



SCHOOL OF PUBLIC HEALTH
UNIVERSITY AT ALBANY State University of New York

University at Albany
Center for Public Health Preparedness

Grand Rounds Series

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Environmental Health and Disaster Preparedness



Speaker

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Objectives of this Presentation

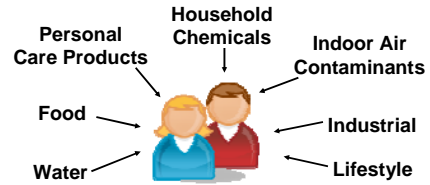
Reach a better understanding of Environmental health

- 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

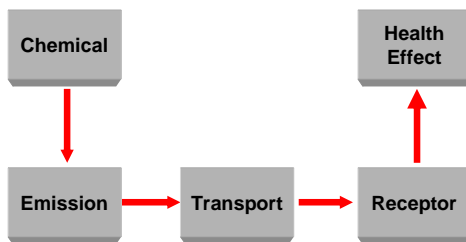
Environmental Health

First: define Environment...

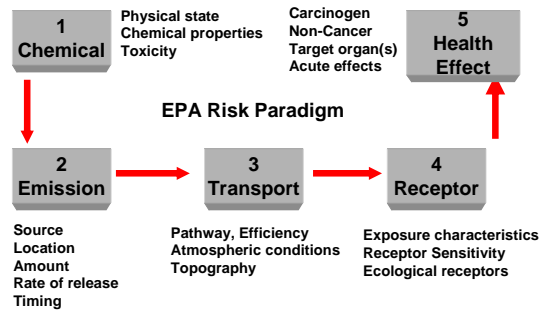
All things external to the host.



The EPA Risk Paradigm



Chemical Release



EH Professionals

Examples of Agencies and Groups Involved in Emergencies

FEDERAL	STATE
Army Corps of Engineers	Civil Defense
Coast Guard	Department of Health
Department of Defense	Department of Labor
Department of Transportation	Environmental Agency
Environmental Protection Agency (EPA)	Office of the Attorney General
Federal Aviation Administration (FAA)	State Police
Federal Emergency Management Agency (FEMA)	
National Institute for Occupational Safety and Health (NIOSH)	
Occupational Safety and Health Administration (OSHA)	



EH Professionals

Examples of Agencies and Groups Involved in Emergencies

LOCAL

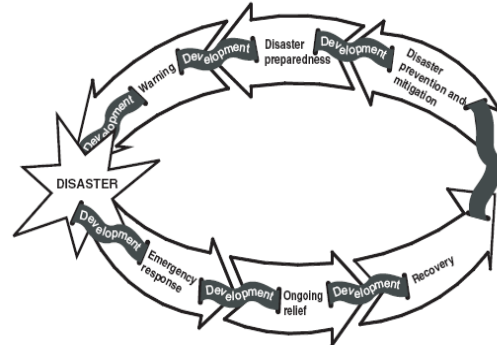
- Ambulance and rescue services
- Cleanup contractor
- Disposal companies
- Fire department
- Hospital
- Police
- Red Cross
- Salvation Army
- Transporters
- Utility companies (electric, gas, water, phone)



Steps of Disaster Management

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

Disaster Management Cycle

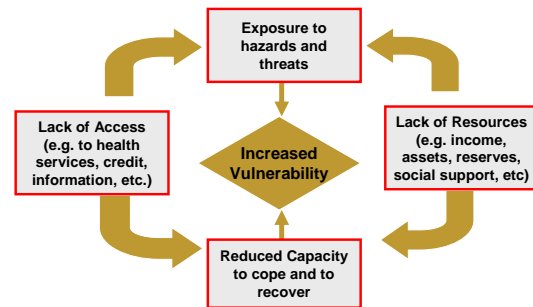


WHO, Environmental Health in Emergencies and Disasters: A Practical Guide

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



www.who.int/water_sanitation_health/hygiene/emergencies/emergencies2002/en/
WHO, Environmental Health in Emergencies and Disasters: A Practical Guide.

