

# SWEPI LP

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## 9 Point Drilling Plan

### Deal Gulch 6-16

Section 16, Township 5 North, Range 90 West, 6<sup>th</sup> P.M.

Moffat County, Colorado

#### 1. Estimated Formation Tops

Formation	True Vertical Depth (ft)	Measured Depth Final Horizontal Borehole (ft)
Morapos	2099	2100
Mancos	2299	2320
Buck Peak	4467	4760
Niobrara Main Bench / Top of Tow Creek	Not Expected	Not Expected
Niobrara / Top of Wolf Mountain	Not Expected	Not Expected

\* See attached directional plan

#### 2. Estimated depths of anticipated water, oil, gas bearing formations

Substance	Formation	Vertical Depth (ft)	Measured Depth (ft)
Water	Morapos	2099	2100
Oil / Gas	Buck Peak	4467	4760
Oil	Tow Creek/ Wolf Mountain	Not Expected	Not Expected

All shows of fresh water and raw minerals will be reported and protected.

### 3. Blow Out Prevention Equipment

Pore pressure, based on data from offset wells, is anticipated to be 0.34 psi/ft. Using a partially evacuated hole with a gradient of 0.22 psi/ft, the maximum anticipated surface pressure at deepest drilled TVD is therefore:

$$4581 \text{ ft TVD} \times (.34 \text{ psi/ft} - .22 \text{ psi/ft}) = 551 \text{ psi}$$

A 2000 psi or greater, working pressure BOP system will be installed and maintained after the 10-3/4" surface casing is set and cemented.

The well control equipment above the 2000 psig minimum rated drilling flange is as follows:

- a. An 11" 2000 psi or greater drilling spool with (2) side outlets (Choke side 3" & kill side 2")
- b. An 11" 2000 psi or greater double preventer with blind and pipe rams
- c. An 11" 750 psi Static/ 600 psi dynamic rated rotating drilling head

The choke and kill systems coming off the drilling spool are as follows:

- a. A 3" choke line with (1) valve connected to a manifold with (2) adjustable chokes and pressure gauge
- b. A 2" kill line with one manual valve and one check valve

Auxiliary Equipment:

- a. A hydraulically actuated upper Kelly valve
- b. A float valve will be used in the drill string above the bit
- c. A stabbing valve will be on the floor at all times

The BOP and casing will be pressure tested to a minimum standard set forth in "On Shore Order # 2". The BOP will be mechanically checked daily during the drilling operation.

BOP tests with 200 psi minimum and 2000 psi maximum, except the rotating head, will be conducted on the following occasions:

- a. After initial installation
- b. After any component change
- c. Twenty one days after previous test if applicable
- d. As required by well condition

### 4. Casing Program

All casing will be new, range 3 casing.

Well is planned as a 2-string design with surface and production casing only. Production casing will be suspended from surface and will be run with a stage tool and packer such that production casing shallower than Tow Creek Bench will be cemented to at least 200' above top of Buck Peak, and production casing below Toe Creek Bench will be slotted or perforated for production.

Hole Section	Hole size	Csg Top	Depth TVD	Depth MD	Pipe Size	Pipe weight lb/ft	Pipe Grade	Threads
Surface	13-1/2"	0'	1250'	1250'	10-3/4"	40.5 lb/ft	J-55	ST&C
Production	7-7/8"	0'	3911'	10,154'	5-1/2"	17 lb/ft	N-80	H-511

**10-3/4" 40.5 lb/ft casing:** Burst 3,140 psi / Collapse: 1,580 psi

**5-1/2" 17 lb/ft casing:** Burst 7,740 psi / Collapse: 6,280 psi

\*Intermediate casing is a **contingency** pending borehole conditions and subsurface evaluation. If intermediate casing is used, it will be cemented to at least 200' above Buck Peak. Production casing would then be run as a slotted liner only, with no cementing.

Hole Section	Hole size	Csg Top	Depth TVD	Depth MD	Pipe Size	Pipe weight lb/ft	Pipe Grade	Threads
Surface	13-1/2"	0'	1250'	1250'	10-3/4"	40.5 lb/ft	J-55	ST&C
Intermediate*	9-7/8"	0'	4467'	4760'	7-5/8"	29 lb/ft	P-110	LT&C
Production	6-3/4"	4560'	3911'	10,154'	5-1/2"	17 lb/ft	N-80	H-511

**10-3/4" 40.5 lb/ft casing:** Burst 3,140 psi / Collapse: 1,580 psi

**7-5/8" 29 lb/ft casing:** Burst 9,468 psi / Collapse: 5,350 psi

**5-1/2" 17 lb/ft casing:** Burst 7,740 psi / Collapse: 6,280 psi

## 5. Cement Program

The following is the proposed cementing program for the 10-3/4" surface casing and 5-1/2" production casing.

