

## Natural Disaster – Flood

### Setting

Season: Summer - Mid August

Issues: Major thunderstorm cell stalls out upstream of a city. Heavy rain and localized street flooding was expected. However, about 8 to 10 inches of rain falls over a 24-hour window upstream of the city. Thunderstorm starts about 6:15 pm on a Tuesday. A river or creek runs through the city and the levees or dykes are damaged/breached and not high enough to control all of the rainfall. Flooding starts next day at 6:00am. People did not evacuate initially, because weather forecast did not reflect a stalled out thunderstorm and excessive rainfall. Many roads leading out of town closed due to high water. One major 4 lane highway and one two lane county road remained open for people to evacuate. People were ordered to evacuate their homes on day 2 at 8:15 a.m. Approximately 2-3% of city residents did not evacuate and remained in their homes. No electricity or telephone service for about one-third of the town. Outside of city limits there are farms with dairy cows; livestock is affected. Mayor contacted the governor who directed the National Guard to respond for security.

Size of city: 50,000 people

Duration: Several days before water significantly recedes and residents/business owners-operators are allowed back to inspect their properties.

Receptors: The flooded area consists of hundreds of single family homes, a number of large apartment buildings, one major grocery store, 2 to 3 day cares, 1-2 schools (an elementary and a middle school), 3-4 churches, 1 community center, 1 private full service athletic club, 1 strip style shopping mall with 12 retail tenants, 20 restaurants affected, 6 gas station/convenience stores, 1 nursing home, a large food processing plant, 2 hotels with swimming pools and restaurants and 1 hospital.

*Activity No 1*  
*EH and Disaster Related Impacts*

Flooding is one of the most frequent and widespread of all weather-related hazards. Floods of various types and magnitudes occur in most regions of the country, causing huge annual losses in terms of damage and disruption to economic livelihoods, businesses, infrastructure, services and public health. Impacts associated with a flood can be significant and devastating to a community. Please discuss and list as many issues/problems as you can think of that would be associated with a flood.

## List of Potential Issues/Problems Due to Flooding

- Evacuation of the population
- Inoperable municipal water and wastewater systems
- Significant soil erosion throughout the impacted area
- Tremendous amount of solid waste/debris generated by a flood
- Generation and management of household hazardous waste
- Generation and management of white goods (e.g., appliances)
- Medical waste management (e.g., storage and transportation)
- Vulnerable populations
- Water storage, disinfection and rationing
- Power outages
- Interrupted telephone service; limited or no service
- Poor or non existent hand hygiene
- Food safety and supply
- Possible carbon monoxide poisoning
- Assess on-site waste water systems
- Testing private wells for possible contamination
- Indoor air quality (e.g., mold and moisture levels)
- Contaminated flood water
- Sheltering affected population
- Chemical releases and spills
- Damaged licensed facilities (e.g., daycare, pools, retail food establishments)

*Activity No.2*  
*Potential Health Effects of Flooding*

Floods have the potential to exact a major impact on the health of human populations, and for a given flood event the range of possible health outcomes is broad. These outcomes can result from health risks associated with the presence of floodwaters or indirectly via the impact of floods on shelters, livelihoods, infrastructure and health systems. Please discuss and write down as many direct and indirect health effects commonly associated with a flood.

## Potential Health Effects of Flooding

### Direct

- Drowning
- Injuries (e.g., cuts, sprains, fractures, punctures and electric shock)
- Diarrheal disease
- Vector and rodent-borne diseases (e.g., malaria, encephalitis, leptospirosis)
- Chemical contamination (e.g. of food and water)
- Respiratory infections
- Skin/eye infections
- Mental health

### Indirect

- Damage to health care infrastructure
- Loss of essential drugs/medicine
- Damage to water and sanitation infrastructure
- Damage to crops and/or disruption of food supplies
- Damage/destruction to property
- Disruption to livelihood and income
- Population displacement

*Activity No. 3*  
*Immediate EH Issues for Response and Recovery*

Go back to your notes that describe potential issues and problems associated with a flood. Take a moment and review your list. You may use any item on this list. Now, please discuss and compile a comprehensive list of issues that you think should be immediately addressed. In this case, immediate refers to within 24-hours of the flooding onset.

