

# Radio 101: Operating Two-Way Radios Every Day and in Emergencies

## *Instructor's Guide*

Report of Investigations 9686

**Instructor's Guide**

**Radio 101: Operating Two-Way Radios Every Day and in Emergencies**

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# **Instructor's Guide: Radio 101**

## **Overview**

*Instructor's Guide: Radio 101* is part of a program to train miners in the use of two-way radio communication in the mines. This training tool provides detailed information and scripts for use by instructors when conducting training for miners on everyday and emergency radio communication in mining. The training program was created by a multidisciplinary team at the National Institute for Occupational Safety and Health (NIOSH) to focus on the need for improved communication in the mines and to train miners to effectively use radios as part of a communications system in a mine. This instructor's guide is intended for use in a group training setting or for individual trainees and should be used in conjunction with the PowerPoint presentation *Radio 101: Everyday and Emergency Radio Use* and the *Student Handbook*.

# **Instructor's Guide**

## **Introduction**

With new requirements for communications and tracking systems, as mandated by the MINER Act of 2006, new issues may arise with the use of radios both on a daily basis and in emergencies. For example, if every miner has a handheld radio, there could be a problem with inundation of the airwaves in an emergency, causing a delay in the communication of important information. Also, miners will have more access to handheld radios, so it may be worthwhile to provide all miners with training on how to properly use those radios.

In the past, the ineffective use of communications systems within mines in emergency situations has caused a variety of problems. During the Sago Mine disaster in West Virginia in January 2006, the improper use of handheld radios resulted in immeasurable pain for the families of the deceased as they were mistakenly informed that there were 12 survivors and 1 dead when, in fact, 12 miners had died and only 1 had survived. This training may be able to prevent a similar situation from occurring in future emergencies. Further, relative to the new systems mines are required to install, miners will need to know how to use both primary and secondary communications systems. Rather than focusing on the technical details and specialized terms of communications systems, the tips provided in this training program will focus on briefer, rule-of-thumb information which can be used to improve the chances of successful communication under less-than-optimal circumstances.

New miners may not understand the potential consequences of not answering the phones in an emergency situation. For new miners, these consequences should be stressed in training and include the use of examples.

Trainers should explain the meaning and significance of various visual and audible warning systems used in their mine to new miners. They may not understand the significance or consequences of failing to take action in response to these warning systems.

## Setup for the Training

### *Materials Needed*

- ☐ Two handheld radios
- ☐ Radio Charger
- ☐ Copies of scenarios for practice (found in this guide)
- ☐ Copies of student handbooks (one per student)
- ☐ PowerPoint® presentation (available online)
- ☐ Screen or wall for projection of presentation
- ☐ Computer for PowerPoint® presentation

Before the class starts, have the PowerPoint presentation set up and test it to make sure everything is working. If you are going to do hands-on practice with radios, make sure you have radios set up, charged, and ready to go.

### *Time Needed for Training*

- ☐ 30 minutes for the PowerPoint presentation
- ☐ 5–10 minutes of practice time per pair of students (e.g., if there are 10 students, 5–10 minutes for 5 pairs)

*Prior to the training, investigate the potential for radio interference at your mine.*

Although two-way radio communication can be invaluable, radios have the potential to interfere with other safety appliances in the mine. This may or may not be the case with the particular equipment at your mine. Following are some known examples of interference.

- One safety director reported that if a radio mic was keyed within 10 ft of a carbon monoxide (CO) detector at his mine, the detector would activate and send a false alarm.
- Several miners reported their mine's radios caused cap lamps to shut off or dim considerably unless the lights had shielding in the battery.

Before starting training on radio use, determine the potential issues with your equipment. If any potential problems are identified, be sure to inform the trainees of the potential for interference when conducting the radio training.

## Conducting the Training

Hand out one Student Handbook (the “handbook”) to each class participant. Each trainee should be allowed to keep their copy of the handbook if they want to do so. Then, go over the information in the booklet. Types of radio traffic are covered first, followed by coverage of everyday use and emergency use. All the information in the student handbook is also provided below in this instructor’s guide (shown inside the boxes that follow), along with additional tips for the instructor.

