

# BLACK HILLS PLATEAU PRODUCTION COMPANY

## Homer Deep Unit #9-11AH

SHL: 298' FNL, 367' FWL, NWNW Sect. 9 T8S R98W

BHL: 443' FSL, 77' FWL SWSW Sect. 15 T8S R98W

Garfield & Mesa Counties, Colorado

### DRILLING PROGRAM

*NOTE:* This drilling plan revision is as of November 30, 2012. This well is being proposed as a horizontal in the Mancos formation. Due to the voluminous requirements of horizontal drilling, a larger well pad is being proposed. The pit on location is also being proposed in larger proportions. The pit will be used to contain freshwater only during drilling; a closed loop system will be utilized during drilling. The freshwater will then also be used for the fracture stimulation of the wellbore. The pit will be lined with 2 synthetic liners, each having a minimum of 24 mil thickness as per COGCC regulation 904.c.(1).

#### 1) ESTIMATED TOPS OF GEOLOGICAL MARKERS:

GL: 5,521.2' (Graded),

KB: 5546.2' (Estimated)

<u>Formation</u>	<u>TVD Depth</u>	<u>Subsea Depth</u>
Wasatch	Surface	Surface
Mesaverde	1,013'	4,523'
Cameo Coal & Sand	2,956'	2,580'
Rollins Sandstone	3,285'	2,251'
Cozzette Sandstone	3,466'	2,070'
Corcoran Sandstone	3,685'	1,851'
Mancos	3,967'	1,569'
Mancos 'A'	4,352'	1,184'
Bentonite Marker (MOAB)	5,106'	430'
KOP	5,248'	288'
Mancos 'B'	5,536'	0'
Niobrara	6,567'	(1,031)'
Niobrara (Mancos) Lateral	7,146'	(1,610)'
Lateral Measured Depth	8,176' to 18,592' (10,416' in length)	
Total Depth	MD is estimated to be 18,592'. TVD is estimated at 6,941'. There is no plan to drill a pilot hole.	

**2) ANTICIPATED FORMATIONS FOR WATER, OIL, GAS AND OTHER MINERALS:**

<b><u>Formation</u></b>	<b><u>Mineral</u></b>	<b><u>TVD</u></b>
Mesaverde Sandstone	Gas or Water	1,013'
Cameo Coal	Gas or Water	2,956'
Rollins Sandstone	Oil, Gas, or Water	3,285'
Cozzette Sandstone	Oil, Gas, or Water	3,466'
Corcoran Sandstone	Oil, Gas, or Water	3,685'
Mancos Shale*	Oil, Gas, or Water	4,352'
Niobrara*	Oil, Gas, or Water	6,941'

\* Projected completion intervals.

No other formations are expected to produce oil, gas, or fresh water in measurable quantities. The surface fresh water sands will be protected by setting adequate surface casing and circulating cement back to surface.

**3) OPERATOR'S MINIMUM SPECIFICATIONS FOR PRESSURE CONTROL:**

Please reference enclosed BOP Diagram.

The blowout preventer assembly shall consist of one 11" 5,000 psi double ram preventer, and an 11" 5,000 psi annular preventer. All will be hydraulically operated. The BOP pipe and blind rams will be hydraulically tested to 100% of working pressure (if isolated from the surface casing with a test plug) or to 70% of the internal yield of the surface casing after nipping up. The annular preventer will be tested to 50% of its' working pressure rating for 10 minutes or until provisions for the test are met. The pipe rams and blind rams will be function tested on each trip out of the hole, but not more than once per day. All such checks will be noted on the daily Tour Sheets.

Accessories to the BOPE include an upper and lower kelly cock, a sub on the floor with a full opening valve to be stabbed into the drill string when the kelly is not in the drill string, a drill pipe float (except for lost circulation conditions), and a choke manifold with a pressure rating equivalent to the BOP stack. An accumulator with a minimum of 1.5 times the volume of fluid necessary to close all BOP equipment will be part of the BOP system.

Remote controls capable of both opening and closing all preventers will be readily accessible to the driller. A manual locking device (i.e., hand wheels) or automatic locking devices shall be installed as part of the system. The BOP will be kept in good mechanical working order. Checks and inspections will be recorded on daily Tour Sheets.

