# PECOS DISTRICT DRILLING CONDITIONS OF APPROVAL

OPERATOR'S NAME: | EOG RESOURCES INC

**LEASE NO.: NMNM 108503** 

WELL NAME & NO.: | CABALLO 23 FED COM 703H

SURFACE HOLE FOOTAGE: 300' FSL & 1755' FWL

BOTTOM HOLE FOOTAGE 1. 2

1. 2411' FSL & 989' FWL

LOCATION: Section 23, T. 25 S., R 33 E., NMPM

**COUNTY:** | **Eddy County, New Mexico** 

COA

All previous COAs still apply expect the following:

H2S	C Yes	© No	
Potash	© None	© Secretary	C R-111-P
Cave/Karst Potential	© Low	<sup>C</sup> Medium	C High
Variance	<sup>C</sup> None	© Flex Hose	Other Other
Wellhead	C Conventional	• Multibowl	C Both
Other	4 String Area	Capitan Reef	WIPP

### A. Hydrogen Sulfide

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 & 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 13-3/8 inch surface casing shall be set at approximately 1150 feet (a minimum of 25 feet into the Rustler Anhydrite and above the salt) and cemented to the surface.
  - a. If cement does not circulate to the surface, the appropriate BLM office shall be notified and a temperature survey utilizing an electronic type temperature survey with surface log readout will be used or a cement bond log shall be run to verify the top of the cement. Temperature survey will be run a minimum of six hours after pumping cement and ideally between 8-10 hours after completing the cement job.
  - b. Wait on cement (WOC) time for a primary cement job will be a minimum of **8 hours** or 500 pounds compressive strength, whichever is greater. (This is to include the lead cement)

- c. Wait on cement (WOC) time for a remedial job will be a minimum of 4 hours after bringing cement to surface or 500 pounds compressive strength, whichever is greater.
- d. If cement falls back, remedial cementing will be done prior to drilling out that string.
- 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. Additional cement maybe required. Excess calculates to 20%.

Wait on cement (WOC) time for a primary cement job is to include the lead cement slurry due to cave/karst or potash.

- 3. The minimum required fill of cement behind the 7-5/8 inch production casing is:
  - Cement should tie-back at least 200 feet into previous casing string. Operator shall provide method of verification.

Variance approved for annular clearance for the 5  $1/2 \times 7 5/8$  casing.

The minimum required fill of cement behind the 5-1/2 inch production liner is:

• Cement should tie-back 100' into the previous casing. Operator shall provide method of verification.

## C. PRESSURE CONTROL

- 1. Variance approved to use flex line from BOP to choke manifold. Manufacturer's specification to be readily available. No external damage to flex line. Flex line to be installed as straight as possible (no hard bends).
- 2. 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.

## **GENERAL 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)
  - Chaves and Roosevelt Counties
    Call the Roswell Field Office, 2909 West Second St., Roswell NM 88201.
    During office hours call (575) 627-0272.
    After office hours call (575)
  - Eddy County
     Call the Carlsbad Field Office, 620 East Greene St., Carlsbad, NM 88220, (575) 361-2822
- 1. 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. The operator proposes to set surface and 1st intermediate casing casing with Spudder Rig
    - Notify the BLM when moving in and removing the Spudder Rig.
    - Notify the BLM when moving in the 2<sup>nd</sup> Rig. Rig to be moved in within 90 days of notification that Spudder Rig has left the location.
    - BOP/BOPE test to be conducted per Onshore Oil and Gas Order No. 2 as soon as 2nd Rig is rigged up on well.
- 2. 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.

3. 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.

#### 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 that portion of any well approved for a 5M BOPE system or greater, a pressure integrity test of each casing shoe shall be performed. Formation at the shoe shall be tested to a minimum of the mud weight equivalent anticipated to control the formation pressure to the next casing depth or at total depth of the well. This test shall be performed before drilling more than 20 feet of new hole.

