

UNITED STATES
DEPARTMENT OF THE INTERIOR
BUREAU OF LAND MANAGEMENT

FORM 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.

OCD Artesia

SUBMIT IN TRIPLICATE - Other instructions on page 2

1. Type of Well <input checked="" type="checkbox"/> Oil Well <input type="checkbox"/> Gas Well <input type="checkbox"/> Other		5. Lease Serial No. NMNM0531277
2. Name of Operator MEWBOURNE OIL COMPANY Contact: JACKIE LATHAN E-Mail: jlathan@mewbourne.com		6. If Indian, Allottee or Tribe Name
3a. Address P O BOX 5270 HOBBS, NM 88241	3b. Phone No. (include area code) Ph: 575-393-5905	7. If Unit or CA/Agreement, Name and/or No. 891012406C
4. Location of Well (Footage, Sec., T., R., M., or Survey Description) Sec 22 T23S R30E SESE 525FSL 496FEL		8. Well Name and No. FORTY NINER RIDGE UNIT 106H
		9. API Well No. 30-015-44204-00-X1
		10. Field and Pool or Exploratory Area FORTY NINER RIDGE
		11. County or Parish, State EDDY COUNTY, NM

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

TYPE OF SUBMISSION	TYPE OF ACTION			
<input checked="" type="checkbox"/> Notice of Intent	<input type="checkbox"/> Acidize	<input type="checkbox"/> Deepen	<input type="checkbox"/> Production (Start/Resume)	<input type="checkbox"/> Water Shut-Off
<input type="checkbox"/> Subsequent Report	<input type="checkbox"/> Alter Casing	<input type="checkbox"/> Hydraulic Fracturing	<input type="checkbox"/> Reclamation	<input type="checkbox"/> Well Integrity
<input type="checkbox"/> Final Abandonment Notice	<input type="checkbox"/> Casing Repair	<input type="checkbox"/> New Construction	<input type="checkbox"/> Recomplete	<input checked="" type="checkbox"/> Other
	<input type="checkbox"/> Change Plans	<input type="checkbox"/> Plug and Abandon	<input type="checkbox"/> Temporarily Abandon	Change to Original APD
	<input type="checkbox"/> Convert to Injection	<input type="checkbox"/> Plug Back	<input type="checkbox"/> 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 recomple 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.

Mewbourne Oil Company has an approved APD for the above well. Mewbourne requests approval to make the following changes:

- 1) Change 7" x 5 1/2" split production casing to 7" production casing with 4 1/2" cemented liner.
- 2) Change cement to suit new casing.
- 3) Change wellhead to multi-bowl type wellhead.

Please see attachments for wellhead schematic, casing & cement information..

Please contact Andy Taylor with any questions.

NM OIL CONSERVATION
ARTESIA DISTRICT

SEP 11 2017

AC 9-12-17
Accepted for record - NMOCD

RECEIVED

14. I hereby certify that the foregoing is true and correct.	
Electronic Submission #379820 verified by the BLM Well Information System For MEWBOURNE OIL COMPANY, sent to the Carlsbad Committed to AFMSS for processing by PRISCILLA PEREZ on 07/07/2017 (17PP0573SE)	
Name (Printed/Typed) ANDREW TAYLOR	Title ENGINEER
Signature (Electronic Submission)	Date 06/26/2017

THIS SPACE FOR FEDERAL OR STATE OFFICE USE

Approved By ZOTA STEVENS	Title PETROLEUM ENGINEER	Date 08/30/2017
Conditions of approval, if any, are attached. Approval of this notice does not warrant or certify that the applicant holds legal or equitable title to those rights in the subject lease which would entitle the applicant to conduct operations thereon.		Office Carlsbad

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.

