

**McElvain Energy, Inc.  
Pargin Ranch #11  
Fruitland Coal Gas Well  
N/2 Section 36, T33N-R7W  
La Plata County, Colorado**

**Surface Location: 680' FNL & 2488' FWL**

**DRILLING PLAN**

In compliance with Onshore Oil and Gas Order No. 1 (OO1 III.D.3, effective March 7, 2007) and Onshore Order No. 2

**Formation Names, Estimated Tops & Anticipated Fluids and Minerals:**

<i>Ground Level:</i>	6450 '	<i>Estimated KB:</i>	6463.5 '
<i>Estimated TD:</i>	2905.5 '	(150+' below top PC)	

**FORMATION TOPS**

<i>Formation</i>	<i>Drilled Depth</i>	<i>Subsea</i>	<i>Anticipated Fluids &amp; Minerals</i>
San Jose	Surface		Possible water to 300'
Ojo Alamo	1283.5 '	5180 '	None
Kirtland	1408.5 '	5055 '	None
Upper Fruitland coal top	2683.5 '	3780 '	Gas and Water
Upper Fruitland coal base	2717.5 '	3746 '	Gas and Water
Lower Fruitland coal top	2713.5 '	3750 '	Gas and Water
Lower Fruitland coal base	2725.5 '	3738 '	Gas and Water
Pictured Cliffs	2755.5 '	3708 '	Gas and Water
TD	2910 '		

**Possible Aquifers:** Surface to 300'.

**Oil Shale:** None Expected.

**Oil:** None Expected

**Gas:** Gas is expected in and throughout the Fruitland Coal formation.

**Protection of oil, gas, water, or other mineral bearing formations:** Any useable water zones encountered will be adequately protected and reported. All usable water zones, potentially productive hydrocarbon zones and valuable mineral zones will be isolated. Protection and isolation shall be accomplished with steel casing and cement. Surface casing will be set below the base of

possible fresh water aquifers and production casing will be run to total drilled depth. Both surface casing and the production casing will be cemented to surface.

**Minimum specifications for blowout prevention and diverter systems'equipment:**

**For drilling 12-1/4" surface hole to 400'MD:**

- No BOP equipment required.

**For drilling 7-7/8" production hole to 2,910 MD/TVD:**

- An 11" 3,000 psi working pressure BOP will be installed and tested on the 11"3M x 8-5/8" SOW casinghead prior to drilling out the 8-5/8" surface casing shoe. At a minimum, BOP tests will be conducted upon initial installation of the equipment, whenever any seal subject to pressure is broken, following related BOP equipment repairs and at 30 day intervals.
- Maximum anticipated surface pressure is less than 2,000 psi and all blowout prevention and pressure control equipment will meet or exceed the requirements of a 2M system as set forth in Onshore Oil and Gas Order # 2 and as indicated below.

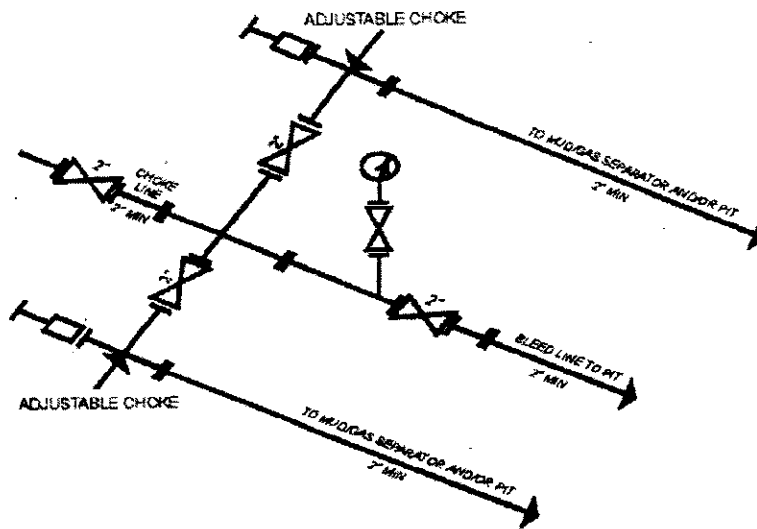
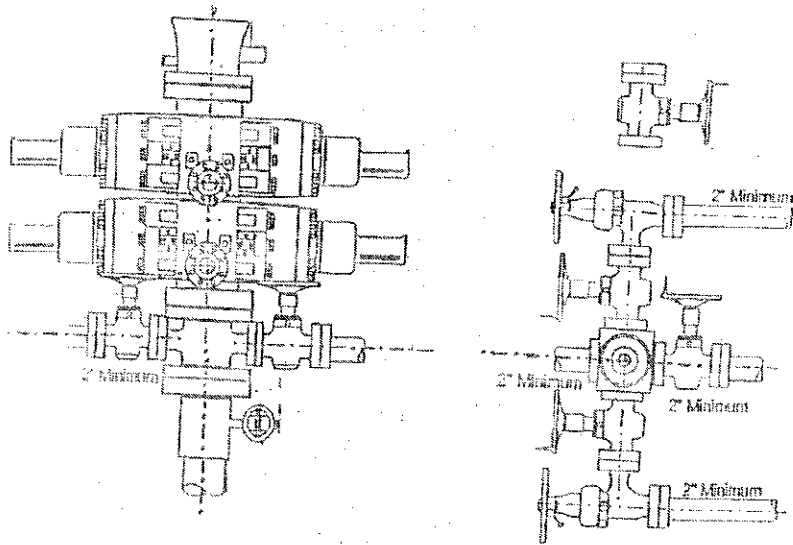
**Minimum BOP Specifications (2M System):**

