Chile mine rescue – some of the technology

IM takes a brief look at the fantastic drilling success behind the rescue at San José

It was a Schramm T685WS heavy-duty, heavy-hoist, truck mounted drill rig that put down the hole that first found the miners. The collapse in the San José mine occurred on August 5 and on August 11 software supplier Maptek became involved when it was asked for help on the drilling control and 3D display to map the drill holes (see the software article in this issue).

Maptek I-Site was used to conduct surveys of the region. This data was taken into Maptek Vulcan 3D software to create an accurate topographic model and 3D representation of the complex underground workings to understand where the 33 miners were trapped. Maptek Mine Engineer Alvaro Quezada then helped to design the direction and orientation of the drill hole which targeted the tunnel, named the Esperanza (Hope) drill hole.

On August 22, first contact was made with the miners via the hole drilled by the T685WS. The T685WS is a premier reverse circulation mineral exploration rig that uses high pressure air and dual tube drill pipe to quickly penetrate the hardest rock formations.

Having found the miners, a Schramm T130XD rig was put to work to drill the Plan B hole that became their rescue shaft. This is a heavy duty, heavy hoist, carrier mounted drill rig, using the latest concepts in mast design and technology. Telescoping construction permits long head travel and working height to allow use of Range III casing, yet short overall length in the transport position. With a front overhang of less than 1.8 m, the T130XD got to the site where access was not easy.

Pulling together as many people as the with this fantastic mine rescue, Schramm had equipment and service personnel on site to do all it could to help. "We just happened to have the right technology rig at the right time," Frank Gabriél, Vice President of Sales for Schramm, told The Wall Street Journal.

Geotec Boyles Bros. SA of Chile owns the Schramm rig used in the rescue. That drilling firm is 50% owned by Layne Christensen. "They're the real heroes," Gabriel said of the drill operators from Geotec Boyles who performed the rescue work with the help of representatives from Center Rock and Schramm.

The particular rig was suitable for this job because it is mobile and can be set up within hours, Gabriel told the newspaper. The rig is self-propelled on five axles. "You can drive it down the highway," he said. At about 100,000 lb (45,350 kg), it is about half the weight of more traditional rigs, he said.

The Center Rock Inc bits used in the operation involve four or five spinning hammers, powered by compressed air. "These things operate like a jackhammer," said Brandon Fisher, the company's President, explained.

This success required the extra special knowledge and skills only our team could provide," said Dave Singleton, Water Resource Division President for Layne Christensen.

It was about two weeks after the collapse that Geotec Boyles brought in the Schramm T130 tophead drill. Layne also sent in two drillers, Jeff Hart and Matt Staffel, who had been drilling water wells in Afghanistan to support US troops stationed there. Assisting the drillers were two Spanish-speaking drilling helpers, Doug Reeves and Jorge Herrera, from Layne's western region in the US.

Working as a team, Layne and Geotec drilled a 51 mm hole to about 700 m, reamed it to 305 mm and finally to 660 mm in diameter - large enough to accommodate the Phoenix rescue capsule. A cheer went up as families and rescue workers joined in a celebration when the drill broke through. "I'm on top of the world," Hart told a TV reporter.

"Had Layne and Geotec not been there, it probably would have taken until Christmas for 'Plan A' or 'Plan C' to break through," Singleton noted. "We cut more than two months from the original estimate." "It's a first for our company to be involved in a rescue effort like this," added President and CEO Andrew B. Schmidt. "It's also noteworthy that we're celebrating our 15th anniversary with our Latin American affiliates," he said. IM

Above: There were several Fassi cranes employed at the operation. Among other tasks, they were used to support the main Schramm drill. These cranes and the Schramm drills were supplied by Geotec Boyles. "Just the day before the accident," explains Germán Iñáyera, Manager of Fassi Chile, "the vehicle involved in equipping the pipes of the main drill had come to San José." The vehicle is fitted with a Fassi crane model F170A.22 with a lifting capacity of 15.40 t and a maximum standard reach of 10.4 m. Fassi explains that it is also equipped with a special kit "including devices to operate according to the safety standards required by Geotec Boyles. This crane configuration helps operator interventions in critical conditions and makes it more effective, especially during prolonged working cycles."