

TCS Tackles Mine Safety

By Dick Hill

Summary

Recent events in the mining industry have brought the public's attention to the issue of safety. In particular, the 33 miners trapped in the mine in

Mine safety should be on everyone's mind, particularly in light of recent events. It took more than two weeks to determine that the 33 miners in northern Chile were all alive. TCS's new miner location and tracking system could help someday.

northern Chile heightened awareness of the danger that miners face every day. When a disaster happens, the time it takes to assess the location and condition of the miners is crucial and can mean the difference between life and death.

Tata Consultancy Services (TCS), which recently briefed ARC, has been working on a system solu-

tion for location and tracking systems for the miners working in underground mines. This system is now being deployed in partnership with Coal India in the Jhanjra coal mine in Eastern India and, someday, could help save lives.

Today's Mines Lack Dependable Two-Way Communications

Few dangers faced by workers in industry are as frightening as the prospects of being trapped in an underground mine. We have been reminded of this often in recent months. At the time of this writing, 33 miners in Chile remain trapped 700 meters underground. What is unusual about this incident is that it appears that all 33 are now accounted for and still alive. Although experts predict that it may take as long as four months to get these miners out, at least for now, they are in contact with the surface.

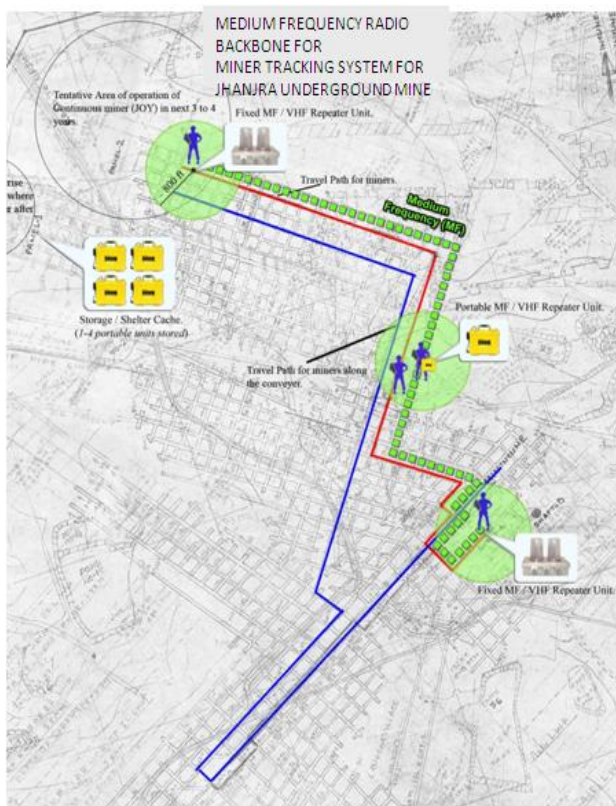
What is *not* unusual about the mining accident in northern Chile is that it took over two weeks to determine if any of the 33 men have survived. All underground miners face the serious problem of a lack of dependable two-way communications and location identification in emergency and other situations.



Miner Location and Tracking

Tata Consultancy Services (TCS) has been working on a solution for continuous miner location and tracking systems. The company's motivation is that its clients in the mining sector need a way to communicate with miners while they are working in the mine and to identify their location.

Despite advances in automated drilling and mineral moving machinery, virtually all underground mines still have people in them. In the northeastern and eastern regions of India, where numerous mines are located, many workers are down in the mines during normal operations.



Jhanjra Coal Mine in Eastern India

Access points are strategically located throughout the mine such that the individual miners' location and movement can be detected when they come into proximity of the various access points.

The miner is equipped with a TCS-designed miner's communication device (MCD). This device not only has the traditional miner essentials such as a battery and helmet lamp, it also contains an embedded WiFi-enabled tag, a

Reliable Underground Communication Is Difficult

The conditions inside a mine are inherently troublesome to the communications technologies commonly used above ground. This is particularly true when the object of the communication is a moving human. TCS has designed a system that incorporates both wired and wireless technologies. WiFi provides primary data communications and MF/VHF provides backup. The roles are reversed for voice communication – MF/VHF is primary and WiFi is backup. Physical wiring provides the "lifeline" part of the system for MF propagation. Even the rail used to haul minerals in the mine can be used, if available, to help keep the installed cost down.

Using a combination of technologies, the TCS system tracks the physical location and movements of the miners at all times. Access

membrane Icon-based key pad, LCD display, and communication support via both Medium Wave as well as the WiFi backbone.

The system's aboveground component keeps track of the entire underground network. This includes displays that detect unusual situations. For example, if a miner has not moved for a specified period, the miner and his

or her location are flagged in the system and clearly indicated on a display, much as a process alarm would be displayed in a process control system.

Mine Disasters

- August 2010 - 33 miners trapped underground in San Jose Mine, Copiapo, Chile
- April 2010 - Upper Big Branch Mine Disaster, WA, USA, 29 miners out of 31 killed
- Jan 2010 - CHINA - At least 25 miners have died in a fire at a colliery in central China and three others remain trapped
- Nov 2007 - UKRAINE - 63 miners killed following a methane blast at the Zasyadko mine, 37 miners are still missing
- Jan 2006 - USA -12 killed in the famous Sago Mine disaster, which received worldwide attention

Conclusion

ARC believes that the timing of TCS' introduction of this system could not have been better. With the increased pressure on mining companies to improve worker safety, this system appears to be a step in the right direction.

While the appropriate regulatory agencies have not yet evaluated the system for compliance with mining safety regulations, TCS has anticipated this requirement, and designed the system and all its components with compliance in mind. The first complete installation is now underway at the Jhanjra coal mine in eastern India.

While the system cannot eliminate accidents such as the one in Chile, it almost certainly can help mitigate the impact of mining accidents by quickly identifying the presence and location of survivors.

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