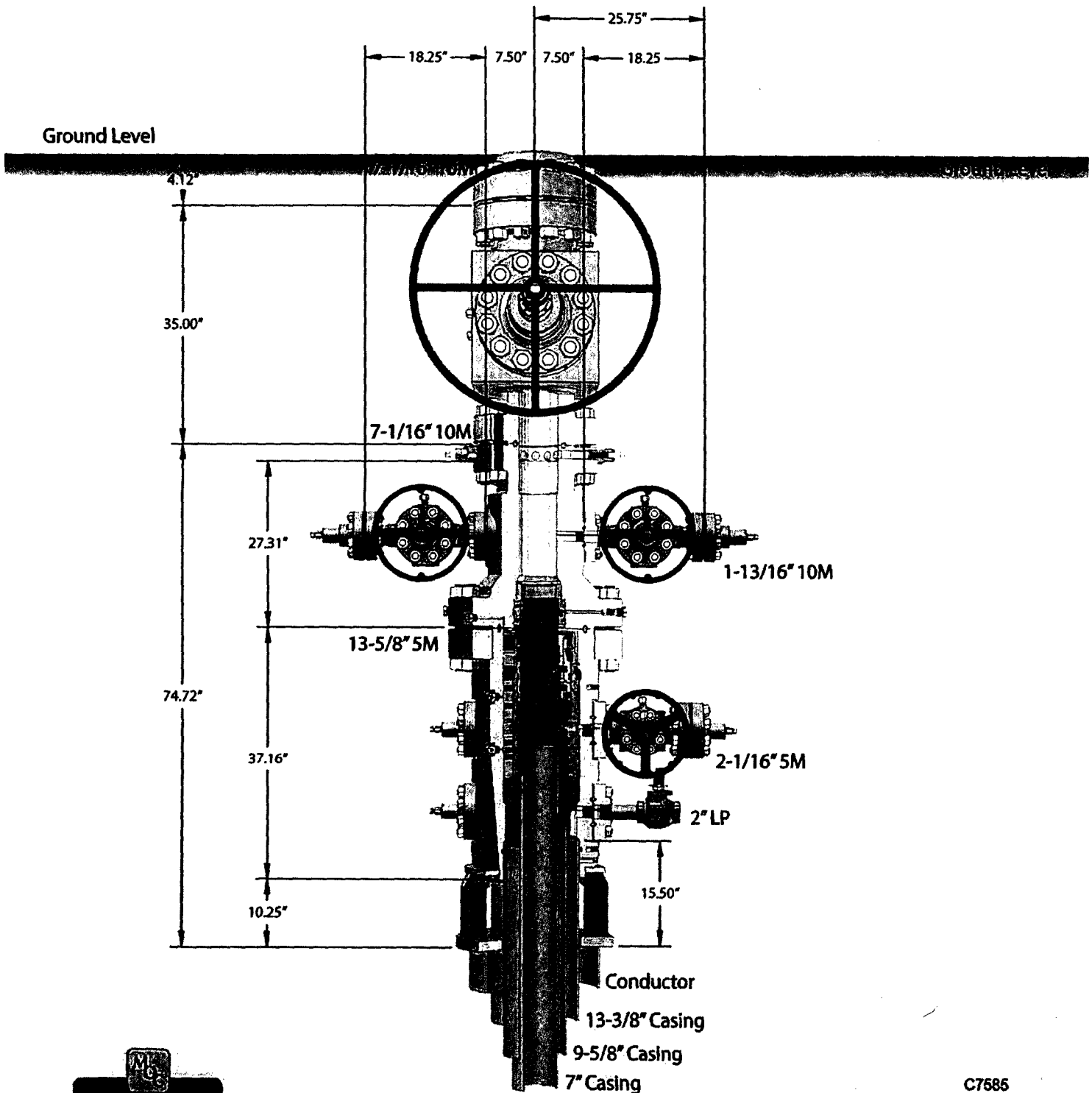
(Instructions on page 2)

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

CAMERON

A Schlumberger Company

13-5/8" MN-DS Wellhead System



C7585
Rev. 02

NOTE: All dimensions on this drawing are estimated measurements and should be evaluated by engineering.



