

# Trials break new ground

**The world's largest mineral exploration collaboration bringing together industry, government, and research organisations – MinEx CRC – has begun field trials of its integrated coiled tubing drilling and fluid processing platform innovations with highly promising results.**

The technology comprises 'coiled tubing' (CT) drilling – said to offer the potential for rapid, safe, energy and water-efficient drilling at a fraction of the cost of conventional techniques – coupled with an innovative fluid processing platform or Hydraulic Processing System (HPS).

MinEx CRC's CT drilling platform, comprising the RoXplorer CT drill rig and HPS, commenced drilling trials at the Mawson Lakes Campus of UniSA in July and Kapunda, in collaboration with MinEx CRC Affiliate EnviroCopper, in August.

MinEx CRC is building on the RoXplorer CT technology developed by the Deep Exploration Technologies Cooperative Research Centre (DET CRC) and deployed to field trials in Nevada in 2018.

The DET CRC was established in 2010 under the Australian Government's CRC program that funds critical mass in research ventures between end users and researchers to deliver significant economic, environmental, and social benefits.

MinEx CRC CEO, Andrew Bailey, said the Nevada trials confirmed the potential of CT drilling, but showed that fluid management could be improved, sampling procedures streamlined, and the drill site footprint reduced.

"The current drilling trials represent the next generation of CT drilling, with these improvements added to the platform," Andrew told *Australasian Drilling*.

"Many of the challenges of drilling with coiled tubing have been addressed by the novel design of the RoXplorer – including its unique above-hole coil position, fatigue-resistant steel tubing and carefully engineered bottom hole assembly.

"However, other challenges have been addressed by ancillary technologies that have become vital components of the complete CT platform. These include the liqCtrl drilling fluid additive, i-Fluid monitoring and dosing system and an innovative shaker screen sampling system – all of which are built into the HPS."

Andrew added that fluid management was critical to coiled tubing drilling to ensure clean fluid is delivered to the bottom hole assembly for efficient operation and minimal wear.

"It's also important to ensure reliable and predictable sample returns and to maintain the integrity of the drill hole," he said. *continued.*

The RoXplorer is a revolutionary drill rig for mineral exploration that utilises a continuous, malleable steel coil, removing the need to add individual drill rods as a drill hole deepens, thereby making drilling faster, cheaper and safer, at a fraction of the cost of diamond drilling and RC.



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Design and construction of the HPS was undertaken by MinEx CRC and was completed in June this year in recognition of the fact that no existing fluid management technology, or combination of technologies, could meet the technical needs and logistic demands of CT drilling for mineral exploration.

The HPS is an all-in-one, truck-mounted fluid management system for CT drilling - including fluid storage, additive mixing and dosing, solids removal and solids sampling.

Fluids are entirely recirculated within the HPS, removing the need for drill sumps or external tanks.

The HPS includes a prototype fluid monitoring system that paves the way for remote and automated fluid management, where multiple parameters can be optimised for drilling under constantly changing conditions.

"In previous CT drilling trials, these sub-systems acted independently, with numerous manual controls, contributing to a large and complex drill site," Andrew said.

"On the current drill site, the sub-systems are coupled, constantly monitored, with the promise of future automation and contained within two vehicles – the rig and HPS.

"The entire drilling platform can be transported efficiently over long distances, allows all-terrain access and can be set up safely and quickly by one person. In mobilising from Mawson Lakes to Kapunda, the drill platform was set up and ready to drill within three hours of arriving at the site."

Andrew said the purpose of drilling at Mawson



Lakes was to connect and test the multiple linked systems – mechanical, electrical, hydraulic – on the HPS and CT rig in a live drilling scenario and test the platform in complex cover materials.

The hole was commenced on 21 July, drilling in conventional 'top-drive' mode and cased with PQ to a depth of 20.8m.

The hole was then drilled in 'coiled tubing' mode to a depth of 241.5m through a combination of swelling clays and shell-rich sandstone units with maximum drilling productivity of 115.5m in 6 hours.

"The HPS performed admirably in its first field trial with the unexpected benefit, resulting from COVID-imposed travel restrictions, that real-time fluid





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management was conducted remotely by MinEx CRC researchers in Perth,” Andrew said. “The purpose of the Kapunda drilling in collaboration with MinEx CRC affiliate EnviroCopper was to practice mobilisation and set-up of the CT drill site and test the platform in a completely different drilling scenario – hard, fractured rocks from the surface – where there is potential for future exploration drilling.

“The safety and environmental benefits of CT drilling make it an attractive option for EnviroCopper, but the technology needs to be proved in this setting before it can be adopted.”

Mobilisation to Kapunda, set up, and commencement of drilling occurred on 30 August.

The hole was drilled to a depth of 290m, using a range of drilling tools and parameters to assess the most efficient drilling methodology, achieving 80m of drilling in one six-hour period.

The formation was sampled from the surface in one-meter increments and comprised silicified siltstones and shales with abundant sulphide minerals and a narrow near-surface weathering profile.

In October, the MinEx CRC CT drilling platform deployed to the Delamerian National Drilling Initiative (NDI) drilling campaign in south-eastern South.

#### **Delamerian drilling ramps up**

The MinExCRC NDI Campaign underway in the Delamerian Orogen in collaboration with the SA

Department for Energy and Mining, South Australia is utilising both Coil Tube drilling and conventional Diamond drilling.

While MinExCRC's first conventional drillhole (NDIAW\_D01) was hydrothermally-altered in places, with pervasive hematitic alteration of the host granite and chlorite-sericite veining, its second (NDIAW\_D02) showed significant alteration. This most-recent drillhole showed a similar granitic host to the first hole, with an upper silicified interval, then intense K-Feldspar alteration widely overprinted by epidote, chlorite and sericite.

Hydrothermal brecciation and chlorite and carbonate veining of several generations was present with pyrite and minor chalcopyrite associated with chlorite selvages.

This drillhole is interpreted to lie adjacent to intersections of two major structures in the south of our Alawoona NDI area. ▲

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