- Annular preventer, or double ram, or two rams with one being blind and onebeing a pipe ram. (The anticipated 2M BOP system is as shown in the "2-M System" diagram below.)
- kill line (2 inch minimum)
- 1 kill line valve (2 inch minimum)
- 1 choke line valve
- 2 chokes (refer to diagram below)
- Upper kelly cock valve with handle available
- Safety valve and subs to fit all drill strings in use
- Pressure gauge on choke manifold
- 2 inch minimum choke line
- Fill-up line above the uppermost preventer.

**Minimum Choke Manifold Specifications (2M System):**

- All choke lines will be straight lines unless turns use tee blocks or are targeted with running tees, and shall be anchored to prevent whip and reduce vibration.
- Choke manifold equipment configuration shall be functionally equivalent to the appropriate schematic below.
- Both the choke lines and kill lines will be 2" minimum. Both choke lines and kill lines will be 2000 psi working pressure. Please refer to schematic below.

## 2-M SYSTEM



2M CHOKE MANIFOLD EQUIPMENT - CONFIGURATION OF CHOKES MAY VARY

### Minimum Standards for pressure accumulator system:

- The 2M system accumulator shall have sufficient capacity to close all BOPs and retain 200 psi above pre-charge.

**Miscellaneous Pressure Testing and Control Information:**

- Test procedure and frequency shall be in accordance with BLM minimum standards for 2000 psi equipment, per BLM Oil & Gas Order #2.
- Pressure tests will be performed with clear water or an appropriate clear liquid for subfreezing temperatures with a viscosity similar to water.
- A test plug will be used to test ram type preventers and associated equipment to approved stack working pressure for the high test and 250 psi for the low test.
- An annular preventer (if used) shall be tested to 50% of the approved BOP stack working pressure (anticipated annular high test pressure of 1,500 psi and 250 psi low test pressure). Pressure shall be maintained for at least 10 minutes or until provision of the test are met, whichever is longer.
- At a minimum, the BOP tests shall be performed upon initial installation, whenever any seal subject to test pressure is broken, following related repairs and at 30 day intervals.
- The 2000 psi BOP system will also include a) a lower kelly cock valve with the handle available, b) safety valves and subs to fit all drill string connections in use, and c) an inside BOP or float sub.
- All choke lines from the drilling spool forward, shall be straight steel lines flanged at both ends, unless turns use tee blocks or are targeted with running tees and shall be anchored to prevent whip and reduce vibration. All choke lines shall have the same pressure rating as the BOP stack and choke manifold. The diameter of this line shall be a minimum of 2 inches.
- A Form 3160-5 (Subsequent Report Sundry Notice) shall be submitted to the AO's representative within five (5) working days following the test reporting the test results. The reported results will contain a copy of the third party BOP test report including time and pressure charts, accumulator tests, notes/results made while performing the test and recordation of any repair of BOP equipment made.

