MarkWest Resources, Inc.
Fullerton Federal 27-11 14-1
1105' FNL & 1115' FEL
Sec. 14, T. 27 N., R. 11 W.
San Juan County, New Mexico

Drilling Program

1. ESTIMATED FORMATION TOPS

Formation Name	GL Depth	KB Depth	Subsea Elevation
Nacimiento Fm	000'	12'	+6,142'
Ojo Alamo Ss	840'	852'	+5,302'
Kirtland Sh	935'	947'	+5,207'
Fruitland Coal	1,436'	1,448'	+4,706'
Pictured Cliffs Ss	1,902'	1,914'	+4,240'
Mesa Verde Ss	2,797'	2,809'	+3,345'
Point Lookout Ss	4,265'	4,277'	+1,877'
Gallup Ss	5,765'	5,777'	+377'
Dakota Ss	6,356'	6,368'	-214'
Total Depth (TD)*	6,510'	6,622'	-368'

* all elevations reflect the ungraded ground level of 6,142'

2. NOTABLE ZONES

Gas or Oil Zones	Water Zones	Coal Zone
Fruitland	Nacimiento	Fruitland
Pictured Cliffs	Ojo Alamo	
Gallup	Kirtland	
Dakota	Fruitland	

Water zones will be protected with casing, cement, and weighted mud. Fresh water found while drilling will be recorded. Oil or gas shows will be tested for commercial potential based on the geologist's recommendations.

3. PRESSURE CONTROL

Maximum expected pressure is ≈1,000 psi. The drilling contract has not yet been awarded, thus the exact BOP model to be used is not yet known. A typical 11" 3,000 psi model is on PAGE 3.

BOP equipment and all accessories will meet or exceed BLM requirements in 43 CFR Part 3160 for a 3,000 psi system. A 3,000 psi double ram hydraulic BOP will be used. Accumulator system capacity will be sufficient to close all BOPE with a 50% safety factor. Fill, kill, and choke manifold lines will be 2". Accessories will include upper and lower Kelly cocks with handles, stabbing valve to fit drill pipe on floor at all times, string float at bit, 3,000 psi choke manifold with 2" adjustable and 2" positive chokes, and pressure gauge. BOPs will be tested every 24 hours. Tests will be recorded on IADC log.

4. CASING & CEMENT

Hole Size	O.D.	Weight (lb/ft)	Grade	Age	Connection	GL Setting Depth
12-1/4"	8-5/8"	24	K-55	New	ST&C	320 ~~160~~'
7-7/8"	4-1/2"	11.6	N-80	New	ST&C	6,510'

Surface casing will be cemented to the surface with ≈~~118~~ cu. ft. (≈~~100~~ sx) Class B + 1/4 lb/sk cello-flake + 2% $CaCl_2$. Yield = 1.18 cu. ft./sk. Weight = 15.2 lb/gal. Volume = 100% excess. A guide shoe and insert float will be used. WOC =12 hours. Surface casing will be tested to 1,500 psi for 30 minutes.

Production casing will be cemented to the surface. Volumes are calculated at 37% excess. If cement does not circulate to surface, then a temperature survey will be run to determine the actual cement top as needed. WOC = 12 hours. Test to 2,000 psi.

Lead cement will be ≈1,677 cubic feet (≈1,075 sx) modified Super H cement at 61 #/sack and 22 #/sack blended silica light with 7 #/sack gilsonite + 1/4 #/sack Flocele. Mixed to weight of 13 #/gal for a yield of 1.56 cubic feet per sack. Mixed to weight of 8.5 #/gal with 75-600 SCF/bbl N2.

Tail cement will be ≈216 cubic feet (≈165 sx) 50/50 Class H Poz with 2% gel + 5 #/sack gilsonite + 1/4 #/sack Flocele + 0.4% Halad + 0.1% HR5. Yield = 1.31 cubic feet per sack. Weight = 13.5 #/gal. No N2.

Cap cement down annulus with ≈153 cubic feet (≈130 sx) Class B with 3% $CaCl_2$.

Cementing equipment will include guide shoe, float collar and 23 centralizers. One centralizer each will be installed on the first three joints above the float, then one every second joint to 5,700' and one every fourth joint from 2,000' to surface.

5. MUD PROGRAM

RANGE	MUD TYPE	WEIGHT
0' - 160'	Fresh-Spud	8.4
160' - 4,800'	LSND	8.6
4,800' - TD	LSND	8.8

Lost circulation and absorption material will be on location.

6. CORING, TESTING, & LOGGING

No cores or DSTs are planned. Open hole logs will include GR, Neutron-Density, and Induction. The Neutron Density will be run from TD to 5,760'. The other logs will be run from TD to the base of the surface casing.