

UNITED STATES
DEPARTMENT OF THE INTERIOR
BUREAU OF LAND MANAGEMENTCarlsbad Field Office
OCD ArtesiaFORM APPROVED
OMB NO. 1004-0137
Expires: January 31, 2018**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.5. Lease Serial No.
NMNM100555

6. If Indian, Allottee or Tribe Name

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

8. Well Name and No.
PUDGE FEDERAL 21H9. API Well No.
30-015-4504510. Field and Pool or Exploratory Area
WILDCAT; BONE SPRING
Rock Spar 52775

11. County or Parish, State

EDDY COUNTY, NM

SUBMIT IN TRIPLICATE - Other instructions on page 2

1. Type of Well

☒ Oil Well ☐ Gas Well ☐ Other2. Name of Operator
COG OPERATING LLCContact: MAYTE X REYES
E-Mail: mreyes1@concho.com3a. Address
2208 WEST MAIN STREET
ARTESIA, NM 882103b. Phone No. (include area code)
Ph: 575-748-6945

4. Location of Well (Footage, Sec., T., R., M., or Survey Description)

Sec 31 T25S R29E SESE 615FSL 760FEL

12. CHECK THE 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	☐ Hydraulic Fracturing	☐ Reclamation	☐ Well Integrity
☐ Final Abandonment Notice	☐ Casing Repair	☐ New Construction	☐ Recomplete	☒ Other
	☐ 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 must 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 must be filed once testing has been completed. Final Abandonment Notices must be filed only after all requirements, including reclamation, have been completed and the operator has determined that the site is ready for final inspection.

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

POOL CHANGE:

From: Purple Sage; Wolfcamp Gas
To: Wildcat Bone Spring
C102 Attached.

**SEE ATTACHED FOR
CONDITIONS OF APPROVAL**

Target Formation: 2nd Bone Spring Sand (Wellplan & AC Report Attached)

Surface

**NM OIL CONSERVATION
ARTESIA DISTRICT****JUN 27 2018**

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

Electronic Submission #425190 verified by the BLM Well Information System
For COG OPERATING LLC, sent to the Carlsbad
Committed to AFMSS for processing by MUSTAFA HAQUE on 06/25/2018 ()

RECEIVED

Name (Printed/Typed) MAYTE X REYES

Title SENIOR REGULATORY ANALYST

Signature (Electronic Submission)

Date 06/25/2018

THIS SPACE FOR FEDERAL OR STATE OFFICE USE

Approved By <u>Mustafa Haque</u>	Title <u>Engineer</u>	Date <u>06-25-2018</u>
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 <u>cfo</u>

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

(Instructions on page 2)

**** OPERATOR-SUBMITTED ** OPERATOR-SUBMITTED ** OPERATOR-SUBMITTED ****RWP 6-29-18

Additional data for EC transaction #425190 that would not fit on the form

32. Additional remarks, continued

Hole Size: ~~17 1/2~~ 17 1/2"
Depth: 400?
Casing: 13 3/8" 54.5# J-55 BTC
Cement: 450 sx 14.8ppg Class C + 2% CaCl₂ (Circulate to surface)

Intermediate
BOP: 3M
Hole Size: 12 1/4"
Depth: 2800?
Max Mud Weight: 10.0 ppg
Casing: 9 5/8" 40# J-55 BTC
Cement: Circulate to surface
Lead: 975 sx 13.5ppg Class C + 4% gel
Tail: 250 sx 14.8ppg Class C + 1% CaCl₂

Production
BOP: 3M
Hole Size: 8 3/4"
Depth: 13680? MD / 8180? TVD
Max Mud Weight: 9.5 ppg
Casing: 5 1/2" 17# P-110 BTC
Cement: Tied into pervious casing string a minimum of 500?
Lead: 650 sx 10.3ppg Tuned Light Blend
Tail: 1800 sx 14.4ppg 50:50:2

DISTRICT I
1622 N. YENCH DR., HOBBS, NM 88240
Phone: (505) 393-0101 Fax: (505) 393-0720

DISTRICT II
511 S. FIRST ST., ARTESIA, NM 88210
Phone: (505) 748-1863 Fax: (505) 748-9720

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

DISTRICT IV
1820 S. ST. FRANCIS DR., SANTA FE, NM 87505
Phone: (505) 476-3400 Fax: (505) 476-3402

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

RECEIVED
JUN 27 2018

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

☐ AMENDED REPORT

WELL LOCATION AND ACREAGE DEDICATION PLAT

API Number 30-015-45045	Pool Code 52775	Pool Name Rock Spar Wildcat, Bone Spring
Property Code 321562	Property Name PUDGE FEDERAL	
OCRID No. 229137	Operator Name COG OPERATING, LLC	
	Well Number 21H	Elevation 2938.6'

Surface Location

UL or lot No.	Section	Township	Range	Lot Idn	Feet from the	North/South line	Feet from the	East/West line	County
P	31	25-S	29-E		615	SOUTH	760	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
P	6	26-S	29-E		200	SOUTH	330	EAST	EDDY

Dedicated Acres	Joint or Infill	Consolidation Code	Order No.
160			

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

LOT 1 40.65 Ac LOT 2 40.58 Ac LOT 3 40.64 Ac LOT 4 40.55 Ac SECTION 31 LOT 1 SECTION 6 T 26 S 40.25 Ac 40.49 Ac 40.72 Ac LOT 2 39.77 Ac LOT 3 39.27 Ac LOT 4 39.30 Ac		Y=393940.4 N X=639923.9 E NAD 83 NME <u>SURFACE LOCATION</u> Y=393215.3 N X=639161.8 E LAT.=32.080635° N LONG.=104.017483° W S.L. 760' 615' 40.68 AC PRODUCING AREA GRID AZ. - 179°34'50" HORIZ. DIST. - 4773.2' 330' FNL & 330' FEL LAT.=32.078037° N LONG.=104.016104° W GRID AZ. TO FTP 155°30'32" NAD 83 NME <u>PROPOSED BOTTOM HOLE LOCATION</u> Y=387498.5 N X=639626.6 E LAT.=32.064916° N LONG.=104.016036° W Y=387360.4 N X=638607.8 E Y=387297.9 N X=639958.4 E	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. <i>Mayte Reyes</i> Signature _____ Date _____ Mayte Reyes Printed Name _____ mreyes1@concho.com E-mail Address _____ SURVEYOR CERTIFICATION I hereby certify that the well location shown on this plat was plotted from field notes of actual surveys made by me or under my supervision, and that the same is true and correct to the best of my belief. MARCH 30, 2017 Date of Survey _____ Signature & Seal of Professional Surveyor CHAD L. HARCROW NEW MEXICO 17777 LICENSED PROFESSIONAL SURVEYOR <i>Chad L. Harcrow</i> Certificate No. CHAD HARCROW 17777 W.O. #17-394 DRAWN BY: SA
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RwP 6-29-18



Project: Eddy County, NM (NAD27 NME)
Site: Pudge Federal
Well: 21H
Wellbore: OH
Design: Plan 2 06-18-18
Rig: McVay 8



PHOENIX
TECHNOLOGY SERVICES



Azimuths to Grid North
True North: -0.17°
Magnetic North: 6.79°

Magnetic Field
Strength: 47931.1anT
Dip Angle: 59.76°
Date: 6/30/2018
Model: MVHD

Map System US State Plane 1927 (Exact solution)
Datum NAD 1927 (NADCON CONUS)
Ellipsoid Clarke 1866
Zone Name New Mexico East 3001

Local Origin Well 21H, Grid North

Latitude 32° 4' 49.83872 N
Longitude 104° 1' 1.19173 W

Grid East 597976.80
Grid North 393157.50
Scale Factor 1.000

Geomagnetic Model: MVHD
Sample Date: 30-Jun-18
Magnetic Declination: 6.96°
Dip Angle from Horizontal: 59.76°
Magnetic Field Strength: 47931.13516449nT

To convert a Magnetic Direction to a Grid Direction, Add 6.79°
To convert a Magnetic Direction to a True Direction, Add 6.96° East
To convert a True Direction to a Grid Direction, Subtract 0.17°

LEGEND

— 2H, OH, Surveys VO
— Plan 2 06-18-18

FORMATION TOP DETAILS

No formation data is available

WELL DETAILS

	7938.60				
NAS	0.00	EAW	0.00	Northing	393157.50
				Eastings	597976.80
				Latitude	32° 4' 49.83872 N
				Longitude	104° 1' 1.19173 W

DESIGN TARGET DETAILS

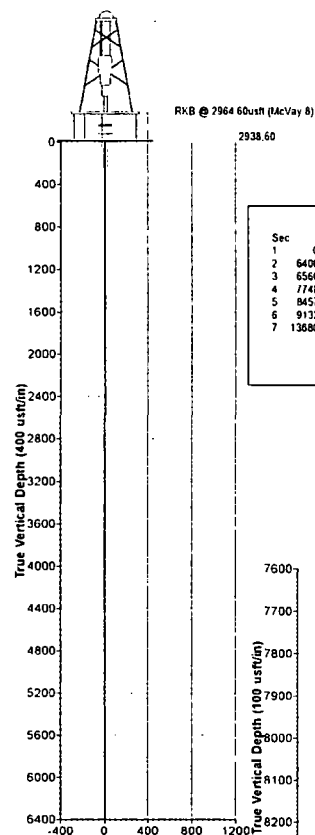
Name	TVD	NAS	EAW	Northing	Eastings	Latitude	Longitude
BHL - Pudge Federal 21H	8180.00	-5716.80	464.70	387440.70	598441.50	32° 3' 53.24906 N	104° 0' 55.98617 W
FTP - Pudge Federal 21H	8180.00	-943.71	429.80	392213.79	598406.60	32° 4' 40.48680 N	104° 0' 56.22840 W
LTP - Pudge Federal 21H	8180.00	-5586.72	463.92	387570.78	598440.72	32° 3' 54.52640 N	104° 0' 55.99080 W

