Emergency Preparedness and Response for Environmental Health Professionals

A training guide for environmental health managers, supervisors and trainers

http://www.publichealthplanet.org
Center for Public Health Preparedness
Train the Trainer Guide

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Content Development
The content for this training is derived from the Emergency Preparedness and Response Fundamentals and Putting Principles into Practice training modules developed by the Twin Cities Metro Advanced Practice Center (APC) through Cooperative Agreement Number U50/CCU3020718 from the CDC to the National Association of County and City Health Officials (NACCHO). Contact Information: Twin Cities Metro Advanced Practice Center, Hennepin County Public Health Protection Division, 952-351-5200, epi-envhlt@co.hennepin.mn.us

To download electronic versions of the training guide, PowerPoint slides with speaker notes, and self-study training modules contact:

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Course goal
To train environmental health managers/supervisors to prepare their staff in emergency and disaster response.

Delivery
This course will be delivered in a classroom with computer projection capabilities. A set of PowerPoint slides is provided with speaker notes accompanying each slide. Suggestions for activities are also given based on the scenarios in the Putting Principles into Practice module (CD included with this training guide) as indicated in the presentation outline below. You are encouraged to use examples from your own experience to illustrate concepts throughout the training.

Course structure
This course will take approximately four hours to deliver, with this as a possible agenda:
8:00   Introductions and course agenda
8:15   Presentation of lessons 1 and 2 (with built-in activities)
9:30   Break
9:45   Presentation of lessons 3 and 4 (with built-in activities)
11:00  Group activity
11:30  Discussion and debriefing
12:00  Adjourn

Materials
• Train the Trainers Guide
• EH training modules
• PowerPoint slides with speaker notes for training

Equipment
• Computer with PowerPoint
• Projection system
• Flipcharts, markers and blue masking tape for group activities (optional)
Lesson 1: Overview of Environmental Health Principles

Objectives
After participants complete this lesson, they will be able to:

- describe the basic principles of environmental health (EH).
- interpret the cause of disease model.
- recognize skills and tools needed by EH professionals.
- distinguish between different types of disasters.
- identify their role in responding to a disaster.

Presentation outline

<table>
<thead>
<tr>
<th>Themes</th>
<th>Examples and suggested activities</th>
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<tbody>
<tr>
<td>1. What is environmental health?</td>
<td>Refer to Scenarios on CD: <em>Putting Principles into Practice</em> Scenario 1-7, Scenario 2-6, and Scenario 3-8.</td>
</tr>
<tr>
<td>2. Principles of environmental health</td>
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<td>3. Public health - cause of disease model</td>
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<td>4. Environmental health skills</td>
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<tr>
<td>• Assessment</td>
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<tr>
<td>• Management</td>
<td></td>
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<tr>
<td>• Communication</td>
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<tr>
<td>5. Environmental health tools</td>
<td></td>
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<tr>
<td>6. Disasters and the role of EH professionals</td>
<td>For examples, refer to scenarios on CD: <em>Putting Principles into Practice</em> Scenario 1-8 &amp; 1-10, Scenario 2-10, Scenario 3-7</td>
</tr>
<tr>
<td>7. Types of disasters</td>
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<td>8. Effects if disasters</td>
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<tr>
<td>9. Role of EH professionals</td>
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<tr>
<td>10. Working with other responders</td>
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</tbody>
</table>
Main points of discussion

1. Environmental health promotes health and quality of life by preventing or controlling those injuries, diseases or deaths that result from interactions between people and their environment.

2. One of the jobs of an EH professional is to intervene in order to reduce health hazards.

3. EH professionals need to be competent in many areas including assessment, management and communication.

4. To respond to emergency situations, EH professionals have many tools at their disposal such as plans, special equipment, transportation, and emergency communication systems.

5. Disasters can be classified according to their speed of onset, scale, or cause (natural or man-made).

6. The three major roles for EH professionals are to assess hazards, act to reduce hazards, and assure public awareness.

Note: Refer to PowerPoint slides and speaker notes for more detailed talking points. We suggest you print out the PowerPoint slides using the Print / Notes Pages feature. Presentation of Lessons 1 and 2 takes about 30 minutes. Related activities take about 45 minutes.
Activities

Activity 1 – cause of disease model (15 minutes)

The cause of disease model provides an excellent framework for understanding an event and being able to respond to it. Here are descriptions of the three scenarios we will be using throughout the activities. You will ask the workshop participants to come up with a model for each of these. Sample worksheets for this exercise are provided in the appendix. You can select the one you like best and assign it to one group or use a scenario of your own choosing. You can also divide the class into two or three groups, and assign a scenario to each. It is a good idea to have the scenarios typed out on handouts for participants to refer to. Worksheets for each scenario and a reference sheet of terminology are included in the appendix.

Scenario 1: mercury contamination

On Labor Day 2004, late afternoon in Rosemount Woods, a manufactured home park in Dakota County, a release of mercury into the environment occurred. Teenagers had removed two pint-sized jars of mercury from the demolition site of the former Brockway glass factory. The two youths carried the jars to the manufactured home park. After some time, a parent found them surrounded by other kids, playing with the alluring shiny liquid metal. By this time, the mercury had been spread onto the skin, clothes and shoes of the children playing with the dangerous metal. Mercury was tracked to other parts of manufactured home park as the children returned to their homes.