### 1. Go over the types of radio traffic.

#### TYPES OF RADIO TRAFFIC

When learning how to use the radio, it is important to know that there are three types of radio traffic. These include:

- **Routine traffic** – the regular, daily radio traffic one would hear on the mine radio including basic emergencies such as an injured employee, but whose injuries are not life threatening.
- **Emergency traffic** – radio traffic about an emergency situation (e.g., a miner with a fractured arm or the loss of ventilation on a working section). In these situations, a miner would call out that they have emergency radio traffic. Then the dispatcher or communications person would clear the airways for this person to state the problem.
- **Mayday** traffic– describes radio traffic when a major mine emergency occurs (e.g., explosion, fire) or someone is in danger of death (e.g., heart attack, pinned by machinery or roof fall). The term “Mayday” is repeated three times, “Mayday, Mayday, Mayday”. In this case the dispatcher should respond by asking all other traffic to cease, except for the Mayday traffic.

The handbook is presented in two sections:

- routine traffic (or basic use)
- emergency and Mayday traffic

***Note:** Your mine may have different designated terms for each type of radio traffic; if this is the case, then you should use those designated terms.*



## 2. Discuss issues related to everyday use of radios.

### **ROUTINE TRAFFIC:**

#### **ISSUES WITH BASIC USE OF MINE COMMUNICATIONS SYSTEMS**

According to a group of miners who were asked about using radios in a mine, the radio is easy to use—“you just push the button and talk.” However, in the past there have been some difficulties associated with using radios to communicate. When we asked miners, they noted the following problems that can occur when using the communications systems in mines on an everyday basis:

- Miners underground do not always call out when there is a problem, such as when the carbon monoxide (CO) alarms go off.
- Finding radio units with dead batteries, which then cannot be used.
- People not answering the phone on the sections. “They can hear it; they just ignore it. In fact, the dispatcher will page them again and say ‘there’s not work involved, answer it!’”
  - One story shared was about someone’s child who was injured in a car accident. No one inside the mine would answer the phone because they thought there was work to do. They had to announce the message about the accident over the airwaves to get the father’s attention to answer the phone.
- The lack of good maintenance on the system. For example, if someone is loading supplies and hits a communications cable, it needs to be fixed.
- People chattering on the line so when it is really needed it is not available.
- People inadvertently or unknowingly holding down the mic button so the line is busy, such as when the radio is in someone’s pocket.
- People not knowing what signals mean.
  - For example, at a mine that has a pager system that flashes different lights for different messages, miners did not know the meaning of each different light signal.
- People not remembering to keep portable radio units with them as they move around the mine and forgetting to bring them back.
  - One miner reported his mine had lost 50 units in the mine within a six-month period.

Maybe you can think of similar problems at your own mine! The goal of this training is to teach you some “rules of the radio” that can improve the efficiency and effectiveness of the radio in a mine.

**3. Provide basic training on how to use the radio at your mine. This should include the following mine-specific information:**

Each mine has its own communications system and rules for when to communicate information. The mine should supply the following information to its underground employees, and verify that they understand it.

- What is the primary communications system (e.g., mine or pager phone, handheld radio, etc.).
- What is the secondary communications system (e.g., leaky feeder system, medium frequency system, etc.).

**Note:** *Depending on the type of system you have at your mine, go over any relevant sections on the wireless communications systems which are provided at the end of the student booklet (e.g., if you have a leaky feeder system at your mine, go over that section).*

**WIRELESS COMMUNICATIONS SYSTEMS:**

Following are some simple tips for users of these systems. For detailed information on the components of these systems and how they work, see NIOSH's Tutorial on Wireless Communication and Electronic Tracking, which is located at:

<http://www.cdc.gov/niosh/mining/topics/electrical/commtrackingtutorial/commtrackingtutorial.htm>

- **Leaky feeder** –Leaky feeder communications systems use two-way radios and a special antenna cable called a leaky feeder. The cable runs from outside the mine (surface) to all working sections (underground). The main control, called the “head end,” is located on the surface. At predetermined locations along its length, the leaky feeder has signal amplifiers (boosters) designed to help maintain signal strength. Communication in a leaky feeder system goes through the head end. Depending on the individual mine, a leaky feeder system may have one or more lines into the mine.

