

# SWEPI LP

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## 9 Point Drilling Plan

### North Hayden 1-26

Section 26, Township 7 North, Range 88 West, 6<sup>th</sup> P.M.

Routt County, Colorado

#### 1. Estimated Formation Tops

Formation	True Vertical Depth (ft)	Measured Depth Final Horizontal Borehole (ft)
Lewis Shale	0	0
Mesaverde	2341	2341
Mancos	5341	5341
Morapos	6301	6301
Niobrara / Buck Peak	8701	8701
Niobrara/Tow Creek	9091	9091
Niobrara/Wolf Mtn.	9406	9406
Carlile	9851	9851

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

Substance	Formation	Vertical Depth (ft)	Measured Depth (ft)
Water	Mesaverde	2341	2341
Water/ Gas	Morapos	6301	6301
Oil / Gas	Niobrara/Buck Peak	8701	8701

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 0.45 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:

$$9951 \text{ ft TVD} \times (.45 \text{ psi/ft} - .22 \text{ psi/ft}) = 2289 \text{ psi}$$

A 5000 psi or greater, working pressure BOP system will be installed and maintained after the surface casing is set and cemented.

The well control equipment above the 5000 psig minimum rated drilling flange is as follows:

- a. An 11" 5000 psi or greater annular preventer
- b. An 11" 5000 psi or greater drilling spool with (2) side outlets (Choke side 3" & kill side 2")
- c. An 11" 5000 psi or greater double preventer with blind and pipe rams (if conditions warrant another pipe ram will be used)

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

- a. A 3" choke line with (2) 3" valves connected to a manifold with (2) adjustable chokes and pressure gauge- one remotely controlled from rig floor
- b. A 2" kill line with (2) 2" valves and one check valve

Auxiliary Equipment:

- a. A hydraulically actuated upper and lower Kelly valve
- b. A float valve will be used in the drill string to fit all connections in use
- c. A stabbing valve will be on the floor at all times
- d. A BOP or float sub available

All BOPE connections subjected to well pressure shall be flanged, welded or clamped

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 5000 psi maximum, except the rotating head, will be conducted on the following occasions:

- a. After initial installation
- b. After any component change or repair
- 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.

Surface and intermediate casing will be cemented to provide zonal isolation.

The production hole will be left “barefoot”, with no production casing installed.

Hole Section	Hole size	Csg Top	Depth TVD	Depth MD	Pipe Size	Pipe weight	Pipe Grade	Threads
Surface	12-1/4"	0'	2300'	2300'	9-5/8"	36 lb/ft	J-55	ST&C
Intermediate	8-1/2"	0'	8601'	8601'	7"	29 lb/ft	P-110	LT&C

9-5/8" 36 lb/ft casing: Burst 3,524 psi / Collapse: 2,031 psi  
 7" 29 lb/ft casing: Burst 11,226 psi / Collapse: 8,528 psi

## 5. Cement Program

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 9-5/8"	NA	Lead	2,000	Surface	882	Class G/Poz	1.42	14.5	100
		Tail	2,300	2,000	161	Class G	1.17	15.8	100
Intermed. 7"	NA	Lead	8601	2100	464	LiteCRETE	2.4	9.5	35

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** or Aerated Brine	2.0- 8.5	3– 20	NC	Aerated OBM or Aerated Brine

*\*\* 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 4478 psi. (0.45 psi/ ft x 9951' 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

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.

### **Anticipated Starting Dates: 2014**

Construction: 8/23/14

Anticipated commencement of drilling date: 9/2/14

Drilling Days: Approximately 20 days

Completion Days: Approximately 15 days