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**From:** Allen Witters [alw@falcongroupllc.com]  
**Sent:** Thursday, February 02, 2006 7:16 PM  
**To:** zzMSHA-Standards - Comments to Fed Reg Group  
**Subject:** Reply to MSHA and RIN 1219-AB44.

To whom it may concern,

Please forward and review the attached documents on a Mine Rescue System Design. We are a design think tank with experience in sensors, networks, hardened computing.

Thank You,

**Allen Witters**

505-454-9620 Fax:505-454-1254

**MSHA Docket No.  
AB44-Comm-13**

## Common Questions and Answers:

Name and title: Allen Witters, Managing Partner

How did you identify the need for this device?

*It was very obvious to us that during the Sago Incident that both the surface and subterranean rescue crews did not know where the trapped personnel were. They drilled several test holes to no avail. They needed a technology to get a high-speed hole in the ground at the correct location within hours not days.*

Did you study current mining rescue procedures and respond to what was being asked for in the profession, or did you take a look at what's out there and see a better way to do it?

*We looked at what was available for underground personnel locators; there are a few types that rely on telemetry being sent out the mine entrance via network cables or wireless networks. These systems do a great job if they stay intact during a collapse and the personnel do not need to move from their current location. They are also excellent for helping optimize asset deployment and tracking during the workday. Our technology takes into consideration the fact that miners are trapped without any infrastructure or communications and that they need to move into a safe zone. 95% of Mine accidents happen within areas populated by personnel and are usually caused by some action or reaction to personnel activities. So, they almost always need to move. That is why a portable MRS beacon that does not rely on wires or networks is the only viable solution for trapped personnel. The best is to have the telemetry equipment and an MRS beacon.*

Where do you see it going?

*You will see an industry mandate for safety/communication/locator equipment, possibly even mobile shelters with supplies. There is no reason that the man-cars could not be modified like a troop transport is outfitted today for our troops, which can provide shelter, clean air and have a cache of survival supplies.*

How is your product prepared to meet those ever-changing needs?

*We do not see the need changing. You are either trapped or you are not. We do see several pieces of new technology or even old technology being applied to what I would call is a changing mining process.*

Was this technology designed with those changes in mind?

*It was designed to provide a new, more accurate and timely method of rescue of trapped underground personnel.*

Some critics and experts have argued that fatality and injury numbers have not increased, in fact their numbers seem stable and fairly low when compared to historical numbers in mining's early days.

*Very true, but a life is a life, ask the experts to go into a mine with the hazards and lack of safety gear and see how much coal we get out. Human life per ton has gone way down over the last 100 years.*

How long was this product in development?

*The sensors have been around for a few years and some just a few months, we saw application for them in a few areas, one of them in underground locating, and not necessarily for mining.*

Did you see a need for this long before the recent accidents in West Virginia?

*The Sago incident drove us to a think tank and we put it together within a few weeks, using our existing experience and knowledge of the technology.*

What are your thoughts about the recent push from law makers for tougher safety regulations?

*It is good, if it can be done fast enough to make the mines safe, I think what the West Virginia Governor did in making a safety shut-down will get the attention of the operators.*

Do you think this will help the advancement of mine rescue technology?

*Technology and Processes*

How?

*I believe you will see complete overhaul of the mine process protocols at all stages of production. In and out of the mine*

Do you think more must be done?

*Not at this time there is a lot of fuel on the fire and huge amount of political capital is being exercised.*

What process would be involved integrating your product into a mining facility?

*Very basic personnel training, less than 1 hour would be expected.*

Would employees need extensive training?

*No.*

Would companies have to invest in new computer hardware or software?

*It would come as a complete system and can be accessed by a web browser.*

What sort of compatibility does this have with current systems employed at mines?

*Underground it is a standalone beacon, not tied to anything. Above ground the equipment can be tied into any open system with a web browser.*

The presentation mentions that there is no current manufacturing for the product. Has this changed recently with the current legislative push?

*No, we are a design think tank; we are looking for companies to manufacture the technology.*

Additional comments:

*We focused on an un-answered problem of how do you find personnel when they are cut off from all communications, locating technology etc. This is the only system that can help both surface and sub-surface rescue efforts, when there is failure of the existing systems.*

# Mine Rescue System



Falcon Group, LLC

# Perspective



- Falcon Group, LLC is a high technology design think-tank
- It has multi-disciplinary skills and is recognized for developing leading edge technologies, both theoretical and real world
- It is focused on technologies that can help humanity
- After the many current mine accidents with tremendous loss of life, it is obvious to us that a system is required to help mine rescue

# Perspective – Cont.



- With Falcon Group's knowledge of recent sensor development, microprocessors, wireless networks, and hardened systems, we have designed a system to locate underground personnel
- This system has never been built, or tested, it is an engineered design
- Any suggestions and enhancements are appreciated
- Falcon Group is looking for companies that can develop the design into a commercially produced system
- With that we will give you the design specifications.....

