

EFFECTIVE DATE: March 27, 2014

EXPIRATION DATE: 3/31/2028

LAST VALIDATED: 3/26/2026

PROGRAM POLICY LETTER NO. P14-V-01

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SUBJECT: Revised Guidance for Compliance with Post-Accident Two-Way
Communication and Electronic Tracking Requirements of the Mine
Improvement and New Emergency Response Act of 2006
(MINER Act)

Scope

This Program Policy Letter (PPL) is intended for underground coal mine operators, independent contractors, miners' representatives, Mine Safety and Health Administration (MSHA) personnel, equipment manufacturers, repair facilities, and other interested parties.

Purpose

This PPL revises and supersedes P11-V-13. This PPL is a general statement of policy that provides mine operators guidance in implementing: (1) post-accident wireless two-way communication between underground and surface personnel and (2) electronic tracking systems, both of which are required by the MINER Act. The two-way communication systems currently include infrastructure underground to provide untethered communications with miners.

Policy

The following guidance is provided to assist mine operators in developing post-accident two-way communication between underground and surface personnel and electronic tracking for their Emergency Response Plans (ERPs). The MINER Act requires that a plan be submitted that provides for a post-accident communication system between underground personnel and surface personnel via a wireless two-way medium and for an electronic tracking system that permits surface personnel to determine the location of any persons trapped underground. If these provisions cannot be adopted, ERPs must set forth an alternative means of compliance that

approximates, “as closely as possible, the degree of functional utility and safety protection provided by the wireless two-way medium and tracking system” referenced.

Because fully wireless communication technology is not sufficiently developed at this time to permit use throughout the industry, this guidance addresses acceptable alternatives. ERPs must provide alternatives to fully wireless communication systems until these systems become available for use throughout the industry.

With respect to tracking, because MSHA-approved electronic systems currently are available for use throughout the industry, ERPs must provide for electronic tracking of persons underground.

This guidance represents MSHA’s current thinking with respect to two-way communication and electronic tracking for use in mine emergencies. It does not create or confer any rights for any person nor does it operate to bind mine operators or any other members of the public. Mine operators can use an alternative approach or system to provide two-way communication or electronic tracking if the approach or system satisfies the requirements of applicable statutes and regulations. If you are a mine operator, miners’ representative, or miner and want to discuss another approach or system, you may contact the MSHA District Manager for the area in which the mine is located. Other interested parties may contact the individuals identified in this PPL. References to the District Manager in this PPL refer to the Agency’s consultative process for approving mine plans, as opposed to the process for enforcement decisions related to citations.

Two-Way Communication Systems

While operators and District Managers must consider mine-specific circumstances in determining appropriate two-way communication systems, this guidance outlines the features MSHA believes would best approximate the functional utility and safety protections necessary to meet the intent of the post-accident wireless communication system, given current technology. However, operators and others may propose other approaches or systems, and the District Manager will exercise discretion in evaluating them.

- A. General Considerations - A post-accident communication system can either be a system used for day-to-day operations or a stored system used in the event of an accident. Examples of currently available technologies that may be capable of best approximating a fully wireless communication system include, but are not limited to, leaky feeder, wireless or wired node-based, through-the-earth, and medium frequency systems. Any system should:

1. Have an untethered device, such as a hand-held radio, that miners can use to communicate with the surface. The untethered device should be readily accessible to each group of miners working or traveling together and to any individual miner working or traveling alone.
2. Provide communications in the form of two-way voice and/or two-way text messages. If text messaging is used, pre-programmed text messages should be capable of providing information to the surface necessary to determine the status of miners and the conditions in the mine, as well as providing the necessary emergency response information to miners.
3. Provide an audible, visual, and/or vibrating alarm that is activated by an incoming signal. The alarm should be distinguishable from the surrounding environment.
4. Be capable of sending an emergency message to each of the untethered devices.
5. Be capable of communicating between untethered devices over the network infrastructure.
6. Be installed to prevent interference with blasting circuits and other electrical systems.

