Form 3160-3
(June 2015)

FORM APPROVED
OMB No. 1004-0137
Expires: January 31, 2018

UNITED STATES
DEPARTMENT OF THE INTERIOR
BUREAU OF LAND MANAGEMENT

APPLICATION FOR PERMIT TO DRILL OR REENTER

5. Lease Serial No.: NMNM092757

6. If Indian, Allotee or Tribe Name:

1a. Type of work: ☑ DRILL ☐ REENTER

1b. Type of Well: ☑ Oil Well ☐ Gas Well ☐ Other

1c. Type of Completion: ☐ Hydraulic Fracturing ☑ Single Zone ☐ Multiple Zone

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

8. Lease Name and Well No.: TOMAHAWK FEDERAL UNIT 701H

2. Name of Operator: COG OPERATING LLC

9. API Well No.: 30 015 47439

3a. Address: 600 West Illinois Ave, Midland, TX 79701

3b. Phone No. *(include area code)*: (432) 683-7443

10. Field and Pool, or Exploratory: Malaga/PURPLE SAGE WOLFCAMP GAS

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

At surface: SESE / 412 FSL / 1106 FEL / LAT 32.197033 / LONG -104.104761

At proposed prod. zone: SESE / 200 FSL / 670 FEL / LAT 32.167063 / LONG -104.103185

11. Sec., T. R. M. or Blk. and Survey or Area: SEC 20/T24S/R28E/NMP

14. Distance in miles and direction from nearest town or post office*: 3 miles

12. County or Parish: EDDY

13. State: NM

15. Distance from proposed* location to nearest property or lease line, ft. (Also to nearest drig. unit line, if any): 200 feet

16. No of acres in lease: 1081.18

17. Spacing Unit dedicated to this well: 1280.0

18. Distance from proposed location* to nearest well, drilling, completed, applied for, on this lease, ft.: 30 feet

19. Proposed Depth: 9448 feet / 19943 feet

20. BLM/BIA Bond No. in file: FED: NMB000215

21. Elevations (Show whether DF, KDB, RT, GL, etc.): 3042 feet

22. Approximate date work will start*: 07/01/2020

23. Estimated duration: 30 days

24. Attachments

The following, completed in accordance with the requirements of Onshore Oil and Gas Order No. 1, and the Hydraulic Fracturing rule per 43 CFR 3162.3-3 (as applicable)

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

25. Signature	Name *(Printed/Typed)*	Date
(Electronic Submission)	MAYTE REYES / Ph: (432) 683-7443	03/25/2020

Title: Regulatory Analyst

Approved by *(Signature)*	Name *(Printed/Typed)*	Date
(Electronic Submission)	Cody Layton / Ph: (575) 234-5959	09/09/2020

Title	Office
Assistant Field Manager Lands & Minerals	Carlsbad Field Office

Application approval 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.
Conditions of approval, if any, are attached.

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.

APPROVED WITH CONDITIONS

Approval Date: 09/09/2020

(Continued on page 2)

*(Instructions on page 2)

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

DISTRICT II
811 S. FIRST ST., ARTESIA, NM 88210
Phone: (575) 748-1283 Fax: (575) 748-9720

DISTRICT III
1000 RIO BRAZOS 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
1220 SOUTH ST. FRANCIS DR.
Santa Fe, New Mexico 87505

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

☐ AMENDED REPORT

WELL LOCATION AND ACREAGE DEDICATION PLAT

API Number	Pool Code	Pool Name
30-015 47439		Purple Sage; Wolfcamp

Property Code	Property Name	Well Number
328919	TOMAHAWK FEDERAL UNIT	701H

OGRID No.	Operator Name	Elevation
229137	COG OPERATING, LLC	3042.4'

Surface Location

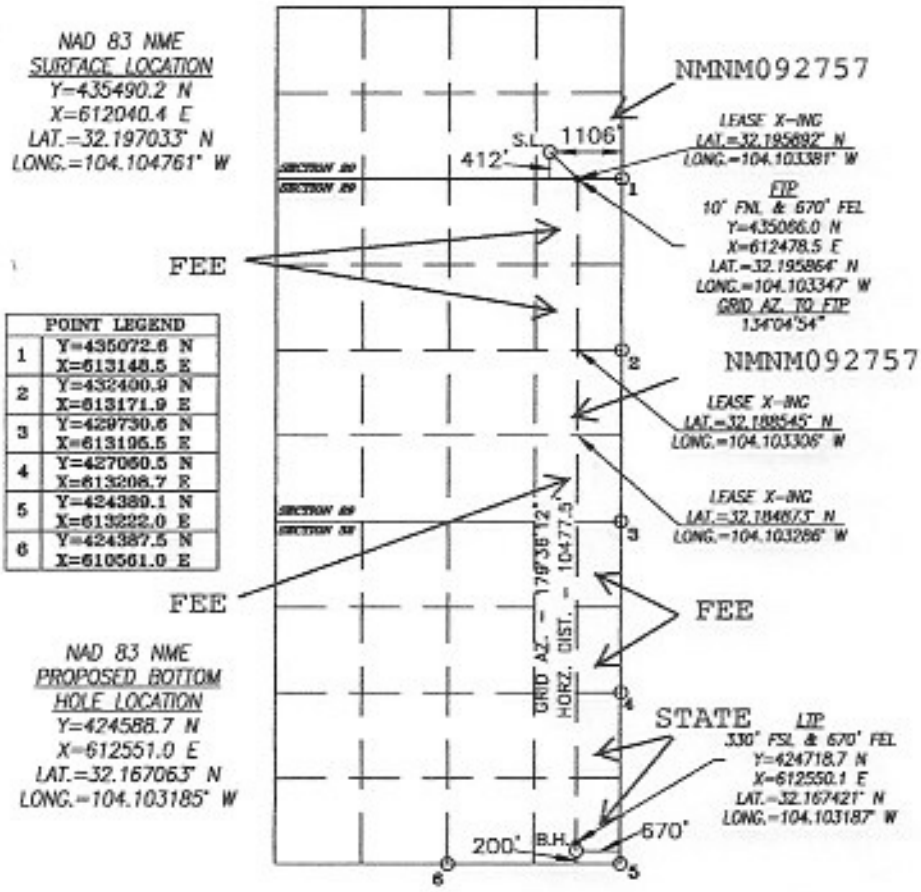
UL or lot No.	Section	Township	Range	Lot Idn	Feet from the	North/South line	Feet from the	East/West line	County
P	20	24-S	28-E		412	SOUTH	1106	EAST	EDDY

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	32	24-S	28-E		200	SOUTH	670	EAST	EDDY

Dedicated Acres	Joint or Infill	Consolidation Code	Order No.
1280			

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.

Genesis P. Vasquez 3/24/20
Signature Date

Genesis P. Vasquez
Printed Name

ggarzaperez@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.

JANUARY 30, 2020
Date of Survey

Signature & Seal of Professional Surveyor

CHAD L. HARCROW
NEW MEXICO
17777
LICENSED PROFESSIONAL SURVEYOR

Chad Harcrow 2/18/20
Certificate No. CHAD HARCROW 17777

W.O. # 20-368E DRAWN BY: AH

4. Pressure Control Equipment

N	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?	Min. Required WP	Type	x	Tested to:
12-1/4"	13-5/8"	3M	Annular	x	2500 psi
			Blind Ram		3M
			Pipe Ram	x	
			Double Ram	x	
			Other*		
8 1/2"	13-5/8"	5M	5M Annular	x	2500 psi
			Blind Ram		5M
			Pipe Ram	x	
			Double Ram	x	
			Other*		

BOP and BOPE will be installed per Onshore Order #2 requirements prior to drilling below the surface casing and will be rated to the above pressure rating or greater, see attached diagrams. Required safety valves, with appropriate wrenches and subs for the drill string being utilized, will be in the open position and accessible on the rig floor. 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 valves (inside BOP and full-opening valve) with appropriate wrenches and choke lines and choke manifold. See attached schematics.

Y	Formation integrity test will be performed per Onshore Order #2. On Exploratory wells or on that portion of any well approved for a 5M BOPE system or greater, a pressure integrity test of each casing shoe shall be performed. Will be tested in accordance with Onshore Oil and Gas Order #2 III.B.1.i.
Y	A variance is requested for the use of a flexible choke line from the BOP to Choke Manifold. See attached for specs and hydrostatic test chart.
	N Are anchors required by manufacturer?
Y	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.

5. Mud Program

Depth		Type	Weight (ppg)	Viscosity	Water Loss
From	To				
0	Surf. Shoe	FW Gel	8.4 - 8.6	28-29	N/C
Surf csg	Int shoe	Diesel Brine Emul	8.6 - 9.4	30-40	N/C
Int shoe	Lateral TD	OBM	10.5 - 12	30-40	20

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.
N	Are Logs are planned based on well control or offset log information.
N	Drill stem test? If yes, explain.
N	Coring? If yes, explain.

Additional logs planned		Interval
N	Resistivity	Pilot Hole TD to ICP
N	Density	Pilot Hole TD to ICP
Y	CBL	Production casing (If cement not circulated to surface)
Y	Mud log	Intermediate shoe to TD
N	PEX	

7. Drilling Conditions

Condition	Specify what type and where?
BH Pressure at deepest TVD	5900 psi at 9448' TVD
Abnormal Temperature	NO 155 Deg. F.

No abnormal pressure or temperature conditions are anticipated. Sufficient mud materials to maintain mud properties and weight increase requirements will be kept on location at all times.

Sufficient supplies of Paper/LCM for periodic sweeps to control seepage and losses will be maintained on location.

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

Y	Is it a walking operation?
Y	Is casing pre-set?

x	H2S Plan.
x	BOP & Choke Schematics.
x	Directional Plan
x	5M Annular Variance

APD ID: 10400055499
Submission Date: 03/25/2020
Operator Name: COG OPERATING LLC
Federal/Indian APD: FED
Well Name: TOMAHAWK FEDERAL UNIT
Well Number: 701H
Well Type: OIL WELL
Well Work Type: Drill

Highlighted data reflects the most recent changes

Show Final Text

Application

Section 1 - General

APD ID: 10400055499
Tie to previous NOS? N
Submission Date: 03/25/2020
BLM Office: CARLSBAD
User: MAYTE REYES
Title: Regulatory Analyst
Federal/Indian APD: FED
Is the first lease penetrated for production Federal or Indian? FED
Lease number: NMNM092757
Lease Acres: 1081.18
Surface access agreement in place?
Allotted?
Reservation:
Agreement in place? NO
Federal or Indian agreement:
Agreement number:
Agreement name:
Keep application confidential? YES
Permitting Agent? NO
APD Operator: COG OPERATING LLC
Operator letter of designation:

Operator Info

Operator Organization Name: COG OPERATING LLC
Operator Address: 600 West Illinois Ave
Zip: 79701
Operator PO Box:
Operator City: Midland
State: TX
Operator Phone: (432)683-7443
Operator Internet Address: RODOM@CONCHO.COM

Section 2 - Well Information

Well in Master Development Plan? NO
Master Development Plan name:
Well in Master SUPO? NO
Master SUPO name:

Operator Name: COG OPERATING LLC

Well Name: TOMAHAWK FEDERAL UNIT **Well Number:** 701H

Well in Master Drilling Plan? NO **Master Drilling Plan name:**

Well Name: TOMAHAWK FEDERAL UNIT **Well Number:** 701H **Well API Number:**

Field/Pool or Exploratory? Field and Pool **Field Name:** Malaga **Pool Name:** PURPLE SAGE WOLFCAMP GAS

Is the proposed well in an area containing other mineral resources? USEABLE WATER

Is the proposed well in a Helium production area? N **Use Existing Well Pad?** N **New surface disturbance?**

