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Methane Ignition and Coal Dust Explosion in Mine Entry
Mine-Wide Two-Way Radio Communications

Mine-wide two-way Radio Communications are required during the first few minutes of an incident or the situation goes out of control.

- **1984 Welburg Mine Fire**
  - 27 dead
  - Only a 900-ft walk to safety

- **2002 Quecreek Water Inundation**
  - 9 trapped

- **2004 Sago Mine Explosion**
  - 12 dead
  - Only an 1,800-ft walk to safety
Radio Communications and Tracking System Features

- Wireless two-way transmission
- Natural waveguides
  - Through-the-earth waveguide (ultra-low frequency)
  - Conveyor belt/cable waveguide (low frequency)
  - Coal seam waveguide (low frequency)
  - Passageway waveguide (ultra-high frequency)
- Intrinsically safe
  - Operational when ventilation is disrupted
Radio Communications and Tracking System Features

- Three redundant tracking and location subsystems
  - Real-time network with graphic display
  - Surface Delta Tracker to pinpoint location
  - In-mine Fox Hunter Antenna

- Extremely reliable network
  - F1/F1 repeater drilled into roof rock
  - Expandable and self-healing
  - Through-the-earth redundancy
  - Modulated for digital transmission
Radio Communications and Tracking System Features

- Cap lamp-powered tracking beacon
- Cap lamp transceiver
  - Multi-mode
  - Two-way text messaging
  - Synthetic voice capability
  - Bluetooth link to monitor physiological condition and provide PDA download
Radio Communications and Tracking System
Tracking Beacon
Through-the-Earth Waveguide
Tracking Beacon

MSHA IS Certification
Investigation IA-22294

- Keypad
- OLED
- Micro controller
- Class L Transmitter
Delta Tracker

- Suppresses surface radio frequency interference (RFI)
- Detects spreading EM waves
- Pinpoints trapped miners’ location
- Determines depth
Delta Tracker Detection of Mine Voids
Suggested Regulation Changes

- Combine 30 CFR 75:1600 and 30 CFR 49
- Require the same network and equipment
- Require 96-hour system operation when ventilation system is disrupted
Offer Tax Incentives

- Purchase of equipment
- Installation of equipment
- Maintenance of equipment
- Training of maintenance personnel