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## Chapter 6

# Hazard-Unique Planning Considerations

### Introduction

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This chapter provides guidance for developing hazard-specific appendices. Hazard-specific appendices offer a means of extending functional annexes to address special and unique response procedures, notifications, protective actions, emergency public information, and other needs generated by a particular hazard. They allow the jurisdiction, in its EOP, to address priorities identified through hazard analysis and to meet detailed regulatory requirements associated with some hazards. A hazard-specific appendix should be prepared for any functional annex that does not, by itself, give enough information to perform the function adequately in the face of a particular high-priority hazard. Some hazards may require that appendices be prepared for various functional annexes; others may affect planning for only one or two functions. Appendices may be long or very brief depending upon need.

*Think of hazard-specific appendices as supplements to functional annexes. Planning considerations common to all hazards should be addressed in functional annexes, not repeated in hazard-specific appendices.*

### Development of a Hazard-Specific Appendix

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The decision to develop a hazard-specific appendix should be based on special planning requirements not common to other hazards addressed in the functional annex, and on regulatory considerations that may require extensive, detailed planning that is inappropriate for inclusion in the annex.

As the planning team develops each of the functional annexes, close scrutiny must be given to the "unique" characteristics of those hazards that require special attention. Further, the planning team must know the regulatory requirements associated with the hazards their jurisdiction faces.

This approach promotes consistency and continuity and provides the flexibility to include a hazard-specific appendix or not, based on the need to cover information that is relevant to the hazard, but is not appropriate for inclusion in the functional annex.

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## Content of a Hazard-Specific Appendix

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The content of a hazard-specific appendix focuses on the special planning needs generated by the hazard and should not duplicate the information in the functional annex. The appendix contains unique and regulatory response planning details that apply to a single hazard. It addresses the essential operational actions that must be accomplished to facilitate the successful completion of a particular response function. As appropriate, the appendix should quantify the risk area, geography, and demography considerations that apply to the hazard.

It is recommended that hazard-specific appendices follow the same structure-- i.e., include, as appropriate, the same content sections (Purpose, Situation and Assumptions, Concept of Operations, Organization and Assignment of Responsibilities, Administration and Logistics, Plan Development, and Authorities and References)--as the functional annexes.

Tabs may be used to: identify hazard-specific risk areas and evacuation routes; specify provisions and protocols for warning the public and disseminating emergency public information; and specify the types of protective equipment and detection devices for responders, etc. Tabs serve as work aids, and include such things as maps, charts, tables, checklists, resource inventories, and summaries of critical information.

The responsibility for making the decision on what to include in a hazard-specific appendix is vested with the jurisdiction's planning team. The flexibility of the planning approach described in this Guide should make it possible to accommodate and satisfy:

- The planning requirements associated with unique aspects of hazards and with various regulatory authorities.
- The different constituencies in the jurisdiction's emergency response organizations.
- The members of the planning team.

Table 6-1 identifies the core functional annexes discussed in Chapter 5, and provides a synopsis of the typical hazard-specific planning considerations that are associated with them. The planning team should consider Table 6-1

when making its decision on the kinds of information to be included in the appendices that they deem it is appropriate to prepare.

### **Description of Unique and Regulatory Planning Considerations**

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The attachments provide a brief summary of seven significant hazards that threaten many communities in the United States. The information provided on each of these hazards focuses on the specific types of planning considerations that should be examined, analyzed, and applied, as appropriate, in the development of hazard-specific appendices. The format for each attachment has been structured to be consistent with the planning considerations outlined above. Please note that what follows is only summary information. Information on other hazards your jurisdiction faces and additional relevant data on the hazards addressed in this chapter should be readily available to the planning team. Much of the needed information should have been gathered as part of the jurisdiction's hazard analysis. For additional information, the planner should review the applicable hazard-specific planning guides and other relevant technical manuals to gain more insight into the hazards and to obtain detailed information on the emergency response planning considerations associated with each one.