Capping flange 57" conductor cut-off
79

Mewbourne Oil Company, Forty Niner Ridge Unit #106H
Sec 22, T23S, R30E
SL: 525' FSL & 495' FEL, Sec 22
BHL: 100' FNL & 330' FEL, Sec 15

1. Geologic Formations

TVD of target	10962'	Pilot hole depth	NA
MD at TD:	20719'	Deepest expected fresh water:	300'

Basin

Formation	Depth (TVD) from KB	Water/Mineral Bearing/ Target Zone?	Hazards*
Quaternary Fill	Surface		
Rustler			
Top of Salt	470	Salt	
Castile	2289		
Base of Salt	3547		
Yates		Oil	
Lamar	3774		
Cherry Canyon	4702		
Manzanita Marker	4872		
Brushy Canyon	5992		
Bone Spring	7647	Oil/Gas	
1 st Bone Spring Sand	8647		
2 nd Bone Spring Sand	9502		
3 rd Bone Spring Sand	10579	Target Zone	
Abo			
Wolfcamp		Will Not Penetrate	
Devonian			
Fusselman			
Ellenburger			
Granite Wash			

*H₂S, water flows, loss of circulation, abnormal pressures, etc.

Mewbourne Oil Company, Forty Niner Ridge Unit #106H
Sec 22, T23S, R30E
SL: 525' FSL & 495' FEL, Sec 22
BHL: 100' FNL & 330' FEL, Sec 15

2. Casing Program

Hole Size	Casing Interval		Csg. Size	Weight (lbs)	Grade	Conn.	SF Collapse	SF Burst	SF Tension
	From	To							
17.5"	0'	425'	13.375"	48	H40	STC	3.87	8.70	15.78
12.25"	0'	3453'	9.625"	36	J55	LTC	1.13	1.96	3.38
12.25"	3453'	3700'	9.625"	40	J55	LTC	1.34	2.05	52.63
8.75"	0'	11237'	7"	26	HCP110	LTC	1.43	1.83	2.22
6.125"	10485'	20719'	4.5"	13.5	P110	LTC	1.87	2.18	2.45
BLM Minimum Safety Factor			1.125	1	1.6 Dry 1.8 Wet				

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

Must have table for contingency casing

	Y or N
Is casing new? If used, attach certification as required in Onshore Order #1	Y
Is casing API approved? 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 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?	Y
If yes, are the first 2 strings cemented to surface and 3 rd string cement tied back 500' into previous casing?	Y
Is well located in R-111-P and SOPA?	N
If yes, are the first three strings cemented to surface?	
Is 2 nd string set 100' to 600' below the base of salt?	
Is well located in high Cave/Karst?	Y
If yes, are there two strings cemented to surface?	Y
(For 2 string wells) If yes, is there a contingency casing if lost circulation occurs?	
Is well located in critical Cave/Karst?	N
If yes, are there three strings cemented to surface?	

Mewbourne Oil Company, Forty Niner Ridge Unit #106H

Sec 22, T23S, R30E

SL: 525' FSL & 495' FEL, Sec 22

BHL: 100' FNL & 330' FEL, Sec 15

3. Cementing Program

Casing	# Sks	Wt. lb/ gal	Yld ft³/ sack	H₂O gal/ sk	500# Comp. Strength (hours)	Slurry Description
Surf.	160	14.8	2.12	6.3	8	Lead: Class C + Salt + Gel + Extender + LCM
	200	14.8	1.34	6.3	8	Tail: Class C + Retarder
Inter.	580	12.5	2.12	11	10	Lead: Class C + Salt + Gel + Extender + LCM
	200	14.8	1.34	6.3	8	Tail: Class C + Retarder
Prod,	500	12.5	2.12	11	9	Lead: Class C + Gel + Retarder + Defoamer + Extender
	400	15.6	1.18	5.2	10	Tail: Class H + Retarder + Fluid Loss + Defoamer
Liner	415	11.2	2.97	17	16	Class C + Salt + Gel + Fluid Loss + Retarder + Dispersant + Defoamer + Anti-Settling Agent

A copy of cement test will be available on location at time of cement job providing pump times & compressive strengths.

