

OSC 10
Ohio Safety Congress & Expo

Emergency response to a chemical spill
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Planning an emergency response

Chemical spills and hazardous material incidents



Objectives

- Main sections of a Health and Safety Plan (HASP)
- Designation of incidents
- Training requirements for the Hazwoper standard
- Introduction to chemical-protective clothing

Objectives

- Basics of the incident command system (ICS)
- Basic identification of chemical incidents
- Conducting a hazard and vulnerability analysis

HASP

HASP's objective is to protect workers by:

- Identifying, evaluating and controlling health and safety hazards and;
- Providing emergency-response contingency planning.

HASP

- Employers can be cited by the Occupational Safety and Health Administration (OSHA) for not having a written HASP program.

HASP

- Scope – Objective (emergency-response cleanup or site remediation)
- Roles – Responsibilities
- Emergency response
- ICS

HASP

- Hazards associated
- Hierarchy of controls used (site monitoring)
- Protective equipment needed
- Decontamination

HASP requirements

- Safety, risk and hazard analysis for each task and operation
- Employee training
- Personal protective equipment (PPE) used for each task
- Medical surveillance
- Personal monitoring
- Environmental sampling procedures (area)

HASP requirements

- Site-control measures
- Decontamination procedures
- Site-emergency response plan
- Confined-space entry procedures
- Spill-containment program

Designation of incidents INCIDENTAL Spill/Controlled:

- Example: A chemical spill that is small enough in quantity.
 - The individual has a working knowledge of the chemical.
 - The individual can clean up the chemical by having the knowledge and equipment to do so safely.
 - Spilled material has not reached the environment.

Designation of incidents EMERGENCY Response / Complex Spill or Incident:

- A hazardous chemical spill or incident that could pose a health or environmental risk
- Outside their normal duties and responsibilities
- Must be cleaned up by trained personnel (Hazardous Standard)

Specific levels of training

- **Awareness level:** Individuals who will likely witness a chemical incident and are trained to initiate the notification process.
- **Operations level:** Individuals who are trained to respond to chemical incidents by protecting nearby personnel, property and the environment by containment or diversion methods. This is a non-aggressive response.
- Most fire department personnel are trained to this level.

Specific levels of training

- **Hazardous material technician:**
 - These individuals are trained to respond to chemical incidents for the purpose of stopping the chemical release (aggressive response.)
 - Individuals who will enter where the contaminant is present.
- **Scene incident commander**

Protective clothing

- **Limited use:**

Limited-use materials are protective clothing materials which are used and then discarded.
- **Multi use:**

Based upon chemical exposure, multi-use materials are designed to allow for decontamination and reuse.

Four types of protection

- **Level A**



- **Level B**

- **Level C**



- **Level D**

Levels of chemical-protective clothing

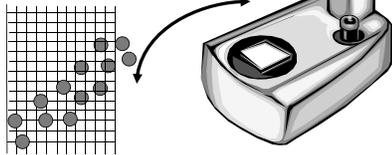
- Level A: Highest level of protection
- Level B: Highest level of protection for a chemical splash (self-contained breathing apparatus - SCBA)
- Level C: Chemical protection with air purifying respirators (APRs)
- Level D: Street-clothing coveralls

Selection criteria for chemical-protective clothing

- Compatibility of material
- Chemicals involved
- Dexterity needed
- Testing required by manufacturer
- Storage of garment

Permeation

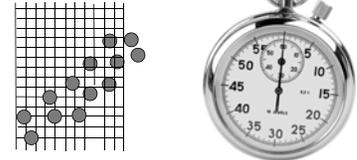
- Definition means to pass through the protective clothing in a period of time.
- This passing through may not be noticeable without a microscope.



Break-through time

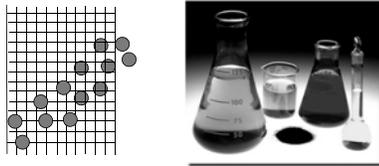
This means the amount of time it takes to break through the material.

It is the initial time the chemical starts to attack the outside of the clothing until it is desorbed or detected inside the clothing.



Degradation

- The physical destruction or decomposition of the clothing or material due to exposure or ambient conditions (i.e., sunlight, cold temperatures)
- Visible signs such as shrinkage

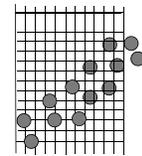


Penetration

The flow or movement of a hazardous chemical through closures, seams of protective clothing or other imperfections in the material.

Causes of penetration include:

- Tears;
- Punctures; or
- Other physical damage in the suit.



Example of Level A



Example of Level B



Example of Level C

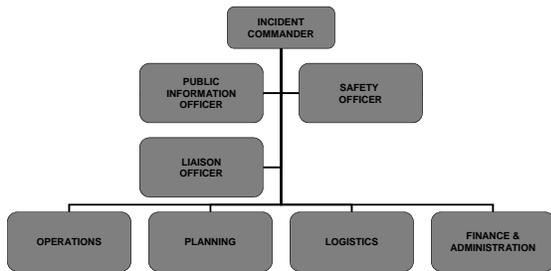


Equipment inspection

- Inspect for tears
- Inspect for seams
- Inspect for cracks
- Inspect for signs of swelling
- Inspect for signs of stiffness
- Inspect for signs of deterioration
- Inspect for signs of discoloration
- Inspect for non-uniform coatings
- Inspect for pinholes (hold to light)
- Inspect for malfunctioning closures
- Check clothing for compatibility with material
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Incident Command System



Operations section

- Hazmat team is part of the operations section.
- The command structure would be the same as the larger ICS.
- Team leader or operational officer would oversee the operational level of the Hazmat Response Team.