## List of Potential Immediate Issues (Within 24-Hours)

- ICS
- Communication
- Shelter(s)/temporary housing
- Medical/triage
- Security
- Life Safety
- Food Safety
- Wastewater
- Personal hygiene
- Potable water
- Private wells
- Clothing, blankets, bedding
- Animal control & shelter
- Staffing issues
- PIO
- Staff safety/tetanus/PPE
- Donation management
- Power outage consequences
- Safe generator use
- Pets
- Special needs population

*Activity No. 4*  
*Short-Term EH Issues for Response and Recovery*

Go back to your notes that describe potential issues and problems associated with a flood. Take a moment and review your list again. You may use any item on this list. Now, please discuss and compile a comprehensive list of short-term issues that you think need to be addressed. In this case, short-term refers to a time frame that begins after the immediate issues have been thought about and hopefully addressed.

## Potential List of Short-Term Issues

- Damage assessment
- Ongoing involvement with shelter(s)
- Medical/triage
- Discourage early returns
- Personal hygiene
- Communication
- Roads and bridges
- Transportation
- Vector control
- Mass casualty issues
- Needed inspections for FBL
- Identify debris removal sites
- Disaster declaration
- PIO
- MOU/MOA/EMAC
- Debris management
- Food safety
- Potable water
- Pets
- Air quality
- Clearing roads (mud and debris) for emergency vehicles
- Hazardous waste
- Household hazardous waste

*Activity No. 5*  
*Long-Term EH Issues for Response and Recovery*

Go back to your notes that describe potential issues and problems associated with a flood. Take a moment and review your list one final time. You may use any item on this list. Now, please discuss and compile a comprehensive list of long-term issues that you think need to be addressed. In this case, long-term refers to a time frame that begins after the short-term issues (which you listed) have been thought about and hopefully addressed.

## Potential List of Long-Term Issues

- Vector control
- Sampling (air, soil and water)
- Medical/triage
- Debris management
- Restore potable water supply
- Recovery of deceased people
- Repair levees
- Transition out of shelters
- Evaluation and repair of infrastructure (roads, sewer and water)
- Mitigate mold
- Address fuel oil spills
- Reopening inspections for: restaurants, grocery stores, convenience stores, delis, hotels
- Resume refuse collection
- Restoration of all utilities
- PIO
- Environmental testing (% moisture in sheet rock and mold)
- Food safety
- Personal hygiene
- Hazardous waste
- Household hazardous waste
- Housing needs

*Activity No. 6*  
*Potential Topics for Re-entry – Initial Visit Phase I*

The water has begun to recede and the Mayor wants to allow community members to re-enter the impacted area during daylight hours to assess their property and recover personal items.

Identify critical problems/issues/hazards that must be addressed to allow this re-entry/initial visit to occur safely. You can think broadly and not just focus on environmental health.

## Potential Topics for Re-entry – Initial Visit Phase I

- No power
- Roads cleared
- Sewage mixed in standing and receding water
- Security risks
- Physical hazards (debris, heat, humidity, fire ants, mosquitoes, flies, gnats,snakes, silt and mud)
- Need for positive ID/credentials
- Collaborate with building officials (structural issues/mold)
- Determine level of needed PPE
- Time guidance recall mechanism (air horn)
- Bring food, water, first aid kit, sunscreen, bug repellent, hat, sunglasses
- Wildlife in homes (snakes, raccoons, squirrels, rodents)
- Natural gas leaks
- Up to date vaccinations for EH responders
- Household chemicals
- Hazardous waste
- Awareness of structural issues/cracks
- Clean-up procedures and required equipment
- Overall damage assessment

*Activity No. 7*  
*Recovery and Re-occupancy Phase II*

The flood waters in the city have receded and homeowners and business operators have pumped water out of flooded basements and lower levels. You are the Environmental Health Strike Team Leader. You and your team have been asked to determine the actions that should be taken to enable people to safely reenter their homes and businesses to reopen.

What hazards should be removed?

What systems should be operable before moving back permanently?

What services should be in place before everyone returns?

What tasks need to be accomplished for food establishments to reopen?

What metrics will you use to measure progress in terms of a return to pre flood conditions?