Assuming there is only one line in and out of the mine, if there is a break in the line, miners on the side of the break away from the head end will not be able to communicate even with other workers on the same side of the break. In other words, if there is a break in the line, anyone in by the break will not be able to use the system. However, if there is an additional alternate line into the mine, then miners in by a break in one line may be able to move to the alternate line and communicate through it.

Handhelds for this system sound a warning tone if two devices are keyed at the same time.

- **Medium Frequency (MF)** –Compared to other communications systems, medium frequency systems depend much more on the environment to work, such as through the pager phone wire, water pipes, power lines, etc. There must be metal available in

the mine for the signal to travel. Medium frequency has a delay of 1–2 seconds (or more depending on how far the signal has to travel). If two radio mics are keyed at the same time on an MF system, the message may not go through, and there is no way of knowing and no warning that both sides tried to communicate at the same time.

- **Through-the-Earth (TTE)** – The antenna for this system is a long, looped wire. In general, the bigger the circle enclosed by the antenna, the better reception you will get.

TTE is a slower system with less bandwidth—most likely there will only be text communication when using this type of system. This system is susceptible to interference. TTE would most likely be used as an emergency backup system only.

### *Additional Basic Training Topics*

- What functions are activated by the buttons on each type of radio unit
- Which channels are used and for what purpose
- How to use the all-page feature in an emergency
- How to contact the dispatcher or Responsible Person
- What events are considered emergencies (e.g., serious injury, life-threatening illnesses or incidents, ventilation problems, fire, and mine explosions)
- If there are special signals (such as colored lights on a pager), what the signals mean
- Examples of specific protocols mines may want to adopt:
  - Report your location in the mine to the communications person or responsible person.
  - On a regular dial phone, call out as soon as shift change arrives on section to make sure phone is working.
  - Require some communication to take place every two hours.
  - Test the communications system when moving refuge chambers.

4. After the basic training on radio use specific to your mine, you should go over “How to use the radio” and “Tips for using your radio on a daily basis” in the Student Handbook.

### HOW TO USE THE RADIO:

- Push and hold the transmit button before starting to talk.
- Wait a few seconds before you start talking.
- Hold the radio 3–4 inches away from your mouth.
- Do not yell into the radio.
- Speak slowly and clearly.
- Remember only one person can talk at a time.
  - Simultaneous communication will cancel each talker out, and both talkers will be unaware that their messages did not go through.

### WHAT TO SAY:

- Message Content
  - Communicate where you are and your request/problem.
  - Use location identifiers (e.g., Crosscut 23).
  - Know what you want to say before you press the transmit button.

### HOW TO SAY IT:

- Be brief and efficient:
  - Reduce the use of air time as much as possible.
    - Keep the length of the transmission to a minimum.
    - Communicate essential information only.
  - Use this standard protocol for speaking:
    - *Sender:* “Hey Fred, it’s me George.” (receiver’s name first, then yours)
    - *Receiver:* “Go ahead, George.”
    - *Sender:* State the message (only pertinent, specific information).
    - *Receiver:* Repeat the information back.
    - *Sender:* Correct or confirm the information.
    - *Receiver:* Simply states what will be done (e.g., “We’re sending Engine 1, estimated time of arrival 4 minutes”).

#### For example:

- *Section mechanic:* “Hey, Fred, this is Mike on F20 Panel.”
- *Maintenance foreman:* “Go ahead, Mike.”
- *Section mechanic:* “Fred, I need five water spray nozzles for the continuous miner and three shuttle car cable splice kits.”
- *Maintenance foreman:* “Okay, that’s five water spray nozzles for the miner and three shuttle car cable splice kits, correct?”
- *Section mechanic:* “Yes, that’s correct.”
- *Maintenance foreman:* “Okay, Mike, I will bring them when I come to F20 Panel in about an hour.”

