

**OCD – HOBBS**  
10/06/2017  
**RECEIVED**

**DRILLING AND OPERATIONS PLAN**  
**BC OPERATING, INC.**  
**CAVE LION 5 FEDERAL WC #5H**  
 Surface: 185' FSL & 480' FWL, UL M  
 BHL: 330' FNL & 330' FWL, UL D  
 Sec. 5-T26S- R35E  
 Lea County, New Mexico

1. Geological Surface Formation: **windblown sand and gypsum dunes (Holocene).**
2. Horizontal Oil well. No pilot hole, total depth 17,286', depth to Fresh Water: unknown no water wells found in search of state engineers office website. **Elevation 3,270'**

**3. TOPS OF IMPORTANT GEOLOGICAL MARKERS: TVD**

Rustler	1,085'
Top Salado	1,273'
Lamar	5,348
Delaware/Bell Canyon	5,400'
Cherry Canyon	6,387
Brushy Canyon	7,750'
Bone Spring	9,340'
First Bone Spring Sand	10,450
Second Bone Spring Sand	11,040'
Third Bone Spring Sand	12,080'
Wolfcamp	12,520'
Wolfcamp Target	12,750' horizontal target TVD, deepest depth

**4. Estimated Depth of Anticipated/Possible Water, Oil or Gas:**

Rustler	0-1,085'	Possible fresh Water, no wells found
Bell Canyon – Brushy Canyon	5,400- 9,340'	Possible Oil, gas and water
Bone Spring	9,340	Oil, gas and water
Wolfcamp	12,520	Oil, gas, and water

No other formations are expected to yield oil, gas or water in measurable volumes. The surface fresh water will be protected by setting 13 3/8" casing at 1,085' and circulating cement back to surface, all other intervals will be isolated by the 9 5/8 and 7" casing.

5. Proposed Casing Program

HOLE SIZE	CASING SIZE	WT./GRADE	THREAD/COLLAR	SETTING DEPTH	TOP CEMENT
Conductor	20"	94# H-40	8rd BTC	40'	Surface**
17.5"	13 3/8" (new)	61# J-55	8rd BTC	1,050'	Surface**
12.25"	9 5/8" (new)	40# L80	8rd BTC	5,400'	Surface**
8.75"	7" (new)	26# P-110	8rd BTC	12,080'	3,900**
6.125"	4.5" (new)	13.5#, P110	8rd BTC	17,286'	11,800' (Liner top)

\*\* Casing will be kept liquid filled and void of air while running in hole

MINIMUM SAFETY FACTORS: BURST 1.125 COLLAPSE 1.125 TENSION 1.8

**ALL CASING WILL BE NEW API APPROVED**

CEMENT PROGRAM-ALL CEMENT BLENDS WILL BE TESTED TO BLM MINIMUM REQUIREMENTS.

- A. 13 3/8" SURFACE CEMENT TO SURFACE 100% EXCESS OVER CALCULATED  
 LEAD 530 SX C, 12.8 PPG, 1.82 YIELD 5% P-402, ¼ CELLO FLAKE. TAIL: 450 SX C, 14.8 PPG, 1.33 YIELD ¼#/ SACK CELLO FLAKE, 2% CACL
- B. 9 5/8" INTERMEDIATE CEMENT TO SURFACE 75% EXCESS LEAD, 50% TAIL  
 LEAD 1030 SX 50/50 C, 11.6 PPG, 2.61 YIELD 10% GEL, 5% P-402, .4% P-101, ¼ LB/SX CELLO FLAKE. TAIL: 230 SX C, 13.8 PPG, 1.60 Yield, .3% P-101 ¼#/ SACK CELLO FLAKE
- C. 7" PRODUCTION CEMENT TO MIN OF 3,900' 50% EXCESS OVER CALCULATED.  
 LEAD 600 SACKS CLASS C 50/50 +10% BENTONITE +.15% C-20 RETARDER +3# GILSONITE +.3% C-12 FLUID LOSS+3% SALT+.25% DEFOAMER, 11.8 PPG, 2.37 YIELD, 13.52 GL/SK  
 Tail: 350 SX PRO-VALUE H, 15.6 PPG, 1.18 YIELD
- 4.5" LINER 440 SACKS PRO-VALUE H 35:65, 14.8 PPG, 1.87 YIELD, 50% CaCO3 (50% excess) cement to liner top