Type of Well Pad: MULTIPLE WELL **Multiple Well Pad Name:** Tomahawk Federal Unit **Number:** 701H and 702H

Well Class: HORIZONTAL **Number of Legs:** 1

Well Work Type: Drill

Well Type: OIL WELL

Describe Well Type:

Well sub-Type: EXPLORATORY (WILDCAT)

Describe sub-type:

Distance to town: 3 Miles **Distance to nearest well:** 30 FT **Distance to lease line:** 200 FT

Reservoir well spacing assigned acres Measurement: 1280 Acres

Well plat: COG_Tomahawk_701H_C102_20200325091943.pdf

Well work start Date: 07/01/2020 **Duration:** 30 DAYS

Section 3 - Well Location Table

Survey Type: RECTANGULAR

Describe Survey Type:

Datum: NAD83 **Vertical Datum:** NAVD88

Survey number: **Reference Datum:** GROUND LEVEL

Wellbore	NS-Foot	NS Indicator	EW-Foot	EW Indicator	Twsp	Range	Section	Aliquot/Lot/Tract	Latitude	Longitude	County	State	Meridian	Lease Type	Lease Number	Elevation	MD	TVD	Will this well produce from this lease?
SHL Leg #1	412	FSL	1106	FEL	24S	28E	20	Aliquot SESE	32.197033	-104.104761	EDDY	NEW MEXICO	NEW MEXICO	F	NMNM 092757	3042	0	0	Y
KOP Leg #1	412	FSL	1106	FEL	24S	28E	20	Aliquot SESE	32.197033	-104.104761	EDDY	NEW MEXICO	NEW MEXICO	F	NMNM 092757	3042	0	0	Y

Operator Name: COG OPERATING LLC

Well Name: TOMAHAWK FEDERAL UNIT **Well Number:** 701H

Wellbore	NS-Foot	NS Indicator	EW-Foot	EW Indicator	Twsp	Range	Section	Aliquot/Lot/Tract	Latitude	Longitude	County	State	Meridian	Lease Type	Lease Number	Elevation	MD	TVD	Will this well produce from this lease?
PPP Leg #1-1	10	FNL	670	FEL	24S	28E	29	Aliquot NENE	32.195864	-104.103347	EDDY	NEW MEXICO	NEW MEXICO	F	FEE	-4202	7250	7244	Y
PPP Leg #1-2	2639	FSL	670	FEL	24S	28E	29	Aliquot NESE	32.188545	-104.103306	EDDY	NEW MEXICO	NEW MEXICO	F	NMNM 092757	-6410	12000	9452	Y
EXIT Leg #1	330	FSL	670	FEL	24S	28E	32	Aliquot SESE	32.167421	-104.103187	EDDY	NEW MEXICO	NEW MEXICO	S	STATE	-6428	19813	9470	Y
BHL Leg #1	200	FSL	670	FEL	24S	28E	32	Aliquot SESE	32.167063	-104.103185	EDDY	NEW MEXICO	NEW MEXICO	S	STATE	-6406	19943	9448	Y

Drilling Plan

Section 1 - Geologic Formations

Formation ID	Formation Name	Elevation	True Vertical Depth	Measured Depth	Lithologies	Mineral Resources	Producing Formation
697487	QUATERNARY	3042	0	0	ALLUVIUM	NONE	N
697482	RUSTLER	2642	400	400	ANHYDRITE	USEABLE WATER	N
697483	TOP SALT	2116	926	926	SALT	NONE	N
697492	BASE OF SALT	690	2352	2352	SALT	NONE	N
697486	BELL CANYON	483	2559	2559	SANDSTONE	NONE	N
697485	LAMAR	483	2559	2559	LIMESTONE	NONE	N
697493	CHERRY CANYON	-335	3377	3377	SANDSTONE	NATURAL GAS, OIL	N
697494	BRUSHY CANYON	-1532	4574	4574	SANDSTONE	NATURAL GAS, OIL	N
697495	BONE SPRING LIME	-3049	6091	6091	LIMESTONE	NATURAL GAS, OIL	N
697925	UPPER AVALON SHALE	-3242	6284	6284	SANDSTONE	NATURAL GAS, OIL	N

Operator Name: COG OPERATING LLC

Well Name: TOMAHAWK FEDERAL UNIT **Well Number:** 701H

Formation ID	Formation Name	Elevation	True Vertical Depth	Measured Depth	Lithologies	Mineral Resources	Producing Formation
697924	---	-3624	6666	6666	GILSONITE	NATURAL GAS, OIL	N
697496	BONE SPRING 1ST	-4007	7049	7049	SANDSTONE	NATURAL GAS, OIL	N
697497	BONE SPRING 2ND	-4751	7793	7793	SANDSTONE	NATURAL GAS, OIL	N
697489	BONE SPRING 3RD	-5927	8969	8969	SANDSTONE	NATURAL GAS, OIL	N
697484	WOLFCAMP	-6299	9341	9341	SHALE	NATURAL GAS, OIL	Y

Section 2 - Blowout Prevention

Pressure Rating (PSI): 3M **Rating Depth:** 8820

Equipment: BOP and BOPE will be installed per Onshore Order #2 requirements prior to drilling below the surface casing and will be rated to the above pressure rating or greater, see attached diagrams. Required safety valves, with appropriate wrenches and subs for the drill string being utilized, will be in the open position and accessible on the rig floor.
Requesting Variance? YES

Variance request: 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. 5M Annular variance requested. A variance is requested to use a multibowl wellhead.
Testing Procedure: The BOP and BOPE will be fully tested per Onshore Order #2 when initially installed, whenever any seal subject to test pressure is broken, and/or following related repairs.

Choke Diagram Attachment:

COG_Tomahawk_701H_3M_Choke_20200325135404.pdf

BOP Diagram Attachment:

COG_Tomahawk_701H_3M_BOP_20200325135412.pdf

COG_Tomahawk_701H_Flex_Hose_20200325135904.pdf

Pressure Rating (PSI): 5M **Rating Depth:** 9448

Equipment: BOP and BOPE will be installed per Onshore Order #2 requirements prior to drilling below the surface casing and will be rated to the above pressure rating or greater, see attached diagrams. Required safety valves, with appropriate wrenches and subs for the drill string being utilized, will be in the open position and accessible on the rig floor.
Requesting Variance? YES

Variance request: 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. 5M Variance is requested. A variance is requested to use a multibowl wellhead.
Testing Procedure: The BOP and BOPE will be fully tested per Onshore Order #2 when initially installed, whenever any seal subject to test pressure is broken, and/or following related repairs.

Choke Diagram Attachment:

COG_Tomahawk_701H_5M_Choke_20200325135548.pdf

COG_Tomahawk_701H_5M_Choke_20200325135548.pdf

BOP Diagram Attachment:

COG_Tomahawk_701H_5M_BOP_20200325135556.pdf

COG_Tomahawk_701H_Flex_Hose_20200325135922.pdf

Section 3 - Casing

Casing ID	String Type	Hole Size	Csg Size	Condition	Standard	Tapered String	Top Set MD	Bottom Set MD	Top Set TVD	Bottom Set TVD	Top Set MSL	Bottom Set MSL	Calculated casing length MD	Grade	Weight	Joint Type	Collapse SF	Burst SF	Joint SF Type	Joint SF	Body SF Type	Body SF
1	SURFACE	14.75	10.75	NEW	API	N	0	815	0	815	3042	2227	815	J-55	45.5	ST&C	5.73	11.3	DRY	13.29	DRY	13.29
2	INTERMEDIATE	9.875	7.625	NEW	API	N	0	8820	0	8820	3585	-5778	8820	HCL-80	29.7	OTHER - BTC	2.01	1.49	DRY	2.75	DRY	2.75
3	PRODUCTION	6.75	5.5	NEW	API	N	0	19943	0	9448	3585	-6406	19943	P-110	23	OTHER - SF Torq	2.47	2.93	DRY	3.02	DRY	3.02

Casing Attachments

Casing ID: 1 **String Type:** SURFACE

Inspection Document:

Spec Document:

Tapered String Spec:

Casing Design Assumptions and Worksheet(s):

COG_TOMAHAWK_701H_Casing_Plan_20200325140251.pdf

Casing Attachments

Casing ID: 2 **String Type:** INTERMEDIATE

Inspection Document:

Spec Document:

Tapered String Spec:

Casing Design Assumptions and Worksheet(s):

COG_TOMAHAWK_701H_Casing_Plan_20200325140407.pdf

Casing ID: 3 **String Type:** PRODUCTION

Inspection Document:

Spec Document:

Tapered String Spec:

Casing Design Assumptions and Worksheet(s):

COG_TOMAHAWK_701H_Casing_Plan_20200325140210.pdf

Section 4 - Cement

String Type	Lead/Tail	Stage Tool Depth	Top MD	Bottom MD	Quantity(sx)	Yield	Density	Cu Ft	Excess%	Cement type	Additives
SURFACE	Lead		0	815	300	1.75	13.5	525	50	Class C +4% Gel	As needed
SURFACE	Tail			815	250	1.34	14.8	335	50	Class C + 2% CaCl2	As needed
INTERMEDIATE	Lead		0	8820	1400	2.8	11	3920	50	NeoCem	N/A
INTERMEDIATE	Tail			8820	300	1.1	16.4	330	50	Class H	N/A

Operator Name: COG OPERATING LLC

Well Name: TOMAHAWK FEDERAL UNIT **Well Number:** 701H

String Type	Lead/Tail	Stage Tool Depth	Top MD	Bottom MD	Quantity(sx)	Yield	Density	Cu Ft	Excess%	Cement type	Additives
PRODUCTION	Lead		8320	19943	750	2	12.7	1500	35	Lead: 35:65:6 H Blend	As needed
PRODUCTION	Tail		8320	19943	1200	1.24	14.4	1488	35	Tail: 50:50:2 Class H Blend	As needed

Section 5 - Circulating Medium

Mud System Type: Closed

Will an air or gas system be Used? NO

Description of the equipment for the circulating system in accordance with Onshore Order #2:

Diagram of the equipment for the circulating system in accordance with Onshore Order #2:

Describe what will be on location to control well or mitigate other conditions: Sufficient mud materials to maintain mud properties and meet minimum lost circulation and weight increase requirements will be kept on location at all times

Describe the mud monitoring system utilized: PVT/Pason/Visual Monitoring

Circulating Medium Table

Top Depth	Bottom Depth	Mud Type	Min Weight (lbs/gal)	Max Weight (lbs/gal)	Density (lbs/cu ft)	Gel Strength (lbs/100 sqft)	PH	Viscosity (CP)	Salinity (ppm)	Filtration (cc)	Additional Characteristics
815	8820	OTHER : Diesel Brine Emulsion	8.6	9.4							Diesel Brine Emulsion
8820	19943	OIL-BASED MUD	10.5	12							OBM
0	815	WATER-BASED MUD	8.4	8.6							Fresh water gel

Section 6 - Test, Logging, Coring

List of production tests including testing procedures, equipment and safety measures:

None planned

List of open and cased hole logs run in the well:

CEMENT BOND LOG,COMPENSATED NEUTRON LOG,GAMMA RAY LOG,

Coring operation description for the well:

None planned

Section 7 - Pressure

Anticipated Bottom Hole Pressure: 5900 **Anticipated Surface Pressure:** 3816

Anticipated Bottom Hole Temperature(F): 155

Anticipated abnormal pressures, temperatures, or potential geologic hazards? NO

Describe:

Contingency Plans geoharzards description:

Contingency Plans geohazards attachment:

Hydrogen Sulfide drilling operations plan required? YES

Hydrogen sulfide drilling operations plan:

COG_Tomahawk_701H_H2S_Schem_20200325141803.pdf

COG_Tomahawk_701H_H2S_SUP_20200325141811.pdf

Section 8 - Other Information

Proposed horizontal/directional/multi-lateral plan submission:

COG_TOMAHAWK_701H_Direct_Plan_Plot_20200325141837.pdf

COG_TOMAHAWK_701H_Direct_Plan_20200325141906.pdf

COG_TOMAHAWK_701H_AC_RPT_20200325141912.pdf

Other proposed operations facets description:

Drilling Plan attached.
GCP attached.
Cement Plan attached.