Scenario 2: chemical spill

At approximately 1:37 a.m. on January 18, 2002, an eastbound Canadian Pacific Railway freight train, traveling about 41 mph, derailed 31 of its 112 cars about half a mile west of the city limits of Minot, North Dakota. Five tank cars carrying anhydrous ammonia, a liquefied compressed gas, catastrophically ruptured, and a vapor plume covered the derailment site and surrounding area. The conductor and engineer were taken to the hospital for observation after they complained of breathing difficulties. About 11,600 people occupied the area affected by the vapor plume. One resident was fatally injured, and about 60 residents of the neighborhood nearest the derailment site were rescued. Damages exceeded $2 million, and more than $8 million has been spent for environmental remediation.

Scenario 3: tornado

On March 29, 1998, the staff of the Brown-Nicollet Environmental Health Department in south-central Minnesota, quite unexpectedly, was given a crash course in disaster response. That’s the day two tornadoes carved a 100-mile wide destructive path through their region, leveling and damaging thousands of buildings (including the Environmental Health Office) and claiming two lives. Downed trees and debris made roads impassable. Phone and electric service was spotty in some areas, nonexistent in others. Relief efforts were made even more difficult by a snowstorm that swept through the area the following day. Food had to be inspected and distribution monitored for contamination. (Build the cause of disease model based on food contamination).
Activity 1 – responses:

Scenario 1:
Agent: Elemental mercury
Host: Humans in Rosemount Woods, especially children
Environment: Manufactured home park, warm weather, holiday
Source: Jars of mercury taken from demolition site
Portal of exit: Children opened glass jars storing mercury and played with it
Mode of transmission: Mercury on skin, clothes, shoes
Portal of entry: Oral, dermal or respiratory

Scenario 2:
Agent: Anhydrous ammonia
Host: People in or near Minot
Environment: Winter weather, thermal inversion
Source: Tank cars
Portal of exit: Ruptured tank
Mode of transmission: Air dispersal
Portal of entry: Inhalation

Scenario 3:
Agent: Bacteria in food
Host: People in south-central Minnesota storm-damaged area
Environment: Winter weather, thermal inversion
Source: Contaminated food – bacteria was present in, or introduced into the food as it was prepared
Portal of exit: Contaminated food is not properly prepared and held at correct temperature, allowing the bacteria to multiply to infective doses
Mode of transmission: Contaminated food is served
Portal of entry: Oral, if a person eats contaminated food and ingests enough bacteria to become sick
Activity 2 – role of EH professionals (15 minutes)

The primary goal for EH is to protect the public from the hazard associated with contamination of the environment such as food and water supplies, to prevent further exposures. Tell workshop participants about their overall role, for example: “You will work to interrupt the chain of disease/injury transmission to prevent harm to humans. Your goal is to protect humans from adverse environmental exposures. You may work with an environmental protection entity such as the state Pollution Control Agency to assist them in protecting the environment.” Ask participants with regard to the three scenarios, what they think their role might be. Keeping the same group(s) as in Activity 1, have them record their responses on flip chart paper and hang on the wall to compare with other groups. Remind them to be creative!

Activity 2 – ideas for responses

Scenario 1: many contamination

In the Rosemount mercury spill, the environmental health department engaged in an array of activities. The opportunity was seized to try to gain more visibility for the department and better public understanding for what EH professionals do.

One of the key activity areas for EH was to help the lead agency, Minnesota Pollution Control Agency, with the cleanup effort including:
- Indoor cleanup
- Outdoor cleanup
- Screening of homes
- Cross-contamination

Scenario 2: chemical spill

Environmental health was involved throughout the emergency response and in the months that followed. The North Dakota Department of Health (NDDH), called in by the Governor, was on the scene at around 7:00 the morning of the disaster. Terry O’Clair, Director of the Division of Air Quality for the NDDH, describes their efforts as extremely cooperative with other groups who were there to respond. “We were on the scene as soon as we could get there on the morning of the event. First responders were already hard at work, and the hazmat team from the air force base had been called in. The event occurred only months after 9/11, and so many suspected a terrorism act, which of course was not the case. We were involved at all stages of the response, from the very beginning to the cleanup that lasted for many months afterwards.”
Scenario 3: tornado

Following these tornadoes, the role of environmental health was quite prominent. EH professionals exercised their specialties in many different areas including:

- Mass care (emergency shelter and feeding)
- Water quality
- Food safety

In addition to their specialty areas, EH professionals helped with immunizations (tetanus boosters) and medication replacements. Ideally in an emergency, EH professionals would be cross-trained to deal with all these activities, or at least assist with them.
Lesson 2: Communication as a Key Role for EH Professionals

Objectives
After participants complete this lesson, they will be able to:

• describe how public health ordinances help prevent emergencies.
• describe how environmental health fits into an Incident Command Structure.
• assume an appropriate risk communication role in emergencies, which depends on the structure of the organization.