# Design Specs



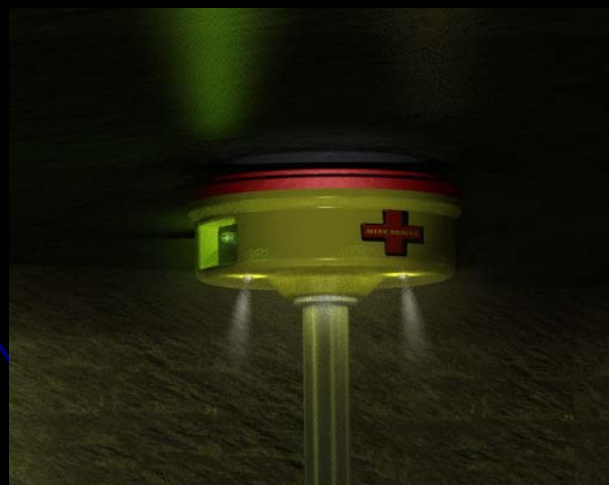
- Deployment by underground personnel in under one minute
- 10 day or 120 hour battery life on Rescue Beacon
- Rapid surface deployment in under 1 hour
- Ruggedized design for mine environment
- Multiple sensor technologies for varying mine geologies
- Spark free design
- Wireless sensor modules
- Intuitive interface
- Optional Personnel Status Communication
- Optional two-way communication
- Designed to help both surface and subsurface rescue teams
- Target Cost of Complete Rescue System <\$100,000



# Mine Rescue System (MRS)



- Major Components
  - Rescue Beacon
  - Subsurface Portable Sensors
  - Surface Sensor
  - Rescue Command Console



# Technology



- Is an integration of the following:
  - Extremely sensitive MEMS sensors
    - Acoustic (4 sensors available)
    - Seismic (3 sensors available)
    - Electromagnetic (9 sensors available)
  - Portable microprocessor computing
  - Wireless networking
  - GPS locating & timing
  - Web Based portable PC Command Console

# Construction



- Rescue Beacon
  - Hardened design for rugged mine use
  - Made out of spark free high impact glass filled plastics
  - Lightweight support telescopic support pole to install beacon against mine ceiling
  - Long-life rechargeable battery
  - Light weight 10-20 pounds depending on battery technology
  - Easy to use intuitive interface
  - Optional 1 way, 2 way, automatic communication

# Construction



- Surface Sensor Modules
  - Packaged in a hardened all weather Field Case
  - 48 Hour battery life without charging
  - Solar charging of battery during daylight hours
  - Wireless network connection to Rescue Command Console
  - All sensor modules are waterproof and connected via waterproof cables and connectors
  - GPS system included for timing and positioning
  - Microprocessor based signal processing and identification

# Construction



- Sub-surface sensors
  - Portable with similar sensors to Surface units
  - Sensor Module will be hand held for ease of use
  - These sensors can be integrated with inertial guidance and synchronized with the surface sensors
  - They can also give direct direction finding similar to metal detectors

# Construction



- Rescue Command Console
  - Hardened Portable PC
  - Uses standard wireless networking
  - Web based sharable software



# How does it work?



- **Beacon Outputs**
  - Long-wave – “Underground Sonar”
  - Acoustic
  - Seismic
  - Electro-magnetic
  - Multiple signals output in multiple patterns and frequencies
- **Surface Sensors Modules**
  - Seismic
  - Acoustic
  - Electromagnetic
  - Applied either on the surface or in shallow small bore holes in bedrock
  - Portable with setup in under 1 minute
- **Subsurface Sensors**
  - Directional locating of beacon signals
- **Rescue Command Console**
  - Off the shelf PC with web interface to Surface Sensor Modules
  - Wireless or Wired networking to Surface Sensor Modules

# Deployment Protocol



- Workers have an emergency situation and deploy beacon
- If there are permanent sensor modules installed they will sense a beacon being deployed and will start to triangulate position immediately
- If this is a rescue, and the site has no permanent sensors, then mine surface personnel deploy rescue sensors and sensors identify beacon signals and beacon location, this should be within 1 hour
- Beacon location is identified and triangulated by using GPS clocking, GPS locations of the surface sensors
- This allows overlay of mapping data for precise locating of underground personnel
- Immediate surface rescue drilling can be done accurately and within minutes, not days
- When a small drill hole has reached the level of the beacon, beacon air sensors can be lowered in the hole to verify the beacon and location data.
- Upon positive determination of the beacon location additional rescue assets can be delivered through the initial drill hole, ie oxygen, communications, water, food, fire fighting foam, etc.
- Also once a beacon location has been identified, a large rescue hole can be started immediately to save time and lives



# Status of technology



- We are looking for companies that would like to build this design and deploy it into mines
- We are willing to work with any group that has interest in deploying this technology
- Falcon Group is a think tank not a manufacture

Any questions please contact:

Allen Witters

505-454-9620

or email

[alw@falcongroupllc.com](mailto:alw@falcongroupllc.com)