

SECTION 5 – Mud Program

The “standard” mud program and procedures used during the previous drilling programs at McElmo Dome will be employed during the drilling operation of the well.

Surface - 2929’ (9-5/8” Casing Point):

Hole Size: 12-1/4”
Mud Type: Fresh water

Spud the 12-1/4” surface hole with fresh water and circulate the fresh water section of the reserve pit. Maintain the fluid as clean as possible to help prevent lost circulation. Use paper to control any seepage and pump LCM sweeps if lost circulation becomes a problem. Pump viscous sweeps if tight connections are encountered and prior to running the 9-5/8” casing.

2929’ - 5839’ (100’ above the Desert Creek):

Hole Size: 8-3/4”
Mud Type: Fresh water
Problems: Seepage, hole cleaning

Drill out of the 9-5/8” casing with clean fresh water. Circulate the reserve pit to keep solids to a minimum. Sweep the hole as required for hole cleaning and / or lost circulation problems. Use paper to control any seepage problems.

5839’ – 7998’ (25’ into the Leadville / 7” Casing Point):

Hole Size: 8-3/4”
Mud Type: Salt saturated brine
pH: 11+, as required to control H₂S
Problems: H₂S, killer Shale gas influx, hole cleaning

Displace the fresh water system with salt saturated brine 100’ above the Desert Creek formation. Circulate through the salt water section of the reserve pit to maintain a clean fluid and to assist in breaking out any entrained gas. Pre-treat mud for H₂S prior to drilling the P4 Shale.

Follow the attached guidelines for drilling the Killer Shale, titled “Paradox Salt Drilling Procedure”, which is located at the back of this prognosis. The recommendations have proven to be very successful in recent drilling programs.

7998’ – 8373’(Pilot Hole) and 8003’ – 10003’ (Lateral ~2000’):

Hole Size: 6” and 4-3/4”
Mud Type: Fresh water / Baradril-N Sweeps
pH: 9-9.5 with caustic soda
Problems: LC, Hole cleaning, Lubricity

Build 400-500 bbls Freshwater/Bardril-N for sweeps. Expect complete losses while drilling the lateral. Drill blind with freshwater at normal pump rates. Circulate 20-30 Bardril-N sweeps each stand drilled to keep cuttings moving up the hole. Add Enviro-Torque with each sweep for lubricity. Circulate 10 bbls 15% BDF-408 while drilling to prevent cuttings bed build-up.

If circulation is lost and unable to be regained, nitrogen will be added to the mud system to help lift the fluid for circulation and cuttings movement. A specific description of this process is discussed in Section 8 of this prognosis.