- 7. If hardband drill pipe is rotated inside casing, returns will be monitored for metal. If metal is found in samples, drill pipe will be pulled and rubber protectors which have a larger diameter than the tool joints of the drill pipe will be installed prior to continuing drilling operations.
- 8. Whenever a casing string is cemented in the R-111-P potash area, the NMOCD requirements shall be followed.

#### B. PRESSURE CONTROL

- 1. All blowout preventer (BOP) and related equipment (BOPE) shall comply with well control requirements as described in Onshore Oil and Gas Order No. 2 and API RP 53 Sec. 17.
- 2. If a variance is approved for a flexible hose to be installed from the BOP to the choke manifold, the following requirements apply: 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. 5M or higher system requires an HCR valve, remote kill line and annular to match. The remote kill line is to be installed prior to testing the system and tested to stack pressure.
- 4. If the operator has proposed a multi-bowl wellhead assembly in the APD. The following requirements must be met:
  - a. Wellhead shall be installed by manufacturer's representatives, submit documentation with subsequent sundry.
  - b. If the welding is performed by a third party, the manufacturer's representative shall monitor the temperature to verify that it does not exceed the maximum temperature of the seal.
  - c. Manufacturer representative shall install the test plug for the initial BOP test.
  - d. 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 OOGO2.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 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 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 reported to the appropriate BLM office.
- 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. 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. This test shall be performed prior to the test at full stack pressure.
- g. BOP/BOPE must be tested by an independent service company within 500 feet of the top of the Wolfcamp formation if the time between the setting of the intermediate casing and reaching this depth exceeds 20 days. This test does not exclude the test prior to drilling out the casing shoe as per Onshore Order No. 2.

#### C. DRILLING MUD

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

#### D. 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.

#### Waste Minimization Plan (WMP)

In the interest of resource development, submission of additional well gas capture development plan information is deferred but may be required by the BLM Authorized Officer at a later date.