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# Attachment A

## Earthquake

### The Hazard

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<b>Nature of the Hazard</b>	A sudden, violent shaking or movement of part of the earth's surface caused by the abrupt displacement of rock masses, usually within the upper 10 to 20 miles of the earth's surface. The earthquake hazard may consist of:
<i>Ground Motion</i>	Vibration and shaking of the ground during an earthquake is the most far-reaching effect and causes the most damage to buildings, structures, lifelines, etc.
<i>Ground Surface Fault Rupture</i>	The ground shaking is the result of a rupture of a fault beneath the surface. When the ground shaking results in a rupture of the surface of ground, an opening of up to 20 feet may occur.
<i>Liquefaction</i>	The ground temporarily loses its strength and behaves as a viscous fluid (similar to quicksand) rather than a solid.
<i>Landslides</i>	Sometimes an earthquake causes a landslide to occur. This involves a rock fall and slides of rock fragments on steep slopes.
<i>Tsunamis</i>	Tsunamis are sea waves produced by an undersea earthquake. These sea waves caused by the earthquake can reach 80 feet and can devastate coastal cities and low-lying coastal areas.
<i>Secondary Hazards</i>	Consequences of earthquakes may include fire, HAZMAT release, or dam failure, among others.
<b>Risk Area</b>	Wide areas of the United States have some vulnerability to earthquakes. Thirty-nine States face the threat of a major damaging earthquake and are considered to be earthquake hazard areas. The planning team in each of the jurisdictions in these States should use information from their State's earthquake hazard identification study to quantify the seismic hazard their community faces. This study addresses the magnitude, estimates the amount of ground shaking that

could occur, and delineates the associated geological hazards (landslide, liquefaction, etc.) that may occur as a result of a catastrophic earthquake. Further, a vulnerability assessment should have been prepared as part of the hazard analysis. The assessment provides the planning team information related to probable consequences and damages their jurisdiction may suffer if struck by an earthquake. It focuses on casualties and injuries; potential building losses and identifies the buildings most vulnerable to seismicity (including critical facilities such as hospitals, EOCs, mass care centers, emergency services organizations' work centers, water and waste management plants, power companies, etc.); medical needs versus available medical resources; loss of utilities and replacement/repair time; etc. caused by the earthquake and the collateral hazards it may trigger (e.g. fires, dam or levee failure, tsunamis, HAZMAT spills, etc.). This information will help the team develop the appropriate information for inclusion in the EOP.

## **Earthquake Unique Planning Considerations**

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This section contains a listing of the functional annexes that typically would require the preparation of a hazard-specific appendix for earthquakes. It also identifies the unique and/or regulatory planning considerations that should be examined by the planning team and used, as appropriate, when preparing earthquake-specific appendices.

### **Direction and Control**

For this hazard it is essential for emergency response personnel to take immediate action to gather damage assessment information. This information is needed to determine the severity and extent of injuries and damages. Further, this data gathering effort should provide much of the information decision makers will need to implement and prioritize response actions for: US&R activities, access control and re-entry to the impacted area, debris clearance, restoration of utilities and lifeline repairs, and the inspection, condemnation, and or demolition of buildings and other structures.

Therefore, provisions should be made, as appropriate, to address the following planning considerations in one or more appendices to a direction and control annex:

#### *Damage*

Conduct of ground and aerial surveys to determine the scope of the damage,

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<i>Assessment</i>	casualties, and the status of key facilities.
<i>Search and Rescue</i>	<p>Removal of trapped and injured persons from landslides, buildings collapses, and other structural collapses, administering first aid, and assisting in transporting the seriously injured to medical facilities. This activity involves the use of professional and volunteer search teams including the use of dog teams. Consideration should be given to:</p> <ul style="list-style-type: none"><li data-bbox="474 659 1443 772">➤ Use of damage assessment information to identify the facilities and areas where US&amp;R operations are to be conducted and to establish a priority for conduct of these operations.</li><li data-bbox="474 821 1308 856">➤ Request for Federal assistance to perform US&amp;R operations.</li></ul>
<i>Access Control and Re-Entry</i>	<p>Major consequences associated with an earthquake are the collapse of buildings and other structures, and landslides. In a metropolitan area that is struck by a major earthquake many hundreds to thousands of people could be trapped. These trapped people need immediate assistance. In such situations, it is likely that local and State governments would be overwhelmed by the demand for emergency services. Further, most jurisdictions do not have a sufficient quantity of specialized equipment or enough trained teams available to accomplish the large-scale search and rescue operations that would be needed to respond to a catastrophic earthquake. In order to assist State and local governments to accomplish this critical lifesaving activity, the Federal Government has established Federal US&amp;R teams. These teams are available to State and local jurisdictions upon request. The FRP's ESF-9 includes provisions for deploying Federal US&amp;R teams. These teams augment State and local emergency response efforts to locate, extract, and provide for the immediate medical treatment of victims trapped in collapsed structures.</p> <p>This section deals with the immediate actions to be taken, as soon as conditions permit, in the area that was severely impacted by an earthquake. Relevant considerations include:</p> <ul style="list-style-type: none"><li data-bbox="474 1696 1443 1766">➤ Control of access to the area until it is safe. Only those people directly involved in emergency response operations should be allowed to enter.</li></ul>