String Type	DV Depth	Stage Lead/Tail	Cement Bottom	Cement Top	No Sacks	Cement Type	Cement Yield Cu. Ft/sk	Cement Weight PPG	% Excess
Cond.		Redi Mix to surface							
Surface 13-1/2"	NA	Lead	950	Surface	482	Class G/Poz	1.42	14.5	100
		Tail	1,250	950	185	Class G	1.17	15.8	100
Produc. 7-7/8"	4760	Lead	4760	3960	78	LiteCRETE	2.4	9.5	35
					3				

The following is the proposed cementing program for the **contingency** well design with an intermediate casing string set at 4760' MD and un-cemented liner from 4560' to 10154' MD.

String Type	DV Depth	Stage Lead/Tail	Cement Bottom	Cement Top	No Sacks	Cement Type	Cement Yield	Cement Weight	% Excess
							Cu. Ft/sk	PPG	
Cond.		Redi Mix to surface							
Surface	NA	Lead	950	Surface	482	Class G/Poz	1.42	14.5	100
13-1/2"		Tail	1,250	950	185	Class G	1.17	15.8	100
Intermed.	NA	Lead	4760	3960	96	LiteCRETE	2.4	9.5	35
9-7/8"									

Actual cement slurries/volumes may be adjusted/alterd based on actual mud weights, hole caliper results, and hole conditions.

The cement will be allowed to cure up the point where the compressive strength is 500 psi or greater before drilling out the shoe. Wait on cement time will be recorded on the daily report.

## 6. Drilling Fluids Program

Interval	Mud Type	Density (ppg)	Viscosity (cp)	Fluid Loss (cc)	Remarks
Surface/Intermediate	Spud	8.4 – 9.0	40 - 60	NC	Fresh water with gel & lime or Air
Production	N2 +OBM**	2.0- 8.5	3– 20	NC	Aerated OBM

\*\* As a contingency a water-based or oil based foam may be used

## 7. Formation Evaluation Program

- a. Mud logging samples will be gathered and analyzed at regular intervals in surface, intermediate, and production hole sections.
- b. GR and resistivity data will be gathered using a combination of LWD, open hole and casing hole logs. Additionally, the following logs may be obtained:
  - i. Production:
    - 1. OH Quad-Combo (GR-RES-DEN-NEU-DTC) or OH Triple-Combo (RES-DEN-NEU)+ Spectral GR (NGT) + Elemental (ECS)
    - 2. OH SonicScanner + Imager (OBMI)
    - 3. CH Pulsed Neutron (Sigma)
    - 4. Pressure / Temperature Gauge

## 8. Abnormal Conditions

- a. The maximum expected bottom hole pressure is 1560 psi. ( $0.34 \text{ psi/ft} \times 4589' \text{ TVD}$ )
- b. The maximum bottom hole temperature is 129 degrees F
- c. No hydrogen sulfide gas is expected
- d. When drilling under-pressured naturally fractured reservoirs the potential lost circulation is present providing that the effective circulating density is greater than the pore pressure. However, this potential has been eliminated by the utilization of an air/mist drilling fluid system.

## 9. Other Facets regarding the drilling plan

Casing across the Niobrara objective interval will be pre-slotted or pre-perforated. As a contingency, if drilling with casing is used, production casing will be perforated once landed in the well.

Artificial lift will consist of a sucker rod and pump jack system. The tubing will be run and anchored above the producing interval. The sucker rods will be run with the pump set near the end of the tubing. All tubing and sucker rod equipment will be run with a BOP package and a kill weight completion fluid system. The well will be initially swabbed for fluid clean up and flow testing. Frac'ing or additional reservoir stimulation methods are not anticipated to be necessary.

### **Anticipated Starting Dates:**

Construction: NA

Anticipated commencement of drilling date: 12/15/2012  
Drilling Days: Approximately 25 days  
Completion Days: Approximately 15 days