Primary BOP actuating control will be located either in the doghouse or on the rig floor.

Sufficient mud volume and weight material will be maintained on location to overcome any flows.

## AUXILIARY EQUIPMENT:

- a) A Kelly Cock will be kept in the drill string at all times.
- b) A float will be used at the bit at all times (except for lost circulation drilling condition).
- c) A full-opening drill pipe stabbing valve (inside BOP) with proper drill pipe connection will be on the rig floor at all times.
- d) The drilling fluids systems will be visually monitored at all times.

## 4) CASING PROGRAM:

### 13 3/8" SURFACE CASING PROGRAM

<u>Interval</u>	<u>Hole</u>	<u>Weight</u>	<u>Grade</u>	<u>Coupling</u>	<u>I.D.</u>	<u>Drift</u>	<u>Make-up Torque (ft-lb)</u>		
							<u>Minimum</u>	<u>Optimum</u>	<u>Maximum</u>
0' to 560'	17 1/2"	54.5 #/ft	J-55	ST&C	12.615"	12.459"	3860	5140	6430

#### API Rating / Safety Factor

<u>Interval</u>	<u>Description</u>	<u>Collapse (psi)a</u>	<u>Burst (psi)b</u>	<u>Tension</u>	<u>Tension</u>
				<u>Body (M Lbs)c</u>	<u>Cplng (M Lbs)c</u>
0' to 560'	13-3/8", 54.5 #/ft, J-55, STC	1,130 / 4.13	2,730 / 12.69	853 / 6.74	514 / 4.06

- a) based on full casing evacuation with 8.6 ppg formation gradient on backside
- b) based on 8.6 ppg gradient to surface, with no fluid on backside (backside evacuated) and 800 psi applied surface pressure
- c) based on casing string weight in air (30,520 lbs) with 100,000 lbs of over-pull applied. Buoyed weight of casing string in 8.6 ppg mud = 26,507 lbs

### 9 5/8" INTERMEDIATE CASING PROGRAM

<u>Interval</u>	<u>Hole</u>	<u>Weight</u>	<u>Grade</u>	<u>Coupling</u>	<u>I.D.</u>	<u>Drift</u>	<u>Make-up Torque (ft-lb)</u>		
							<u>Minimum</u>	<u>Optimum</u>	<u>Maximum</u>
0' to 4,945'	12 1/4"	40 #/ft	J-55	LT&C	8.835"	8.679"	3,900	5,200	6,500
4,945' to 5,450'	12 1/4"	40 #/ft	N-80	LT&C	8.835"	8.679"	3,900	5,200	6,500

#### API Rating / Safety Factor

<u>Interval</u>	<u>Description</u>	<u>Collapse (psi)a</u>	<u>Burst (psi)b</u>	<u>Tension</u>	<u>Tension</u>
				<u>Body (M Lbs)c</u>	<u>Cplng (M Lbs)c</u>
0' to 4,945'	9-5/8", 40 #/ft, J-55, LTC	2,570 / 1.06	3,950 / 1.53	630 / 2.20	520 / 1.82
4,945' to 5,450'	9-5/8", 40 #/ft, N-80, LTC	3,090 / 13.95	5,750 / 25.96	916 / 3.20	737 / 2.57

- a) based on full casing evacuation with 9.5 ppg formation gradient on backside
- b) based on 9.5 ppg gradient to surface, with no fluid on backside (backside evacuated) and 800 psi applied surface pressure
- c) based on casing string weight in air (218,000 lbs) with 100,000 lbs of over-pull applied. Buoyed weight of casing string in 9.0 ppg mud = 186,333 lbs

## **7" INTERMEDIATE CASING PROGRAM**

<u>Interval</u>	<u>Hole</u>	<u>Weight</u>	<u>Grade</u>	<u>Coupling</u>	<u>I.D.</u>	<u>Drift</u>	<u>Make-up Torque (ft-lb)</u>		
							<u>Minimum</u>	<u>Optimum</u>	<u>Maximum</u>
5,250' to 8,176'	8 3/4"	23 #/ft	N-80	LT&C	6.366"	6.241"	3,320	4,420	5,530