- Establishing a protocol for determining the appropriate time to allow evacuees and the general public to re-enter the area that was severely impacted.

*Debris  
Clearance*

The identification, removal, and disposal of rubble, landslides, wreckage, and other material which block or hamper the performance of emergency response functions should be a high priority action. Activities may include:

- Demolition and other actions to clear obstructed roads.
- Repair or temporary reinforcement of roads and bridges.
- Construction of emergency detours and access roads.

*Inspection,  
Condemnation  
, Demolition*

Inspection of buildings and other structures to determine whether it is safe to inhabit or use them after an earthquake has occurred. Activities may include:

- Inspection of buildings and structures which are critical to emergency services operations and mass care activities. Designate those that may be occupied and identify/mark those that are unsafe.
- Inspection of buildings and structures that may threaten public safety. Identify/mark those that are unsafe and may not be occupied.
- Inspection of dams and levees.
- Inspection of less critical damaged structures. Designate those that may be occupied and identify/mark those that are unsafe to occupy.
- Arrangements for the demolition of condemned structures.

*Utilities and  
Lifeline  
Repairs*

Restoration and repair of electrical power, natural gas, water, sewer, and telephone and other communications systems to minimize the impact on critical services and the public.

**Warning**

Earthquakes usually occur without warning. Although some earthquakes have been successfully predicted, a reliable warning system has not been developed. However, it is appropriate for those jurisdictions located on the West Coast,

Hawaii, and Pacific Insular areas where a large seaquake or undersea volcanic eruption may occur to include an appendix in their plan that will facilitate the issuance of a tsunami warning.

**Emergency  
Public  
Information**

The flow of accurate and timely emergency information is critical to the protection of lives and property in the wake of a catastrophic earthquake. This section deals with the provisions that should be included in the plan for the preparation and dissemination of notifications, updates, warnings, and instructional messages. The following planning considerations should be examined and addressed, if appropriate, in one or more appendices to an EPI annex:

- Survival tips for people on what to do during and immediately after an earthquake.
- Warnings and advice on the continuing threat of fire, unsafe areas, building collapse, aftershocks, and other hazards.

**Evacuation**

Immediately following an earthquake people may need to be evacuated. People should be evacuated from structures that have been damaged and are likely to receive more damage when hit by one or more of the aftershocks. An appendix to an evacuation annex should address special provisions for moving the residents of custodial facilities (hospitals, jails, mental health facilities, nursing homes, retirement homes, etc.) following an earthquake.

**Mass Care**

The information gained from the vulnerability assessment should be used to ensure the following needs are addressed, if appropriate, in one or more appendices to a mass care annex:

*Safe Location  
of Facilities*

If possible, identify mass care facilities in low seismic risk areas that are also out of the way of secondary effect threats (e.g., flooding from a damaged dam).

*Structural  
Safety*

If the facilities selected for use are located within the earthquake hazard area, ensure that a structural engineer, knowledgeable of the earthquake hazard:

- Identifies facilities for use that are structurally sound, well retrofitted or

built to code.

- Ranks the facilities based on the amount of earthquake resistance/protection each one offers.

