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Speaker

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Objectives of this Presentation
Reach a better understanding of Environmental health
• Impact of the environment on human health and welfare
• Impact of environmental disasters on human health and welfare
• Minimizing the impact by effective preparedness and management strategies

Environmental Health
First: define Environment…
All things external to the host.

The EPA Risk Paradigm

Chemical Release

EH Professionals
Examples of Agencies and Groups Involved in Emergencies

EH Professionals
Examples of Agencies and Groups Involved in Emergencies
Steps of Disaster Management

• Before – Preplanning
• During – Emergency Response
• After – Rehabilitation, Reconstruction, and Recovery

Chemical Incident Vulnerability/Risk Assessment

- Identification of hazardous chemical sites, pipelines and transport routes
- Identification of possible incident scenarios and their exposure pathways
- Identification of vulnerable populations, facilities and environments
- Estimation of the health impact of potential chemical incidents and the requirements for health care facilities.

Disaster Vulnerability

Increased Vulnerability
- Exposure to hazards and threats
- Lack of Access (e.g. to health services, credit, information, etc.)
- Lack of Resources (e.g. income, assets, reserves, social support, etc)
- Reduced Capacity to cope and to recover

Disaster Management Cycle

Vulnerability and Capacity Matrix

<table>
<thead>
<tr>
<th>Potential Hazard: Chemical Spill</th>
<th>Vulnerabilities</th>
<th>Capacities</th>
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<tbody>
<tr>
<td>Physical and Material</td>
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<td>What is vulnerable?</td>
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<td>What resources exist to address vulnerability?</td>
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<tr>
<td>Social and Organization</td>
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<tr>
<td>Who is vulnerable?</td>
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<tr>
<td>What resources exist to make them less so?</td>
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<td>Motivation and Attitude</td>
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<tr>
<td>What attitudes lead to vulnerability?</td>
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<tr>
<td>What capacities exist to improve the situation?</td>
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Chemical Incident Example

The first steps toward preparedness requires learning from the past to attempt to answer two questions:

1. What are the most common challenges likely to occur?
2. How are people likely to behave during these events?
Chemical Incident Example

- Describe events surrounding Minot, North Dakota derailment.
- Preplan for similar type of incident in Sabinal, Texas involving a chlorine tank car.
- Focus on single aspect of EH involvement... protecting public from hazardous inhalation of chlorine.

Derailment near Minot, N.D.

- At approximately 1:39 a.m., on January 18, 2002, a freight train near Minot, North Dakota derailed releasing more than 210,000 gallons of anhydrous ammonia from seven tank cars.
(Source: NTSB, 2002)

Derailment near Minot, N.D.

- The plume of anhydrous ammonia affected approximately 15,000 people and injuring more than 300 people, 11 seriously, with one fatally.

Agencies Involved:
- 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

Derailment near Minot, N.D.

“Because of the time of day and extreme cold temperature (-5 °F) the general community [slept through, and], in essence, sheltered in place”.

“We can only wonder how tragic this accident could have been if the derailment had occurred later in the day, when the people of Minot were going about their normal activities.” (NTSB, 2002)
Consider the Potential for a Chemical Release from a Railcar

- 1.7 to 1.8 million carloads of hazardous materials transported by rail in the US annually (2/3 in tank cars)
- Railroads typically transport just over 100,000 carloads of TIH annually (nearly all in tank cars)
- In 2005, 99.997% of rail hazmat shipments reached their final destination without release caused by an accident

Sabinal, Texas Scenario

All commercial rail lines in Texas pass through at least 1 rural community.

Sabinal, Texas Scenario

- Population: 1661 residents
- High School Students: 161
- Elementary students: 306
- Jr High School students: 90
- Medina community hospital 25 miles away
- Full-time Law Enforcement Employees in 2006: 3
- Hispanic (64.1%)
- White Non-Hispanic (35.4%)

www.city-data.com/city/Sabinal-Texas.html

Sabinal, Texas Scenario

- In 2003, over 60,000 tank cars of chlorine and anhydrous ammonia chemicals were shipped carrying an average of 90 tons of chlorine or 30,000 gallons of anhydrous ammonia.

What if there were a chlorine tank leak...

...Right in the middle of town, in the middle of a day like today...

2004 Emergency Response Guidebook
Step 1: Understand the Chemical

Chlorine... www.cdc.gov/niosh

Step 2: Determine How the Chemical is Released

Chlorine Tank Car – Emission
- High pressure tank car
- Amount: 90 tons
- Leak / Catastrophic failure
- Timing
  - Day/night
  - Summer/winter

Step 3: Determine How the Chemical is Moving

Chlorine Spill - Transport
- Pathway
- Atmospheric conditions
- Topography

Step 4: Identify Potentially Exposed population

- Population: 1661 residents
- High School Students: 161
- Elementary students: 306
- Jr High School students: 90
- Hispanic (64.1%)
- White Non-Hispanic (35.4%)

Step 5: Determine Health Effects

Chlorine - Health Effects
- Symptoms: Burning of eyes, nose, mouth; lacrimation (discharge of tears), rhinorrhea (discharge of thin mucus); cough, choking, substernal (occurring beneath the sternum) pain; nausea, vomiting; headache, dizziness; syncope; pulmonary edema; pneumonitis; hypoxemia (reduced oxygen in the blood); dermatitis: liquid; frostbite
- Target Organs: Eyes, skin, respiratory system

Protecting the Public

- Evacuate
  - Move all people from a threatened area to a safer place.
- Shelter-in-Place
  - people should seek shelter inside a building and remain inside until the danger passes.
### Preparing the Community

**Preparing the community – consider:**
- Education regarding evacuation and shelter-in-place order procedures
- Dealing with school children
- Dealing with non-English speaking residents
- Various places/sources residents get information.

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### Rural Considerations

- Rural areas which comprise 4/5ths of America's land area contain only 1/5th of the country's population
- 29 states have at least 1/3rd of their population classified as rural.
- 18% of rural residents are over 65; 15% urban over 65.
- 1/4th of the rural residents are at 200% or less of the federal poverty guidelines.

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### Evacuate or Shelter-in-Place

- Communicating to the affected population:
  - Radio / TV
  - Sirens
  - Door-to-door
  - Reverse 911
- How to evacuate?
- How to shelter-in-place?
- American Red Cross
  [www.redcross.org/search/search.asp](http://www.redcross.org/search/search.asp)

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### Summary

**Key points:**
- There are many elements to effective disaster preparedness.
- The EPA Risk Paradigm is a useful tool to identify priorities in chemical disasters.
- It is important to understand the characteristics of the location and population when providing for public health protection.

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