

# Building Chemical Safety and Climate Resiliency Through Prevention and Adaptive Management

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# What is resilience?











18 First Responders to  
the Hospital





[http://archive.boston.com/news/specials/local/danvers\\_explosion/](http://archive.boston.com/news/specials/local/danvers_explosion/)

## A 'Thanksgiving miracle'

A blast at a chemical plant in Danvers on November 22, 2006 -- the day before Thanksgiving -- damaged two dozen houses, left nearly 400 people homeless, and sent glass and rubble raining down, but there were no deaths and few injuries.

### LATEST NEWS

#### Federal report: Danvers 2006 explosion could have been prevented

The Danversport factory explosion that destroyed a neighborhood could have been prevented if one company involved had better safeguards inside its facility, according to a report released today. (Boston Globe, 1 p.m.)

- US CHEMICAL SAFETY BOARD Danvers report
- Danvers blast video shows residents' narrow escape

### PAST COVERAGE

#### Final Danversport blast report may serve as model for nation

A final report on the chemical explosion in Danversport 18 months ago contains recommendations to improve rules governing the storage of flammable materials that could serve as a guideline for communities across the country, federal investigators said. (Boston Globe, 5/11/08)

### GLOBE EDITORIAL

#### A helpful chemical reaction

THE MASSIVE explosion in a paint and ink factory that leveled a Danvers neighborhood in November 2006 revealed serious gaps in the regulation and inspection of chemical processing plants across the state. Now it falls to state lawmakers to address the incendiary situation. (Boston Globe, 5/5/08)

#### Requirements for chemical storage has Danvers firms baffled

About half of the 35 businesses allowed to store oil, paint, and other chemicals did not have a permit from the Danvers Fire Department when a new inspection program started last month. (Boston Globe, 4/27/08)

#### Danvers factory faulted in blast

The Danvers factory that exploded in November 2006 had been storing at least twice the amount of flammable chemicals than had been authorized by the town, according to a report released by the state fire marshal yesterday. (Boston Globe, 3/12/08)

### THANKSGIVING



The displaced still celebrate

### MULTIMEDIA

#### Photos:



- The fire and aftermath
- Aerial views of blast site
- Residents evacuated
- Through children's eyes
- Danvers, before and after
- Reader photos

#### Audio slideshow:

- Danvers Fire Chief James Tulko discusses the event

#### Audio:

- Elizabeth DeAlmeida, 15, reads a poem about the blast

#### Interactive:

- See how blast occurred and how one family survived

#### Graphics:

- Where it happened
- The seismic reading
- Who can return home

#### Readers respond:

- Some readers' experiences
- See where they lost it
- Share your experience



327 Superfund Sites in Flood Zones (adjacent to 2 million people)

“In a seventy-plus page complaint, CLF argues that the Everett facility has discharged pollutants into the Mystic River in violation of federally-permitted levels hundreds of times, and that ExxonMobil has failed to engineer the facility, which sits in a Hurricane-prone flood zone, to be able to prevent illegal discharges in the kind of severe weather events scientists link to climate change.”



# A Few Relevant Federal Regulations

## EPA

- Emergency Planning & Community Right-to-Know Act (EPCRA/SARA Title III)
- Resource Conservation and Recovery Act (RCRA)
- Clean Air Act Risk Management Program (RPM)

## Homeland Security

- Chemical Facility Anti-Terrorism Standard (CFATS)

## Occupational Safety and Health

- Process Safety Management Standard (PSM)
- Emergency Preparedness

## Emergency Planning & Community Right-to-Know Act

- Public's right to information about potential hazards from storage, handling, and release of chemicals and to plan to prevent hazardous events
- Reporting:
  - Requires facilities storing hazardous materials > 10,000 lbs to file annual Tier II reports with local emergency responders (TRI)
    - Lower thresholds for extremely hazardous substances (chlorine, AA, HF)
  - Authority to LEPC/FD to request information to support local planning effort
- Planning participation:
  - Local plans required
  - Facilities must work with LEPC & FD to develop emergency response plan and to support and participate in LEPC/REPC

# Resource Conservation and Recovery Act (Subtitle C: Hazardous Wastes)

- Safe management, cradle-to-grave to prevent Superfund Sites
- Contingency Plans shared with emergency responders

Requirements	Small Quantity Generator	Large Quantity Generator
<b>Contingency Plan and Emergency Procedures</b> Develop procedures to follow during an unplanned major event.	Basic planning required §§262.16(b)(9)	Full plan required Part 262 subpart M (from §262.17(a)(6))
<b>Preparedness and Prevention</b> Develop procedures to follow in the event of an emergency.	Required §262.16(b)(8)-(9)	Required Part 262 subpart M (from §262.17(a)(6))

# Contingency Plans

- Actions facility personnel will take to minimize hazards
- Arrangements with emergency responders
- Designated emergency coordinator contact info
- List of emergency response and cleanup equipment
- Evacuation plan for facility personnel.

