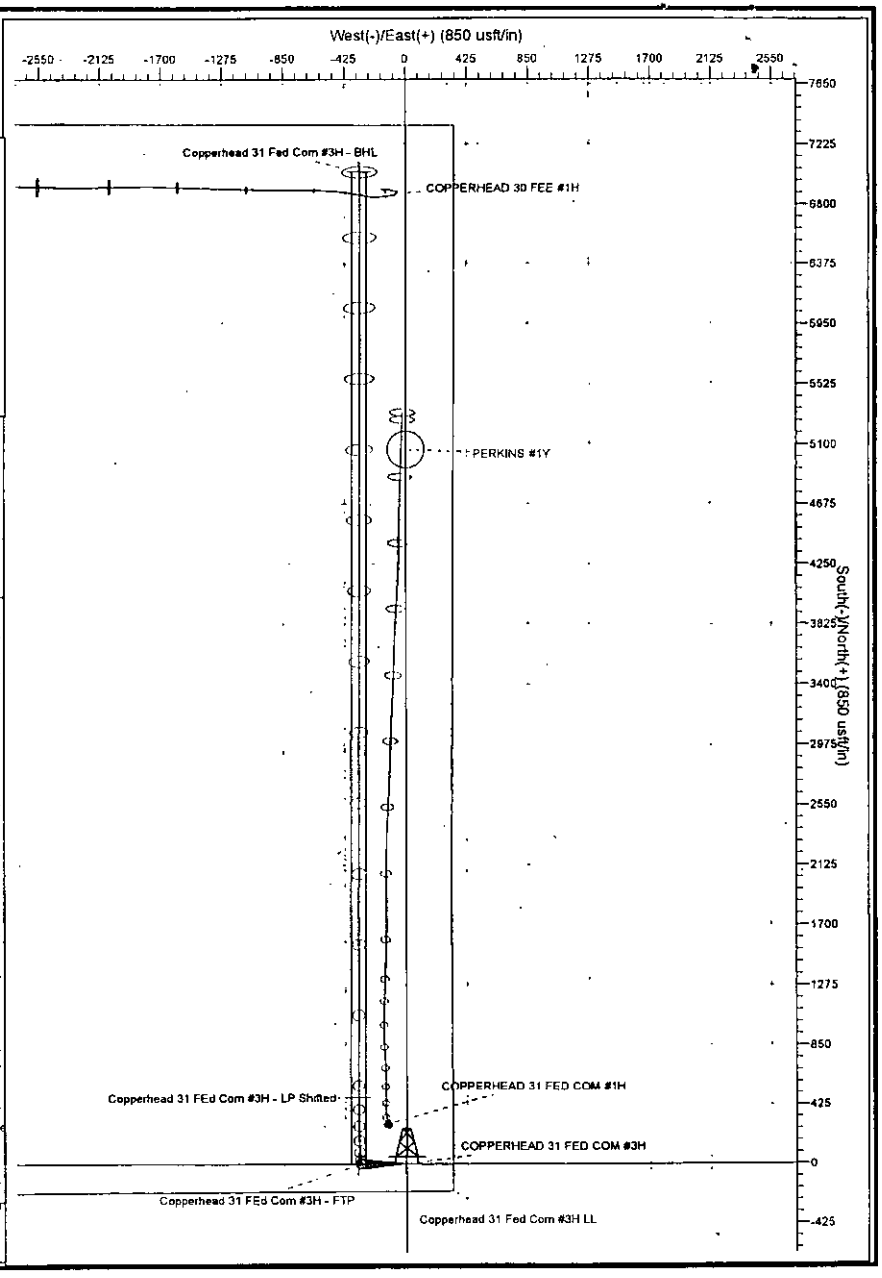
Project: EDDY COUNTY, NM
Site: WOLFCAMP
Well: COPPERHEAD 31 FED COM #3H
Wellbore: OWB
Design: DWD Plan 1



LEGEND

COPPERHEAD 30 FEE #1H, OWB-PILOT HOLE, AWP-PH V0
COPPERHEAD 30 FEE #1H, LATERAL 01, AWP-LATERAL 01 V0
COPPERHEAD 31 FED COM #1H, OWB, ACTUAL WELLPATH V0
PERKINS #1Y, OWB, ACTUAL WELLPATH V0
DWD Plan 1





COG PRODUCTION LLC

EDDY COUNTY, NM
WOLFCAMP
COPPERHEAD 31 FED COM #3H

OWB

Plan: DWD Plan 1

Standard Planning Report

29 March, 2016

COG Production LLC

Planning Report

Database:	COG Production LLC	**Local Co-ordinate Reference:**	Well COPPERHEAD 31 FED COM #3H
Company:	NEW MEXICO BASIN	**TVD Reference:**	RKB=2895+26 @ 2921.0usft (TBD)
Project:	EDDY COUNTY, NM	**MD Reference:**	RKB=2895+26 @ 2921.0usft (TBD)
Site:	WOLFCAMP	**North Reference:**	Grid
Well:	COPPERHEAD 31 FED COM #3H	**Survey Calculation Method:**	Minimum Curvature
Wellbore:	OWB		
Design:	DWD Plan 1		

Project EDDY COUNTY, NM

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

Site WOLFCAMP

Site Position:		**Northing:**	451,348.10 usft	**Latitude:**	32° 14' 26.959 N
From:	Map	**Easting:**	535,087.50 usft	**Longitude:**	104° 13' 11.454 W
Position Uncertainty:	0.0 usft	**Slot Radius:**	13-3/16 "	**Grid Convergence:**	0.06 °

Well COPPERHEAD 31 FED COM #3H

Well Position	**+N/-S**	-87,287.3 usft	**Northing:**	364,060.80 usft	**Latitude:**	32° 0' 1.870 N
	+E/-W	63,315.9 usft	**Easting:**	598,403.40 usft	**Longitude:**	104° 0' 57.227 W
Position Uncertainty		3.0 usft	**Wellhead Elevation:**	0.0 usft	**Ground Level:**	2,895.0 usft

Wellbore OWB

Magnetics	Model Name	Sample Date	Declination (°)	Dip Angle (°)	Field Strength (nT)
	WMM2015	2/9/2016	7.30	59.79	47,892

Design DWD Plan 1

Audit Notes:

Version:		**Phase:**	PLAN	**Tie On Depth:**	0.0

Vertical Section:	Depth From (TVD) (usft)	+N/-S (usft)	+E/-W (usft)	Direction (°)
	0.0	0.0	0.0	357.44

Plan Sections

Measured Depth (usft)	Inclination (°)	Azimuth (°)	Vertical Depth (usft)	+N/-S (usft)	+E/-W (usft)	Dogleg Rate (°/100usft)	Build Rate (°/100usft)	Turn Rate (°/100usft)	TFO (°)	Target
0.0	0.00	0.00	0.0	0.0	0.0	0.00	0.00	0.00	0.00	
500.0	0.00	0.01	500.0	0.0	0.0	0.00	0.00	0.00	0.01	
593.6	1.87	269.30	593.6	0.0	-1.5	2.00	2.00	0.00	269.30	
10,162.7	1.87	269.30	10,157.6	-3.8	-314.2	0.00	0.00	0.00	0.00	
10,909.7	89.61	0.12	10,635.0	470.4	-328.7	12.00	11.75	12.16	90.83	Copperhead 31 FEd
17,465.7	89.61	0.12	10,679.6	7,026.3	-314.9	0.00	0.00	0.00	0.00	Copperhead 31 Fed

Database:	COG Production LLC	**Local Co-ordinate Reference:**	Well COPPERHEAD 31 FED COM #3H
Company:	NEW MEXICO BASIN	**TVD Reference:**	RKB=2895+26 @ 2921.0usft (TBD)
Project:	EDDY COUNTY, NM	**MD Reference:**	RKB=2895+26 @ 2921.0usft (TBD)
Site:	WOLFCAMP	**North Reference:**	Grid
Well:	COPPERHEAD 31 FED COM #3H	**Survey Calculation Method:**	Minimum Curvature
Wellbore:	OWB		
Design:	DWD Plan 1		

Planned Survey

Measured Depth (usft)	Inclination (°)	Azimuth (°)	Vertical Depth (usft)	+N/-S (usft)	+E/-W (usft)	Vertical Section (usft)	Dogleg Rate (°/100usft)	Build Rate (°/100usft)	Turn Rate (°/100usft)
0.0	0.00	0.00	0.0	0.0	0.0	0.0	0.00	0.00	0.00
Copperhead 31 Fed Com #3H - SHL									
100.0	0.00	0.00	100.0	0.0	0.0	0.0	0.00	0.00	0.00
200.0	0.00	0.00	200.0	0.0	0.0	0.0	0.00	0.00	0.00
300.0	0.00	0.00	300.0	0.0	0.0	0.0	0.00	0.00	0.00
400.0	0.00	0.00	400.0	0.0	0.0	0.0	0.00	0.00	0.00
500.0	0.00	0.01	500.0	0.0	0.0	0.0	0.00	0.00	0.00
593.6	1.87	269.30	593.6	0.0	-1.5	0.0	2.00	2.00	0.00
600.0	1.87	269.30	600.0	0.0	-1.7	0.1	0.00	0.00	0.00
700.0	1.87	269.30	699.9	-0.1	-5.0	0.2	0.00	0.00	0.00
800.0	1.87	269.30	799.9	-0.1	-8.3	0.3	0.00	0.00	0.00
846.2	1.87	269.30	846.0	-0.1	-9.8	0.3	0.00	0.00	0.00
Rustler									
870.0	1.87	269.30	869.8	-0.1	-10.6	0.3	0.00	0.00	0.00
10 3/4"									
897.2	1.87	269.30	897.0	-0.1	-11.4	0.4	0.00	0.00	0.00
TOS									
900.0	1.87	269.30	899.8	-0.1	-11.5	0.4	0.00	0.00	0.00
1,000.0	1.87	269.30	999.8	-0.2	-14.8	0.5	0.00	0.00	0.00
1,100.0	1.87	269.30	1,099.7	-0.2	-18.1	0.6	0.00	0.00	0.00
1,200.0	1.87	269.30	1,199.7	-0.3	-21.3	0.7	0.00	0.00	0.00
1,300.0	1.87	269.30	1,299.6	-0.3	-24.6	0.8	0.00	0.00	0.00
1,400.0	1.87	269.30	1,399.6	-0.3	-27.9	0.9	0.00	0.00	0.00
1,500.0	1.87	269.30	1,499.5	-0.4	-31.1	1.0	0.00	0.00	0.00
1,600.0	1.87	269.30	1,599.4	-0.4	-34.4	1.1	0.00	0.00	0.00
1,700.0	1.87	269.30	1,699.4	-0.5	-37.7	1.2	0.00	0.00	0.00
1,800.0	1.87	269.30	1,799.3	-0.5	-40.9	1.3	0.00	0.00	0.00
1,900.0	1.87	269.30	1,899.3	-0.5	-44.2	1.4	0.00	0.00	0.00
2,000.0	1.87	269.30	1,999.2	-0.6	-47.5	1.5	0.00	0.00	0.00
2,100.0	1.87	269.30	2,099.2	-0.6	-50.7	1.6	0.00	0.00	0.00
2,200.0	1.87	269.30	2,199.1	-0.7	-54.0	1.8	0.00	0.00	0.00
2,300.0	1.87	269.30	2,299.1	-0.7	-57.3	1.9	0.00	0.00	0.00
2,400.0	1.87	269.30	2,399.0	-0.7	-60.5	2.0	0.00	0.00	0.00
2,479.0	1.87	269.30	2,478.0	-0.8	-63.1	2.0	0.00	0.00	0.00
BOS (Fletcher)									
2,500.0	1.87	269.30	2,499.0	-0.8	-63.8	2.1	0.00	0.00	0.00
2,600.0	1.87	269.30	2,598.9	-0.8	-67.1	2.2	0.00	0.00	0.00
2,658.1	1.87	269.30	2,657.0	-0.8	-69.0	2.2	0.00	0.00	0.00
LMAR (Top Delaware)									
2,700.0	1.87	269.30	2,698.9	-0.9	-70.3	2.3	0.00	0.00	0.00
2,702.1	1.87	269.30	2,701.0	-0.9	-70.4	2.3	0.00	0.00	0.00
BLCN									
2,800.0	1.87	269.30	2,798.8	-0.9	-73.6	2.4	0.00	0.00	0.00
2,900.0	1.87	269.30	2,898.8	-0.9	-76.9	2.5	0.00	0.00	0.00
3,000.0	1.87	269.30	2,998.7	-1.0	-80.1	2.6	0.00	0.00	0.00
3,100.0	1.87	269.30	3,098.6	-1.0	-83.4	2.7	0.00	0.00	0.00
3,200.0	1.87	269.30	3,198.6	-1.1	-86.7	2.8	0.00	0.00	0.00
3,300.0	1.87	269.30	3,298.5	-1.1	-89.9	2.9	0.00	0.00	0.00
3,400.0	1.87	269.30	3,398.5	-1.1	-93.2	3.0	0.00	0.00	0.00
3,500.0	1.87	269.30	3,498.4	-1.2	-96.5	3.1	0.00	0.00	0.00
3,573.6	1.87	269.30	3,572.0	-1.2	-98.9	3.2	0.00	0.00	0.00
CYCN									
3,600.0	1.87	269.30	3,598.4	-1.2	-99.7	3.2	0.00	0.00	0.00

Database:	COG Production LLC	**Local Co-ordinate Reference:**	Well COPPERHEAD 31 FED COM #3H
Company:	NEW MEXICO BASIN	**TVD Reference:**	RKB=2895+26 @ 2921.0usft (TBD)
Project:	EDDY COUNTY, NM	**MD Reference:**	RKB=2895+26 @ 2921.0usft (TBD)
Site:	WOLFCAMP	**North Reference:**	Grid
Well:	COPPERHEAD 31 FED COM #3H	**Survey Calculation Method:**	Minimum Curvature
Wellbore:	OWB		
Design:	DWD Plan 1		

Planned Survey

Measured Depth (usft)	Inclination (°)	Azimuth (°)	Vertical Depth (usft)	+N/-S (usft)	+E/-W (usft)	Vertical Section (usft)	Dogleg Rate (°/100usft)	Build Rate (°/100usft)	Turn Rate (°/100usft)
3,700.0	1.87	269.30	3,698.3	-1.3	-103.0	3.3	0.00	0.00	0.00
3,800.0	1.87	269.30	3,798.3	-1.3	-106.3	3.5	0.00	0.00	0.00
3,900.0	1.87	269.30	3,898.2	-1.3	-109.5	3.6	0.00	0.00	0.00
4,000.0	1.87	269.30	3,998.2	-1.4	-112.8	3.7	0.00	0.00	0.00
4,100.0	1.87	269.30	4,098.1	-1.4	-116.1	3.8	0.00	0.00	0.00
4,200.0	1.87	269.30	4,198.1	-1.5	-119.4	3.9	0.00	0.00	0.00
4,300.0	1.87	269.30	4,298.0	-1.5	-122.6	4.0	0.00	0.00	0.00
4,400.0	1.87	269.30	4,398.0	-1.5	-125.9	4.1	0.00	0.00	0.00
4,500.0	1.87	269.30	4,497.9	-1.6	-129.2	4.2	0.00	0.00	0.00
4,600.0	1.87	269.30	4,597.8	-1.6	-132.4	4.3	0.00	0.00	0.00
4,700.0	1.87	269.30	4,697.8	-1.7	-135.7	4.4	0.00	0.00	0.00
4,800.0	1.87	269.30	4,797.7	-1.7	-139.0	4.5	0.00	0.00	0.00
4,892.3	1.87	269.30	4,890.0	-1.7	-142.0	4.6	0.00	0.00	0.00
BYCN									
4,900.0	1.87	269.30	4,897.7	-1.7	-142.2	4.6	0.00	0.00	0.00
5,000.0	1.87	269.30	4,997.6	-1.8	-145.5	4.7	0.00	0.00	0.00
5,100.0	1.87	269.30	5,097.6	-1.8	-148.8	4.8	0.00	0.00	0.00
5,200.0	1.87	269.30	5,197.5	-1.9	-152.0	4.9	0.00	0.00	0.00
5,300.0	1.87	269.30	5,297.5	-1.9	-155.3	5.0	0.00	0.00	0.00
5,400.0	1.87	269.30	5,397.4	-1.9	-158.6	5.1	0.00	0.00	0.00
5,500.0	1.87	269.30	5,497.4	-2.0	-161.8	5.3	0.00	0.00	0.00
5,600.0	1.87	269.30	5,597.3	-2.0	-165.1	5.4	0.00	0.00	0.00
5,700.0	1.87	269.30	5,697.3	-2.1	-168.4	5.5	0.00	0.00	0.00
5,800.0	1.87	269.30	5,797.2	-2.1	-171.6	5.6	0.00	0.00	0.00
5,900.0	1.87	269.30	5,897.2	-2.1	-174.9	5.7	0.00	0.00	0.00
6,000.0	1.87	269.30	5,997.1	-2.2	-178.2	5.8	0.00	0.00	0.00
6,100.0	1.87	269.30	6,097.0	-2.2	-181.4	5.9	0.00	0.00	0.00
6,200.0	1.87	269.30	6,197.0	-2.3	-184.7	6.0	0.00	0.00	0.00
6,300.0	1.87	269.30	6,296.9	-2.3	-188.0	6.1	0.00	0.00	0.00
6,356.1	1.87	269.30	6,353.0	-2.3	-189.8	6.2	0.00	0.00	0.00
Bone Sprg (BSGL)									
6,400.0	1.87	269.30	6,396.9	-2.3	-191.2	6.2	0.00	0.00	0.00
6,500.0	1.87	269.30	6,496.8	-2.4	-194.5	6.3	0.00	0.00	0.00
6,600.0	1.87	269.30	6,596.8	-2.4	-197.8	6.4	0.00	0.00	0.00
6,648.2	1.87	269.30	6,645.0	-2.4	-199.3	6.5	0.00	0.00	0.00
U Avalon Sh									
6,700.0	1.87	269.30	6,696.7	-2.5	-201.0	6.5	0.00	0.00	0.00
6,800.0	1.87	269.30	6,796.7	-2.5	-204.3	6.6	0.00	0.00	0.00
6,900.0	1.87	269.30	6,896.6	-2.5	-207.6	6.7	0.00	0.00	0.00
6,947.4	1.87	269.30	6,944.0	-2.6	-209.1	6.8	0.00	0.00	0.00
L Avalon Sh									
7,000.0	1.87	269.30	6,996.6	-2.6	-210.8	6.8	0.00	0.00	0.00
7,100.0	1.87	269.30	7,096.5	-2.6	-214.1	6.9	0.00	0.00	0.00
7,200.0	1.87	269.30	7,196.5	-2.7	-217.4	7.1	0.00	0.00	0.00
7,275.6	1.87	269.30	7,272.0	-2.7	-219.8	7.1	0.00	0.00	0.00
FBSG_sand									
7,300.0	1.87	269.30	7,296.4	-2.7	-220.6	7.2	0.00	0.00	0.00
7,400.0	1.87	269.30	7,396.3	-2.7	-223.9	7.3	0.00	0.00	0.00
7,500.0	1.87	269.30	7,496.3	-2.8	-227.2	7.4	0.00	0.00	0.00
7,600.0	1.87	269.30	7,596.2	-2.8	-230.4	7.5	0.00	0.00	0.00
7,700.0	1.87	269.30	7,696.2	-2.9	-233.7	7.6	0.00	0.00	0.00
7,800.0	1.87	269.30	7,796.1	-2.9	-237.0	7.7	0.00	0.00	0.00
7,900.0	1.87	269.30	7,896.1	-2.9	-240.2	7.8	0.00	0.00	0.00
8,000.0	1.87	269.30	7,996.0	-3.0	-243.5	7.9	0.00	0.00	0.00

Database:	COG Production LLC	Local Co-ordinate Reference:	Well COPPERHEAD 31 FED COM #3H
Company:	NEW MEXICO BASIN	TVD Reference:	RKB=2895+26 @ 2921.0usft (TBD)
Project:	EDDY COUNTY, NM	MD Reference:	RKB=2895+26 @ 2921.0usft (TBD)
Site:	WOLFCAMP	North Reference:	Grid
Well:	COPPERHEAD 31 FED COM #3H	Survey Calculation Method:	Minimum Curvature
Wellbore:	OWB		
Design:	DWD Plan 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)
8,048.0	1.87	269.30	8,044.0	-3.0	-245.1	8.0	0.00	0.00	0.00
SBSG_sand									
8,100.0	1.87	269.30	8,096.0	-3.0	-246.8	8.0	0.00	0.00	0.00
8,200.0	1.87	269.30	8,195.9	-3.1	-250.0	8.1	0.00	0.00	0.00
8,300.0	1.87	269.30	8,295.9	-3.1	-253.3	8.2	0.00	0.00	0.00
8,400.0	1.87	269.30	8,395.8	-3.1	-256.6	8.3	0.00	0.00	0.00
8,500.0	1.87	269.30	8,495.8	-3.2	-259.8	8.4	0.00	0.00	0.00
8,600.0	1.87	269.30	8,595.7	-3.2	-263.1	8.5	0.00	0.00	0.00
8,700.0	1.87	269.30	8,695.7	-3.3	-266.4	8.6	0.00	0.00	0.00
8,800.0	1.87	269.30	8,795.6	-3.3	-269.6	8.8	0.00	0.00	0.00
8,900.0	1.87	269.30	8,895.5	-3.3	-272.9	8.9	0.00	0.00	0.00
9,000.0	1.87	269.30	8,995.5	-3.4	-276.2	9.0	0.00	0.00	0.00
9,100.0	1.87	269.30	9,095.4	-3.4	-279.4	9.1	0.00	0.00	0.00
9,135.5	1.87	269.30	9,131.0	-3.4	-280.6	9.1	0.00	0.00	0.00
TBSG_sand									
9,200.0	1.87	269.30	9,195.4	-3.5	-282.7	9.2	0.00	0.00	0.00
9,300.0	1.87	269.30	9,295.3	-3.5	-286.0	9.3	0.00	0.00	0.00
9,400.0	1.87	269.30	9,395.3	-3.5	-289.2	9.4	0.00	0.00	0.00
9,474.7	1.87	269.30	9,470.0	-3.6	-291.7	9.5	0.00	0.00	0.00
WFMP									
9,500.0	1.87	269.30	9,495.2	-3.6	-292.5	9.5	0.00	0.00	0.00
9,600.0	1.87	269.30	9,595.2	-3.6	-295.8	9.6	0.00	0.00	0.00
9,700.0	1.87	269.30	9,695.1	-3.7	-299.0	9.7	0.00	0.00	0.00
9,800.0	1.87	269.30	9,795.1	-3.7	-302.3	9.8	0.00	0.00	0.00
9,900.0	1.87	269.30	9,895.0	-3.7	-305.6	9.9	0.00	0.00	0.00
10,000.0	1.87	269.30	9,995.0	-3.8	-308.8	10.0	0.00	0.00	0.00
10,063.0	1.87	269.30	10,057.9	-3.8	-310.9	10.1	0.00	0.00	0.00
7 5/8"									
10,086.1	1.87	269.30	10,081.0	-3.8	-311.6	10.1	0.00	0.00	0.00
WFMP B									
10,100.0	1.87	269.30	10,094.9	-3.8	-312.1	10.1	0.00	0.00	0.00
10,162.7	1.87	269.30	10,157.6	-3.8	-314.2	10.2	0.00	0.00	0.00
10,200.0	4.83	337.36	10,194.8	-2.4	-315.4	11.7	12.00	7.92	182.45
10,215.2	6.55	343.59	10,210.0	-1.0	-315.9	13.1	12.00	11.31	40.92
WFMP C									
10,300.0	16.55	353.82	10,292.9	15.7	-318.5	29.9	12.00	11.80	12.06
10,400.0	28.51	356.68	10,385.1	53.8	-321.5	68.1	12.00	11.95	2.86
10,500.0	40.48	357.94	10,467.4	110.3	-324.0	124.7	12.00	11.98	1.26
10,530.5	44.14	358.20	10,490.0	130.8	-324.7	145.2	12.00	11.99	0.87
Copperhead 31 FEd Com #3H - FTP									
10,600.0	52.47	358.69	10,536.1	182.7	-326.1	197.0	12.00	11.99	0.71
10,666.0	60.39	359.07	10,572.6	237.6	-327.2	252.0	12.00	11.99	0.57
WFMP D									
10,700.0	64.46	359.24	10,588.3	267.7	-327.6	282.1	12.00	11.99	0.50
10,800.0	76.46	359.68	10,621.7	361.8	-328.5	376.1	12.00	11.99	0.44
10,900.0	88.45	0.08	10,634.8	460.7	-328.7	475.0	12.00	11.99	0.40
10,909.7	89.61	0.12	10,635.0	470.4	-328.7	484.6	12.00	11.99	0.39
Copperhead 31 FEd Com #3H - LP Shifted									
11,000.0	89.61	0.12	10,635.6	560.7	-328.5	574.8	0.00	0.00	0.00
11,100.0	89.61	0.12	10,636.3	660.7	-328.3	674.7	0.00	0.00	0.00
11,200.0	89.61	0.12	10,637.0	760.7	-328.1	774.6	0.00	0.00	0.00
11,300.0	89.61	0.12	10,637.7	860.7	-327.8	874.5	0.00	0.00	0.00
11,400.0	89.61	0.12	10,638.3	960.7	-327.6	974.4	0.00	0.00	0.00

Database:	COG Production LLC	**Local Co-ordinate Reference:**	Well COPPERHEAD 31 FED COM #3H
Company:	NEW MEXICO BASIN	**TVD Reference:**	RKB=2895+26 @ 2921.0usft (TBD)
Project:	EDDY COUNTY, NM	**MD Reference:**	RKB=2895+26 @ 2921.0usft (TBD)
Site:	WOLFCAMP	**North Reference:**	Grid
Well:	COPPERHEAD 31 FED COM #3H	**Survey Calculation Method:**	Minimum Curvature
Wellbore:	OWB		
Design:	DWD Plan 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)
11,500.0	89.61	0.12	10,639.0	1,060.7	-327.4	1,074.3	0.00	0.00	0.00
11,600.0	89.61	0.12	10,639.7	1,160.7	-327.2	1,174.2	0.00	0.00	0.00
11,700.0	89.61	0.12	10,640.4	1,260.7	-327.0	1,274.1	0.00	0.00	0.00
11,800.0	89.61	0.12	10,641.1	1,360.7	-326.8	1,374.0	0.00	0.00	0.00
11,900.0	89.61	0.12	10,641.7	1,460.7	-326.6	1,473.8	0.00	0.00	0.00
12,000.0	89.61	0.12	10,642.4	1,560.7	-326.4	1,573.7	0.00	0.00	0.00
12,100.0	89.61	0.12	10,643.1	1,660.7	-326.2	1,673.6	0.00	0.00	0.00
12,200.0	89.61	0.12	10,643.8	1,760.7	-326.0	1,773.5	0.00	0.00	0.00
12,300.0	89.61	0.12	10,644.5	1,860.7	-325.7	1,873.4	0.00	0.00	0.00
12,400.0	89.61	0.12	10,645.1	1,960.7	-325.5	1,973.3	0.00	0.00	0.00
12,500.0	89.61	0.12	10,645.8	2,060.7	-325.3	2,073.2	0.00	0.00	0.00
12,600.0	89.61	0.12	10,646.5	2,160.7	-325.1	2,173.1	0.00	0.00	0.00
12,700.0	89.61	0.12	10,647.2	2,260.7	-324.9	2,272.9	0.00	0.00	0.00
12,800.0	89.61	0.12	10,647.9	2,360.7	-324.7	2,372.8	0.00	0.00	0.00
12,900.0	89.61	0.12	10,648.5	2,460.7	-324.5	2,472.7	0.00	0.00	0.00
13,000.0	89.61	0.12	10,649.2	2,560.7	-324.3	2,572.6	0.00	0.00	0.00
13,100.0	89.61	0.12	10,649.9	2,660.7	-324.1	2,672.5	0.00	0.00	0.00
13,200.0	89.61	0.12	10,650.6	2,760.7	-323.9	2,772.4	0.00	0.00	0.00
13,300.0	89.61	0.12	10,651.3	2,860.7	-323.7	2,872.3	0.00	0.00	0.00
13,400.0	89.61	0.12	10,652.0	2,960.7	-323.4	2,972.2	0.00	0.00	0.00
13,500.0	89.61	0.12	10,652.6	3,060.7	-323.2	3,072.1	0.00	0.00	0.00
13,600.0	89.61	0.12	10,653.3	3,160.7	-323.0	3,171.9	0.00	0.00	0.00
13,700.0	89.61	0.12	10,654.0	3,260.7	-322.8	3,271.8	0.00	0.00	0.00
13,800.0	89.61	0.12	10,654.7	3,360.7	-322.6	3,371.7	0.00	0.00	0.00
13,900.0	89.61	0.12	10,655.4	3,460.7	-322.4	3,471.6	0.00	0.00	0.00
14,000.0	89.61	0.12	10,656.0	3,560.7	-322.2	3,571.5	0.00	0.00	0.00
14,100.0	89.61	0.12	10,656.7	3,660.7	-322.0	3,671.4	0.00	0.00	0.00
14,200.0	89.61	0.12	10,657.4	3,760.7	-321.8	3,771.3	0.00	0.00	0.00
14,300.0	89.61	0.12	10,658.1	3,860.6	-321.6	3,871.2	0.00	0.00	0.00
14,400.0	89.61	0.12	10,658.8	3,960.6	-321.4	3,971.0	0.00	0.00	0.00
14,500.0	89.61	0.12	10,659.4	4,060.6	-321.1	4,070.9	0.00	0.00	0.00
14,600.0	89.61	0.12	10,660.1	4,160.6	-320.9	4,170.8	0.00	0.00	0.00
14,700.0	89.61	0.12	10,660.8	4,260.6	-320.7	4,270.7	0.00	0.00	0.00
14,800.0	89.61	0.12	10,661.5	4,360.6	-320.5	4,370.6	0.00	0.00	0.00
14,900.0	89.61	0.12	10,662.2	4,460.6	-320.3	4,470.5	0.00	0.00	0.00
15,000.0	89.61	0.12	10,662.8	4,560.6	-320.1	4,570.4	0.00	0.00	0.00
15,100.0	89.61	0.12	10,663.5	4,660.6	-319.9	4,670.3	0.00	0.00	0.00
15,200.0	89.61	0.12	10,664.2	4,760.6	-319.7	4,770.2	0.00	0.00	0.00
15,300.0	89.61	0.12	10,664.9	4,860.6	-319.5	4,870.0	0.00	0.00	0.00
15,400.0	89.61	0.12	10,665.6	4,960.6	-319.3	4,969.9	0.00	0.00	0.00
15,500.0	89.61	0.12	10,666.2	5,060.6	-319.0	5,069.8	0.00	0.00	0.00
15,600.0	89.61	0.12	10,666.9	5,160.6	-318.8	5,169.7	0.00	0.00	0.00
15,700.0	89.61	0.12	10,667.6	5,260.6	-318.6	5,269.6	0.00	0.00	0.00
15,800.0	89.61	0.12	10,668.3	5,360.6	-318.4	5,369.5	0.00	0.00	0.00
15,900.0	89.61	0.12	10,669.0	5,460.6	-318.2	5,469.4	0.00	0.00	0.00
16,000.0	89.61	0.12	10,669.6	5,560.6	-318.0	5,569.3	0.00	0.00	0.00
16,100.0	89.61	0.12	10,670.3	5,660.6	-317.8	5,669.1	0.00	0.00	0.00
16,200.0	89.61	0.12	10,671.0	5,760.6	-317.6	5,769.0	0.00	0.00	0.00
16,300.0	89.61	0.12	10,671.7	5,860.6	-317.4	5,868.9	0.00	0.00	0.00
16,400.0	89.61	0.12	10,672.4	5,960.6	-317.2	5,968.8	0.00	0.00	0.00
16,500.0	89.61	0.12	10,673.1	6,060.6	-317.0	6,068.7	0.00	0.00	0.00
16,600.0	89.61	0.12	10,673.7	6,160.6	-316.7	6,168.6	0.00	0.00	0.00
16,700.0	89.61	0.12	10,674.4	6,260.6	-316.5	6,268.5	0.00	0.00	0.00
16,800.0	89.61	0.12	10,675.1	6,360.6	-316.3	6,368.4	0.00	0.00	0.00