Presentation outline

<table>
<thead>
<tr>
<th>Themes</th>
<th>Examples and suggested activities</th>
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</thead>
<tbody>
<tr>
<td>1. Role of ordinances</td>
<td>For examples, refer to the scenarios on CD: <em>Putting Principles into Practice</em>: Scenario 1-9, Scenario 2-9, Scenario 3-5</td>
</tr>
<tr>
<td>1. Emergency management organization (agencies)</td>
<td></td>
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<tr>
<td>3. Incident command structure</td>
<td></td>
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<tr>
<td>4. Who communicates what?</td>
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</tr>
<tr>
<td>5. Personal plans</td>
<td></td>
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<tr>
<td>6. EH communication role in an emergency</td>
<td></td>
</tr>
</tbody>
</table>
Main points of discussion

1. Local ordinances establish standards and regulations to protect the health, safety and welfare of the people.

2. The Incident Command structure provides for internal communication with the city, the public information officer (PIO), the security and safety officers, and external liaison with various organizations.

3. It is the EH professional’s responsibility to report up the chain of command to the PIO with EH information about the emergency that needs to be communicated to the public or the media.

Note: Refer to various courses and publications on Risk Communication, and Incident Management Systems (IMS). Go to http://www.umncphp.umn.edu to access free online training modules on Incident Management Systems.

See PowerPoint slides and speaker notes for more detailed talking points. We suggest you print out the PowerPoint slides using the Print / Notes Pages feature.
Activities

Activity 3 – emergency management organizations (15 minutes)

In any kind of emergency, many different agencies are involved. Depending on the type and scale of disaster, local, state and federal agencies may be involved. For our three scenarios, we provide a list of organizations involved in each case (see worksheets in appendix). Divide the workshop participants into groups. Distribute the worksheets with the list of agencies involved in each scenario to the groups. Ask each group to discuss the types for activities some of the agencies might be engaged in. Have each group record their responses on flip chart paper. Hang responses on the wall to compare and discuss with the large group.

Activity 3 – ideas for responses

Scenario 1: mercury contamination

The mercury emergency in Dakota County involved many agencies, all of which had a role in the response. Some of the agencies involved in the incident are listed below:

- Rosemount Police
- Minnesota Department of Health (MDH)
- Minnesota Pollution Control Agency (MPCA)
- American Red Cross (ARC)
- Dakota County Public/Environmental Health (DCPH)
- Dakota County Special Operations Team (SOT)
  (a hazardous materials team operated by Dakota County Emergency Management)
- State Chemical Assessment Team (CAT)

Examples of agency activities:

- Police: Acted as first responders to the release and arrested teenagers.
- MDH: Did risk assessment consultation to provide guidance related to health hazards.
- MPCA: Took a lead role in environmental cleanup within homes and the community.
- Red Cross: Provided disaster shelter for displaced families and transportation to hotels.
- DCPH: Assisted with residential monitoring for mercury levels and re-occupation of homes.
- SOT: Decontaminated residents to reduce the exposure to mercury.
- CAT: Secured jars of mercury and assessed magnitude of contamination.
Scenario 2: chemical spill

There were about 30 agencies involved with the disaster at the Emergency Operations Center at the local, county, state and federal levels, which presented huge communication challenges:

- Minot Rural Fire
- Minot Fire
- Minot Air Force Base Fire
- Minot Police Department
- Ward Co Sheriff
- ND Highway Patrol
- Ward Co EM
- Minot Public Works
- EPA – Denver
- ND Health Dept
- First District Health
- Trinity Hospital
- ND Governor’s Office
- US Air Force
- Canadian Pacific Rail
- ND Veterinarian
- ND Emergency Management
- ND National Guard
- Federal Railroad Administration
- FBI
- National Weather Service
- US Dept of Health & Human Services
- Xcel Energy
- Red Cross
- Civil Air Patrol
- Re-ACT
- Salvation Army
- Voluntary Organizations

Examples of agency activities:

Minot Rural Fire Acted as first responders to the disaster and maintained command at the Emergency Operations Center.

Minot Air Force Base Sent in their hazmat team to help with the spill.

ND Health Dept Helped determine the nature of the pollutant and assess the extent of the spill. Collaborated with other agencies to monitor the environmental cleanup. Framed issues for discussion with the public.

EPA - Denver Assisted with air quality monitoring.

Trinity Hospital Examined over 400 residents for respiratory injuries and eye burns.

Canadian Pacific Rail Took responsibility for the disaster and for the associated cleanup costs.

FBI Investigated the incident for suspected terrorism since the event occurred only months after 9/11.
Scenario 3: tornado

Emergency managers activated incident command and solicited a variety of agencies for help including:

- Fire and law enforcement
- Minnesota Department of Health
- FEMA
- Minnesota National Guard
- American Red Cross/Salvation Army
- Brown-Nicollet County Environmental Health

Examples of agency activities:

<table>
<thead>
<tr>
<th>Agency</th>
<th>Activity</th>
</tr>
</thead>
<tbody>
<tr>
<td>Fire &amp; Law Enforcement</td>
<td>Acted as first responders to the disaster and kept order.</td>
</tr>
<tr>
<td>MDH</td>
<td>Coordinated with various agencies on health issues.</td>
</tr>
<tr>
<td>FEMA</td>
<td>Assisted with insurance and re-imbursement after a Federal disaster was declared.</td>
</tr>
<tr>
<td>MN National Guard</td>
<td>Sent by the Governor to deal with issues related to temporary housing.</td>
</tr>
<tr>
<td>Red Cross/ Salvation Army</td>
<td>Sent by the Governor to provide disaster shelter for residents. Also provided food and beverages to volunteers.</td>
</tr>
<tr>
<td>Brown-Nicollet EH</td>
<td>Inspected shelters and emergency feeding operations.</td>
</tr>
</tbody>
</table>

It is interesting to note that one of the “lessons” learned from this event was that the mutual help arrangements with various agencies could be strengthened for future events.
Lesson 3 - Responding to an Emergency

Objectives
After participants complete this lesson, they will be able to:

- know what to do in the immediate wake of a disaster.
- know who is responsible for what in a disaster.
- follow local procedures for emergency response.
- respond to activities that involve their area of expertise.
- follow an emergency plan for them and their family.
- follow an emergency plan for their workplace.