B. Coverage Area

1. The system must provide coverage throughout each working section in a mine.
2. The system should provide continuous coverage along the escapeways.
3. The system should provide a coverage zone both inby and outby strategic areas of the mine. Strategic areas are:
 - a. Those areas where miners are normally required to work or likely to congregate in an emergency and can include belt drives and transfer points, power centers, loading points, refuge alternatives, SCSR caches and other areas identified by the District Manager. Entire entries where miners normally work, such as belt, haulage, or travelway entries, may be considered "strategic areas" depending upon mine-specific conditions.

- b. While a coverage zone of 200 feet inby and 200 feet outby strategic areas normally should be adequate, the District Manager may require longer or shorter distances given mine-specific conditions.
 - c. The District Manager may approve alternative coverage areas to those areas identified in 3.a., such as adjacent entries, for reasons such as radio frequency interference or other factors that may reduce the coverage area at the identified strategic areas.
4. Miners should follow an established check-in/check-out procedure or an equivalent procedure when assigned to work in bleeders or other remote areas of the mine that are not provided with communication coverage.
 5. Communication for refuge alternatives must be provided as required under 30 C.F.R. §75.1600-3.
- C. Permissibility – The communication system must be approved by MSHA under 30 C.F.R. part 23 and applicable policies.
- D. Standby Power for Underground Components and Devices
1. Stationary components (infrastructure) should be equipped with a standby power source capable of providing sufficient power to facilitate evacuation and rescue in the event the line power fails or is cut off. In many mining situations, at least 24 hours of standby power based on a 5% transmit time, 5% receive time, and 90% idle time duty cycle (denoted as 5/5/90) should be adequate, but mine-specific conditions may warrant more or less standby power capability.
 - a. The system should display whether it is operating on line or standby power.
 - b. A means should be provided to determine the state-of-charge (SOC) of standby power. The SOC should account for the degradation of battery capacity that occurs over time due to age, temperature, and other factors, so that the length of time the system will function on standby power can be determined.
 2. Untethered devices, such as hand-held radios, should provide sufficient power to facilitate evacuation and rescue following an accident. In many mining situations, at least 4 hours of operation in addition to the normal shift duration (12-hour minimum total duration) based on a 5/5/90 duty cycle should be adequate, but mine-specific conditions may warrant more or less

capability. This total operation time can be achieved via spare portable devices or cached batteries if the device is approved for battery replacement in a hazardous area.

E. Surface Component Considerations

1. The surface portion of the communication system should include a line-powered surface component with a standby power source to ensure continued operation in the event the line power is interrupted.
2. The communication system should be configured to allow communication between underground personnel and the communication facility. 30 C.F.R. § 75.1600-1 requires that a responsible person, who can receive incoming messages and respond immediately in the event of an emergency, is always on duty when miners are underground. The responsible person should be trained in the operation of the communication system and knowledgeable of the mine's ERP.
3. The communication system can be monitored from a remote site. However, the mine site must have full system capability.
4. The surface portion of the system should be equipped with the capability to print communications, message histories, and other system data in a post-accident situation.

F. Survivability

1. The post-accident communication system should provide redundant signal pathways from the underground components to the surface component. The system should display pathway disruptions and system malfunctions.
 - a. Redundancy means that the system can maintain communication with the surface when a single pathway is disrupted. Disruption can be the result of major events, such as fires, explosions, or roof falls, or communication system component failure.
 - b. Redundancy can be achieved by multiple systems installed in multiple entries, or one system with multiple pathways to the surface, provided that a failure in one system or pathway does not affect the other system or pathway.
2. If system components must be installed in areas vulnerable to damage (such as in areas with adverse roof or rib conditions or in front of seals designed for less than 50 psi explosion force), enhanced protection against damage should be provided. For example, protection could be provided by installing

enclosures in recessed areas, around corners, or other areas that reduce potential for damage; or routing and protecting cables such that potential for damage, especially from explosive forces perpendicular to infrastructure, is minimized.