Casing String	TOC	% Excess
Surface	0'	100%
Intermediate	0'	25%
Production	3200'	25%
Liner	10485'	25%

Mewbourne Oil Company, Forty Niner Ridge Unit #106H
Sec 22, T23S, R30E
SL: 525' FSL & 495' FEL, Sec 22
BHL: 100' FNL & 330' FEL, Sec 15

4. Pressure Control Equipment

	Variance: None
--	----------------

BOP installed and tested before drilling which hole?	Size?	System Rated WP	Type	✓	Tested to:
12-1/4"	13-5/8"	5M	Annular	X	2500#
			Blind Ram	X	5000#
			Pipe Ram	X	
			Double Ram		
			Other*		

*Specify if additional ram is utilized.

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

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

X	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. <ul style="list-style-type: none"> Provide description here: See attached schematic.

Mewbourne Oil Company, Forty Niner Ridge Unit #106H
Sec 22, T23S, R30E
SL: 525' FSL & 495' FEL, Sec 22
BHL: 100' FNL & 330' FEL, Sec 15

5. Mud Program

Depth		Type	Weight (ppg)	Viscosity	Water Loss
From	To				
0	425	FW Gel	8.6-8.8	28-34	N/C
425	3700	Saturated Brine	10.0	28-34	N/C
3700	10485	Cut Brine	8.6-9.5	28-34	N/C
10485	20719	OBM	8.6-9.5	30-40	<10cc

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?	Visual Monitoring
---	-------------------

6. Logging and Testing Procedures

Logging, Coring and Testing.	
X	Will run GR/CNL from KOP (10485') to surface (horizontal well – vertical portion of hole). Stated logs run will be in the Completion Report and submitted to the BLM.
	No Logs are planned based on well control or offset log information.
	Drill stem test? If yes, explain
	Coring? If yes, explain

Additional logs planned		Interval
X	Gamma Ray	10485' (KOP) to TD
	Density	
	CBL	
	Mud log	
	PEX	

Mewbourne Oil Company, Forty Niner Ridge Unit #106H
Sec 22, T23S, R30E
SL: 525' FSL & 495' FEL, Sec 22
BHL: 100' FNL & 330' FEL, Sec 15

7. Drilling Conditions

Condition	Specify what type and where?
BH Pressure at deepest TVD	5700 psi
Abnormal Temperature	No

Mitigation measure for abnormal conditions. Describe. Lost circulation material/sweeps/mud scavengers in surface hole.

Hydrogen Sulfide (H ₂ S) monitors will be installed prior to drilling out the surface shoe. If H ₂ S 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.	
	H ₂ S is present
X	H ₂ S Plan attached

8. Other facets of operation

Is this a walking operation? If yes, describe.
 Will be pre-setting casing? If yes, describe.

Attachments

- ☐ Directional Plan
☐ Other, describe

PECOS DISTRICT CONDITIONS OF APPROVAL

OPERATOR'S NAME:	Mewbourne Oil Company
LEASE NO.:	NM0531277
WELL NAME & NO.:	106H-Forty Niner Ridge Unit
SURFACE HOLE FOOTAGE:	525'/S & 496'/E
BOTTOM HOLE FOOTAGE	100'/N & 500'/E
LOCATION:	Section 22, T.23 S., R.30 E., NMPM
COUNTY:	Eddy County, New Mexico

All previous COA still apply except the following:

TABLE OF CONTENTS

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

☒ **Special Requirements**

Units



☒ **Drilling**

Cement Requirements

H2S Requirements

R-111-P-Potash

Medium Cave/Karst

Logging Requirements

Waste Material and Fluids

I. SPECIAL REQUIREMENT(S)

Unit Wells

The well sign for a unit well shall include the unit number 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 when the sign is replaced.