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## Attachment B

### Flooding and Dam Failure

#### The Hazard

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**Nature of the Hazard**

Flooding occurs when normally dry land is inundated with water (or flowing mud). Flooding may result from: bodies of water overflowing their banks, including artificial ones like dams and levees; structural failure of dams and levees; rapid accumulation of runoff or surface water; hurricane-caused storm surges or earthquake-caused tsunamis; or erosion of a shoreline. (Coastal flooding and erosion are not treated in this attachment.) Typically, the two parameters of most concern for flood planning are suddenness of onset--in the case of flash floods and dam failures--and flood elevation in relation to topography and structures. Other factors contributing to damage are the velocity or "energy" of moving water, the debris carried by the water, and extended duration of flood conditions. Flooding can happen at any time of the year, but predominates in the late Winter and early Spring due to melting snow, breakaway ice jams, and rainy weather patterns.

**Risk Area**

All States and territories are at risk from flooding. Apart from a rainy climate, local risk factors, usually present in combination, include:

*Rivers,  
Streams, and  
Drainageways*

These are bodies of water often subject to overflowing. The size of the stream can be misleading; small streams that receive substantial rain or snowmelt, locally or upstream, can overflow their banks. High-velocity, low elevation flooding can be dangerous and damaging. Six inches of moving water can knock a person off his or her feet; 12 inches of water flowing at 10 miles per hour carries the force of a 100 mile-per-hour wind, although the force would be distributed differently on obstacles.

*Dams and  
Levees*

There are 74,053 dams in the United States, according to the 1993-1994 National Inventory of Dams. Approximately one third of these pose a "high" or "significant" hazard to life and property if failure occurs. Structural failure of dams or levees creates additional problems of water velocity and debris.

*Steep Topography* Steep topography increases runoff water velocity and debris flow. Lack of vegetation to slow runoff is another factor. Alluvial fans, making up twenty to thirty percent of the Southwest region, show these characteristics and face the additional complication of shifting drainage patterns and erosion.

*Cold Climatic Conditions* Apart from snowmelt, 35 northern States face flooding problems associated with ice jams. In the Spring, ice breaks away and then collects at constriction points in rivers and streams (i.e., bends, shallows, areas of decreasing slope, and bridges); by trapping water behind it and then later giving way, an ice jam heightens flood levels both upstream and downstream. Ice jams occur in the Fall with "frazil ice" (when a swift current permits formation of ice cover, but ice is carried downstream and attaches to the underside of ice cover there) and in Winter when channels freeze solid.

**Identifying Hazards** A jurisdiction's susceptibility to floods--riverine floods, ice jam floods, debris jam floods, flash floods--will in most cases be a matter of historical record, as will flood elevations. (However, planners must be alert to development upstream or extensive paving over of the ground that used to absorb runoff.) The NWS maintains a list of communities with potential flash flood problems, and stream flow data for large watersheds is kept by the USGS in cooperation with State and local agencies. Results of the Corps of Engineers' dam survey, as well as subsequent work done by many States, should be available to permit plotting of dams with an evaluation of the risk they pose. Planners have access to the National Flood Insurance Program's (NFIP) Flood Insurance Rate Maps (FIRM) and Flood Hazard Boundary Maps (FHBM), USGS topographic maps, and soil maps prepared by the Soil Conservation Service to use as base maps.

**Estimating Vulnerable Zones** Using the NFIP's maps and Flood Insurance Studies (FIS) as a base, the planning team--consulting with an engineer for technical analysis--should plot dams and levees as applicable, then adjust inundation levels behind levees and progressively downstream of the dam. Where ice jams are a problem, base flood fringe boundaries should be broadened to account for higher potential flood elevations. Also, despite shallow flood elevations, it is important to map alluvial fans as high risk areas. Note, too, that areas prone to flash flooding from small streams and drainage ways may not always have been mapped as such by the NFIP. See FEMA 116, *Reducing Losses in High Risk Flood*

*Hazard Areas: A Guidebook for Local Officials* for discussion of models and additional bibliography.

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## **Flooding and Dam Failure Unique Planning Considerations**

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This section contains a listing of the functional annexes that typically would require the preparation of a hazard-specific appendices for flooding and dam failure. It also identifies the unique and/or regulatory planning considerations that should be examined by the planning team and used, as appropriate, when preparing appendices for flooding and dam failure.