Presentation outline

<table>
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<th>Themes</th>
<th>Examples and suggested activities</th>
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<tr>
<td>1. Emergency response and immediate actions</td>
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<tr>
<td>1. Responsibility for public health after a disaster</td>
<td>For examples, refer to the Scenarios on the CD: Putting Principles into Practice Scenario 1-17, Scenario 3-12 &amp; 3-13</td>
</tr>
<tr>
<td>3. Local procedures for emergency response</td>
<td></td>
</tr>
<tr>
<td>• Assessment</td>
<td>For examples, refer to the Scenarios on the CD:</td>
</tr>
<tr>
<td>• Investigation</td>
<td>Putting Principles into Practice Scenario 3-20</td>
</tr>
<tr>
<td>• Response</td>
<td>For examples, refer to the Scenarios on the CD:</td>
</tr>
<tr>
<td>4. EH response activities in specific areas</td>
<td>Putting Principles into Practice Scenario 3-18</td>
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<tr>
<td>5. Personal plans</td>
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<tr>
<td>6. Workplace plans</td>
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</table>
Main points of discussion

1. Right after a disaster, you conduct rapid assessments, meet the immediate needs of the people and essential facilities, and disseminate information.

2. Communication and coordination among the participating groups is crucial to prevent confusion, misunderstandings, and duplication of efforts during the response activities.

3. When news of an emergency reaches the county environmental health office, there is a decision process with three main points: assessment, investigation and response.

4. They need to respond to activities, especially those that involve their specific area of expertise.

5. It is important to have contingency plans for their family and their workplace.

Note: See PowerPoint slides and speaker notes for more detailed talking points. We suggest you print out the PowerPoint slides using the Print / Notes Pages feature.

Presentation of Lessons 3 and 4 takes about 35 minutes.
Related activities take about 40 minutes.
Activities

Activity 4 – response activities (15 minutes)

As we saw in lesson 3, there are many areas in which EH professionals need to be active in emergencies. Based on what they know about these, have participants decide which specialty areas might come into play for Scenarios 1 and 3. Divide the class into small groups for this activity. Have them record their responses on flip chart paper. Hang the responses on the wall to compare and discuss in the large group.

Activity 4 – ideas for responses

Scenario 1: 

In the mercury contamination disaster, the specialty areas of a chemical incident, water safety and hazardous material assessment received the most impact. Because of its nature, the disaster did not result in a vector control problem or infectious disease. As it turned out, and because the incident was contained as soon as possible, there was no threat to the municipal water systems or wells.

Scenario 3A: 

Given the extent of destruction caused by the tornados - 1,200 housing units destroyed and 4,000 severely damaged – mass care was essential during the days that followed the tornado. Many restaurants, commercial buildings, schools and churches were also badly damaged.

Four EH staff members met on April 8 with Minnesota Department of Health staff, two FEMA officials and the local liaison with the Minnesota National Guard. They discussed environmental health issues related to temporary housing trailers provided by FEMA to displaced households. Everyone agreed that all Environmental Health considerations would be resolved through the inspection program already in place and through FEMA’s cleaning and safety contracts.

Scenario 3B: 

Food safety had to be closely monitored at mass feeding stations and in food establishments. The EH department was the key player in this area. There was good news and bad news on the food safety front. While restaurants did well in terms of salvaging and storing their food supplies, some volunteer efforts at donating food did not follow safety protocols and had to be closely supervised. Besides providing salvage, sanitation, insurance and disposal information to food establishments, environmental health had to start inspections to allow them to re-open. The EH staff assisted in re-opening 18 restaurants within two weeks of the tornado, which was critical in returning the communities to normalcy.
Activity 5 – personal and workplace plans (15 minutes)

It is important for individuals to protect themselves and their family before a disaster strikes, and there are a variety of suggested plans that can be implemented. Likewise, workplace plans need to be implemented. Have the participants work individually to develop a personal/family plan or in small groups to consider a workplace plan. Worksheets are included in the appendix.

Activity 5 – ideas for responses

Scenario 3A: tornado - personal plan

Winds during tornadoes can quickly destroy lives and property. It is important to understand when you need to take shelter, and which places are the safest. Because most tornado-related injuries are caused by flying debris, avoid being near windows, near or under top-heavy furniture that could easily fall. The lowest level of a home or building such as a basement is safest, but an interior closet or room also provides some shelter. Never stay in a mobile home or car during a tornado.