**Casing and Cementing Requirements**

**All casing information summarized in casing spec & design tables below:**

**Casing Specification Table**

Interval (MD)	Hole Size	Casing Size	Weight	Grade	Thread	Length	Staged	Centralizers
0'- 400'	12-1/4"	8-5/8"	24. lbs/ft	J-55	ST&C	400'	No	≥ 4
0'-2910'	7-7/8"	5-1/2"	17. lbs/ft	K-55	LT&C	2910'	No	≥ 6

### Casing Design Table

	<u>Surface Casing</u>	<u>Production Casing</u>	<u>Assumptions</u>
<b>Collapse Rating (psi)</b>	1,370	4,910	Evacuated Casing w/9.0 ppg mud in annulus
<b>Potential Collapse Load (psi)</b>	187	1,360	
<b>Safety Factor</b>	7.32	3.61	
<b>Burst Rating (psi)</b>	2,950	5,320	9.0 ppg fluid in casing, dry annulus, formation fracture gradient of 1.0 ppg possible if frac job screenout
<b>Potential Burst Load (psi)</b>	587	4,265	
<b>Safety Factor</b>	5.02	1.25	
<b>Tensile Rating (psi)</b>	244,000	272,000	Buoyed casing weight in 9.0 ppg mud added to 100,000 lbf overpull
<b>Potential Tensile Load (psi)</b>	108,281	142,607	
<b>Safety Factor</b>	2.25	1.91	

### Miscellaneous Casing Information:

- All indications of useable water shall be reported to the BLM AO.
- All casing is designed to meet the following safety factor criteria; Collapse: 1.10, Burst: 1.10, Tension: 1.60
- Any change in the casing and cement design will be approved by the BLM AO prior to running and cementing the casing string.
- All casing, except the conductor casing, shall be new or reconditioned and tested. All casing shall meet or exceed API standards for new casing. The use of reconditioned and tested used casing shall be subject to approval by the AO prior to installation.
- All waiting on cement times shall be adequate to achieve a minimum of 500 psi compressive strength at the casing shoe prior to drill out.
- After cementing and prior to drilling out casing shoes, all cemented casing strings below the conductor shall be tested to 0.22 psi/ft of casing string length or 1500 psi, whichever is greater, but not to exceed 70% of the minimum internal yield pressure rating of the casing. If pressure declines more than 10 percent in 30 minutes, corrective action shall be taken.
- A Form 3160-5 (Subsequent Report Sundry Notice), along with a copy of the service company's materials ticket and job log shall be submitted to this office within 5 working days following the running and cementing of all casing strings.

### Surface Casing Cementing Program:

- New 8-5/8", 24 #/ft surface casing will be set through all useable water zones in a 12-1/4" hole to  $\geq 400'$  MD/TVD. The surface hole will be drilled to match the surface casing pipe tally but in no event will surface casing be set less than 400' KB.

- The 8-5/8" surface casing will be centralized by placing the 1<sup>st</sup> centralizer 10' above shoe on shoe joint and on 1<sup>st</sup>, 2<sup>nd</sup> and 3<sup>rd</sup> casing collars (4 centralizers minimum on the surface casing string).
- Surface casing will be cemented to surface in a single stage by pumping a premium oilfield cement containing 2% CaCl<sub>2</sub> (accelerator) and 0.125 lbs/sk cell-o-flake (lost circulation material) plus additives in a slurry volume based upon 100% excess over gauge hole (0.4127ft<sup>3</sup>/ft). The slurry will be blended to 15.8#/gal and yielding 1.17 ft<sup>3</sup>/sk of cement slurry. 400' fill with this slurry will require approximately 285 sacks.
- The 8-5/8" surface casing cement operation will utilize a top plug. If a bottom plug is not utilized then a designed water and chemical pre-flush plus scavenger cement will be run to prevent cement contamination by the displaced fluid.
- The surface casing shall in all cases be cemented to surface. In the event cement does not circulate to surface or fall back of the cement column occurs, remedial cementing shall be done to cement the casing back to surface. No more than the top 100' will be remediated with 1" line if fall back occurs. Anything more than 100' will require BLM AO approval to remediate.
- If returns are lost and/or cement is not brought to surface and no fallback occurs, a cement bond log (CBL) will be required to determine the quality of the job prior to drilling ahead pursuant to Onshore Order #2.
- Pea Gravel or other material shall not be used to fill up around the surface casing in the event cement fall back occurs.