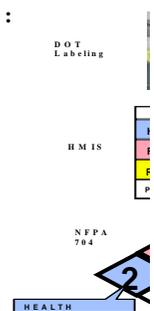
Hazard identification

- Labels and placards
- Other documentation (Material Safety Data Sheet)
- Shipping papers
- Container shapes



Chemical Hazard Labeling:

- There are many different types of labels used in the chemical industry
- NFPA 704 - (Bulk Tank storage)
- DOT - Hazardous Materials, in commerce transportation
- HMIS - Hazard Material ID System
- RCRA Hazardous Waste-Generator Requirements



Pre-planning for incidents

Possible resources can be:

- Hazop (process safety)
- Tier II Form R
- Worst-case scenario
- Chemical inventories
- Hazardous Waste Contingency Plans
- Department of Transportation (DOT) Readiness Plans
- Spill prevention counter measures and control (SPCC) plans

Hazard and vulnerability analysis

- What are your major chemical hazards on-site?
- What type of response is available for support?
- What are the demographics where your facility is located?

Hazard and vulnerability analysis

- Where is the closest hospital (i.e., medical services)?
- Do they have resources available to treat chemically contaminated patients?
- What is the probability of this happening?

Hazard and vulnerability analysis

Main components

1. Hazards identification (major hazards)
2. Vulnerability analysis
3. Risk analysis

Hazards identification (major hazards)

- Chemical
 - List the most hazardous chemicals
 - Name of chemical or DOT proper shipping name
- Location
 - Stored location specific to your facility
- Quantity
 - Type of container and amount
- Properties
 - Toxicity , hazards associated

Vulnerability analysis

- Zones that are vulnerable if a catastrophic release happens (worst case)
- Facility, company zones or locations that may be affected
- Population zones
- Essential resources within the zone
- Environment affected

Risk analysis

- Probability of occurrence, multiple emergencies occurring
- Consequences of persons exposed, property damage, environmental exposure
- Other or special concerns

Appendix 1 HAZARD ANALYSIS SAMPLE PLANT 1 & 2

1. HAZARD IDENTIFICATION (MAJOR HAZARDS)

	Plant 1 - Hazard A	Plant 2 - Hazard B
a. Chemical	Corrosive liquid, toxic, flammable, A.C.S. 2 Subclass polymer waste (hydrochloric acid), 50-1000	Liquidated Phenol, JAL2521
b. Location	Urban Plant	Main receiving dock and chemical supply storage
c. Quantity	8.8 shipment 10,000 gallons	55 gallons up to 500 gallons
d. Properties	Toxic, corrosive, acidic. Prolonged skin contact can cause severe burns. Can get inside, where it can cause chemical burns to internal organs. Fire is not a concern.	Toxic, corrosive & flammable. Can cause severe chemical burns, may be toxic if an acute exposure occurs by skin contact or ingestion.

2. VULNERABILITY ANALYSIS

a. Vulnerable Zone	A large spill could result in an area radius of 1 square mile where a spill could occur from. If liquid is released into atmosphere, nearby communities would be affected for a total of 2 to 4 miles.	A large spill could result in a possible 100+ acre radius to nearby communities of the manufacturing facility. A large spill could result in an evacuation of the area, being in the morning community with 1 square mile. If liquid, however, could result in toxic water or food chain. 550 could result in toxic pollution to nearby waterways.
b. Population within Vulnerable Zone	1000 residents in 1000 nearby. Approximately 1000 residents. Shopping center 2.5 miles north/west.	500 residents at manufacturing facility. Approximately 1000 residents.
c. Essential services within zone	1 volunteer fire department - 2 miles 1 hospital - 13 miles	1 volunteer fire department - 6 miles 1 hospital - 14 miles
d. Environment that may be affected	Aquatic life in stream	Pollution to nearby waterways (Kauaikele lagoon)

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Appendix 1 HAZARD ANALYSIS SAMPLE PLANT 1 & 2

2. RISK ANALYSIS

	PLANT 1 - HAZARD A	PLANT 2 - HAZARD B
a. Frequency of major incidents	Low for large spills, medium for small spills. Release of chemical storage from piping incidents or containers will depend on the total area receiving area at a given point.	Low to medium. A small or large spill could occur from equipment or storage tanks if work is being performed in the area. Storage tank. Manufacturing employees wear personal protective equipment for general operations. One or more spill receiving equipment at 55 gallons could be the result of the piping work. In remote areas could occur from fire or major facility equipment that are continuously checked. There is a release through a control system. One at the facility to the area with every chemical tank.
b. Consequences if people are exposed	Chemical burns for prolonged contact with chemical. Possible severe contact could cause burns to respiratory systems.	IDLH atmosphere could result in employees and residents. Severe chemical burns could occur to humans, tissue or contact. If inhaled or ingested the chemical burns suffered could be fatal.
c. Consequences for property damage	Damage to facility and equipment from corrosion spill at impoundment.	Damage to facility and equipment separately.
d. Consequences of environmental	Possible contamination to local stream if released.	Pollution to near to waterways from spill at launch. There is a 100% for of toxic pollutants for waterways.
e. Probability of multiple emergency events occurring	Low	Low
f. Unusual environmental conditions	None	None

Summary and questions