Other proposed operations facets attachment:

COG_TOMAHAWK_701H_Cement_Plan_20200325142040.pdf

COG_TOMAHAWK_701H_Drilling_Plan_20200325142050.pdf

COG_Tomahawk_701H_GCP_20200325142145.pdf

Other Variance attachment:

Operator Name: COG OPERATING LLC

Well Name: TOMAHAWK FEDERAL UNIT **Well Number:** 701H

Section 1 - Existing Roads

Will existing roads be used? YES

Existing Road Map:

COG_Tomahawk_701H_Vicinity_Map_20200325142550.pdf

Existing Road Purpose: ACCESS,FLUID TRANSPORT **Row(s) Exist?** NO

ROW ID(s)

ID:

Do the existing roads need to be improved? YES

Existing Road Improvement Description: Existing roads will be maintained in the same condition or better.

Existing Road Improvement Attachment:

Section 2 - New or Reconstructed Access Roads

Will new roads be needed? YES

New Road Map:

COG_Tomahawk_701H_Road_Plat_Maps_20200325142613.pdf

New road type: RESOURCE

Length: 26 Feet **Width (ft.):** 30

Max slope (%): 33 **Max grade (%):** 1

Army Corp of Engineers (ACOE) permit required? N

ACOE Permit Number(s):

New road travel width: 14

New road access erosion control: Water will be diverted where necessary to avoid ponding, prevent erosion, maintain good drainage, and to be consistent with local drainage patterns.

New road access plan or profile prepared? N

New road access plan attachment:

Access road engineering design? N

Access road engineering design attachment:

Turnout? N

Access surfacing type: OTHER

Access topsoil source: ONSITE

Access surfacing type description: Caliche

Access onsite topsoil source depth: 6

Offsite topsoil source description:

Onsite topsoil removal process: Blading

Access other construction information: No turnouts are planned.

Access miscellaneous information:

Number of access turnouts: **Access turnout map:**

Drainage Control

New road drainage crossing: OTHER

Drainage Control comments: None necessary

Road Drainage Control Structures (DCS) description: None needed.

Road Drainage Control Structures (DCS) attachment:

Access Additional Attachments

Section 3 - Location of Existing Wells

Existing Wells Map? YES

Attach Well map:

COG_Tomahawk_701H_1_Mile__Data_20200325142643.pdf

Section 4 - Location of Existing and/or Proposed Production Facilities

Submit or defer a Proposed Production Facilities plan? SUBMIT

Production Facilities description: The new Tomahawk Fed Unit 20 O Central Tank Battery (CTB) proposed in Sec. 20, T24S, R28E will be utilized for the production of 10 Wolfcamp wells. Each well head will be connected to a buried 4 FP 601HT that will be used to carry oil, water and gas production from each wellhead to the inlet manifold of the CTB; the route for these flowlines will follow the flowline corridor route as shown in the exhibit drawing and in the attached plats. Additionally, each well pad will have one buried 6 FP 150 line for gas lift supply from the CTB; the route for this gas lift line will start on the CTB pad where designated by gas line in the exhibit drawing and then following the flowline corridor in the attached plats.
Production Facilities map:

COG_Tomahawk_701H_CTB_Flowline_Powerline_20200325143354.pdf
COG_Tomahawk_Federal_Unit_20_O_CTB_Schematic_20200325143519.pdf

Section 5 - Location and Types of Water Supply

Water Source Table

Water source type: OTHER

Describe type: Brine Water

Water source use type: INTERMEDIATE/PRODUCTION CASING

Source latitude: **Source longitude:**

Source datum:

Water source permit type: PRIVATE CONTRACT

Water source transport method: TRUCKING

Source land ownership: COMMERCIAL

Source transportation land ownership: COMMERCIAL

Water source volume (barrels): 30000 **Source volume (acre-feet):** 3.866793

Source volume (gal): 1260000

Water source type: OTHER

Describe type: Fresh Water

Water source use type: ICE PAD CONSTRUCTION & MAINTENANCE
STIMULATION
SURFACE CASING

Source latitude: **Source longitude:**

Source datum:

Water source permit type: PRIVATE CONTRACT

Water source transport method: PIPELINE

Source land ownership: PRIVATE

Source transportation land ownership: PRIVATE

Water source volume (barrels): 450000 **Source volume (acre-feet):** 58.001892

Source volume (gal): 18900000

Water source and transportation map:

COG_Tomahawk_701H_Brine_H2O_20200325143700.pdf
COG_Tomahawk_701H_Fresh_H2O_20200325143712.pdf

Water source comments: See attached maps

New water well? N

New Water Well Info

Well latitude: **Well Longitude:** **Well datum:**

Well target aquifer:

Est. depth to top of aquifer(ft): **Est thickness of aquifer:**

Aquifer comments:

Aquifer documentation:

Well depth (ft): **Well casing type:**

Well casing outside diameter (in.): **Well casing inside diameter (in.):**

New water well casing? **Used casing source:**

Drilling method: **Drill material:**

Grout material: **Grout depth:**

Casing length (ft.): **Casing top depth (ft.):**

Well Production type: **Completion Method:**

Water well additional information:

State appropriation permit:

Additional information attachment:

Section 6 - Construction Materials

Using any construction materials: YES

Construction Materials description: Caliche will be obtained from the actual well site. If caliche does not exist or is not plentiful from the well site, the caliche source will be from the Hayhurst Caliche Pit located in Sec 18-T24S-R28E.

Construction Materials source location attachment:

Section 7 - Methods for Handling Waste

Waste type: DRILLING

Waste content description: Drilling fluids and produced oil land water while drilling and completion operations

Amount of waste: 6000 barrels

Waste disposal frequency : One Time Only

Safe containment description: All drilling waste will be stored safely and disposed of properly

Safe containmant attachment:

Waste disposal type: HAUL TO COMMERCIAL FACILITY **Disposal location ownership:** COMMERCIAL

Disposal type description:

Disposal location description: Trucked to an approved disposal facility

Waste type: SEWAGE

Waste content description: Human waste and gray water

Amount of waste: 1000 gallons

Waste disposal frequency : One Time Only

Safe containment description: Waste will be properly contained and disposed of properly at a state approved disposal facility.

Safe containmant attachment:

Waste disposal type: HAUL TO COMMERCIAL FACILITY **Disposal location ownership:** PRIVATE

Disposal type description:

Disposal location description: Trucked to an approved disposal facility

Waste type: GARBAGE

Waste content description: Garbage and trash produced during drilling and completion operations.

Amount of waste: 500 pounds

Waste disposal frequency : One Time Only

Safe containment description: Garbage and trash produced during drilling and completion operations will be collected in a trash container and disposed of properly at a state approved disposal facility

Safe containmant attachment:

Waste disposal type: HAUL TO COMMERCIAL FACILITY **Disposal location ownership:** COMMERCIAL

Disposal type description:

Disposal location description: Trucked to an approved disposal facility.

Reserve Pit

Reserve Pit being used? NO

Temporary disposal of produced water into reserve pit? NO

Reserve pit length (ft.) **Reserve pit width (ft.)**

Reserve pit depth (ft.) **Reserve pit volume (cu. yd.)**

Is at least 50% of the reserve pit in cut?

Reserve pit liner

Reserve pit liner specifications and installation description

Cuttings Area

Cuttings Area being used? NO

Are you storing cuttings on location? Y

Description of cuttings location Roll off cutting containers on tracks

Cuttings area length (ft.) **Cuttings area width (ft.)**

Cuttings area depth (ft.) **Cuttings area volume (cu. yd.)**

Is at least 50% of the cuttings area in cut?

WCuttings area liner

Cuttings area liner specifications and installation description

Section 8 - Ancillary Facilities

Are you requesting any Ancillary Facilities?: N

Ancillary Facilities attachment:

Comments: Gas Capture Plan attached

Section 9 - Well Site Layout

Well Site Layout Diagram:

COG_Tomahawk_701H_Layout_20200325143751.pdf

Comments:

Section 10 - Plans for Surface Reclamation

Type of disturbance: New Surface Disturbance

Multiple Well Pad Name: Tomahawk Federal Unit

Multiple Well Pad Number: 701H and 702H

Recontouring attachment:

COG_Tomahawk_701H_Reclamation_20200326142029.pdf

Drainage/Erosion control construction: Proper erosion control methods will be used at the well site to control erosion, runoff, and siltation of the surrounding area. Straw waddles will be used as necessary at the well site to reduce sediment impacts to fragile/sensitive soils.

Drainage/Erosion control reclamation: The interim reclamation will be monitored periodically to ensure that vegetation has re-established and that erosion is controlled.

Operator Name: COG OPERATING LLC

Well Name: TOMAHAWK FEDERAL UNIT **Well Number:** 701H

Well pad proposed disturbance (acres): 3.67
Road proposed disturbance (acres): 0.01
Powerline proposed disturbance (acres): 2.62
Pipeline proposed disturbance (acres): 1.44
Other proposed disturbance (acres): 5.74
Total proposed disturbance: 13.48

Well pad interim reclamation (acres): 0.06
Road interim reclamation (acres): 0.01
Powerline interim reclamation (acres): 2.62
Pipeline interim reclamation (acres): 1.44
Other interim reclamation (acres): 5.74
Total interim reclamation: 9.870000000000001

Well pad long term disturbance (acres): 3.21
Road long term disturbance (acres): 0.01
Powerline long term disturbance (acres): 2.62
Pipeline long term disturbance (acres): 1.44
Other long term disturbance (acres): 5.74
Total long term disturbance: 13.02

Disturbance Comments:

Reconstruction method: If needed, portions of the pad not needed for production operations will be re-contoured to its original state as much as possible. The caliche that is removed will be reused. The stockpiled topsoil will be spread out over reclaimed area and reseeded with BLM approved seed mixture.
Topsoil redistribution: East

Soil treatment: None

Existing Vegetation at the well pad: Shinnery Oak/Mesquite grassland

Existing Vegetation at the well pad attachment:

Existing Vegetation Community at the road: Shinnery Oak/Mesquite grassland

Existing Vegetation Community at the road attachment:

Existing Vegetation Community at the pipeline: Shinnery Oak/Mesquite grassland

Existing Vegetation Community at the pipeline attachment:

Existing Vegetation Community at other disturbances: N/A

Existing Vegetation Community at other disturbances attachment:

Non native seed used? N

Non native seed description:

Seedling transplant description:

Will seedlings be transplanted for this project? N

Seedling transplant description attachment:

Will seed be harvested for use in site reclamation? N

Seed harvest description:

Seed harvest description attachment:

TOMAHAWK FEDERAL UNIT 701H_1 MILE DATA (20-368E)