Database:	COG Production LLC	Local Co-ordinate Reference:	Well COPPERHEAD 31 FED COM #3H
Company:	NEW MEXICO BASIN	TVD Reference:	RKB=2895+26 @ 2921.0usft (TBD)
Project:	EDDY COUNTY, NM	MD Reference:	RKB=2895+26 @ 2921.0usft (TBD)
Site:	WOLFCAMP	North Reference:	Grid
Well:	COPPERHEAD 31 FED COM #3H	Survey Calculation Method:	Minimum Curvature
Wellbore:	OWB		
Design:	DWD Plan 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)
16,900.0	89.61	0.12	10,675.8	6,460.6	-316.1	6,468.3	0.00	0.00	0.00
17,000.0	89.61	0.12	10,676.5	6,560.6	-315.9	6,568.1	0.00	0.00	0.00
17,100.0	89.61	0.12	10,677.1	6,660.6	-315.7	6,668.0	0.00	0.00	0.00
17,200.0	89.61	0.12	10,677.8	6,760.6	-315.5	6,767.9	0.00	0.00	0.00
17,300.0	89.61	0.12	10,678.5	6,860.6	-315.3	6,867.8	0.00	0.00	0.00
17,400.0	89.61	0.12	10,679.2	6,960.6	-315.1	6,967.7	0.00	0.00	0.00
17,465.7	89.61	0.12	10,679.6	7,026.3	-314.9	7,033.3	0.00	0.00	0.00
5.5" x 5" - Copperhead 31 Fed Com #3H - BHL									

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
Copperhead 31 Fed - plan hits target center - Point	0.00	0.01	0.0	0.0	0.0	364,060.80	598,403.40	32° 0' 1.870 N	104° 0' 57.227 W
Copperhead 31 FEd - plan misses target center by 200.2usft at 10530.5usft MD (10490.0 TVD, 130.8 N, -324.7 E) - Point	0.00	0.01	10,635.0	-7.1	-329.7	364,053.72	598,073.72	32° 0' 1.810 N	104° 1' 1.056 W
Copperhead 31 FEd - plan hits target center - Point	0.00	0.00	10,635.0	470.4	-328.7	364,531.21	598,074.74	32° 0' 6.535 N	104° 1' 1.028 W
Copperhead 31 Fed - plan misses target center by 0.7usft at 17465.7usft MD (10679.6 TVD, 7026.3 N, -314.9 E) - Rectangle (sides W100.0 H7,033.3 D30.0)	0.39	357.44	10,679.0	7,026.3	-314.7	371,087.10	598,088.70	32° 1' 11.416 N	104° 1' 0.643 W

Casing Points

Measured Depth (usft)	Vertical Depth (usft)	Name	Casing Diameter (")	Hole Diameter (")
870.0	869.8	10 3/4"	10-3/4	13-1/2
10,063.0	10,057.9	7 5/8"	7-5/8	9-5/8
17,465.7	10,679.6	5 1/2" x 5".	5	6-3/4

Database:	COG Production LLC	**Local Co-ordinate Reference:**	Well COPPERHEAD 31 FED COM #3H
Company:	NEW MEXICO BASIN	**TVD Reference:**	RKB=2895+26 @ 2921.0usft (TBD)
Project:	EDDY COUNTY, NM	**MD Reference:**	RKB=2895+26 @ 2921.0usft (TBD)
Site:	WOLFCAMP	**North Reference:**	Grid
Well:	COPPERHEAD 31 FED COM #3H	**Survey Calculation Method:**	Minimum Curvature
Wellbore:	OWB		
Design:	DWD Plan 1		

Formations:

Measured Depth (usft)	Vertical Depth (usft)	Name	Lithology	Dip (°)	Dip Direction (°)
846.2	846.0	Rustler		0.39	0.12
897.2	897.0	TOS		0.39	0.12
2,479.0	2,478.0	BOS (Fletcher)		0.39	0.12
2,658.1	2,657.0	LMAR (Top Delaware)		0.39	0.12
2,702.1	2,701.0	BLCN		0.39	0.12
3,573.6	3,572.0	CYCN		0.39	0.12
4,892.3	4,890.0	BYCN		0.39	0.12
6,356.1	6,353.0	Bone Sprg (BSGL)		0.39	0.12
6,648.2	6,645.0	U Avalon Sh		0.39	0.12
6,947.4	6,944.0	L Avalon Sh		0.39	0.12
7,275.6	7,272.0	FBSG_sand		0.39	0.12
8,048.0	8,044.0	SBSG_sand		0.39	0.12
9,135.5	9,131.0	TBSG_sand		0.39	0.12
9,474.7	9,470.0	WFMP		0.39	0.12
10,086.1	10,081.0	WFMP B		0.39	0.12
10,215.2	10,210.0	WFMP C		0.39	0.12
10,666.0	10,572.6	WFMP D		0.39	0.12

COG PRODUCTION LLC

EDDY COUNTY, NM
WOLFCAMP
COPPERHEAD 31 FED COM #3H

OWB
DWD Plan 3

Anticollision Report

29 March, 2016

COG Production LLC

Anticollision Report

Company:	COG Production LLC	**Local Co-ordinate Reference:**	Well COPPERHEAD 31 FED COM #3H
Project:	EDDY COUNTY, NM	**TVD Reference:**	RKB=2895+26 @ 2921.0usft (TBD)
Reference Site:	WOLFCAMP	**MD Reference:**	RKB=2895+26 @ 2921.0usft (TBD)
Site Error:	0.0 usft	**North Reference:**	Grid
Reference Well:	COPPERHEAD 31 FED COM #3H	**Survey Calculation Method:**	Minimum Curvature
Well Error:	3.0 usft	**Output errors are at**	2.00 sigma
Reference Wellbore	OWB	**Database:**	EDM_Users
Reference Design:	DWD Plan 3	**Offset TVD Reference:**	Offset Datum

Reference DWD Plan 3

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

Survey Tool Program **Date** 3/29/2016

From (usft)	To (usft)	Survey (Wellbore)	Tool Name	Description
0.0	17,465.7	DWD Plan 1 (OWB)	MWD	OWSG MWD - Standard

Summary

Site Name / Offset Well - Wellbore - Design	Reference Measured Depth (usft)	Offset Measured Depth (usft)	Distance Between Centres (usft)	Distance Between Ellipses (usft)	Separation Factor	Warning
WOLFCAMP						
COPPERHEAD 30 FEE #1H - LATERAL 01 - AWP-LATE	17,304.3	7,353.0	3,556.3	3,424.7	27.020	CC
COPPERHEAD 30 FEE #1H - LATERAL 01 - AWP-LATE	17,400.0	7,353.0	3,557.6	3,424.4	26.724	ES
COPPERHEAD 30 FEE #1H - LATERAL 01 - AWP-LATE	17,465.7	7,367.9	3,559.5	3,425.0	26.460	SF
COPPERHEAD 30 FEE #1H - OWB-PILOT HOLE - AWP	17,267.9	7,672.0	3,061.8	2,934.6	24.076	CC
COPPERHEAD 30 FEE #1H - OWB-PILOT HOLE - AWP	17,300.0	7,672.0	3,061.9	2,934.2	23.982	ES
COPPERHEAD 30 FEE #1H - OWB-PILOT HOLE - AWP	17,465.7	7,672.0	3,068.1	2,937.8	23.548	SF
COPPERHEAD 31 FED COM #1H - OWB - ACTUAL WE	5,946.0	5,939.1	280.1	238.0	6.643	CC
COPPERHEAD 31 FED COM #1H - OWB - ACTUAL WE	6,000.0	5,990.0	280.4	237.8	6.592	ES
COPPERHEAD 31 FED COM #1H - OWB - ACTUAL WE	6,100.0	6,079.6	282.9	239.7	6.549	SF
PERKINS #1Y - OWB - ACTUAL WELLPATH	500.0	524.0	5,062.1	5,044.9	295.926	CC
PERKINS #1Y - OWB - ACTUAL WELLPATH	3,000.0	3,000.0	5,063.8	4,923.8	36.177	ES
PERKINS #1Y - OWB - ACTUAL WELLPATH	17,465.7	3,000.0	7,958.1	7,706.4	31.617	SF

Offset Design WOLFCAMP - COPPERHEAD 30 FEE #1H - LATERAL 01 - AWP-LATERAL 01 — Offset Site Error: 0.0 usft

Survey Program: 100-Standard Keeper 104, 6496-MWD — Offset Well Error: 3.0 usft

Reference Measured Depth (usft)	Reference Vertical Depth (usft)	Offset Measured Depth (usft)	Offset Vertical Depth (usft)	Semi Major Axis Reference (usft)	Semi Major Axis Offset (usft)	Highside Toolface (°)	Offset Wellbore Centre +N/-S (usft)	Offset Wellbore Centre +E/-W (usft)	Distance Between Centres (usft)	Distance Between Ellipses (usft)	Minimum Separation (usft)	Separation Factor	Warning
0.0	0.0	40.1	40.1	3.0	3.0	-1.13	6,875.6	-135.4	6,876.9				
100.0	100.0	124.5	124.5	3.0	3.0	-1.13	6,875.7	-135.7	6,877.1	6,871.1	6.00	1,145.410	
200.0	200.0	200.0	200.0	3.0	3.0	-1.13	6,876.1	-135.9	6,877.6	6,871.5	6.04	1,137.748	
300.0	300.0	238.5	238.5	3.1	3.0	-1.13	6,876.5	-136.0	6,878.7	6,872.5	6.13	1,122.900	
400.0	400.0	300.0	300.0	3.2	3.0	-1.14	6,877.8	-136.4	6,880.7	6,874.5	6.25	1,101.210	
500.0	500.0	337.7	337.6	3.4	3.0	-1.14	6,878.9	-136.6	6,883.4	6,877.0	6.40	1,074.960	
593.6	593.6	410.5	410.5	3.5	3.0	89.51	6,881.2	-137.0	6,886.3	6,879.7	6.58	1,046.760	
600.0	600.0	416.4	416.3	3.6	3.0	89.51	6,881.4	-137.0	6,886.5	6,879.9	6.59	1,044.638	
700.0	699.9	510.1	510.0	3.8	3.1	89.54	6,884.6	-137.3	6,889.9	6,883.1	6.81	1,011.881	
800.0	799.9	626.3	626.1	4.0	3.1	89.56	6,888.4	-137.8	6,893.1	6,886.1	7.06	976.246	
900.0	899.8	758.3	758.0	4.2	3.1	89.59	6,892.2	-138.6	6,896.1	6,888.7	7.35	938.861	
1,000.0	999.8	907.1	906.8	4.5	3.2	89.62	6,895.7	-140.8	6,898.4	6,890.7	7.66	900.544	
1,100.0	1,099.7	1,050.0	1,049.6	4.7	3.2	89.63	6,898.1	-143.7	6,900.1	6,892.1	7.99	863.395	
1,200.0	1,199.7	1,242.2	1,241.8	5.0	3.3	89.65	6,899.5	-147.5	6,900.9	6,892.5	8.35	825.972	
1,300.0	1,299.6	1,377.5	1,377.0	5.3	3.4	89.67	6,898.9	-149.9	6,900.4	6,891.7	8.69	793.733	
1,400.0	1,399.6	1,445.4	1,445.0	5.6	3.4	89.68	6,898.7	-151.1	6,900.1	6,891.1	9.02	764.797	

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

COG Production LLC

Anticollision Report

Company:	COG Production LLC	**Local Co-ordinate Reference:**	Well COPPERHEAD 31 FED COM #3H
Project:	EDDY COUNTY, NM	**TVD Reference:**	RKB=2895+26 @ 2921.0usft (TBD)
Reference Site:	WOLFCAMP	**MD Reference:**	RKB=2895+26 @ 2921.0usft (TBD)
Site Error:	0.0 usft	**North Reference:**	Grid
Reference Well:	COPPERHEAD 31 FED COM #3H	**Survey Calculation Method:**	Minimum Curvature
Well Error:	3.0 usft	**Output errors are at**	2.00 sigma
Reference Wellbore	OWB	**Database:**	EDM_Users
Reference Design:	DWD Plan 3	**Offset TVD Reference:**	Offset Datum

Offset Design WOLFCAMP - COPPERHEAD 30 FEE #1H - LATERAL 01 - AWP-LATERAL 01 — Offset Site Error: 0.0 usft

Survey Program: 100-Standard Keeper 104, 6496-MWD — Offset Well Error: 3.0 usft

Reference Measured Depth (usft)	Reference Vertical Depth (usft)	Offset Measured Depth (usft)	Offset Vertical Depth (usft)	Semi Major Axis Reference (usft)	Semi Major Axis Offset (usft)	Highside Toolface (°)	Offset Wellbore Centre +N/-S (usft)	Offset Wellbore Centre +E/-W (usft)	Distance Between Centres (usft)	Distance Between Ellipses (usft)	Minimum Separation (usft)	Separation Factor	Warning
1,406.9	1,406.4	1,449.5	1,449.0	5.6	3.4	89.68	6,898.7	-151.2	6,900.1	6,891.1	9.04	762.876	
1,500.0	1,499.5	1,500.0	1,499.5	5.9	3.4	89.68	6,898.8	-152.2	6,900.4	6,891.0	9.36	737.612	
1,600.0	1,599.4	1,563.7	1,563.3	6.2	3.5	89.69	6,899.3	-153.7	6,901.2	6,891.5	9.71	711.017	
1,700.0	1,699.4	1,636.4	1,635.9	6.6	3.5	89.69	6,900.3	-155.5	6,902.6	6,892.5	10.07	685.428	
1,800.0	1,799.3	1,750.1	1,749.6	6.9	3.6	89.70	6,902.0	-158.2	6,904.1	6,893.7	10.47	659.386	
1,900.0	1,899.3	1,883.4	1,882.8	7.2	3.7	89.71	6,903.4	-161.0	6,905.2	6,894.3	10.89	633.957	
2,000.0	1,999.2	2,000.0	1,999.4	7.5	3.8	89.73	6,904.2	-162.9	6,905.9	6,894.6	11.31	610.652	
2,100.0	2,099.2	2,079.6	2,079.0	7.9	3.8	89.75	6,904.8	-162.9	6,906.7	6,895.0	11.67	591.651	
2,200.0	2,199.1	2,248.5	2,247.7	8.2	3.8	89.85	6,905.6	-156.7	6,907.1	6,895.1	12.01	575.058	
2,300.0	2,299.1	2,365.3	2,364.3	8.5	3.8	89.94	6,905.5	-150.2	6,906.9	6,894.5	12.34	559.598	
2,400.0	2,399.0	2,536.7	2,535.1	8.9	3.8	90.11	6,904.3	-135.2	6,906.0	6,893.3	12.68	544.572	
2,500.0	2,499.0	2,641.4	2,639.4	9.2	3.8	90.21	6,902.9	-125.9	6,904.6	6,891.6	13.03	530.029	
2,600.0	2,598.9	2,744.8	2,742.5	9.6	3.8	90.30	6,901.5	-117.9	6,903.2	6,889.9	13.38	516.027	
2,700.0	2,698.9	2,846.9	2,844.3	9.9	3.8	90.39	6,900.1	-111.0	6,901.8	6,888.1	13.73	502.550	
2,800.0	2,798.8	2,940.3	2,937.5	10.3	3.8	90.47	6,898.7	-104.9	6,900.4	6,886.3	14.09	489.608	
2,900.0	2,898.8	3,025.6	3,022.6	10.6	3.8	90.53	6,897.7	-99.7	6,899.1	6,884.7	14.46	477.203	
3,000.0	2,998.7	3,114.0	3,110.9	11.0	3.9	90.60	6,896.8	-94.6	6,898.1	6,883.3	14.83	465.244	
3,100.0	3,098.6	3,214.7	3,211.5	11.3	3.9	90.67	6,895.8	-89.0	6,897.1	6,881.9	15.20	453.627	
3,200.0	3,198.6	3,314.2	3,310.8	11.7	3.9	90.74	6,894.8	-84.0	6,896.2	6,880.6	15.59	442.478	
3,300.0	3,298.5	3,411.4	3,407.9	12.0	4.0	90.80	6,893.8	-79.5	6,895.3	6,879.3	15.97	431.774	
3,400.0	3,398.5	3,500.0	3,496.4	12.4	4.0	90.86	6,893.0	-75.6	6,894.4	6,878.0	16.35	421.567	
3,500.0	3,498.4	3,590.3	3,586.7	12.7	4.0	90.91	6,892.3	-72.0	6,893.7	6,876.9	16.74	411.730	
3,600.0	3,598.4	3,671.6	3,667.9	13.1	4.1	90.96	6,891.9	-69.3	6,893.2	6,876.1	17.13	402.351	
3,700.0	3,698.3	3,763.6	3,759.8	13.4	4.1	91.01	6,891.6	-66.5	6,893.0	6,875.5	17.53	393.201	
3,800.0	3,798.3	3,854.7	3,850.9	13.8	4.2	91.05	6,891.4	-64.0	6,892.8	6,874.9	17.93	384.385	
3,834.9	3,833.1	3,885.0	3,881.2	13.9	4.2	91.07	6,891.4	-63.2	6,892.8	6,874.8	18.07	381.405	
3,900.0	3,898.2	3,943.7	3,939.8	14.1	4.2	91.10	6,891.4	-61.7	6,892.9	6,874.5	18.34	375.904	
4,000.0	3,998.2	4,040.6	4,036.8	14.5	4.3	91.14	6,891.4	-59.6	6,893.0	6,874.3	18.75	367.624	
4,100.0	4,098.1	4,141.5	4,137.6	14.8	4.3	91.18	6,891.4	-57.7	6,893.1	6,873.9	19.17	359.587	
4,200.0	4,198.1	4,238.7	4,234.8	15.2	4.4	91.22	6,891.5	-56.2	6,893.3	6,873.7	19.59	351.875	
4,300.0	4,298.0	4,339.3	4,335.4	15.5	4.5	91.26	6,891.6	-54.8	6,893.4	6,873.4	20.02	344.383	
4,400.0	4,398.0	4,438.6	4,434.7	15.9	4.6	91.30	6,891.7	-53.9	6,893.6	6,873.2	20.45	337.156	
4,500.0	4,497.9	4,543.8	4,539.9	16.2	4.6	91.33	6,891.8	-53.3	6,893.8	6,872.9	20.88	330.120	
4,600.0	4,597.8	4,671.3	4,667.4	16.6	4.7	91.37	6,891.6	-52.9	6,893.7	6,872.4	21.32	323.339	
4,700.0	4,697.8	4,801.8	4,797.9	17.0	4.8	91.40	6,890.8	-52.8	6,893.2	6,871.5	21.72	317.315	
4,800.0	4,797.7	4,903.1	4,899.2	17.3	4.8	91.43	6,890.0	-52.9	6,892.5	6,870.4	22.11	311.792	
4,900.0	4,897.7	5,017.7	5,013.8	17.7	4.8	91.46	6,889.0	-53.0	6,891.7	6,869.2	22.50	306.339	
5,000.0	4,997.6	5,166.3	5,162.4	18.0	4.9	91.50	6,886.8	-53.6	6,890.2	6,867.3	22.90	300.888	
5,100.0	5,097.6	5,269.8	5,265.9	18.4	4.9	91.52	6,884.9	-54.5	6,888.5	6,865.2	23.29	295.801	
5,200.0	5,197.5	5,361.1	5,357.2	18.7	4.9	91.53	6,883.3	-55.5	6,886.8	6,863.1	23.67	290.917	
5,300.0	5,297.5	5,457.7	5,453.7	19.1	5.0	91.55	6,881.7	-56.6	6,885.3	6,861.2	24.06	286.153	
5,400.0	5,397.4	5,569.0	5,565.0	19.5	5.0	91.57	6,879.9	-58.0	6,883.7	6,859.2	24.46	281.444	
5,500.0	5,497.4	5,671.9	5,667.8	19.8	5.0	91.59	6,878.0	-59.4	6,881.9	6,857.1	24.86	276.872	
5,600.0	5,597.3	5,774.0	5,770.0	20.2	5.1	91.60	6,876.1	-61.0	6,880.2	6,854.9	25.26	272.418	
5,700.0	5,697.3	5,881.8	5,877.7	20.5	5.1	91.62	6,874.1	-62.8	6,878.3	6,852.7	25.66	268.036	
5,800.0	5,797.2	5,975.6	5,971.5	20.9	5.2	91.63	6,872.3	-64.3	6,876.5	6,850.4	26.07	263.815	
5,900.0	5,897.2	6,076.2	6,072.0	21.2	5.2	91.64	6,870.4	-65.8	6,874.7	6,848.2	26.48	259.655	
6,000.0	5,997.1	6,172.2	6,168.0	21.6	5.3	91.66	6,868.6	-67.2	6,872.9	6,846.0	26.89	255.612	
6,100.0	6,097.0	6,278.4	6,274.2	22.0	5.3	91.68	6,866.7	-68.8	6,871.1	6,843.8	27.31	251.610	
6,200.0	6,197.0	6,384.5	6,380.2	22.3	5.4	91.69	6,864.6	-70.4	6,869.2	6,841.5	27.73	247.698	
6,300.0	6,296.9	6,472.9	6,468.6	22.7	5.5	91.70	6,862.9	-71.9	6,867.3	6,839.2	28.14	244.045	
6,400.0	6,396.9	6,814.0	6,795.4	23.0	5.8	91.11	6,851.7	-154.0	6,863.3	6,834.4	28.83	238.077	

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

COG Production LLC

Anticollision Report

Company:	COG Production LLC	**Local Co-ordinate Reference:**	Well COPPERHEAD 31 FED COM #3H
Project:	EDDY COUNTY, NM	**TVD Reference:**	RKB=2895+26 @ 2921.0usft (TBD)
Reference Site:	WOLFCAMP	**MD Reference:**	RKB=2895+26 @ 2921.0usft (TBD)
Site Error:	0.0 usft	**North Reference:**	Grid
Reference Well:	COPPERHEAD 31 FED COM #3H	**Survey Calculation Method:**	Minimum Curvature
Well Error:	3.0 usft	**Output errors are at**	2.00 sigma
Reference Wellbore	OWB	**Database:**	EDM_Users
Reference Design:	DWD Plan 3	**Offset TVD Reference:**	Offset Datum

Offset Design WOLFCAMP - COPPERHEAD 30 FEE #1H - LATERAL 01 - AWP-LATERAL 01 — Offset Site Error: 0.0 usft