ZS 040318

#### Lesser Prairie-Chicken.

"B"		surface	csg in a	17 1/2	inch hole.		<u>Design</u> I	actors	SUF	RFACE
### ### ##############################	Segment	#/ft	Grade		Coupling	Joint	Collapse	Burst	Length	Weight
### ### ### #### #### ### ### ### ###	"A"	54.50	J	55	ST&C	8.20	2.15	1.05	1,150	62,675
	"B"			THE		5-4-50-1			0	0
No   No   No   No   No   No   No   No	w/8.4#/g	mud, 30min Sfo	c Csg Test psig	1,409	Tail Cmt	does not	circ to sfc.	Totals:	1,150	62,675
Size	Comparison of Pr	oposed to M	inimum Reg	uired Ceme	nt Volumes					
17.1/2	Hole	Annular	1 Stage	1 Stage	Min	1 Stage	Drilling	Calc	Req'd	Min Dist
9 5/8	Size	Volume	Cmt Sx	<b>CuFt Cmt</b>	Cu Ft	% Excess	Mud Wt	MASP	BOPE	Hole-Cpl
Segment	17 1/2	0.6946	1030	1662	853	95	8.80	1518	2M	1.56
Segment	0 5/9	ener ener en	side the	12 2 / 0	, may 2 may 2 may 2 may 2 may 2 m		Dosign	Factore	INITEDI	MEDIATE
"A" 40.00 J 55 LT&C 2.65 1.21 0.72 4,000 160.0   "B" 40.00 HCK 55 LT&C 18.08 3.04 0.72 900 36,01   w/8.44/g mud, 30min sfc Csg Test psig:	TO DESCRIPTION OF THE PROPERTY OF THE PARTY			13 3/8	Coupling	loint		Contract Chicago Ches Contract	A CONTRACTOR OF THE PARTY OF THE	CONTRACTOR OF A SERVICE OF THE SERVI
"B"		CALL AND AND SERVICE CONTRACTOR		1.55	The state of the s	The Park of the Pa	Committee of the commit			THE BLAY D' KING TO SKILLING
### Totals: 4,900 196.0    The cement volume(s) are intended to achieve a top of Hole   Annular   1 Stage   1 Stage   Min   1 Stage   Drilling   Calc   Req'd   Min   D   Stze   Volume   Cmt Sx   CuPt Cmt   Cu Pt   % Excess   Mud Wt   MASP   BOPE   Hole-Co   P 7/8 x 8 3/4   0.3132   995   1936   1610   20   10.20   3032   5M   0.81									TO TANK THE TANK THE TANK THE	The Control of the Co
The cement volume(s) are intended to achieve a top of   0   ft from surface or a   1150   overlap	to Rose and the	THE PARTY AND ADDRESS OF THE PARTY AND ADDRESS			LIAC	10.08	3.04	4 - 1 - 1 - 1 - 1 - 1 - 1 - 1 - 1 - 1 -	The same and the same of the same of	at the same of the design of the state of th
Hole   Size   Volume   Cmt Sx   CuFt Cmt   Cu Ft   % Excess   Mud Wt   MASP   BOPE   Hole-Co	w/8.4#/g				to achieve a ten of	0	ft fram au			
Size	Hole					_				
9 7/8 x 8 3/4										
Assumed 1/3 Fluid Filled for Collaspse Calculation    Tail cmt										
Tail cmt  7 5/8	9 //0 X 0 3/4	0.3132	993	1930	1010	20	10.20	3032	OIVI	0.01
"A" 29.70 HCP 110 EC FXL 2.23 1.33 1.16 11,300 335.6 "B"  "W/8.4#/g mud, 30min Sfc Csg Test psig: 1,096 Totals: 11,300 335.6 The cement volume(s) are intended to achieve a top of 4700 ft from surface or a 200 overlap Hole Annular 1 Stage 1 Stage Min 1 Stage Drilling Calc Req'd Min D Size Volume Cmt Sx CuFt Cmt Cu Ft % Excess Mud Wt MASP BOPE Hole-C 8 3/4 0.1005 775 2328 676 244 9.40 4681 5M 0.50  MASP is within 10% of 5000psig, need exrta equip?  Tail cmt  5 1/2 casing inside the 7 5/8		A CONTRACTOR OF THE PARTY OF TH		9 5/8	Coupling	la lat		27. 27.1		