### API Rating / Safety Factor

<u>Interval</u>	<u>Description</u>	<u>Collapse (psi)a</u>	<u>Burst (psi)b</u>	<u>Tension</u>	<u>Tension</u>
				<u>Body (M Lbs)c</u>	<u>Cplng (M Lbs)c</u>
5,250' to 8,176'	7", 23 #/ft, N-80, LTC	3,830 / 1.13	6,340 / 2.04	532 / 3.38	442 / 2.81

- a) based on full casing evacuation with 9.6 ppg formation gradient on backside
- b) based on 9.6 ppg gradient to surface, with no fluid on backside (backside evacuated) and 800 psi applied surface pressure
- c) based on casing string weight in air (67,298 lbs) with 100,000 lbs of over-pull applied. Buoyed weight of casing string in 9.6 ppg mud = 57,419 lbs

A hanger will be placed within the 9 5/8" to hang the 7" intermediate string. The hanger will consist of a PBR, Upper 7.000 in TSP4-15 x 9.625" in 36-53.5# and 9.625" 62.80# OD 8.287" in 7.913" in -8 Stub Acme Box API P-110. The casing hanger will be set at a depth of +/-5,350, approximately 200' above the 9 5/8" casing shoe and below the bottom of the Moab formation.

## **4 1/2" PRODUCTION LINER**

<u>Interval</u>	<u>Hole</u>	<u>Weight</u>	<u>Grade</u>	<u>Coupling</u>	<u>I.D.</u>	<u>Drift</u>	<u>Make-up Torque (ft-lb)</u>		
							<u>Minimum</u>	<u>Optimum</u>	<u>Maximum</u>
0' to 18,254'	6-1/8"	11.6 #/ft	HCP-110	LT&C	4"	3.875"	1,940	2,580	3,230

### API Rating / Safety Factor

<u>Interval</u>	<u>Description</u>	<u>Collapse (psi)a</u>	<u>Burst (psi)b</u>	<u>Tension</u>	<u>Tension</u>
				<u>Body (M Lbs)c</u>	<u>Cplng (M Lbs)c</u>
0' to 18,592'	4-1/2", 11.6 #/ft, HCP-110, LTC	8,650 / 1.62	10,690 / 1.54	367 / 1.33	279 / 1.01

- a) based on full casing evacuation with 12 ppg formation gradient on backside
- b) based on 12 ppg gradient to surface, with no fluid on backside (backside evacuated) and 800 psi applied surface pressure
- c) based on casing string weight in air (215,667 lbs) with 100,000 lbs of over-pull applied. Buoyed weight of casing string in 12.0 ppg mud = 176,095 lbs

All casing will be new or reconditioned and tested to meet or exceed API standards.

The surface casing will have centralizers on the bottom three joints of casing and then every other collar for 10 joints. The 4 1/2" liner will have a minimum of one centralizer per joint starting with the shoe joint and extending for 200', and then one centralizer every joint thereafter in remainder of cemented zone.

## 5) CEMENTING PROGRAM:

### 13 3/8" Surface Casing

Cement 560' to surface as follows:

**Lead:** 10 bbl H<sub>2</sub>O flush followed by 180 sks Premium Cement (73.41 bbl) Additives: 0.25 lbm/sk Pol-E-Flake & 1% CaCl. Yield 2.38 ft<sup>3</sup>/sk, Wt. 12.30 lb/gal

**Tail:** 120 sks Premium Cement (42.06 bbl) Additives: 0.25 lbm/sk Pol-E-Flake & 1% CaCl. Displace with +/- 87 bbls water. Yield 2.11 ft<sup>3</sup>/sk, Wt. 12.80 lb/gal

### 9 5/8" Intermediate Casing

Cement 5,450' to 200' as follows (Multiple Stage Cementer):

#### ***Stage 1 (Top of Fluid @ 4,000' MD):***

20 bbl Rheologically Enhanced Tuned Spacer III (11 lb/gal) followed by 570 sks of Premium (VARICEM) cement with 0.1% HR-800 (Retarder), 0.125 lb/sk Poly-E-Flake, yield 1.09 ft<sup>3</sup>/sk and weight 15.20 lb/gal. Displace w/ ±421 bbls.