Survey Program: 100-Standard Keeper-104, 6496-MWD — Offset Well Error: 3.0 usft

Reference Measured Depth (usft)	Reference Vertical Depth (usft)	Offset Measured Depth (usft)	Offset Vertical Depth (usft)	Semi Major Axis Reference (usft)	Semi Major Axis Offset (usft)	Highside Toolface (°)	Offset Wellbore Centre +N/-S (usft)	Offset Wellbore Centre +E/-W (usft)	Distance Between Centres (usft)	Distance Between Ellipses (usft)	Minimum Separation (usft)	Separation Factor	Warning
6,500.0	6,496.8	6,846.0	6,823.6	23.4	5.9	90.99	6,850.4	-169.2	6,858.7	6,829.4	29.29	234.137	
6,600.0	6,596.8	6,892.9	6,864.9	23.8	6.1	90.81	6,848.9	-191.4	6,855.0	6,825.2	29.84	229.746	
6,700.0	6,696.7	6,941.0	6,907.2	24.1	6.3	90.64	6,847.7	-214.0	6,852.2	6,821.8	30.41	225.305	
6,800.0	6,796.7	6,941.0	6,907.2	24.5	6.3	90.64	6,847.7	-214.0	6,850.5	6,819.8	30.77	222.619	
6,893.0	6,889.6	6,973.0	6,935.5	24.8	6.4	90.52	6,847.4	-229.0	6,850.0	6,818.7	31.27	219.085	
6,900.0	6,896.6	6,973.0	6,935.5	24.8	6.4	90.52	6,847.4	-229.0	6,850.0	6,818.7	31.29	218.909	
7,000.0	6,996.6	6,973.0	6,935.5	25.2	6.4	90.52	6,847.4	-229.0	6,850.8	6,819.2	31.65	216.447	
7,100.0	7,096.5	6,973.0	6,935.5	25.6	6.4	90.52	6,847.4	-229.0	6,853.1	6,821.1	32.01	214.087	
7,200.0	7,196.5	6,973.0	6,935.5	25.9	6.4	90.52	6,847.4	-229.0	6,856.8	6,824.5	32.37	211.823	
7,300.0	7,296.4	7,005.0	6,963.4	26.3	6.6	90.40	6,848.7	-244.6	6,861.8	6,828.8	32.91	208.486	
7,400.0	7,396.3	7,005.0	6,963.4	26.6	6.6	90.40	6,848.7	-244.6	6,868.0	6,834.7	33.27	206.418	
7,500.0	7,496.3	7,005.0	6,963.4	27.0	6.6	90.40	6,848.7	-244.6	6,875.7	6,842.1	33.63	204.437	
7,600.0	7,596.2	7,036.0	6,989.9	27.4	6.8	90.27	6,851.1	-260.5	6,884.7	6,850.6	34.19	201.375	
7,700.0	7,696.2	7,036.0	6,989.9	27.7	6.8	90.27	6,851.1	-260.5	6,894.9	6,860.4	34.55	199.570	
7,800.0	7,796.1	7,036.0	6,989.9	28.1	6.8	90.27	6,851.1	-260.5	6,906.5	6,871.6	34.91	197.844	
7,900.0	7,896.1	7,068.0	7,016.8	28.4	7.1	90.14	6,854.6	-277.5	6,919.5	6,884.0	35.49	194.957	
8,000.0	7,996.0	7,068.0	7,016.8	28.8	7.1	90.14	6,854.6	-277.5	6,933.5	6,897.7	35.85	193.390	
8,100.0	8,096.0	7,087.2	7,032.4	29.2	7.2	90.05	6,857.0	-288.4	6,948.9	6,912.6	36.37	191.078	
8,200.0	8,195.9	7,100.0	7,042.6	29.5	7.3	89.99	6,858.6	-296.0	6,965.5	6,928.6	36.83	189.118	
8,300.0	8,295.9	7,131.0	7,066.5	29.9	7.6	89.84	6,862.8	-315.3	6,983.2	6,945.7	37.48	186.300	
8,400.0	8,395.8	7,142.9	7,075.2	30.2	7.7	89.77	6,864.5	-323.2	7,002.1	6,964.2	37.97	184.390	
8,500.0	8,495.8	7,163.0	7,089.6	30.6	8.0	89.66	6,867.2	-337.0	7,022.1	6,983.6	38.56	182.119	
8,600.0	8,595.7	7,195.0	7,110.5	31.0	8.4	89.47	6,871.4	-360.8	7,043.3	7,004.0	39.34	179.047	
8,700.0	8,695.7	7,195.0	7,110.5	31.3	8.4	89.47	6,871.4	-360.8	7,065.7	7,026.0	39.70	177.984	
8,800.0	8,795.6	7,209.9	7,119.5	31.7	8.6	89.37	6,873.4	-372.6	7,089.3	7,049.0	40.29	175.965	
8,900.0	8,895.5	7,227.0	7,129.0	32.0	8.9	89.26	6,875.7	-386.6	7,114.2	7,073.2	40.91	173.890	
9,000.0	8,995.5	7,227.0	7,129.0	32.4	8.9	89.26	6,875.7	-386.6	7,140.2	7,099.0	41.27	173.001	
9,100.0	9,095.4	7,227.0	7,129.0	32.8	8.9	89.26	6,875.7	-386.6	7,167.6	7,126.0	41.63	172.160	
9,200.0	9,195.4	7,258.0	7,144.3	33.1	9.4	89.04	6,879.7	-413.2	7,196.1	7,153.6	42.54	169.156	
9,300.0	9,295.3	7,258.0	7,144.3	33.5	9.4	89.04	6,879.7	-413.2	7,225.8	7,182.9	42.90	168.426	
9,400.0	9,395.3	7,258.0	7,144.3	33.9	9.4	89.04	6,879.7	-413.2	7,256.8	7,213.5	43.26	167.737	
9,500.0	9,495.2	7,258.0	7,144.3	34.2	9.4	89.04	6,879.7	-413.2	7,289.0	7,245.4	43.62	167.087	
9,600.0	9,595.2	7,290.0	7,156.8	34.6	10.0	88.81	6,883.6	-442.4	7,322.4	7,277.8	44.62	164.102	
9,700.0	9,695.1	7,290.0	7,156.8	34.9	10.0	88.81	6,883.6	-442.4	7,356.8	7,311.8	44.98	163.551	
9,800.0	9,795.1	7,290.0	7,156.8	35.3	10.0	88.81	6,883.6	-442.4	7,392.5	7,347.1	45.34	163.035	
9,900.0	9,895.0	7,290.0	7,156.8	35.7	10.0	88.81	6,883.6	-442.4	7,429.3	7,383.6	45.70	162.552	
10,000.0	9,995.0	7,290.0	7,156.8	36.0	10.0	88.81	6,883.6	-442.4	7,467.3	7,421.2	46.07	162.103	
10,100.0	10,094.9	7,307.1	7,162.1	36.4	10.4	88.67	6,885.5	-458.5	7,506.3	7,459.5	46.80	160.396	
10,162.7	10,157.6	7,322.0	7,166.0	36.6	10.7	88.56	6,886.9	-472.8	7,531.4	7,484.0	47.35	159.050	
10,175.0	10,169.9	7,322.0	7,166.0	36.6	10.7	50.03	6,886.9	-472.8	7,536.2	7,488.8	47.40	159.004	
10,200.0	10,194.8	7,322.0	7,166.0	36.7	10.7	20.64	6,886.9	-472.8	7,545.1	7,497.7	47.48	158.897	
10,225.0	10,219.7	7,322.0	7,166.0	36.8	10.7	11.98	6,886.9	-472.8	7,552.9	7,505.3	47.57	158.772	
10,250.0	10,244.3	7,322.0	7,166.0	36.9	10.7	8.08	6,886.9	-472.8	7,559.5	7,511.9	47.66	158.627	
10,275.0	10,268.8	7,322.0	7,166.0	37.0	10.7	5.89	6,886.9	-472.8	7,564.9	7,517.2	47.74	158.463	
10,300.0	10,292.9	7,322.0	7,166.0	37.1	10.7	4.49	6,886.9	-472.8	7,569.1	7,521.3	47.82	158.280	
10,325.0	10,316.7	7,322.0	7,166.0	37.2	10.7	3.53	6,886.9	-472.8	7,572.1	7,524.2	47.90	158.080	
10,350.0	10,340.0	7,322.0	7,166.0	37.2	10.7	2.82	6,886.9	-472.8	7,573.9	7,525.9	47.98	157.863	
10,375.0	10,362.9	7,322.0	7,166.0	37.3	10.7	2.28	6,886.9	-472.8	7,574.4	7,526.4	48.05	157.630	
10,400.0	10,385.1	7,322.0	7,166.0	37.4	10.7	1.85	6,886.9	-472.8	7,573.7	7,525.6	48.12	157.381	
10,425.0	10,406.8	7,322.0	7,166.0	37.4	10.7	1.50	6,886.9	-472.8	7,571.8	7,523.6	48.19	157.116	
10,450.0	10,427.7	7,322.0	7,166.0	37.5	10.7	1.21	6,886.9	-472.8	7,568.7	7,520.4	48.26	156.840	
10,475.0	10,448.0	7,322.0	7,166.0	37.6	10.7	0.96	6,886.9	-472.8	7,564.4	7,516.0	48.32	156.547	

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

COG Production LLC

Anticollision Report

Company:	COG Production LLC	Local Co-ordinate Reference:	Well COPPERHEAD 31 FED COM #3H
Project:	EDDY COUNTY, NM	TVD Reference:	RKB=2895+26 @ 2921.0usft (TBD)
Reference Site:	WOLFCAMP	MD Reference:	RKB=2895+26 @ 2921.0usft (TBD)
Site Error:	0.0 usft	North Reference:	Grid
Reference Well:	COPPERHEAD 31 FED COM #3H	Survey Calculation Method:	Minimum Curvature
Well Error:	3.0 usft	Output errors are at	2.00 sigma
Reference Wellbore	OWB	Database:	EDM_Users
Reference Design:	DWD Plan 3	Offset TVD Reference:	Offset Datum

Offset Design - WOLFCAMP - COPPERHEAD 30 FEE #1H - LATERAL 01 - AWP-LATERAL 01 — Offset Site Error: 0.0 usft

Survey Program: 100-Standard Keeper 104, 6496-MWD — Offset Well Error: 3.0 usft

Reference Measured Depth (usft)	Reference Vertical Depth (usft)	Offset Measured Depth (usft)	Offset Vertical Depth (usft)	Semi Major Axis Reference (usft)	Semi Major Axis Offset (usft)	Highside Toolface (°)	Offset Wellbore Centre +N/-S (usft)	Offset Wellbore Centre +E/-W (usft)	Distance Between Centres (usft)	Distance Between Ellipses (usft)	Minimum Separation (usft)	Separation Factor	Warning
10,500.0	10,467.4	7,322.0	7,166.0	37.6	10.7	0.74	6,886.9	-472.8	7,558.8	7,510.4	48.38	156.239	
10,525.0	10,483.0	7,322.0	7,166.0	37.7	10.7	0.55	6,886.9	-472.8	7,552.1	7,503.6	48.44	155.916	
10,550.0	10,503.7	7,322.0	7,166.0	37.7	10.7	0.37	6,886.9	-472.8	7,544.2	7,495.7	48.49	155.574	
10,575.0	10,523.4	7,322.0	7,166.0	37.8	10.7	0.21	6,886.9	-472.8	7,535.1	7,486.6	48.55	155.211	
10,600.0	10,536.1	7,322.0	7,166.0	37.9	10.7	0.05	6,886.9	-472.8	7,524.9	7,476.3	48.60	154.822	
10,625.0	10,550.8	7,322.0	7,166.0	37.9	10.7	-0.10	6,886.9	-472.8	7,513.6	7,464.9	48.66	154.402	
10,650.0	10,564.5	7,322.0	7,166.0	38.0	10.7	-0.25	6,886.9	-472.8	7,501.2	7,452.5	48.73	153.947	
10,675.0	10,577.0	7,322.0	7,166.0	38.0	10.7	-0.40	6,886.9	-472.8	7,487.8	7,439.0	48.79	153.457	
10,700.0	10,588.3	7,322.0	7,166.0	38.1	10.7	-0.55	6,886.9	-472.8	7,473.3	7,424.4	48.87	152.935	
10,725.0	10,598.5	7,322.0	7,166.0	38.2	10.7	-0.71	6,886.9	-472.8	7,457.8	7,408.9	48.94	152.384	
10,750.0	10,607.5	7,322.0	7,166.0	38.3	10.7	-0.87	6,886.9	-472.8	7,441.4	7,392.3	49.02	151.808	
10,775.0	10,615.2	7,322.0	7,166.0	38.3	10.7	-1.06	6,886.9	-472.8	7,424.0	7,374.9	49.10	151.208	
10,800.0	10,621.7	7,322.0	7,166.0	38.4	10.7	-1.26	6,886.9	-472.8	7,405.8	7,356.6	49.18	150.588	
10,825.0	10,626.9	7,322.0	7,166.0	38.5	10.7	-1.48	6,886.9	-472.8	7,386.7	7,337.5	49.26	149.949	
10,850.0	10,630.9	7,322.0	7,166.0	38.6	10.7	-1.74	6,886.9	-472.8	7,366.9	7,317.5	49.35	149.293	
10,875.0	10,633.5	7,322.0	7,166.0	38.7	10.7	-2.03	6,886.9	-472.8	7,346.3	7,296.9	49.43	148.622	
10,900.0	10,634.8	7,322.0	7,166.0	38.8	10.7	-2.38	6,886.9	-472.8	7,325.0	7,275.5	49.51	147.937	
10,909.7	10,635.0	7,322.0	7,166.0	38.8	10.7	-2.54	6,886.9	-472.8	7,316.6	7,267.1	49.55	147.669	
11,000.0	10,635.6	7,322.0	7,166.0	39.1	10.7	-2.54	6,886.9	-472.8	7,237.8	7,188.0	49.88	145.100	
11,100.0	10,636.3	7,322.0	7,166.0	39.6	10.7	-2.54	6,886.9	-472.8	7,150.9	7,100.6	50.31	142.130	
11,200.0	10,637.0	7,322.0	7,166.0	40.1	10.7	-2.54	6,886.9	-472.8	7,064.4	7,013.6	50.81	139.046	
11,300.0	10,637.7	7,322.0	7,166.0	40.6	10.7	-2.54	6,886.9	-472.8	6,978.2	6,926.8	51.36	135.868	
11,400.0	10,638.3	7,322.0	7,166.0	41.2	10.7	-2.54	6,886.9	-472.8	6,892.4	6,840.4	51.97	132.615	
11,500.0	10,639.0	7,322.0	7,166.0	41.9	10.7	-2.54	6,886.9	-472.8	6,806.9	6,754.3	52.64	129.306	
11,600.0	10,639.7	7,322.0	7,166.0	42.6	10.7	-2.54	6,886.9	-472.8	6,721.9	6,668.6	53.36	125.961	
11,700.0	10,640.4	7,322.0	7,166.0	43.4	10.7	-2.54	6,886.9	-472.8	6,637.3	6,583.2	54.14	122.597	
11,800.0	10,641.1	7,322.0	7,166.0	44.2	10.7	-2.54	6,886.9	-472.8	6,553.1	6,498.2	54.96	119.231	
11,900.0	10,641.7	7,336.3	7,168.9	45.1	11.1	-2.76	6,888.2	-486.8	6,469.2	6,413.0	56.17	115.181	
12,000.0	10,642.4	7,337.0	7,169.0	46.0	11.1	-2.78	6,888.2	-487.5	6,385.9	6,328.8	57.09	111.851	
12,100.0	10,643.1	7,337.6	7,169.1	46.9	11.1	-2.79	6,888.3	-488.1	6,303.1	6,245.1	58.06	108.559	
12,200.0	10,643.8	7,338.3	7,169.2	47.9	11.1	-2.80	6,888.3	-488.7	6,220.8	6,161.8	59.07	105.315	
12,300.0	10,644.5	7,353.0	7,171.2	49.0	11.5	-3.03	6,889.5	-503.3	6,139.3	6,078.8	60.44	101.573	
12,400.0	10,645.1	7,353.0	7,171.2	50.0	11.5	-3.03	6,889.5	-503.3	6,058.0	5,996.5	61.50	98.499	
12,500.0	10,645.8	7,353.0	7,171.2	51.1	11.5	-3.03	6,889.5	-503.3	5,977.4	5,914.8	62.60	95.489	
12,600.0	10,646.5	7,353.0	7,171.2	52.2	11.5	-3.03	6,889.5	-503.3	5,897.3	5,833.6	63.72	92.548	
12,700.0	10,647.2	7,353.0	7,171.2	53.4	11.5	-3.03	6,889.5	-503.3	5,817.8	5,752.9	64.87	89.680	
12,800.0	10,647.9	7,353.0	7,171.2	54.6	11.5	-3.03	6,889.5	-503.3	5,739.0	5,673.0	66.05	86.888	
12,900.0	10,648.5	7,353.0	7,171.2	55.8	11.5	-3.03	6,889.5	-503.3	5,660.9	5,593.6	67.25	84.172	
13,000.0	10,649.2	7,353.0	7,171.2	57.0	11.5	-3.03	6,889.5	-503.3	5,583.4	5,514.9	68.48	81.534	
13,100.0	10,649.9	7,353.0	7,171.2	58.3	11.5	-3.03	6,889.5	-503.3	5,506.7	5,437.0	69.73	78.976	
13,200.0	10,650.6	7,353.0	7,171.2	59.5	11.5	-3.03	6,889.5	-503.3	5,430.7	5,359.7	70.99	76.496	
13,300.0	10,651.3	7,353.0	7,171.2	60.8	11.5	-3.03	6,889.5	-503.3	5,355.5	5,283.3	72.28	74.094	
13,400.0	10,652.0	7,353.0	7,171.2	62.1	11.5	-3.03	6,889.5	-503.3	5,281.2	5,207.6	73.58	71.770	
13,500.0	10,652.6	7,353.0	7,171.2	63.4	11.5	-3.03	6,889.5	-503.3	5,207.7	5,132.8	74.91	69.523	
13,600.0	10,653.3	7,353.0	7,171.2	64.8	11.5	-3.03	6,889.5	-503.3	5,135.1	5,058.9	76.24	67.352	
13,700.0	10,654.0	7,353.0	7,171.2	66.1	11.5	-3.03	6,889.5	-503.3	5,063.4	4,985.8	77.59	65.256	
13,800.0	10,654.7	7,353.0	7,171.2	67.5	11.5	-3.03	6,889.5	-503.3	4,992.7	4,913.8	78.96	63.232	
13,900.0	10,655.4	7,353.0	7,171.2	68.9	11.5	-3.03	6,889.5	-503.3	4,923.1	4,842.7	80.34	61.280	
14,000.0	10,656.0	7,353.0	7,171.2	70.3	11.5	-3.03	6,889.5	-503.3	4,854.5	4,772.7	81.73	59.398	
14,100.0	10,656.7	7,353.0	7,171.2	71.7	11.5	-3.03	6,889.5	-503.3	4,786.9	4,703.8	83.13	57.584	
14,200.0	10,657.4	7,353.0	7,171.2	73.1	11.5	-3.03	6,889.5	-503.3	4,720.6	4,636.1	84.54	55.837	
14,300.0	10,658.1	7,353.0	7,171.2	74.5	11.5	-3.03	6,889.5	-503.3	4,655.4	4,569.5	85.97	54.155	

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

COG Production LLC

Anticollision Report

Company:	COG Production LLC	**Local Co-ordinate Reference:**	Well COPPERHEAD 31 FED COM #3H
Project:	EDDY COUNTY, NM	**TVD Reference:**	RKB=2895+26 @ 2921.0usft (TBD)
Reference Site:	WOLFCAMP	**MD Reference:**	RKB=2895+26 @ 2921.0usft (TBD)
Site Error:	0.0 usft	**North Reference:**	Grid
Reference Well:	COPPERHEAD 31 FED COM #3H	**Survey Calculation Method:**	Minimum Curvature
Well Error:	3.0 usft	**Output errors are at**	2.00 sigma
Reference Wellbore	OWB	**Database:**	EDM_Users
Reference Design:	DWD Plan 3	**Offset TVD Reference:**	Offset Datum

Offset Design WOLFCAMP - COPPERHEAD 30 FEE #1H - LATERAL 01 - AWP-LATERAL 01 — Offset Site Error: 10.0 usft

Survey Program: 00-Standard Keeper 104; 6496-MWD — Offset Well Error: 3.0 usft

Reference Measured Depth (usft)	Reference Vertical Depth (usft)	Offset Measured Depth (usft)	Offset Vertical Depth (usft)	Semi Major Axis Reference (usft)	Semi Major Axis Offset (usft)	Highside Toolface (°)	Offset Wellbore Centre +N/-S (usft)	Offset Wellbore Centre +E/-W (usft)	Distance Between Centres (usft)	Distance Between Ellipses (usft)	Minimum Separation (usft)	Separation Factor	Warning
14,400.0	10,658.8	7,353.0	7,171.2	75.9	11.5	-3.03	6,889.5	-503.3	4,591.5	4,504.1	87.40	52.536	
14,500.0	10,659.4	7,353.0	7,171.2	77.4	11.5	-3.03	6,889.5	-503.3	4,529.0	4,440.1	88.84	50.978	
14,600.0	10,660.1	7,353.0	7,171.2	78.8	11.5	-3.03	6,889.5	-503.3	4,467.7	4,377.4	90.29	49.481	
14,700.0	10,660.8	7,353.0	7,171.2	80.3	11.5	-3.03	6,889.5	-503.3	4,407.9	4,316.2	91.75	48.042	
14,800.0	10,661.5	7,353.0	7,171.2	81.7	11.5	-3.03	6,889.5	-503.3	4,349.6	4,256.4	93.22	46.661	
14,900.0	10,662.2	7,353.0	7,171.2	83.2	11.5	-3.03	6,889.5	-503.3	4,292.8	4,198.1	94.69	45.335	
15,000.0	10,662.8	7,353.0	7,171.2	84.7	11.5	-3.03	6,889.5	-503.3	4,237.6	4,141.4	96.17	44.063	
15,100.0	10,663.5	7,353.0	7,171.2	86.2	11.5	-3.03	6,889.5	-503.3	4,184.0	4,086.4	97.66	42.843	
15,200.0	10,664.2	7,353.0	7,171.2	87.7	11.5	-3.03	6,889.5	-503.3	4,132.2	4,033.1	99.15	41.675	
15,300.0	10,664.9	7,353.0	7,171.2	89.2	11.5	-3.03	6,889.5	-503.3	4,082.2	3,981.6	100.65	40.557	
15,400.0	10,665.6	7,353.0	7,171.2	90.7	11.5	-3.03	6,889.5	-503.3	4,034.1	3,931.9	102.16	39.488	
15,500.0	10,666.2	7,353.0	7,171.2	92.2	11.5	-3.03	6,889.5	-503.3	3,987.8	3,884.2	103.67	38.467	
15,600.0	10,666.9	7,353.0	7,171.2	93.7	11.5	-3.03	6,889.5	-503.3	3,943.6	3,838.4	105.18	37.492	
15,700.0	10,667.6	7,353.0	7,171.2	95.2	11.5	-3.03	6,889.5	-503.3	3,901.4	3,794.7	106.71	36.562	
15,800.0	10,668.3	7,353.0	7,171.2	96.8	11.5	-3.03	6,889.5	-503.3	3,861.4	3,753.1	108.23	35.677	
15,900.0	10,669.0	7,353.0	7,171.2	98.3	11.5	-3.03	6,889.5	-503.3	3,823.5	3,713.8	109.76	34.835	
16,000.0	10,669.6	7,353.0	7,171.2	99.8	11.5	-3.03	6,889.5	-503.3	3,787.9	3,676.6	111.29	34.035	
16,100.0	10,670.3	7,353.0	7,171.2	101.4	11.5	-3.03	6,889.5	-503.3	3,754.7	3,641.8	112.83	33.276	
16,200.0	10,671.0	7,353.0	7,171.2	102.9	11.5	-3.03	6,889.5	-503.3	3,723.8	3,609.4	114.37	32.558	
16,300.0	10,671.7	7,353.0	7,171.2	104.4	11.5	-3.03	6,889.5	-503.3	3,695.4	3,579.5	115.92	31.879	
16,400.0	10,672.4	7,353.0	7,171.2	106.0	11.5	-3.03	6,889.5	-503.3	3,669.5	3,552.0	117.47	31.238	
16,500.0	10,673.1	7,353.0	7,171.2	107.5	11.5	-3.03	6,889.5	-503.3	3,646.1	3,527.1	119.02	30.634	
16,600.0	10,673.7	7,353.0	7,171.2	109.1	11.5	-3.03	6,889.5	-503.3	3,625.3	3,504.8	120.58	30.067	
16,700.0	10,674.4	7,353.0	7,171.2	110.7	11.5	-3.03	6,889.5	-503.3	3,607.3	3,485.1	122.14	29.535	
16,800.0	10,675.1	7,353.0	7,171.2	112.2	11.5	-3.03	6,889.5	-503.3	3,591.9	3,468.2	123.70	29.037	
16,900.0	10,675.8	7,353.0	7,171.2	113.8	11.5	-3.03	6,889.5	-503.3	3,579.2	3,453.9	125.26	28.574	
17,000.0	10,676.5	7,353.0	7,171.2	115.4	11.5	-3.03	6,889.5	-503.3	3,569.3	3,442.4	126.83	28.142	
17,100.0	10,677.1	7,353.0	7,171.2	116.9	11.5	-3.03	6,889.5	-503.3	3,562.1	3,433.7	128.40	27.743	
17,200.0	10,677.8	7,353.0	7,171.2	118.5	11.5	-3.03	6,889.5	-503.3	3,557.8	3,427.8	129.97	27.374	
17,300.0	10,678.5	7,353.0	7,171.2	120.1	11.5	-3.03	6,889.5	-503.3	3,556.3	3,424.7	131.55	27.034	
17,304.3	10,678.5	7,353.0	7,171.2	120.1	11.5	-3.03	6,889.5	-503.3	3,556.3	3,424.7	131.61	27.020	CC
17,400.0	10,679.2	7,353.0	7,171.2	121.6	11.5	-3.03	6,889.5	-503.3	3,557.6	3,424.4	133.12	26.724	ES
17,465.7	10,679.6	7,367.9	7,172.4	122.7	11.8	-3.27	6,890.5	-518.1	3,559.5	3,425.0	134.52	26.460	SF

COG Production LLC

Anticollision Report

Company:	COG Production LLC	**Local Co-ordinate Reference:**	Well COPPERHEAD 31 FED COM #3H
Project:	EDDY COUNTY, NM	**TVD Reference:**	RKB=2895+26 @ 2921.0usft (TBD)
Reference Site:	WOLFCAMP	**MD Reference:**	RKB=2895+26 @ 2921.0usft (TBD)
Site Error:	0.0 usft	**North Reference:**	Grid
Reference Well:	COPPERHEAD 31 FED COM #3H	**Survey Calculation Method:**	Minimum Curvature
Well Error:	3.0 usft	**Output errors are at**	2.00 sigma
Reference Wellbore	OWB	**Database:**	EDM_Users
Reference Design:	DWD Plan 3	**Offset TVD Reference:**	Offset Datum

Offset Design WOLFCAMP - COPPERHEAD 30 FEE #1H - OWB-PILOT HOLE - AWP-PH — Offset Site Error: 0.0 usft

Survey Program: 100-Standard Keeper,104 — Offset Well Error: 3.0 usft

Reference Measured Depth (usft)	Reference Vertical Depth (usft)	Offset Measured Depth (usft)	Offset Vertical Depth (usft)	Semi Major Axis Reference (usft)	Semi Major Axis Offset (usft)	Highside Toolface (°)	Offset Wellbore Centre +N/-S (usft)	Offset Wellbore Centre +E/-W (usft)	Distance Between Centres (usft)	Distance Between Ellipses (usft)	Minimum Separation (usft)	Separation Factor	Warning
0.0	0.0	40.1	40.1	3.0	3.0	-1.13	6,875.6	-135.4	6,876.9				
100.0	100.0	124.5	124.5	3.0	3.0	-1.13	6,875.7	-135.7	6,877.1	6,871.1	6.00	1,145.410	
200.0	200.0	200.0	200.0	3.0	3.0	-1.13	6,876.1	-135.9	6,877.6	6,871.5	6.04	1,137.748	
300.0	300.0	238.5	238.5	3.1	3.0	-1.13	6,876.5	-136.0	6,878.7	6,872.5	6.13	1,122.900	
400.0	400.0	300.0	300.0	3.2	3.0	-1.14	6,877.8	-136.4	6,880.7	6,874.5	6.25	1,101.210	
500.0	500.0	337.7	337.6	3.4	3.0	-1.14	6,878.9	-136.6	6,883.4	6,877.0	6.40	1,074.960	
593.6	593.6	410.5	410.5	3.5	3.0	89.51	6,881.2	-137.0	6,886.3	6,879.7	6.58	1,046.760	
600.0	600.0	416.4	416.3	3.6	3.0	89.51	6,881.4	-137.0	6,886.5	6,879.9	6.59	1,044.638	
700.0	699.9	510.1	510.0	3.8	3.1	89.54	6,884.6	-137.3	6,889.9	6,883.1	6.81	1,011.881	
800.0	799.9	626.3	626.1	4.0	3.1	89.56	6,888.4	-137.8	6,893.1	6,886.1	7.06	976.246	
900.0	899.8	758.3	758.0	4.2	3.1	89.59	6,892.2	-138.6	6,896.1	6,888.7	7.35	938.861	
1,000.0	999.8	907.1	906.8	4.5	3.2	89.62	6,895.7	-140.8	6,898.4	6,890.7	7.66	900.544	
1,100.0	1,099.7	1,050.0	1,049.6	4.7	3.2	89.63	6,898.1	-143.7	6,900.1	6,892.1	7.99	863.395	
1,200.0	1,199.7	1,242.2	1,241.8	5.0	3.3	89.65	6,899.5	-147.5	6,900.9	6,892.5	8.35	825.972	
1,300.0	1,299.6	1,377.5	1,377.0	5.3	3.4	89.67	6,898.9	-149.9	6,900.4	6,891.7	8.69	793.733	
1,400.0	1,399.6	1,445.4	1,445.0	5.6	3.4	89.68	6,898.7	-151.1	6,900.1	6,891.1	9.02	764.797	
1,406.9	1,406.4	1,449.5	1,449.0	5.6	3.4	89.68	6,898.7	-151.2	6,900.1	6,891.1	9.04	762.876	
1,500.0	1,499.5	1,500.0	1,499.5	5.9	3.4	89.68	6,898.8	-152.2	6,900.4	6,891.0	9.36	737.612	
1,600.0	1,599.4	1,563.7	1,563.3	6.2	3.5	89.69	6,899.3	-153.7	6,901.2	6,891.5	9.71	711.017	
1,700.0	1,699.4	1,636.4	1,635.9	6.6	3.5	89.69	6,900.3	-155.5	6,902.6	6,892.5	10.07	685.428	
1,800.0	1,799.3	1,750.1	1,749.6	6.9	3.6	89.70	6,902.0	-158.2	6,904.1	6,893.7	10.47	659.386	
1,900.0	1,899.3	1,883.4	1,882.8	7.2	3.7	89.71	6,903.4	-161.0	6,905.2	6,894.3	10.89	633.957	
2,000.0	1,999.2	2,000.0	1,999.4	7.5	3.8	89.73	6,904.2	-162.9	6,905.9	6,894.6	11.31	610.652	
2,100.0	2,099.2	2,079.6	2,079.0	7.9	3.8	89.75	6,904.8	-162.9	6,906.7	6,895.0	11.67	591.651	
2,200.0	2,199.1	2,248.5	2,247.7	8.2	3.8	89.85	6,905.6	-156.7	6,907.1	6,895.1	12.01	575.058	
2,300.0	2,299.1	2,365.3	2,364.3	8.5	3.8	89.94	6,905.5	-150.2	6,906.9	6,894.5	12.34	559.598	
2,400.0	2,399.0	2,536.7	2,535.1	8.9	3.8	90.11	6,904.3	-135.2	6,906.0	6,893.3	12.68	544.572	
2,500.0	2,499.0	2,641.4	2,639.4	9.2	3.8	90.21	6,902.9	-125.9	6,904.6	6,891.6	13.03	530.029	
2,600.0	2,598.9	2,744.8	2,742.5	9.6	3.8	90.30	6,901.5	-117.9	6,903.2	6,889.9	13.38	516.027	
2,700.0	2,698.9	2,846.9	2,844.3	9.9	3.8	90.39	6,900.1	-111.0	6,901.8	6,888.1	13.73	502.550	
2,800.0	2,798.8	2,940.3	2,937.5	10.3	3.8	90.47	6,898.7	-104.9	6,900.4	6,886.3	14.09	489.608	
2,900.0	2,898.8	3,025.6	3,022.6	10.6	3.8	90.53	6,897.7	-99.7	6,899.1	6,884.7	14.46	477.203	
3,000.0	2,998.7	3,114.0	3,110.9	11.0	3.9	90.60	6,896.8	-94.6	6,898.1	6,883.3	14.83	465.244	
3,100.0	3,098.6	3,214.7	3,211.5	11.3	3.9	90.67	6,895.8	-89.0	6,897.1	6,881.9	15.20	453.627	
3,200.0	3,198.6	3,314.2	3,310.8	11.7	3.9	90.74	6,894.8	-84.0	6,896.2	6,880.6	15.59	442.478	
3,300.0	3,298.5	3,411.4	3,407.9	12.0	4.0	90.80	6,893.8	-79.5	6,895.3	6,879.3	15.97	431.774	
3,400.0	3,398.5	3,500.0	3,496.4	12.4	4.0	90.86	6,893.0	-75.6	6,894.4	6,878.0	16.35	421.567	
3,500.0	3,498.4	3,590.3	3,586.7	12.7	4.0	90.91	6,892.3	-72.0	6,893.7	6,876.9	16.74	411.730	
3,600.0	3,598.4	3,671.6	3,667.9	13.1	4.1	90.96	6,891.9	-69.3	6,893.2	6,876.1	17.13	402.351	
3,700.0	3,698.3	3,763.6	3,759.8	13.4	4.1	91.01	6,891.6	-66.5	6,893.0	6,875.5	17.53	393.201	
3,800.0	3,798.3	3,854.7	3,850.9	13.8	4.2	91.05	6,891.4	-64.0	6,892.8	6,874.9	17.93	384.385	
3,834.9	3,833.1	3,885.0	3,881.2	13.9	4.2	91.07	6,891.4	-63.2	6,892.8	6,874.8	18.07	381.405	
3,900.0	3,898.2	3,943.7	3,939.8	14.1	4.2	91.10	6,891.4	-61.7	6,892.9	6,874.5	18.34	375.904	
4,000.0	3,998.2	4,040.6	4,036.8	14.5	4.3	91.14	6,891.4	-59.6	6,893.0	6,874.3	18.75	367.624	
4,100.0	4,098.1	4,141.5	4,137.6	14.8	4.3	91.18	6,891.4	-57.7	6,893.1	6,873.9	19.17	359.587	
4,200.0	4,198.1	4,238.7	4,234.8	15.2	4.4	91.22	6,891.5	-56.2	6,893.3	6,873.7	19.59	351.875	
4,300.0	4,298.0	4,339.3	4,335.4	15.5	4.5	91.26	6,891.6	-54.8	6,893.4	6,873.4	20.02	344.383	
4,400.0	4,398.0	4,438.6	4,434.7	15.9	4.6	91.30	6,891.7	-53.9	6,893.6	6,873.2	20.45	337.156	
4,500.0	4,497.9	4,543.8	4,539.9	16.2	4.6	91.33	6,891.8	-53.3	6,893.8	6,872.9	20.88	330.120	
4,600.0	4,597.8	4,671.3	4,667.4	16.6	4.7	91.37	6,891.6	-52.9	6,893.7	6,872.4	21.32	323.339	
4,700.0	4,697.8	4,601.8	4,797.9	17.0	4.8	91.40	6,890.8	-52.8	6,893.2	6,871.5	21.72	317.315	
4,800.0	4,797.7	4,903.1	4,899.2	17.3	4.8	91.43	6,890.0	-52.9	6,892.5	6,870.4	22.11	311.792	