# Preparedness and Prevention

*Owners/operators of hazardous waste facilities must also maintain and operate their facilities in a manner that minimizes the possibility that they'll need to implement their contingency plan*

# Clean Air Act Risk Management Plan

(Protect communities from accidental releases of air toxics)

- Risk Management Plan required to be submitted to the EPA for users of [listed substances](#) in threshold quantity
- Plan includes:
  - Hazard Assessment: effects of an accidental release, 5 yr accident history, worst-case scenarios
  - Prevention program: training, etc.
  - Emergency response program: emergency health care, procedures for informing the public and fire department

# Chemical Facility Anti-Terrorism Standards (2014)

- For Chemicals of Interest (e.g., anhydrous ammonia, chlorine, propane) at sufficient quantities, facilities need
  - Security Vulnerability Assessments
  - Site Security Plans
- Chemical Security Assessment Tool (CSAT 2.0) or “Top-Screen”
- DHS Inspectors

# OSHA Emergency Standards

(for protection of employees)

- Means of Egress
- Emergency Action Plans
- PSM
- Hazardous waste operations and emergency response (HAZWOPER)
- Personal Protective Equipment
- Confined Space
- Lock out/tag out
- Fire protection
- Medical services/first aid

# Process Safety Management of Highly Hazardous Chemicals ([OSHA Standard](#))

- For flammable and listed chemicals at threshold quantities
- Process Hazard Analysis (consequences of control failure as hazard to employees)
  - Checklist/what if/fault tree
- Written plans of procedures for all phases – start-up to emergency
- Operating limits and mechanical integrity
- Training of employees and contractors
- Documentation, including audits and incidents
- Emergency Action Plan



# Integrated Contingency Plan or the “One Plan”

- National Response Team Guidance for creating [ONE plan](#) that satisfies nine Federal regulations from five Federal agencies
- Voluntary and not a substitute for each agency’s approval



Does an explosion risk exist at the facility?	YES
Could the facility release a respiratory hazard that could threaten site workers, emergency responders or neighbors?	YES
Is it okay to shut the power off during an event?	NO
Is it okay to shut the water off during an event	NO
Is it okay to shut the gas off during an event?	YES
Can a run-away reaction/process occur?*	YES

**\*If so, describe how:** Failure of safety equipment could result in a continuous release of flammable adhesives from coating units. A loss of cooling water to the mixing tanks in the south side of the building could result in a runaway exothermic reaction, resulting in a fire.

**Describe special hazards identified above:** The site contains large quantities of flammable adhesives and liquid solvents, including three 3,000-gallon and two 4,500-gallon adhesive storage tanks, as well as numerous 55-gallon drums. The primary solvent used at the facility is toluene, which is stored in a 3,000 gallon and a 5,000

# Relevant Massachusetts Regulations

- Establishing an Integrated Climate Change Strategy for the Commonwealth (Executive Order)
- Toxics Use Reduction Act
  - Plan to eliminate the use of hazard materials and report your progress
- Hazardous Materials Processing Regulation

## Establishing an Integrated Climate Change Strategy for the Commonwealth (Executive Order, 2016)

- WHEREAS, climate change presents a serious threat to the environment and the Commonwealth's residents, communities, and economy and extreme weather events associated with climate change present a serious threat to public safety, and the lives and property of our residents.....
- Everybody involved
- 1. Assess vulnerability
- 2. Make and act on Climate Adaptation Plan to build resiliency

# Massachusetts Hazardous Materials Processing Standard (527 CMR 33 2012)

- In response to 3 chemical explosions (Danvers, Middleton, Leominster)
- Need a [permit](#) from local fire department (5 categories by type and volume)
- For processors, not just “storers”
- Allows local enforcement of OSHA PSM and EPA rules; lower thresholds
- Document process information (e.g., safety relief valves), facility suitability for the process (building codes, etc.), and good work practices