FID	WELL_NAME	OPERATOR	API	SECTION	TOWNSHIP	RANGE	FTG_NS	NS_CD	FTG_EW	EW_CD	LATITUDE	LONGITUDE	COMPL_STAT
0	REED 001	C J FREDERICK	3001502508	28	24.0S	28E	1980	S	1980	W	32.186715	-104.094658	Plugged
1	RICHARDSON ; BA 001	BURGETT EVERETT	3001502511	5	25.0S	28E	1980	N	660	E	32.161123	-104.103156	Plugged
2	HUBER STATE 001	DINERO OPERATING CO	3001523881	32	24.0S	28E	660	N	1980	W	32.179479	-104.111753	Plugged
3	PARDUE 19 COM 001	LEGEND NATURAL GAS III LIMITED PARTNERSHIP	3001524013	19	24.0S	28E	1980	S	660	E	32.201468	-104.120375	Active
4	FEDERAL 28 001	ROBERT N ENFIELD	3001520956	28	24.0S	28E	1980	S	330	W	32.186696	-104.100017	Plugged
5	COLT STATE 001	LEGEND NATURAL GAS III LIMITED PARTNERSHIP	3001535557	5	25.0S	28E	1980	N	660	W	32.161147	-104.116097	Active
6	GOODNIGHT FEDERAL 001	MOREXCO INC	3001535601	30	24.0S	28E	2080	N	660	E	32.190307	-104.120334	Active
7	WILLOW LAKE 20 FEDERAL 001	MOREXCO INC	3001533209	20	24.0S	28E	1910	N	1838	E	32.205367	-104.107179	Active
8	OXY STENT FEDERAL 001	OCCIDENTAL PERMIAN LTD	3001534333	21	24.0S	28E	660	S	1400	W	32.197789	-104.096628	Active
9	PARDUE FARMS 29 002	MOREXCO INC	3001534366	29	24.0S	28E	1980	N	1650	W	32.190572	-104.112831	Active
10	OPL NEW ZIPPER FEDERAL 001	OCCIDENTAL PERMIAN LTD	3001533531	21	24.0S	28E	990	S	990	E	32.19877	-104.087339	Active
11	PARDUE FARMS 29 001	LEGEND NATURAL GAS III LIMITED PARTNERSHIP	3001533537	29	24.0S	28E	754	N	2013	E	32.193909	-104.107689	Active
12	PARDUE FARMS 29 003	MOREXCO INC	3001534858	29	24.0S	28E	660	N	660	W	32.194222	-104.116048	Active
13	NEW MAN FEDERAL COM 001	LEGEND NATURAL GAS III LIMITED PARTNERSHIP	3001534903	20	24.0S	28E	1905	S	660	E	32.201189	-104.103335	Active
14	SECOND CHANCE FEDERAL COM 001	LEGEND NATURAL GAS III LIMITED PARTNERSHIP	3001533852	29	24.0S	28E	700	S	700	E	32.183184	-104.103333	Active
15	EKG FEE 001	LEGEND NATURAL GAS III LIMITED PARTNERSHIP	3001533907	29	24.0S	28E	1980	N	1980	W	32.190565	-104.111759	Active
16	REALLY SCARY FEDERAL 003H	MARBOB ENERGY CORP	3001536372	33	24.0S	28E	430	S	2310	W	32.16773	-104.09348	New (Not drilled or compl)
17	HORSESHOE LAKE STATE 001	LEGEND NATURAL GAS III LIMITED PARTNERSHIP	3001536918	32	24.0S	28E	1980	S	660	E	32.172008	-104.103144	New (Not drilled or compl)
18	FULL CHOKE COM 001	LEGEND NATURAL GAS III LIMITED PARTNERSHIP	3001535270	32	24.0S	28E	660	N	1340	W	32.179487	-104.113832	Active
19	WINCHESTER 5 STATE 001	LEGEND NATURAL GAS III LIMITED PARTNERSHIP	3001535342	5	25.0S	28E	1004	S	1986	W	32.154669	-104.111884	Plugged
20	MOSSBERG FEDERAL 001	OXY USA WTP LIMITED PARTNERSHIP	3001535401	28	24.0S	28E	660	S	810	W	32.183073	-104.098427	Plugged
21	SECOND CHANCE FEDERAL COM 002	LEGEND NATURAL GAS III LIMITED PARTNERSHIP	3001536866	29	24.0S	28E	1960	S	1290	W	32.18669	-104.113998	New (Not drilled or compl)
22	MOSSBERG FEDERAL 001Y	OXY USA WTP LIMITED PARTNERSHIP	3001535533	28	24.0S	28E	725	S	809	W	32.183252	-104.098432	Active
23	SPANKY FEDERAL COM 001	MARBOB ENERGY CORP	3001536895	33	24.0S	28E	1980	N	660	W	32.175815	-104.098875	New (Not drilled or compl)
24	HIGH BRASS FEE 001	LEGEND NATURAL GAS III LIMITED PARTNERSHIP	3001533952	20	24.0S	28E	1980	N	1980	W	32.205167	-104.111823	Active
25	PARDUE 29 FEDERAL COM 004H	LEGEND NATURAL GAS III LIMITED PARTNERSHIP	3001542422	29	24.0S	28E	45	N	1290	W	32.195899	-104.114002	Unknown
26	BROWNING FEDERAL COM 006H	LEGEND NATURAL GAS III LIMITED PARTNERSHIP	3001542443	20	24.0S	28E	110	N	1350	E	32.210317	-104.105615	Unknown
27	STENT 21 FEDERAL COM 002H	OCCIDENTAL PERMIAN LTD	3001541221	21	24.0S	28E	50	S	2000	W	32.196128	-104.094671	Unknown
28	BUCKSHOT STATE COM 002H	LEGEND NATURAL GAS III LIMITED PARTNERSHIP	3001541093	31	24.0S	28E	330	S	620	E	32.167504	-104.120177	Unknown
29	PARDUE 29 FEDERAL COM 007H	LEGEND NATURAL GAS III LIMITED PARTNERSHIP	3001542423	29	24.0S	28E	45	N	1580	E	32.195848	-104.106299	Unknown
30	PARDUE 29 FEDERAL COM 008H	LEGEND NATURAL GAS III LIMITED PARTNERSHIP	3001542424	29	24.0S	28E	45	N	1640	E	32.19585	-104.106494	Unknown
31	KAYRO 4 STATE COM 001H	DEVON ENERGY PRODUCTION COMPANY, LP	3001541292	4	25.0S	28E	207	N	1980	E	32.165976	-104.090206	Unknown
32	BROWNING FEDERAL COM 005H	LEGEND NATURAL GAS III LIMITED PARTNERSHIP	3001542442	20	24.0S	28E	110	N	1290	E	32.210317	-104.10542	Unknown
33	FULL CHOKE FEDERAL COM 004H	LEGEND NATURAL GAS III LIMITED PARTNERSHIP	3001542583	32	24.0S	28E	280	S	1165	E	32.167338	-104.104763	Unknown
34	COLT STATE COM 002H	LEGEND NATURAL GAS III LIMITED PARTNERSHIP	3001540862	5	25.0S	28E	330	N	380	W	32.165684	-104.116941	Unknown
35	HIGH BRASS 002H	LEGEND NATURAL GAS III LIMITED PARTNERSHIP	3001540865	20	24.0S	28E	330	S	2256	W	32.19691	-104.110869	Unknown
36	FULL CHOKE FEDERAL COM 006H	LEGEND NATURAL GAS III LIMITED PARTNERSHIP	3001542577	5	25.0S	28E	290	N	1060	W	32.16579	-104.114732	Unknown
37	FULL CHOKE FEDERAL COM 005H	LEGEND NATURAL GAS III LIMITED PARTNERSHIP	3001542576	5	25.0S	28E	290	N	1030	W	32.16579	-104.114829	Unknown
38	FULL CHOKE COM 003H	LEGEND NATURAL GAS III LIMITED PARTNERSHIP	3001540907	32	24.0S	28E	216	S	654	E	32.167159	-104.103103	Unknown
39	FULL CHOKE COM 002H	LEGEND NATURAL GAS III LIMITED PARTNERSHIP	3001540906	32	24.0S	28E	330	S	380	W	32.167498	-104.11693	Unknown
40	REALLY SCARY FEDERAL 006H	COG OPERATING LLC	3001542663	33	24.0S	28E	360	N	380	W	32.180265	-104.099804	Unknown
41	REALLY SCARY FEDERAL COM 002H	COG OPERATING LLC	3001541411	33	24.0S	28E	190	S	1683	W	32.167074	-104.095513	Unknown
42	HIGH BRASS 003H	LEGEND NATURAL GAS III LIMITED PARTNERSHIP	3001542266	20	24.0S	28E	45	S	1290	W	32.196147	-104.114002	Unknown
43	EKG SWD 001	LEGEND NATURAL GAS III LIMITED PARTNERSHIP	3001542227	29	24.0S	28E	1810	N	1980	W	32.191033	-104.111759	Unknown
44	COLT STATE COM 003H	LEGEND NATURAL GAS III LIMITED PARTNERSHIP	3001542256	5	25.0S	28E	290	N	1000	W	32.16579	-104.114926	Unknown
45	KANSAS 21 28 W0LM FEDERAL COM #002H 002H	MEWBOURNE OIL CO	3001546016	21	24S	28E	2635	N	360	W	32.203333	-104.100042	New (Not drilled or compl)
46	DEVON 6 FEE 001H	OCCIDENTAL PERMIAN LTD	3001543010	6	25.0S	28E	660	N	150	E	32.16478	-104.118675	Unknown
47	PARDUE 29 FEDERAL COM 006H	LEGEND NATURAL GAS III LIMITED PARTNERSHIP	3001542793	29	24.0S	28E	45	N	1610	E	32.195849	-104.106397	Unknown
48	PARDUE 29 FEDERAL COM 005H	LEGEND NATURAL GAS III LIMITED PARTNERSHIP	3001542792	29	24.0S	28E	45	N	1307	W	32.195899	-104.113947	Unknown
49	FULL CHOKE SWD 007	LEGEND NATURAL GAS III LIMITED PARTNERSHIP	3001542796	32	24.0S	28E	510	N	1340	W	32.179899	-104.113832	Unknown
50	BROWNING FEDERAL COM 004H	LEGEND NATURAL GAS III LIMITED PARTNERSHIP	3001542791	20	24.0S	28E	110	N	1307	E	32.210317	-104.105476	Unknown
51	BUCKWHEAT 33 FEDERAL 002H	COG OPERATING LLC	3001540241	33	24.0S	28E	380	S	990	E	32.167588	-104.086999	Unknown
52	REALLY SCARY FEDERAL 004H	COG OPERATING LLC	3001541670	33	24.0S	28E	250	S	2293	E	32.167233	-104.09123	Unknown

53	NERMAL 4 STATE 001H	DEVON ENERGY PRODUCTION COMPANY, LP	3001541239	4	25.0S	28E	207	N	1980	W	32.165981	-104.094551 Unknown
54	COLT STATE SWD 004	LEGEND NATURAL GAS III LIMITED PARTNERSHIP	3001541401	5	25.0S	28E	1066	N	850	W	32.163658	-104.115444 Unknown
55	DEVON 6 W2AD FEE 001H	MEWBOURNE OIL CO	3001543661	6	25.0S	28E	440	N	185	E	32.16537	-104.118806 Unknown
56	CREEDENCE 21 16 W0ED STATE COM 002H	MEWBOURNE OIL CO	3001544871	21	24.0S	28E	2435	N	360	W	32.203767	-104.10007 Unknown
57	CREEDENCE 21 16 W2ED STATE COM 001H	MEWBOURNE OIL CO	3001544887	21	24.0S	28E	2435	N	330	W	32.203767	-104.100168 Unknown
58	CREEDENCE 21 16 B3GB STATE COM 001H	MEWBOURNE OIL CO	3001545144	21	24.0S	28E	2630	N	2015	E	32.203252	-104.090742 Unknown
59	RICK DECKARD STATE 25 28 4 WD 003H	MARATHON OIL PERMIAN LLC	3001545346	4	25.0S	28E	820	N	1622	W	32.164154	-104.0957 Unknown
60	RICK DECKARD STATE 25 28 4 WA 002H	MARATHON OIL PERMIAN LLC	3001545344	4	25.0S	28E	820	N	1682	W	32.164155	-104.095505 Unknown
61	RICK DECKARD STATE 25 28 4 WA 009H	MARATHON OIL PERMIAN LLC	3001545345	4	25.0S	28E	820	N	1742	W	32.164156	-104.09531 Unknown
62	RICK DECKARD STATE 25 28 4 WXY 006H	MARATHON OIL PERMIAN LLC	3001545347	4	25.0S	28E	820	N	1652	W	32.164154	-104.095602 Unknown
63	RICK DECKARD STATE 25 28 4 WXY 008H	MARATHON OIL PERMIAN LLC	3001545348	4	25.0S	28E	820	N	1712	W	32.164155	-104.095408 Unknown
64	KANSAS 21 28 W2LM FEDERAL COM 001H	MEWBOURNE OIL CO	3001545763	21	24.0S	28E	2635	N	330	W	32.203217	-104.100165 Unknown

