

# W.Va. Coal Mine Tests to Locate Workers During Emergencies

The company is using active 2.4 GHz RFID tags to pinpoint miners working in a 3.5-mile series of tunnels.

By Claire Swedberg

May 25, 2007—Southern West Virginia Resources, a Lenore, W.Va., coal provider, has implemented an RFID tracking system for one of its mines, a 3.5-mile series of tunnels. The RFID-based tracking system was developed by Venture Design Services Inc. (VDSI), a subsidiary of Venture Corp., together with Helicomm. In the event of an emergency, the system can be used to locate miners anywhere within the underground tunnels. Known as MineTracer, the system provides real-time location tracking of miners and mining assets in underground facilities.

Most U.S. mines have limited or no tracking or wireless communications system in place. Companies know only who is in the mine at a given time, but have little knowledge of each individual's location. That will change, however, within the next few years. Following the 2006 Sago Mine accident in West Virginia, in which 14 miners died, Congress passed the Mine Improvement and New Emergency Response Act of 2006, mandating that all mines have a wireless tracking system in place for their miners by 2009. In addition, the state has enacted its own legislation requiring mines to place orders for wireless communication and tracking systems by July 2007.

Last week, Southern West Virginia Resources began piloting the MineTracer system, based on a mesh network that can locate each miner to within 75 feet inside the mine at any time. The mesh network uses the ZigBee networking protocol for communications routing.

For the pilot, the company is providing ID badges embedded with active 2.4 GHz RFID tags. These, says Kenneth Hill, Helicomm's director of sales, comply with Helicomm's internally designed proprietary standard, manufactured by VDSI. The tag's read-write chip can hold up to 100 bytes of data, but in this case will be encoded only with a unique ID number. Every 200 feet within the mine, the company has installed VDSI readers known as fixed communication nodes, which receive data from each ID badge.

Those nodes record the badge's ID number and signal strength, then transmit that data wirelessly using a ZigBee communications link to other nearby readers, which relay the information to subsequent readers until it reaches a laptop computer managing all the interrogators. The data can be transmitted by up to 27 relays from the source to the destination. The software on the laptop calculates the location of the miner's badge to within 75 feet, by comparing signal strength between multiple fixed readers.

Only four miners work in the mine where the system is being piloted, says mine superintendent Mike Propst, which gave the company an opportunity to test the system on a smaller scale, though the mine itself is fairly large. "At this point," Propst says, "we're seeing how this one operates. We're the only mine in the company to have this installed."

An RS-485 serial cable connects the underground controller to an aboveground server accessible via the Internet. Helicomm software, installed on the server, enables the data to be configured so that each badge can be viewed on a display of the mine map. This enables the company to track each badge's movement around the tunnels.

RELATED\_ARTICLES With the system in place, Propst says, he can now determine where in the mine his employees are located. Thus, if he needs to send a message, he knows which mine phone to send a message through, and which warning lights to illuminate to alert workers to danger. The tag also includes a panic button, which a miner can press twice to indicate he's in trouble. "I think this will be very beneficial," Propst says, estimating that the cost of the Helicomm-VDSI solution was lower than those of many of its competitors.

The system is also designed to operate in the event of an emergency, after power is shut off to the mine. Typically, Hill says, mines shut off power feeds during emergencies because of the volatile gases that might be within. In such a case, the MineTracer system has a backup battery that will keep it functioning for 48 hours after an incident occurs. "Our entire system," Hill notes, "is designed to work in that environment."

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