#### ***Stage 2 (Top of Fluid @ 4,000' MD):***

**Lead:** 20 bbl Rheologically Enhanced Tuned Spacer III (11 lb/gal) followed by 648 sks of Light Premium (ECONOCEM) cement with 0.125 lb/sk Poly-E-Flake, yield 2.15 ft<sup>3</sup>/sk and weight 12.30 lb/gal

**Tail:** 187 sks Premium (VARICEM) cement with 0.1% HR-800 (Retarder), 0.125 lb/sk Poly-E-Flake, yield 1.09 ft<sup>3</sup>/sk and weight 15.20 lb/gal. Displace with ±298 bbls water.

### 7" Drilling Liner

Cement 8,176' to 5,250' as follows:

20 bbl Rheologically Enhanced Tuned Spacer III (11 lb/gal) followed by 382 sks of Premium (EXPANDACEM) cement, yield 1.49 ft<sup>3</sup>/sk and weight 13.50 lb/gal. Displace w/ ±179 bbls.

### 4 1/2" Liner

Cement 7,009 to 18,592' as follows:

**Lead:** 40 bbl Rheologically Enhanced Tuned Spacer III (11 lb/gal) followed by 680 sks of Foamed Premium (EXPANDACEM) cement, yield 1.47 ft<sup>3</sup>/sk and weight 14.30 lb/gal.

**Tail:** 80 sks Premium (EXPANDACEM) cement, yield 1.47 ft<sup>3</sup>/sk and weight 14.30 lb/gal. Displace w/ ±315 bbls.

Surface casing cement excess to be 70% (gauge). Intermediate and production casing cement excess to be 20% (gauge).

All waiting on cement times will be adequate to achieve a minimum of 500 psi compressive strength at the casing shoe prior to drilling out.

## **“Pump thru Shoe Solution” Method**

### Basic Steps:

- 1) Run Liner
- 2) Pump Cement and drop wiper plug
- 3) Land plug and test liner to 5000 psi
- 4) Shear plug at 6000 psi. Displace fluid to clear shoe
- 5) Pump down composite plug and guns
- 6) Test liner to 10,000# against plug

## **6) MUD PROGRAM:**

Mud	Interval	Type	Wt	Vis	WL	Sld's
17½” Surface	0’ to 560’	FW / Spud Mud	± 8.9-9.4	60 to 80	<10cc	1-5%
12¼” Intermediate	560’ to 5,450’	LSND	± 9.0-10.0	50 to 65	≤6cc	≤6%
8¾” Intermediate	5,450’ to 8,176’	LSND	± 10.0-12.0	45 to 55	≤5cc	≤5-6%
6⅛” Lateral	8,176’ to 18,592’	LSND	± 12.0-15.0	40 to 45	≤5cc	≤5-6%

## **7) TESTING, LOGGING, AND CORE PROGRAMS:**

Cores: None

DST's: None

### Deviation Surveys:

#### Survey Well Plan

0’ to 560’ Totco (7°) – survey every ±210’  
560’ to 5,450’ Totco (7°) – survey every ±300’

#### Lateral Well Plan

5,450’ to 18,592’ ±90 ft MWD w/ INC, AZM , & GR

### Mud Log:

2-Man Unit 3000’ to 18,592’

### Open Hole Logging Program:

#### Triple Combo w/Spectral GR

DIL/FDC/CNL-Sonic 1,000’ to 5,450’

### Samples:

100 ft samples from 560’ to 3,500’  
30 ft samples from 3,500’ to 5,800’  
10 ft samples from 5,800’ to 8,176’  
10-30 ft samples from 8,176’ to 18,592’

**8) ANTICIPATED ABNORMAL PRESSURES OR TEMPERATURES:**

No abnormal pressures or temperatures are anticipated. No H<sub>2</sub>S gas is anticipated.

**9) ANTICIPATED STARTING DATE AND DURATION:**

Dirt work start up: March 15, 2012

Spud: May 1, 2012

Duration:

Drilling 30 days

Completion 20 days