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

COG Production LLC

Anticollision Report

Company:	COG Production LLC	**Local Co-ordinate Reference:**	Well COPPERHEAD 31 FED COM #3H
Project:	EDDY COUNTY, NM	**TVD Reference:**	RKB=2895+26 @ 2921.0usft (TBD)
Reference Site:	WOLFCAMP	**MD Reference:**	RKB=2895+26 @ 2921.0usft (TBD)
Site Error:	0.0 usft	**North Reference:**	Grid
Reference Well:	COPPERHEAD 31 FED COM #3H	**Survey Calculation Method:**	Minimum Curvature
Well Error:	3.0 usft	**Output errors are at**	2.00 sigma
Reference Wellbore	OWB	**Database:**	EDM_Users
Reference Design:	DWD Plan 3	**Offset TVD Reference:**	Offset Datum

Offset Design WOLFCAMP - COPPERHEAD 30 FEE #1H - OWB-PILOT HOLE - AWP-PH — Offset Site Error: 0.0 usft

Survey Program: 100-Standard Keeper 104 — Offset Well Error: 3.0 usft

Reference Measured Depth (usft)	Reference Vertical Depth (usft)	Offset Measured Depth (usft)	Offset Vertical Depth (usft)	Semi Major Axis Reference (usft)	Semi Major Axis Offset (usft)	Highside Toolface (°)	Offset Wellbore Centre +N/-S (usft)	Offset Wellbore Centre +E/-W (usft)	Distance Between Centres (usft)	Distance Between Ellipses (usft)	Minimum Separation (usft)	Separation Factor	Warning
4,900.0	4,897.7	5,017.7	5,013.8	17.7	4.8	91.46	6,889.0	-53.0	6,891.7	6,869.2	22.50	306.339	
5,000.0	4,997.6	5,166.3	5,162.4	18.0	4.9	91.50	6,886.8	-53.6	6,890.2	6,867.3	22.90	300.888	
5,100.0	5,097.6	5,269.8	5,265.9	18.4	4.9	91.52	6,884.9	-54.5	6,888.5	6,865.2	23.29	295.801	
5,200.0	5,197.5	5,361.1	5,357.2	18.7	4.9	91.53	6,883.3	-55.5	6,886.8	6,863.1	23.67	290.917	
5,300.0	5,297.5	5,457.7	5,453.7	19.1	5.0	91.55	6,881.7	-56.6	6,885.3	6,861.2	24.06	286.153	
5,400.0	5,397.4	5,569.0	5,565.0	19.5	5.0	91.57	6,879.9	-58.0	6,883.7	6,859.2	24.46	281.444	
5,500.0	5,497.4	5,671.9	5,667.8	19.8	5.0	91.59	6,878.0	-59.4	6,881.9	6,857.1	24.86	276.872	
5,600.0	5,597.3	5,774.0	5,770.0	20.2	5.1	91.60	6,876.1	-61.0	6,880.2	6,854.9	25.26	272.418	
5,700.0	5,697.3	5,881.8	5,877.7	20.5	5.1	91.62	6,874.1	-62.8	6,878.3	6,852.7	25.66	268.036	
5,800.0	5,797.2	5,975.6	5,971.5	20.9	5.2	91.63	6,872.3	-64.3	6,876.5	6,850.4	26.07	263.815	
5,900.0	5,897.2	6,076.2	6,072.0	21.2	5.2	91.64	6,870.4	-65.8	6,874.7	6,848.2	26.48	259.655	
6,000.0	5,997.1	6,172.2	6,168.0	21.6	5.3	91.66	6,868.6	-67.2	6,872.9	6,846.0	26.89	255.612	
6,100.0	6,097.0	6,278.4	6,274.2	22.0	5.3	91.68	6,866.7	-68.8	6,871.1	6,843.8	27.31	251.610	
6,200.0	6,197.0	6,384.5	6,380.2	22.3	5.4	91.69	6,864.6	-70.4	6,869.2	6,841.5	27.73	247.698	
6,300.0	6,296.9	6,473.4	6,469.2	22.7	5.5	91.70	6,862.9	-71.9	6,867.3	6,839.2	28.15	243.954	
6,400.0	6,396.9	6,543.0	6,538.7	23.0	5.5	91.71	6,861.7	-73.3	6,865.7	6,837.2	28.55	240.499	
6,500.0	6,496.8	6,600.0	6,595.7	23.4	5.5	91.71	6,861.0	-74.9	6,864.7	6,835.7	28.94	237.192	
6,600.0	6,596.8	6,684.5	6,680.1	23.8	5.6	91.71	6,860.5	-76.0	6,864.0	6,834.7	29.35	233.883	
6,700.0	6,696.7	6,781.2	6,776.8	24.1	5.6	91.70	6,860.0	-82.2	6,863.6	6,833.9	29.76	230.609	
6,800.0	6,796.7	6,886.1	6,881.5	24.5	5.7	91.69	6,859.5	-87.0	6,863.2	6,833.0	30.18	227.372	
6,900.0	6,896.6	6,995.9	6,991.2	24.8	5.8	91.67	6,858.9	-92.4	6,862.6	6,832.0	30.61	224.184	
7,000.0	6,996.6	7,097.6	7,092.8	25.2	5.8	91.66	6,858.2	-98.0	6,861.9	6,830.9	31.03	221.104	
7,100.0	7,096.5	7,174.3	7,169.3	25.6	5.9	91.64	6,857.8	-102.4	6,861.4	6,830.0	31.44	218.215	
7,200.0	7,196.5	7,283.8	7,278.6	25.9	6.0	91.61	6,857.5	-109.1	6,861.1	6,829.2	31.87	215.254	
7,300.0	7,296.4	7,533.6	7,527.9	26.3	6.1	91.57	6,852.7	-122.6	6,858.6	6,826.2	32.42	211.588	
7,400.0	7,396.3	7,636.2	7,630.4	26.6	6.2	91.56	6,849.8	-127.1	6,855.9	6,823.0	32.86	208.669	
7,500.0	7,496.3	7,672.0	7,666.2	27.0	6.2	91.56	6,848.9	-128.5	6,853.5	6,820.3	33.24	206.160	
7,600.0	7,596.2	7,672.0	7,666.2	27.4	6.2	91.56	6,848.9	-128.5	6,852.5	6,818.9	33.60	203.920	
7,620.0	7,616.2	7,672.0	7,666.2	27.4	6.2	91.56	6,848.9	-128.5	6,852.5	6,818.8	33.68	203.484	
7,700.0	7,696.2	7,672.0	7,666.2	27.7	6.2	91.56	6,848.9	-128.5	6,852.9	6,819.0	33.96	201.771	
7,800.0	7,796.1	7,672.0	7,666.2	28.1	6.2	91.56	6,848.9	-128.5	6,854.8	6,820.5	34.32	199.709	
7,900.0	7,896.1	7,672.0	7,666.2	28.4	6.2	91.56	6,848.9	-128.5	6,858.2	6,823.5	34.68	197.731	
8,000.0	7,996.0	7,672.0	7,666.2	28.8	6.2	91.56	6,848.9	-128.5	6,863.0	6,828.0	35.04	195.835	
8,100.0	8,096.0	7,672.0	7,666.2	29.2	6.2	91.56	6,848.9	-128.5	6,869.3	6,833.9	35.41	194.019	
8,200.0	8,195.9	7,672.0	7,666.2	29.5	6.2	91.56	6,848.9	-128.5	6,877.0	6,841.2	35.77	192.280	
8,300.0	8,295.9	7,672.0	7,666.2	29.9	6.2	91.56	6,848.9	-128.5	6,886.1	6,850.0	36.13	190.614	
8,400.0	8,395.8	7,672.0	7,666.2	30.2	6.2	91.56	6,848.9	-128.5	6,896.7	6,860.2	36.49	189.021	
8,500.0	8,495.8	7,672.0	7,666.2	30.6	6.2	91.56	6,848.9	-128.5	6,908.8	6,871.9	36.85	187.498	
8,600.0	8,595.7	7,672.0	7,666.2	31.0	6.2	91.56	6,848.9	-128.5	6,922.2	6,885.0	37.21	186.042	
8,700.0	8,695.7	7,672.0	7,666.2	31.3	6.2	91.56	6,848.9	-128.5	6,937.1	6,899.5	37.57	184.652	
8,800.0	8,795.6	7,672.0	7,666.2	31.7	6.2	91.56	6,848.9	-128.5	6,953.3	6,915.4	37.93	183.325	
8,900.0	8,895.5	7,672.0	7,666.2	32.0	6.2	91.56	6,848.9	-128.5	6,971.0	6,932.7	38.29	182.060	
9,000.0	8,995.5	7,672.0	7,666.2	32.4	6.2	91.56	6,848.9	-128.5	6,990.1	6,951.4	38.65	180.853	
9,100.0	9,095.4	7,672.0	7,666.2	32.8	6.2	91.56	6,848.9	-128.5	7,010.5	6,971.5	39.01	179.704	
9,200.0	9,195.4	7,672.0	7,666.2	33.1	6.2	91.56	6,848.9	-128.5	7,032.3	6,992.9	39.37	178.611	
9,300.0	9,295.3	7,672.0	7,666.2	33.5	6.2	91.56	6,848.9	-128.5	7,055.4	7,015.7	39.73	177.571	
9,400.0	9,395.3	7,672.0	7,666.2	33.9	6.2	91.56	6,848.9	-128.5	7,079.9	7,039.8	40.09	176.583	
9,500.0	9,495.2	7,672.0	7,666.2	34.2	6.2	91.56	6,848.9	-128.5	7,105.7	7,065.2	40.45	175.646	
9,600.0	9,595.2	7,672.0	7,666.2	34.6	6.2	91.56	6,848.9	-128.5	7,132.8	7,092.0	40.82	174.757	
9,700.0	9,695.1	7,672.0	7,666.2	34.9	6.2	91.56	6,848.9	-128.5	7,161.2	7,120.0	41.18	173.915	
9,800.0	9,795.1	7,672.0	7,666.2	35.3	6.2	91.56	6,848.9	-128.5	7,190.9	7,149.4	41.54	173.118	
9,900.0	9,895.0	7,672.0	7,666.2	35.7	6.2	91.56	6,848.9	-128.5	7,221.8	7,179.9	41.90	172.364	

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

COG Production LLC

Anticollision Report

Company:	COG Production LLC	**Local Co-ordinate Reference:**	Well COPPERHEAD 31 FED COM #3H
Project:	EDDY COUNTY, NM	**TVD Reference:**	RKB=2895+26 @ 2921.0usft (TBD)
Reference Site:	WOLFCAMP	**MD Reference:**	RKB=2895+26 @ 2921.0usft (TBD)
Site Error:	0.0 usft	**North Reference:**	Grid
Reference Well:	COPPERHEAD 31 FED COM #3H	**Survey Calculation Method:**	Minimum Curvature
Well Error:	3.0 usft	**Output errors are at**	2.00 sigma
Reference Wellbore	OWB	**Database:**	EDM_Users
Reference Design:	DWD Plan 3	**Offset TVD Reference:**	Offset Datum

Offset Design WOLFCAMP - COPPERHEAD 30 FEE #1H - OWB-PILOT HOLE - AWP-PH — Offset Site Error: 0.0 usft

Survey Program: 100-Standard Keeper 104 — Offset Well Error: 3.0 usft

Reference Measured Depth (usft)	Reference Vertical Depth (usft)	Offset Measured Depth (usft)	Offset Vertical Depth (usft)	Semi Major Axis Reference (usft)	Semi Major Axis Offset (usft)	Highside Toolface (°)	Offset Wellbore Centre +N/-S (usft)	Offset Wellbore Centre +E/-W (usft)	Distance Between Centres (usft)	Distance Between Ellipses (usft)	Minimum Separation (usft)	Separation Factor	Warning
10,000.0	9,995.0	7,672.0	7,666.2	36.0	6.2	91.56	6,848.9	-128.5	7,254.0	7,211.8	42.26	171.654	
10,100.0	10,094.9	7,672.0	7,666.2	36.4	6.2	91.56	6,848.9	-128.5	7,287.4	7,244.8	42.62	170.983	
10,162.7	10,157.6	7,672.0	7,666.2	36.6	6.2	91.56	6,848.9	-128.5	7,309.0	7,266.2	42.85	170.583	
10,175.0	10,169.9	7,672.0	7,666.2	36.6	6.2	53.00	6,848.9	-128.5	7,313.2	7,270.3	42.89	170.505	
10,200.0	10,194.8	7,672.0	7,666.2	36.7	6.2	23.56	6,848.9	-128.5	7,320.7	7,277.7	42.98	170.311	
10,225.0	10,219.7	7,672.0	7,666.2	36.8	6.2	14.85	6,848.9	-128.5	7,327.1	7,284.0	43.08	170.069	
10,250.0	10,244.3	7,672.0	7,666.2	36.9	6.2	10.91	6,848.9	-128.5	7,332.2	7,289.1	43.19	169.776	
10,275.0	10,268.8	7,672.0	7,666.2	37.0	6.2	8.68	6,848.9	-128.5	7,336.2	7,292.9	43.30	169.428	
10,300.0	10,292.9	7,672.0	7,666.2	37.1	6.2	7.27	6,848.9	-128.5	7,339.0	7,295.6	43.42	169.028	
10,325.0	10,316.7	7,672.0	7,666.2	37.2	6.2	6.29	6,848.9	-128.5	7,340.5	7,297.0	43.54	168.581	
10,350.0	10,340.0	7,672.0	7,666.2	37.2	6.2	5.57	6,848.9	-128.5	7,340.8	7,297.2	43.67	168.090	
10,375.0	10,362.9	7,672.0	7,666.2	37.3	6.2	5.03	6,848.9	-128.5	7,339.9	7,296.1	43.80	167.562	
10,400.0	10,385.1	7,672.0	7,666.2	37.4	6.2	4.61	6,848.9	-128.5	7,337.8	7,293.8	43.94	167.001	
10,425.0	10,406.8	7,672.0	7,666.2	37.4	6.2	4.27	6,848.9	-128.5	7,334.4	7,290.4	44.07	166.413	
10,450.0	10,427.7	7,672.0	7,666.2	37.5	6.2	4.00	6,848.9	-128.5	7,329.9	7,285.7	44.21	165.801	
10,475.0	10,448.0	7,672.0	7,666.2	37.6	6.2	3.78	6,848.9	-128.5	7,324.1	7,279.8	44.34	165.169	
10,500.0	10,467.4	7,672.0	7,666.2	37.6	6.2	3.60	6,848.9	-128.5	7,317.2	7,272.7	44.48	164.520	
10,525.0	10,486.0	7,672.0	7,666.2	37.7	6.2	3.45	6,848.9	-128.5	7,309.1	7,264.5	44.61	163.857	
10,550.0	10,503.7	7,672.0	7,666.2	37.7	6.2	3.32	6,848.9	-128.5	7,299.8	7,255.1	44.73	163.180	
10,575.0	10,520.4	7,672.0	7,666.2	37.8	6.2	3.22	6,848.9	-128.5	7,289.4	7,244.6	44.86	162.487	
10,600.0	10,536.1	7,672.0	7,666.2	37.9	6.2	3.14	6,848.9	-128.5	7,277.9	7,232.9	44.99	161.777	
10,625.0	10,550.8	7,672.0	7,666.2	37.9	6.2	3.08	6,848.9	-128.5	7,265.3	7,220.2	45.11	161.047	
10,650.0	10,564.5	7,672.0	7,666.2	38.0	6.2	3.03	6,848.9	-128.5	7,251.7	7,206.5	45.24	160.294	
10,675.0	10,577.0	7,672.0	7,666.2	38.0	6.2	3.00	6,848.9	-128.5	7,237.0	7,191.7	45.37	159.521	
10,700.0	10,588.3	7,672.0	7,666.2	38.1	6.2	2.98	6,848.9	-128.5	7,221.4	7,175.9	45.49	158.732	
10,725.0	10,598.5	7,672.0	7,666.2	38.2	6.2	2.97	6,848.9	-128.5	7,204.8	7,159.2	45.62	157.933	
10,750.0	10,607.5	7,672.0	7,666.2	38.3	6.2	2.98	6,848.9	-128.5	7,187.3	7,141.6	45.74	157.129	
10,775.0	10,615.2	7,672.0	7,666.2	38.3	6.2	3.01	6,848.9	-128.5	7,168.9	7,123.1	45.86	156.323	
10,800.0	10,621.7	7,672.0	7,666.2	38.4	6.2	3.05	6,848.9	-128.5	7,149.8	7,103.8	45.97	155.519	
10,825.0	10,626.9	7,672.0	7,666.2	38.5	6.2	3.11	6,848.9	-128.5	7,129.8	7,083.7	46.08	154.719	
10,850.0	10,630.9	7,672.0	7,666.2	38.6	6.2	3.19	6,848.9	-128.5	7,109.1	7,062.9	46.19	153.926	
10,875.0	10,633.5	7,672.0	7,666.2	38.7	6.2	3.29	6,848.9	-128.5	7,087.7	7,041.4	46.28	153.141	
10,900.0	10,634.8	7,672.0	7,666.2	38.8	6.2	3.43	6,848.9	-128.5	7,065.7	7,019.3	46.37	152.367	
10,909.7	10,635.0	7,672.0	7,666.2	38.8	6.2	3.50	6,848.9	-128.5	7,057.0	7,010.6	46.41	152.070	
11,000.0	10,635.6	7,672.0	7,666.2	39.1	6.2	3.50	6,848.9	-128.5	6,975.7	6,929.0	46.74	149.244	
11,100.0	10,636.3	7,672.0	7,666.2	39.6	6.2	3.50	6,848.9	-128.5	6,886.0	6,838.9	47.17	145.979	
11,200.0	10,637.0	7,672.0	7,666.2	40.1	6.2	3.50	6,848.9	-128.5	6,796.6	6,748.9	47.66	142.592	
11,300.0	10,637.7	7,672.0	7,666.2	40.6	6.2	3.50	6,848.9	-128.5	6,707.5	6,659.3	48.22	139.105	
11,400.0	10,638.3	7,672.0	7,666.2	41.2	6.2	3.50	6,848.9	-128.5	6,618.7	6,569.8	48.83	135.541	
11,500.0	10,639.0	7,672.0	7,666.2	41.9	6.2	3.50	6,848.9	-128.5	6,530.2	6,480.7	49.50	131.921	
11,600.0	10,639.7	7,672.0	7,666.2	42.6	6.2	3.50	6,848.9	-128.5	6,442.0	6,391.8	50.22	128.267	
11,700.0	10,640.4	7,672.0	7,666.2	43.4	6.2	3.50	6,848.9	-128.5	6,354.2	6,303.2	51.00	124.598	
11,800.0	10,641.1	7,672.0	7,666.2	44.2	6.2	3.50	6,848.9	-128.5	6,266.8	6,214.9	51.82	120.932	
11,900.0	10,641.7	7,672.0	7,666.2	45.1	6.2	3.50	6,848.9	-128.5	6,179.7	6,127.0	52.69	117.286	
12,000.0	10,642.4	7,672.0	7,666.2	46.0	6.2	3.50	6,848.9	-128.5	6,093.0	6,039.4	53.60	113.673	
12,100.0	10,643.1	7,672.0	7,666.2	46.9	6.2	3.50	6,848.9	-128.5	6,006.8	5,952.2	54.55	110.106	
12,200.0	10,643.8	7,672.0	7,666.2	47.9	6.2	3.50	6,848.9	-128.5	5,921.0	5,865.4	55.55	106.595	
12,300.0	10,644.5	7,672.0	7,666.2	49.0	6.2	3.50	6,848.9	-128.5	5,835.6	5,779.0	56.57	103.150	
12,400.0	10,645.1	7,672.0	7,666.2	50.0	6.2	3.50	6,848.9	-128.5	5,750.7	5,693.1	57.64	99.776	
12,500.0	10,645.8	7,672.0	7,666.2	51.1	6.2	3.50	6,848.9	-128.5	5,666.3	5,607.6	58.73	96.481	
12,600.0	10,646.5	7,672.0	7,666.2	52.2	6.2	3.50	6,848.9	-128.5	5,582.4	5,522.6	59.85	93.268	
12,700.0	10,647.2	7,672.0	7,666.2	53.4	6.2	3.50	6,848.9	-128.5	5,499.1	5,438.1	61.01	90.141	

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

COG Production LLC

Anticollision Report

Company:	COG Production LLC	Local Co-ordinate Reference:	Well COPPERHEAD 31 FED COM #3H
Project:	EDDY COUNTY, NM	TVD Reference:	RKB=2895+26 @ 2921.0usft (TBD)
Reference Site:	WOLFCAMP	MD Reference:	RKB=2895+26 @ 2921.0usft (TBD)
Site Error:	0.0 usft	North Reference:	Grid
Reference Well:	COPPERHEAD 31 FED COM #3H	Survey Calculation Method:	Minimum Curvature
Well Error:	3.0 usft	Output errors are at	2.00 sigma
Reference Wellbore	OWB	Database:	EDM_Users
Reference Design:	DWD Plan 3	Offset TVD Reference:	Offset Datum

Offset Design WOLFCAMP - COPPERHEAD 30 FEE #1H - OWB-PILOT HOLE - AWP-PH — Offset Site Error: 0.0 usft