"B"    W/8.4#/g mud, 30min Sfc Csg Test psig: 1,096   Totals: 11,300   335,6     The cement volume(s) are intended to achieve a top of   4700   ft from surface or a   200   overlap     Hole				110 50					Length	vveign
W/8.4#/g mud, 30min Sfc Csg Test psig: 1,096		29.70	П.,-					1 16	11 200	
The cement volume(s) are intended to achieve a top of   4700   ft from surface or a   200   overlap			1101	20	IXL	2.23	1.33	1.16		335,610
Hole	"B"	mud 30min Sfr			IXE	2.23	1.33		0	335,610 <b>0</b>
Size	"B"		c Csg Test psig	: 1,096				Totals:	<b>0</b> 11,300	335,610 <b>0</b> 335,610
8 3/4	<b>"B"</b> w/8.4#/g	The cement	c Csg Test psig	: 1,096 are intended	to achieve a top of	4700	ft from su	Totals:	0 11,300 <b>200</b>	335,610 0 335,610 overlap.
Tail cmt   Tail cmt	"B" w/8.4#/g Hole	The cement Annular	c Csg Test psig volume(s) a 1 Stage	: 1,096 are intended 1 Stage	to achieve a top of Min	4700 1 Stage	ft from su	Totals:  rface or a  Calc	0 11,300 <b>200</b> Req'd	335,610 0 335,610 overlap. Min Dist
Segment	"B" w/8.4#/g Hole Size	The cement Annular Volume	c Csg Test psig volume(s) a 1 Stage Cmt Sx	: 1,096 are intended 1 Stage CuFt Cmt	to achieve a top of Min Cu Ft	4700 1 Stage % Excess	ft from su Drilling Mud Wt	Totals:  rface or a  Calc  MASP	0 11,300 200 Req'd BOPE	335,610 <b>0</b> 335,610
Segment	"B" w/8.4#/g Hole Size 8 3/4	The cement Annular Volume 0.1005	c Csg Test psig volume(s) a 1 Stage Cmt Sx	: 1,096 are intended 1 Stage CuFt Cmt 2328	to achieve a top of Min Cu Ft 676	4700 1 Stage % Excess 244	ft from su Drilling Mud Wt 9.40	Totals:  rface or a  Calc  MASP	0 11,300 200 Req'd BOPE	335,610 0 335,610 overlap. Min Dist Hole-Cpl
"A" 20.00 P 110 DWC/C 2.94 1.87 1.94 10,800 216,0 "B" 20.00 P 110 VAM SFC 4.49 1.50 1.94 9,075 181,5  w/8.4#/g mud, 30min Sfc Csg Test psig: 2,376  Biegment Design Factors would be: 15.92 1.63 if it were a vertical wellbore.  No Pilot Hole Planned MTD Max VTD Csg VD Curve KOP Dogleg° Severity° MEO  19875 12402 12402 11949 90 12 1277  The cement volume(s) are intended to achieve a top of 11100 ft from surface or a 200 overlap  Hole Annular 1 Stage 1 Stage Min 1 Stage Drilling Calc Req'd Min D  Size Volume Cmt Sx CuFt Cmt Cu Ft % Excess Mud Wt MASP BOPE Hole-C  6 3/4 0.0835 1000 1310 740 77 11.50 0.55	"B" w/8.4#/g Hole Size 8 3/4 Class 'H' tail cmt ye	The cement Annular Volume 0.1005	c Csg Test psig volume(s) a 1 Stage Cmt Sx 775	: 1,096 are intended 1 Stage CuFt Cmt 2328 MASP is with	to achieve a top of Min Cu Ft 676	4700 1 Stage % Excess 244	ft from su Drilling Mud Wt 9.40 quip?	Totals: rface or a Calc MASP 4681	0 11,300 200 Req'd BOPE 5M	335,610 0 335,610 overlap. Min Dist Hole-Cpl 0.56
