

Activity name: Hazardous Materials Spill Response: Observation and Communication Skills Practice

This activity is meant to provide a real-world application of the ATEEC Recommended Core Curriculum's math, science, technical, communications, or critical thinking knowledge and skill concepts, which have been identified by the ATEEC Fellows as necessary preparation for environmental technology occupations.

Appropriate for which course(s)?): High school and community college technology ed, communications, science

Concept/skill learned (i.e. from [K/S Tables](#)): Give clear, concise verbal instructions; develop and use active listening skills, draw graphic communications

[SCANS](#) skills addressed:: Mental visualization, listening, interpreting and communicating information, participating as a member of a team, monitoring and correcting performance

Cognitive Level: Comprehension, analysis, and evaluation

Learning objectives - Students will be able to:

- Accurately listen to and interpret communications from a remote site regarding the particulars of a simulated hazardous materials spill.
- Accurately describe to a listener at a remote site the particulars of a simulated hazardous materials spill.
- Evaluate difficulties that can occur during remote site communications and make improvements to the process.

Approximate time to complete activity: 1 class meeting

Source of idea or activity (for published source, please include author, title, publisher, date): Sally Gaines, lead teacher of environmental programs at Scott Community College

Materials/resources needed (equipment, print media, electronic media, videos, supplies, etc.):

- Two walkie-talkie radios or cell phones
- An easel and large newsprint pad
- Markers
- Any common harmless substance that simulates a spill; flour, partially set jello, or frosting squeezed from a tube all have worked well.

- At least one large container that will be used to simulate a spill (preferably an unmarked five-gallon container of the type that industrial solvents, paints, etc. are stored in, so that it presents a mystery as to the contents. You might add to the drama by painting a skull and crossbones!).
- Background sheets.
- Option: Mark labels with names of chemicals (e.g., sulfuric acid, trichloroethylene, caustic soda) and provide chemical resources, such as the Department of Transportation Emergency Response Guidebook, the National Institute for Occupational Safety and Health's Pocket Guide to Chemical Hazards, material safety data sheets obtained from chemical manufacturers, or other chemical reference books. This option allows the integration of science knowledge into the exercise.
- Option: jeans (stuffed with newspaper), hard hat, and boots to simulate a person being "down"; that is, overcome by a material.
- Option: binoculars add to the authenticity of the situation, where the hazmat team views the situation from a distance.
- Option: "Drums in a Box" contextual teaching and learning kit. The kit lends itself to a tabletop exercise that may be performed in a classroom.

General Description of Activity:

The students participate in a simulated hazmat spill response. They are divided into two groups: (1) the hazmat team members who approach the spill "hot (or restricted) zone" and (2) the incident command members who stay well back from the incident in the "cold zone," from where they direct the response. Since the incident command position in the cold zone does not permit members to see what is going on at the spill, they must rely on voice communications to visualize the situation. As the hazmat team describes the situation, incident command sketches their interpretation of the scene on a large pad. After the simulation ends, the incident command group goes to the scene to find out how effective the communications were.

Typically, the first attempt at communicating ranges anywhere from imprecise to total failure. As the students discuss where their descriptions were effective and ineffective, they develop some strategies to try on the next attempt.

The students should try another simulation, staying in their same groups so that the hazmat team has a chance to improve their descriptions, and the incident command team has a chance to ask better questions to clarify their understanding. If necessary, try as well for more efficient use of time.

If time permits a third simulation, the hazmat team members become the incident commanders and the commanders become the hazmat team.

Teaching Procedure:

1. Assemble the materials listed above. Check with school administration for availability of communications equipment. You might invite a professional (member of a hazmat team, fire service, police) to participate in the activity and to supply the communications equipment. If equipment is not available, the locale of the activity should be at the corner of a building or some other place that presents a visual barrier but not a sound barrier during the activity.
2. Arrange ahead for an aid, a colleague, an administrator, a parent volunteer, or the visiting professional if you need to have constant supervision of each group during the activity.
3. Reproduce the two sets of Group Instruction and Background Sheets. Go over these sheets with the students.
4. Just before students are taken to their site(s), spill a large container of one of the materials listed above, and leave the container lying on its side. (This represents a spill of an unknown hazardous material.) An optional touch is to simulate a person lying behind the container (hard hat lying on ground; boots and jeans stuffed with paper to look like legs sticking out behind the other end).
5. Students assigned to the Hazmat Team (HM) go to the spill. Students assigned to the Incident Command Team (IC) go to an area that is removed visually from the spill, taking with them the markers, easel, and paper.
6. The simulation starts with the HM Team reporting by voice to the IC Team an exact description of the scene. As the IC Team hears the description, they sketch their interpretation of the scene, including distances to cars, buildings, storm sewers, etc. IC Team members may ask as many questions as necessary to clarify their interpretation.
7. When both teams feel they have completed sending and receiving the description, they come together to see the results of their efforts. Often the first attempt at this activity yields an imprecise drawing. Students should debrief on what types of information could produce a precise drawing.
8. Keeping the same teams, do another spill, perhaps with a scattering of flour by the container this time, representing a dry potentially hazardous material. In the debriefing, students should compare their first and second experiences and think of any further suggestions for improving communications.

Background Sheets:

Group Instruction and Background Sheet

Hazmat Team

In the event of an emergency (or incident) involving hazardous materials, only those personnel who have been specially trained by federal Occupational Safety and Health Administration (OSHA) standards are permitted to respond. These specially trained personnel might be fire fighters, industrial emergency response teams, or hazardous waste workers. Team members involved in an actual response report their activities to Incident Command personnel who stay in a safe zone during a response situation.

The Hazmat Team enters the "hot zone" clothed in protective equipment. They communicate by radio with Incident Command about the situation as they find it, and then follow orders to mitigate—that is, correct or improve—the situation.

To describe the layout of the situation to Incident Command, the Hazmat Team uses a four-point method of description: A (or 6 o'clock) represents the point of entry to the site, B (or 9 o'clock) represents the left, C (or 12 o'clock) represents straight ahead, and D (or 3 o'clock) represents the right. The use by the Hazmat Team of a scheme such as this allows Incident Command to orient their sketch as they interpret the scene.

All of these reporting and mitigation activities happen in a potentially hazardous atmosphere, so efficient use of time is necessary to get the Hazmat Team in and out safely and quickly.

List below those students that will function as the Hazmat Team during the simulation:

Group Instruction and Background Sheets

Incident Command

In the event of an emergency (or incident) involving hazardous materials, only those personnel who have been specially trained by federal Occupational Safety and Health Administration (OSHA) standards are permitted to respond. These specially trained personnel might be fire fighters, industrial emergency response teams, or hazardous waste workers. The Incident Commander and his or her supporting team members stay in a position of safety as they direct the operations. The Incident Commander directs the Hazmat Team by radio.

List below those students that will function as the Hazmat Team during the simulation:

Tabletop Exercise:

A tabletop exercise simulates a real-life situation by using small, manageable components in a classroom. This communication exercise may be carried out with common objects: vegetable tins lying on their sides (painting them a solid color is a helpful touch); frosting squeezed onto the table surface (line with waxed paper); and self-stick mailing labels for including the chemical names in the exercise. If allowed in your setting, you might position a candle behind the "scene" with the flame visible, so that it appears that fire is complicating the situation. A small stuffed animal or bird on its back can provide the appearance of being overcome by the spilled material.

Activity submitted by: Diane Gere, ATEEC

Return to <http://www.ateec.org/> > Learning Resources > Instructor > Environmental Tech Activities