***Note:** Although it is not conventional in emergency communications because the protocol is established and known to all parties, if you prefer, you may instruct your students to close each transmission by saying “Over.”*

**TIPS FOR USING YOUR RADIO ON A DAILY BASIS:**

- Politeness does not matter; efficiency is more important.
  - You do not have to say “please” and “thank you.”
- Avoid jargon and codes.
- Use established protocols for identification, communication, and signoff.
- Repeat back what you heard to ensure you have understood the message being sent.
- Be brief, listen, speak slowly and clearly, acknowledge receipt of information.
  - Brevity is important, **but** messages must be relayed verbatim.
- Only transmit relevant information.
- Keep the radio with you at all times as you move around the mine.
- Be aware that, in addition to the intended audience, other people may overhear your message.
- Limit your talking to essential communication to avoid “clogging” the line or “overtalking.”
  - Do not have personal or casual conversations on the radio.
  - Do not talk too much.
- Do not swear or shout.
- Many wireless systems are line-of-sight. If possible, move to transmit line-of-sight to the next radio.
- Antennas can be easily damaged; protect them as much as possible.

**5. Stress the emergency use of communications devices, including types of radio traffic, tips, and points on messages.**

**EMERGENCY AND MAYDAY TRAFFIC:**

**ISSUES WITH EMERGENCY USE OF TWO-WAY RADIOS**

Miners and mine rescue experts were asked about using radios in emergency situations. These individuals shared their thoughts and ideas on emergency radio use including problems they have encountered. Here are some of the topics that were discussed:

- There tend to be different interpretations of the term “emergency”. Though the miners said there are true emergencies, such as life-threatening injuries, fires, and so forth, they also said there can be production emergencies. While miners contend they do not have a problem using radios during true emergencies, they find operators tend to treat production emergencies with the same urgency.
- When an emergency occurs at a mine, there can be an inundation of radio traffic over the airways. Personnel outside in the communications or command center are trying to get information about what is happening. Likewise, miners are trying to find out as much as they can about the situation.
- When there is an emergency, people sometimes talk over each other. This occurs when someone is talking on the radio and another person on the line will try to talk at the same time. When this happens, neither message gets through.
- Some radio communications systems may not be reliable. Therefore, some miners do not have confidence that the radio communications system in place at their mine will work when they need it.
- Depending on the type of radio system in place, there can be problems with limited transmission distance. Depending on the system and how it is set up, there can be “dead spots” (where communications are unavailable) in certain locations in the mine. There can even be problems transmitting from one entry to the next.

**WHAT TO SAY:**

It is important to know how your radio works and how to physically use it. This was covered in the section “How to use the radio.” In addition to this knowledge, it is equally important to know what information to communicate during an emergency. Most messages will consist of:

- Orders and instructions to perform tasks for controlling the situation.
- Reports about the conditions and progress encountered.
- Requests for additional resources to fulfill assigned tasks.

**Here Is What To Say During An Emergency:**

- Ask for radio waves by saying “Emergency traffic” or “Mayday, Mayday, Mayday” (or the codes designated by your mine).

- Tell the receiver of your call WHO you are.
- Tell the receiver of your call exactly WHERE the problem is located.
- Tell the receiver of your call WHAT is happening at the scene of the problem.
- After this, give the details of the situation including:
  - MINERS: details about the miners involved (e.g., “Two miners are hurt.”)
  - EVENT: details about the event (e.g., “The miners are pinned under a roof fall.”)
  - RESPONSE: details about the response that is occurring (e.g., “We’re trying to get the rock off of them.”), how many people are there, what equipment is there and/or needed.
- If you will be bringing someone out of the mine, ask the dispatcher or communications person to clear all vehicle traffic to allow you to exit the mine quickly.
- Note that these instructions on what to communicate correspond to the NIOSH Emergency Communication Triangle [NIOSH, 1999].