Survey Program: 100-Standard Keeper 104 — Offset Well Error: 3.0 usft

Reference Measured Depth (usft)	Reference Vertical Depth (usft)	Offset Measured Depth (usft)	Offset Vertical Depth (usft)	Semi Major Axis Reference (usft)	Semi Major Axis Offset (usft)	Highside Toolface (°)	Offset Wellbore Centre +N/-S (usft)	Offset Wellbore Centre +E/-W (usft)	Distance Between Centres (usft)	Distance Between Ellipses (usft)	Minimum Separation (usft)	Separation Factor	Warning
12,800.0	10,647.9	7,672.0	7,666.2	54.6	6.2	3.50	6,848.9	-128.5	5,416.3	5,354.1	62.16	87.102	
12,900.0	10,648.5	7,672.0	7,666.2	55.8	6.2	3.50	6,848.9	-128.5	5,334.1	5,270.7	63.39	84.153	
13,000.0	10,649.2	7,672.0	7,666.2	57.0	6.2	3.50	6,848.9	-128.5	5,252.6	5,187.9	64.61	81.294	
13,100.0	10,649.9	7,672.0	7,666.2	58.3	6.2	3.50	6,848.9	-128.5	5,171.6	5,105.8	65.86	78.526	
13,200.0	10,650.6	7,672.0	7,666.2	59.5	6.2	3.50	6,848.9	-128.5	5,091.4	5,024.3	67.13	75.847	
13,300.0	10,651.3	7,672.0	7,666.2	60.8	6.2	3.50	6,848.9	-128.5	5,011.8	4,943.4	68.41	73.259	
13,400.0	10,652.0	7,672.0	7,666.2	62.1	6.2	3.50	6,848.9	-128.5	4,933.0	4,863.3	69.72	70.758	
13,500.0	10,652.6	7,672.0	7,666.2	63.4	6.2	3.50	6,848.9	-128.5	4,855.0	4,784.0	71.04	68.344	
13,600.0	10,653.3	7,672.0	7,666.2	64.8	6.2	3.50	6,848.9	-128.5	4,777.8	4,705.5	72.37	66.015	
13,700.0	10,654.0	7,672.0	7,666.2	66.1	6.2	3.50	6,848.9	-128.5	4,701.5	4,627.8	73.73	63.770	
13,800.0	10,654.7	7,672.0	7,666.2	67.5	6.2	3.50	6,848.9	-128.5	4,626.1	4,551.0	75.09	61.606	
13,900.0	10,655.4	7,672.0	7,666.2	68.9	6.2	3.50	6,848.9	-128.5	4,551.6	4,475.1	76.47	59.522	
14,000.0	10,656.0	7,672.0	7,666.2	70.3	6.2	3.50	6,848.9	-128.5	4,478.1	4,400.3	77.86	57.515	
14,100.0	10,656.7	7,672.0	7,666.2	71.7	6.2	3.50	6,848.9	-128.5	4,405.7	4,326.4	79.26	55.583	
14,200.0	10,657.4	7,672.0	7,666.2	73.1	6.2	3.50	6,848.9	-128.5	4,334.3	4,253.6	80.68	53.726	
14,300.0	10,658.1	7,672.0	7,666.2	74.5	6.2	3.50	6,848.9	-128.5	4,264.1	4,182.0	82.10	51.939	
14,400.0	10,658.8	7,672.0	7,666.2	75.9	6.2	3.50	6,848.9	-128.5	4,195.1	4,111.6	83.53	50.222	
14,500.0	10,659.4	7,672.0	7,666.2	77.4	6.2	3.50	6,848.9	-128.5	4,127.4	4,042.4	84.97	48.573	
14,600.0	10,660.1	7,672.0	7,666.2	78.8	6.2	3.50	6,848.9	-128.5	4,061.0	3,974.6	86.42	46.990	
14,700.0	10,660.8	7,672.0	7,666.2	80.3	6.2	3.50	6,848.9	-128.5	3,996.1	3,908.2	87.88	45.470	
14,800.0	10,661.5	7,672.0	7,666.2	81.7	6.2	3.50	6,848.9	-128.5	3,932.5	3,843.2	89.35	44.013	
14,900.0	10,662.2	7,672.0	7,666.2	83.2	6.2	3.50	6,848.9	-128.5	3,870.6	3,779.7	90.82	42.616	
15,000.0	10,662.8	7,672.0	7,666.2	84.7	6.2	3.50	6,848.9	-128.5	3,810.2	3,717.9	92.30	41.279	
15,100.0	10,663.5	7,672.0	7,666.2	86.2	6.2	3.50	6,848.9	-128.5	3,751.5	3,657.8	93.79	39.999	
15,200.0	10,664.2	7,672.0	7,666.2	87.7	6.2	3.50	6,848.9	-128.5	3,694.7	3,599.4	95.29	38.775	
15,300.0	10,664.9	7,672.0	7,666.2	89.2	6.2	3.50	6,848.9	-128.5	3,639.6	3,542.9	96.79	37.605	
15,400.0	10,665.6	7,672.0	7,666.2	90.7	6.2	3.50	6,848.9	-128.5	3,586.6	3,488.3	98.29	36.489	
15,500.0	10,666.2	7,672.0	7,666.2	92.2	6.2	3.50	6,848.9	-128.5	3,535.5	3,435.7	99.80	35.425	
15,600.0	10,666.9	7,672.0	7,666.2	93.7	6.2	3.50	6,848.9	-128.5	3,486.6	3,385.3	101.32	34.413	
15,700.0	10,667.6	7,672.0	7,666.2	95.2	6.2	3.50	6,848.9	-128.5	3,439.9	3,337.0	102.84	33.449	
15,800.0	10,668.3	7,672.0	7,666.2	96.8	6.2	3.50	6,848.9	-128.5	3,395.4	3,291.1	104.36	32.535	
15,900.0	10,669.0	7,672.0	7,666.2	98.3	6.2	3.50	6,848.9	-128.5	3,353.4	3,247.5	105.89	31.668	
16,000.0	10,669.6	7,672.0	7,666.2	99.8	6.2	3.50	6,848.9	-128.5	3,313.9	3,206.5	107.43	30.848	
16,100.0	10,670.3	7,672.0	7,666.2	101.4	6.2	3.50	6,848.9	-128.5	3,276.9	3,168.0	108.96	30.073	
16,200.0	10,671.0	7,672.0	7,666.2	102.9	6.2	3.50	6,848.9	-128.5	3,242.6	3,132.1	110.51	29.343	
16,300.0	10,671.7	7,672.0	7,666.2	104.4	6.2	3.50	6,848.9	-128.5	3,211.1	3,099.0	112.05	28.657	
16,400.0	10,672.4	7,672.0	7,666.2	106.0	6.2	3.50	6,848.9	-128.5	3,182.4	3,068.8	113.60	28.014	
16,500.0	10,673.1	7,672.0	7,666.2	107.5	6.2	3.50	6,848.9	-128.5	3,156.6	3,041.4	115.15	27.412	
16,600.0	10,673.7	7,672.0	7,666.2	109.1	6.2	3.50	6,848.9	-128.5	3,133.8	3,017.0	116.71	26.851	
16,700.0	10,674.4	7,672.0	7,666.2	110.7	6.2	3.50	6,848.9	-128.5	3,114.0	2,995.7	118.27	26.330	
16,800.0	10,675.1	7,672.0	7,666.2	112.2	6.2	3.50	6,848.9	-128.5	3,097.3	2,977.5	119.83	25.848	
16,900.0	10,675.8	7,672.0	7,666.2	113.8	6.2	3.50	6,848.9	-128.5	3,083.8	2,962.4	121.39	25.403	
17,000.0	10,676.5	7,672.0	7,666.2	115.4	6.2	3.50	6,848.9	-128.5	3,073.5	2,950.5	122.96	24.995	
17,100.0	10,677.1	7,672.0	7,666.2	116.9	6.2	3.50	6,848.9	-128.5	3,066.4	2,941.8	124.53	24.623	
17,200.0	10,677.8	7,672.0	7,666.2	118.5	6.2	3.50	6,848.9	-128.5	3,062.5	2,936.4	126.10	24.286	
17,267.9	10,678.3	7,672.0	7,666.2	119.6	6.2	3.50	6,848.9	-128.5	3,061.8	2,934.6	127.17	24.076 CC	
17,300.0	10,678.5	7,672.0	7,666.2	120.1	6.2	3.50	6,848.9	-128.5	3,061.9	2,934.2	127.68	23.982 ES	
17,400.0	10,679.2	7,672.0	7,666.2	121.6	6.2	3.50	6,848.9	-128.5	3,064.6	2,935.3	129.26	23.710	
17,465.7	10,679.6	7,672.0	7,666.2	122.7	6.2	3.50	6,848.9	-128.5	3,068.1	2,937.8	130.29	23.548 SF	

COG Production LLC

Anticollision Report

Company:	COG Production LLC	**Local Co-ordinate Reference:**	Well COPPERHEAD 31 FED COM #3H
Project:	EDDY COUNTY, NM	**TVD Reference:**	RKB=2895+26 @ 2921.0usft (TBD)
Reference Site:	WOLFCAMP	**MD Reference:**	RKB=2895+26 @ 2921.0usft (TBD)
Site Error:	0.0 usft	**North Reference:**	Grid
Reference Well:	COPPERHEAD 31 FED COM #3H	**Survey Calculation Method:**	Minimum Curvature
Well Error:	3.0 usft	**Output errors are at**	2.00 sigma
Reference Wellbore	OWB	**Database:**	EDM_Users
Reference Design:	DWD Plan 3	**Offset TVD Reference:**	Offset Datum

Offset Design WOLFCAMP - COPPERHEAD 31 FED COM #1H - OWB - ACTUAL WELLPATH — Offset Site Error: 0.0 usft

Survey Program: 100-MWD — Offset Well Error: 3.0 usft

Reference Measured Depth (usft)	Reference Vertical Depth (usft)	Offset Measured Depth (usft)	Offset Vertical Depth (usft)	Semi Major Axis Reference (usft)	Semi Major Axis Offset (usft)	Highside Toolface (°)	Offset Wellbore Centre +N/-S (usft)	Offset Wellbore Centre +E/-W (usft)	Distance Between Centres (usft)	Distance Between Ellipses (usft)	Minimum Separation (usft)	Separation Factor	Warning
0.0	0.0	0.0	0.0	3.0	3.0	-28.47	279.2	-151.4	317.7				
100.0	100.0	92.2	92.2	3.0	3.0	-28.49	279.3	-151.6	317.7	311.7	6.01	52.903	
200.0	200.0	193.7	193.7	3.0	3.0	-28.58	279.1	-152.0	317.6	311.7	6.08	52.286	
300.0	300.0	294.3	294.3	3.1	3.1	-28.67	278.5	-152.3	317.5	311.2	6.23	50.945	
400.0	400.0	394.0	394.0	3.2	3.2	-28.65	278.3	-152.0	317.1	310.6	6.46	49.109	
500.0	500.0	497.2	497.1	3.4	3.4	-28.58	277.7	-151.3	316.3	309.5	6.75	46.827	
593.6	593.6	592.6	592.5	3.5	3.5	62.45	276.5	-150.4	314.1	307.0	7.09	44.327	
600.0	600.0	599.1	599.0	3.6	3.5	62.48	276.4	-150.3	313.9	306.8	7.11	44.142	
700.0	699.9	700.3	700.2	3.8	3.8	62.96	274.3	-149.6	310.2	302.7	7.51	41.286	
800.0	799.9	800.3	800.2	4.0	4.0	63.37	271.9	-149.1	306.4	298.4	7.96	38.481	
900.0	899.8	900.8	900.7	4.2	4.2	63.81	269.4	-148.6	302.4	294.0	8.45	35.794	
1,000.0	999.8	1,000.6	1,000.4	4.5	4.5	64.33	267.0	-147.6	298.4	289.5	8.97	33.260	
1,100.0	1,099.7	1,100.0	1,099.8	4.7	4.8	64.96	264.9	-146.2	294.5	285.0	9.51	30.969	
1,200.0	1,199.7	1,198.0	1,197.8	5.0	5.0	65.73	263.4	-144.4	291.0	281.0	10.07	28.904	
1,300.0	1,299.6	1,294.4	1,294.1	5.3	5.3	66.64	263.1	-142.3	288.5	277.9	10.64	27.128	
1,400.0	1,399.6	1,391.5	1,391.2	5.6	5.6	67.68	264.0	-140.2	287.2	276.0	11.22	25.608	
1,500.0	1,499.5	1,493.3	1,493.0	5.9	5.9	68.83	265.2	-137.8	286.2	274.4	11.83	24.206	
1,600.0	1,599.4	1,593.6	1,593.3	6.2	6.2	69.89	265.8	-135.7	284.8	272.4	12.44	22.890	
1,700.0	1,699.4	1,691.9	1,691.6	6.6	6.5	70.75	266.2	-134.5	283.7	270.6	13.06	21.718	
1,800.0	1,799.3	1,790.1	1,789.8	6.9	6.8	71.46	266.9	-134.2	283.2	269.6	13.69	20.696	
1,819.6	1,818.9	1,809.3	1,809.0	7.0	6.9	71.60	267.1	-134.2	283.2	269.4	13.81	20.511	
1,900.0	1,899.3	1,888.4	1,888.1	7.2	7.1	72.18	268.2	-134.2	283.4	269.1	14.31	19.799	
2,000.0	1,999.2	1,988.9	1,988.5	7.5	7.4	73.08	270.0	-133.3	283.9	268.9	14.96	18.976	
2,100.0	2,099.2	2,090.7	2,090.3	7.9	7.7	74.33	271.9	-130.7	284.0	268.4	15.62	18.179	
2,200.0	2,199.1	2,190.4	2,190.0	8.2	8.1	75.60	273.4	-127.9	283.8	267.5	16.28	17.431	
2,300.0	2,299.1	2,292.3	2,291.7	8.5	8.4	77.01	274.8	-124.4	283.5	266.6	16.96	16.720	
2,400.0	2,399.0	2,393.1	2,392.4	8.9	8.7	78.60	275.8	-119.9	282.8	265.2	17.63	16.037	
2,500.0	2,499.0	2,492.3	2,491.6	9.2	9.1	80.07	276.6	-115.9	282.2	263.9	18.31	15.412	
2,600.0	2,598.9	2,591.4	2,590.6	9.6	9.4	81.23	277.3	-113.4	281.9	263.0	18.99	14.850	
2,619.9	2,618.8	2,611.2	2,610.4	9.6	9.5	81.43	277.4	-113.1	281.9	262.8	19.12	14.745	
2,700.0	2,698.9	2,691.0	2,690.3	9.9	9.8	82.18	278.0	-112.1	282.0	262.3	19.67	14.338	
2,800.0	2,798.8	2,790.6	2,789.8	10.3	10.1	83.04	278.8	-111.2	282.2	261.8	20.35	13.869	
2,900.0	2,898.8	2,890.4	2,889.6	10.6	10.4	83.86	279.6	-110.5	282.6	261.5	21.03	13.435	
3,000.0	2,998.7	2,990.4	2,989.7	11.0	10.8	84.64	280.4	-109.9	283.0	261.3	21.72	13.031	
3,100.0	3,098.6	3,090.4	3,089.6	11.3	11.1	85.37	281.2	-109.7	283.4	261.0	22.40	12.651	
3,200.0	3,198.6	3,190.3	3,189.5	11.7	11.4	86.07	281.9	-109.5	283.9	260.8	23.09	12.296	
3,300.0	3,298.5	3,290.5	3,289.8	12.0	11.8	86.72	282.6	-109.6	284.4	260.6	23.77	11.962	
3,400.0	3,398.5	3,390.4	3,389.6	12.4	12.1	87.36	283.2	-109.8	284.8	260.4	24.46	11.645	
3,500.0	3,498.4	3,490.9	3,490.1	12.7	12.4	87.99	283.8	-109.9	285.3	260.1	25.15	11.344	
3,600.0	3,598.4	3,590.7	3,589.9	13.1	12.8	88.59	284.2	-110.2	285.7	259.8	25.83	11.058	
3,700.0	3,698.3	3,690.5	3,689.7	13.4	13.1	89.15	284.8	-110.7	286.1	259.6	26.52	10.789	
3,800.0	3,798.3	3,790.5	3,789.7	13.8	13.4	89.67	285.3	-111.4	286.7	259.5	27.21	10.536	
3,900.0	3,898.2	3,890.5	3,889.7	14.1	13.8	90.19	285.8	-112.1	287.2	259.3	27.90	10.295	
4,000.0	3,998.2	3,991.0	3,990.2	14.5	14.1	90.70	286.3	-112.8	287.7	259.1	28.59	10.063	
4,100.0	4,098.1	4,092.1	4,091.3	14.8	14.5	91.20	286.4	-113.6	287.9	258.6	29.28	9.831	
4,200.0	4,198.1	4,193.1	4,192.3	15.2	14.8	91.70	286.2	-114.4	287.7	257.7	29.97	9.599	
4,300.0	4,298.0	4,293.2	4,292.4	15.5	15.1	92.19	285.7	-115.2	287.3	256.7	30.66	9.371	
4,400.0	4,398.0	4,393.6	4,392.8	15.9	15.5	92.67	285.2	-116.1	286.9	255.6	31.35	9.151	
4,500.0	4,497.9	4,492.7	4,491.9	16.2	15.8	93.13	284.7	-117.0	286.6	254.5	32.04	8.943	
4,600.0	4,597.8	4,592.4	4,591.6	16.6	16.1	93.59	284.5	-118.0	286.5	253.7	32.74	8.751	
4,613.5	4,611.3	4,605.8	4,604.9	16.6	16.2	93.66	284.5	-118.1	286.5	253.6	32.83	8.726	
4,700.0	4,697.8	4,690.7	4,689.9	17.0	16.5	94.08	284.5	-118.7	286.7	253.3	33.43	8.577	

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

COG Production LLC

Anticollision Report

Company:	COG Production LLC	**Local Co-ordinate Reference:**	Well COPPERHEAD 31 FED COM #3H
Project:	EDDY COUNTY, NM	**TVD Reference:**	RKB=2895+26 @ 2921.0usft (TBD)
Reference Site:	WOLFCAMP	**MD Reference:**	RKB=2895+26 @ 2921.0usft (TBD)
Site Error:	0.0 usft	**North Reference:**	Grid
Reference Well:	COPPERHEAD 31 FED COM #3H	**Survey Calculation Method:**	Minimum Curvature
Well Error:	3.0 usft	**Output errors are at**	2.00 sigma
Reference Wellbore	OWB	**Database:**	EDM_Users
Reference Design:	DWD Plan 3	**Offset TVD Reference:**	Offset Datum

Offset Design WOLFCAMP - COPPERHEAD 31 FED COM #1H - OWB - ACTUAL WELLPATH — Offset Site Error: 0.0 usft

Survey Program: 0-100-MWD — Offset Well Error: 3.0 usft

Reference Measured Depth (usft)	Reference Vertical Depth (usft)	Offset Measured Depth (usft)	Offset Vertical Depth (usft)	Semi Major Axis Reference (usft)	Semi Major Axis Offset (usft)	Highside Toolface (°)	Offset Wellbore Centre +N/-S (usft)	Offset Wellbore Centre +E/-W (usft)	Distance Between Centres (usft)	Distance Between Ellipses (usft)	Minimum Separation (usft)	Separation Factor	Warning
4,800.0	4,797.7	4,792.4	4,791.6	17.3	16.8	94.64	284.6	-119.2	287.0	252.9	34.13	8.410	
4,900.0	4,897.7	4,893.3	4,892.4	17.7	17.2	95.25	284.2	-119.5	286.8	252.0	34.83	8.236	
5,000.0	4,997.6	4,993.5	4,992.7	18.0	17.5	95.89	283.5	-119.6	286.5	251.0	35.53	8.064	
5,100.0	5,097.6	5,094.3	5,093.4	18.4	17.8	96.55	282.7	-119.7	286.0	249.8	36.23	7.895	
5,200.0	5,197.5	5,194.4	5,193.6	18.7	18.2	97.22	281.7	-119.7	285.4	248.4	36.93	7.727	
5,300.0	5,297.5	5,294.1	5,293.2	19.1	18.5	97.87	280.6	-119.8	284.8	247.1	37.63	7.568	
5,400.0	5,397.4	5,393.9	5,393.0	19.5	18.9	98.52	279.7	-119.9	284.3	246.0	38.33	7.418	
5,500.0	5,497.4	5,494.9	5,494.0	19.8	19.2	99.18	278.6	-120.1	283.7	244.7	39.03	7.269	
5,600.0	5,597.3	5,594.8	5,594.0	20.2	19.6	99.83	277.4	-120.3	283.0	243.2	39.73	7.122	
5,700.0	5,697.3	5,695.7	5,694.8	20.5	19.9	100.52	275.8	-120.4	282.0	241.6	40.44	6.975	
5,800.0	5,797.2	5,795.8	5,794.8	20.9	20.3	101.25	274.1	-120.3	281.0	239.9	41.14	6.830	
5,900.0	5,897.2	5,894.2	5,893.3	21.2	20.6	102.19	272.5	-119.1	280.2	238.4	41.84	6.697	
5,946.0	5,943.1	5,939.1	5,938.1	21.4	20.8	102.86	271.7	-117.4	280.1	238.0	42.16	6.643 CC	
6,000.0	5,997.1	5,990.0	5,988.9	21.6	20.9	103.77	270.9	-114.7	280.4	237.8	42.54	6.592 ES	
6,100.0	6,097.0	6,079.6	6,078.5	22.0	21.2	104.07	272.7	-115.7	282.9	239.7	43.20	6.549 SF	
6,200.0	6,197.0	6,171.2	6,169.8	22.3	21.5	103.58	279.0	-119.7	289.4	245.5	43.87	6.595	
6,300.0	6,296.9	6,255.7	6,253.7	22.7	21.8	102.91	288.4	-123.8	299.9	255.4	44.52	6.737	
6,400.0	6,396.9	6,318.7	6,315.4	23.0	22.0	101.99	299.9	-128.4	317.5	272.4	45.09	7.041	
6,500.0	6,496.8	6,369.0	6,362.7	23.4	22.2	100.87	316.2	-133.2	348.4	302.8	45.62	7.637	
6,600.0	6,596.8	6,414.1	6,402.9	23.8	22.4	99.89	336.1	-136.9	391.4	345.2	46.13	8.484	
6,700.0	6,696.7	6,454.1	6,436.7	24.1	22.5	99.23	357.4	-138.7	444.3	397.7	46.63	9.529	
6,800.0	6,796.7	6,494.0	6,468.0	24.5	22.6	98.78	382.1	-139.2	505.6	458.4	47.12	10.729	
6,900.0	6,896.6	6,531.0	6,494.8	24.8	22.8	98.41	407.6	-139.1	573.4	525.8	47.61	12.044	
7,000.0	6,996.6	6,562.0	6,515.8	25.2	22.9	98.11	430.5	-139.0	645.9	597.8	48.08	13.434	
7,100.0	7,096.5	6,600.9	6,541.2	25.6	23.0	97.76	459.9	-138.9	721.3	672.7	48.59	14.846	
7,200.0	7,196.5	6,641.4	6,566.8	25.9	23.2	97.42	491.2	-138.8	798.6	749.5	49.11	16.264	
7,300.0	7,296.4	6,677.4	6,588.8	26.3	23.3	97.15	519.7	-138.7	877.8	828.2	49.62	17.692	
7,400.0	7,396.3	6,709.4	6,607.5	26.6	23.5	96.92	545.7	-138.6	958.8	908.7	50.12	19.131	
7,500.0	7,496.3	6,740.2	6,624.9	27.0	23.6	96.69	571.2	-138.7	1,041.3	990.7	50.62	20.573	
7,600.0	7,596.2	6,770.8	6,641.5	27.4	23.8	96.45	596.8	-139.1	1,125.2	1,074.1	51.12	22.011	
7,700.0	7,696.2	6,793.8	6,653.5	27.7	23.9	96.26	616.4	-139.5	1,210.3	1,158.7	51.60	23.458	
7,800.0	7,796.1	6,811.0	6,662.2	28.1	24.0	96.13	631.3	-139.9	1,296.8	1,244.7	52.04	24.917	
7,900.0	7,896.1	6,831.3	6,671.9	28.4	24.1	95.97	649.1	-140.3	1,384.4	1,331.9	52.51	26.364	
8,000.0	7,996.0	6,851.1	6,681.1	28.8	24.2	95.82	666.6	-140.7	1,473.0	1,420.0	52.98	27.805	
8,100.0	8,096.0	6,873.0	6,690.9	29.2	24.3	95.66	686.2	-141.3	1,562.3	1,508.9	53.46	29.226	
8,200.0	8,195.9	6,873.0	6,690.9	29.5	24.3	95.66	686.2	-141.3	1,652.6	1,598.8	53.82	30.708	
8,300.0	8,295.9	6,905.0	6,704.1	29.9	24.5	95.38	715.3	-142.7	1,743.5	1,689.1	54.36	32.073	
8,400.0	8,395.8	6,905.0	6,704.1	30.2	24.5	95.38	715.3	-142.7	1,835.0	1,780.3	54.72	33.535	
8,500.0	8,495.8	6,905.0	6,704.1	30.6	24.5	95.38	715.3	-142.7	1,927.4	1,872.3	55.08	34.992	
8,600.0	8,595.7	6,920.4	6,709.9	31.0	24.6	95.23	729.6	-143.6	2,020.2	1,964.7	55.53	36.379	
8,700.0	8,695.7	6,936.0	6,715.3	31.3	24.7	95.08	744.2	-144.6	2,113.7	2,057.7	55.98	37.755	
8,800.0	8,795.6	6,936.0	6,715.3	31.7	24.7	95.08	744.2	-144.6	2,207.5	2,151.1	56.35	39.178	
8,900.0	8,895.5	6,936.0	6,715.3	32.0	24.7	95.08	744.2	-144.6	2,301.8	2,245.1	56.71	40.592	
9,000.0	8,995.5	6,936.0	6,715.3	32.4	24.7	95.08	744.2	-144.6	2,396.6	2,339.5	57.07	41.996	
9,100.0	9,095.4	6,950.2	6,719.8	32.8	24.7	94.94	757.6	-145.6	2,491.5	2,434.0	57.51	43.320	
9,200.0	9,195.4	6,968.0	6,724.8	33.1	24.9	94.78	774.6	-146.7	2,587.1	2,529.1	57.98	44.617	
9,300.0	9,295.3	6,968.0	6,724.8	33.5	24.9	94.78	774.6	-146.7	2,682.6	2,624.3	58.34	45.979	
9,400.0	9,395.3	6,968.0	6,724.8	33.9	24.9	94.78	774.6	-146.7	2,778.5	2,719.8	58.71	47.329	
9,500.0	9,495.2	6,968.0	6,724.8	34.2	24.9	94.78	774.6	-146.7	2,874.6	2,815.5	59.07	48.667	
9,600.0	9,595.2	6,968.0	6,724.8	34.6	24.9	94.78	774.6	-146.7	2,971.0	2,911.5	59.43	49.993	
9,700.0	9,695.1	6,968.0	6,724.8	34.9	24.9	94.78	774.6	-146.7	3,067.6	3,007.8	59.79	51.307	
9,800.0	9,795.1	6,981.3	6,728.2	35.3	24.9	94.67	787.5	-147.5	3,164.2	3,104.0	60.23	52.533	

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

COG Production LLC

Anticollision Report

Company:	COG Production LLC	**Local Co-ordinate Reference:**	Well COPPERHEAD 31 FED COM #3H
Project:	EDDY COUNTY, NM	**TVD Reference:**	RKB=2895+26 @ 2921.0usft (TBD)
Reference Site:	WOLFCAMP	**MD Reference:**	RKB=2895+26 @ 2921.0usft (TBD)
Site Error:	0.0 usft	**North Reference:**	Grid.
Reference Well:	COPPERHEAD 31 FED COM #3H	**Survey Calculation Method:**	Minimum Curvature
Well Error:	3.0 usft	**Output errors are at**	2.00 sigma
Reference Wellbore	OWB	**Database:**	EDM_Users
Reference Design:	DWD Plan 3	**Offset TVD Reference:**	Offset Datum

Offset Design WOLFCAMP - COPPERHEAD 31 FED COM #1H - OWB - ACTUAL WELLPATH — Offset Site Error: 0.0 usft

Survey Program: 100-MWD — Offset Well Error: 3.0 usft

Reference Measured Depth (usft)	Reference Vertical Depth (usft)	Offset Measured Depth (usft)	Offset Vertical Depth (usft)	Semi Major Axis Reference (usft)	Semi Major Axis Offset (usft)	Highside Toolface (°)	Offset Wellbore Centre +N/-S (usft)	Offset Wellbore Centre +E/-W (usft)	Distance Between Centres (usft)	Distance Between Ellipses (usft)	Minimum Separation (usft)	Separation Factor	Warning
9,900.0	9,895.0	6,985.3	6,729.2	35.7	25.0	94.63	791.3	-147.7	3,261.1	3,200.5	60.62	53.797	
10,000.0	9,995.0	6,999.0	6,732.4	36.0	25.1	94.52	804.6	-148.5	3,358.3	3,297.2	61.07	54.994	
10,100.0	10,094.9	6,999.0	6,732.4	36.4	25.1	94.52	804.6	-148.5	3,455.4	3,394.0	61.43	56.252	
10,162.7	10,157.6	6,999.0	6,732.4	36.6	25.1	94.52	804.6	-148.5	3,516.4	3,454.8	61.65	57.034	
10,175.0	10,169.9	6,999.0	6,732.4	36.6	25.1	55.61	804.6	-148.5	3,528.3	3,466.7	61.70	57.187	
10,200.0	10,194.8	6,999.0	6,732.4	36.7	25.1	25.63	804.6	-148.5	3,552.4	3,490.6	61.79	57.494	
10,225.0	10,219.7	6,999.0	6,732.4	36.8	25.1	16.54	804.6	-148.5	3,576.0	3,514.1	61.87	57.796	
10,250.0	10,244.3	6,999.0	6,732.4	36.9	25.1	12.31	804.6	-148.5	3,599.2	3,537.2	61.96	58.091	
10,275.0	10,268.8	6,999.0	6,732.4	37.0	25.1	9.87	804.6	-148.5	3,621.9	3,559.8	62.04	58.379	
10,300.0	10,292.9	6,999.0	6,732.4	37.1	25.1	8.28	804.6	-148.5	3,644.0	3,581.9	62.12	58.659	
10,325.0	10,316.7	6,999.0	6,732.4	37.2	25.1	7.15	804.6	-148.5	3,665.6	3,603.4	62.20	58.930	
10,350.0	10,340.0	6,999.0	6,732.4	37.2	25.1	6.32	804.6	-148.5	3,686.5	3,624.3	62.28	59.194	
10,375.0	10,362.9	7,012.8	6,735.3	37.3	25.1	5.65	818.1	-149.2	3,706.7	3,644.2	62.44	59.360	
10,400.0	10,385.1	7,016.3	6,736.0	37.4	25.2	5.14	821.5	-149.4	3,726.1	3,663.6	62.54	59.582	
10,425.0	10,406.8	7,030.0	6,738.7	37.4	25.3	4.71	834.9	-150.1	3,744.8	3,682.1	62.70	59.730	
10,450.0	10,427.7	7,030.0	6,738.7	37.5	25.3	4.38	834.9	-150.1	3,762.6	3,699.8	62.76	59.951	
10,475.0	10,448.0	7,030.0	6,738.7	37.6	25.3	4.10	834.9	-150.1	3,779.5	3,716.7	62.82	60.161	
10,500.0	10,467.4	7,030.0	6,738.7	37.6	25.3	3.86	834.9	-150.1	3,795.5	3,732.7	62.88	60.358	
10,525.0	10,486.0	7,030.0	6,738.7	37.7	25.3	3.66	834.9	-150.1	3,810.6	3,747.7	62.94	60.544	
10,550.0	10,503.7	7,030.0	6,738.7	37.7	25.3	3.49	834.9	-150.1	3,824.8	3,761.8	63.00	60.715	
10,575.0	10,520.4	7,030.0	6,738.7	37.8	25.3	3.34	834.9	-150.1	3,838.0	3,774.9	63.05	60.871	
10,600.0	10,536.1	7,030.0	6,738.7	37.9	25.3	3.21	834.9	-150.1	3,850.1	3,787.0	63.11	61.009	
10,625.0	10,550.8	7,045.3	6,741.5	37.9	25.4	3.09	850.0	-150.8	3,861.0	3,797.8	63.27	61.026	
10,650.0	10,564.5	7,061.0	6,743.9	38.0	25.5	2.98	865.5	-151.6	3,871.2	3,807.8	63.44	61.024	
10,675.0	10,577.0	7,061.0	6,743.9	38.0	25.5	2.90	865.5	-151.6	3,880.0	3,816.5	63.51	61.097	
10,700.0	10,588.3	7,061.0	6,743.9	38.1	25.5	2.83	865.5	-151.6	3,887.7	3,824.2	63.58	61.150	
10,725.0	10,598.5	7,061.0	6,743.9	38.2	25.5	2.77	865.5	-151.6	3,894.4	3,830.7	63.65	61.182	
10,750.0	10,607.5	7,061.0	6,743.9	38.3	25.5	2.72	865.5	-151.6	3,899.9	3,836.2	63.73	61.194	
10,775.0	10,615.2	7,061.0	6,743.9	38.3	25.5	2.68	865.5	-151.6	3,904.3	3,840.5	63.81	61.187	
10,800.0	10,621.7	7,061.0	6,743.9	38.4	25.5	2.65	865.5	-151.6	3,907.5	3,843.6	63.89	61.160	
10,825.0	10,626.9	7,061.0	6,743.9	38.5	25.5	2.63	865.5	-151.6	3,909.6	3,845.6	63.97	61.114	
10,850.0	10,630.9	7,061.0	6,743.9	38.6	25.5	2.61	865.5	-151.6	3,910.6	3,846.5	64.06	61.049	
10,875.0	10,633.5	7,075.7	6,745.7	38.7	25.6	2.59	880.0	-152.2	3,910.1	3,845.9	64.24	60.867	
10,900.0	10,634.8	7,092.0	6,747.3	38.8	25.7	2.58	896.3	-152.7	3,908.9	3,844.4	64.44	60.661	
10,909.7	10,635.0	7,092.0	6,747.3	38.8	25.7	2.58	896.3	-152.7	3,908.0	3,843.5	64.47	60.616	
11,000.0	10,635.6	7,092.0	6,747.3	39.1	25.7	2.58	896.3	-152.7	3,899.8	3,835.0	64.81	60.177	
11,100.0	10,636.3	7,092.0	6,747.3	39.6	25.7	2.58	896.3	-152.7	3,893.1	3,827.9	65.24	59.677	
11,200.0	10,637.0	7,123.0	6,749.0	40.1	25.9	2.57	927.2	-153.3	3,888.5	3,822.5	65.94	58.966	
11,300.0	10,637.7	7,139.7	6,749.4	40.6	26.0	2.57	943.9	-153.3	3,886.0	3,819.4	66.62	58.334	
11,400.0	10,638.3	7,186.0	6,750.0	41.2	26.3	2.57	990.2	-153.2	3,885.4	3,817.8	67.57	57.506	
11,403.4	10,638.4	7,186.0	6,750.0	41.2	26.3	2.57	990.2	-153.2	3,885.4	3,817.8	67.59	57.486	
11,500.0	10,639.0	7,212.1	6,749.9	41.9	26.5	2.58	1,016.3	-152.9	3,886.3	3,817.9	68.43	56.790	
11,600.0	10,639.7	7,275.9	6,748.6	42.6	27.0	2.59	1,080.1	-151.8	3,888.9	3,819.2	69.66	55.827	
11,700.0	10,640.4	7,604.0	6,754.3	43.4	30.1	2.72	1,407.9	-142.1	3,886.3	3,812.8	73.48	52.892	
11,800.0	10,641.1	7,698.0	6,758.0	44.2	31.1	2.76	1,501.8	-139.9	3,883.2	3,807.9	75.29	51.573	
11,900.0	10,641.7	7,740.3	6,759.1	45.1	31.5	2.77	1,544.1	-138.9	3,881.1	3,804.4	76.63	50.647	
12,000.0	10,642.4	7,800.2	6,760.1	46.0	32.2	2.78	1,603.9	-137.8	3,880.2	3,801.9	78.20	49.615	
12,100.0	10,643.1	7,884.0	6,761.1	46.9	33.2	2.81	1,687.7	-135.9	3,879.8	3,799.7	80.12	48.427	
12,101.0	10,643.1	7,884.0	6,761.1	47.0	33.2	2.81	1,687.7	-135.9	3,879.8	3,799.7	80.13	48.421	
12,200.0	10,643.8	7,944.7	6,761.3	47.9	33.9	2.83	1,748.4	-134.5	3,880.2	3,798.4	81.83	47.420	
12,300.0	10,644.5	8,072.0	6,761.0	49.0	35.4	2.83	1,875.7	-134.3	3,881.2	3,796.8	84.40	45.986	
12,400.0	10,645.1	8,140.2	6,761.1	50.0	36.3	2.81	1,943.8	-135.2	3,881.7	3,795.4	86.32	44.969	

