

# HDD Mining & Waterwell Products Used to Drill Vertical Hole in Australian Subsidence Zone

“This trial on the deepest hole on this mine site proved that the right combination of treatment and expertise can not only push the limits of hole depth in a difficult zone but overcome severe issues like lost circulation and suck zones.”

Rodney Cahill and Andy Burdett, HDD Mining & Waterwell Engineers

## Well Information

Location ..... Western Australia  
 Hole Depth ..... 4,974 ft (1,516 m)  
 MMO Drilling Fluids Used ..... MAX GEL\*, DRILPLEX HDD\*, FLOPLEX\*, ROD EASE\*  
 PHPA Drilling Fluids Used ..... POLY-PLUS\*, POLY-PLUS\* RD, POLY-PAC\* R, ROD EASE\*

## The Situation

HDD Mining & Waterwell was invited to trial mining products on vertical hole in the upper northern region of Western Australia. Drilling in this designated area had been attempted three times and had been unsuccessful each time. While the drilling program called for a hole depth of ft (1,400 m) with an extended open hole to 4,974 ft (1,516 m), the deepest hole had reached only 4,593 ft (1,100 m). The hole was in a subsidence zone, complete with severe broken ground, suck zones, loaded reactive Brucezite zones, major collapsible broken rock, severe dewatering, and significant lost circulation problems.

## The Solution

M-I SWACO HDD Mining & Waterwell took control of the hole at approximately 1,476 ft (450 m) and ran a PHPA mud program until drillers encountered the first of the subsidence-related problems at a depth of 2,293 ft (699 m)—a suck zone. The first of three mud programs was run and consisted of Heashan (burlap) bag wraps with drill paper, POLY-SWELL\* polymer, DRILPLEX HDD powder, cement powder and Bentonite pellets. The second mud program, consisting of MAX GEL premium bentonite, DRILPLEX HDD powder, FLOPLEX polymer, ROD EASE lubricant, drill paper and POLY-SWELL polymer, gave the ability to keep water loss down to the point to keep Brucezite zones under control. A PHPA mud program was re-introduced to complete the hole and consisted of soda ash, POLY-PLUS polymer, POLY-PLUS RD polymer, POLY-PAC R polymer, and ROD EASE lubricant.

## The Results

The troublesome hole was drilled in seven weeks and the operator saw a 35% improvement in rig production. This drilling program was completed (even in the subsidence zone) at a 35% faster rate than other program in the area.

When the first problem in the subsidence zone was encountered at 2,293 ft (699 m), the first treatment combination was wrapped in a 12- by 3-in. bag and put down the rod string to seal the suck zones. Once this area was sealed then the area was treated with a DRILPLEX\* mud system to enable continued advancement of the hole.

The second challenge, encountered at 3,143 ft (958 m) had to be tackled by overcoming the reactive Brucezite zones that swell to 10 times their original size when exposed to water in addition to lost circulation problems associated with the fractured and broken ground. The second treatment program allowed the Brucezite to be removed from the hole and rod string. The DRILPLEX system was used to advance the hole.

When the hole reached 3,691 ft (1,125 m), the well was shut down for four weeks over the Christmas break. POLY-SWELL polymer and the DRILPLEX fluid system were used to fill the hole and keep it open over the duration of the break. It was not necessary to cement or case the hole until drilling recommenced. When the drill crews returned to recommence the hole after the four weeks they cased the hole out to a depth of 3,691 ft (1,125 m) with HQ casing and then ran back in with NQ rod string to start advancing the hole. Following three attempts to cement the hole, M-I SWACO engineers reintroduced a PHPA mud program as the ground had become stable to complete the hole.

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## Summary

In this field trial, three suites of HDD Mining & Waterwell products enabled the deepest hole to be drilled in the Western Australia subsidence zone in two years and the desired depth to be reached.

## Questions? We'll be glad to answer them.

If you'd like to know more about the HDD Mining & Waterwell products and how they are performing for our other customers, please call the M-I SWACO office nearest you.



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