#### **How To Say It:**

- After stating “Emergency traffic” or “Mayday, Mayday, Mayday,” follow the same protocol for speaking as you would on a daily basis.

#### **Tips for Using Your Radio in an Emergency:**

- Every message must be clear, concise, and timely.
- Provide regular status reports or updates about the incident.
- Timing of updates:
  - Community emergency responders suggest the first progress report be given about 10 minutes after the initial report.
  - For the next hour of the incident, provide an update every 10 to 15 minutes and whenever a significant escalation of operations occurs. The transmission of additional alarms would be defined as escalation and would require the Incident Commander to inform the communications center of the reasons for this additional response.

## **Training Methods**

1. Make sure the trainer is qualified to train on the mine's specific communications system.
  - It is important that the trainer delivering this training is knowledgeable about how to use the communications system at the mine, how the communications system works, and basic radio etiquette.
  - The trainer should be someone who has experience using the mine's communications system.
  - The mine's communications technology or services vendor may be available to provide system-specific training to all mine employees or to a group of individuals selected to be radio trainers.
2. Teach radio users what to say and how to say it.
  - Refer to the NIOSH Emergency Communication Triangle to instruct radio users on the information that should be communicated during an emergency (NIOSH, 1999, Publication Number 99-157).
  - Establish policies for what is appropriate and acceptable radio communication during nonemergencies.
  - Emphasize the importance of clarity and brevity when communicating via radio.
3. Train in context
  - Provide hands-on opportunities for trainees with communication devices during the training (bring actual radios with which to practice).
  - Place half of the trainees in one room and half in another room and require them to communicate with each other via the radio.
  - Present trainees with emergency scenarios and have them communicate with one another using the radios.
  - Observe and correct their behavior, including what button they push, how close they hold the radio to their mouth, etc.
  - Incorporate underground training sessions so trainees become familiar with the background noise and acoustics they will encounter while working underground.

## **Common Radio Use Mistakes to Address during Training**

1. "Thinking" while on the radio
  - New radio users often push the mic button before they know what they are going to say.
  - Emphasize that radio users need to know what they are going to say before pushing the talk button.



2. Excessive transmission
  - New radio users often say more than is necessary.
  - Emphasize that radio communications should relay “just the facts.”
  - Being polite (e.g., please and thank you) wastes air time.
3. Incorrect channel
  - New radio users often broadcast on the wrong radio channel.
  - Emphasize the importance of ensuring that the radio is set to the desired channel prior to beginning the transmission.

## Reminders for Trainees

1. When using certain hard wired systems, wait a second or two before speaking to make sure you don’t hear a system busy tone (it sounds like a “bonk”).  
**Note:** There is no system busy tone for conventional radios/channels.
2. Keep the radio battery charged.
  - *Trainers: Review all procedures for proper charging technique.*
3. Do not remove the battery or antenna while the radio is turned on.
4. Take defective equipment out of service.
  - *Trainers: Describe proper procedures for taking defective equipment out of service.*
  - *Trainers: Describe how to obtain replacement equipment.*
5. Equipment must be maintained
  - *Trainers: Describe all procedures to maintain equipment.*

## Reminders for Mine Management

1. Regularly check that radio infrastructure systems are working.
  - Roof falls, water, and contact with equipment can damage wiring within the mine.
2. Mine dispatchers and those serving as the Responsible Person need in-depth knowledge of the mine’s communications system and experience using it.
  - Newer employees should not be assigned to these roles.
3. Do not assume that only new miners could benefit from radio communication training.
  - Consider including radio training in toolbox talks, annual refresher training, quarterly escape training, or other training programs.

## Assessment of Trainees

To ensure each miner is able to use the radio, especially in case of an emergency, it may be useful to assess each miner's knowledge using hands-on and/or written assessment methods. Both a hands-on and written assessment are provided here. If possible, it is best to do both assessments; however, conducting one or the other is preferable to not doing any assessment of the trainees.