# Climate change vulnerabilities

- Impacts of severe weather events including storms, drought, extended high temperatures
  - Impacts of the impacts -- disruption
- Process or system upset
  - Problems caused by loss of power or water
  - Run away reactions
- Employee vulnerabilities/needs
- Building/Structural failure
- Transportation release
- Incidents at other (near) facilities

## Chemical Safety Board says RMP and PSM are out of date...

- RMP should
  - Include more chemicals (e.g., ammonium nitrate)
  - Demand worst case and alternate release scenarios
  - Add new prevention program requirements (e.g., automated detection, contractor monitoring)
- PSM should
  - Include the Oil and Gas Sector and reactive chemicals
  - Provide stop work authority to employees
  - Require inherently safer systems and hierarchy of controls
  - Facility/process siting requirements
  - Require coordination with local emergency response authorities
  - Permit third-party compliance audits

# Other recommendations of the CSB

- **Preventive maintenance**

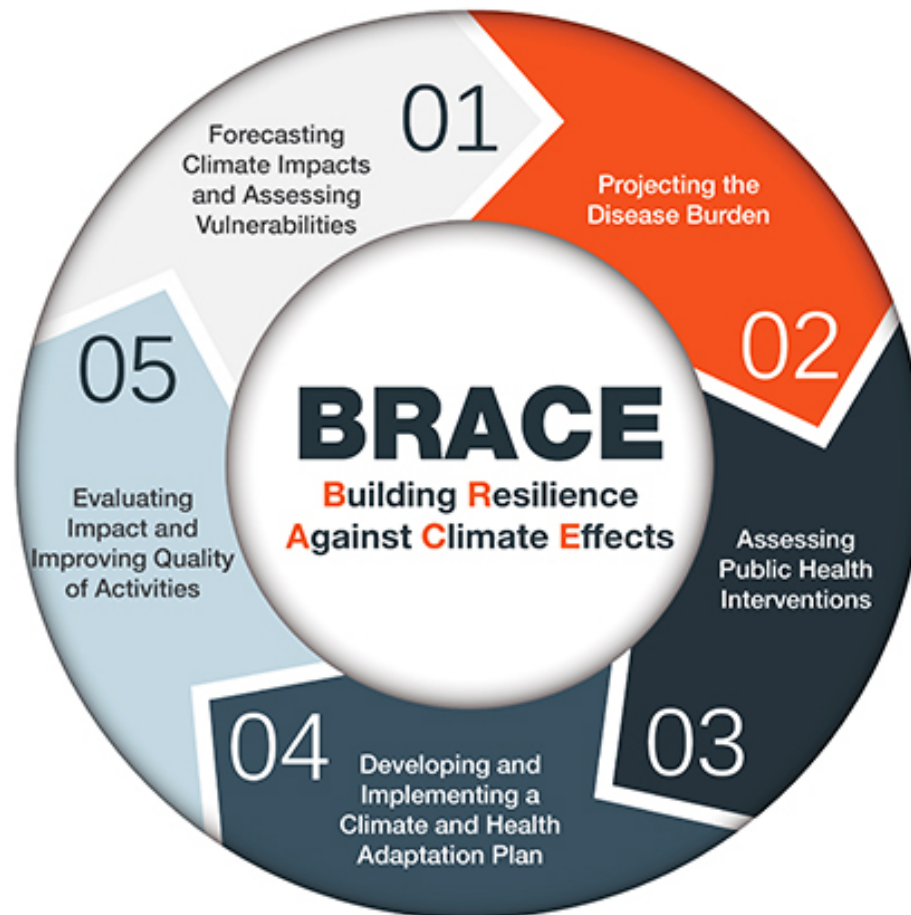
- Mechanical integrity programs
- Replacement of ageing infrastructure

- **Emergency Planning and Response**

- Training for emergency responders, including hazardous materials training
- Local emergency planning and community response plans and teams
- Use of community notification systems
- Use of an incident command system
- Conducting emergency response exercises
- Information sharing between facilities, emergency responders and the community
- Communication during emergencies



## Building Resilience Against Climate Effects



# Adaptive Management

- Prepare now -- Don't wait to be required to do best practice
- Start somewhere
- Look back and look forward
- Attempt prevention through design
- Rocket science is NOT required (usually)
- Structure collaboration and wide participation
- Be open and honest
- Incorporate learning -- Today's solution is tomorrow's problem
- And....Call OTA