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Underground Mine Rescue Equipment and Technology

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SECTION 1. CORPORATE INFORMATION

Savi Technology, Inc. is a global leader in Radio Frequency Identification (RFID)-based supply chain visibility, security, and management solutions. Savi was founded in 1989 as a small business concern with headquarters in Sunnyvale, California. It maintains offices in Johannesburg, London, Singapore, and Washington, DC.

Savi has more than fifteen years of experience implementing RFID solutions around the world that have been proven to enhance operational efficiency and deliver substantial cost savings. We are the primary RFID technology provider for the world's largest wireless cargo monitoring network for the U.S. Department of Defense, which employs RFID, barcode, cellular and satellite communications systems to track more than 35,000 conveyances daily across a global network of 800 locations with over 1,500 read and write stations in more than 45 countries. Since the late 1990's, through investment in research, development and technology acquisitions, the company has designed and developed a network software platform, Savi SmartChain, for both the public and commercial sectors that is uniquely integrated with automatic data collection and identification systems to create RFID-based networks that deliver real-time supply chain management and asset management. With more than one million tags deployed world-wide, Savi has a strong presence building and expanding RFID networks in the commercial world. With the increase in National Security and the emphasis on safe and secure trading, Savi's leadership role has broadened to helping the United States and its international partners in securing global supply chain networks.

Savi has been instrumental in the development of key active RFID standards. A Savi proposal served as the basis for ANSI NCITS 256 part 4 (published in 1999) for active RFID. More recently, as RFID becomes important to global commerce, Savi has been working with ISO to develop the international standards. The ISO/IEC 18000-7 standard was based on a Savi proposal and endorsed by all nation bodies on the committee. Officially published in 2004, ISO/IEC 18000-7 has become the baseline active RFID technology standard. Savi is also an established leader in the EOC community and has been actively involved in the development of class 1 generation 2 specifications. Savi is an active member in the EPCglobal Hardware action group, Software action group, and Business action group. Anticipating active RFID standard work in EPCglobal, Savi is working diligently with the EPC community to ensure that the active RFID and passive standards appropriately complement one another. Savi is working with the DoD to develop the ANSI MH10 compliant RFID tag data format specification and is working closely with the DoD AIT office to establish that as the next generation DoD RFID tag data standard.

Savi has over fifteen years of US and Allied Military expertise in asset management and asset tracking based upon active and passive RFID technologies. Our RFID implementation experience as the sole-source provider for the US DoD in building its In-Transit Visibility (ITV) network, coupled with our established leadership in setting standards, uniquely positions Savi to assist MSHA in exploring the application of RFID technology to mine rescue operations.

SECTION 2. TECHNICAL APPROACH

Savi Technology, Inc. respectfully submits the following comments to MSHA RIN 1219-AB44. Specifically, these comments are directed at Section E: Communications; Bullet 4:

What new communication devices or technology may be well suited for day-to-day operations and also assist miners in the event of an emergency?

When an incident occurs, knowing who is in the mine and where they are located within the mine is critical to an effective response. Through the use of radio frequency identification (RFID), miners can be identified as entering or exiting the mine as well as their location can be tracked within the mine. Therefore, if an incident occurs, the rescue team knows specifically which people may be trapped and can concentrate their efforts accordingly.

Developing an effective strategy for responding to a mine emergency begins long before an emergency occurs. In order to track and locate miners, the mine must be instrumented with the appropriate RFID devices and the miners must carry with them a small RFID tag. The tag is small enough to be worn around the miner's neck (e.g. attached to a lanyard), affixed to their helmet, or could be slipped into a miner's pocket. This tag has a unique serial number identification (ID) that would be assigned to an individual miner. The association between tag ID and miner identification is done through a database. As the miner enters the mine, the tag interacts with devices that have been installed at the entrance to the mine and throughout the mine shafts. These devices read the miner's tag ID and the system reports him or her as passing a certain location. These devices work such that a miner does not have to do anything special to have his or her tag read. The miner simply needs to walk in the vicinity of these devices and they will be registered. The devices can be easily installed and are ruggedized to withstand the environmental conditions they would encounter in the mine. Each device requires a power source and certain devices require network connectivity. The networked devices communicate with a terrestrial computer running Savi's SmartChain Site Manager software. The Site Manager software collects the raw tag read data and forwards this to an application that provides mapping and location reports in a user-friendly interface. The application running at the surface matches the tag ID reads coming from the devices in the mine to the miner that was assigned to that tag. No personal data is transmitted from the mine to the surface, only tag ID and location.

Depending on the level of location granularity required, the system can be incrementally installed to provide immediate short-term benefit with the ability to expand to additional areas as needed. For example, an initial phase could involve instrumenting mine entrances and exits only. Our system could be quickly deployed to give immediate visibility on who enters and exits the mine. The next logical step would be to instrument further "location nodes" within the mine. A site survey would be required to determine the best locations to install equipment so that it is unobtrusive to mining operations while providing the necessary coverage. Essentially, this solution will divide the mine into location segments or zones. For example, a miner enters the mine and the system

would register his/her location as having entered the mine. As the miner passes the first location node, the system would update the miner's location. If the miner's tag is not read at the next location node, then the miner is located in the area between the two location nodes. The area between location nodes can be as close as 15 feet, but that may not be practicable. A site survey would determine the optimal installation locations and the distance between those locations. As the mine work area expands, additional location nodes can be installed to provide additional granularity.

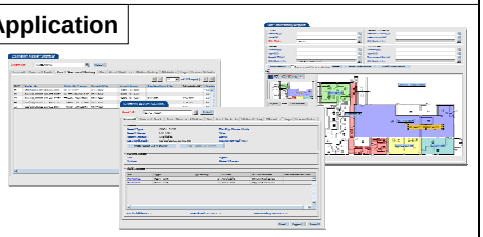
This technology is commercially available today and could be deployed immediately. Nodal location could be a first step. Technology will be available within a year or two which can complement the proposed system to determine precisely the last known location of a miner. The one consideration regarding this system is that like any other wireless system, an operable network connection to the surface is required. If the network connection between the surface and the devices in the mine is severed, then the system will know the place the miners were at the time the network went offline and that place becomes the beginning search point. This technology uses UHF frequencies that will not penetrate rock but rather follow the path created by the mine shafts.

The following diagram illustrates the solution components.

Miner Tracking Solution Architecture

SmartChain Enterprise Platform (SCEP) Application

- Real-time miner tracking and visibility
- Display visual map of mine location zones
- Configurable alerts
- Miner location reporting
- RFID device network management



SmartChain Site Manager Application

- Collects RFID data from readers; forwards to SCEP
- RFID device configuration and administration

SmartChain Platform Hardware

1) Savi Reader (SR-650)
   - Network device that collects tag reads and forwards them to Site Manager
2) Savi Signposts (SP-651-211)
   - Used to create location zones within mine
3) Savi RFID Active Tags (ST-602)
   - Uniquely identifies each miner
   - Attached to hard hat or carried in pocket

APPENDIX