G. Maintenance

1. Normally, the equipment manufacturer will provide a maintenance schedule and checklist to the mine operator.
2. The mine operator should:
 - a. Establish and follow a procedure to provide communication during system or component failures in the event that an accident occurs before the failure can be corrected. This procedure should include restoring at least 24 hours of standby power for the stationary components (infrastructure).
 - b. Examine the infrastructure and verify on a weekly basis that it is maintained in proper operating condition. In the event of any failure that results in the loss of communication, repairs should be started immediately and the system restored to operating condition. Operators should establish a means of verifying that weekly examinations have been conducted and that any needed repairs have been made.
 - c. Examine the untethered devices on a daily basis to verify that they have sufficient battery charge and are maintained in proper operating condition.
 - d. Follow the manufacturer's maintenance recommendations.

Electronic Tracking Systems

Approved electronic tracking systems are available for use throughout the industry. While operators and District Managers must consider mine-specific circumstances in determining an appropriate electronic tracking system, this guidance outlines features MSHA believes would provide the protection contemplated in the MINER Act in many underground coal mining environments. As noted, operators and others may propose alternative approaches or systems, and the District Manager will exercise discretion in evaluating them.

A. General Considerations

Plans must be submitted that provide for determining the location of persons underground using an electronic tracking system pursuant to 30 U.S.C. § 876(b)(2)(F)(ii).

B. Performance

1. While the required capabilities of a particular tracking system will depend on mine-specific circumstances, an effective electronic tracking system should be capable of:
 - a. Determining the location of miners on a working section to within 200 feet.
 - b. Determining the location of miners within 200 feet of strategic locations. Strategic areas are those areas where miners are normally required to work or likely to congregate in an emergency and can include belt drives and transfer points, power centers, loading points, refuge alternatives, SCSR caches and other areas identified by the District Manager. Entire entries where miners normally work, such as belt, haulage, or travelway entries, may be considered "strategic areas" depending upon mine-specific conditions.
 - c. Determining the location of miners in escapeways at intervals not exceeding 2000 feet.
 - d. Determining the location of miners in belt entries at intervals not exceeding 4000 feet or at each manned belt drive if the distance between the drives is less than 4000 feet.
 - e. Determining direction of travel at key junctions in escapeways.
2. Electronic tracking systems should be installed to prevent interference with blasting circuits and other electrical systems.

C. Permissibility – The tracking system must be approved by MSHA under 30 C.F.R. part 23 and applicable policies.

D. Standby Power for Underground Components

1. Stationary components (infrastructure) should be capable of tracking persons underground during evacuation and rescue efforts, even upon loss of mine power. In many circumstances, the capacity to provide a minimum of 24 hours of continuous tracking operation after a power loss should be sufficient.
 - a. The system should display whether it is operating on line or standby power.
 - b. A means should be provided to determine the state-of-charge (SOC) of standby power. The SOC should account for the degradation of battery

capacity that occurs over time due to age, temperature, and other factors, so that the length of time the system will function on standby power can be determined.

2. An individually worn/carried tracking device (e.g., a tag) should provide a low power warning. To facilitate evacuation and rescue efforts, the individually worn/carried tracking device should provide at least 4 hours of operation in addition to the normal shift duration (12-hour total minimum duration).
- E. Capacity - Tracking system components (readers) must be capable of tracking the maximum number of persons, including visitors, expected to be in a coverage area.
- F. Scanning rate - To provide timely and relevant information, the tracking system should be capable of updating (refreshing) location data at least every 60 seconds.
- G. Surface Component Considerations
1. The surface portion of the tracking system should be equipped with standby power to ensure continuous operation in the event the line power is interrupted.
 2. The tracking system should be configured to allow monitoring the location of miners underground from the communication facility. 30 C.F.R. § 75.1600-1 requires that a responsible person, who can receive incoming messages and respond immediately in the event of an emergency, is always on duty when miners are underground. The tracking system should include the capability to display the location of all miners underground. The responsible person on duty on the surface should be trained in the operation of the tracking system and knowledgeable of the mine's ERP.
 3. The tracking system can be monitored from a remote site. However the mine site must have full system capability.
 4. The tracking system interface should display the last known location of a miner when the tracking device is not communicating with the system.
 5. Each miner should be uniquely identified.
 6. Location data should be associated with a time stamp.
 7. Location data should be stored for at least two weeks so that it will be available for evacuation and rescue of persons underground, and should also be made available to MSHA upon request for accident investigations. The operator should develop and adopt a reliable method for determining the

current and historical underground locations of miners when the system is not transmitting location data to the surface components (e.g., miners are beyond the tracking coverage areas or the electronic tracking system malfunctions).