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

COG Production LLC

Anticollision Report

Company:	COG Production LLC	**Local Co-ordinate Reference:**	Well COPPERHEAD 31 FED COM #3H
Project:	EDDY COUNTY, NM	**TVD Reference:**	RKB=2895+26 @ 2921.0usft (TBD)
Reference Site:	WOLFCAMP	**MD Reference:**	RKB=2895+26 @ 2921.0usft (TBD)
Site Error:	0.0 usft	**North Reference:**	Grid
Reference Well:	COPPERHEAD 31 FED COM #3H	**Survey Calculation Method:**	Minimum Curvature
Well Error:	3.0 usft	**Output errors are at**	2.00 sigma
Reference Wellbore	OWB	**Database:**	EDM_Users
Reference Design:	DWD Plan 3	**Offset TVD Reference:**	Offset Datum

Offset Design WOLFCAMP - COPPERHEAD 31 FED COM #1H - OWB - ACTUAL WELLPATH — Offset Site Error: 0.0 usft

Survey Program: 100-MWD — Offset Well Error: 3.0 usft

Reference Measured Depth (usft)	Reference Vertical Depth (usft)	Offset Measured Depth (usft)	Offset Vertical Depth (usft)	Semi Major Axis Reference (usft)	Semi Major Axis Offset (usft)	Highside Toolface (°)	Offset Wellbore Centre +N/-S (usft)	Offset Wellbore Centre +E/-W (usft)	Distance Between Centres (usft)	Distance Between Ellipses (usft)	Minimum Separation (usft)	Separation Factor	Warning
12,500.0	10,645.8	8,235.2	6,760.4	51.1	37.5	2.80	2,038.8	-135.9	3,883.1	3,794.5	88.63	43.812	
12,600.0	10,646.5	8,371.9	6,760.5	52.2	39.3	2.80	2,175.5	-135.6	3,883.7	3,792.2	91.55	42.424	
12,700.0	10,647.2	8,447.0	6,760.5	53.4	40.3	2.82	2,250.6	-133.8	3,884.4	3,790.7	93.69	41.458	
12,800.0	10,647.9	8,641.5	6,762.1	54.6	42.9	2.90	2,445.0	-127.7	3,884.7	3,787.2	97.51	39.837	
12,900.0	10,648.5	8,736.4	6,764.3	55.8	44.2	2.97	2,539.8	-123.4	3,883.3	3,783.3	100.03	38.822	
13,000.0	10,649.2	8,851.7	6,767.3	57.0	45.9	3.03	2,654.9	-118.6	3,881.5	3,778.7	102.87	37.732	
13,100.0	10,649.9	8,935.7	6,769.3	58.3	47.1	3.09	2,738.9	-115.0	3,880.1	3,774.8	105.31	36.844	
13,200.0	10,650.6	9,051.2	6,772.1	59.5	48.7	3.15	2,854.2	-110.3	3,878.5	3,770.2	108.23	35.835	
13,300.0	10,651.3	9,141.6	6,774.5	60.8	50.0	3.20	2,944.5	-107.4	3,876.8	3,765.9	110.83	34.980	
13,400.0	10,652.0	9,215.8	6,776.0	62.1	51.1	3.24	3,018.7	-104.4	3,875.6	3,762.4	113.21	34.233	
13,500.0	10,652.6	9,290.0	6,777.0	63.4	52.2	3.28	3,092.8	-101.3	3,875.2	3,759.5	115.62	33.517	
13,506.3	10,652.7	9,290.0	6,777.0	63.5	52.2	3.28	3,092.8	-101.3	3,875.2	3,759.5	115.70	33.493	
13,600.0	10,653.3	9,331.7	6,777.1	64.8	52.8	3.31	3,134.4	-99.4	3,875.8	3,758.2	117.57	32.967	
13,700.0	10,654.0	9,384.0	6,776.5	66.1	53.6	3.36	3,186.6	-96.0	3,877.9	3,758.2	119.68	32.401	
13,800.0	10,654.7	9,483.9	6,774.7	67.5	55.0	3.43	3,286.3	-90.4	3,880.6	3,758.1	122.52	31.672	
13,900.0	10,655.4	9,741.5	6,775.4	68.9	58.9	3.56	3,543.7	-81.4	3,881.4	3,753.6	127.77	30.378	
14,000.0	10,656.0	9,805.6	6,776.6	70.3	59.9	3.57	3,607.8	-80.6	3,880.3	3,750.2	130.13	29.818	
14,053.0	10,656.4	9,850.0	6,777.0	71.0	60.6	3.59	3,652.2	-79.2	3,880.2	3,748.7	131.55	29.496	
14,100.0	10,656.7	9,869.2	6,777.1	71.7	60.8	3.60	3,671.4	-78.5	3,880.3	3,747.8	132.50	29.285	
14,200.0	10,657.4	9,943.0	6,777.4	73.1	62.0	3.63	3,745.1	-76.1	3,880.9	3,745.8	135.04	28.740	
14,300.0	10,658.1	10,037.0	6,777.1	74.5	63.4	3.69	3,839.1	-72.1	3,882.1	3,744.2	137.89	28.153	
14,400.0	10,658.8	10,113.1	6,776.5	75.9	64.6	3.74	3,915.0	-67.8	3,883.8	3,743.3	140.48	27.646	
14,500.0	10,659.4	10,346.1	6,776.8	77.4	68.1	3.95	4,147.5	-53.5	3,885.8	3,740.3	145.49	26.709	
14,600.0	10,660.1	10,536.2	6,783.8	78.8	71.1	4.01	4,337.5	-49.3	3,882.9	3,733.0	149.90	25.904	
14,700.0	10,660.8	10,597.0	6,785.8	80.3	72.0	4.01	4,398.2	-49.1	3,880.0	3,727.7	152.31	25.474	
14,800.0	10,661.5	10,597.0	6,785.8	81.7	72.0	4.01	4,398.2	-49.1	3,878.4	3,724.6	153.77	25.221	
14,877.0	10,662.0	10,655.7	6,786.6	82.9	73.0	4.02	4,456.9	-48.7	3,878.0	3,722.2	155.83	24.886	
14,900.0	10,662.2	10,667.0	6,786.6	83.2	73.1	4.02	4,468.2	-48.6	3,878.1	3,721.7	156.35	24.804	
15,000.0	10,662.8	10,728.4	6,786.4	84.7	74.1	4.03	4,529.6	-47.5	3,879.1	3,720.3	158.79	24.429	
15,100.0	10,663.5	10,824.6	6,785.6	86.2	75.6	4.08	4,625.7	-44.1	3,880.9	3,719.1	161.78	23.988	
15,200.0	10,664.2	10,954.0	6,785.5	87.7	77.6	4.14	4,755.0	-39.3	3,881.9	3,716.6	165.30	23.484	
15,300.0	10,664.9	11,096.0	6,786.8	89.2	79.9	4.19	4,896.9	-35.5	3,881.6	3,712.6	169.04	22.963	
15,317.9	10,665.0	11,104.9	6,786.9	89.4	80.0	4.20	4,905.9	-35.3	3,881.6	3,712.1	169.45	22.907	
15,400.0	10,665.6	11,160.0	6,787.0	90.7	80.9	4.22	4,960.9	-33.7	3,882.0	3,710.5	171.55	22.629	
15,500.0	10,666.2	11,223.0	6,786.7	92.2	81.9	4.25	5,023.9	-31.4	3,883.4	3,709.3	174.06	22.311	
15,600.0	10,666.9	11,288.6	6,786.0	93.7	82.9	4.28	5,089.5	-29.2	3,885.3	3,708.7	176.61	22.000	
15,700.0	10,667.6	11,347.0	6,784.8	95.2	83.8	4.31	5,147.8	-26.7	3,888.4	3,709.4	179.05	21.717	
15,800.0	10,668.3	11,507.8	6,781.6	96.8	86.4	4.39	5,308.4	-20.4	3,891.5	3,708.4	183.12	21.251	
15,900.0	10,669.0	11,522.0	6,781.4	98.3	86.6	4.40	5,322.6	-20.0	3,894.5	3,709.6	184.88	21.065	
16,000.0	10,669.6	11,522.0	6,781.4	99.8	86.6	4.40	5,322.6	-20.0	3,899.9	3,713.5	186.41	20.921	
16,100.0	10,670.3	11,522.0	6,781.4	101.4	86.6	4.40	5,322.6	-20.0	3,908.0	3,720.0	187.95	20.793	
16,200.0	10,671.0	11,522.0	6,781.4	102.9	86.6	4.40	5,322.6	-20.0	3,918.6	3,729.1	189.49	20.679	
16,300.0	10,671.7	11,522.0	6,781.4	104.4	86.6	4.40	5,322.6	-20.0	3,931.6	3,740.6	191.04	20.580	
16,400.0	10,672.4	11,522.0	6,781.4	106.0	86.6	4.40	5,322.6	-20.0	3,947.2	3,754.6	192.59	20.496	
16,500.0	10,673.1	11,522.0	6,781.4	107.5	86.6	4.40	5,322.6	-20.0	3,965.3	3,771.1	194.14	20.425	
16,600.0	10,673.7	11,522.0	6,781.4	109.1	86.6	4.40	5,322.6	-20.0	3,985.7	3,790.0	195.69	20.367	
16,700.0	10,674.4	11,522.0	6,781.4	110.7	86.6	4.40	5,322.6	-20.0	4,008.6	3,811.3	197.25	20.322	
16,800.0	10,675.1	11,522.0	6,781.4	112.2	86.6	4.40	5,322.6	-20.0	4,033.8	3,835.0	198.81	20.289	
16,900.0	10,675.8	11,522.0	6,781.4	113.8	86.6	4.40	5,322.6	-20.0	4,061.3	3,860.9	200.38	20.268	
17,000.0	10,676.5	11,522.0	6,781.4	115.4	86.6	4.40	5,322.6	-20.0	4,091.1	3,889.1	201.95	20.258	
17,100.0	10,677.1	11,522.0	6,781.4	116.9	86.6	4.40	5,322.6	-20.0	4,123.1	3,919.6	203.52	20.259	
17,200.0	10,677.8	11,522.0	6,781.4	118.5	86.6	4.40	5,322.6	-20.0	4,157.2	3,952.1	205.09	20.270	

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

COG Production LLC

Anticollision Report

Company:	COG Production LLC	**Local Co-ordinate Reference:**	Well COPPERHEAD 31 FED COM #3H
Project:	EDDY COUNTY, NM	**TVD Reference:**	RKB=2895+26 @ 2921.0usft (TBD)
Reference Site:	WOLFCAMP	**MD Reference:**	RKB=2895+26 @ 2921.0usft (TBD)
Site Error:	0.0 usft	**North Reference:**	Grid
Reference Well:	COPPERHEAD 31 FED COM #3H	**Survey Calculation Method:**	Minimum Curvature
Well Error:	3.0 usft	**Output errors are at**	2.00 sigma
Reference Wellbore	OWB	**Database:**	EDM_Users
Reference Design:	DWD Plan 3	**Offset TVD Reference:**	Offset Datum

Offset Design WOLFCAMP - COPPERHEAD 31 FED COM #1H - OWB - ACTUAL WELLPATH — **Offset Site Error:** 0.0 usft

Survey Program: 100-MWD — **Offset Well Error:** 3.0 usft

Reference Measured Depth (usft)	Reference Vertical Depth (usft)	Offset Measured Depth (usft)	Offset Vertical Depth (usft)	Semi Major Axis Reference (usft)	Semi Major Axis Offset (usft)	Highside Toolface (°)	Offset Wellbore Centre +N/-S (usft)	Offset Wellbore Centre +E/-W (usft)	Distance Between Centres (usft)	Distance Between Ellipses (usft)	Minimum Separation (usft)	Separation Factor	Warning
17,300.0	10,678.5	11,522.0	6,781.4	120.1	86.6	4.40	5,322.6	-20.0	4,193.5	3,986.8	206.66	20.291	
17,400.0	10,679.2	11,522.0	6,781.4	121.6	86.6	4.40	5,322.6	-20.0	4,231.8	4,023.6	208.24	20.322	
17,465.7	10,679.6	11,522.0	6,781.4	122.7	86.6	4.40	5,322.6	-20.0	4,258.1	4,048.8	209.28	20.346	

COG Operating LLC

Anticollision Report

Company:	NEW MEXICO BASIN	Local Co-ordinate Reference:	Well COPPERHEAD 31 FED COM #3H
Project:	EDDY COUNTY, NM	TVD Reference:	RKB=2895+26 @ 2921.0usft (TBD)
Reference Site:	WOLFCAMP	MD Reference:	RKB=2895+26 @ 2921.0usft (TBD)
Site Error:	0.0 usft	North Reference:	Grid
Reference Well:	COPPERHEAD 31 FED COM #3H	Survey Calculation Method:	Minimum Curvature
Well Error:	3.0 usft	Output errors are at	2.00 sigma
Reference Wellbore	OWB	Database:	EDM_Users
Reference Design:	DWD Plan 3	Offset TVD Reference:	Offset Datum

Offset Design: WOLFCAMP - PERKINS #1Y - OWB - ACTUAL WELLPATH — Offset Site Error: 0.0 usft

Survey Program: 1000-INC-ONLY — Offset Well Error: 3.0 usft

Reference Measured Depth (usft)	Reference Vertical Depth (usft)	Offset Measured Depth (usft)	Offset Vertical Depth (usft)	Semi Major Axis Reference (usft)	Semi Major Axis Offset (usft)	Highside Toolface (°)	Offset Wellbore Centre +N/-S (usft)	Offset Wellbore Centre +E/-W (usft)	Distance Between Centres (usft)	Distance Between Ellipses (usft)	Minimum Separation (usft)	Separation Factor	Warning
0.0	0.0	24.0	24.0	3.0	3.1	0.06	5,062.1	5.6	5,062.1				
100.0	100.0	124.0	124.0	3.0	4.4	0.06	5,062.1	5.6	5,062.1	5,054.7	7.37	687.186	
200.0	200.0	224.0	224.0	3.0	6.5	0.06	5,062.1	5.6	5,062.1	5,052.6	9.50	532.723	
300.0	300.0	324.0	324.0	3.1	8.8	0.06	5,062.1	5.6	5,062.1	5,050.1	11.92	424.535	
400.0	400.0	424.0	424.0	3.2	11.2	0.06	5,062.1	5.6	5,062.1	5,047.6	14.48	349.686	
500.0	500.0	524.0	524.0	3.4	13.7	0.06	5,062.1	5.6	5,062.1	5,044.9	17.11	295.926 CC	
593.6	593.6	617.6	617.6	3.5	16.1	90.78	5,062.1	5.6	5,062.1	5,042.5	19.61	258.110	
600.0	600.0	624.0	624.0	3.6	16.2	90.78	5,062.1	5.6	5,062.1	5,042.3	19.78	255.856	
700.0	699.9	723.9	723.9	3.8	18.7	90.82	5,062.1	5.6	5,062.1	5,039.6	22.50	225.000	
800.0	799.9	823.9	823.9	4.0	21.3	90.86	5,062.1	5.6	5,062.2	5,036.9	25.24	200.524	
900.0	899.8	923.8	923.8	4.2	23.8	90.89	5,062.1	5.6	5,062.2	5,034.2	28.02	180.684	
940.1	939.9	963.9	963.9	4.3	24.8	90.91	5,062.1	5.6	5,062.2	5,033.1	29.13	173.751	
1,000.0	999.8	1,000.0	1,000.0	4.5	25.7	90.92	5,062.1	5.6	5,062.3	5,032.1	30.21	167.590	
1,100.0	1,099.7	1,000.0	1,000.0	4.7	25.7	90.92	5,062.1	5.6	5,063.8	5,033.4	30.48	166.148	
1,200.0	1,199.7	1,000.0	1,000.0	5.0	25.7	90.92	5,062.1	5.6	5,067.3	5,036.6	30.76	164.734	
1,300.0	1,299.6	1,000.0	1,000.0	5.3	25.7	90.92	5,062.1	5.6	5,072.8	5,041.7	31.05	163.359	
1,394.4	1,393.9	1,417.9	1,417.9	5.6	47.3	91.08	5,062.1	5.6	5,062.5	5,009.6	52.87	95.757	
1,400.0	1,399.6	1,423.6	1,423.6	5.6	47.6	91.08	5,062.1	5.6	5,062.5	5,009.3	53.18	95.202	
1,500.0	1,499.5	1,523.5	1,523.5	5.9	52.7	91.12	5,062.1	5.6	5,062.6	5,003.9	58.64	86.328	
1,600.0	1,599.4	1,623.4	1,623.4	6.2	57.9	91.15	5,062.1	5.6	5,062.6	4,998.5	64.12	78.959	
1,700.0	1,699.4	1,723.4	1,723.4	6.6	63.0	91.19	5,062.1	5.6	5,062.7	4,993.1	69.60	72.742	
1,800.0	1,799.3	1,823.3	1,823.3	6.9	68.2	91.23	5,062.1	5.6	5,062.8	4,987.7	75.08	67.428	
1,900.0	1,899.3	1,923.3	1,923.3	7.2	73.4	91.26	5,062.1	5.6	5,062.8	4,982.3	80.57	62.834	
2,000.0	1,999.2	2,000.0	1,999.2	7.5	77.3	91.29	5,062.1	5.6	5,063.0	4,978.1	84.87	59.657	
2,100.0	2,099.2	2,000.0	1,999.2	7.9	77.3	91.29	5,062.1	5.6	5,064.5	4,979.3	85.20	59.442	
2,200.0	2,199.1	2,000.0	1,999.2	8.2	77.3	91.29	5,062.1	5.6	5,068.0	4,982.5	85.54	59.250	
2,300.0	2,299.1	2,000.0	1,999.2	8.5	77.3	91.29	5,062.1	5.6	5,073.5	4,987.6	85.87	59.081	
2,394.3	2,393.4	2,418.2	2,417.4	8.9	98.9	91.45	5,062.1	5.6	5,083.2	4,955.4	107.81	46.965	
2,400.0	2,399.0	2,423.8	2,423.0	8.9	99.2	91.45	5,062.1	5.6	5,083.2	4,955.1	108.12	46.830	
2,500.0	2,499.0	2,523.8	2,523.0	9.2	104.4	91.48	5,062.1	5.6	5,083.3	4,949.7	113.63	44.560	
2,600.0	2,598.9	2,623.7	2,622.9	9.6	109.6	91.52	5,062.1	5.6	5,083.4	4,944.3	119.14	42.500	
2,700.0	2,698.9	2,723.7	2,722.9	9.9	114.7	91.56	5,062.1	5.6	5,083.5	4,938.8	124.65	40.622	
2,800.0	2,798.8	2,823.6	2,822.8	10.3	119.9	91.60	5,062.1	5.6	5,083.6	4,933.4	130.16	38.902	
2,900.0	2,898.8	2,923.6	2,922.8	10.6	125.1	91.63	5,062.1	5.6	5,083.7	4,928.0	135.68	37.322	
3,000.0	2,998.7	3,000.0	2,998.4	11.0	129.0	91.66	5,062.1	5.6	5,083.8	4,923.8	139.97	36.177 ES	
3,100.0	3,098.6	3,000.0	2,998.4	11.3	129.0	91.66	5,062.1	5.6	5,085.4	4,925.1	140.32	36.098	
3,200.0	3,198.6	3,000.0	2,998.4	11.7	129.0	91.66	5,062.1	5.6	5,088.9	4,928.2	140.67	36.033	
3,300.0	3,298.5	3,000.0	2,998.4	12.0	129.0	91.66	5,062.1	5.6	5,074.4	4,933.4	141.02	35.983	
3,400.0	3,398.5	3,000.0	2,998.4	12.4	129.0	91.66	5,062.1	5.6	5,081.9	4,940.5	141.37	35.947	
3,500.0	3,498.4	3,000.0	2,998.4	12.7	129.0	91.66	5,062.1	5.6	5,091.3	4,949.6	141.72	35.924	
3,600.0	3,598.4	3,000.0	2,998.4	13.1	129.0	91.66	5,062.1	5.6	5,102.7	4,960.6	142.08	35.915	
3,700.0	3,698.3	3,000.0	2,998.4	13.4	129.0	91.66	5,062.1	5.6	5,116.0	4,973.5	142.43	35.919	
3,800.0	3,798.3	3,000.0	2,998.4	13.8	129.0	91.66	5,062.1	5.6	5,131.2	4,988.4	142.78	35.937	
3,900.0	3,898.2	3,000.0	2,998.4	14.1	129.0	91.66	5,062.1	5.6	5,148.3	5,005.1	143.14	35.968	
4,000.0	3,998.2	3,000.0	2,998.4	14.5	129.0	91.66	5,062.1	5.6	5,167.3	5,023.8	143.49	36.011	
4,100.0	4,098.1	3,000.0	2,998.4	14.8	129.0	91.66	5,062.1	5.6	5,188.1	5,044.2	143.84	36.067	
4,200.0	4,198.1	3,000.0	2,998.4	15.2	129.0	91.66	5,062.1	5.6	5,210.8	5,066.6	144.20	36.136	
4,300.0	4,298.0	3,000.0	2,998.4	15.5	129.0	91.66	5,062.1	5.6	5,235.3	5,090.7	144.55	36.217	
4,400.0	4,398.0	3,000.0	2,998.4	15.9	129.0	91.66	5,062.1	5.6	5,261.5	5,116.6	144.91	36.309	
4,500.0	4,497.9	3,000.0	2,998.4	16.2	129.0	91.66	5,062.1	5.6	5,289.6	5,144.3	145.27	36.413	
4,600.0	4,597.8	3,000.0	2,998.4	16.6	129.0	91.66	5,062.1	5.6	5,319.3	5,173.7	145.62	36.529	
4,700.0	4,697.8	3,000.0	2,998.4	17.0	129.0	91.66	5,062.1	5.6	5,350.8	5,204.8	145.98	36.655	

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

COG Operating LLC

Anticollision Report

Company:	NEW MEXICO BASIN	Local Co-ordinate Reference:	Well COPPERHEAD 31 FED COM #3H
Project:	EDDY COUNTY, NM	TVD Reference:	RKB=2895+26 @ 2921.0usft (TBD)
Reference Site:	WOLFCAMP	MD Reference:	RKB=2895+26 @ 2921.0usft (TBD)
Site Error:	0.0 usft	North Reference:	Grid
Reference Well:	COPPERHEAD 31 FED COM #3H	Survey Calculation Method:	Minimum Curvature
Well Error:	3.0 usft	Output errors are at	2.00 sigma
Reference Wellbore	OWB	Database:	EDM_Users
Reference Design:	DWD Plan 3	Offset TVD Reference:	Offset Datum

Offset Design: WOLFCAMP - PERKINS #1Y - OWB - ACTUAL WELLPATH — Offset Site Error: 0.0 usft