### **Direction and Control**

The extent of the initial response will depend on warning time, which varies with the cause of the flooding and the distance a jurisdiction is from the origin of the flooding. Intense storms may produce a flood in a few hours or even minutes for upstream locations, while areas downstream from heavy rains may have from 12 hours to several weeks to prepare. Flash floods occur within six hours of the beginning of heavy rainfall, and dam failure may occur within hours of the first signs of breaching, but floods from snowmelt can take months to develop.

The EOPs of jurisdictions located downstream of a heavy flood source should address the following planning considerations in one or more appendices to a direction and control annex:

### *Floodfighting*

Relevant floodfighting considerations include:

- Obtaining and keeping current a list of all dams in or near the jurisdiction, by location and name.
- Coordination with a dam's staff during disaster or disaster threat situations to facilitate expeditious notification and the exchange of information.
- Maps that identify the likely areas to be inundated by flood waters.
- Identification of potential locations for the placement of temporary levees and inclusion of this information on the appropriate maps.

- Obtaining a labor force to perform flood fighting tasks associated with building a levee (e.g. fill and place sand sandbags to prevent flooding).
- Obtaining assistance from the U.S. Army Corps of Engineers to build temporary emergency levees.

*Search and Rescue*

Conduct aerial and waterborne search and rescue once flooding occurs. Include provisions for the rescue of stranded animals and the disposal of dead ones.

*Continuity of Operations*

Address the relocation of government resources, vital records, and equipment to assure continuation of services and to prevent damage or loss.

*Inspection and Condemnation*

Structures left standing may still have been weakened by water pressure and debris flows. Building interiors will be filled with mud and filth, and some building materials will be waterlogged.

Therefore, it will be necessary to inspect buildings and other structures to determine whether they are safe to inhabit after a flood has occurred. Activities may include:

- Identifying buildings and structures that may threaten public safety.
- Designating those buildings and structures that may be occupied.
- Identifying/marketing those buildings and structures that are to be condemned.

**Warning**

The NWS is responsible for most flood warning efforts in the United States. For large river systems, hydrological models are used by River Forecast Centers. For many--not all--smaller streams, the NWS has developed a system called ALERT (Automated Local Evaluation in Real Time) that does not rely on volunteer observers. However, some communities may still need to use volunteer observers to monitor water levels, the effectiveness of the levee system, or even to back up automated systems. The following planning considerations should be addressed, if appropriate, in one or more appendices to a warning annex:

<i>Automated Warning</i>	Include a listing that identifies location and telephone numbers for all automated dam and river warning devices within or upstream of the jurisdiction, if available.
<i>Use of Volunteers</i>	<p>If the jurisdiction relies on a volunteer warning network an appendix should describe:</p> <ul style="list-style-type: none"><li>➤ Composition and locations of each team in the network.</li><li>➤ How and when the network teams are activated (e.g., automatically with an NWS flood watch or as directed by the Emergency Manager).</li><li>➤ The type of information to be reported and the frequency of reporting.</li><li>➤ The means established to facilitate reporting.</li><li>➤ How warning information is passed on to response organization members.</li><li>➤ How the warning data received will be disseminated as emergency public information.</li></ul>
<i>Dam Failure</i>	<p>In jurisdictions that are vulnerable to flooding from dam failure, an appendix should include provision for:</p> <ul style="list-style-type: none"><li>➤ Alerting the Warning Coordinator and other key members of the emergency management staff when the local authorities receive notification that a problem exists or may occur at the dam.</li><li>➤ Disseminating emergency warning information (to the public and other key response personnel) received from the dam's emergency management staff. Typically, a warning message should address a serious situation that could develop (alert) or inform the audience when an excessively high runoff occurs or a dam failure threatens (warning).</li><li>➤ Coordinating with the PIO to facilitate the timely warning of the</li></ul>

population at risk from dam failure.

**Emergency  
Public  
Information**

Public information begins with communication of risks to the community, to potential home buyers, and to applicants for construction permits. Knowledge of being in a flood zone, of being downstream of a dam, of being protected by an inadequate levee, and the like, may rivet attention on the rest of the public information strategy. The population should be educated about what the levels of warning imply, should know how to interpret a predicted flood level as it relates to their property, and should be informed about expedient loss-reduction measures they can apply to their property.