8. The surface portion of the system should be equipped with the capability to print a list of the last known location of all miners underground and other system data in a post-accident situation.

H. Survivability

1. If system components must be installed in areas vulnerable to damage (such as in areas with adverse roof or rib conditions or in front of seals designed for less than 50 psi explosion force), enhanced protection against damage should be provided. For example, protection could be provided by installing enclosures in recessed areas, around corners, or other areas that reduce potential for damage, or routing and protecting cables such that potential for damage, especially from explosive forces perpendicular to infrastructure, is minimized.
2. The MINER Act does not explicitly require redundancy for tracking systems, however, pursuant to Section 2 of the MINER Act, tracking systems must be “calculated to remain serviceable in a post-accident setting.” As system redundancy is one method for improving the likelihood of tracking capability following an accident, consideration should be given to the use of redundant signal pathways to the surface component as a means to better ensure survival of electronic tracking systems following an accident.
 - a. Redundancy means that the system can maintain communication with the surface when a single pathway is disrupted. Disruption can be the result of major events, such as fires, explosions, or roof falls, or electronic tracking system component failure.
 - b. Redundancy can be achieved by multiple systems installed in multiple entries, or one system with multiple pathways to the surface, provided that a failure in one system or pathway does not affect the other system or pathway.

3. Data storage should not be impacted by interruption of the data link between underground and surface components.
4. The system should display pathway interruptions and system malfunctions.

I. Maintenance

1. Normally, the equipment manufacturer will provide a maintenance schedule and checklist to the mine operator.
2. The mine operator should:
 - a. Establish and follow a procedure to provide manual tracking during system or component failures in the event that an accident occurs before the failure can be corrected. This procedure should address the process that must be followed while restoring at least 24 hours of standby power for the stationary components (infrastructure).
 - b. Examine the infrastructure and verify on a weekly basis that it is maintained in proper operating condition. In the event of any failure that affects the tracking capability of the system, repairs should be started immediately and the system restored to operating condition. Operators should establish a means of verifying that weekly examinations have been conducted and that any needed repairs have been made.
 - c. Examine on a daily basis the devices worn by miners to verify that they have sufficient battery charge and are maintained in proper operating condition.
 - d. Follow the manufacturer's maintenance recommendations.

Background

The MINER Act included the following requirements for communication and tracking systems:

The [emergency response] plan shall provide for redundant means of communication with the surface for persons underground...

Consistent with commercially available technology and with the physical constraints, if any, of the mine, the plan shall provide for above ground personnel to determine the current, or immediately pre-accident, location of

all underground personnel. Any system so utilized shall be functional, reliable, and calculated to remain serviceable in a post-accident setting.

Not later than 3 years after the date of enactment of the [MINER Act], a plan shall, to be approved, provide for post-accident communication between underground and surface personnel via a wireless two-way medium, and provide for an electronic tracking system permitting surface personnel to determine the location of any persons trapped underground or set forth within the plan the reasons such provisions cannot be adopted. Where such plan sets forth the reasons such provisions cannot be adopted, the plan shall also set forth the operator's alternative means of compliance. Such alternative shall approximate, as closely as possible, the degree of functional utility and safety protection provided by the wireless two-way medium and tracking system referred to in this subpart.

As technological advances are made and become available, MSHA will update this guidance, and District Managers will review existing Emergency Response Plans to consider the manner in which intervening advances in communication and tracking systems may enhance miners' ability to evacuate or otherwise survive in an emergency.

Authority

Section 316 of the Federal Mine Safety and Health Act of 1977, as amended, 30 U.S.C. § 876; 30 C.F.R. part 23 and § 75.1600.

Filing Instructions

This program policy letter should be filed behind the tab marked "Program Policy Letters" at the back of Volume V of the Program Policy Manual.

Internet Availability

This program policy letter may be viewed on the [MSHA home page](#) by choosing "Compliance Info" and "Program Policy Letters." Also posted is a list of MSHA-approved two-way communication systems and a list of MSHA-approved electronic tracking systems.

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