COG Operating, LLC - Tomahawk Federal Unit #701H

1. Geologic Formations

TVD of target	9,448' EOL	Pilot hole depth	NA
MD at TD:	19,943'	Deepest expected fresh water:	50'

Formation	Depth (TVD) from KB	Water/Mineral Bearing/ Target Zone?	Hazards*
Quaternary Fill	Surface	Water	
Rustler	400	Water	
Top of Salt	926	Salt	
Base of Salt	2352	Salt	
Lamar	2559	Salt Water	
Bell Canyon	2595	Salt Water	
Cherry Canyon	3377	Oil/Gas	
Brushy Canyon	4574	Oil/Gas	
Bone Spring Lime	6091	Oil/Gas	
U. Avalon Shale	6284	Oil/Gas	
L. Avalon Shale	6666	Oil/Gas	
1st Bone Spring Sand	7049	Oil/Gas	
2nd Bone Spring Sand	7793	Oil/Gas	
3rd Bone Spring Sand	8969	Oil/Gas	
Wolfcamp	9341	Target Oil/Gas	

2. Casing Program

Hole Size	Casing Interval		Csg. Size	Weight (lbs)	Grade	Conn.	SF Collapse	SF Burst	SF Tension
	From	To							
14.75	0	815	10.75	45.5	J55	STC	5.73	11.30	13.29
9.875	0	8820	7.625	29.7	HCL80	BTC	2.01	1.49	2.75
6.75	0	19,943	5.5”	23	P110	SF Torq	2.47	2.93	3.02
			BLM Minimum Safety Factor				1.125	1	1.6 Dry 1.8 Wet

Intermediate casing will be kept at least 1/3 full while running casing.to mitigate collapse. Intermediate burst based on 0.7 frac gradient at the shoe with Gas Gradient 0.1 psi/ft to surface.
All casing strings will be tested in accordance with Onshore Oil and Gas Order #2 III.B.1.h

COG Operating, LLC - Tomahawk Federal Unit #701H

	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).	Y
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?	N
If yes, are there two strings cemented to surface?	
(For 2 string wells) If yes, is there a contingency casing if lost circulation occurs?	
Is well located in critical Cave/Karst?	N
If yes, are there three strings cemented to surface?	

3. Cementing Program

Casing	# Sks	Wt. lb/ gal	Yld ft3/ sack	H_20 gal/sk	500# Comp. Strength (hours)	Slurry Description
Surf.	300	13.5	1.75	9	12	Lead: Class C + 4% Gel
	250	14.8	1.34	6.34	8	Tail: Class C + 2% CaCl2
Inter.	1400	11	2.8	19	48	Lead: NeoCem
	300	16.4	1.1	5	8	Tail: Class H
5.5 Prod	750	12.7	2	10.6	16	Lead: 35:65:6 H Blend
	1200	14.4	1.24	5.7	19	Tail: 50:50:2 Class H Blend

Volumes Subject to Observed Hole Conditions and/or Fluid Caliper Results
Lab reports with the 500 psi compressive strength time for the cement will be onsite for review.

Casing String	TOC	% Excess
Surface	0’	50%
1st Intermediate	0’	50%
Production	8,320'	35%

NORTHERN DELAWARE BASIN

EDDY COUNTY, NM
ATLAS
TOMAHAWK FEDERAL UNIT #701H

OWB

Plan: PWP1

Standard Survey Report

17 March, 2020

Concho Resources LLC

Survey Report

Company:	NORTHERN DELAWARE BASIN	**Local Co-ordinate Reference:**	Well TOMAHAWK FEDERAL UNIT #701H
Project:	EDDY COUNTY, NM	**TVD Reference:**	KB=24' @ 3066.4usft (ENSIGN 155)
Site:	ATLAS	**MD Reference:**	KB=24' @ 3066.4usft (ENSIGN 155)
Well:	TOMAHAWK FEDERAL UNIT #701H	**North Reference:**	Grid
Wellbore:	OWB	**Survey Calculation Method:**	Minimum Curvature
Design:	PWP1	**Database:**	edm

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		

Well	TOMAHAWK FEDERAL UNIT #701H				
Well Position	**+N/-S**	0.0 usft	**Northing:**	435,431.90 usft	**Latitude:**	32° 11' 48.883 N
	+E/-W	0.0 usft	**Easting:**	570,856.90 usft	**Longitude:**	104° 6' 15.365 W
Position Uncertainty		3.0 usft	**Wellhead Elevation:**	usft	**Ground Level:**	3,042.4 usft

Wellbore	OWB				
Magnetics	**Model Name**	**Sample Date**	**Declination (°)**	**Dip Angle (°)**	**Field Strength (nT)**
	IGRF2015	3/16/2020	6.90	59.92	47,586.55317276

Design	PWP1				
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	177.32

Survey Tool Program **Date** 3/17/2020

From (usft)	**To (usft)**	**Survey (Wellbore)**	**Tool Name**	**Description**
0.0	8,824.0	PWP1 (OWB)	Standard Keeper 104	Standard Wireline Keeper ver 1.0.4
8,824.0	19,943.1	PWP1 (OWB)	MWD+IFR1+FDIR	OWSG MWD + IFR1 + FDIR Correction

Planned Survey

Measured Depth (usft)	**Inclination (°)**	**Azimuth (°)**	**Vertical Depth (usft)**	**+N/-S (usft)**	**+E/-W (usft)**	**Vertical Section (usft)**	**Dogleg Rate (°/100usft)**	**Build Rate (°/100usft)**	**Turn Rate (°/100usft)**
0.0	0.00	0.00	0.0	0.0	0.0	0.0	0.00	0.00	0.00
100.0	0.00	0.00	100.0	0.0	0.0	0.0	0.00	0.00	0.00
200.0	0.00	0.00	200.0	0.0	0.0	0.0	0.00	0.00	0.00
300.0	0.00	0.00	300.0	0.0	0.0	0.0	0.00	0.00	0.00
400.0	0.00	0.00	400.0	0.0	0.0	0.0	0.00	0.00	0.00
500.0	0.00	0.00	500.0	0.0	0.0	0.0	0.00	0.00	0.00
600.0	0.00	0.00	600.0	0.0	0.0	0.0	0.00	0.00	0.00
700.0	0.00	0.00	700.0	0.0	0.0	0.0	0.00	0.00	0.00
800.0	0.00	0.00	800.0	0.0	0.0	0.0	0.00	0.00	0.00
900.0	0.00	0.00	900.0	0.0	0.0	0.0	0.00	0.00	0.00
1,000.0	0.00	0.00	1,000.0	0.0	0.0	0.0	0.00	0.00	0.00
1,100.0	0.00	0.00	1,100.0	0.0	0.0	0.0	0.00	0.00	0.00
1,200.0	0.00	0.00	1,200.0	0.0	0.0	0.0	0.00	0.00	0.00
1,300.0	0.00	0.00	1,300.0	0.0	0.0	0.0	0.00	0.00	0.00
1,400.0	0.00	0.00	1,400.0	0.0	0.0	0.0	0.00	0.00	0.00

Concho Resources LLC

Survey Report

Company:	NORTHERN DELAWARE BASIN	**Local Co-ordinate Reference:**	Well TOMAHAWK FEDERAL UNIT #701H
Project:	EDDY COUNTY, NM	**TVD Reference:**	KB=24' @ 3066.4usft (ENSIGN 155)
Site:	ATLAS	**MD Reference:**	KB=24' @ 3066.4usft (ENSIGN 155)
Well:	TOMAHAWK FEDERAL UNIT #701H	**North Reference:**	Grid
Wellbore:	OWB	**Survey Calculation Method:**	Minimum Curvature
Design:	PWP1	**Database:**	edm

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)
1,500.0	0.00	0.00	1,500.0	0.0	0.0	0.0	0.00	0.00	0.00
1,600.0	0.00	0.00	1,600.0	0.0	0.0	0.0	0.00	0.00	0.00
1,700.0	0.00	0.00	1,700.0	0.0	0.0	0.0	0.00	0.00	0.00
1,800.0	0.00	0.00	1,800.0	0.0	0.0	0.0	0.00	0.00	0.00
1,900.0	0.00	0.00	1,900.0	0.0	0.0	0.0	0.00	0.00	0.00
2,000.0	0.00	0.00	2,000.0	0.0	0.0	0.0	0.00	0.00	0.00
2,100.0	0.00	0.00	2,100.0	0.0	0.0	0.0	0.00	0.00	0.00
2,200.0	0.00	0.00	2,200.0	0.0	0.0	0.0	0.00	0.00	0.00
2,300.0	0.00	0.00	2,300.0	0.0	0.0	0.0	0.00	0.00	0.00
2,400.0	0.00	0.00	2,400.0	0.0	0.0	0.0	0.00	0.00	0.00
2,500.0	0.00	0.00	2,500.0	0.0	0.0	0.0	0.00	0.00	0.00
2,600.0	0.00	0.00	2,600.0	0.0	0.0	0.0	0.00	0.00	0.00
2,700.0	0.00	0.00	2,700.0	0.0	0.0	0.0	0.00	0.00	0.00
2,800.0	0.00	0.00	2,800.0	0.0	0.0	0.0	0.00	0.00	0.00
2,900.0	0.00	0.00	2,900.0	0.0	0.0	0.0	0.00	0.00	0.00
3,000.0	0.00	0.00	3,000.0	0.0	0.0	0.0	0.00	0.00	0.00
3,100.0	0.00	0.00	3,100.0	0.0	0.0	0.0	0.00	0.00	0.00
3,200.0	0.00	0.00	3,200.0	0.0	0.0	0.0	0.00	0.00	0.00
3,300.0	0.00	0.00	3,300.0	0.0	0.0	0.0	0.00	0.00	0.00
3,400.0	0.00	0.00	3,400.0	0.0	0.0	0.0	0.00	0.00	0.00
3,500.0	0.00	0.00	3,500.0	0.0	0.0	0.0	0.00	0.00	0.00
3,600.0	0.00	0.00	3,600.0	0.0	0.0	0.0	0.00	0.00	0.00
3,700.0	0.00	0.00	3,700.0	0.0	0.0	0.0	0.00	0.00	0.00
3,800.0	0.00	0.00	3,800.0	0.0	0.0	0.0	0.00	0.00	0.00
3,900.0	0.00	0.00	3,900.0	0.0	0.0	0.0	0.00	0.00	0.00
4,000.0	0.00	0.00	4,000.0	0.0	0.0	0.0	0.00	0.00	0.00
4,100.0	0.00	0.00	4,100.0	0.0	0.0	0.0	0.00	0.00	0.00
4,200.0	0.00	0.00	4,200.0	0.0	0.0	0.0	0.00	0.00	0.00
4,300.0	0.00	0.00	4,300.0	0.0	0.0	0.0	0.00	0.00	0.00
4,400.0	0.00	0.00	4,400.0	0.0	0.0	0.0	0.00	0.00	0.00
4,500.0	0.00	0.00	4,500.0	0.0	0.0	0.0	0.00	0.00	0.00
4,600.0	0.00	0.00	4,600.0	0.0	0.0	0.0	0.00	0.00	0.00
4,700.0	0.00	0.00	4,700.0	0.0	0.0	0.0	0.00	0.00	0.00
4,800.0	0.00	0.00	4,800.0	0.0	0.0	0.0	0.00	0.00	0.00
4,900.0	0.00	0.00	4,900.0	0.0	0.0	0.0	0.00	0.00	0.00
5,000.0	0.00	0.00	5,000.0	0.0	0.0	0.0	0.00	0.00	0.00
5,100.0	0.00	0.00	5,100.0	0.0	0.0	0.0	0.00	0.00	0.00
5,200.0	0.00	0.00	5,200.0	0.0	0.0	0.0	0.00	0.00	0.00
5,300.0	0.00	0.00	5,300.0	0.0	0.0	0.0	0.00	0.00	0.00
5,400.0	0.00	0.00	5,400.0	0.0	0.0	0.0	0.00	0.00	0.00
5,500.0	0.00	0.00	5,500.0	0.0	0.0	0.0	0.00	0.00	0.00
Start Build 2.00									
5,600.0	2.00	135.00	5,600.0	-1.2	1.2	1.3	2.00	2.00	0.00