Survey Program: 1000-INC ONLY — Offset Well Error: 3.0 usft

Reference Measured Depth (usft)	Reference Vertical Depth (usft)	Offset Measured Depth (usft)	Offset Vertical Depth (usft)	Semi Major Axis Reference (usft)	Semi Major Axis Offset (usft)	Highside Toolface (°)	Offset Wellbore Centre +N/-S (usft)	Offset Wellbore Centre +E/-W (usft)	Distance Between Centres (usft)	Distance Between Ellipses (usft)	Minimum Separation (usft)	Separation Factor	Warning
4,800.0	4,797.7	3,000.0	2,998.4	17.3	129.0	91.66	5,062.1	5.6	5,384.0	5,237.6	146.33	36.792	
4,900.0	4,897.7	3,000.0	2,998.4	17.7	129.0	91.66	5,062.1	5.6	5,418.8	5,272.1	146.69	36.940	
5,000.0	4,997.6	3,000.0	2,998.4	18.0	129.0	91.66	5,062.1	5.6	5,455.2	5,308.1	147.05	37.098	
5,100.0	5,097.6	3,000.0	2,998.4	18.4	129.0	91.66	5,062.1	5.6	5,493.1	5,345.7	147.41	37.266	
5,200.0	5,197.5	3,000.0	2,998.4	18.7	129.0	91.66	5,062.1	5.6	5,532.7	5,384.9	147.76	37.443	
5,300.0	5,297.5	3,000.0	2,998.4	19.1	129.0	91.66	5,062.1	5.6	5,573.7	5,425.6	148.12	37.630	
5,400.0	5,397.4	3,000.0	2,998.4	19.5	129.0	91.66	5,062.1	5.6	5,616.2	5,467.8	148.48	37.825	
5,500.0	5,497.4	3,000.0	2,998.4	19.8	129.0	91.66	5,062.1	5.6	5,660.2	5,511.4	148.84	38.030	
5,600.0	5,597.3	3,000.0	2,998.4	20.2	129.0	91.66	5,062.1	5.6	5,705.6	5,556.4	149.19	38.243	
5,700.0	5,697.3	3,000.0	2,998.4	20.5	129.0	91.66	5,062.1	5.6	5,752.4	5,602.8	149.55	38.464	
5,800.0	5,797.2	3,000.0	2,998.4	20.9	129.0	91.66	5,062.1	5.6	5,800.5	5,650.6	149.91	38.693	
5,900.0	5,897.2	3,000.0	2,998.4	21.2	129.0	91.66	5,062.1	5.6	5,849.9	5,699.6	150.27	38.929	
6,000.0	5,997.1	3,000.0	2,998.4	21.6	129.0	91.66	5,062.1	5.6	5,900.6	5,750.0	150.63	39.173	
6,100.0	6,097.0	3,000.0	2,998.4	22.0	129.0	91.66	5,062.1	5.6	5,952.5	5,801.6	150.99	39.424	
6,200.0	6,197.0	3,000.0	2,998.4	22.3	129.0	91.66	5,062.1	5.6	6,005.7	5,854.4	151.35	39.682	
6,300.0	6,296.9	3,000.0	2,998.4	22.7	129.0	91.66	5,062.1	5.6	6,060.1	5,908.4	151.70	39.946	
6,400.0	6,396.9	3,000.0	2,998.4	23.0	129.0	91.66	5,062.1	5.6	6,115.6	5,963.5	152.06	40.217	
6,500.0	6,496.8	3,000.0	2,998.4	23.4	129.0	91.66	5,062.1	5.6	6,172.2	6,019.8	152.42	40.494	
6,600.0	6,596.8	3,000.0	2,998.4	23.8	129.0	91.66	5,062.1	5.6	6,229.9	6,077.1	152.78	40.776	
6,700.0	6,696.7	3,000.0	2,998.4	24.1	129.0	91.66	5,062.1	5.6	6,288.7	6,135.6	153.14	41.065	
6,800.0	6,796.7	3,000.0	2,998.4	24.5	129.0	91.66	5,062.1	5.6	6,348.5	6,195.0	153.50	41.358	
6,900.0	6,896.6	3,000.0	2,998.4	24.8	129.0	91.66	5,062.1	5.6	6,409.3	6,255.5	153.86	41.657	
7,000.0	6,996.6	3,000.0	2,998.4	25.2	129.0	91.66	5,062.1	5.6	6,471.1	6,316.9	154.22	41.960	
7,100.0	7,096.5	3,000.0	2,998.4	25.6	129.0	91.66	5,062.1	5.6	6,533.8	6,379.3	154.58	42.268	
7,200.0	7,196.5	3,000.0	2,998.4	25.9	129.0	91.66	5,062.1	5.6	6,597.5	6,442.6	154.94	42.581	
7,300.0	7,296.4	3,000.0	2,998.4	26.3	129.0	91.66	5,062.1	5.6	6,662.0	6,506.7	155.30	42.898	
7,400.0	7,396.3	3,000.0	2,998.4	26.6	129.0	91.66	5,062.1	5.6	6,727.5	6,571.8	155.66	43.219	
7,500.0	7,496.3	3,000.0	2,998.4	27.0	129.0	91.66	5,062.1	5.6	6,793.7	6,637.7	156.02	43.544	
7,600.0	7,596.2	3,000.0	2,998.4	27.4	129.0	91.66	5,062.1	5.6	6,860.8	6,704.4	156.38	43.872	
7,700.0	7,696.2	3,000.0	2,998.4	27.7	129.0	91.66	5,062.1	5.6	6,928.6	6,771.9	156.74	44.205	
7,800.0	7,796.1	3,000.0	2,998.4	28.1	129.0	91.66	5,062.1	5.6	6,997.3	6,840.2	157.10	44.540	
7,900.0	7,896.1	3,000.0	2,998.4	28.4	129.0	91.66	5,062.1	5.6	7,066.7	6,909.2	157.46	44.879	
8,000.0	7,996.0	3,000.0	2,998.4	28.8	129.0	91.66	5,062.1	5.6	7,136.8	6,979.0	157.82	45.221	
8,100.0	8,096.0	3,000.0	2,998.4	29.2	129.0	91.66	5,062.1	5.6	7,207.6	7,049.4	158.18	45.565	
8,200.0	8,195.9	3,000.0	2,998.4	29.5	129.0	91.66	5,062.1	5.6	7,279.1	7,120.6	158.54	45.913	
8,300.0	8,295.9	3,000.0	2,998.4	29.9	129.0	91.66	5,062.1	5.6	7,351.3	7,192.4	158.90	46.263	
8,400.0	8,395.8	3,000.0	2,998.4	30.2	129.0	91.66	5,062.1	5.6	7,424.1	7,264.8	159.26	46.615	
8,500.0	8,495.8	3,000.0	2,998.4	30.6	129.0	91.66	5,062.1	5.6	7,497.5	7,337.9	159.62	46.970	
8,600.0	8,595.7	3,000.0	2,998.4	31.0	129.0	91.66	5,062.1	5.6	7,571.6	7,411.6	159.98	47.327	
8,700.0	8,695.7	3,000.0	2,998.4	31.3	129.0	91.66	5,062.1	5.6	7,646.2	7,485.9	160.34	47.686	
8,800.0	8,795.6	3,000.0	2,998.4	31.7	129.0	91.66	5,062.1	5.6	7,721.4	7,560.7	160.71	48.047	
8,900.0	8,895.5	3,000.0	2,998.4	32.0	129.0	91.66	5,062.1	5.6	7,797.2	7,636.1	161.07	48.410	
9,000.0	8,995.5	3,000.0	2,998.4	32.4	129.0	91.66	5,062.1	5.6	7,873.5	7,712.1	161.43	48.774	
9,100.0	9,095.4	3,000.0	2,998.4	32.8	129.0	91.66	5,062.1	5.6	7,950.3	7,788.5	161.79	49.141	
9,200.0	9,195.4	3,000.0	2,998.4	33.1	129.0	91.66	5,062.1	5.6	8,027.7	7,865.5	162.15	49.508	
9,300.0	9,295.3	3,000.0	2,998.4	33.5	129.0	91.66	5,062.1	5.6	8,105.5	7,943.0	162.51	49.877	
9,400.0	9,395.3	3,000.0	2,998.4	33.9	129.0	91.66	5,062.1	5.6	8,183.8	8,021.0	162.87	50.248	
9,500.0	9,495.2	3,000.0	2,998.4	34.2	129.0	91.66	5,062.1	5.6	8,262.6	8,099.4	163.23	50.619	
9,600.0	9,595.2	3,000.0	2,998.4	34.6	129.0	91.66	5,062.1	5.6	8,341.9	8,178.3	163.59	50.992	
9,700.0	9,695.1	3,000.0	2,998.4	34.9	129.0	91.66	5,062.1	5.6	8,421.6	8,257.6	163.95	51.366	
9,800.0	9,795.1	3,000.0	2,998.4	35.3	129.0	91.66	5,062.1	5.6	8,501.7	8,337.4	164.31	51.740	
9,900.0	9,895.0	3,000.0	2,998.4	35.7	129.0	91.66	5,062.1	5.6	8,582.2	8,417.5	164.68	52.116	

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

COG Operating LLC

Anticollision Report

Company:	NEW MEXICO BASIN	**Local Co-ordinate Reference:**	Well COPPERHEAD 31 FED COM #3H
Project:	EDDY COUNTY, NM	**TVD Reference:**	RKB=2895+26 @ 2921.0usft (TBD)
Reference Site:	WOLFCAMP	**MD Reference:**	RKB=2895+26 @ 2921.0usft (TBD)
Site Error:	0.0 usft	**North Reference:**	Grid
Reference Well:	COPPERHEAD 31 FED COM #3H	**Survey Calculation Method:**	Minimum Curvature
Well Error:	3.0 usft	**Output errors are at**	2.00 sigma
Reference Wellbore	OWB	**Database:**	EDM_Users
Reference Design:	DWD Plan 3	**Offset TVD Reference:**	Offset Datum

Offset Design WOLFCAMP - PERKINS #1Y - OWB - ACTUAL WELLPATH — Offset Site Error: 0.0 usft

Survey Program: 1000-INC-ONLY — Offset Well Error: 3.0 usft

Reference Measured Depth (usft)	Reference Vertical Depth (usft)	Offset Measured Depth (usft)	Offset Vertical Depth (usft)	Semi Major Axis Reference (usft)	Semi Major Axis Offset (usft)	Highside Toolface (°)	Offset Wellbore Centre +N/-S (usft)	Offset Wellbore Centre +E/-W (usft)	Distance Between Centres (usft)	Distance Between Ellipses (usft)	Minimum Separation (usft)	Separation Factor	Warning
10,000.0	9,995.0	3,000.0	2,998.4	36.0	129.0	91.66	5,062.1	5.6	8,663.1	8,498.1	165.04	52.492	
10,100.0	10,094.9	3,000.0	2,998.4	36.4	129.0	91.66	5,062.1	5.6	8,744.5	8,579.1	165.40	52.870	
10,162.7	10,157.6	3,000.0	2,998.4	36.6	129.0	91.66	5,062.1	5.6	8,795.7	8,630.0	165.62	53.106	
10,175.0	10,169.9	3,000.0	2,998.4	36.6	129.0	53.08	5,062.1	5.6	8,805.6	8,640.0	165.67	53.153	
10,200.0	10,194.8	3,000.0	2,998.4	36.7	129.0	23.60	5,062.1	5.6	8,825.3	8,659.6	165.76	53.243	
10,225.0	10,219.7	3,000.0	2,998.4	36.8	129.0	14.86	5,062.1	5.6	8,844.2	8,678.4	165.84	53.329	
10,250.0	10,244.3	3,000.0	2,998.4	36.9	129.0	10.88	5,062.1	5.6	8,862.3	8,696.3	165.93	53.411	
10,275.0	10,268.8	3,000.0	2,998.4	37.0	129.0	8.63	5,062.1	5.6	8,879.4	8,713.4	166.01	53.487	
10,300.0	10,292.9	3,000.0	2,998.4	37.1	129.0	7.19	5,062.1	5.6	8,895.6	8,729.5	166.09	53.558	
10,325.0	10,316.7	3,000.0	2,998.4	37.2	129.0	6.19	5,062.1	5.6	8,910.8	8,744.7	166.17	53.624	
10,350.0	10,340.0	3,000.0	2,998.4	37.2	129.0	5.45	5,062.1	5.6	8,925.1	8,758.8	166.25	53.685	
10,375.0	10,362.9	3,000.0	2,998.4	37.3	129.0	4.89	5,062.1	5.6	8,938.2	8,771.9	166.32	53.740	
10,400.0	10,385.1	3,000.0	2,998.4	37.4	129.0	4.45	5,062.1	5.6	8,950.3	8,783.9	166.39	53.790	
10,425.0	10,406.8	3,000.0	2,998.4	37.4	129.0	4.10	5,062.1	5.6	8,961.3	8,794.9	166.46	53.834	
10,450.0	10,427.7	3,000.0	2,998.4	37.5	129.0	3.81	5,062.1	5.6	8,971.2	8,804.7	166.53	53.872	
10,475.0	10,448.0	3,000.0	2,998.4	37.6	129.0	3.57	5,062.1	5.6	8,979.9	8,813.3	166.59	53.904	
10,500.0	10,467.4	3,000.0	2,998.4	37.6	129.0	3.37	5,062.1	5.6	8,987.4	8,820.8	166.65	53.930	
10,525.0	10,486.0	3,000.0	2,998.4	37.7	129.0	3.20	5,062.1	5.6	8,993.8	8,827.1	166.71	53.949	
10,550.0	10,503.7	3,000.0	2,998.4	37.7	129.0	3.06	5,062.1	5.6	8,998.9	8,832.1	166.76	53.962	
10,575.0	10,520.4	3,000.0	2,998.4	37.8	129.0	2.93	5,062.1	5.6	9,002.8	8,836.0	166.82	53.968	
10,600.0	10,536.1	3,000.0	2,998.4	37.9	129.0	2.83	5,062.1	5.6	9,005.5	8,838.6	166.87	53.965	
10,625.0	10,550.8	3,000.0	2,998.4	37.9	129.0	2.74	5,062.1	5.6	9,006.9	8,840.0	166.93	53.955	
10,650.0	10,564.5	3,000.0	2,998.4	38.0	129.0	2.66	5,062.1	5.6	9,007.1	8,840.1	167.00	53.936	
10,675.0	10,577.0	3,000.0	2,998.4	38.0	129.0	2.60	5,062.1	5.6	9,006.1	8,839.0	167.07	53.908	
10,700.0	10,588.3	3,000.0	2,998.4	38.1	129.0	2.54	5,062.1	5.6	9,003.8	8,836.7	167.14	53.871	
10,725.0	10,598.5	3,000.0	2,998.4	38.2	129.0	2.50	5,062.1	5.6	9,000.3	8,833.1	167.21	53.826	
10,750.0	10,607.5	3,000.0	2,998.4	38.3	129.0	2.46	5,062.1	5.6	8,995.6	8,828.3	167.29	53.773	
10,775.0	10,615.2	3,000.0	2,998.4	38.3	129.0	2.44	5,062.1	5.6	8,989.7	8,822.3	167.37	53.712	
10,800.0	10,621.7	3,000.0	2,998.4	38.4	129.0	2.42	5,062.1	5.6	8,982.5	8,815.1	167.45	53.643	
10,825.0	10,626.9	3,000.0	2,998.4	38.5	129.0	2.40	5,062.1	5.6	8,974.2	8,806.7	167.53	53.567	
10,850.0	10,630.9	3,000.0	2,998.4	38.6	129.0	2.40	5,062.1	5.6	8,964.8	8,797.1	167.62	53.484	
10,875.0	10,633.5	3,000.0	2,998.4	38.7	129.0	2.40	5,062.1	5.6	8,954.1	8,786.4	167.70	53.394	
10,900.0	10,634.8	3,000.0	2,998.4	38.8	129.0	2.41	5,062.1	5.6	8,942.4	8,774.6	167.79	53.297	
10,909.7	10,635.0	3,000.0	2,998.4	38.8	129.0	2.42	5,062.1	5.6	8,937.6	8,769.7	167.82	53.257	
11,000.0	10,635.6	3,000.0	2,998.4	39.1	129.0	2.42	5,062.1	5.6	8,892.0	8,723.9	168.15	52.881	
11,100.0	10,636.3	3,000.0	2,998.4	39.6	129.0	2.42	5,062.1	5.6	8,842.4	8,673.8	168.58	52.451	
11,200.0	10,637.0	3,000.0	2,998.4	40.1	129.0	2.42	5,062.1	5.6	8,793.6	8,624.6	169.08	52.010	
11,300.0	10,637.7	3,000.0	2,998.4	40.6	129.0	2.42	5,062.1	5.6	8,745.8	8,576.1	169.63	51.557	
11,400.0	10,638.3	3,000.0	2,998.4	41.2	129.0	2.42	5,062.1	5.6	8,698.8	8,528.5	170.24	51.096	
11,500.0	10,639.0	3,000.0	2,998.4	41.9	129.0	2.42	5,062.1	5.6	8,652.6	8,481.7	170.91	50.626	
11,600.0	10,639.7	3,000.0	2,998.4	42.6	129.0	2.42	5,062.1	5.6	8,607.5	8,435.8	171.64	50.149	
11,700.0	10,640.4	3,000.0	2,998.4	43.4	129.0	2.42	5,062.1	5.6	8,563.2	8,390.8	172.41	49.668	
11,800.0	10,641.1	3,000.0	2,998.4	44.2	129.0	2.42	5,062.1	5.6	8,519.9	8,346.7	173.23	49.182	
11,900.0	10,641.7	3,000.0	2,998.4	45.1	129.0	2.42	5,062.1	5.6	8,477.5	8,303.4	174.10	48.693	
12,000.0	10,642.4	3,000.0	2,998.4	46.0	129.0	2.42	5,062.1	5.6	8,436.1	8,261.1	175.01	48.203	
12,100.0	10,643.1	3,000.0	2,998.4	46.9	129.0	2.42	5,062.1	5.6	8,395.7	8,219.8	175.97	47.712	
12,200.0	10,643.8	3,000.0	2,998.4	47.9	129.0	2.42	5,062.1	5.6	8,356.4	8,179.4	176.96	47.222	
12,300.0	10,644.5	3,000.0	2,998.4	49.0	129.0	2.42	5,062.1	5.6	8,318.0	8,140.0	177.99	46.734	
12,400.0	10,645.1	3,000.0	2,998.4	50.0	129.0	2.42	5,062.1	5.6	8,280.6	8,101.6	179.05	46.248	
12,500.0	10,645.8	3,000.0	2,998.4	51.1	129.0	2.42	5,062.1	5.6	8,244.3	8,064.2	180.14	45.765	
12,600.0	10,646.5	3,000.0	2,998.4	52.2	129.0	2.42	5,062.1	5.6	8,209.1	8,027.8	181.27	45.287	
12,700.0	10,647.2	3,000.0	2,998.4	53.4	129.0	2.42	5,062.1	5.6	8,174.9	7,992.5	182.42	44.814	

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

COG Operating LLC

Anticollision Report

Company:	NEW MEXICO BASIN	**Local Co-ordinate Reference:**	Well COPPERHEAD 31 FED COM #3H
Project:	EDDY COUNTY, NM	**TVD Reference:**	RKB=2895+26 @ 2921.0usft (TBD)
Reference Site:	WOLFCAMP	**MD Reference:**	RKB=2895+26 @ 2921.0usft (TBD)
Site Error:	0.0 usft	**North Reference:**	Grid
Reference Well:	COPPERHEAD 31 FED COM #3H	**Survey Calculation Method:**	Minimum Curvature
Well Error:	3.0 usft	**Output errors are at**	2.00 sigma
Reference Wellbore	OWB	**Database:**	EDM_Users
Reference Design:	DWD Plan 3	**Offset TVD Reference:**	Offset Datum

Offset Design WOLFCAMP - PERKINS #1Y - OWB - ACTUAL WELLPATH — Offset Site Error: 0.0 usft

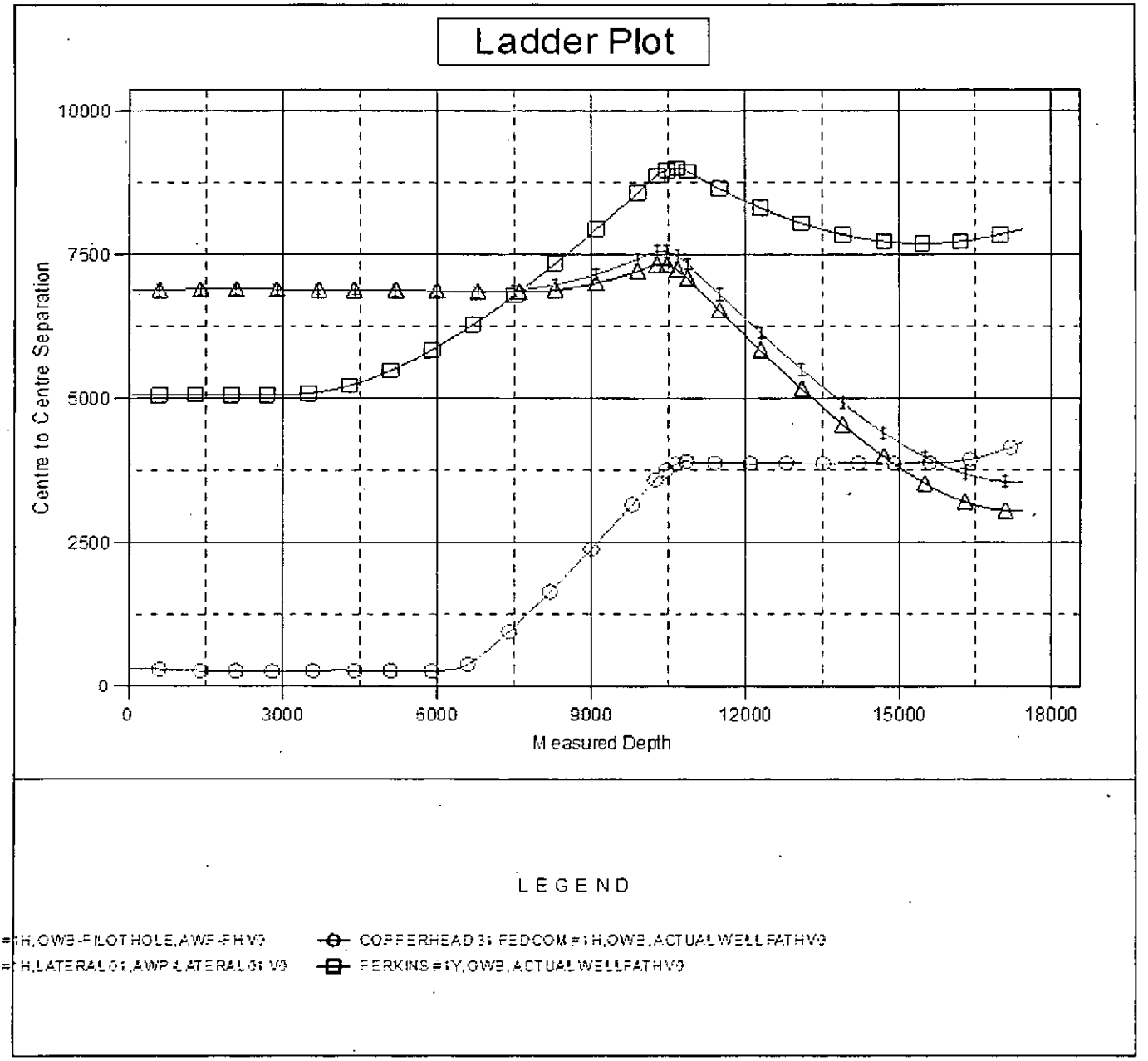
Survey Program: 1000-INC-ONLY — Offset Well Error: 3.0 usft

Reference Measured Depth (usft)	Reference Vertical Depth (usft)	Offset Measured Depth (usft)	Offset Vertical Depth (usft)	Semi Major Axis Reference (usft)	Semi Major Axis Offset (usft)	Highside Toolface (°)	Offset Wellbore Centre +N/-S (usft)	Offset Wellbore Centre +E/-W (usft)	Distance Between Centres (usft)	Distance Between Ellipses (usft)	Minimum Separation (usft)	Separation Factor	Warning
12,800.0	10,647.9	3,000.0	2,998.4	54.6	129.0	2.42	5,062.1	5.6	8,141.8	7,958.2	183.60	44.346	
12,900.0	10,648.5	3,000.0	2,998.4	55.8	129.0	2.42	5,062.1	5.6	8,109.8	7,925.0	184.80	43.885	
13,000.0	10,649.2	3,000.0	2,998.4	57.0	129.0	2.42	5,062.1	5.6	8,078.9	7,892.9	186.02	43.429	
13,100.0	10,649.9	3,000.0	2,998.4	58.3	129.0	2.42	5,062.1	5.6	8,049.2	7,861.9	187.27	42.981	
13,200.0	10,650.6	3,000.0	2,998.4	59.5	129.0	2.42	5,062.1	5.6	8,020.5	7,832.0	188.54	42.540	
13,300.0	10,651.3	3,000.0	2,998.4	60.8	129.0	2.42	5,062.1	5.6	7,993.1	7,803.2	189.83	42.107	
13,400.0	10,652.0	3,000.0	2,998.4	62.1	129.0	2.42	5,062.1	5.6	7,966.8	7,775.6	191.13	41.682	
13,500.0	10,652.6	3,000.0	2,998.4	63.4	129.0	2.42	5,062.1	5.6	7,941.6	7,749.2	192.45	41.266	
13,600.0	10,653.3	3,000.0	2,998.4	64.8	129.0	2.42	5,062.1	5.6	7,917.7	7,723.9	193.79	40.857	
13,700.0	10,654.0	3,000.0	2,998.4	66.1	129.0	2.42	5,062.1	5.6	7,894.9	7,699.8	195.14	40.458	
13,800.0	10,654.7	3,000.0	2,998.4	67.5	129.0	2.42	5,062.1	5.6	7,873.3	7,676.8	196.50	40.067	
13,900.0	10,655.4	3,000.0	2,998.4	68.9	129.0	2.42	5,062.1	5.6	7,853.0	7,655.1	197.88	39.685	
14,000.0	10,656.0	3,000.0	2,998.4	70.3	129.0	2.42	5,062.1	5.6	7,833.9	7,634.6	199.27	39.312	
14,100.0	10,656.7	3,000.0	2,998.4	71.7	129.0	2.42	5,062.1	5.6	7,816.0	7,615.3	200.67	38.948	
14,200.0	10,657.4	3,000.0	2,998.4	73.1	129.0	2.42	5,062.1	5.6	7,799.3	7,597.2	202.09	38.594	
14,300.0	10,658.1	3,000.0	2,998.4	74.5	129.0	2.42	5,062.1	5.6	7,783.9	7,580.4	203.51	38.248	
14,400.0	10,658.8	3,000.0	2,998.4	75.9	129.0	2.42	5,062.1	5.6	7,769.8	7,564.9	204.94	37.912	
14,500.0	10,659.4	3,000.0	2,998.4	77.4	129.0	2.42	5,062.1	5.6	7,756.9	7,550.5	206.39	37.585	
14,600.0	10,660.1	3,000.0	2,998.4	78.8	129.0	2.42	5,062.1	5.6	7,745.3	7,537.5	207.84	37.266	
14,700.0	10,660.8	3,000.0	2,998.4	80.3	129.0	2.42	5,062.1	5.6	7,735.0	7,525.7	209.30	36.957	
14,800.0	10,661.5	3,000.0	2,998.4	81.7	129.0	2.42	5,062.1	5.6	7,725.9	7,515.2	210.76	36.657	
14,900.0	10,662.2	3,000.0	2,998.4	83.2	129.0	2.42	5,062.1	5.6	7,718.2	7,505.9	212.24	36.366	
15,000.0	10,662.8	3,000.0	2,998.4	84.7	129.0	2.42	5,062.1	5.6	7,711.7	7,498.0	213.72	36.084	
15,100.0	10,663.5	3,000.0	2,998.4	86.2	129.0	2.42	5,062.1	5.6	7,706.5	7,491.3	215.20	35.810	
15,200.0	10,664.2	3,000.0	2,998.4	87.7	129.0	2.42	5,062.1	5.6	7,702.6	7,485.9	216.70	35.545	
15,300.0	10,664.9	3,000.0	2,998.4	89.2	129.0	2.42	5,062.1	5.6	7,700.0	7,481.8	218.20	35.289	
15,400.0	10,665.6	3,000.0	2,998.4	90.7	129.0	2.42	5,062.1	5.6	7,698.7	7,479.0	219.70	35.041	
15,449.8	10,665.9	3,000.0	2,998.4	91.4	129.0	2.42	5,062.1	5.6	7,698.6	7,478.1	220.45	34.921	
15,500.0	10,666.2	3,000.0	2,998.4	92.2	129.0	2.42	5,062.1	5.6	7,698.7	7,477.5	221.21	34.802	
15,600.0	10,666.9	3,000.0	2,998.4	93.7	129.0	2.42	5,062.1	5.6	7,700.0	7,477.3	222.73	34.571	
15,700.0	10,667.6	3,000.0	2,998.4	95.2	129.0	2.42	5,062.1	5.6	7,702.6	7,478.4	224.25	34.348	
15,800.0	10,668.3	3,000.0	2,998.4	96.8	129.0	2.42	5,062.1	5.6	7,706.5	7,480.7	225.78	34.134	
15,900.0	10,669.0	3,000.0	2,998.4	98.3	129.0	2.42	5,062.1	5.6	7,711.7	7,484.4	227.31	33.927	
16,000.0	10,669.6	3,000.0	2,998.4	99.8	129.0	2.42	5,062.1	5.6	7,718.2	7,489.4	228.84	33.728	
16,100.0	10,670.3	3,000.0	2,998.4	101.4	129.0	2.42	5,062.1	5.6	7,726.0	7,495.6	230.38	33.536	
16,200.0	10,671.0	3,000.0	2,998.4	102.9	129.0	2.42	5,062.1	5.6	7,735.0	7,503.1	231.92	33.352	
16,300.0	10,671.7	3,000.0	2,998.4	104.4	129.0	2.42	5,062.1	5.6	7,745.4	7,511.9	233.46	33.176	
16,400.0	10,672.4	3,000.0	2,998.4	106.0	129.0	2.42	5,062.1	5.6	7,757.0	7,522.0	235.01	33.006	
16,500.0	10,673.1	3,000.0	2,998.4	107.5	129.0	2.42	5,062.1	5.6	7,769.9	7,533.3	236.57	32.844	
16,600.0	10,673.7	3,000.0	2,998.4	109.1	129.0	2.42	5,062.1	5.6	7,784.0	7,545.9	238.12	32.689	
16,700.0	10,674.4	3,000.0	2,998.4	110.7	129.0	2.42	5,062.1	5.6	7,799.4	7,559.7	239.68	32.541	
16,800.0	10,675.1	3,000.0	2,998.4	112.2	129.0	2.42	5,062.1	5.6	7,816.1	7,574.8	241.24	32.399	
16,900.0	10,675.8	3,000.0	2,998.4	113.8	129.0	2.42	5,062.1	5.6	7,834.0	7,591.2	242.81	32.264	
17,000.0	10,676.5	3,000.0	2,998.4	115.4	129.0	2.42	5,062.1	5.6	7,853.1	7,608.7	244.37	32.136	
17,100.0	10,677.1	3,000.0	2,998.4	116.9	129.0	2.42	5,062.1	5.6	7,873.4	7,627.5	245.94	32.013	
17,200.0	10,677.8	3,000.0	2,998.4	118.5	129.0	2.42	5,062.1	5.6	7,895.0	7,647.5	247.52	31.897	
17,300.0	10,678.5	3,000.0	2,998.4	120.1	129.0	2.42	5,062.1	5.6	7,917.8	7,668.7	249.09	31.787	
17,400.0	10,679.2	3,000.0	2,998.4	121.6	129.0	2.42	5,062.1	5.6	7,941.7	7,691.1	250.67	31.682	
17,465.7	10,679.6	3,000.0	2,998.4	122.7	129.0	2.42	5,062.1	5.6	7,958.1	7,706.4	251.71	31.617 SF	