Provisions must be made to prepare and disseminate notifications, updates, and instructional messages as a follow-up to the original warning. The following planning considerations should be addressed, if appropriate, in one or more appendices to an EPI annex:

*When Floods  
Develop  
Slowly*

For flood emergencies that develop slowly enough to permit evacuation, provide the public information and instruction on:

- Expected elevation of the flood waters, and instructions on when to evacuate.
- Where to obtain transportation assistance to evacuate.
- Designated travel routes and departure times.
- Status of road closures (what routes must be avoided due to probable inundation).
- What to take or not to take to shelters (including options available for companion animals).
- Location of mass care shelters and other assistance centers.

*Transition to  
Recovery*

As the initial response shifts to recovery, provide residents returning to their homes information on safety precautions associated with:

- Sanitary conditions.
- Unsafe drinking water.
- Use of utilities.
- Electric fields created in water by downed power lines.

## **Evacuation**

If fast- and slow-developing floods are possible in a jurisdiction, protective action decisions must be based on the estimated time necessary for evacuation and the availability of shelter space above the estimated flood elevation. When complete evacuation is not feasible, citizens need to know where high ground is; when evacuation is feasible, planning should have accounted for routes facing possible inundation. In evacuation planning for floods, consideration must be given not only to critical facilities and custodial institutions but also to recreational areas prone to flooding, whether because the site is physically isolated or because visitors isolate themselves from communication.

Particular attention should be paid to critical facilities that are low-lying or in the path of projected debris flows. Transportation routes subject to flooding should also be noted, given the potential impact on evacuation and relief efforts.

The following planning considerations should be addressed, if appropriate, in one or more appendices to an evacuation annex:

- Maps that detail probable flood inundation areas and designated evacuation routes.
- Pickup points and government provided transport to move evacuees.
- Provisions for moving the residents of custodial facilities (hospitals, jails, mental health facilities, nursing homes, retirement homes, etc.).
- Coordination and implementation of mutual aid agreements with adjacent jurisdictions to facilitate evacuation.

<b>Mass Care</b>	The following planning considerations should be addressed, if appropriate, in one or more appendices to a mass care annex:
<i>Space/ Capacity</i>	Relevant considerations include: <ul style="list-style-type: none"><li>➤ Identification of a sufficient number of mass care facilities to accommodate the estimated number of people that may be evacuated.</li><li>➤ Availability of shelter space for a prolonged (up to 90 day) period.</li></ul>
<i>Safe Location of Facilities</i>	This involves designating shelters for use that are located on high ground (beyond the worst case inundation estimates).
<b>Health and Medical</b>	The following planning considerations should be addressed, if appropriate, in one or more appendices to a health and medical annex: <ul style="list-style-type: none"><li>➤ Provisions to keep people informed of the health and sanitary conditions created by floods: flood waters may carry untreated sewage, dead animals, disinterred bodies, and hazardous materials.</li><li>➤ Monitoring water quality and sanitary conditions.</li></ul>
<b>Resource Management</b>	The following planning considerations should be addressed, as appropriate, in one or more appendices to a resource management annex: <ul style="list-style-type: none"><li>➤ Provisions for purchasing, stockpiling or otherwise obtaining essential flood fighting items such as sand bags, fill, polyethylene sheeting, and pumps (of the right size and type, with necessary fuel, set-up personnel, operators, and tubing/pipes).</li><li>➤ Resource lists that identify the quantity and location of the items mentioned above, as well as points of contact (day, night, and weekend) to obtain them.</li></ul>

## Attachment C

### Hazardous Materials

Given the technical nature of the HAZMAT threat, it is essential that the National Response Team's NRT-1, *Hazardous Materials Emergency Planning Guide*, and the Environmental Protection Agency's (EPA) *Technical Guidance for Hazard Analysis* be used as the principal source documents for addressing HAZMAT planning needs. Other helpful guides include the *Handbook of Chemical Analysis Procedures*, co-published by the Department of Transportation (DOT), EPA, and FEMA, and the planning section of the *Guidelines for Public Sector Hazardous Materials Training*, coordinated by FEMA under an agreement with DOT. The planning team should use the guides and this attachment to help facilitate the completion of the hazard analysis and to identify unique planning requirements that should be addressed in the EOP.