II. DRILLING

A. DRILLING OPERATIONS REQUIREMENTS

The BLM is to be notified in advance for a representative to witness:

- a. Spudding well (minimum of 24 hours)
- b. Setting and/or Cementing of all casing strings (minimum of 4 hours)
- c. BOPE tests (minimum of 4 hours)

☒ **Eddy County**

Call the Carlsbad Field Office, 620 East Greene St., Carlsbad, NM 88220,
(575) 361-2822

1. **Although there are no measured amounts of Hydrogen Sulfide reported, it is always a potential hazard. It is recommended that monitoring equipment be onsite for potential Hydrogen Sulfide. If H₂S is detected in concentrations greater than 100 ppm, the Hydrogen Sulfide area shall meet Onshore Order 6 requirements, which includes equipment and personnel/public protection items. If Hydrogen Sulfide is encountered, report measured amounts and formations to the BLM.**
2. Unless the production casing has been run and cemented or the well has been properly plugged, the drilling rig shall not be removed from over the hole without prior approval. **If the drilling rig is removed without approval – an Incident of Non-Compliance will be written and will be a “Major” violation.**
3. Floor controls are required for 3M or Greater systems. These controls will be on the rig floor, unobstructed, readily accessible to the driller and will be operational at all times during drilling and/or completion activities. Rig floor is defined as the area immediately around the rotary table; the area immediately above the substructure on which the draw works is located, this does not include the dog house or stairway area.
4. **The record of the drilling rate along with the GR/N well log run from TD to surface (horizontal well – vertical portion of hole) shall be submitted to the BLM office as well as all other logs run on the borehole 30 days from completion. If available, a digital copy of the logs is to be submitted in addition to the paper copies. The Rustler top and top and bottom of Salt are to be recorded on the Completion Report.**

B. CASING

Changes to the approved APD casing program need prior approval if the items substituted are of lesser grade or different casing size or are Non-API. The Operator can exchange the components of the proposal with that of superior strength (i.e. changing from J-55 to N-80, or from 36# to 40#). Changes to the approved cement program need prior approval if the altered cement plan has less volume or strength or if the changes are substantial (i.e. Multistage tool, ECP, etc.). The initial wellhead installed on the well will remain on the well with spools used as needed.

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

Wait on cement (WOC) for 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.

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

R-111-P- Potash

Medium Cave/Karst

Possibility of water flows in the Salado and Castile.

Possibility of lost circulation in the Rustler and Delaware.

1. The 13-3/8 inch surface casing shall be set at approximately **425 feet** (a minimum of 25 feet into the Rustler Anhydrite and above the salt) and cemented to the surface. **If salt is encountered, set casing at least 25 feet above the salt.**
 - a. If cement does not circulate to the surface, the appropriate BLM office shall be notified and a temperature survey utilizing an electronic type temperature survey with surface log readout will be used or a cement bond log shall be run to verify the top of the cement. Temperature survey will be run a minimum of six hours after pumping cement and ideally between 8-10 hours after completing the cement job.
 - b. **Wait on cement (WOC) time for a primary cement job is to include the lead cement slurry.**
 - c. Wait on cement (WOC) time for a remedial job will be a minimum of 4 hours after bringing cement to surface or 500 pounds compressive strength, whichever is greater.
 - d. If cement falls back, remedial cementing will be done prior to drilling out that string.

The 9-5/8" casing must be kept liquid filled while running into hole to meet minimum BLM requirements for collapse.

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 and potash. Excess calculates to 21% - Additional cement may be required.**

Centralizers required on horizontal leg, must be type for horizontal service and a minimum of one every other joint.

Formation below the 9 5/8" shoe to be tested according to Onshore Order 2.III.B.1.i. Test to be done as a mud equivalency test using the mud weight necessary for the pore pressure of the formation below the shoe (not the mud weight required to prevent dissolving the salt formation) and the mud weight for the bottom of the hole. Report results to BLM office.