Vulnerability and Capacity Matrix

Potential Hazard: Chemical Spill	Vulnerabilities	Capacities
Physical and Material What is vulnerable? What resources exist to address vulnerability?		
Social and Organization Who is vulnerable? What resources exist to make them less so?		
Motivation and Attitude What attitudes lead to vulnerability? What capacities exist to improve the situation?		

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.

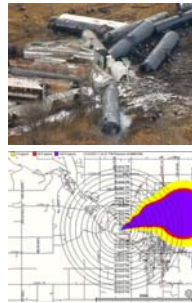
Derailment near Minot, N.D.

- 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.
- Population (2000) 36,567 (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.



Derailment near Minot, N.D.

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

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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...



ID No.	NAME OF MATERIAL	TABLE OF INITIAL ISOLATION AND PROTECTIVE ACTION DISTANCES							
		SMALL SPELLS <i>(From a small package or small tank from a large package)</i>				LARGE SPELLS <i>(From a large package or from many small packages)</i>			
		ISOLATE in all directions		PROTECT persons Downwind during		ISOLATE in all directions		PROTECT persons Downwind during	
Mean (Feet)	DAY (kilometers/Miles)	NIGHT (kilometers/Miles)	DAY (kilometers/Miles)	Mean (Feet)	DAY (kilometers/Miles)	NIGHT (kilometers/Miles)	DAY (kilometers/Miles)		
1216	Carbon monoxide	30m (100ft)	0.1km (0.1mi)	0.1km (0.1mi)	30m (100ft)	0.1km (0.1mi)	0.1km (0.1mi)	0.1km (0.1mi)	
1216	Carbon monoxide, compressed	30m (100ft)	0.2km (0.2mi)	0.2km (0.2mi)	240m (800ft)	2.4km (1.5mi)	2.4km (1.5mi)	2.4km (1.5mi)	
1217	Chlorine	30m (100ft)	0.2km (0.2mi)	0.2km (0.2mi)	240m (800ft)	2.4km (1.5mi)	2.4km (1.5mi)	2.4km (1.5mi)	

2004 Emergency Response Guidebook



A GUIDEBOOK FOR FIRST RESPONDERS DURING THE INITIAL PHASE OF A DANGEROUS GOODS HAZARDOUS MATERIALS INCIDENT

Step 1: Understand the Chemical

Chlorine... www.cdc.gov/niosh

Chlorine		CAS 7782-50-6
Cl ₂		RTECS C0410000
Synonyms & Trade Names Respiratory irritant		DOT ID & Guide 1817 (2.8)
Exposure Limits		
IDLH 10 ppm (see 233000)	Conversion 1 ppm = 2.86 mg/m ³	
Physical Description Greenish-yellow gas with a pungent irritating odor. (Note: Shipped as a liquefied compressed gas.)		
MW 70.9	BP -34°F	MP2 -103°F
LD 1.5 mg/m ³	SP 11.48 g/l	Relative D 2.47
HF 100	VEL 100	LDL 100
Incompatibilities & Reactivities Reacts explosively or forms explosive compounds with many common substances such as acetone, ether, sulfuric, nitric, and hydrofluoric acids, and with many other organic materials.		

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%)

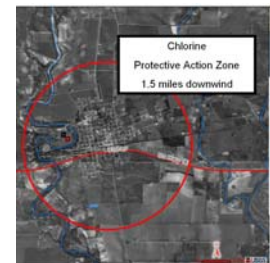
Step 5: Determine Health Effects

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.

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.

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

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Fax: 518-426-0696

**Email:
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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.

References:

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- www.cdc.gov/nceh/ehs/ETP/default.htm
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Opening statement by Honorable Carol J. Carmody,
Chairman, Board of Inquiry

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