Concho Resources LLC

Survey Report

Company:	NORTHERN DELAWARE BASIN	**Local Co-ordinate Reference:**	Well TOMAHAWK FEDERAL UNIT #701H
Project:	EDDY COUNTY, NM	**TVD Reference:**	KB=24' @ 3066.4usft (ENSIGN 155)
Site:	ATLAS	**MD Reference:**	KB=24' @ 3066.4usft (ENSIGN 155)
Well:	TOMAHAWK FEDERAL UNIT #701H	**North Reference:**	Grid
Wellbore:	OWB	**Survey Calculation Method:**	Minimum Curvature
Design:	PWP1	**Database:**	edm

Planned Survey

Measured Depth (usft)	Inclination (°)	Azimuth (°)	Vertical Depth (usft)	+N/-S (usft)	+E/-W (usft)	Vertical Section (usft)	Dogleg Rate (°/100usft)	Build Rate (°/100usft)	Turn Rate (°/100usft)
5,700.0	4.00	135.00	5,699.8	-4.9	4.9	5.2	2.00	2.00	0.00
5,750.0	5.00	135.00	5,749.7	-7.7	7.7	8.1	2.00	2.00	0.00
Start 3180.7 hold at 5750.0 MD									
5,800.0	5.00	135.00	5,799.5	-10.8	10.8	11.3	0.00	0.00	0.00
5,900.0	5.00	135.00	5,899.1	-17.0	17.0	17.7	0.00	0.00	0.00
6,000.0	5.00	135.00	5,998.7	-23.1	23.1	24.2	0.00	0.00	0.00
6,100.0	5.00	135.00	6,098.4	-29.3	29.3	30.6	0.00	0.00	0.00
6,200.0	5.00	135.00	6,198.0	-35.4	35.4	37.1	0.00	0.00	0.00
6,300.0	5.00	135.00	6,297.6	-41.6	41.6	43.5	0.00	0.00	0.00
6,400.0	5.00	135.00	6,397.2	-47.8	47.8	49.9	0.00	0.00	0.00
6,500.0	5.00	135.00	6,496.8	-53.9	53.9	56.4	0.00	0.00	0.00
6,600.0	5.00	135.00	6,596.4	-60.1	60.1	62.8	0.00	0.00	0.00
6,700.0	5.00	135.00	6,696.1	-66.3	66.3	69.3	0.00	0.00	0.00
6,800.0	5.00	135.00	6,795.7	-72.4	72.4	75.7	0.00	0.00	0.00
6,900.0	5.00	135.00	6,895.3	-78.6	78.6	82.2	0.00	0.00	0.00
7,000.0	5.00	135.00	6,994.9	-84.7	84.7	88.6	0.00	0.00	0.00
7,100.0	5.00	135.00	7,094.5	-90.9	90.9	95.1	0.00	0.00	0.00
7,200.0	5.00	135.00	7,194.2	-97.1	97.1	101.5	0.00	0.00	0.00
7,300.0	5.00	135.00	7,293.8	-103.2	103.2	107.9	0.00	0.00	0.00
7,400.0	5.00	135.00	7,393.4	-109.4	109.4	114.4	0.00	0.00	0.00
7,500.0	5.00	135.00	7,493.0	-115.6	115.6	120.8	0.00	0.00	0.00
7,600.0	5.00	135.00	7,592.6	-121.7	121.7	127.3	0.00	0.00	0.00
7,700.0	5.00	135.00	7,692.3	-127.9	127.9	133.7	0.00	0.00	0.00
7,800.0	5.00	135.00	7,791.9	-134.0	134.0	140.2	0.00	0.00	0.00
7,900.0	5.00	135.00	7,891.5	-140.2	140.2	146.6	0.00	0.00	0.00
8,000.0	5.00	135.00	7,991.1	-146.4	146.4	153.1	0.00	0.00	0.00
8,100.0	5.00	135.00	8,090.7	-152.5	152.5	159.5	0.00	0.00	0.00
8,200.0	5.00	135.00	8,190.4	-158.7	158.7	165.9	0.00	0.00	0.00
8,300.0	5.00	135.00	8,290.0	-164.9	164.9	172.4	0.00	0.00	0.00
8,400.0	5.00	135.00	8,389.6	-171.0	171.0	178.8	0.00	0.00	0.00
8,500.0	5.00	135.00	8,489.2	-177.2	177.2	185.3	0.00	0.00	0.00
8,600.0	5.00	135.00	8,588.8	-183.3	183.3	191.7	0.00	0.00	0.00
8,700.0	5.00	135.00	8,688.5	-189.5	189.5	198.2	0.00	0.00	0.00
8,800.0	5.00	135.00	8,788.1	-195.7	195.7	204.6	0.00	0.00	0.00
8,900.0	5.00	135.00	8,887.7	-201.8	201.8	211.1	0.00	0.00	0.00
8,930.7	5.00	135.00	8,918.3	-203.7	203.7	213.0	0.00	0.00	0.00
Start DLS 10.00 TFO 31.35									
9,000.0	11.49	153.36	8,986.8	-212.0	209.0	221.6	10.00	9.37	26.50
9,100.0	21.35	159.59	9,082.6	-238.1	219.8	248.1	10.00	9.86	6.23
9,200.0	31.30	161.97	9,172.2	-279.9	234.2	290.6	10.00	9.95	2.39
9,300.0	41.27	163.29	9,252.7	-336.4	251.8	347.8	10.00	9.97	1.32
9,400.0	51.25	164.17	9,321.7	-405.7	272.0	417.9	10.00	9.98	0.88
9,500.0	61.23	164.83	9,377.2	-485.7	294.1	498.9	10.00	9.99	0.66
9,600.0	71.22	165.37	9,417.5	-574.0	317.6	588.2	10.00	9.99	0.54

Concho Resources LLC

Survey Report

Company:	NORTHERN DELAWARE BASIN	**Local Co-ordinate Reference:**	Well TOMAHAWK FEDERAL UNIT #701H
Project:	EDDY COUNTY, NM	**TVD Reference:**	KB=24' @ 3066.4usft (ENSIGN 155)
Site:	ATLAS	**MD Reference:**	KB=24' @ 3066.4usft (ENSIGN 155)
Well:	TOMAHAWK FEDERAL UNIT #701H	**North Reference:**	Grid
Wellbore:	OWB	**Survey Calculation Method:**	Minimum Curvature
Design:	PWP1	**Database:**	edm

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)
9,700.0	81.21	165.85	9,441.3	-668.0	341.7	683.2	10.00	9.99	0.48
9,786.8	89.88	166.25	9,448.0	-751.9	362.6	768.0	10.00	9.99	0.46
Start DLS 2.00 TFO 90.03									
9,800.0	89.88	166.51	9,448.0	-764.7	365.7	781.0	2.00	0.00	2.00
9,900.0	89.88	168.51	9,448.3	-862.3	387.3	879.5	2.00	0.00	2.00
10,000.0	89.88	170.51	9,448.5	-960.6	405.5	978.6	2.00	0.00	2.00
10,100.0	89.88	172.51	9,448.7	-1,059.5	420.2	1,078.0	2.00	0.00	2.00
10,200.0	89.88	174.51	9,448.9	-1,158.9	431.5	1,177.8	2.00	0.00	2.00
10,300.0	89.88	176.51	9,449.1	-1,258.6	439.4	1,277.8	2.00	0.00	2.00
10,400.0	89.88	178.51	9,449.3	-1,358.5	443.7	1,377.8	2.00	0.00	2.00
10,454.4	89.88	179.60	9,449.5	-1,412.9	444.6	1,432.1	2.00	0.00	2.00
Start 9488.6 hold at 10454.4 MD									
10,500.0	89.88	179.60	9,449.5	-1,458.5	444.9	1,477.7	0.00	0.00	0.00
10,600.0	89.88	179.60	9,449.8	-1,558.5	445.6	1,577.6	0.00	0.00	0.00
10,700.0	89.88	179.60	9,450.0	-1,658.5	446.3	1,677.5	0.00	0.00	0.00
10,800.0	89.88	179.60	9,450.2	-1,758.5	447.0	1,777.5	0.00	0.00	0.00
10,900.0	89.88	179.60	9,450.4	-1,858.5	447.7	1,877.4	0.00	0.00	0.00
11,000.0	89.88	179.60	9,450.6	-1,958.5	448.4	1,977.3	0.00	0.00	0.00
11,100.0	89.88	179.60	9,450.8	-2,058.5	449.1	2,077.2	0.00	0.00	0.00
11,200.0	89.88	179.60	9,451.1	-2,158.5	449.8	2,177.1	0.00	0.00	0.00
11,300.0	89.88	179.60	9,451.3	-2,258.5	450.5	2,277.1	0.00	0.00	0.00
11,400.0	89.88	179.60	9,451.5	-2,358.5	451.1	2,377.0	0.00	0.00	0.00
11,500.0	89.88	179.60	9,451.7	-2,458.5	451.8	2,476.9	0.00	0.00	0.00
11,600.0	89.88	179.60	9,451.9	-2,558.5	452.5	2,576.8	0.00	0.00	0.00
11,700.0	89.88	179.60	9,452.1	-2,658.4	453.2	2,676.7	0.00	0.00	0.00
11,800.0	89.88	179.60	9,452.4	-2,758.4	453.9	2,776.7	0.00	0.00	0.00
11,900.0	89.88	179.60	9,452.6	-2,858.4	454.6	2,876.6	0.00	0.00	0.00
12,000.0	89.88	179.60	9,452.8	-2,958.4	455.3	2,976.5	0.00	0.00	0.00
12,100.0	89.88	179.60	9,453.0	-3,058.4	456.0	3,076.4	0.00	0.00	0.00
12,200.0	89.88	179.60	9,453.2	-3,158.4	456.7	3,176.3	0.00	0.00	0.00
12,300.0	89.88	179.60	9,453.4	-3,258.4	457.4	3,276.3	0.00	0.00	0.00
12,400.0	89.88	179.60	9,453.7	-3,358.4	458.1	3,376.2	0.00	0.00	0.00
12,500.0	89.88	179.60	9,453.9	-3,458.4	458.8	3,476.1	0.00	0.00	0.00
12,600.0	89.88	179.60	9,454.1	-3,558.4	459.5	3,576.0	0.00	0.00	0.00
12,700.0	89.88	179.60	9,454.3	-3,658.4	460.2	3,675.9	0.00	0.00	0.00
12,800.0	89.88	179.60	9,454.5	-3,758.4	460.9	3,775.9	0.00	0.00	0.00
12,900.0	89.88	179.60	9,454.7	-3,858.4	461.5	3,875.8	0.00	0.00	0.00
13,000.0	89.88	179.60	9,455.0	-3,958.4	462.2	3,975.7	0.00	0.00	0.00
13,100.0	89.88	179.60	9,455.2	-4,058.4	462.9	4,075.6	0.00	0.00	0.00
13,200.0	89.88	179.60	9,455.4	-4,158.4	463.6	4,175.5	0.00	0.00	0.00
13,300.0	89.88	179.60	9,455.6	-4,258.4	464.3	4,275.5	0.00	0.00	0.00
13,400.0	89.88	179.60	9,455.8	-4,358.4	465.0	4,375.4	0.00	0.00	0.00
13,500.0	89.88	179.60	9,456.0	-4,458.4	465.7	4,475.3	0.00	0.00	0.00