3. The minimum required fill of cement behind the 7 inch production 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 and potash. Additional cement maybe required. Excess cement calculates only -13%.**
4. The minimum required fill of cement behind the 4-1/2 inch production casing is:
☒ Cement should tie-back at least 100 feet into previous casing string. Operator shall provide method of verification.
5. 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.
6. Whenever a casing string is cemented in the R-111-P potash area, the NMOCD requirements shall be followed.

C. PRESSURE CONTROL

1. All blowout preventer (BOP) and related equipment (BOPE) shall comply with well control requirements as described in Onshore Oil and Gas Order No. 2 and API RP 53.
2. Variance approved to use flex line from BOP to choke manifold. Check condition of flexible line from BOP to choke manifold, replace if exterior is damaged or if line fails test. Line to be as straight as possible with no hard bends and is to be anchored according to Manufacturer's requirements. The flexible hose can be exchanged with a hose of equal size and equal or greater pressure rating. **Anchor requirements, specification sheet and hydrostatic pressure test certification matching the hose in service, to be onsite for review. These documents shall be posted in the company man's trailer and on the rig floor.** If the BLM inspector questions the straightness of the hose, a BLM engineer will be contacted and will review in the field or via picture supplied by inspector to determine if changes are required (operator shall expect delays if this occurs).

Operator has proposed a multi-bowl wellhead assembly. This assembly will only be tested when installed on the surface casing. Minimum working pressure of the blowout preventer (BOP) and related equipment (BOPE) required for drilling below the surface casing shoe shall be 5000 (5M) psi.

- 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.**
3. The appropriate BLM office shall be notified a minimum of 4 hours in advance for a representative to witness the tests.
- a. 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.
 - b. The tests shall be done by an independent service company utilizing a test plug.
 - c. The test shall be run on a 5000 psi chart for a 2-3M BOP/BOP, on a 10000 psi chart for a 5M BOP/BOPE and on a 15000 psi chart for a 10M BOP/BOPE. If a linear chart is used, it shall be a one hour chart. A circular chart shall have a maximum 2 hour clock. If a twelve hour or twenty-four hour chart is used, tester shall make a notation that it is run with a two hour clock.
 - d. The results of the test shall be reported to the appropriate BLM office.
 - e. All tests are required to be recorded on a calibrated test chart. **A copy of the BOP/BOPE test chart and a copy of independent service company test will be submitted to the appropriate BLM office.**
 - f. The BOP/BOPE test shall include a low pressure test from 250 to 300 psi. The test will be held for a minimum of 10 minutes if test is done with a test plug and 30 minutes without a test plug. This test shall be performed prior to the test at full stack pressure.

D. DRILL STEM TEST

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

E. WASTE MATERIAL AND FLUIDS

All waste (i.e. drilling fluids, trash, salts, chemicals, sewage, gray water, etc.) created as a result of drilling operations and completion operations shall be safely contained and disposed of properly at a waste disposal facility. No waste material or fluid shall be disposed of on the well location or surrounding area.

Porto-johns and trash containers will be on-location during fracturing operations or any other crew-intensive operations.

ZS 083017

R-111-P: 3 strings circ, a casing seal test of 600psi(hydr) for the surface and 1000 for intermediate, <100psi drop in 30min. High Cave Karst: two casing strings, both to circulate cement to surface.

13 3/8 Segment	surface csg in a #/ft	17 1/2 Grade	inch hole. Coupling	Joint	Design Factors		SURFACE		
"A"	48.00	H 40	ST&C	15.78	Collapse	Burst	Length	Weight	
"B"							425	20,400	
w/8.4#/g mud, 30min Sfc Csg Test psig: 1,026				Tail Cmt	does	circ to sfc.	Totals:	425 20,400	
<u>Comparison of Proposed to Minimum Required Cement Volumes</u>									
Hole Size	Annular Volume	1 Stage Cmt Sx	1 Stage CuFt Cmt	Min Cu Ft	1 Stage % Excess	Drilling Mud Wt	Calc MASP	Req'd BOPE	Min Dist Hole-Cplg
17 1/2	0.6946	360	607	350	74	8.80	1108	2M	1.56

Burst Frac Gradient(s) for Segment(s) A, B = , b All > 0.70, OK.