For a framework that you can propose to participants, see Advance Planning at Home from the CDC at: http://www.bt.cdc.gov/disasters/tornadoes/index.asp

Scenario 3B: tornado – workplace plan

You can also propose the recommendations of the EH Department from their experience with the tornado, and what they would do to be better prepared next time, for example:

- List the disasters and emergencies that could happen in your area.
- Visualize the worst-case scenario for each situation.
- Brainstorm how to forestall and fix potential problems.
- Develop plans and procedures.
- Communicate the plans and procedures to all the employees.

Lesson 4 - Minimizing Health Implications

Objectives
After participants complete this lesson, they will be able to:

- describe different types of recovery efforts they could be involved in.
- identify questions to be considered before reconstruction begins.
- describe the concept of secondary damage assessment.
- educate the public on recovery and mitigation.
- reduce the health impacts through environmental protections.

Presentation outline

<table>
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<tr>
<th>Themes</th>
<th>Examples and suggested activities</th>
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<tbody>
<tr>
<td>1. Moving from relief to recovery</td>
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<tr>
<td>1. Recovery</td>
<td>For examples, refer to Scenarios on the CD: <em>Putting Principles into Practice</em> Scenarios 2-18 &amp; 3-17</td>
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<tr>
<td>3. Reconstruction</td>
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<td>4. Secondary damage assessment</td>
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<td>5. Mitigation and its relevance to EH professionals</td>
<td></td>
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<tr>
<td>6. Health promotion and public education</td>
<td></td>
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<tr>
<td>7. Prevention of environmental injuries</td>
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</tbody>
</table>
**Main points of discussion**

1. They may be involved with efforts to assist citizens and regulated establishments to recover from a disaster and return to their homes.

2. A main function of local EH professionals is to provide assessment and information for decontamination and recovery at licensed facilities.

3. Secondary damage assessment is concerned with the impact of the primary damage on the economic, social and cultural life of survivors.

4. It is the responsibility of EH professionals to reduce the potential impact of emergencies and disasters by mitigating the risks and being prepared to respond effectively, rather than trying to eliminate them altogether.

5. Several points have been identified through which environmental protections can greatly reduce the vulnerability of populations in an emergency, such as legal and administrative controls, laboratory protection, and sanitary landfills and facilities.

**Note:** Refer to the FEMA Mitigation Planning “How to” Guides. See PowerPoint slides and speaker notes for more detailed talking points.
Activities

Activity 6 – health promotion and public education (10 minutes)

The promotion of health practices and safety consciousness are not elements to be considered only during emergencies. Educating your staff and the public about steps to take before, during, and after an emergency can be critical to the survival and wellbeing of community members. Divide the class into groups to consider ways in which they might prepare themselves and the public for 1) a chemical spill and 2) a tornado. Have groups record their responses on flip charts paper. Hang responses on the wall to compare and discuss in the large group.

Activity 6 – ideas for responses:

Scenario 2 – chemical spill

Being prepared made a big difference. Planning and training with area agencies can be invaluable leading to:

- Face recognition
- Awareness of the roles and responsibilities
- Knowledge of resources
  - Minot Air Force Base
  - Earthmovers and CP Rail
  - Public Works
  - Volunteer agencies

In a news release after the incident, the US Senator from North Dakota said “the response of local emergency personnel was a bright spot in the event. The National Transportation Safety Board specifically praised the Ward County 911 and the Minot Rural Fire Department for their quick and effective response to the emergency, despite overwhelming public need. Without their skill and professionalism, this tragedy might have been far worse.”

Scenario 3 - tornado

As a result of their experiences with the tornado, the director of the Environmental Health Department comments on the importance of being prepared.

“Although the disaster planning work done before the tornado was primarily focused on a flood scenario, it was tremendously helpful for the tornado response and recovery. The single most important task was spending time educating the emergency manager, first responders and elected officials about our capabilities. As a result, we now have a permanent seat in the Emergency Operations Center and we’re recognized as subject-matter experts on environmental health issues. In many cases, our recommendations have become policy. We can’t stress enough how important it is to be part of the team from the onset rather than a party that EOC staff turn to when they can’t think of anyone else.”
**Group activity - Developing an Emergency Plan**

(30 minutes for case study and 30 minutes for debriefing and wrap-up)

As a concluding exercise, divide the class into assigned groups as appropriate by county or district and ask each group to think of a hypothetical disaster in their area. Tell them that they will be expected to come up with a set of recommendations to consider in the planning process for emergency response. Distribute the worksheet provided in the appendix to each group. After 30 minutes, have each group report back on their case and recommendations. Solicit the help of other groups to debrief each case and offer suggestions for improving each response plan.

Top ten questions to consider:

1. What type of disaster is this?
2. What would be their main job as an EH professional in responding to this disaster?
3. What tools would they use (plans, equipment, transportation, communication systems)?
4. Would an Incident Command Structure be necessary?
5. Which types of agencies might be involved in the response effort?
6. Who would be responsible for communication, and what types of communication would be used?
7. What are some specific EH activities that would come into play?
8. Which specialty areas would be called upon?
9. How would they assist citizens in recovering from the disaster?
10. How would they reduce the community's vulnerability in the future?
Materials and handouts

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Activity 1
Cause of Disease Model

The cause of disease model provides an excellent framework for understanding an event and being able to respond to it. Match each factor to the correct description using the information provided in the scenario and what you have learned about the Epidemiologic Triangle Model of Disease Causation.