**Production Casing Cementing Program:**

- New 5-1/2", 17# production casing will be set upon reaching TD at  $\pm$  2910' MD/TVD
- The 5-1/2" production casing will be centralized at the shoe, through the Fruitland Coal and at the base of surface casing.
- The 5-1/2" production string will be cemented to surface in a single stage by pumping a premium oilfield cement with volumes based upon either a 75% excess over gauge hole or 30% over the calipered annular hole volume. The cement slurry will utilize separate lead and tail slurry blends as follows:
  - LEAD – 265 sacks of premium cement plus additives mixed to 12.5 #/gal density and 2.27 ft<sup>3</sup>/sk yield to obtain a desired 2,000 feet of annular fillup and reach surface.
  - TAIL – 150 sacks of premium cement plus additives mixed to 13.5 #/gal density and 1.84 yield to obtain a desired  $\geq$  900 feet of annular fillup.
- The 5-1/2" production casing cement operation will utilize both a bottom and top plug.
- The top of cement (TOC) will be confirmed on the vertical production string by running a Cement Bond Log (CBL) - except where there are full cement

returns to the surface. If the CBL shows that TOC is less than 500 feet above the top of the Ft. Union formation, then corrective measures shall be taken to assure the TOC meets the minimum prescribed standards.

## **Mud Program**

### **Summary of anticipated drilling fluid properties by hole section.**

Interval (MD)	Hole Size	Type	MW	VIS	FL	PV	YP	PH	REMARKS
0'- 400'	12-1/4"	FW/Gel	8.5-9.0	32-45	NC	12	12	9-10.5	Spud Mud
400'-2910'	7-7/8"	FW/Gel	8.8-9.0	36-50	12	16	12	9-10.5	LSND

*NC = No Control*

#### **Surface Hole – 12.25" (0'-400'MD)**

- Fresh water based drilling fluids consisting of fresh water and bentonite. Lime and lost circulation material may be used in the event of an unstable wellbore or lost circulation.
- Maximum anticipated mud weight is 9.0 #/gal.
- Sufficient quantities of mud materials shall be maintained at the well site, at all times, for the purpose of assuring well control.

#### **Production Hole – 7.875" (400'- 2910'MD)**

- Drilling below surface casing will be with fresh water based drilling fluids (Low Solids Non-Dispersed, LSND) consisting primarily of fresh water, bentonite, lignite, caustic, soda ash, sulfonated asphalts, polymers and lost circulation materials.
- Maximum anticipated mud weight is 9.0 #/gal.
- Sufficient quantities of mud materials shall be maintained at the well site, at all times, for the purpose of assuring well control.
- Visual mud monitoring equipment shall be in place to detect volume changes indicating loss or gain of circulating fluid volume.
- No abnormal pressures or H<sub>2</sub>S gas is anticipated.
- After mud up, a mud test shall be performed at least once every 24 hours to determine, as applicable: density, viscosity, gel strength, filtration, and pH.

#### **Mud Logging:**

- In the production hole, gas detection equipment shall be installed in the mud return system and returns monitored prior to cutting the Upper Fruitland Coal. This equipment will remain in place until reaching TD.

**Coring:** No cores planned.

**Drillstem Tests:** No tests planned.

**Electric Logging:**

- A full suite of open-hole logs will be run in the production hole. This log suite will consist of deep, medium and shallow resistivity curves, a porosity log, gamma-ray, and caliper. The log will be run from TD to at least 50' above any zone considered to be potentially productive of hydrocarbons.
- Depending on the cement returns when cementing the 5-1/2" production string, a cement bond log (CBL) may be run prior to the start of the initial completion operations.

**Additional well information:**

- Normal to subnormal pressure gradient to TD.
- Max expected BHP @ bottom of Fruitland Coal & Pictured Cliff  $\leq 1500$  psi.
- MASP and casing design parameters determined using 0.516 psi/ft.
- Maximum expected BHT @ 2910' MD/TVD:  $\sim 150^{\circ}$  F
- The 7.875" production hole will be vertical.

**Initial Completion Plans:**

- The 5.5" cased wellbore will be initially completed by selectively perforating and fracture stimulating the Lower Fruitland coal seam before blinding off this lower zone and selectively perforating and fracture stimulating the Upper Fruitland coal seam. Both fracture treatments will be fresh water based and include sand as the propping agent.
- The plug isolating the Upper Fruitland coal seam from the Lower Fruitland coal seam will be removed, commingling the two coal seams, and the well placed on production.