Company:	NEW MEXICO BASIN	**Local Co-ordinate Reference:**	Well COPPERHEAD 31 FED COM #3H
Project:	EDDY COUNTY, NM	**TVD Reference:**	RKB=2895+26 @ 2921.0usft (TBD)
Reference Site:	WOLFCAMP	**MD Reference:**	RKB=2895+26 @ 2921.0usft (TBD)
Site Error:	0.0 usft	**North Reference:**	Grid
Reference Well:	COPPERHEAD 31 FED COM #3H	**Survey Calculation Method:**	Minimum Curvature
Well Error:	3.0 usft	**Output errors are at**	2.00 sigma
Reference Wellbore	OWB	**Database:**	EDM_Users
Reference Design:	DWD Plan 3	**Offset TVD Reference:**	Offset Datum

Reference Depths are relative to RKB=2895+26 @ 2921.0usft (TBD)
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°



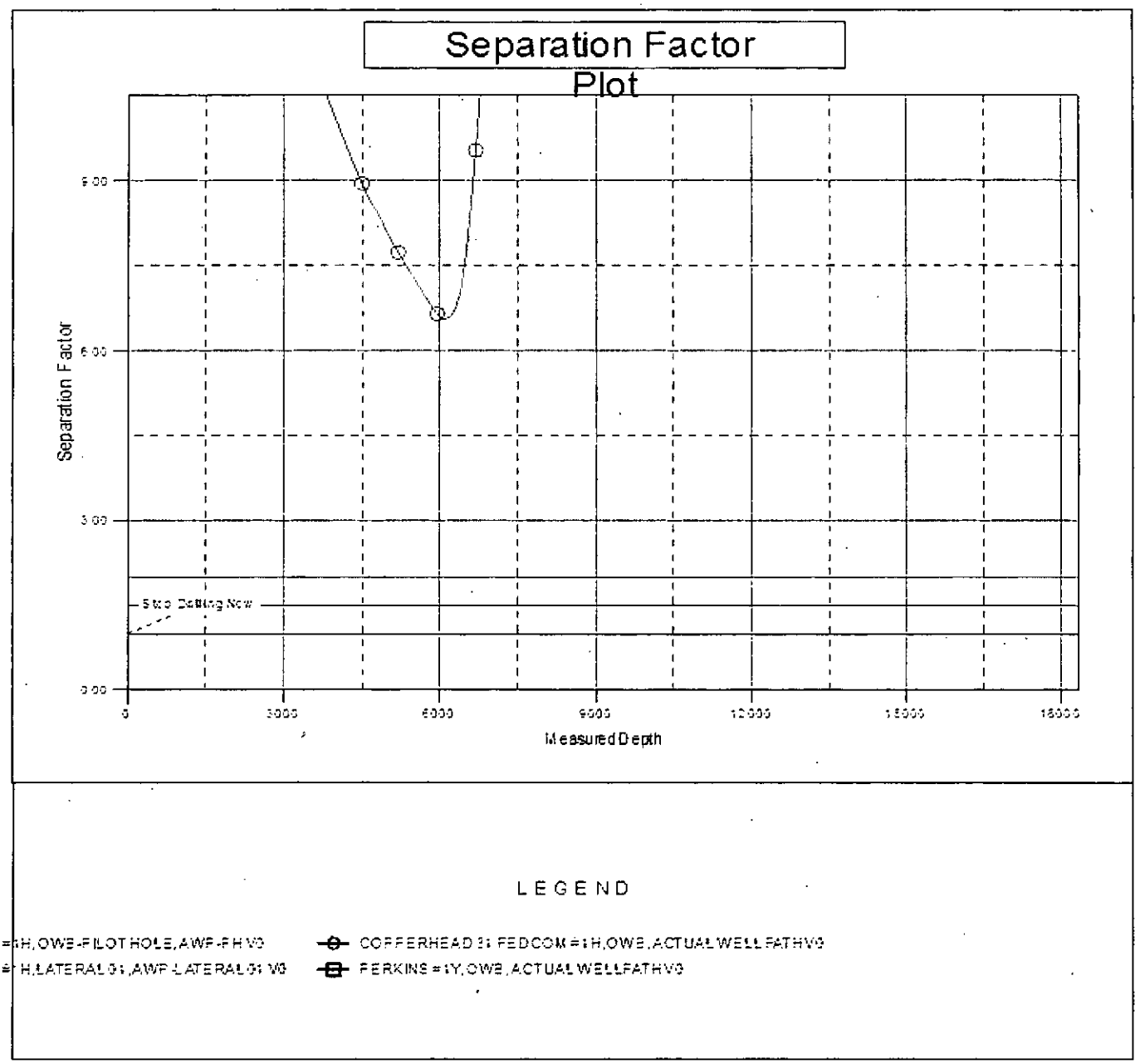
COG Operating LLC

Anticollision Report

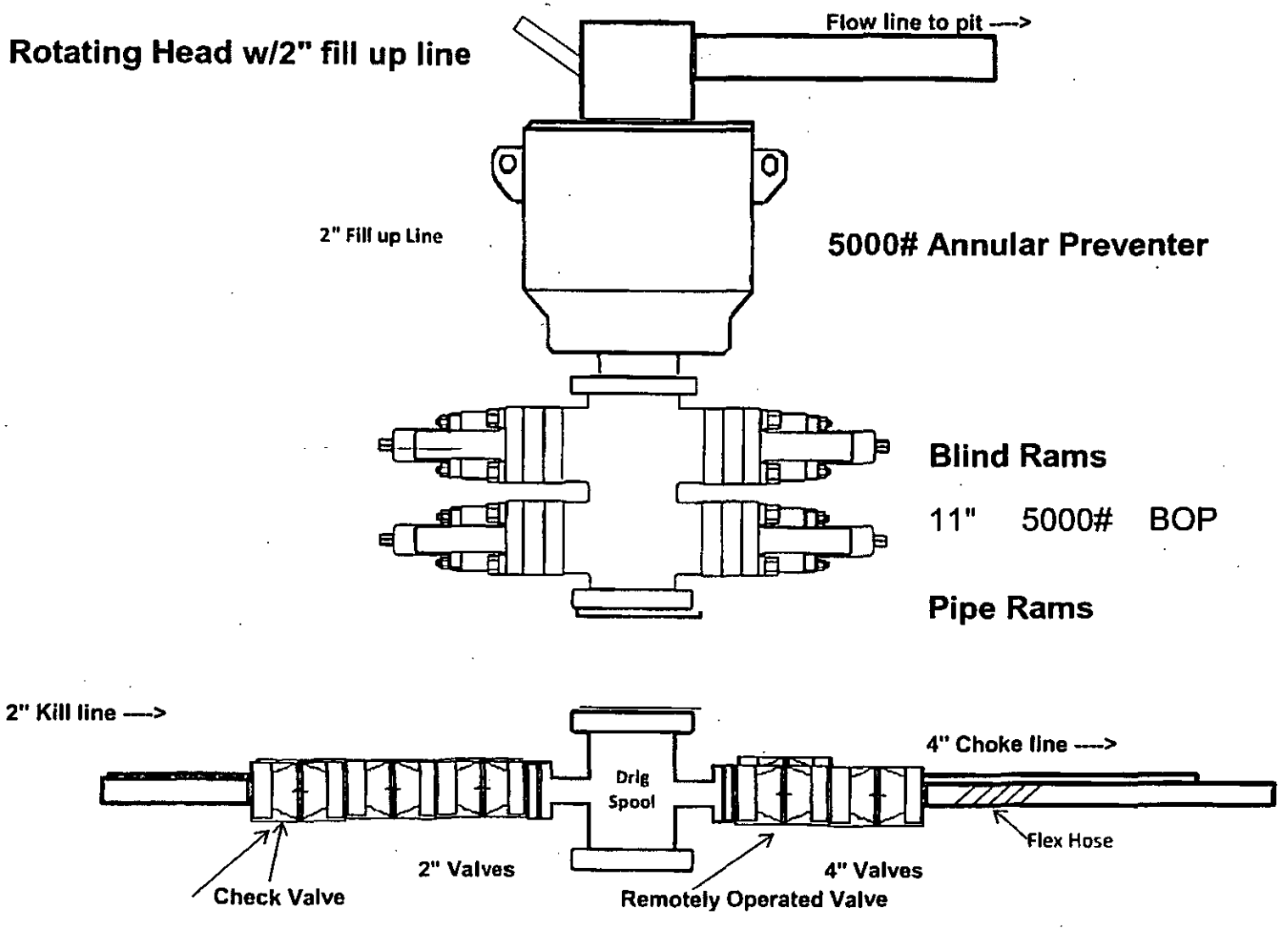
Company:	NEW MEXICO BASIN	**Local Co-ordinate Reference:**	Well COPPERHEAD 31 FED COM #3H
Project:	EDDY COUNTY, NM	**TVD Reference:**	RKB=2895+26 @ 2921.0usft (TBD)
Reference Site:	WOLFCAMP	**MD Reference:**	RKB=2895+26 @ 2921.0usft (TBD)
Site Error:	0.0 usft	**North Reference:**	Grid
Reference Well:	COPPERHEAD 31 FED COM #3H	**Survey Calculation Method:**	Minimum Curvature
Well Error:	3.0 usft	**Output errors are at**	2.00 sigma
Reference Wellbore	OWB	**Database:**	EDM_Users
Reference Design:	DWD Plan 3	**Offset TVD Reference:**	Offset Datum

Reference Depths are relative to RKB=2895+26 @ 2921.0usft (TBD)
Offset Depths are relative to Offset Datum
Central Meridian is 104° 20' 0.000 W

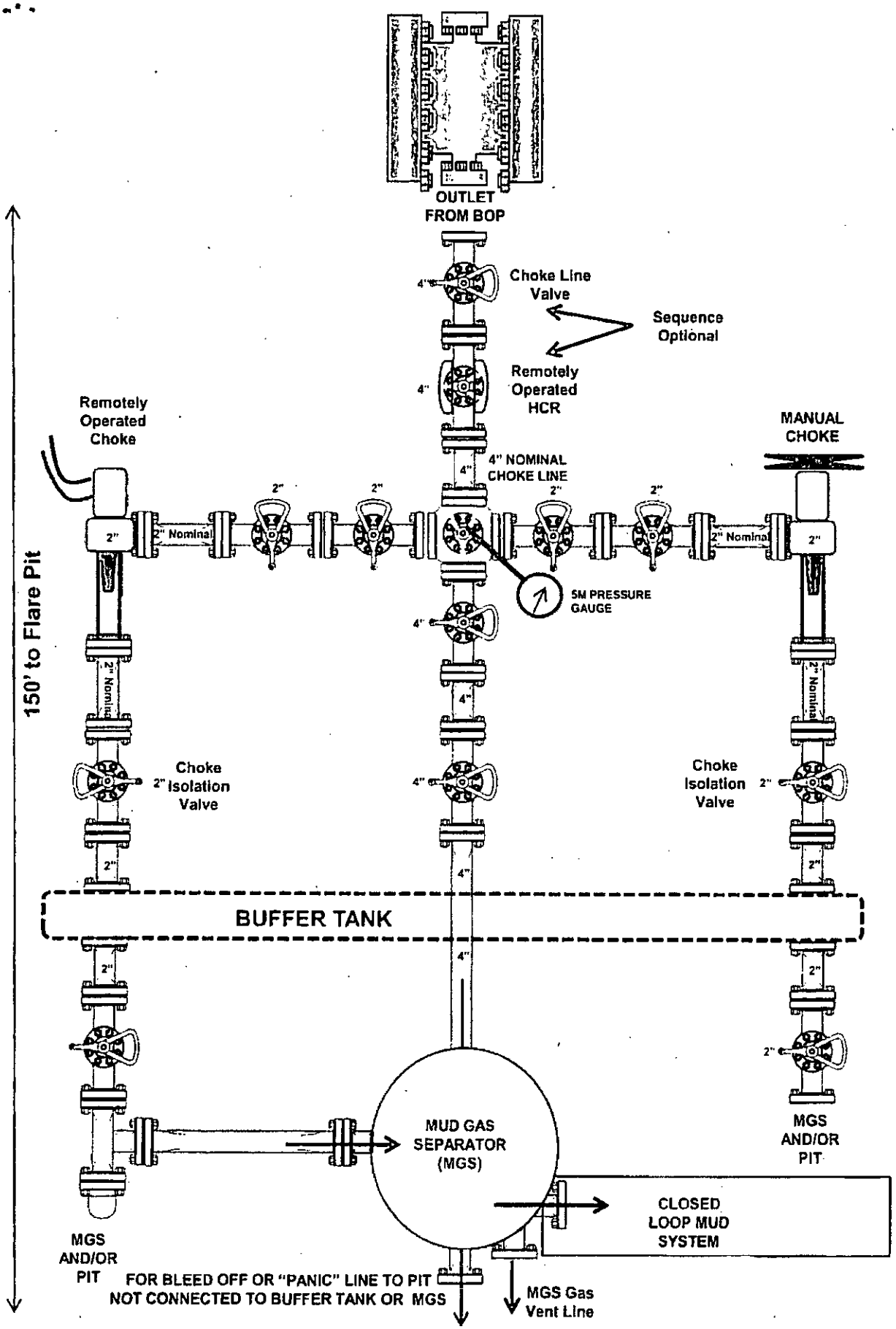
Coordinates are relative to: COPPERHEAD 31 FED COM #3H
Coordinate System is US State Plane 1927 (Exact solution), New Mexico East 30
Grid Convergence at Surface is: 0.17°



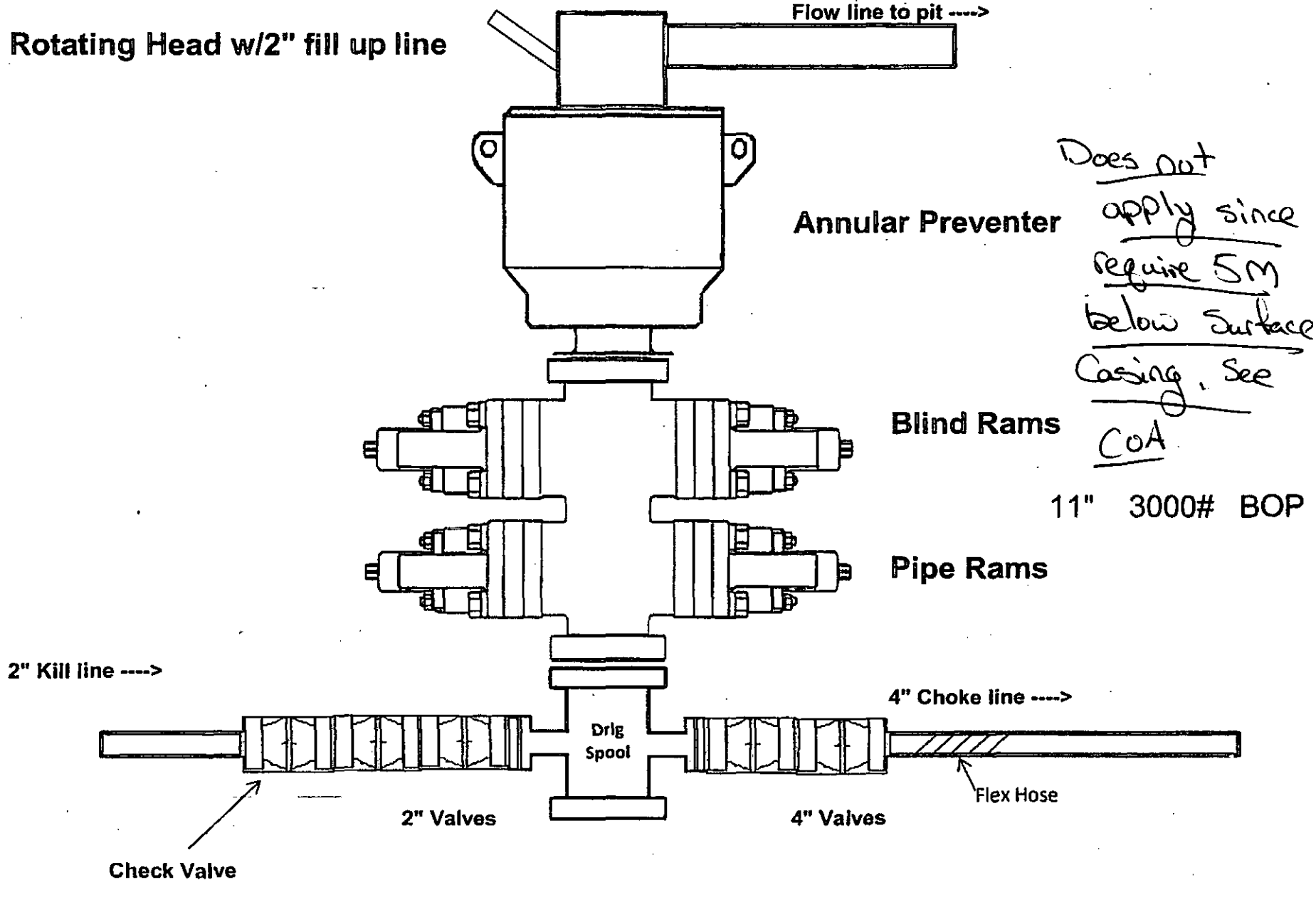
5,000 psi BOP Schematic



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



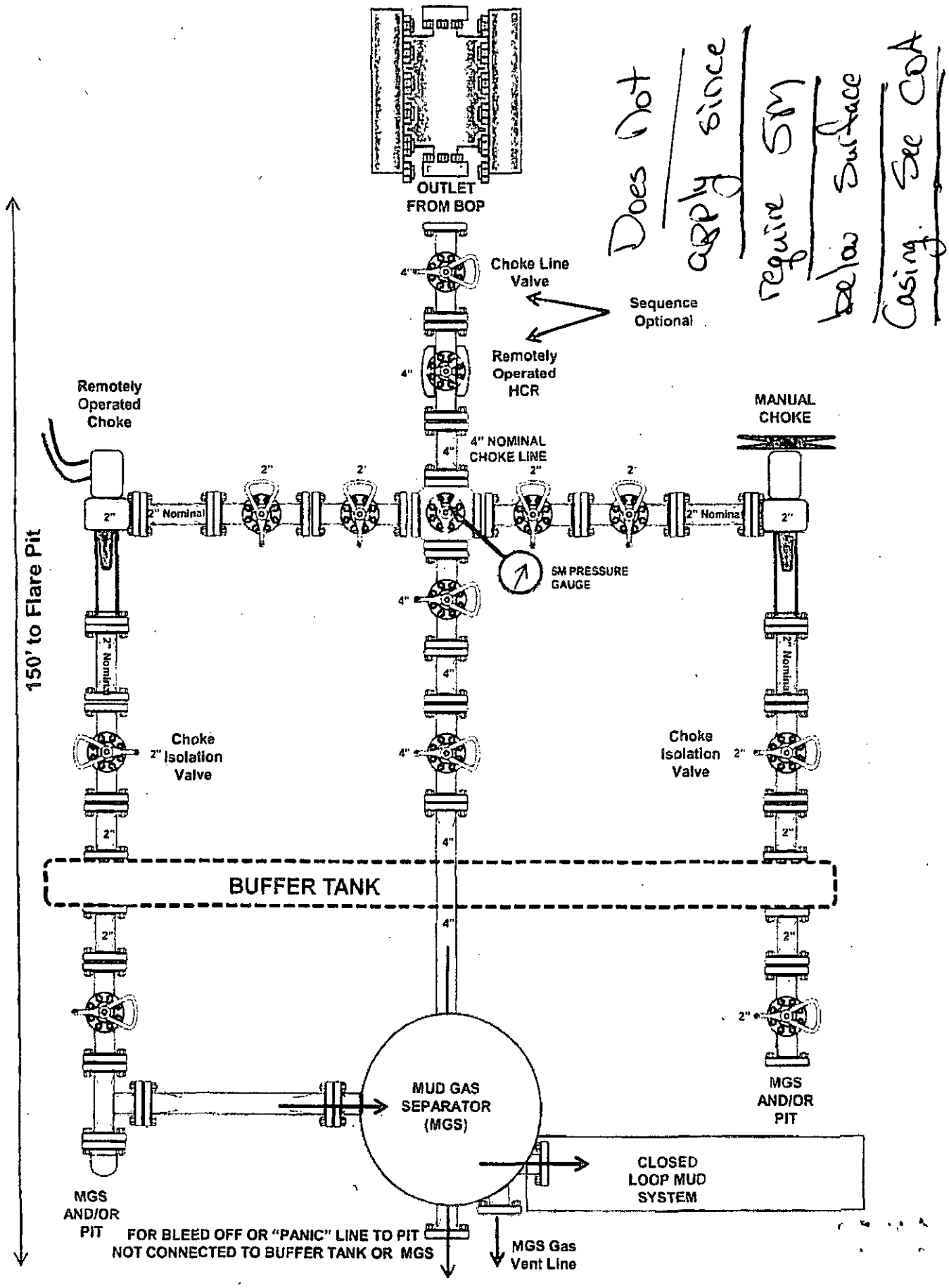
3,000 psi BOP Schematic



Does not apply since require 5M below Surface Casing. See CoA

11" 3000# BOP

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



Does not apply since require SM below surface Casing. See COA

Hose For Choke to Bop

Rubber Hose

Midwest Hose & Specialty, Inc.

Internal Hydrostatic Test Certificate

General Information		Hose Specifications	
Customer	Hobbs	Hose Assembly Type	Rotary/Vibrator
MWH Sales Representative	Ryan Rynolds	Certification	API 7K/FSL Level 2
Date Assembled	11/19/2015	Hose Grade	D
Location Assembled	OKC	Hose Working Pressure	5000
Sales Order #	271739	Hose Lot # and Date Code	11834 11/14
Customer Purchase Order #	302337	Hose I.D. (inches)	3.5"
Assembly Serial # (Pick Ticket #)	326000	Hose O.D. (inches)	4.89"
Hose Assembly Length	25'	Armor (optional)	No

Fittings			
End A		End B	
Stem (Part and Revision #)	R3.5X64WB	Stem (Part and Revision #)	R3.5X64WB
Steel (Heat #)	A144783	Stem (Heat #)	A144783
Ferrule (Part and Revision #)	RF3.5	Ferrule (Part and Revision #)	RF3.5
Ferrule (Heat #)	J1628	Ferrule (Heat #)	J1628
Connection - Flange Hammer Union Part	4-1/16 5000	Connection (Part #)	4-1/16 5000
Connection (Heat #)	14032501	Connection (Heat #)	1404FB21
Nut (Part #)	N/A	Nut (Part #)	N/A
Nut (Heat #)	N/A	Nut (Heat #)	N/A
Dies Used	5.49"	Dies Used	5.49"

Hydrostatic Test Requirements		
Test Pressure (psi)	10,000	Hose assembly was tested with ambient water temperature.
Test Pressure Hold Time (minutes)	11 1/2	

Date Tested	Tested By	Approved By
11/19/2015		

Midwest Hose & Specialty, Inc.

Certificate of Conformity

Customer: Hobbs	Customer P.O.#: 3023337
Sales Order #: 271739	Date Assembled: 11/19/2015

Specifications

Hose Assembly Type:	Rotary/Vibrator		
Assembly Serial #	326000	Hose Lot # and Date Code	11894 11/14
Hose Working Pressure (psi)	5000	Test Pressure (psi)	10000

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
Kim Thomas	11/19/2015

Midwest Hose & Specialty, Inc.

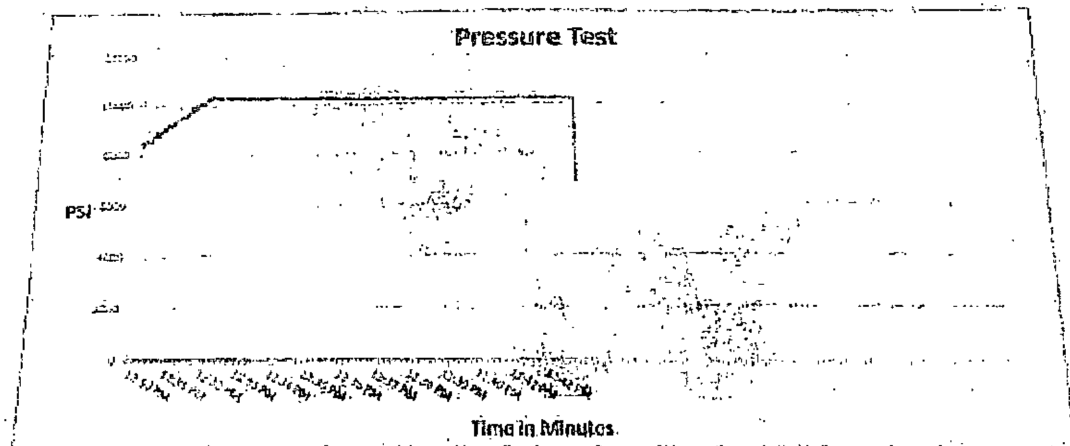
November 19, 2010

Internal Hydrostatic Test Graph

Customer: Hobbs

Pick Ticket #: 326000

Hose Specifications		Test Location [illegible]	
Hose Type	Length	Type of Fitting	Coupling Method
C	39'	4 1/16 10K	Swage [illegible]
I.D.	O.D.	Die Size	Final O.D.
3.5"	4.00"	5.49"	5.57"
Working Pressure	Burst Pressure	Hose Serial #	Hose Assembly Serial #
5000 PSI	[illegible]	31054	326000



Test Pressure	Time Held at Test Pressure	Actual Burst Pressure	Peak Pressure
10000 PSI	11 2/4 Minutes		10373 PSI

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

Tested By: [illegible]

Approved By: Ken Thomas

Midwest Hose & Specialty, Inc.

Hose Assembly & Test Report

General Information		Hose Specifications	
Customer	Hobbs	Hose Assembly Type	Choke & Kill
Date Assembled	6-26-14	Certification	API 7K
Location Assembled	OKC	Hose Grade	D
Sales Order #	216797	Hose Working Pressure	5,000
Customer Purchase Order #	237512	Hose Lot #	8309
Hose Assembly Serial #	260212	Hose Date Code	04/12
Pick Ticket Line Item	0010	Hose I.D. (Inches)	3.5 inches
Hose Assembly Length (Feet and Inches)	50 feet	Hose O.D. (Inches)	5.45
Contact Information Phone #		Armor (yes/no)	yes

Fittings

End A		End B	
Stem (Part and Revision #)	R3.5X64WB	Stem (Part and Revision #)	R3.5X64WB
Stem (Heat #)	1311405022 5	Stem (Heat #)	1311405022 5
Stem (Rockwell Hardness HRB #)	—	Stem (Rockwell Hardness HRB #)	—
Ferrule (Part and Revision #)	RF3.5	Ferrule (Part and Revision #)	RF3.5
Ferrule (Heat #)	126151	Ferrule (Heat #)	372114
Ferrule (Rockwell Hardness HRB #)	—	Ferrule (Rockwell Hardness HRB #)	—
Connection (Part #)	4 1/16 5K	Connection (Part #)	4 1/16 5K
Connection (Heat #)	V3360	Connection (Heat #)	V3360
Connection (Brinell Hardness HB #)	—	Connection (Brinell Hardness HB #)	—
Stress Relief #	17614	Stress Relief #	17614
Welding #	MKR	Welding #	MKR
X-ray #	—	X-ray #	—

Assembly Information

End A		End B	
Skive O.D. (Inches)	5.04	Skive O.D. (Inches)	4.92
Swager Dies (1st pass)	5.62	Swager Dies (1st pass)	5.53
Swager Dies (2nd pass)	—	Swager Dies (2nd pass)	—
Final Swage O.D. (Inches)	5.64	Final Swage O.D. (Inches)	5.48
Compression % (See Crimp Calculator)	24%	Compression % (See Crimp Calculator)	22%
Swaged By	Charles Ash		

Hydrostatic Test Requirements

Test Pressure (psi)	10,000	Hold Time (minutes)	13 1/4
Tested By	Charles Ash	Date Tested	6-26-14

This is to certify that the above Hose Assembly has been satisfactorily tested in accordance with MHSI procedure 8.2.4.2

Final Verification

Visual Insp.	(Yes)	No	Hammer Unions	Yes	(No)
Inspected	(Yes)	No	Safety Clamps	Yes	(No)
Customer or Third Party Witness	(No)	Customer or Third Party Witnessed By:			