

# SWEPI LP

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## 9 Point Drilling Plan

### Wood Gulch 2-36

Section 36, Township 4 North, Range 92 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)
Mancos	Surface	Surface
Morapos	Surface	Surface
Base Mancos/Niobrara	1400	1455
Niobrara / Buck Peak	1504	1597
Niobrara/ Tow Creek	1726	1997
Niobrara/ Wolf Mountain	1816	2368

\* See attached directional plan

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

Substance	Formation	Vertical Depth (ft)	Measured Depth (ft)
Water	Morapos	Surface	Surface
Oil / Gas	Niobrara/Buck Peak	1504	1597

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:

$$1820 \text{ ft TVD} \times (.34 \text{ psi/ft} - .22 \text{ psi/ft}) = 2184 \text{ psi}$$

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.

Surface and intermediate casing will be cemented to provide zonal isolation. Production casing will then be run as a slotted liner only, with no cementing.

Hole Section	Hole size	Csg Top MD	Depth TVD	Depth MD	Pipe Size	Pipe weight lb/ft	Pipe Grade	Threads
Surface	13-1/2"	0'	600'	600'	10-3/4"	40.5 lb/ft	J-55	ST&C
Intermediate	9-7/8"	0'	1504'	1597'	7-5/8"	29.7 lb/ft	P-110	LT&C
Production	6-3/4"	1397'	1584'	5550'	5-1/2"	17 lb/ft	N-80	H-511/STL

**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 well design with an intermediate casing string set at 1597' MD and un-cemented liner from 1397' to 5550' MD.

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	300	Surface	152	Class G/Poz	1.42	14.5	100
		Tail	600	300	185	Class G	1.17	15.8	100
Intermed. 9-7/8"	NA	Lead	1597	797	96	LiteCRETE	2.4	9.5	35

Actual cement slurries/volumes may be adjusted/alterred 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 619 psi. (0.34 psi/ ft x 1820' 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.

### **Anticipated Starting Dates: Summer 2013**

Construction: 7/15/2013

Anticipated commencement of drilling date: 8/15/2013

Drilling Days: Approximately 25 days

Completion Days: Approximately 15 days