SECTION DETAILS

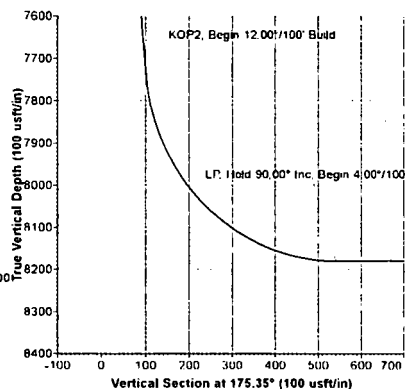
Sec	MD	Inc	Azi	TVD	NAS	EAW	Oleg	TFace	Vsect	Target	Annotation
1	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00		
2	6400.00	0.00	0.00	6400.00	0.00	0.00	0.00	0.00	0.00		
3	6566.67	5.00	152.55	6566.66	-6.45	3.35	3.00	152.55	6.70		KOP, Begin 3.00°/100' Build
4	7749.86	5.00	152.55	7744.15	-97.88	50.85	0.00	0.00	101.68		Hold 5.00° Inc at 152.55° Azm
5	8457.19	90.00	152.55	8180.00	-519.98	276.11	12.00	0.00	540.15		KOP2, Begin 12.00°/100' Build
6	9132.93	90.00	179.58	8180.00	-1169.77	431.34	4.00	90.00	1700.87		LP, Hold 90.00° Inc, Begin 4.00°/100' Turn
7	13680.09	90.00	179.58	8180.00	-5716.80	464.70	0.00	0.00	5735.66	BHL - Pudge Federal 21H	Hold 179.58° Azm

CASING DETAILS

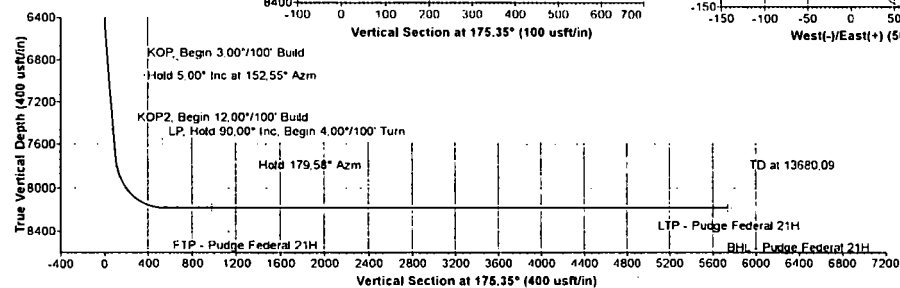
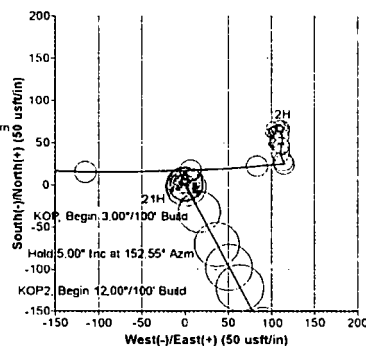
No casing data is available



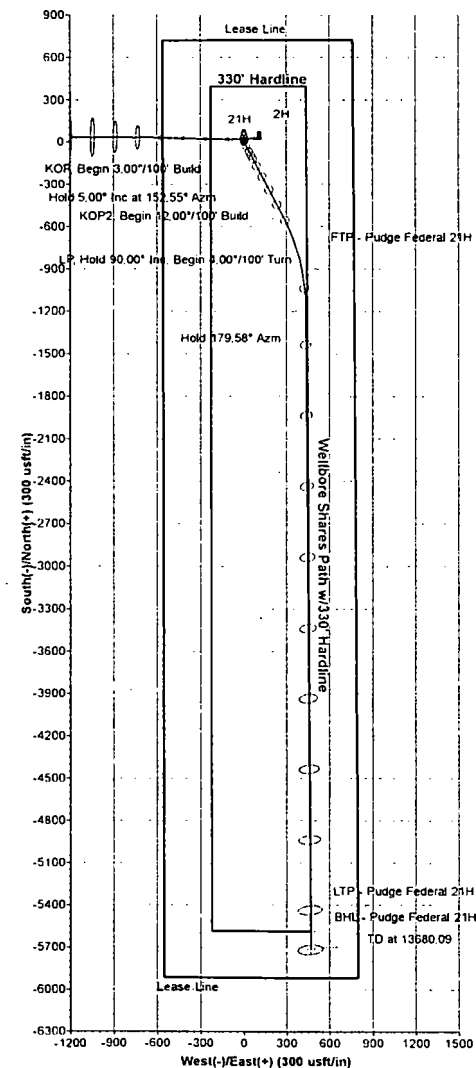
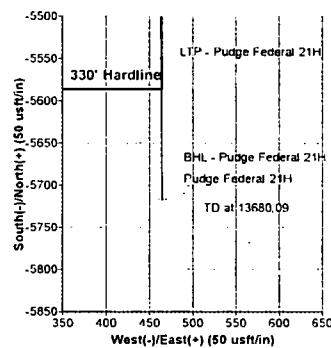
Vertical Section at 175.35° (400 usf/in)



Vertical Section at 175.35° (100 usf/in)



Vertical Section at 175.35° (400 usf/in)





NM OIL CONSERVATION
ARTESIA DISTRICT
JUN 27 2018

RECEIVED

COG Operating LLC

Eddy County, NM (NAD27 NME)
Pudge Federal
21H

OH

Plan: Plan 2 06-18-18

Standard Planning Report

18 June, 2018



Database: USA Compass
Company: COG Operating LLC
Project: Eddy County, NM (NAD27 NME)
Site: Pudge Federal
Well: 21H
Wellbore: OH
Design: Plan 2 06-18-18

Local Co-ordinate Reference: Well 21H
TVD Reference: RKB @ 2964.60usft (McVay 8)
MD Reference: RKB @ 2964.60usft (McVay 8)
North Reference: Grid
Survey Calculation Method: Minimum Curvature

Project	Eddy County, NM (NAD27 NME)		
Map System:	US State Plane 1927 (Exact solution)	System Datum:	Mean Sea Level
Geo Datum:	NAD 1927 (NADCON CONUS)		
Map Zone:	New Mexico East 3001		

Site	Pudge Federal				
Site Position:		Northing:	393,157.50 usft	Latitude:	32° 4' 49.83872 N
From:	Map	Easting:	597,976.80 usft	Longitude:	104° 1' 1.19173 W
Position Uncertainty:	0.00 usft	Slot Radius:	13-3/16 "	Grid Convergence:	0.17 °

Well	21H					
Well Position	+N/-S	0.00 usft	Northing:	393,157.50 usft	Latitude:	32° 4' 49.83872 N
	+E/-W	0.00 usft	Easting:	597,976.80 usft	Longitude:	104° 1' 1.19173 W
Position Uncertainty		0.00 usft	Wellhead Elevation:		Ground Level:	2,938.60 usft

Wellbore	OH				
Magnetics	Model Name	Sample Date	Declination (°)	Dip Angle (°)	Field Strength (nT)
	MVHD	6/30/2018	6.96	59.76	47,931.13516449

Design	Plan 2 06-18-18				
Audit Notes:					
Version:		Phase:	PROTOTYPE	Tie On Depth:	0.00
Vertical Section:	Depth From (TVD) (usft)	+N/-S (usft)	+E/-W (usft)	Direction (°)	
	0.00	0.00	0.00	175.35	

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
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	
6,400.00	0.00	0.00	6,400.00	0.00	0.00	0.00	0.00	0.00	0.00	
6,566.67	5.00	152.55	6,566.46	-6.45	3.35	3.00	3.00	0.00	152.55	
7,748.86	5.00	152.55	7,744.15	-97.88	50.85	0.00	0.00	0.00	0.00	
8,457.19	90.00	152.55	8,180.00	-519.98	270.11	12.00	12.00	0.00	0.00	
9,132.93	90.00	179.58	8,180.00	-1,169.77	431.34	4.00	0.00	4.00	90.00	
13,680.09	90.00	179.58	8,180.00	-5,716.80	464.70	0.00	0.00	0.00	0.00	BHL - Pudge Feder

Database: USA Compass
Company: COG Operating LLC
Project: Eddy County, NM (NAD27 NME)
Site: Pudge Federal
Well: 21H
Wellbore: OH
Design: Plan 2 06-18-18

Local Co-ordinate Reference: Well 21H
TVD Reference: RKB @ 2964.60usft (McVay 8)
MD Reference: RKB @ 2964.60usft (McVay 8)
North Reference: Grid
Survey Calculation Method: Minimum Curvature