### Hands-on Assessment

#### *Materials Needed*

- ☐ 2 radios
- ☐ Radio charger
- ☐ Instructor's Script/Answer Sheet \*
- ☐ Miner's Information Sheet\*

\*These sheets are on the following pages of this instructor's guide and can be copied for classroom use.

#### *Assessment Steps*

1. Place the miner being assessed alone in a room with a radio. Provide the miner with a copy of the Miner's Information Sheet; then, go to a separate room with another radio so the miner can radio information to you.
2. Using your radio, transmit "Start" to the miner and wait for him/her to begin transmitting. Have the Instructor's Script/Answer Sheet ready so you can write notes about what skills the miner performs correctly or incorrectly.
3. Some things to observe when assessing the miner's radio skills:
  - Make sure the message comes through clearly and is not cut off.
  - Ensure the transmission is brief but has the necessary information.
  - Listen for proper volume (e.g., no yelling).
4. Respond to the miner's transmissions according to the script.
5. When the transmission is complete, return to the room where the miner is located and have a brief discussion with the trainee on what she/he did correctly or incorrectly.
6. If the instructor thinks it is necessary, the transmission could be repeated again for practice.

## *Instructor's Script/Answer Sheet*

### SCENARIO # 1: Request for supplies

1. *MINER*: "Dispatch, it's (miner states name)."
2. *INSTRUCTOR*: "Go ahead, (fill in name)."
3. *MINER*: "We need roof bolts and plates on the continuous miner (CM) section; put them inby Crosscut 52."
4. *INSTRUCTOR*: "Roof bolts and plates for CM section and put them inby 52?"
5. *MINER*: "Confirm."
6. *INSTRUCTOR*: "We will send in roof bolts and plates."

### SCENARIO # 2: Non-life-threatening emergency (injury to miner)

1. *MINER*: "Emergency traffic, this is (miner states name)."
2. *INSTRUCTOR*: "Clear the airways, go ahead with emergency transmission, (fill in name)."
3. *MINER*: "CM operator with possible broken ankle near Crosscut 52."
4. *INSTRUCTOR*: "CM operator, broken ankle, Crosscut 52?"
5. *MINER*: "Confirm."
6. *INSTRUCTOR*: "Prepare the injured. Report back when you're ready to move the miner for transport. We'll clear traffic to allow you out."

### SCENARIO # 3: Life-threatening emergency (severe injury to miner)

1. *MINER*: "Mayday, Mayday, Mayday, this is (miner states name)."
2. *INSTRUCTOR*: "Stop all radio transmissions immediately, go ahead with Mayday, (fill in name)."
3. *MINER*: "CM operator pinned between CM and the rib. We are inby Crosscut 52."
4. *INSTRUCTOR*: "CM operator, pinned by machine, inby Crosscut 52?"
5. *MINER*: "Confirm. One injured, EMT on the scene administering first aid, request EMS and a medical helicopter on the surface."
6. *INSTRUCTOR*: "One injured, EMT on the scene. We will contact EMS and a medical helicopter. We are also sending help in."
7. *MINER*: "Confirm you are sending help in, calling EMS, and ordering a medical helicopter."
8. *INSTRUCTOR*: "Confirm. Please update status in 15 minutes."

### SCENARIO # 4: Life-threatening emergency (mine fire)

1. *MINER*: "Mayday, Mayday, Mayday, this is (miner states name)."
2. *INSTRUCTOR*: "Stop all radio transmissions immediately, go ahead with Mayday, (fill in name)."
3. *MINER*: "Fire on D Mains belt outby of Crosscut 67."
4. *INSTRUCTOR*: "Fire on D Mains belt outby of Crosscut 67?"
5. *MINER*: "Confirm."
6. *INSTRUCTOR*: "I will inform the responsible person and send out word to evacuate the mine."

SCENARIO # 5: Non-life-threatening emergency (damage to overcast)

1. *MINER*: "Emergency traffic, this is (miner states name)."
2. *INSTRUCTOR*: "Go ahead, (fill in name)."
3. *MINER*: "We have an overcast damaged at the mouth of section F22. It's between the 3 North Mains intake and F22 return."
4. *INSTRUCTOR*: "F22 damaged overcast between 3 North Mains intake and F22 return?"
5. *MINER*: "Confirm."
6. *INSTRUCTOR*: "I will call the responsible person and send out word to prepare to evacuate everyone inby F22."