"B" 20.00 P 110 VAM SFC 4.49 1.50 1.94 9,075 181,5  w/8.4#/g mud, 30min Sfc Csg Test psig: 2,376  B) egment Design Factors would be: 15.92 1.63 if it were a vertical wellbore.  No Pilot Hole Planned MTD Max VTD Csg VD Curve KOP Dogleg° Severity° MEO  19875 12402 12402 11949 90 12 1277  The cement volume(s) are intended to achieve a top of 11100 ft from surface or a 200 overlap  Hole Annular 1 Stage 1 Stage Min 1 Stage Drilling Calc Req'd Min D  Size Volume Cmt Sx CuFt Cmt Cu Ft % Excess Mud Wt MASP BOPE Hole-C  6 3/4 0.0835 1000 1310 740 77 11.50 0.55	"B" w/8.4#/g  Hole Size 8 3/4  Class 'H' tail cmt yld  Tail cmt 5 1/2	The cement Annular Volume 0.1005 d > 1.20	c Csg Test psig volume(s) a 1 Stage Cmt Sx 775	: 1,096 are intended 1 Stage CuFt Cmt 2328 MASP is with	to achieve a top of Min Cu Ft 676 thin 10% of 5000psig,	4700 1 Stage % Excess 244 need exrta e	ft from su Drilling Mud Wt 9.40 quip?	Totals: rface or a Calc MASP 4681	0 11,300 200 Req'd BOPE 5M	335,610 0 335,610 overlap. Min Dist Hole-Cpl 0.56
w/8.4#/g mud, 30min Sfc Csg Test psig: 2,376  B segment Design Factors would be:  No Pilot Hole Planned  MTD  Max VTD  Csg VD  Curve KOP  Dogleg°  Severity°  MEO  Totals: 19,875 397,5  MEO  Csg VD  Curve KOP  Dogleg°  Severity°  MEO  The cement volume(s) are intended to achieve a top of 11100 ft from surface or a 200 overlap  Hole  Annular 1 Stage 1 Stage Min 1 Stage Drilling Calc Req'd Min D  Size Volume Cmt Sx CuFt Cmt Cu Ft % Excess Mud Wt MASP BOPE Hole-Co  6 3/4 0.0835 1000 1310 740 77 11.50 0.55	"B" w/8.4#/g  Hole Size 8 3/4 Class 'H' tail cmt ye  Tail cmt 5 1/2 Segment	The cement Annular Volume 0.1005 d>120  casing in #/ft	c Csg Test psig volume(s) a 1 Stage Cmt Sx 775	: 1,096 are intended 1 Stage CuFt Cmt 2328 MASP is wir	to achieve a top of Min Cu Ft 676 thin 10% of 5000psig, Coupling	4700 1 Stage % Excess 244 need exrta e	ft from su Drilling Mud Wt 9.40 quip?  Design Collapse	Totals: rface or a Calc MASP 4681	0 11,300 200 Req'd BOPE 5M PROD Length	335,610 0 335,610 overlap. Min Dist Hole-Cpl 0.56
Bisegment Design Factors would be:  No Pilot Hole Planned  MTD  Max VTD  Csg VD  Curve KOP  Dogleg° Severity° MEO  19875  12402  12402  11949  90  12  1277  The cement volume(s) are intended to achieve a top of Hole  Annular  1 Stage  Volume  Cmt Sx  CuFt Cmt  Cu Ft  % Excess  Mud Wt  MASP  BOPE  Hole-Co  6 3/4  0.0835  1000  1310  740  77  11.50  163  if it were a vertical wellbore.  Curve KOP  Dogleg° Severity° MEO  Curve KOP  Dogleg° Severity° MEO  1277  1100  ft from surface or a  200  Overlap  Prilling  Calc  Req'd  Min D  Size  Volume  Cmt Sx  CuFt Cmt  Cu Ft  % Excess  Mud Wt  MASP  BOPE  Hole-Co  6 3/4  0.0835	"B" w/8.4#/g  Hole Size 8 3/4 Class 'H' tail cmt vic  Tail cmt 5 1/2 Segment "A"	The cement Annular Volume 0.1005 d>120  casing in #/ft 20.00	c Csg Test psig volume(s) a 1 Stage Cmt Sx 775	: 1,096 are intended 1 Stage CuFt Cmt 2328 MASP is wir	to achieve a top of Min Cu Ft 676 thin 10% of 5000psig,  Coupling DWC/C	4700 1 Stage % Excess 244 need exrta e	ft from su Drilling Mud Wt 9.40 quip?  Design Collapse 1.87	Totals: rface or a Calc MASP 4681  Factors Burst 1.94	0 11,300 200 Req'd BOPE 5M PROD Length 10,800	335,610 0 335,610 overlap. Min Dist Hole-Cpl 0.56 UCTION Weight 216,000