Planned Survey

Measured Depth (usft)	Inclination (°)	Azimuth (°)	Vertical Depth (usft)	+N/-S (usft)	+E/-W (usft)	Vertical Section (usft)	Dogleg Rate (°/100usft)	Build Rate (°/100usft)	Turn Rate (°/100usft)
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
6,400.00	0.00	0.00	6,400.00	0.00	0.00	0.00	0.00	0.00	0.00
KOP, Begin 3.00°/100' Build									
6,500.00	3.00	152.55	6,499.95	-2.32	1.21	2.41	3.00	3.00	0.00
6,566.67	5.00	152.55	6,566.46	-6.45	3.35	6.70	3.00	3.00	0.00
Hold 5.00° Inc at 152.55° Azm									
6,600.00	5.00	152.55	6,599.66	-9.03	4.69	9.38	0.00	0.00	0.00
6,700.00	5.00	152.55	6,699.28	-16.76	8.71	17.41	0.00	0.00	0.00
6,800.00	5.00	152.55	6,798.90	-24.50	12.72	25.45	0.00	0.00	0.00
6,900.00	5.00	152.55	6,898.52	-32.23	16.74	33.48	0.00	0.00	0.00
7,000.00	5.00	152.55	6,998.14	-39.96	20.76	41.52	0.00	0.00	0.00
7,100.00	5.00	152.55	7,097.76	-47.70	24.78	49.55	0.00	0.00	0.00
7,200.00	5.00	152.55	7,197.38	-55.43	28.80	57.58	0.00	0.00	0.00
7,300.00	5.00	152.55	7,297.00	-63.17	32.81	65.62	0.00	0.00	0.00
7,400.00	5.00	152.55	7,396.62	-70.90	36.83	73.65	0.00	0.00	0.00
7,500.00	5.00	152.55	7,496.24	-78.64	40.85	81.69	0.00	0.00	0.00
7,600.00	5.00	152.55	7,595.86	-86.37	44.87	89.72	0.00	0.00	0.00
7,700.00	5.00	152.55	7,695.48	-94.10	48.88	97.76	0.00	0.00	0.00
7,748.86	5.00	152.55	7,744.15	-97.88	50.85	101.68	0.00	0.00	0.00
KOP2, Begin 12.00°/100' Build									
7,800.00	11.14	152.55	7,794.76	-104.25	54.15	108.30	12.00	12.00	0.00
7,900.00	23.14	152.55	7,890.15	-130.35	67.71	135.41	12.00	12.00	0.00
8,000.00	35.14	152.55	7,977.33	-173.48	90.12	180.21	12.00	12.00	0.00
8,100.00	47.14	152.55	8,052.51	-231.75	120.39	240.75	12.00	12.00	0.00
8,200.00	59.14	152.55	8,112.39	-302.62	157.20	314.36	12.00	12.00	0.00
8,300.00	71.14	152.55	8,154.36	-382.99	198.95	397.85	12.00	12.00	0.00
8,400.00	83.14	152.55	8,176.58	-469.35	243.81	487.56	12.00	12.00	0.00
8,457.19	90.00	152.55	8,180.00	-519.98	270.11	540.15	12.00	12.00	0.00
LP, Hold 90.00° Inc, Begin 4.00°/100' Turn									
8,500.00	90.00	154.26	8,180.00	-558.26	289.27	579.86	4.00	0.00	4.00
8,600.00	90.00	158.26	8,180.00	-649.78	329.52	674.34	4.00	0.00	4.00
8,700.00	90.00	162.26	8,180.00	-743.89	363.28	770.87	4.00	0.00	4.00
8,800.00	90.00	166.26	8,180.00	-840.12	390.40	868.98	4.00	0.00	4.00
8,900.00	90.00	170.26	8,180.00	-938.01	410.74	968.20	4.00	0.00	4.00
9,000.00	90.00	174.26	8,180.00	-1,037.08	424.20	1,068.03	4.00	0.00	4.00
9,100.00	90.00	178.26	8,180.00	-1,136.84	430.72	1,168.00	4.00	0.00	4.00
9,132.93	90.00	179.58	8,180.00	-1,169.77	431.34	1,200.87	4.00	0.00	4.00
Hold 179.58° Azm									
9,200.00	90.00	179.58	8,180.00	-1,236.84	431.83	1,267.75	0.00	0.00	0.00
9,300.00	90.00	179.58	8,180.00	-1,336.83	432.56	1,367.48	0.00	0.00	0.00
9,400.00	90.00	179.58	8,180.00	-1,436.83	433.30	1,467.21	0.00	0.00	0.00
9,500.00	90.00	179.58	8,180.00	-1,536.83	434.03	1,566.94	0.00	0.00	0.00
9,600.00	90.00	179.58	8,180.00	-1,636.82	434.76	1,666.67	0.00	0.00	0.00
9,700.00	90.00	179.58	8,180.00	-1,736.82	435.50	1,766.39	0.00	0.00	0.00
9,800.00	90.00	179.58	8,180.00	-1,836.82	436.23	1,866.12	0.00	0.00	0.00
9,900.00	90.00	179.58	8,180.00	-1,936.82	436.97	1,965.85	0.00	0.00	0.00
10,000.00	90.00	179.58	8,180.00	-2,036.81	437.70	2,065.58	0.00	0.00	0.00
10,100.00	90.00	179.58	8,180.00	-2,136.81	438.43	2,165.31	0.00	0.00	0.00
10,200.00	90.00	179.58	8,180.00	-2,236.81	439.17	2,265.03	0.00	0.00	0.00
10,300.00	90.00	179.58	8,180.00	-2,336.81	439.90	2,364.76	0.00	0.00	0.00
10,400.00	90.00	179.58	8,180.00	-2,436.80	440.63	2,464.49	0.00	0.00	0.00
10,500.00	90.00	179.58	8,180.00	-2,536.80	441.37	2,564.22	0.00	0.00	0.00
10,600.00	90.00	179.58	8,180.00	-2,636.80	442.10	2,663.95	0.00	0.00	0.00
10,700.00	90.00	179.58	8,180.00	-2,736.80	442.84	2,763.67	0.00	0.00	0.00

Database: USA Compass
Company: COG Operating LLC
Project: Eddy County, NM (NAD27 NME)
Site: Pudge Federal
Well: 21H
Wellbore: OH
Design: Plan 2 06-18-18

Local Co-ordinate Reference: Well 21H
TVD Reference: RKB @ 2964.60usft (McVay 8)
MD Reference: RKB @ 2964.60usft (McVay 8)
North Reference: Grid
Survey Calculation Method: Minimum Curvature

Planned Survey

Measured Depth (usft)	Inclination (°)	Azimuth (°)	Vertical Depth (usft)	+N/-S (usft)	+E/-W (usft)	Vertical Section (usft)	Dogleg Rate (°/100usft)	Build Rate (°/100usft)	Turn Rate (°/100usft)
10,800.00	90.00	179.58	8,180.00	-2,836.79	443.57	2,863.40	0.00	0.00	0.00
10,900.00	90.00	179.58	8,180.00	-2,936.79	444.30	2,963.13	0.00	0.00	0.00
11,000.00	90.00	179.58	8,180.00	-3,036.79	445.04	3,062.86	0.00	0.00	0.00
11,100.00	90.00	179.58	8,180.00	-3,136.78	445.77	3,162.59	0.00	0.00	0.00
11,200.00	90.00	179.58	8,180.00	-3,236.78	446.50	3,262.31	0.00	0.00	0.00
11,300.00	90.00	179.58	8,180.00	-3,336.78	447.24	3,362.04	0.00	0.00	0.00
11,400.00	90.00	179.58	8,180.00	-3,436.78	447.97	3,461.77	0.00	0.00	0.00
11,500.00	90.00	179.58	8,180.00	-3,536.77	448.70	3,561.50	0.00	0.00	0.00
11,600.00	90.00	179.58	8,180.00	-3,636.77	449.44	3,661.23	0.00	0.00	0.00
11,700.00	90.00	179.58	8,180.00	-3,736.77	450.17	3,760.96	0.00	0.00	0.00
11,800.00	90.00	179.58	8,180.00	-3,836.77	450.91	3,860.68	0.00	0.00	0.00
11,900.00	90.00	179.58	8,180.00	-3,936.76	451.64	3,960.41	0.00	0.00	0.00
12,000.00	90.00	179.58	8,180.00	-4,036.76	452.37	4,060.14	0.00	0.00	0.00
12,100.00	90.00	179.58	8,180.00	-4,136.76	453.11	4,159.87	0.00	0.00	0.00
12,200.00	90.00	179.58	8,180.00	-4,236.75	453.84	4,259.60	0.00	0.00	0.00
12,300.00	90.00	179.58	8,180.00	-4,336.75	454.57	4,359.32	0.00	0.00	0.00
12,400.00	90.00	179.58	8,180.00	-4,436.75	455.31	4,459.05	0.00	0.00	0.00
12,500.00	90.00	179.58	8,180.00	-4,536.75	456.04	4,558.78	0.00	0.00	0.00
12,600.00	90.00	179.58	8,180.00	-4,636.74	456.78	4,658.51	0.00	0.00	0.00
12,700.00	90.00	179.58	8,180.00	-4,736.74	457.51	4,758.24	0.00	0.00	0.00
12,800.00	90.00	179.58	8,180.00	-4,836.74	458.24	4,857.96	0.00	0.00	0.00
12,900.00	90.00	179.58	8,180.00	-4,936.74	458.98	4,957.69	0.00	0.00	0.00
13,000.00	90.00	179.58	8,180.00	-5,036.73	459.71	5,057.42	0.00	0.00	0.00
13,100.00	90.00	179.58	8,180.00	-5,136.73	460.44	5,157.15	0.00	0.00	0.00
13,200.00	90.00	179.58	8,180.00	-5,236.73	461.18	5,256.88	0.00	0.00	0.00
13,300.00	90.00	179.58	8,180.00	-5,336.73	461.91	5,356.60	0.00	0.00	0.00
13,400.00	90.00	179.58	8,180.00	-5,436.72	462.65	5,456.33	0.00	0.00	0.00
13,500.00	90.00	179.58	8,180.00	-5,536.72	463.38	5,556.06	0.00	0.00	0.00
13,600.00	90.00	179.58	8,180.00	-5,636.72	464.11	5,655.79	0.00	0.00	0.00
13,680.09	90.00	179.58	8,180.00	-5,716.80	464.70	5,735.66	0.00	0.00	0.00
TD at 13680.09									