### The Hazard

#### **Working Definition of Hazardous Materials**

Definition of a risk area for hazardous materials depends on defining "hazardous materials." Many Federal laws and regulations exist to help the planner do just that; however, since the various lists overlap and serve different purposes (identifying acceptable quantities for "wastes" and "pollutants," reportable quantities for "emergency releases," etc.), this chapter will use the term "hazardous materials" in a broad sense to include:

- Explosive, flammable, combustible, corrosive, oxidizing, toxic, infectious, or radioactive materials
- that, when involved in an accident and released in sufficient quantities,
- put some portion of the general public in immediate danger from exposure, contact, inhalation, or ingestion.

Off-site planning for radiological accidents at nuclear power plants is addressed in Tab 1 to Attachment F. Radiological protection planning for the nuclear conflict threat is addressed in Tab 2 to Attachment F. Planning for the release of lethal unitary chemical agents and munitions is addressed in Attachment E.

*For a discussion of the different lists of hazardous materials, see EPA's A Review of Federal Authorities for Hazardous Materials Accident Safety, Chapter*

4. Note that substances not on these lists may still be hazardous.

**Risk Areas**

Areas at risk for hazardous materials transportation incidents lie along highways, rail lines, pipelines, rivers, and port areas. A large number of States also are potentially involved with nuclear waste incidents, given the routing for shipments. Jurisdictions with facilities that produce, process, or store hazardous materials are at risk, as are jurisdictions with facilities for the treatment, storage, or disposal of hazardous wastes. These risks are compounded by natural hazards (e.g., earthquakes, floods) or, for highway transportation of hazardous materials, poor weather conditions. In addition, other kinds of facilities (e.g., for natural gas) may contribute to risks posed by hazardous materials facilities.

**Locating  
Hazardous  
Materials**

This section discusses information made available to planners under Federal law. States and localities may have additional or more stringent information requirements, and planners may wish to check with their State Emergency Response Commission (SERC), State Environmental Protection Agency, State Department of Transportation, Public Service Commission, Radiological Health Division of the State Health Department, and the like for additional information. Area Committees established under the auspices of the National Oil and Hazardous Substances Pollution Contingency Plan (NCP) and the Oil Pollution Act (OPA) may provide additional resources in identifying areas at risk from a hazardous materials incident.

*At Fixed  
Facilities*

EPCRA, or Title III of the Superfund Amendments and Reauthorization Act (SARA), requires facilities to notify the SERC and LEPC if they have present any of the substances designated by the EPA as an "extremely hazardous substance" when the amount on hand exceeds the EPA-defined "threshold planning quantity." Facilities must submit to the appropriate LEPC, local fire department, and SERC a list of the "hazardous chemicals" (as defined by the Occupational Safety and Health Administration, or OSHA) on site in excess of threshold quantities or the OSHA-required material safety data sheets (MSDS) on each of these chemicals. In addition, facilities must provide the appropriate LEPC, local fire department, and SERC with an inventory form containing general, aggregate ("Tier I") information on amounts of the chemical present at the facility and their location, or (upon a request made to the facility by the LEPC, fire department, or SERC) more specific ("Tier II") information. LEPCs

may complete the general picture of the fixed facility hazard by obtaining data from EPA's Toxic Chemical Release Inventory and by reviewing previous notifications of accidental releases of "hazardous substances" in excess of "reportable quantities" (as defined in 40 CFR 302). Interviews with facility emergency coordinators, fire and law enforcement personnel, and news reporters also may be used to obtain needed information.

### *On Transport Routes*

The LEPC is entitled to information from facilities subject to SARA Title III that may be necessary for emergency planning, and the LEPC is required by SARA Title III to address routes for transportation of extremely hazardous substances in emergency planning. Facility emergency coordinators may provide information on frequency of shipments, form and quantity of shipments, and routes. Representatives of trucking, rail, air freight, and shipping industries also may assist. Planners should know of State and local route designations for hazardous materials shipments. Information is available from the Department of Energy (DOE) or the Nuclear Regulatory Commission on nuclear waste shipment routes, and from DOT on the routes for and volume of shipments involving "highway route controlled quantities" (HRCQ) of radioactive material.