No Pilot Hole Planned  MTD  Max VTD  Csg VD  Curve KOP  Dogleg°  Severity°  MEO  19875  12402  12402  11949  90  12  1277  The cement volume(s) are intended to achieve a top of  Hole  Annular  1 Stage  Volume  Cmt Sx  CuFt Cmt  Cu Ft  % Excess  Mud Wt  MASP  BOPE  Hole-C  6 3/4  0.0835  1000  1310  740  77  11.50  Csg VD  Curve KOP  Dogleg°  Severity°  MEO  1277  1277  The cement volume(s) are intended to achieve a top of  11100  ft from surface or a  200  overlap  Prilling  Calc  Req'd  Min D  Size  Volume  Cmt Sx  CuFt Cmt  Cu Ft  % Excess  Mud Wt  MASP  BOPE  Hole-C  6 3/4  0.0835	"B"  w/8.4#/g  Hole Size 8 3/4  class 'H' tail cmt vis  Tail cmt 5 1/2  Segment "A" "B"	The cement Annular Volume 0.1005 d = 1.20 casing in #/ft 20.00 20.00	c Csg Test psig volume(s) 1 Stage Cmt Sx 775 side the Grade	1,096 are intended 1 Stage CuFt Cmt 2328 MASP is wir	to achieve a top of Min Cu Ft 676 thin 10% of 5000psig,  Coupling DWC/C	4700 1 Stage % Excess 244 need exrta e	ft from su Drilling Mud Wt 9.40 quip?  Design Collapse 1.87	Totals: rface or a Calc MASP 4681  Factors Burst 1.94 1.94	0 11,300 200 Req'd BOPE 5M PROD Length 10,800 9,075	335,610 0 335,610 overlap. Min Dist Hole-Cpl 0.56 UCTION Weight 216,000 181,500
The cement volume(s) are intended to achieve a top of 1100 ft from surface or a 200 overlap Hole Annular 1 Stage 1 Stage Min 1 Stage Drilling Calc Req'd Min D Size Volume Cmt Sx CuFt Cmt Cu Ft % Excess Mud Wt MASP BOPE Hole-C 6 3/4 0.0835 1000 1310 740 77 11.50 0.55	"B"  w/8.4#/g  Hole Size 8 3/4  class 'H' tail cmt ye  Tail cmt 5 1/2  Segment "A" "B"  w/8.4#/g	The cement Annular Volume 0.1005 d = 1.20  casing in #/ft 20.00  mud, 30min Sfd	c Csg Test psig volume(s) 1 Stage Cmt Sx 775 side the Grade F C Csg Test psig	: 1,096 are intended 1 Stage CuFt Cmt 2328 MASP is with 7 5/8 2 110 2 110 2 2,376	to achieve a top of Min Cu Ft 676 thin 10% of 5000psig,  Coupling DWC/C VAM SFC	4700 1 Stage % Excess 244 need exrta e Joint 2.94 4.49	ft from su Drilling Mud Wt 9.40 quip? Design Collapse 1.87 1.50	Totals:  rface or a  Calc  MASP  4681  Factors  Burst  1.94  1.94  Totals:	0 11,300 200 Req'd BOPE 5M PROD Length 10,800 9,075 19,875	335,610 0 335,610 overlap. Min Disi Hole-Cpl 0.56 UCTION Weight 216,000 181,500 397,500
The cement volume(s) are intended to achieve a top of 11100 ft from surface or a 200 overlap Hole Annular 1 Stage 1 Stage Min 1 Stage Drilling Calc Req'd Min D Size Volume Cmt Sx CuFt Cmt Cu Ft % Excess Mud Wt MASP BOPE Hole-0 6 3/4 0.0835 1000 1310 740 77 11.50 0.55	"B"  w/8.4#/g  Hole Size 8 3/4  Class 'H' tail cmt vic  Tail cmt 5 1/2  Segment  "A"  "B"  w/8.4#/g	Casing in #/ft 20.00 mud, 30min Sfo	c Csg Test psig volume(s) 1 Stage Cmt Sx 775  side the Grade F c Csg Test psig ign Factors	: 1,096 are intended 1 Stage CuFt Cmt 2328 MASP is with 7 5/8 2 110 2 110 2 2,376 would be:	to achieve a top of Min Cu Ft 676 thin 10% of 5000psig,  Coupling DWC/C VAM SFC	4700 1 Stage % Excess 244 need exrta e  Joint 2.94 4.49	ft from su Drilling Mud Wt 9.40 quip? Design Collapse 1.87 1.50	Totals:  rface or a  Calc  MASP  4681  Factors  Burst  1.94  1.94  Totals:  if it were a verse.	0 11,300 200 Req'd BOPE 5M PROD Length 10,800 9,075 19,875 ertical wellt	335,610 0 335,610 overlap. Min Dist Hole-Cpl 0.56 UCTION Weight 216,000 181,500 397,500 oore.