9 5/8 Segment	casing inside the #/ft	13 3/8 Grade	Coupling	Joint	Design Factors		INTERMEDIATE	
					Collapse	Burst	Length	Weight
"A"	36.00	J 55	ST&C	2.96	1.13	0.65	3,453	124,308
"B"	36.00	J 55	LT&C	50.94	1.58	0.65	247	8,892
w/8.4#/g mud, 30min Sfc Csg Test psig:							Totals:	3,700 133,200
The cement volume(s) are intended to achieve a top of				0	ft from surface or a		425	overlap.
Hole	Annular	1 Stage	Min	1 Stage	Drilling	Calc	Req'd	Min Dist
Size	Volume	Cmt Sx	CuFt Cmt	Cu Ft	% Excess	Mud Wt	MASP	BOPE
12 1/4	0.3132	760	1455	1205	21	10.00	2998	3M 0.81

Burst Frac Gradient(s) for Segment(s): A, B, C, D = 1.02, 0.95, c, d All > 0.70, OK. B section has to be 1/3 full to pass safety factor

7 Segment	casing inside the #/ft	9 5/8 Grade	Coupling	Joint	Design Factors		PRODUCTION		
					Collapse	Burst	Length	Weight	
"A"	26.00	HCP 110	LT&C	2.47	6.67	1.84	2,369	61,594	
"B"	26.00	HCP 110	LT&C	3.16	1.51	1.84	8,116	211,016	
"C"	17.00	p 110	BUTT	5.56	1.26	1.97	752	12,784	
"D"							0	0	
w/8.4#/g mud, 30min Sfc Csg Test psig: 1,500							Totals:	11,237	285,394
C would be:				67.32	1.38	if it were a vertical wellbore.			
No Pilot Hole Planned			MTD	Max VTD	Csg VD	Curve KOP	Dogleg°	Severity°	MEOC
			11237	10962	10962	10485	90	12	11236.5
The cement volume(s) are intended to achieve a top of					0	ft from surface or a		3700	overlap.
Hole Size	Annular Volume	1 Stage Cmt Sx	1 Stage CuFt Cmt	Min Cu Ft	1 Stage % Excess	Drilling Mud Wt	Calc MASP	Req'd BOPE	Min Dist Hole-Cplg
8 3/4	0.1503	900	1532	1756	-13	9.50	2988	3M	0.55

4 1/2 Segment	Liner w/top @ #/ft	Grade	#####	Coupling	Joint	Design Factors		LINER	
"A"	13.50	P 110		LT&C	1.88	1.76	2.3	752	10,145
"B"	13.50	P 110		LT&C	2.46	1.98	2.3	9,483	128,014
w/8.4#/g mud, 30min Sfc Csg Test psig: 2,403								Totals:	10,234 138,159
Segment Design Factors would be:					2.45	1.98	if it were a vertical wellbore.		
No Pilot Hole Planned			MTD 20719	Max VTD 10923	Csg V/D 10923	Curve KOP 10485	Dogleg° 90	Severity° 12	MEOC 11236.5
The cement volume(s) are intended to achieve a top of					10485	ft from surface or a		752	overlap.
Hole Size	Annular Volume	1 Stage Cmt Sx	1 Stage CuFt Cmt	Min Cu Ft	1 Stage % Excess	Drilling Mud Wt	Calc MASP	Req'd BOPE	Min Dist Hole-Cplg
6 1/8	0.0942	415	1233	970	27	9.50			0.56
Capitan Reef est top XXXX.									

Capitan Reef est top XXXX.