Concho Resources LLC

Survey Report

Company:	NORTHERN DELAWARE BASIN	**Local Co-ordinate Reference:**	Well TOMAHAWK FEDERAL UNIT #701H
Project:	EDDY COUNTY, NM	**TVD Reference:**	KB=24' @ 3066.4usft (ENSIGN 155)
Site:	ATLAS	**MD Reference:**	KB=24' @ 3066.4usft (ENSIGN 155)
Well:	TOMAHAWK FEDERAL UNIT #701H	**North Reference:**	Grid
Wellbore:	OWB	**Survey Calculation Method:**	Minimum Curvature
Design:	PWP1	**Database:**	edm

Planned Survey

Measured Depth (usft)	Inclination (°)	Azimuth (°)	Vertical Depth (usft)	+N/-S (usft)	+E/-W (usft)	Vertical Section (usft)	Dogleg Rate (°/100usft)	Build Rate (°/100usft)	Turn Rate (°/100usft)
13,600.0	89.88	179.60	9,456.3	-4,558.4	466.4	4,575.2	0.00	0.00	0.00
13,700.0	89.88	179.60	9,456.5	-4,658.4	467.1	4,675.1	0.00	0.00	0.00
13,800.0	89.88	179.60	9,456.7	-4,758.4	467.8	4,775.1	0.00	0.00	0.00
13,900.0	89.88	179.60	9,456.9	-4,858.4	468.5	4,875.0	0.00	0.00	0.00
14,000.0	89.88	179.60	9,457.1	-4,958.4	469.2	4,974.9	0.00	0.00	0.00
14,100.0	89.88	179.60	9,457.3	-5,058.4	469.9	5,074.8	0.00	0.00	0.00
14,200.0	89.88	179.60	9,457.6	-5,158.4	470.6	5,174.7	0.00	0.00	0.00
14,300.0	89.88	179.60	9,457.8	-5,258.4	471.3	5,274.7	0.00	0.00	0.00
14,400.0	89.88	179.60	9,458.0	-5,358.4	472.0	5,374.6	0.00	0.00	0.00
14,500.0	89.88	179.60	9,458.2	-5,458.4	472.6	5,474.5	0.00	0.00	0.00
14,600.0	89.88	179.60	9,458.4	-5,558.4	473.3	5,574.4	0.00	0.00	0.00
14,700.0	89.88	179.60	9,458.6	-5,658.4	474.0	5,674.3	0.00	0.00	0.00
14,800.0	89.88	179.60	9,458.9	-5,758.4	474.7	5,774.3	0.00	0.00	0.00
14,900.0	89.88	179.60	9,459.1	-5,858.4	475.4	5,874.2	0.00	0.00	0.00
15,000.0	89.88	179.60	9,459.3	-5,958.4	476.1	5,974.1	0.00	0.00	0.00
15,100.0	89.88	179.60	9,459.5	-6,058.4	476.8	6,074.0	0.00	0.00	0.00
15,200.0	89.88	179.60	9,459.7	-6,158.4	477.5	6,174.0	0.00	0.00	0.00
15,300.0	89.88	179.60	9,459.9	-6,258.4	478.2	6,273.9	0.00	0.00	0.00
15,400.0	89.88	179.60	9,460.2	-6,358.4	478.9	6,373.8	0.00	0.00	0.00
15,500.0	89.88	179.60	9,460.4	-6,458.3	479.6	6,473.7	0.00	0.00	0.00
15,600.0	89.88	179.60	9,460.6	-6,558.3	480.3	6,573.6	0.00	0.00	0.00
15,700.0	89.88	179.60	9,460.8	-6,658.3	481.0	6,673.6	0.00	0.00	0.00
15,800.0	89.88	179.60	9,461.0	-6,758.3	481.7	6,773.5	0.00	0.00	0.00
15,900.0	89.88	179.60	9,461.2	-6,858.3	482.4	6,873.4	0.00	0.00	0.00
16,000.0	89.88	179.60	9,461.5	-6,958.3	483.1	6,973.3	0.00	0.00	0.00
16,100.0	89.88	179.60	9,461.7	-7,058.3	483.7	7,073.2	0.00	0.00	0.00
16,200.0	89.88	179.60	9,461.9	-7,158.3	484.4	7,173.2	0.00	0.00	0.00
16,300.0	89.88	179.60	9,462.1	-7,258.3	485.1	7,273.1	0.00	0.00	0.00
16,400.0	89.88	179.60	9,462.3	-7,358.3	485.8	7,373.0	0.00	0.00	0.00
16,500.0	89.88	179.60	9,462.5	-7,458.3	486.5	7,472.9	0.00	0.00	0.00
16,600.0	89.88	179.60	9,462.8	-7,558.3	487.2	7,572.8	0.00	0.00	0.00
16,700.0	89.88	179.60	9,463.0	-7,658.3	487.9	7,672.8	0.00	0.00	0.00
16,800.0	89.88	179.60	9,463.2	-7,758.3	488.6	7,772.7	0.00	0.00	0.00
16,900.0	89.88	179.60	9,463.4	-7,858.3	489.3	7,872.6	0.00	0.00	0.00
17,000.0	89.88	179.60	9,463.6	-7,958.3	490.0	7,972.5	0.00	0.00	0.00
17,100.0	89.88	179.60	9,463.8	-8,058.3	490.7	8,072.4	0.00	0.00	0.00
17,200.0	89.88	179.60	9,464.1	-8,158.3	491.4	8,172.4	0.00	0.00	0.00
17,300.0	89.88	179.60	9,464.3	-8,258.3	492.1	8,272.3	0.00	0.00	0.00
17,400.0	89.88	179.60	9,464.5	-8,358.3	492.8	8,372.2	0.00	0.00	0.00
17,500.0	89.88	179.60	9,464.7	-8,458.3	493.5	8,472.1	0.00	0.00	0.00
17,600.0	89.88	179.60	9,464.9	-8,558.3	494.1	8,572.0	0.00	0.00	0.00
17,700.0	89.88	179.60	9,465.1	-8,658.3	494.8	8,672.0	0.00	0.00	0.00
17,800.0	89.88	179.60	9,465.4	-8,758.3	495.5	8,771.9	0.00	0.00	0.00
17,900.0	89.88	179.60	9,465.6	-8,858.3	496.2	8,871.8	0.00	0.00	0.00

Concho Resources LLC

Survey Report

Company:	NORTHERN DELAWARE BASIN	**Local Co-ordinate Reference:**	Well TOMAHAWK FEDERAL UNIT #701H
Project:	EDDY COUNTY, NM	**TVD Reference:**	KB=24' @ 3066.4usft (ENSIGN 155)
Site:	ATLAS	**MD Reference:**	KB=24' @ 3066.4usft (ENSIGN 155)
Well:	TOMAHAWK FEDERAL UNIT #701H	**North Reference:**	Grid
Wellbore:	OWB	**Survey Calculation Method:**	Minimum Curvature
Design:	PWP1	**Database:**	edm

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)
18,000.0	89.88	179.60	9,465.8	-8,958.3	496.9	8,971.7	0.00	0.00	0.00
18,100.0	89.88	179.60	9,466.0	-9,058.3	497.6	9,071.6	0.00	0.00	0.00
18,200.0	89.88	179.60	9,466.2	-9,158.3	498.3	9,171.6	0.00	0.00	0.00
18,300.0	89.88	179.60	9,466.4	-9,258.3	499.0	9,271.5	0.00	0.00	0.00
18,400.0	89.88	179.60	9,466.7	-9,358.3	499.7	9,371.4	0.00	0.00	0.00
18,500.0	89.88	179.60	9,466.9	-9,458.3	500.4	9,471.3	0.00	0.00	0.00
18,600.0	89.88	179.60	9,467.1	-9,558.3	501.1	9,571.2	0.00	0.00	0.00
18,700.0	89.88	179.60	9,467.3	-9,658.3	501.8	9,671.2	0.00	0.00	0.00
18,800.0	89.88	179.60	9,467.5	-9,758.3	502.5	9,771.1	0.00	0.00	0.00
18,900.0	89.88	179.60	9,467.7	-9,858.3	503.2	9,871.0	0.00	0.00	0.00
19,000.0	89.88	179.60	9,468.0	-9,958.3	503.9	9,970.9	0.00	0.00	0.00
19,100.0	89.88	179.60	9,468.2	-10,058.3	504.6	10,070.8	0.00	0.00	0.00
19,200.0	89.88	179.60	9,468.4	-10,158.3	505.2	10,170.8	0.00	0.00	0.00
19,300.0	89.88	179.60	9,468.6	-10,258.2	505.9	10,270.7	0.00	0.00	0.00
19,400.0	89.88	179.60	9,468.8	-10,358.2	506.6	10,370.6	0.00	0.00	0.00
19,500.0	89.88	179.60	9,469.0	-10,458.2	507.3	10,470.5	0.00	0.00	0.00
19,600.0	89.88	179.60	9,469.3	-10,558.2	508.0	10,570.4	0.00	0.00	0.00
19,700.0	89.88	179.60	9,469.5	-10,658.2	508.7	10,670.4	0.00	0.00	0.00
19,800.0	89.88	179.60	9,469.7	-10,758.2	509.4	10,770.3	0.00	0.00	0.00
19,900.0	89.88	179.60	9,469.9	-10,858.2	510.1	10,870.2	0.00	0.00	0.00
19,943.1	89.88	179.60	9,470.0	-10,901.3	510.4	10,913.2	0.00	0.00	0.00
TD at 19943.1									

Design Targets

Target Name - hit/miss target - Shape	Dip Angle (°)	Dip Dir. (°)	TVD (usft)	+N/-S (usft)	+E/-W (usft)	Northing (usft)	Easting (usft)	Latitude	Longitude
FTP (TOMAHAWK FE	0.00	0.00	9,448.0	-424.3	438.1	435,007.60	571,295.00	32° 11' 44.675 N	104° 6' 10.277 W
- plan misses target center by 171.3usft at 9508.1usft MD (9381.1 TVD, -492.6 N, 296.0 E)									
- Circle (radius 50.0)									
LTP (TOMAHAWK FE	0.00	0.00	9,470.0	-10,771.3	518.1	424,660.60	571,375.02	32° 10' 2.275 N	104° 6' 9.604 W
- plan misses target center by 8.6usft at 19813.1usft MD (9469.7 TVD, -10771.4 N, 509.5 E)									
- Point									
PBHL (TOMAHAWK F	-0.12	359.60	9,470.0	-10,901.3	510.4	424,530.60	571,367.30	32° 10' 0.989 N	104° 6' 9.697 W
- plan hits target center									
- Rectangle (sides W100.0 H10,477.3 D20.0)									

Concho Resources LLC

Survey Report

Company:	NORTHERN DELAWARE BASIN	**Local Co-ordinate Reference:**	Well TOMAHAWK FEDERAL UNIT #701H
Project:	EDDY COUNTY, NM	**TVD Reference:**	KB=24' @ 3066.4usft (ENSIGN 155)
Site:	ATLAS	**MD Reference:**	KB=24' @ 3066.4usft (ENSIGN 155)
Well:	TOMAHAWK FEDERAL UNIT #701H	**North Reference:**	Grid
Wellbore:	OWB	**Survey Calculation Method:**	Minimum Curvature
Design:	PWP1	**Database:**	edm

Plan Annotations

Measured Depth (usft)	Vertical Depth (usft)	Local Coordinates +N/-S (usft)	Local Coordinates +E/-W (usft)	Comment
5500	5500	0	0	Start Build 2.00
5750	5750	-8	8	Start 3180.7 hold at 5750.0 MD
8931	8918	-204	204	Start DLS 10.00 TFO 31.35
9787	9448	-752	363	Start DLS 2.00 TFO 90.03
10,454	9449	-1413	445	Start 9488.6 hold at 10454.4 MD
19,943	9470	-10,901	510	TD at 19943.1

Checked By: _____ Approved By: _____ Date: _____

COG OPERATING LLC
HYDROGEN SULFIDE DRILLING OPERATIONS PLAN

1. HYDROGEN SULFIDE TRAINING

All personnel, whether regularly assigned, contracted, or employed on an unscheduled basis, will receive training from a qualified instructor in the following areas prior to commencing drilling operations on this well:

a. The hazards and characteristics of hydrogen sulfide (H_2S).
b. The proper use and maintenance of personal protective equipment and life support systems.
c. The proper use of H_2S detectors, alarms, warning systems, briefing areas, evacuation procedures, and prevailing winds.
d. The proper techniques for first aid and rescue procedures.