Hole         Annular         1 Stage         1 Stage         Min         1 Stage         Drilling         Calc         Req'd         Min         D           Size         Volume         Cmt Sx         CuFt Cmt         Cu Ft         % Excess         Mud Wt         MASP         BOPE         Hole-0           6 3/4         0.0835         1000         1310         740         77         11.50         0.53	"B"  w/8.4#/g  Hole Size 8 3/4  Class 'H' tail cmt vic 5 1/2  Segment "A" "B"  w/8.4#/g	Casing in #/ft 20.00 mud, 30min Sfo	c Csg Test psig volume(s) 1 Stage Cmt Sx 775  side the Grade F c Csg Test psig ign Factors	: 1,096 are intended 1 Stage CuFt Cmt 2328 MASP is with 7 5/8 2 110 2 110 2 110 2 2,376 would be: MTD	to achieve a top of Min Cu Ft 676 thin 10% of 5000psig,  Coupling DWC/C VAM SFC  Max VTD	4700 1 Stage % Excess 244 need exrta e  Joint 2.94 4.49  15.92 Csg VD	ft from su Drilling Mud Wt 9.40 quip? Design Collapse 1.87 1.50	Totals:  rface or a  Calc  MASP  4681  Factors  Burst  1.94  1.94  Totals:  if it were a very boglege	0 11,300 200 Req'd BOPE 5M PROD Length 10,800 9,075 19,875 ertical wellt Severity°	335,610 0 335,610 overlap. Min Dist Hole-Cpl 0.56 UCTION Weight 216,000 181,500 397,500 oore.
Size         Volume         Cmt Sx         CuFt Cmt         Cu Ft         % Excess         Mud Wt         MASP         BOPE         Hole-0           6 3/4         0.0835         1000         1310         740         77         11.50         0.52	"B"  w/8.4#/g  Hole Size 8 3/4  Class 'H' tail cmt vic 5 1/2  Segment "A" "B"  w/8.4#/g	Casing in #/ft 20.00 mud, 30min Sfo	c Csg Test psig volume(s) 1 Stage Cmt Sx 775  side the Grade F c Csg Test psig ign Factors	: 1,096 are intended 1 Stage CuFt Cmt 2328 MASP is wir 7 5/8 2 110 2 110 2 110 3 110 4 110	to achieve a top of Min Cu Ft 676 thin 10% of 5000psig,  Coupling DWC/C VAM SFC  Max VTD 12402	4700 1 Stage % Excess 244 need exrta e  Joint 2.94 4.49  15.92 Csg VD 12402	ft from su Drilling Mud Wt 9.40 quip? Design Collapse 1.87 1.50	Totals:  rface or a  Calc  MASP  4681  Factors  Burst  1.94  1.94  Totals:  if it were a von Doglegon  90	0 11,300 200 Req'd BOPE 5M PROD Length 10,800 9,075 19,875 ertical wellt Severity° 12	335,610 0 335,610 overlap. Min Dist Hole-Cpl 0.56 UCTION Weight 216,000 181,500 397,500 ore. MEOC 12714