**SPECIFICATIONS FOR PRESSURE CONTROL EQUIPMENT:**

A 10,000# WP Double Ram BOP and 10,000 annular will be installed after running the 13-3/8", 9-5/8" and 7" casing. Pressure test will be conducted prior to drilling out under all casing strings. BOP controls will be installed prior to drilling under surface casing and will remain in use until completion of drilling operations. BOP's will be inspected and operated as recommended in Onshore Order #2. A Kelly cock and a sub equipped with a full opening valve sized to fit the drill pipe and collars will be available on the rig floor in the open position when the Kelly is not in use, float sub will be available. 13-3/8", 9-5/8" & 7" BOP will be tested to 10,000# and the annular to 10,000# with a third party testing company before drilling below each shoe, all test will be recorded and provided. If operations last more than 30 days from 1<sup>st</sup> test, will test again as per BLM Onshore Oil and Gas order #2.

**MUD PROGRAM:**

Spud and drill 17 1/2" surface hole with **fresh water (8.4 to 8.7 ppg)** to a depth of approx 1,150'. Control lost circulation with paper and LCM pills. Viscosity 28-55, no fluid loss control. Fresh water gel sweeps.

Drill 12 1/4" hole to 5,400' with **Brine (10.0 ppg)**. Control lost circulation with paper and LCM pills. Viscosity 28-36, no fluid loss control. Salt water gel sweeps.

Drill 8 3/4" production hole to 12,080' **cut brine (8.8 to 10.0 ppg)**. Control lost circulation with paper and LCM pills. Clean hole with salt water sweeps as necessary. System properties: viscosity 28-32, fluid loss <30 ml/30min.

Drill 6-1/8" lateral with oil based mud. **11.8 - 12.0 ppg**, 60 vis, 80k Chlorides, 75% oil, 25% water

All necessary mud products for weight addition and fluid loss control will be on location at all times. Mud program subject to change due to hole conditions.

**Mud monitoring system:** Mud will be maintained and checked daily for mud weight, viscosity, API water loss, pH, etc. Additional electronic monitoring will include a pit volume totalizer to monitor mud volume in active system, pump rate, and mud return flow percentage. H2S monitors and alarms will be located on rig floor, shale shakers, and mud tanks (see rig plat). Gas chromatograph with monitor hydrocarbon gas content of mud from 5,400' to TD. Third party corrosion company will utilize H2S/oxygen scavengers to monitor for corrosion and limit damage to tubulars.

**Auxiliary Equipment**

- A. A Kelly cock will be in the drill string at all times.
- B. A full opening drill pipe stabbing valve having the appropriate connections will be on the rig floor at all times
- C. Hydrogen Sulfide detection equipment will be in operation after drilling out the 13 3/8" casing shoe until the 4 1/2" Liner is run and set with the floats holding and rigging down operations have begun.

**TESTING, LOGGING & CORING PROGRAM:**

- a. Testing: No DST's will be conducted.
- b. Cased hole Gamma and Cement bond log for 7" casing
- c. Mud logging will take place from 5,400ft to TD 10ft samples
- d. Gyro survey will be run at 1,150'
- e. MWD (directional surveys) and LWD (gamma) surveys will be taken from KOP (12,177') to TD 17,286ft

**POTENTIAL HAZARDS:**

No significant hazards are expected. Above normal pressure gradient expected. Normal temperature gradient is expected, **estimated pressure gradient of .65 psi/ft. 8,287 psi at 12,750 ft.** Expected temperature at 12,750 TVD is **165 deg F** based on data from area wells. No H<sub>2</sub>S is expected, but the operator will utilize a 3<sup>rd</sup> party H<sub>2</sub>S monitoring package from 1,150' to TD. No losses or H<sub>2</sub>s occurred in the drilling of the offset Mammoth #1H. If H<sub>2</sub>S is encountered the operator will comply with the provisions of onshore oil and gas order no 6. All personnel will be familiar with all aspects of safe operation of equipment being used to drill this well.

**ANTICIPATED STARTING DATE & DURATION:**

BC Operating, Inc. anticipates drilling operations to begin around June 30, 2017 and completed in approximately 25 days. An additional 15 days will be needed for completion activities. Road and location construction will begin after the BLM has approved the APD.