

## Diamond Drilling Using Above-Ground Tanks and a 'Mud Farm' System

*Drilling in sensitive areas (cropping paddocks, dry lake beds and near watercourses) is increasingly requiring specialised drilling measures to limit surface disturbance and to prevent drilling fluids and cuttings from coming into contact with the ground surface. An above ground tank system at the drill rig combined with a 'mud farm' set up is one solution to minimise ground disturbance, dispose of cuttings and recycle drilling fluids.*

### Background

Barrick (Cowel), in association with Boart Longyear, has developed a fluid containment and recirculation system for exploration drilling adjacent to the Cowal Gold Mine. Such a system was necessary because the exploration licence conditions stipulated that "all drill cuttings and fluids must be contained in above-ground tanks or in-ground sumps", due to the environmentally sensitive area. Plastic lined earthen mud sumps were discounted because of the ground disturbance activities that would have been necessary for their installation.

Portable collar trays and above ground metal barges (tanks) were designed and utilised to contain fluids and cuttings at the drill site. The separation of drill cuttings from the drilling fluids and recycling of these fluids was carried out at a centralised 'mud farm' facility, through a system of shallow metal troughs and storage tanks. While this system can be adapted to suit all drilling methods including air core and reverse circulation percussion drilling, the system described below is for diamond drilling.

### The Drill Rig Set-Up

The diamond hole is collared through a hole in the bottom of a metal collar tray (approximately 2m square, with 50cm high sides) using a blade bit. A PVC collar pipe is then inserted through which the diamond drilling will be carried out. The remaining gap in the bottom of the collar tray is then sealed by a rubber matting seal that slides over the top of the collar pipe and sits on the base of the collar tray. This prevents drilling return fluids from leaking through the hole onto the ground.

Two barge tanks of approximately 15,000 litres each are placed beside the rig, one containing the drilling mud mixture and the other with fresh water and/or recycled fluids. The return drilling fluids are pumped from the collar tray regularly (to prevent overflowing onto the ground) using a flexi pump, back into the larger mud tank. When the mud tank and/or collar tray becomes too full or too thick with drilling fluids and cuttings, a waste services vacuum truck pumps out the slurry mixture and delivers it back to the 'mud farm'. Using the fresh water and/or recycled fluids in the second tank at the rig, another mud mix can then be prepared to allow drilling to continue.

### The 'Mud Farm' System

The 'mud farm' is preferably located in an area that is readily accessible and close to infrastructure. It consists of a series of large flat bottomed metal troughs partially buried in the ground and several large above-ground plastic tanks. The number of troughs and storage tanks depends on the number of rigs operating in the area at the one time. The troughs are segmented by metal baffles with holes at the top to allow fluid flow between the trough segments. The waste truck dumps the slurry from the rig into an empty segment of the trough allowing the sediment to settle out. The excess drilling fluid is pumped into the plastic tanks where it can be recirculated back to the rig by poly pipe or vacuum truck.



Rig with barge tanks



*Collar Trough*



*Mud Farm Troughs and Tanks*



*Vacuum truck pumping out barges and collar trough*

When the troughs are full of sediment and excess drilling fluids have been extracted, the laden troughs are left to dry, before the sediment is removed to a landfill site via the use of a backhoe and truck.

The above-ground tank and collar tray set-up at the drill rig could be used in most exploration drilling programs. However, the 'mud farm' set up is best suited to an advanced drill out situation where numerous drilling rigs are working at the same time. Although more costly to set up, this type of drilling system has numerous benefits including:

- Low impact surface disturbance and therefore less rehabilitation required at hole completion
- Minimal drilling fluids or cuttings interacting with the ground surface, which may be especially important in environmentally sensitive areas
- Recycling (re-use) of drilling fluids
- All components (tanks, collar trays and troughs) are reusable on subsequent drilling programs.

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