In addition, supervisory personnel will be trained in the following areas:

a. The effects of H2S on metal components. If high tensile tubulars are to be used, personnel will be trained in their special maintenance requirements.
b. Corrective action and shut-in procedures when drilling or reworking a well and blowout prevention and well control procedures.
c. The contents and requirements of the H_2S Drilling Operations Plan and the Public Protection Plan.

There will be an initial training session just prior to encountering a known or probable H2S zone (within 3 days or 500 feet) and weekly H2S and well control drills for all personnel in each crew. The initial training session shall include a review of the site specific H2S Drilling Operations Plan and the Public Protection Plan. This plan shall be available at the well site. All personnel will be required to carry documentation that they have received the proper training.

2. H_2S SAFETY EQUIPMENT AND SYSTEMS

Note: All H_2S safety equipment and systems will be installed, tested, and operational when drilling reaches a depth of 500 feet above, or three days prior to penetrating the first zone containing or reasonably expected to contain H2S. If H2S greater than 100 ppm is encountered in the gas stream we will shut in and install H2S equipment.

a. Well Control Equipment:
   Flare line.
   Choke manifold with remotely operated choke.
   Blind rams and pipe rams to accommodate all pipe sizes with properly sized closing unit.
   Auxiliary equipment to include: annular preventer, mud-gas separator, rotating head.

b. Protective equipment for essential personnel:
Mark II Surviveair 30-minute units located in the dog house and at briefing areas.

c. H2S detection and monitoring equipment:
2 - portable H2S monitor positioned on location for best coverage and response. These units have warning lights and audible sirens when H2S levels of 20 ppm are reached.

d. Visual warning systems:
Caution/Danger signs shall be posted on roads providing direct access to location. Signs will be painted a high visibility yellow with black lettering of sufficient size to be readable at a reasonable distance from the immediate location. Bilingual signs will be used, when appropriate. See example attached.

e. Mud Program:
The mud program has been designed to minimize the volume of H2S circulated to the surface.

f. Metallurgy:
All drill strings, casings, tubing, wellhead, blowout preventers, drilling spool, kill lines, choke manifold and lines, and valves shall be suitable for H2S service.

g. Communication:
Company vehicles equipped with cellular telephone.

COG OPERATING LLC has conducted a review to determine if an H2S contingency plan is required for the above referenced well. We were able to conclude that any potential hazardous volume would be minimal. H2S concentrations of wells in this area from surface to TD are low enough; therefore, we do not believe that an H2S contingency plan is necessary.

W A R N I N G

YOU ARE ENTERING AN H_2S AREA
AUTHORIZED PERSONNEL ONLY

1. ***BEARDS OR CONTACT LENSES NOT ALLOWED***
2. ***HARD HATS REQUIRED***
3. ***SMOKING IN DESIGNATED AREAS ONLY***
4. ***BE WIND CONSCIOUS AT ALL TIMES***
5. ***CK WITH COG OPERATING LLC FOREMAN AT MAIN OFFICE***

COG OPERATING LLC

1-575-748-6940

EMERGENCY CALL LIST

	OFFICE	MOBILE
COG OPERATING LLC OFFICE	575-748-6940	
SETH WILD	432-683-7443	432-528-3633
WALTER ROYE	575-748-6940	432-934-1886

EMERGENCY RESPONSE NUMBERS

	OFFICE
STATE POLICE	575-748-9718
EDDY COUNTY SHERIFF	575-746-2701
EMERGENCY MEDICAL SERVICES (AMBULANCE)	911 or 575-746-2701
EDDY COUNTY EMERGENCY MANAGEMENT (HARRY BURGESS)	575-887-9511
STATE EMERGENCY RESPONSE CENTER (SERC)	575-476-9620
CARLSBAD POLICE DEPARTMENT	575-885-2111
CARLSBAD FIRE DEPARTMENT	575-885-3125
NEW MEXICO OIL CONSERVATION DIVISION	575-748-1283
INDIAN FIRE & SAFETY	800-530-8693
HALLIBURTON SERVICES	800-844-8451

PECOS DISTRICT
DRILLING OPERATIONS
CONDITIONS OF APPROVAL

OPERATOR'S NAME:	**COG Operating LLC**
LEASE NO.:	**NMNM092757**
WELL NAME & NO.:	**Tomahawk Federal Unit 701H**
SURFACE HOLE FOOTAGE:	**412' FSL & 1106' FEL**
BOTTOM HOLE FOOTAGE	**200' FSL & 670' FEL**
LOCATION:	**Section 20, T 24S, R 28E, NMPM**
COUNTY:	**Eddy County, New Mexico**

H2S	○ Yes	◉ No	
Potash	◉ None	○ Secretary	○ R-111-P
Cave/Karst Potential	○ Low	◉ Medium	○ High
Variance	○ None	◉ Flex Hose	○ Other
Wellhead	◉ Conventional	○ Multibowl	○ Both
Other	☐ 4 String Area	☐ Capitan Reef	☐ WIPP
Other	☐ Fluid Filled	☐ Cement Squeeze	☐ Pilot Hole
Special Requirements	☐ Water Disposal	☐ COM	☑ Unit

A. HYDROGEN SULFIDE

1. Hydrogen Sulfide (H2S) monitors shall be installed prior to drilling out the surface shoe. If H2S is detected in concentrations greater than 100 ppm, the Hydrogen Sulfide area shall meet Onshore Order 6 requirements, which includes equipment and personnel/public protection items. If Hydrogen Sulfide is encountered, provide measured values and formations to the BLM.

B. CASING

1. The **10-3/4"** surface casing shall be set a minimum of 25' above the top of the salt and cemented to surface.
   a. **If cement does not circulate to 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 **6 hours** after pumping cement, ideally between 8-10 hours after.
   b. WOC time for a primary cement job will be a minimum of **8 hours** or **500 psi** compressive strength, whichever is greater. This is to include the lead cement.
   c. If cement falls back, remedial cementing will be done prior to drilling out the shoe.
   d. WOC time for a remedial job will be a minimum of 4 hours after bringing cement to surface or 500 psi compressive strength, whichever is greater.

2. The **7-5/8"** intermediate casing shall be set be cemented to surface.

   a. **If cement does not circulate to surface,** see B.1.a, c & d.

3. The **5-1/2"** production casing shall be cemented with at least **200' tie-back** into the previous casing. Operator shall provide method of verification.

   a. 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.

C. 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.

2. Minimum working pressure of the blowout preventer (BOP) and related equipment (BOPE) required for drilling below the intermediate casing shoe shall be **5000 (5M)** psi.

D. SPECIAL REQUIREMENTS

2. The well sign for a unit well shall include the unit number (when applied for) in addition to the surface and bottom hole lease numbers. This also applies to participating area numbers. If a participating area has not been established, the operator can use the general unit designation, but will replace the unit number with the participating area number once it has been established.

   a. A commercial well determination shall be submit after production has been established for at least six months. Secondary recovery unit wells are exempt from this requirement.

DR 9/1/2020

GENERAL REQUIREMENTS

1. The BLM is to be notified in advance for a representative to witness:
   a. Spudding the well (minimum of 24 hours)
   b. Setting and/or Cementing of all casing strings (minimum of 4 hours)
   c. BOP/BOPE tests (minimum of 4 hours)

      ☒ Eddy County: Call the Carlsbad Field Office, (575) 361-2822

      ☒ Lea County: Call the Hobbs Field Station, (575) 393-3612
2. Unless the production casing has been run and cemented or the well has been properly plugged, the drilling rig shall not be removed from over the hole without prior approval.
   a. In the event the operator has proposed to drill multiple wells utilizing a skid/walking rig. Operator shall secure the wellbore on the current well, after installing and testing the wellhead, by installing a blind flange of like pressure rating to the wellhead and a pressure gauge that can be monitored while drilling is performed on the other well(s).
   b. When the operator proposes to set surface casing with Spudder Rig:
      i. Notify the BLM when moving in and removing the Spudder Rig.
      ii. Notify the BLM when moving in the 2nd Rig. Rig to be moved in within 90 days of notification that Spudder Rig has left the location.
      iii. BOP/BOPE test to be conducted per Onshore Oil and Gas Order No. 2 as soon as 2nd Rig is rigged up on well.
3. Floor controls are required for 3M or Greater systems. These controls will be on the rig floor, unobstructed, readily accessible to the driller and will be operational at all times during drilling and/or completion activities. Rig floor is defined as the area immediately around the rotary table; the area immediately above the substructure on which the draw works are located, this does not include the dog house or stairway area.
4. The record of the drilling rate along with the GR/N well log run from TD to surface (horizontal well – vertical portion of hole) shall be available upon request. The Rustler top and top and bottom of Salt are to be recorded on the Completion Report.

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. The casing intergrity test can be done (prior to the cement setting up) immediately after bumping the plug.

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. The casing intergrity test can be done (prior to the cement setting up) immediately after bumping the plug.
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 the portion of 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: The flex line must meet the requirements of API 16C. 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. If the operator has proposed a multi-bowl wellhead assembly in the APD, it must meet or exceed the pressure rating of the BOP system. Additionally, 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. 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.
    e. Whenever any seal subject to test pressure is broken, all the tests in Onshore Order 2 III.A.2.i must be followed.
5. The appropriate BLM office shall be notified a minimum of 4 hours in advance for a representative to witness the BOP/BOPE 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, except the casing pressure test which can be initiated immediately after bumping the plug (only applies to single-stage cement jobs).
    c. The tests shall be done by an independent service company utilizing a test plug. The results of the test shall be made available upon request.
    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 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. This test shall be performed prior

to the test at full stack pressure.

f. BOP/BOPE must be tested 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.

C. DRILLING MUD

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

D. WASTE MATERIAL AND FLUIDS

1. All waste (i.e. drilling fluids, trash, salts, chemicals, sewage, gray water, etc.) created as a result of drilling operations and completion operations shall be safely contained and disposed of properly at a waste disposal facility. No waste material or fluid shall be disposed of on the well location or surrounding area.
2. Porto-johns and trash containers will be on-location during fracturing operations or any other crew-intensive operations.