<b>6 3/4</b> 0.0835 <b>1000</b> 1310 <b>740</b> 77 <b>11.50</b> 0.55	"B"  w/8.4#/g  Hole Size 8 3/4  Class 'H' tail cmt yel 5 1/2 Segment "A" "B"  w/8.4#/g B is No Pilot	The cement Annular Volume 0.1005 d = 1.20  casing in #/ft 20.00 mud, 30min Sfo	c Csg Test psig volume(s) a 1 Stage Cmt Sx 775  side the Grade F c Csg Test psig ign Factors ned volume(s) a	1,096 are intended 1 Stage CuFt Cmt 2328 MASP is wir 7 5/8 2 110 2 110 2 1376 would be: MTD 19875 are intended	to achieve a top of Min Cu Ft 676 thin 10% of 5000psig,  Coupling DWC/C VAM SFC  Max VTD 12402 to achieve a top of	4700 1 Stage % Excess 244 need exrta e Joint 2.94 4.49 15.92 Csg VD 12402 11100	ft from su Drilling Mud Wt 9.40 quip? Design Collapse 1.87 1.50 1.63 Curve KOP 11949 ft from su	Totals:  rface or a  Calc  MASP  4681  Factors  Burst  1.94  1.94  Totals:  if it were a von Doglege  90  rface or a	0 11,300 200 Req'd BOPE 5M PROD Length 10,800 9,075 19,875 ertical wellt Severity° 12 200	335,610 0 335,610 overlap. Min Dist Hole-Cpl 0.56 UCTION Weigh 216,000 181,500 397,500 ore. MEOC 12714 overlap.
	"B"  w/8.4#/g  Hole Size 8 3/4  lass 'H' tail cmt vic 5 1/2 Segment "A" "B"  w/8.4#/g  No Pilot  Hole	The cement Annular Volume 0.1005 d = 1.20  casing in #/ft 20.00 20.00 mud, 30min Sfo	c Csg Test psig volume(s) a 1 Stage Cmt Sx 775  side the Grade F c Csg Test psig ign Factors ned volume(s) a 1 Stage	: 1,096 are intended 1 Stage CuFt Cmt 2328 MASP is with 7 5/8 2 110 2 110 2 1376 Would be: MTD 19875 are intended 1 Stage	to achieve a top of Min Cu Ft 676 thin 10% of 5000psig,  Coupling DWC/C VAM SFC  Max VTD 12402 to achieve a top of Min	4700 1 Stage % Excess 244 need exrta e  Joint 2.94 4.49 15.92 Csg VD 12402 11100 1 Stage	ft from su Drilling Mud Wt 9.40 quip? Design Collapse 1.87 1.50 1.63 Curve KOP 11949 ft from su Drilling	Totals:  rface or a  Calc  MASP 4681  Factors Burst 1.94 1.94 Totals:  if it were a very poolege or a Calc	0 11,300 200 Req'd BOPE 5M PROD Length 10,800 9,075 19,875 ertical wellt Severity° 12 200 Req'd	335,610 0 335,610 overlap. Min Dist Hole-Cpl 0.56 UCTION Weigh 216,000 181,500 397,500 ore. MEOC 12714 overlap. Min Dist
lass 'H' tail cmt yld > 1.20 Capitan Reef est top XXXX. MASP is within 10% of 5000psig, need exrta equi	"B"  w/8.4#/g  Hole Size 8 3/4  Class 'H' tail cmt vis 5 1/2  Segment "A" "B"  w/8.4#/g  No Pilot  Hole Size	The cement Annular Volume 0.1005 d = 1.20  casing in #/ft 20.00 mud, 30min Sforegment Desi Hole Plann The cement Annular Volume	c Csg Test psig volume(s) a 1 Stage Cmt Sx 775 side the Grade F c Csg Test psig ign Factors ned volume(s) a 1 Stage Cmt Sx	: 1,096 are intended 1 Stage CuFt Cmt 2328 MASP is wir 7 5/8 2 110 2 110 2 1376 Would be: MTD 19875 are intended 1 Stage CuFt Cmt	to achieve a top of Min Cu Ft 676 thin 10% of 5000psig,  Coupling DWC/C VAM SFC  Max VTD 12402 to achieve a top of Min Cu Ft	4700 1 Stage % Excess 244 need exrta e  Joint 2.94 4.49  15.92 Csg VD 12402 11100 1 Stage % Excess	ft from su Drilling Mud Wt 9.40 quip? Design Collapse 1.87 1.50 1.63 Curve KOP 11949 ft from su Drilling Mud Wt	Totals:  rface or a  Calc  MASP 4681  Factors Burst 1.94 1.94 Totals:  if it were a very poolege or a Calc	0 11,300 200 Req'd BOPE 5M PROD Length 10,800 9,075 19,875 ertical wellt Severity° 12 200 Req'd	335,610 0 335,610 overlap. Min Dist Hole-Cpl 0.56 UCTION Weight 216,000 181,500 397,500 oore. MEOC 12714 overlap. Min Dist Hole-Cpl