Design Targets

Target Name

- hit/miss target	Dip Angle (°)	Dip Dir. (°)	TVD (usft)	+N/-S (usft)	+E/-W (usft)	Northing (usft)	Easting (usft)	Latitude	Longitude
- Shape									
LTP - Pudge Federal:	0.00	0.01	8,180.00	-5,586.72	463.92	387,570.78	598,440.72	32° 3' 54.53640 N	104° 0' 55.99080 W
- plan misses target center by 0.17usft at 13550.00usft MD (8180.00 TVD, -5586.72 N, 463.75 E)									
- Point									
FTP - Pudge Federal	0.00	0.01	8,180.00	-943.71	429.80	392,213.79	598,406.61	32° 4' 40.48680 N	104° 0' 56.22840 W
- plan misses target center by 17.86usft at 8908.22usft MD (8180.00 TVD, -946.11 N, 412.11 E)									
- Point									
BHL - Pudge Federal	0.00	0.01	8,180.00	-5,716.80	464.70	387,440.70	598,441.50	32° 3' 53.24906 N	104° 0' 55.98617 W
- plan hits target center									
- Point									

Database: USA Compass
Company: COG Operating LLC
Project: Eddy County, NM (NAD27 NME)
Site: Pudge Federal
Well: 21H
Wellbore: OH
Design: Plan 2 06-18-18

Local Co-ordinate Reference: Well 21H
TVD Reference: RKB @ 2964.60usft (McVay 8)
MD Reference: RKB @ 2964.60usft (McVay 8)
North Reference: Grid
Survey Calculation Method: Minimum Curvature

Plan Annotations

Measured Depth (usft)	Vertical Depth (usft)	Local Coordinates		Comment
		+N/-S (usft)	+E/-W (usft)	
6,400.00	6,400.00	0.00	0.00	KOP, Begin 3.00°/100' Build
6,566.67	6,566.46	-6.45	3.35	Hold 5.00° Inc at 152.55° Azm
7,748.86	7,744.15	-97.88	50.85	KOP2, Begin 12.00°/100' Build
8,457.19	8,180.00	-519.98	270.11	LP, Hold 90.00° Inc, Begin 4.00°/100' Turn
9,132.93	8,180.00	-1,169.77	431.34	Hold 179.58° Azm
13,680.09	8,180.00	-5,716.80	464.70	TD at 13680.09



PHOENIX
TECHNOLOGY SERVICES

NM OIL CONSERVATION
ARTESIA DISTRICT

JUN 27 2018

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COG Operating LLC

Eddy County, NM (NAD27 NME)
Pudge Federal
21H

OH
Plan 2 06-18-18

Anticollision Report

18 June, 2018





Anticollision Report



Company: COG Operating LLC
Project: Eddy County, NM (NAD27 NME)
Reference Site: Pudge Federal
Site Error: 0.00 usft
Reference Well: 21H
Well Error: 0.00 usft
Reference Wellbore: OH
Reference Design: Plan 2 06-18-18

Local Co-ordinate Reference: Well21H
TVD Reference: RKB @ 2964.60usft (McVay 8)
MD Reference: RKB @ 2964.60usft (McVay 8)
North Reference: Grid
Survey Calculation Method: Minimum Curvature
Output errors are at: 2.00 sigma
Database: USA Compass
Offset TVD Reference: Offset Datum

Reference Plan 2 06-18-18

Filter type: NO GLOBAL FILTER: Using user defined selection & filtering criteria
Interpolation Method: MD Interval 100.00usft
Depth Range: Unlimited
Results Limited by: Maximum center-center distance of 50,000.00 u
Warning Levels Evaluated at: 2.00 Sigma

Error Model: ISCWSA
Scan Method: Closest Approach 3D
Error Surface: Major Axis
Casing Method: Not applied

Survey Tool Program Date 6/18/2018

From (usft)	To (usft)	Survey (Wellbore)	Tool Name	Description
0.00	13,680.09	Plan 2 06-18-18 (OH)	MWD+HDGM	OWSG Rev.2 MWD + HDGM

Summary

Site Name	Reference Measured Depth (usft)	Offset Measured Depth (usft)	Distance Between Centres (usft)	Distance Between Ellipses (usft)	Separation Factor	Warning
Offset Well - Wellbore - Design						
Copper 31 Federal						
2H - OH - Surveys	7,014.71	7,023.09	59.40	22.31	1.602	CC, ES, SF

Offset Design Copper 31 Federal - 2H - OH - Surveys

Survey Program: 100-NS-GYRO-MS

Offset Site Error: 0.00 usft

Offset Well Error: 0.00 usft

Reference	Offset	Semi Major Axis	Highside	Offset Wellbore Centre	Distance	Minimum	Separation	Warning					
Measured Depth (usft)	Vertical Depth (usft)	Measured Depth (usft)	Vertical Depth (usft)	Reference (usft)	Offset (usft)	Toolface (°)	+N/-S (usft)	+E/-W (usft)	Between Centres (usft)	Between Ellipses (usft)	Separation (usft)	Factor	
0.00	0.00	0.00	0.00	0.00	0.00	65.50	45.47	99.78	110.49				
100.00	100.00	86.55	86.55	0.13	0.10	65.41	45.61	99.65	109.59	109.36	0.23	480.346	
200.00	200.00	186.73	186.73	0.49	0.34	65.12	46.02	99.22	109.37	108.54	0.83	131.579	
300.00	300.00	286.81	286.81	0.85	0.61	64.73	46.54	98.60	109.03	107.58	1.46	74.930	
400.00	400.00	386.77	386.76	1.21	0.87	64.27	47.17	97.90	108.67	106.59	2.08	52.275	
444.39	444.39	430.80	430.79	1.37	0.98	64.05	47.52	97.63	108.58	106.23	2.35	46.250	
500.00	500.00	485.79	485.77	1.57	1.11	63.71	48.16	97.49	108.74	106.06	2.68	40.573	
600.00	600.00	585.29	585.26	1.92	1.34	63.01	49.73	97.65	109.59	106.33	3.26	33.583	
700.00	700.00	685.12	685.07	2.28	1.56	62.32	51.43	98.04	110.72	106.87	3.85	28.775	
800.00	800.00	784.87	784.81	2.64	1.79	61.64	53.21	98.57	112.03	107.59	4.44	25.250	
900.00	900.00	884.77	884.69	3.00	2.03	61.02	54.99	98.28	113.50	108.47	5.03	22.575	
1,000.00	1,000.00	985.51	985.42	3.36	2.26	60.58	56.37	99.94	114.74	109.12	5.62	20.411	
1,100.00	1,100.00	1,086.39	1,086.29	3.72	2.50	60.41	56.89	100.19	115.21	108.99	6.22	18.517	
1,200.00	1,200.00	1,186.46	1,186.37	4.08	2.76	60.31	57.07	100.10	115.23	108.39	6.83	16.862	
1,300.00	1,300.00	1,286.19	1,286.10	4.43	3.02	60.01	57.66	99.92	115.36	107.90	7.45	15.478	
1,400.00	1,400.00	1,386.21	1,386.11	4.79	3.28	59.58	58.54	99.72	115.63	107.56	8.08	14.318	
1,500.00	1,500.00	1,486.57	1,486.47	5.15	3.54	59.31	59.09	99.53	115.75	107.06	8.69	13.319	
1,600.00	1,600.00	1,586.68	1,586.58	5.51	3.78	59.12	59.35	99.23	115.62	106.34	9.29	12.447	
1,700.00	1,700.00	1,686.65	1,686.55	5.87	4.02	58.91	59.63	98.89	115.48	105.59	9.89	11.677	
1,769.78	1,769.78	1,756.29	1,756.18	6.12	4.20	58.72	59.93	98.65	115.43	105.11	10.32	11.189	
1,800.00	1,800.00	1,786.43	1,786.32	6.23	4.28	58.62	60.11	98.55	115.44	104.93	10.50	10.992	
1,900.00	1,900.00	1,886.27	1,886.16	6.59	4.54	58.25	60.82	98.28	115.58	104.46	11.12	10.391	
2,000.00	2,000.00	1,986.38	1,986.27	6.94	4.80	57.82	61.65	97.97	115.75	104.01	11.75	9.855	
2,100.00	2,100.00	2,086.38	2,086.26	7.30	5.07	57.16	62.83	97.34	115.86	103.49	12.37	9.368	
2,200.00	2,200.00	2,186.27	2,186.14	7.66	5.33	56.51	64.01	96.77	116.02	103.03	12.99	8.932	
2,300.00	2,300.00	2,284.35	2,284.22	8.02	5.56	56.12	65.20	97.08	116.96	103.38	13.58	8.611	