Scenario 1: mercury contamination

On Labor Day 2004, late afternoon in Rosemount Woods, a manufactured home park in Dakota County, a release of mercury into the environment occurred. Teenagers had removed two pint-sized jars of mercury from the demolition site of the former Brockway glass factory. The two youths carried the jars to Rosemount Woods. After some time, a parent found them surrounded by other kids, playing with the alluring shiny liquid metal. By this time, the mercury had been spread onto the skin, clothes and shoes of the children playing with the dangerous metal. Mercury was tracked to other parts of Rosemount Woods as the children returned to their homes.

1. Portal of exit  
   - Elemental mercury
2. Portal of entry  
   - Humans in Rosemount Woods, especially children
3. Host  
   - Manufactured home park, warm weather, holiday
4. Agent  
   - Jars of mercury taken from shed
5. Environment  
   - Children opened glass jars storing mercury and played with it
6. Mode of transmission  
   - Mercury on skin, clothes, shoes
7. Source  
   - Oral, dermal, and respiratory
Activity 1
Cause of Disease Model

The cause of disease model provides an excellent framework for understanding an event and being able to respond to it. Match each factor to the correct description using the information provided in the scenario and what you have learned about the Epidemiologic Triangle Model of Disease Causation.

Scenario 2: chemical spill

At approximately 1:37 a.m. on January 18, 2002, an eastbound Canadian Pacific Railway freight train, traveling about 41 mph, derailed 31 of its 112 cars about half a mile west of the city limits of Minot, North Dakota. Five tank cars carrying anhydrous ammonia, a liquefied compressed gas, catastrophically ruptured, and a vapor plume covered the derailment site and surrounding area. The conductor and engineer were taken to the hospital for observation after they complained of breathing difficulties. About 11,600 people occupied the area affected by the vapor plume. One resident was fatally injured, and about 60 residents of the neighborhood nearest the derailment site were rescued. Damages exceeded $2 million, and more than $8 million has been spent for environmental remediation.

1. Source  ___ Anhydrous ammonia
2. Portal of entry  ___ People in or near Minot, ND
3. Environment  ___ Winter weather, thermal inversion
4. Agent  ___ Tank cars
5. Host  ___ Ruptured tank
6. Mode of transmission  ___ Air dispersal
7. Portal of exit  ___ Inhalation
Activity 1
Cause of Disease Model

The cause of disease model provides an excellent framework for understanding an event and being able to respond to it. Match each factor to the correct description using the information provided in the scenario and what you have learned about the Epidemiologic Triangle Model of Disease Causation.

Scenario 3: Tornado

On March 29, 1998, the staff of the Brown-Nicollet Environmental Health Department in south-central Minnesota, quite unexpectedly, was given a crash course in disaster response. That’s the day two tornadoes carved a 100-mile wide destructive path through their region, leveling and damaging thousands of buildings (including the Environmental Health Office) and claiming two lives. Downed trees and debris made roads impassable. Phone and electric service was spotty in some areas, nonexistent in others. Relief efforts were made even more difficult by a snowstorm that swept through the area the following day. Food had to be inspected and distribution monitored for contamination. (Build the cause of disease model based on food contamination).

1. Portal of exit
2. Agent
3. Host
4. Portal of entry
5. Source
6. Mode of transmission
7. Environment

___ Bacteria in food
___ People in south-central Minnesota storm-damaged area
___ Warm weather thermal inversion
___ Contaminated food – bacteria present in, or introduced
___ Contaminated food is not properly prepared and held at correct temperature, allowing the bacteria to multiply to infective doses
___ Contaminated food is served
___ Oral, if a person eats contaminated food and ingests enough of it
Epidemiologic Triangle
Model of Disease Causation

A common model used in public health illustrates the relationships among an agent, a host and the environment. It applies to biological, chemical and physical agents. For a disease or injury to occur, the basic elements of disease or injury causation and an adequate chain of transmission (environmental pathway) must be present.

Disease occurs when an outside agent capable of causing the disease or injury meets a host that is vulnerable to the agent in an environment that allows the agent and host to interact. These basic concepts help guide the selection of health strategies to prevent health problems.

One of the key jobs for the EH professional is to intervene at any point in order to reduce the hazard to health.

Chain of Transmission
Agent, host, and environment alone are not sufficient to cause an epidemic; an adequate chain of transmission must be present. This process requires a source for the agent, a portal of exit, a mode of transmission, and a portal of entry.

Agent
This is an entity that causes the injury or disease. An agent can be biological, chemical or physical. For example, Campylobacter bacteria present on raw chicken is an agent. Anhydrous ammonia in a storage tank is also an agent. Radioactive waste stored at a nuclear power plant is an agent.

Environment
The environment consists of the conditions that are not part of either the agent or the host, but that influence their interaction. A wide variety of factors, including physical, climatologic, biologic, social, and economic conditions can come into play.

Host
The host is the human, or, more generically, the organism, that is susceptible to the agent. Some hosts are more susceptible than others. Children are more vulnerable to many agents than healthy adults. Immuno-compromised individuals, such as people on chemotherapy, are more susceptible to some agents. The host’s response to exposure can vary widely, from showing no effect to manifesting sub-clinical disease, atypical symptoms, straightforward illness, or severe illness.

