Mine Emergency Operation Improvements
Since 2009
Pittsburgh, PA

January 5, 2017
November 2009, Assistant Secretary Main Begins Complete Review of Mine Emergency Response Preparedness:

- November 2009, Assistant Secretary Main tasks MSHA Technical Support and MSHA’s Mine Emergency Unit to identify gaps in mine emergency preparedness and propose solutions.
- January 2010 Technical Support responds outlining priorities, shortcomings and improvements needed at MSHA and with industry mine rescue teams.
- Assistant Secretary Main immediately establishes a funding plan to modernize MSHA’s MEO and mine emergency communications system and engage stakeholders.
Prior to 2009, MSHA MEO has:

- **Pittsburgh, PA**
  - Mobile gas lab
  - Ventilation monitoring truck & Remotec robot
  - Analog seismic system

- **Price, UT**
  - Basic command center office
  - MEU team truck
  - Semi-mobile gas chromatograph

- **Beckley, WV**
  - Basic command center office
  - MEU team truck
  - Laboratory-only chromatograph
  - Rescue capsule
  - Basic surface communications

Prior to 2009, MSHA MEO was:

- Distant from the mining areas with long response times
- Using dated equipment
- Using separate coal and metal and nonmetal mine rescue teams
- Not taking advantage of the newest technologies
Prior to 2009, MSHA Seismic Location System is:

- The original seismic location system recommended by the National Academy of Engineering in 1970
- An analog system using components that were out-of-date
- Not a system that MSHA could rely upon to locate miners in an emergency
Assistant Secretary Main’s 2009 Directive of Overhauling MEO:

- Adds a new Midwest Mine Rescue Station to improve response times
- Adds 23 new MEO vehicles across the US that support
  - Gas monitoring and analyses
  - Surface and underground communication
  - The mobile command staff
  - Rescue teams and equipment
- Upgrades all four MEO stations with standardized equipment including:
  - Infra-red gas analysis
  - Chromatographic analysis
  - Surface communications
  - Mine emergency team personnel and equipment
  - New state-of-the-art underground communications, tracking, mapping, and atmospheric systems
- Improves command and control and MEO staffing and training
- Develops new state-of-the-art seismic location system
MSHA Mine Emergency Operations

MSHA Changes in 2010 and 2011:

MSHA’s PEIR joins with MEO to develop a new surface communications system in 2010. This system corrects the communication problems encountered during the Upper Big Branch Mine rescue and recovery operations.

A new state-of-the-art mobile command center is put into service at the Pittsburgh Station in 2011. This vehicle supports the on-site command staff during a mine emergency.
Completes engineering trailer, which is put into service to support onsite engineering staff during mine emergencies

Installs a specially designed underground transportation vehicle that supports mine rescue needs at the MEU at the Beckley station

Installs a new PEIR communications HUB, new mobile gas lab and a new MEU team truck at the Denver/Price station

Conducts a Mine Emergency Response Drill (MERD) with Consol Energy at its BMX Complex in Western Pennsylvania
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MSHA Changes in 2013:

MSHA Coal and Metal and Nonmetal Mine rescue units combine to form one MEU.

MSHA opens a new mine rescue station at a temporary location in MSHA Coal District 10 offices in Madisonville, KY.
MSHA Changes in 2014:

- Updates mine rescue training guide and creates an Advanced Skills Training guide for mine rescue teams
- Aids NIOSH’s development of explorer and a snake robots to deploy down a borehole
- Finalizes new Mine Emergency Response Drills (MERD)
- Acquires a 28 inch drill steel capable of drilling a large hole for a rescue capsule
- Develops an electronic log to provide a digital version of events during an emergency
- Develops a MEO mapping tool providing real-time mapping
- New state-of-the-art underground communication system installed at Pittsburgh station
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MSHA Changes in 2015:

- Opens a new fully equipped facility at the Kentucky Coal Academy in Madisonville, KY, to service the Midwest
- Electrical Division takes over the development of the seismic location system response
- Robotic Response Team formed in Pittsburgh to work with the new robots being obtained from NIOSH
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MSHA Status in 2016:

- MEO has mine rescue stations in:
  - Pittsburgh, PA
  - Beckley, WV
  - Madisonville, KY
  - Price, UT.
  - Denver, CO (sub-station of Price)

- Each of the four stations have standardized equipment including:
  - Infra-red gas analysis
  - Chromatographic analysis
  - Surface communications
  - Mine emergency team personnel and equipment, and
  - Underground communications

- Command centers and additional underground communications located at the Pittsburgh station and Denver sub-station
- The Robotic Response and Seismic Location System Response Teams located at the Pittsburgh Station
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MSHA Status in 2016:

- Newly developed seismic location system tested at 8 mines and found reliable to detect miners signaling at depths of 1300 ft, including:
  - Aracoma Mine (WV) - Oct 2014 Depth 350 ft
  - Sugar Creek (MO) - Nov 2015 Depth 120 ft
  - Pinnacle Mine (WV) - Jun 2015 Depth 1100 ft
  - Cass #1 Mine (PA) - Apr 2016 Depth 200 ft
  - American Rock Salt (NY) - Aug 2016 Depth 1300 ft
  - Lowry Mine (PA) - Oct 2016 Depth 400 ft
  - Gibson Mine (IN) - Nov 2016 Depth 500 ft

- Recently developed seismic system located in Pittsburgh
- Future testing plans include depths approaching 2000ft and locating additional systems and/or components of the system at other stations
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MSHA Status in 2016:
Infra-red Gas Monitoring Trucks at all four stations

These trucks carry a variety of instruments used for continuous sampling and recording of mine gases, including infra-red and electrochemical analyzers.
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MSHA Status in 2016:
Mobile Gas Laboratories at all four stations

These trucks carry a fully-functional gas laboratory (chromatographs) for analyzing samples of mine air for gases such as methane, ethane, acetylene, oxygen, nitrogen, hydrogen, carbon dioxide, carbon monoxide, ethylene and argon.
MSHA Status in 2016:
Surface Communication Systems at all four stations

- New state-of-the-art surface communications systems
  - Cisco systems
  - IP phones
  - Secure radio system
  - Satellite
  - Repeater systems
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MSHA Status in 2016:
MEU Team Trucks at all four stations

Team trucks provide a workspace for the MSHA mine rescue team members to store and maintain equipment such as emergency breathing apparatus, communications, and handheld gas detectors.
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MSHA Status in 2016:
Underground Communications Equipment

- Equipment allows voice and data communication between underground mine rescue teams and the surface command center
- Pittsburgh and Denver can communicate a full 20,000 ft underground
- Price, Madisonville, and Beckley can establish a first response communication up to 5,000 ft underground
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MSHA Status in 2016: Underground Vehicles

- Pittsburgh – 2 Electric Mine Utility Vehicles (EMUs)
- Price – 1 Diesel Utility Vehicle
- Madisonville – 2 EMUs
- Beckley – 1 Damascus
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MSHA Status in 2016: Command Vehicles

Provides an information hub, secure meeting/working location, and MSHA’s on-site headquarters during a mine emergency response or recovery operations.
Deployable visual/audio equipment that can be placed in the mine office or facility to securely disseminate information needed during an event.
Redotec robot remotely explores underground mine workings when conditions are too hazardous for rescue personnel

- Gemini Scout robot provides a nimble, quick maneuvering tool
- Sarcos Snake robot can be deployed through a borehole from the surface
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MSHA Future Technological Developments For Mine Rescue

- Intrinsically safe helmet camera so that real-time images from the underground rescuers can be viewed by persons above-ground
- Wireless remote gas sensors to allow quick placement of underground, real-time gas monitoring stations
- Voice communications integrated into the mine rescue mask so that communication is clear, fast and readily understood
- WiFi connectivity at the fresh air base