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

Company: COG Operating LLC
Project: Eddy County, NM (NAD27 NME)
Reference Site: Pudge Federal
Site Error: 0.00 usft
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Well Error: 0.00 usft
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Survey Calculation Method: Minimum Curvature
Output errors are at: 2.00 sigma
Database: USA Compass
Offset TVD Reference: Offset Datum

Offset Design Copper 31 Federal - 2H - OH - Surveys													Offset Site Error: 0.00 usft
Survey Program: 100-NS-GYRO-MS													Offset Well Error: 0.00 usft
Reference		Offset		Semi Major Axis			Distance						Warning
Measured Depth (usft)	Vertical Depth (usft)	Measured Depth (usft)	Vertical Depth (usft)	Reference (usft)	Offset (usft)	Highside Tooffset (')	Offset Wellbore Centre +N/-S (usft)	+E/-W (usft)	Between Centres (usft)	Between Ellipses (usft)	Minimum Separation (usft)	Separation Factor	
2,400.00	2,400.00	2,383.97	2,383.81	8.38	5.77	55.74	67.03	98.42	119.11	104.96	14.15	8.417	
2,500.00	2,500.00	2,483.38	2,483.18	8.74	5.95	55.62	68.57	100.23	121.48	106.80	14.69	8.271	
2,600.00	2,600.00	2,583.10	2,582.86	9.09	6.09	55.99	69.47	102.96	124.26	109.07	15.19	8.181	
2,700.00	2,700.00	2,684.13	2,683.86	9.45	6.23	56.44	70.07	105.61	126.77	111.09	15.68	8.084	
2,800.00	2,800.00	2,785.33	2,785.05	9.81	6.35	56.80	70.25	107.34	128.29	112.13	16.16	7.938	
2,900.00	2,900.00	2,885.74	2,885.45	10.17	6.47	57.08	70.19	108.40	129.15	112.51	16.64	7.763	
3,000.00	3,000.00	2,985.89	2,985.59	10.53	6.59	57.30	70.14	109.24	129.82	112.70	17.12	7.585	
3,100.00	3,100.00	3,086.03	3,085.73	10.89	6.72	57.49	70.08	109.95	130.39	112.78	17.60	7.407	
3,200.00	3,200.00	3,186.05	3,185.75	11.25	6.85	57.65	70.04	110.56	130.88	112.78	18.10	7.232	
3,300.00	3,300.00	3,286.12	3,285.82	11.60	6.99	57.83	69.95	111.18	131.36	112.77	18.59	7.066	
3,400.00	3,400.00	3,386.24	3,385.93	11.96	7.11	58.04	69.74	111.78	131.76	112.69	19.07	6.908	
3,500.00	3,500.00	3,486.43	3,486.12	12.32	7.22	58.27	69.44	112.31	132.04	112.51	19.54	6.758	
3,600.00	3,600.00	3,586.49	3,586.18	12.68	7.32	58.51	69.07	112.75	132.22	112.23	19.99	6.613	
3,700.00	3,700.00	3,686.70	3,686.39	13.04	7.41	58.76	68.62	113.13	132.32	111.87	20.44	6.472	
3,800.00	3,800.00	3,786.96	3,786.64	13.40	7.48	59.01	68.07	113.36	132.23	111.35	20.88	6.333	
3,900.00	3,900.00	3,886.97	3,886.65	13.75	7.56	59.27	67.47	113.49	132.03	110.72	21.31	6.195	
4,000.00	4,000.00	3,986.96	3,986.64	14.11	7.64	59.53	66.85	113.64	131.84	110.09	21.75	6.061	
4,100.00	4,100.00	4,086.93	4,086.61	14.47	7.73	59.79	66.25	113.79	131.67	109.47	22.20	5.931	
4,200.00	4,200.00	4,187.18	4,186.86	14.83	7.82	60.01	65.70	113.83	131.43	108.78	22.65	5.802	
4,300.00	4,300.00	4,287.26	4,286.94	15.19	7.91	60.18	65.17	113.68	131.04	107.94	23.10	5.673	
4,400.00	4,400.00	4,387.47	4,387.15	15.55	8.01	60.34	64.60	113.45	130.55	107.00	23.55	5.543	
4,500.00	4,500.00	4,487.73	4,487.41	15.91	8.11	60.51	63.93	113.05	129.88	105.87	24.02	5.408	
4,600.00	4,600.00	4,587.81	4,587.48	16.26	8.22	60.66	63.24	112.51	129.07	104.58	24.48	5.271	
4,700.00	4,700.00	4,687.86	4,687.52	16.62	8.34	60.90	62.35	112.03	128.21	103.25	24.96	5.137	
4,800.00	4,800.00	4,787.97	4,787.62	16.98	8.46	61.29	61.15	111.64	127.30	101.86	25.44	5.003	
4,900.00	4,900.00	4,887.49	4,887.14	17.34	8.59	61.83	59.71	111.52	126.50	100.56	25.93	4.878	
5,000.00	5,000.00	4,987.43	4,987.06	17.70	8.74	62.68	57.81	111.91	125.96	99.53	26.44	4.765	
5,100.00	5,100.00	5,087.76	5,087.36	18.06	8.89	63.68	55.56	112.34	125.34	98.39	26.95	4.651	
5,200.00	5,200.00	5,187.98	5,187.55	18.41	9.04	64.68	53.24	112.52	124.48	97.03	27.46	4.534	
5,300.00	5,300.00	5,288.31	5,287.86	18.77	9.20	65.66	50.86	112.45	123.44	95.47	27.97	4.413	
5,400.00	5,400.00	5,388.50	5,388.02	19.13	9.36	66.57	48.57	112.10	122.18	93.69	28.49	4.288	
5,500.00	5,500.00	5,488.39	5,487.89	19.49	9.52	67.36	46.53	111.57	120.89	91.88	29.01	4.167	
5,600.00	5,600.00	5,587.96	5,587.44	19.85	9.69	68.08	44.73	111.16	119.82	90.29	29.54	4.057	
5,700.00	5,700.00	5,687.81	5,687.28	20.21	9.86	68.76	43.13	110.94	119.04	88.97	30.07	3.959	
5,800.00	5,800.00	5,787.65	5,787.11	20.57	10.04	69.45	41.55	110.83	118.36	87.76	30.60	3.868	
5,900.00	5,900.00	5,887.66	5,887.10	20.92	10.22	70.26	39.78	110.85	117.78	86.63	31.14	3.782	
6,000.00	6,000.00	5,987.49	5,986.91	21.28	10.41	71.16	37.87	110.97	117.25	85.56	31.69	3.700	
6,100.00	6,100.00	6,087.40	6,086.80	21.64	10.60	72.09	35.94	111.21	116.87	84.63	32.24	3.625	
6,200.00	6,200.00	6,187.22	6,186.60	22.00	10.79	73.01	34.07	111.52	116.61	83.82	32.79	3.556	
6,300.00	6,300.00	6,287.15	6,286.51	22.36	10.99	73.98	32.15	111.95	116.48	83.13	33.35	3.493	
6,362.56	6,362.56	6,349.61	6,348.96	22.58	11.12	74.66	30.81	112.29	116.44	82.74	33.70	3.455	
6,400.00	6,400.00	6,386.98	6,386.32	22.72	11.19	75.08	29.99	112.53	116.46	82.55	33.91	3.434	
6,500.00	6,499.95	6,486.36	6,485.67	23.06	11.40	-77.60	27.86	113.41	116.19	81.74	34.45	3.372	
6,600.00	6,599.66	6,586.34	6,585.63	23.38	11.60	-80.29	26.06	114.48	115.26	80.28	34.99	3.295	
6,700.00	6,699.28	6,686.20	6,685.48	23.71	11.81	-83.85	24.72	115.17	114.25	78.73	35.52	3.217	
6,800.00	6,798.90	6,802.54	6,801.49	24.03	12.02	-90.17	24.26	108.95	109.08	73.03	36.05	3.026	
6,900.00	6,898.52	6,918.72	6,912.59	24.36	12.19	-106.27	21.42	76.08	84.65	48.10	36.55	2.316	
7,000.00	6,998.14	7,011.25	6,993.85	24.69	12.33	-141.79	18.25	32.22	60.06	23.04	37.02	1.622	
7,014.71	7,012.79	7,023.09	7,003.61	24.74	12.35	-148.60	17.99	25.53	59.40	22.31	37.09	1.602 CC, ES, SF	
7,100.00	7,097.76	7,082.85	7,049.61	25.02	12.45	177.32	16.86	-12.51	82.18	44.71	37.47	2.193	
7,200.00	7,197.38	7,134.38	7,083.92	25.35	12.53	157.34	15.73	-50.89	146.24	108.36	37.88	3.860	
7,300.00	7,297.00	7,170.15	7,104.43	25.68	12.59	148.66	15.06	-80.17	225.64	187.36	38.28	5.895	