### *Miner's Information Sheet*

Read each scenario in this information sheet and radio the important information to your instructor using the proper radio protocol. The instructor will radio "Start" when she/he is ready. Once you hear the signal, you should begin your transmission.

#### SCENARIO # 1

You are working underground on a seven-man CM section just inby Crosscut 52. The roof bolter has asked you to call outside to request more roof bolts and plates be brought in.

#### SCENARIO # 2

You are working underground on a seven-man CM section just inby Crosscut 52. Your CM operator suddenly yells out. He stepped on a rock and twisted his ankle. One of your crew members is an EMT. He takes a look and thinks the ankle may be broken. He asks you to radio outside about the situation.

#### SCENARIO # 3

You are working underground on a seven-man CM section just inby Crosscut 52. Your CM operator suddenly yells out. You look over and he is pinned between the CM and the rib. One of your crew members is an EMT; he rushes over to help and yells for you to radio outside about the situation.

#### SCENARIO # 4

You are working underground as a beltman and are walking outby of Crosscut 67 on D Mains belt. You start to smell smoke and as you keep walking, you see flames on the belt. You realize the fire is out of control and too big to try to control with the small fire extinguisher that is nearby. Use the radio to communicate to others in or outside of the mine about the situation.

#### SCENARIO # 5

You are working underground as a scoop operator in Section F22, which is a CM section between 3 North Mains and F22 return. As you are driving a load of coal to the belt, you accidentally hit an overcast and disrupt the ventilation. You get on your two-way radio and notify your section foreman about what happened.

## Written Assessment

- \_\_\_\_\_ 1. In an emergency, your first transmission should include who you are, where the problem is located, and what is happening at the scene of the problem.
- \_\_\_\_\_ 2. In radio communication, politeness matters so you should always say please and thank you.
- \_\_\_\_\_ 3. It is okay to use the radio to ask your friend in the next section over about what he's doing for dinner tonight.
- \_\_\_\_\_ 4. When using a radio, hold it 3 to 4 inches from your mouth.
- \_\_\_\_\_ 5. On the radio, it's hard to hear each other, so you should yell loudly into the radio when transmitting a message.
- \_\_\_\_\_ 6. To start your transmission, push the mic button and wait a few seconds before you start talking.
- \_\_\_\_\_ 7. You should plan what you are going to say before you start your transmission.
- \_\_\_\_\_ 8. The following is an example of a correct, complete transmission protocol, "Hey dispatch, we need a mechanic for the CM because Billy did something to it and now it won't run. Over and out."
- \_\_\_\_\_ 9. Antennas can be easily damaged. You should protect them as much as possible.
- \_\_\_\_\_ 10. You should always make sure to return your radio at the end of the day so it can be charged and ready for the next person.

## Written Assessment: ANSWER SHEET

1. TRUE

In an emergency, your first transmission should include who you are, where the problem is located, and what is happening at the scene of the problem.

2. FALSE

In radio communication, politeness matters so you should always say please and thank you.

3. FALSE

It is okay to use the radio to ask your friend in the next section over about what he's doing for dinner tonight.

4. TRUE

When using a radio, hold it 3 to 4 inches from your mouth.

5. FALSE

On the radio, it's hard to hear each other, so you should yell loudly into the radio when transmitting a message.

6. TRUE

To start your transmission, push the mic button and wait a few seconds before you start talking.

7. TRUE

You should plan what you are going to say before you start your transmission.

8. FALSE

The following is an example of a correct, complete transmission protocol, "Hey dispatch, we need a mechanic for the CM because Billy did something to it and now it won't run. Over and out."

9. TRUE

Antennas can be easily damaged. You should protect them as much as possible.

10. TRUE

You should always make sure to return your radio at the end of the day so it can be charged and ready for the next person.

## **Acknowledgments**

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