Portal of Exit
The path by which an agent leaves the reservoir or environment

Portal of Entry
Means or path by which an agent enters a susceptible host
Activity 3
Emergency Management Organizations

Scenario 1: mercury contamination
On Labor Day 2004, late afternoon in Rosemount Woods, a manufactured home park in Dakota County, a release of mercury into the environment occurred. Teenagers had removed two pint-sized jars of mercury from the demolition site of the former Brockway glass factory. The two youths carried the jars to Rosemount Woods. After some time, a parent found them surrounded by other kids, playing with the alluring shiny liquid metal. By this time, the mercury had been spread onto the skin, clothes and shoes of the children playing with the dangerous metal. Mercury was tracked to other parts of Rosemount Woods as the children returned to their homes.

The mercury emergency in Dakota County involved many agencies, all of which had a role in the response. Some of the agencies involved in the incident are listed below.

Develop a list of activities each of these organizations engaged in.

- Rosemount Police
- Minnesota Department of Health (MDH)
- Minnesota Pollution Control Agency (MPCA)
- American Red Cross (ARC)
- Dakota County Public/Environmental Health (DCPH)
- Dakota County Special Operations Team (SOT) (a hazardous materials team operated by Dakota County Emergency Management)
- State Chemical Assessment Team (CAT)
Activity 3
Emergency Management Organizations

Scenario 2: chemical spill
At approximately 1:37 a.m. on January 18, 2002, an eastbound Canadian Pacific Railway freight train, traveling about 41 mph, derailed 31 of its 112 cars about half a mile west of the city limits of Minot, North Dakota. Five tank cars carrying anhydrous ammonia, a liquefied compressed gas, catastrophically ruptured, and a vapor plume covered the derailment site and surrounding area. The conductor and engineer were taken to the hospital for observation after they complained of breathing difficulties. About 11,600 people occupied the area affected by the vapor plume. One resident was fatally injured, and about 60 residents of the neighborhood nearest the derailment site were rescued. Damages exceeded $2 million, and more than $8 million has been spent for environmental remediation.

There were about 30 agencies involved with the disaster at the Emergency Operations Center at the local, county, state and federal levels, which presented huge communication challenges:

Develop a list of activities some of these organizations engaged in

- Minot Rural Fire
- Minot Fire
- Minot Air Force Base Fire
- Minot Police Department
- Ward Co Sheriff
- ND Highway Patrol
- Ward Co EM
- Minot Public Works
- EPA – Denver
- ND Health Dept
- First District Health
- Trinity Hospital
- ND Governor’s Office
- US Air Force
- Canadian Pacific Rail
- ND Veterinarian
- ND Emergency Management
- ND National Guard
- Federal Railroad Administration
- FBI
- National Weather Service
- US Dept of Health & Human Services
- Xcel Energy
- Red Cross
- Civil Air Patrol
- Re-ACT
- Salvation Army
- Voluntary Organizations
Scenario 3: Tornado
On March 29, 1998, the staff of the Brown-Nicollet Environmental Health Department in south-central Minnesota, quite unexpectedly, was given a crash course in disaster response. That’s the day two tornadoes carved a 100-mile wide destructive path through their region, leveling and damaging thousands of buildings (including the Environmental Health Office) and claiming two lives. Downed trees and debris made roads impassable. Phone and electric service was spotty in some areas, nonexistent in others. Relief efforts were made even more difficult by a snowstorm that swept through the area the following day. Food had to be inspected and distribution monitored for contamination.

Emergency managers activated incident command and solicited a variety of agencies for help.

Develop a list of activities each of these organizations engaged in.

- Fire & Law Enforcement
- MN Department of Health
- FEMA
- MN National Guard
- Red Cross/Salvation Army
- Brown-Nicollet Environmental Health
Activity 5
Developing a personal plan

It is important for individuals to protect themselves and their family before a disaster strikes. In this exercise, you will begin to create a personal plan for you and the members of your household in the event of a tornado.

- Draw a floor plan of where you live – include all floors and rooms. Indicate where and how to seek shelter from a tornado.
- Show a second way to exit from each room or area. Indicate if you need special equipment, such as a rope ladder, mark where it is located.
- Mark where your first-aid kit and fire extinguishers are located.
- Mark where the utility switches or valves are located so they can be turned off—if time permits—in an emergency.
- What is your plan for power outages and personal injuries?
- Prepare a list of emergency telephone numbers and contact information
- Pick one out-of-state and one local friend or relative to call if separated during a disaster.
- Establish two emergency meeting places
  1. near your home
  2. a place outside of your neighborhood
- List items to include in a disaster supply kit
Activity 5
Developing a workplace plan

- List disasters and emergencies that could happen in your area.
- Describe a worst-case scenario for each situation.
- Brainstorm with your group how to forstall and fix potential problems.
- Outline a emergency plan for a specific workplace.
- Propose how the plans and procedures would be communicated to all the employees.
Developing an emergency plan

In this activity, think of a hypothetical disaster in your area and develop a set of recommendations to consider in the planning process for the emergency response.