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

Company: COG Operating LLC
Project: Eddy County, NM (NAD27 NME)
Reference Site: Pudge Federal
Site Error: 0.00 usft
Reference Well: 21H
Well Error: 0.00 usft
Reference Wellbore: OH
Reference Design: Plan 2 06-18-18

Local Co-ordinate Reference: Well 21H
TVD Reference: RKB @ 2964.60usft (McVay 8)
MD Reference: RKB @ 2964.60usft (McVay 8)
North Reference: Grid
Survey Calculation Method: Minimum Curvature
Output errors are at 2.00 sigma
Database: USA Compass
Offset TVD Reference: Offset Datum

Offset Design Copper 31 Federal - 2H - OH - Surveys													Offset Site Error:
Survey Program: 100-NS-GYRO-MS													0.00 usft
Reference													Offset Well Error:
Offset													0.00 usft
Semi Major Axis													
Measured Depth (usft)	Vertical Depth (usft)	Measured Depth (usft)	Vertical Depth (usft)	Reference	Offset	Highside Tooface (")	Offset Wellbore Centre +N/-S (usft)	+E/-W (usft)	Between Centres (usft)	Between Ellipses (usft)	Minimum Separation (usft)	Separation Factor	Warning
7,400.00	7,396.62	7,195.88	7,117.28	26.02	12.64	144.30	15.09	-102.45	312.11	273.45	38.66	8.073	
7,500.00	7,496.24	7,210.00	7,123.61	26.35	12.67	142.38	15.30	-115.07	402.54	363.51	39.02	10.315	
7,600.00	7,595.86	7,230.33	7,131.79	26.69	12.71	140.08	15.82	-133.67	495.22	455.82	39.40	12.569	
7,700.00	7,695.48	7,241.00	7,135.63	27.03	12.73	139.06	16.20	-143.62	589.58	549.82	39.76	14.828	
7,800.00	7,794.76	7,241.00	7,135.63	27.37	12.73	120.13	16.20	-143.62	685.81	645.71	40.10	17.102	
7,900.00	7,890.15	7,256.26	7,140.55	27.71	12.77	61.01	16.79	-158.05	783.78	743.30	40.48	19.362	
8,000.00	7,977.33	7,257.12	7,140.81	28.06	12.77	28.87	16.82	-158.87	880.57	839.74	40.83	21.566	
8,100.00	8,052.51	7,254.89	7,140.14	28.42	12.76	17.30	16.74	-156.75	972.80	931.61	41.19	23.618	
8,200.00	8,112.39	7,241.00	7,135.63	28.81	12.73	11.12	16.20	-143.62	1,058.21	1,016.67	41.54	25.473	
8,300.00	8,154.36	7,241.00	7,135.63	29.24	12.73	8.68	16.20	-143.62	1,134.46	1,092.49	41.97	27.031	
8,400.00	8,176.58	7,241.00	7,135.63	29.70	12.73	7.22	16.20	-143.62	1,200.54	1,158.11	42.44	28.290	
8,500.00	8,180.00	7,225.45	7,129.93	30.21	12.70	7.02	15.67	-129.16	1,256.48	1,213.57	42.91	29.281	
8,600.00	8,180.00	7,210.00	7,123.61	30.79	12.67	9.08	15.30	-115.07	1,314.30	1,270.85	43.45	30.246	
8,700.00	8,180.00	7,210.00	7,123.61	31.41	12.67	12.14	15.30	-115.07	1,375.71	1,331.63	44.08	31.207	
8,800.00	8,180.00	7,210.00	7,123.61	32.08	12.67	15.43	15.30	-115.07	1,440.36	1,395.61	44.75	32.186	
8,900.00	8,180.00	7,210.00	7,123.61	32.78	12.67	18.90	15.30	-115.07	1,507.54	1,462.09	45.45	33.172	
9,000.00	8,180.00	7,210.00	7,123.61	33.48	12.67	22.47	15.30	-115.07	1,576.61	1,530.46	46.15	34.160	
9,100.00	8,180.00	7,197.16	7,117.88	34.20	12.64	25.46	15.11	-103.59	1,646.77	1,599.93	46.84	35.157	
9,200.00	8,180.00	7,196.77	7,117.69	34.92	12.64	26.63	15.10	-103.24	1,718.55	1,670.99	47.56	36.135	
9,300.00	8,180.00	7,196.45	7,117.55	35.67	12.64	26.62	15.10	-102.96	1,792.93	1,744.61	48.32	37.108	
9,400.00	8,180.00	7,196.14	7,117.40	36.47	12.64	26.60	15.09	-102.68	1,869.69	1,820.58	49.11	38.068	
9,500.00	8,180.00	7,195.84	7,117.26	37.31	12.64	26.59	15.09	-102.41	1,948.57	1,898.62	49.95	39.010	
9,600.00	8,180.00	7,195.54	7,117.12	38.18	12.64	26.57	15.09	-102.15	2,029.31	1,978.48	50.82	39.928	
9,700.00	8,180.00	7,195.25	7,116.98	39.09	12.64	26.56	15.09	-101.89	2,111.69	2,059.96	51.73	40.822	
9,800.00	8,180.00	7,194.97	7,116.85	40.03	12.64	26.54	15.08	-101.65	2,195.54	2,142.87	52.67	41.687	
9,900.00	8,180.00	7,194.69	7,116.72	40.99	12.64	26.53	15.08	-101.40	2,280.69	2,227.06	53.63	42.524	
10,000.00	8,180.00	7,194.42	7,116.60	41.99	12.64	26.52	15.08	-101.17	2,367.01	2,312.38	54.63	43.331	
10,100.00	8,180.00	7,194.16	7,116.47	43.01	12.64	26.50	15.08	-100.93	2,454.36	2,398.71	55.65	44.107	
10,200.00	8,180.00	7,193.90	7,116.35	44.05	12.64	26.49	15.07	-100.71	2,542.64	2,485.96	56.69	44.854	
10,300.00	8,180.00	7,193.65	7,116.23	45.11	12.64	26.48	15.07	-100.49	2,631.77	2,574.01	57.75	45.571	
10,400.00	8,180.00	7,193.41	7,116.12	46.20	12.64	26.47	15.07	-100.27	2,721.64	2,662.81	58.84	46.258	
10,500.00	8,180.00	7,193.17	7,116.00	47.30	12.64	26.46	15.07	-100.06	2,812.21	2,752.27	59.94	46.918	
10,600.00	8,180.00	7,192.93	7,115.89	48.42	12.64	26.44	15.07	-99.85	2,903.39	2,842.33	61.06	47.550	
10,700.00	8,180.00	7,192.70	7,115.78	49.56	12.64	26.43	15.06	-99.65	2,995.13	2,932.93	62.20	48.155	
10,800.00	8,180.00	7,192.48	7,115.68	50.71	12.64	26.42	15.06	-99.45	3,087.39	3,024.04	63.35	48.735	
10,900.00	8,180.00	7,192.26	7,115.57	51.88	12.64	26.41	15.06	-99.26	3,180.11	3,115.60	64.52	49.291	
11,000.00	8,180.00	7,179.00	7,109.04	53.06	12.61	25.77	15.02	-87.72	3,273.43	3,207.76	65.67	49.845	
11,100.00	8,180.00	7,179.00	7,109.04	54.26	12.61	25.77	15.02	-87.72	3,366.97	3,300.11	66.87	50.354	
11,200.00	8,180.00	7,179.00	7,109.04	55.46	12.61	25.77	15.02	-87.72	3,460.87	3,392.80	68.07	50.843	
11,300.00	8,180.00	7,179.00	7,109.04	56.68	12.61	25.77	15.02	-87.72	3,555.10	3,485.82	69.29	51.311	
11,400.00	8,180.00	7,179.00	7,109.04	57.90	12.61	25.77	15.02	-87.72	3,649.64	3,579.13	70.51	51.759	
11,500.00	8,180.00	7,179.00	7,109.04	59.14	12.61	25.77	15.02	-87.72	3,744.46	3,672.72	71.75	52.190	
11,600.00	8,180.00	7,179.00	7,109.04	60.38	12.61	25.77	15.02	-87.72	3,839.55	3,766.56	72.99	52.603	
11,700.00	8,180.00	7,179.00	7,109.04	61.63	12.61	25.77	15.02	-87.72	3,934.88	3,860.63	74.24	52.999	
11,800.00	8,180.00	7,179.00	7,109.04	62.89	12.61	25.77	15.02	-87.72	4,030.43	3,954.93	75.50	53.380	
11,900.00	8,180.00	7,179.00	7,109.04	64.16	12.61	25.77	15.02	-87.72	4,126.20	4,049.43	76.77	53.746	
12,000.00	8,180.00	7,179.00	7,109.04	65.44	12.61	25.77	15.02	-87.72	4,222.16	4,144.11	78.05	54.097	
12,100.00	8,180.00	7,179.00	7,109.04	66.72	12.61	25.77	15.02	-87.72	4,318.31	4,238.98	79.33	54.435	
12,200.00	8,180.00	7,179.00	7,109.04	68.01	12.61	25.77	15.02	-87.72	4,414.62	4,334.00	80.62	54.760	
12,300.00	8,180.00	7,179.00	7,109.04	69.30	12.61	25.77	15.02	-87.72	4,511.10	4,429.19	81.91	55.073	
12,400.00	8,180.00	7,179.00	7,109.04	70.60	12.61	25.77	15.02	-87.72	4,607.73	4,524.52	83.21	55.374	
12,500.00	8,180.00	7,179.00	7,109.04	71.91	12.61	25.77	15.02	-87.72	4,704.49	4,619.98	84.52	55.664	

