

Falling Borehole Pump Causes Uncontrolled Movement of Cables and Cable Reels

Mine Type: All Mine Types

Incident: A borehole pump needed to be recovered following an electrical fault. The pump was suspended from a drill rod string at approximately 450 metres down a 650 metre cased borehole. A power cable and control cable were attached to the pump and secured by cable ties to the rod string.

The assembly was lifted using a 30 tonne mobile crane, and the rods uncoupled and laid nearby. The control cable was manually wound onto the smaller of two steel cable drums, while the power cable was directed over a sheave wheel above the borehole collar before being manually wound onto the larger drum. Both drums were positioned about 10 metres from the borehole.

As the assembly was being lifted out of the borehole, the cables were found to be twisted around the rod string. Consequently, as each rod was raised out of the borehole, the rod string was rotated using Stillson wrenches to untwist the cables.

When 130 metres of rod had been removed, the cables were suddenly drawn back down the borehole, with both cable drums pulled rapidly towards the collar. The larger drum ricocheted off the crane outrigger and struck the sheave above where the operators had been standing. It then struck a nearby truck before coming to rest about 15 metres from its original location. The employees took evasive action to avoid being hit by the cable drums.



Equipment: 30 tonne mobile crane, 2 cable drums, 3½" diameter PH6L 80 drill rods

Hazard: Uncontrolled movement of cables and cable drums.

Cause: As each rod was rotated at the collar to untwist the cables, the rod string was uncoupling at a corroded joint in the borehole.

Comments:

In this incident, the cable drum frames were not secured to the ground, nor was there any mechanism to control the rotation of the cable drums.

The threads of the drill rods where the rod string parted were heavily corroded. There was no strategy for maintaining the integrity of the rod string in a potentially corrosive environment.

The life cycle of the borehole pump installation had not been risk assessed, nor had the activity to remove the pump from the borehole. No procedure had been developed.

The potential energy of vertically suspended cables in boreholes, and in similar situations such as over pit walls, and the momentum of such cables when they begin to move in an uncontrolled manner, is an often underestimated or unrecognised hazard.

In 1990, an underground mine employee was killed while assisting with the installation of two electrical cables down a borehole. Both cables slipped on the support cable to which they were attached. One cable disappeared down the borehole while the other cable unwound rapidly off the cable drum. The end whipped into a loop and jammed in the rigging assembly, wrenching it from the roof. The employee was standing on a ladder securing the loose end of the support cable, his safety lanyard attached to the rigging assembly. He was hurled to the ground and trapped beneath the tightly suspended power cable.

In 2004, during installation of a pump in a borehole, the pump, riser pipes, cables and hoses dropped 200 metres to the bottom of the hole. The employees took evasive action to avoid being hit by the equipment being drawn into the hole.

Recommendations:

- Apply a formal risk assessment process to the life cycle of a borehole pump installation which covers the design, operation and maintenance aspects of the installation.
- Designate lowering and raising cables installed in boreholes to be high risk activities and implement risk assessed procedures.
- Ensure employees engaged in these activities are familiar with the relevant procedures and apply an appropriate risk assessment process before they commence the activity.
- Effectively anchor or restrain cable drum assemblies to withstand the maximum anticipated load.
- Use powered cable drums to control drum rotation and braking.
- Delineate no-go zones in the vicinity of cable paths between cable drums and the borehole collar.
- Consider including a copy of this Significant Incident Report as an attachment to procedures developed for cable lowering and raising activities to maintain an ongoing awareness of this incident.

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Please ensure all relevant people in your organisation receive a copy of this Significant incident report. Any such advice supplied to site should reach those who require it, and it should also be placed on the mine notice boards.

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http://www.dme.qld.gov.au/mines/safety_information_bulletins.cfm