## Recovery and Re-occupancy Phase II

Hazards removed:	perishable, spoiled foods Damaged white goods (refrigerators, washers, dryers, dishwashers, microwave units) Misc debris (contaminate soil, septic systems, dead animals, human bodies) Household hazardous waste Ruined automobiles Tree waste Destroyed personal possessions (furniture, draperies, carpet, ceiling tiles, wood paneling, pictures, books, toys, mattresses, box springs, clothing) Scared animals Propane tanks Home electronics (computers, game systems, televisions, music players, DVRs, VCRs, copiers and telephones)
Operable Systems	Utilities Building/Inspections Dept. Security (police) Fire department Medical/hospital(s) Transportation Refuse collection
In place Services	Public affairs/PIO Reopening inspections for FBL, grocery stores, pools, and septic systems
Tasks To Complete	Public education/ distribute fact sheets on food and water safety Post facility reopening form Distribute clean-up procedures Coordinate refuse collection Coordinate reopening inspections
Indicators of Progress	% FBL inspected % FBL reopened % of homes reoccupied % of homes with potable water and sewer service % of homes with electricity % of neighborhoods reoccupied





## Event of National Significance

Imagine that your community will be the site for an event of national significance. By national significance, we mean a political party's presidential nominating convention, a major sporting event like the Superbowl or World Series, an international economic or environmental conference and or Olympic Games. All of these events have many common issues such as: increased security, extensive media coverage, and an influx of people (participants, support personnel, reporters, technicians, family members, friends law enforcement, protestors and others). Different activities will be held simultaneously at multiple locations throughout your community and an adjoining one. For example, the event itself will take place in one building, but meetings and parties will occur over several days in a large geographic area encompassing a number of cities and possibly two counties.

Environmental health professionals will be actively involved with pre-event planning and activities during the event itself. We all know environmental health is a broad based discipline ranging from air quality to vectors. In this situation, EH's role will likely focus on food safety and defense. It could also include a foodborne outbreak investigation.

You have six months to prepare for the event.

*Event of National Significance  
Group Activity No. 1*

How would you assure that public and environmental health issues and appropriate agencies are included in pre-event planning activities? Who (i.e., what agency) would take the lead in pre-event planning and why?

- Ensure that public health and environmental health are tied into emergency management planning
- Establish a working relationship with colleagues involved with planning and security for the event
- Ensure that your emergency plans include planned events in addition to disasters/emergencies
- Ensure that the agency which has the broadest responsibility for environmental and public health is actively involved in planning activities

*Event of National Significance  
Group Activity No. 2*

What regional or multi-jurisdictional issues (include public health, environmental health and others too) do you think would arise, and what tools will you need to address those issues?

- Communication with hospitals/EMT
  - Liaison with police departments
  - Liaison with fire departments
  - Liaison with local, regional (if applicable) and state health depts.
  - Communicate with epidemiology staff
  - Communicate with environmental health staff
  - Communicate with appropriate laboratory
  - Communicate with PIOs
  - Liaison with environmental protection agency
  - Liaison with state dept of agriculture
  - Communicate with local water utilities
  - Liaison with emergency management personnel
  - Balancing direction from local IC with guidance/direction from others
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- Mutual aid
  - Common web site
  - 800 Megahertz radios
  - Common protocols for communication
  - Common protocols for foodborne outbreak investigations
  - Educational materials that licensed establishments can use to understand special risks during the event

*Event of National Significance  
Group Activity No. 3*

How will your agency efficiently communicate with multiple agencies on a daily basis during the event? What topics should be in your communication plan?

- Establish or use an existing web site (e.g. in MN, we used MNTrac)
  - Conduct twice a day conference calls with environmental health supervisors, managers and directors
  - Plan for and have available equipment for a backup or contingency means to communicate (e.g., 800 megahertz radios)
  - Assess possibility for a “blast” telephone message system
  - Conduct communication training prior to the event for EH professionals
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- Consistency in inspections
  - Consistency in educational materials
  - Mutual aid procedures
  - Proper and common identification for EH professionals
  - Coordination of messages to the media
  - Coordination of messages to elected officials
  - Resolution of “turf” issues

*Event of National Significance*  
*Group Activity No. 4*

What training do you think you will need to prepare for the event? Where would you get the materials and who would actually lead the session(s)?

- Risk based inspections versus enforcement of food ordinance
  - Communication procedures
  - Regulated establishments
  - Accessing and using a common web site
  - Mutual aid
  - Using 800 megahertz radios
  - Common protocols for badges/identification
  - Common protocols for foodborne outbreak investigations
  - Documenting issues/actions using a common form
  - Work force assignment/scheduling tool
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- State agency
  - FDA
  - Twin Cities Metro APC