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

Company: COG Operating LLC
Project: Eddy County, NM (NAD27 NME)
Reference Site: Pudge Federal
Site Error: 0.00 usft
Reference Well: 21H
Well Error: 0.00 usft
Reference Wellbore: OH
Reference Design: Plan 2 06-18-18

Local Co-ordinate Reference: Well 21H
TVD Reference: RKB @ 2964.60usft (McVay 8)
MD Reference: RKB @ 2964.60usft (McVay 8)
North Reference: Grid
Survey Calculation Method: Minimum Curvature
Output errors are at 2.00 sigma
Database: USA Compass
Offset TVD Reference: Offset Datum

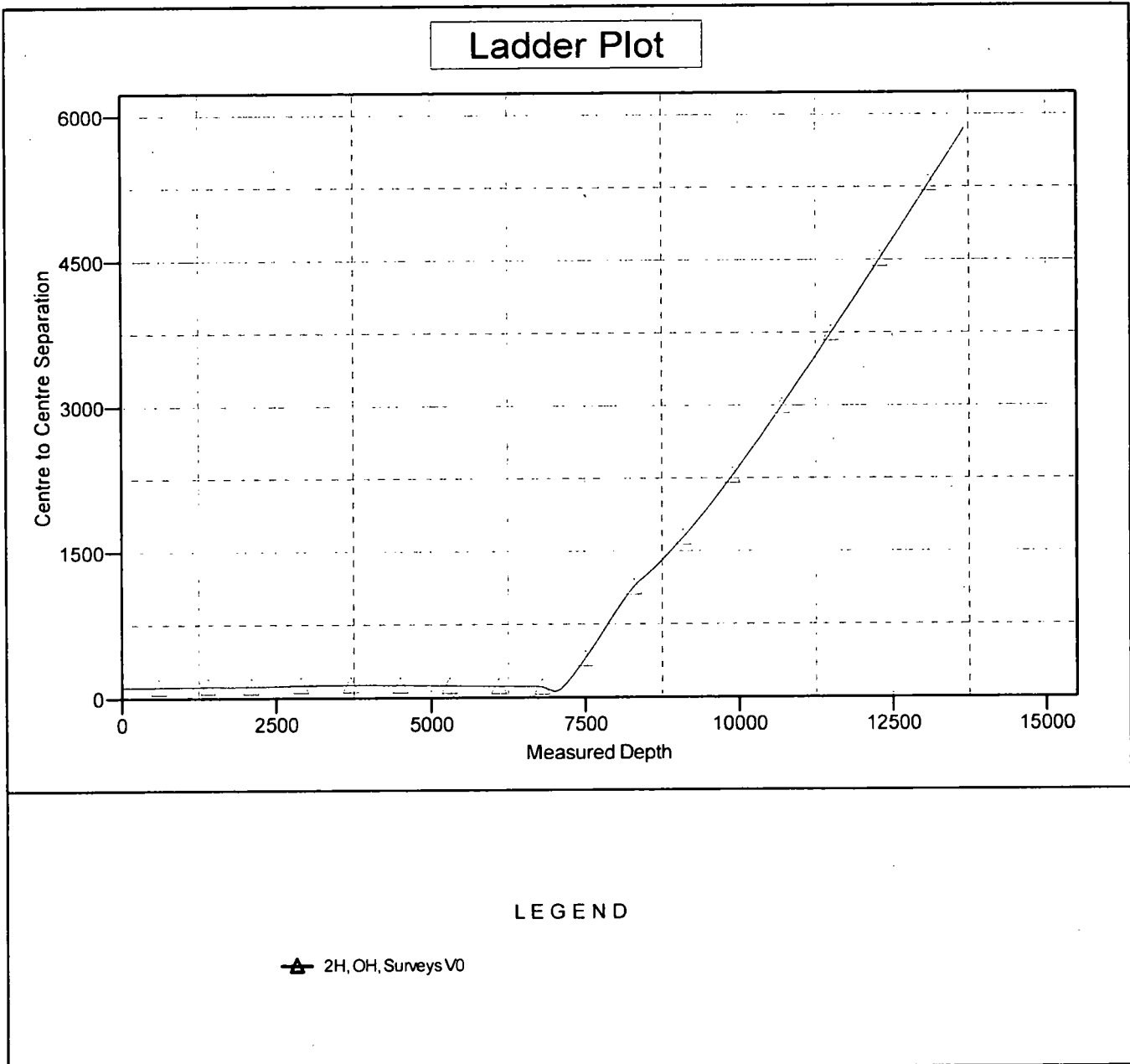
Offset Design Copper 31 Federal - 2H - OH - Surveys													Offset Site Error:	0.00 usft
Survey Program: 100-NS-GYRO-MS													Offset Well Error:	0.00 usft
Reference		Offset		Semi Major Axis			Distance							Warning
Measured Depth (usft)	Vertical Depth (usft)	Measured Depth (usft)	Vertical Depth (usft)	Reference (usft)	Offset (usft)	Highside Toolface (°)	Offset Wellbore Centre +N/-S (usft)	+E/-W (usft)	Between Centres (usft)	Between Ellipses (usft)	Minimum Separation (usft)	Separation Factor		
12,600.00	8,180.00	7,179.00	7,109.04	73.22	12.61	25.77	15.02	-87.72	4,801.40	4,715.57	85.83	55.944		
12,700.00	8,180.00	7,179.00	7,109.04	74.53	12.61	25.77	15.02	-87.72	4,898.42	4,811.28	87.14	56.213		
12,800.00	8,180.00	7,179.00	7,109.04	75.85	12.61	25.77	15.02	-87.72	4,995.56	4,907.10	88.46	56.473		
12,900.00	8,180.00	7,179.00	7,109.04	77.17	12.61	25.77	15.02	-87.72	5,092.82	5,003.03	89.78	56.724		
13,000.00	8,180.00	7,179.00	7,109.04	78.50	12.61	25.77	15.02	-87.72	5,190.17	5,099.06	91.11	56.967		
13,100.00	8,180.00	7,179.00	7,109.04	79.83	12.61	25.77	15.02	-87.72	5,287.63	5,195.19	92.44	57.201		
13,200.00	8,180.00	7,179.00	7,109.04	81.16	12.61	25.77	15.02	-87.72	5,385.18	5,291.40	93.77	57.427		
13,300.00	8,180.00	7,179.00	7,109.04	82.50	12.61	25.77	15.02	-87.72	5,482.82	5,387.70	95.11	57.645		
13,400.00	8,180.00	7,179.00	7,109.04	83.84	12.61	25.77	15.02	-87.72	5,580.54	5,484.08	96.45	57.857		
13,500.00	8,180.00	7,179.00	7,109.04	85.19	12.61	25.77	15.02	-87.72	5,678.34	5,580.54	97.80	58.061		
13,600.00	8,180.00	7,179.00	7,109.04	86.54	12.61	25.77	15.02	-87.72	5,776.22	5,677.07	99.15	58.260		
13,680.71	8,180.00	7,179.00	7,109.04	87.64	12.61	25.77	15.02	-87.72	5,855.26	5,755.01	100.25	58.406		

Company: COG Operating LLC
Project: Eddy County, NM (NAD27 NME)
Reference Site: Pudge Federal
Site Error: 0.00 usft
Reference Well: 21H
Well Error: 0.00 usft
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Reference Design: Plan 2 06-18-18

Local Co-ordinate Reference: Well 21H
TVD Reference: RKB @ 2964.60usft (McVay 8)
MD Reference: RKB @ 2964.60usft (McVay 8)
North Reference: Grid
Survey Calculation Method: Minimum Curvature
Output errors are at: 2.00 sigma
Database: USA Compass
Offset TVD Reference: Offset Datum

Reference Depths are relative to RKB @ 2964.60usft (McVay 8)
Offset Depths are relative to Offset Datum
Central Meridian is 104° 19' 60.00000 W

Coordinates are relative to: 21H
Coordinate System is US State Plane 1927 (Exact solution), New Mexico East 30
Grid Convergence at Surface is: 0.17°