1. What type of disaster is this?

2. What would be the main job of an EH professional in responding to this disaster?

3. What tools would they use (consider plans, equipment, transportation, communication systems)

4. Would an Incident Command Structure be necessary? If yes, why?

5. Which types of agencies might be involved in the response effort?

6. Who would be responsible for communication, and what types of communication would be used?

7. What are some of the specific EH activities that would come into play?

8. Which EH specialty areas would be called upon?

9. How would they assist citizens in recovering from the disaster?

10. How would they reduce the community’s vulnerability in the future?
Example of an Emergency Management Chart
Example of an Incident Command Chart
Resources

American Public Health Association - APHA website.
APHA - EH competencies on the APHA website.
ATSDR - Agency for Toxic Substances and Disease Registry website.
CDC - Advance Planning at Home on CDC website.
CDC - Emergency Preparedness for EH on the CDC website.
CDC - Environmental Health on the CDC website.
CDC - Public Health Emergency Response Guide on the CDC website.
Dakota County Public Health. Powerpoint slides provided by Jon Springsted.
FEMA - Community Emergency Response Teams, MN on the FEMA website.
FEMA - Emergency Checklist on the FEMA website.
FEMA - For Kids Pets and Disasters on the FEMA website.
FEMA - National Incident Management System on the FEMA website.
Food Talk - Sanitation Tips for Food Workers, Fall 1999.
Hennepin County Commissioners on the Hennepin County website.
Hennepin County Ordinances on the Hennepin County website.
Hennepin County Personal-Family Preparedness on the Hennepin County website.
MDH - Role of Environmental Health in Minnesota on the MN Department of Health website.
MDH - Terrorism and Natural Disasters on the MN Department of Health website.
MDH Health Alert, posted on 9/10/04.
MPCA Public Information Officers on the MPCA website.
MPCA website - Community update about mercury issues for Rosemount Residents on the.
North Dakota Department of Health. Powerpoint slides provided by Jim Semerad.
Ramsey County Online website.
Ramsey Ordinances on the Ramsey County website.
Trinity Hospital’s Trauma Department. Powerpoint slides provided by Rhonda Bugbee.
Evaluation

As a result of participating in this course, I am better able to:

<table>
<thead>
<tr>
<th>Task</th>
<th>Strongly Agree</th>
<th>Strongly Disagree</th>
</tr>
</thead>
<tbody>
<tr>
<td>Describe the basic principles of environmental health</td>
<td>5</td>
<td>4</td>
</tr>
<tr>
<td>Interpret the cause of disease model</td>
<td>5</td>
<td>4</td>
</tr>
<tr>
<td>Identify the role of environmental professionals in disaster response</td>
<td>5</td>
<td>4</td>
</tr>
<tr>
<td>Describe how environmental health fits into an incident command structure</td>
<td>5</td>
<td>4</td>
</tr>
<tr>
<td>Explain the key elements of mitigation intended to reduce the impact of emergencies and disasters</td>
<td>5</td>
<td>4</td>
</tr>
</tbody>
</table>

Instructor Evaluation

Presented current, accurate information                               | 5 | 4 | 3 | 2 | 1 |
Was prepared and well organized                                       | 5 | 4 | 3 | 2 | 1 |
Communicated in an engaging manner                                   | 5 | 4 | 3 | 2 | 1 |
Encouraged interaction and discussion                                 | 5 | 4 | 3 | 2 | 1 |
Materials were useful and relevant                                   | 5 | 4 | 3 | 2 | 1 |

Comments:

Which features of this workshop were of most value to you?

What features were of least value to you?

How will the knowledge at this workshop impact your work?

Courses and topics you would like to see offered in the future:

Other comments
Centers for Public Health Education and Outreach

The Centers for Public Health Education and Outreach (CPHEO) within the University of Minnesota School of Public Health build excellence in professional public health leadership and practice. CPHEO brings together academic and public health professionals in pursuit of lifelong learning to improve the public health workforce and to promote understanding of population health.

CPHEO is committed to making public health education available to a broad range of practicing professionals.

**CPHEO supports, coordinates, and manages:**

- The University of Minnesota Center for Public Health Preparedness
- The Midwest Center for Life Long Learning in Public Health and Safety
- Great Lakes Regional OTI Education Center
- The Midwest Center for Occupational Health and Safety
- The Midwest Consortium of Hazardous Waste Worker Training Center

University of Minnesota Center for Public Health Preparedness

The University of Minnesota Center for Public Health Preparedness (UMNCPHP) is part of a coordinated national network of training center designed to train state and local public health workers and others to prepare for and respond to terrorism incidents, infectious disease outbreaks and emergent public health threats. The UMNCPHP is funded in part by the Centers for Disease Control and Prevention as a member of the national network of centers for public health preparedness.

The UMNCPHP strives to leverage resources through the University of Minnesota School of Public Health Centers for Public Health Education and Outreach. The center works in collaboration with state and local departments of health to create a strong public health system through assessment, training, education and evaluation with a primary service area of Minnesota, North Dakota and Wisconsin. The primary purpose of these educational activities is to build competency for preparation, response and recovery from public health threats and emergencies.

**UMNCPHP Provides National Leadership in:**

Occupational safety and worker preparedness Cross border preparedness Food safety and biosecurity Preparedness education evaluation methods Environmental health capacity building Rural and agroterrorisism preparedness

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