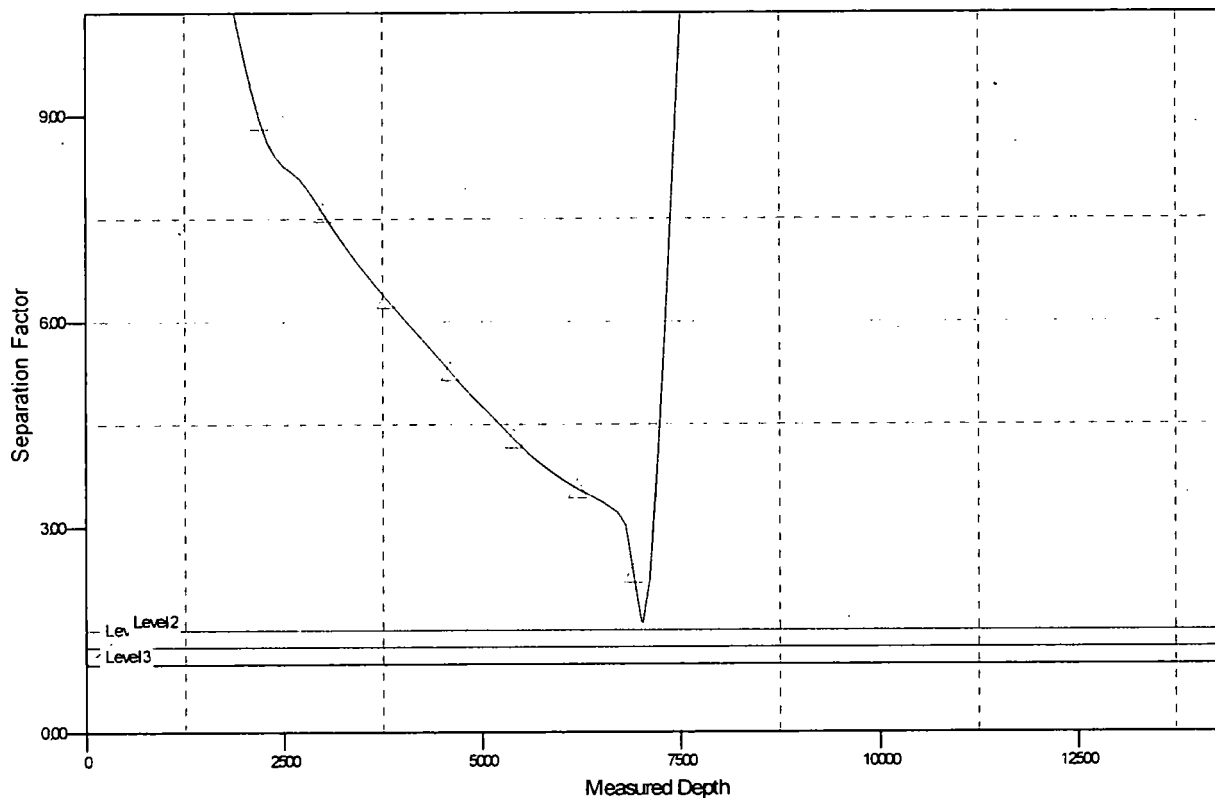
Company: COG Operating LLC
Project: Eddy County, NM (NAD27 NME)
Reference Site: Pudge Federal
Site Error: 0.00 usft
Reference Well: 21H
Well Error: 0.00 usft
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Local Co-ordinate Reference: Well 21H
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MD Reference: RKB @ 2964.60usft (McVay 8)
North Reference: Grid
Survey Calculation Method: Minimum Curvature
Output errors are at: 2.00 sigma
Database: USA Compass
Offset TVD Reference: Offset Datum

Reference Depths are relative to RKB @ 2964.60usft (McVay 8)
 Offset Depths are relative to Offset Datum
 Central Meridian is 104° 19' 60.00000 W

Coordinates are relative to: 21H
 Coordinate System is US State Plane 1927 (Exact solution), New Mexico East 30
 Grid Convergence at Surface is: 0.17°

Separation Factor Plot



LEGEND

—△— 2H, OH, Surveys V0



Haque, Mustafa <mhaque@blm.gov>

[EXTERNAL] Sundry - Pudge Federal 21H - 30-015-34836

Parker Simmons <PSimmons@concho.com>

Fri, Jun 22, 2018 at 3:06 PM

To: "Haque, Mustafa" <mhaque@blm.gov>

I knew I was missing something, below are the yields for each cement slurry.

Also I got the API in the subject incorrect, as it turns out the OCD has not issued one for this well yet.

Surface

Cement: yield=1.35 cuft/sx

Intermediate

Cement:

Lead: yield= 1.75 cuft/sx

Tail: yield = 1.35 cuft/sx

Production

Cement:

Lead: yield= 3.48 cuft/sx

Tail: yield= 1.25 cuft/sx

Thanks,

Parker Simmons

432.250.8045

On Jun 22, 2018, at 15:45, Haque, Mustafa <mhaque@blm.gov> wrote:

**** External email. Use caution. ****

[Quoted text hidden]



image001.png
6K

JUN 27 2018

PECOS DISTRICT DRILLING CONDITIONS OF APPROVAL

RECEIVED

OPERATOR'S NAME:	COG Operating LLC
LEASE NO.:	NMNM 100555
WELL NAME & NO.:	21H-PUDGE FEDERAL
SURFACE HOLE FOOTAGE:	615'/S & 760'/E
BOTTOM HOLE FOOTAGE:	200'/S & 330'/E
LOCATION:	Section 31, R29E, T.25S, NMPPM
COUNTY:	EDDY County, New Mexico.

Potash	☒ None	☐ Secretary	☐ R-111-P
Cave/Karst Potential	☐ Low	☒ Medium	☐ High
Variance	☐ None	☒ Flex Hose	☐ Other
Wellhead	☒ Conventional	☐ Multibowl	
Other	☐ 4 String Area	☐ Capitan Reef	☐ WIPP

All previous COAs still apply except for the following:

A. CASING

1. The 13 3/8 inch surface casing shall be set at approximately 400 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 will be a minimum of 8 hours or 500 pounds compressive strength, whichever is greater. (This is to include the lead cement)
 - 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.
- ❖ In Medium Cave/Karst Areas if cement does not circulate to surface on the first two casing strings, the cement on the 3rd casing string must come to surface.

2. The minimum required fill of cement behind the **9 5/8** inch intermediate casing is:
 - Cement to surface. If cement does not circulate see B.1.a, c-d above.
Wait on cement (WOC) time for a primary cement job is to include the lead cement slurry due to cave/karst.
3. The minimum required fill of cement behind the **5 1/2** inch production casing is:
 - Cement should tie-back at least **200** feet into previous casing string.
Operator shall provide method of verification.

B. PRESSURE CONTROL

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

MHH 06252018

GENERAL REQUIREMENTS

A. CASING

1. 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.
2. Wait on cement (WOC) for Potash Areas: 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 for all cement blends, 2) until cement has been in place at least 24 hours. WOC time will be recorded in the driller's log.
3. 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.
4. 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.
5. No pea gravel permitted for remedial or fall back remedial without prior authorization from the BLM engineer.
6. 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. Formation at the shoe shall be tested to a minimum of the mud weight equivalent anticipated to control the formation pressure to the next casing depth or at total depth of the well. This test shall be performed before drilling more than 20 feet of new hole.
7. 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.
8. Whenever a casing string is cemented in the R-111-P potash area, the NMOCD requirements shall be followed.

B. PRESSURE CONTROL

1. All blowout preventer (BOP) and related equipment (BOPE) shall comply with well control requirements as described in Onshore Oil and Gas Order No. 2 and API RP 53 Sec. 17.
2. If a variance is approved for a flexible hose to be installed from the BOP to the choke manifold, the following requirements apply: 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.
3. 5M or higher 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. If the operator has proposed a multi-bowl wellhead assembly in the APD. The following requirements must be met:
 - a. Wellhead shall be installed by manufacturer's representatives, submit documentation with subsequent sundry.
 - b. If the welding is performed by a third party, the manufacturer's representative shall monitor the temperature to verify that it does not exceed the maximum temperature of the seal.
 - c. Manufacturer representative shall install the test plug for the initial BOP test.
 - d. Whenever any seal subject to test pressure is broken, all the tests in OOGO2.III.A.2.i must be followed.
 - e. If the cement does not circulate and one inch operations would have been possible with a standard wellhead, the well head shall be cut off, cementing operations performed and another wellhead installed.
5. The appropriate BLM office shall be notified a minimum of 4 hours in advance for a representative to witness the tests.
 - a. In a water basin, for all casing strings utilizing slips, these are to be set as soon as the crew and rig are ready and any fallback cement remediation has been done. The casing cut-off and BOP installation can be initiated four hours after installing the slips, which will be approximately six hours after bumping the plug. For those casing strings not using slips, the minimum wait time before cut-off is eight hours after bumping the plug. BOP/BOPE testing can begin after cut-off or once cement reaches 500 psi compressive strength (including

lead when specified), whichever is greater. However, if the float does not hold, cut-off cannot be initiated until cement reaches 500 psi compressive strength (including lead when specified).

- b. In potash areas, 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. For all casing strings, casing cut-off and BOP installation can be initiated at twelve hours after bumping the plug. However, **no tests** shall commence until the cement has had a minimum of 24 hours setup time.
- c. The tests shall be done by an independent service company utilizing a test plug not a cup or J-packer. The operator also has the option of utilizing an independent tester to test without a plug (i.e. against the casing) pursuant to Onshore Order 2 with the pressure not to exceed 70% of the burst rating for the casing. Any test against the casing must meet the WOC time for water basin (8 hours) or potash (24 hours) or 500 pounds compressive strength, whichever is greater, prior to initiating the test (see casing segment as lead cement may be critical item).
- d. 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.
- e. The results of the test shall be reported to the appropriate BLM office.
- f. 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.
- g. 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.
- h. BOP/BOPE must be tested by an independent service company within 500 feet of the top of the Wolfcamp formation if the time between the setting of the intermediate casing and reaching this depth exceeds 20 days. This test does not exclude the test prior to drilling out the casing shoe as per Onshore Order No. 2.