### **Estimating Vulnerable Zones**

Having plotted the location of facilities and transportation routes with the potential for hazardous materials incidents, planners can estimate vulnerable zones. The widest area of vulnerability would be for an airborne release. For airborne releases of acutely toxic chemicals, vulnerable zones would be plotted as circles around facilities--given uncertainty about wind direction--and as corridors along land transportation routes. Calculating the radii for these circles and corridors depends on knowing what concentration represents a "level of concern" for health effects, the quantity of material likely to be released, the likely rate of release, physical state of the material, elevation at which the release occurs, wind speed, and surrounding topography or construction. In determining vulnerable zones, planners will want to use both worst case and more probable scenarios for the potential releases. Planners should take advantage of any hazard assessments completed by facilities themselves, as these can provide valuable information.

*The Risk Management Program under the Clean Air Act, Section 112(r), will require facilities to conduct hazard assessments for a selected list of about 140 toxic chemicals. The facilities are not required to have completed these hazard assessments until May 1999.*

**Determining  
Vulnerability**

Once vulnerable zones have been plotted, planners can assess the possible consequences of potential hazardous materials incidents. In particular, planners should look at what critical facilities (e.g., hospitals, utilities and treatment plants, broadcast stations, police and fire stations, emergency operating centers) lie within the vulnerable zones; they should also note what facilities house people with special evacuation needs (e.g., schools, prisons, hospitals and nursing homes). SARA Title III requires identification of facilities subject to additional risk due to their proximity to facilities that may release hazardous materials. Beyond the facility level, planners should consider the demographics of the population in the area (particularly with regard to age and language use) and the potential for property damage in the zone. They should also note the potential for contamination of drinking water supplies and other environmental consequences. The vulnerable facilities, bodies of water, and other features should also be shown on a vulnerability map.

**Assessing  
Risk**

Finally, planners will want to estimate the probability of incidents and the severity of their consequences, in order to focus preparedness and prevention efforts. Probability estimates may be simply qualitative (i.e., "low," "medium," or "high"); in any case they can be based on the historical record of releases and incidents, on general transportation accident statistics for roads (and for airports and railways), on fault tree analyses or hazard operability studies shared by facilities, as well as on professional opinion. SARA Title III requires the LEPC to identify facilities (e.g., for natural gas) that, due to their proximity to facilities that may release hazardous materials, may contribute to risk; these should be considered in assessing risk. Potential consequences may be estimated from case studies of the worst incidents involving particular hazardous materials.

**Hazardous Materials Unique Planning Considerations**

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This section contains a listing of the functional annexes that typically would require the preparation of a hazard-specific appendix for hazardous materials. It also identifies many of the unique and/or regulatory planning considerations that should be examined by the planning team and used, as appropriate, when preparing appendices specific to hazardous materials. Note that, whatever the HAZMAT planning provisions adopted by the jurisdiction, SARA Title III requires that HAZMAT emergency planning include training programs and schedules for response and medical personnel, as well as methods and

schedules for exercising the provisions.

**Direction and Control**

For this hazard, OSHA's Hazardous Waste Operations and Emergency Response Standard (29 CFR 1910) requires that *an* ICS be used for on-scene management of response activities. A description of ICS is provided in Attachment A to Chapter 5. SARA Title III requires a community's plan to include the designation of a community emergency coordinator and facility emergency coordinators, who shall make determinations necessary to implement the plan.

*Response Actions*

Response actions are triggered when the organization that is responsible for managing HAZMAT response operations is notified. Response is initiated when an incident or accident report is received from an operations center in a facility that stores, manufactures, or uses hazardous materials or when a police officer, fireman, or member of an emergency services organization is informed of an emergency situation involving HAZMAT. SARA Title III requires HAZMAT planning to address methods for determining the occurrence of a release and the area or population likely to be affected, procedures for timely notification of the community emergency coordinator by facility emergency coordinators, and methods and procedures to be followed in response to a release.

Therefore, provisions should be made, as appropriate, to describe the on-scene management structure and address the following planning considerations in one or more appendices to a direction and control annex:

- Identify and designate special technical experts (chemists, toxicologists, occupational health physicians, etc. to augment the response organization. Where appropriate, private sector response organizations (chemical manufacturers, commercial cleanup contractors, etc.) should be part of the response organization.
- Notify response organizations, public officials, and appropriate local and State organizations that are directly involved in the response.
  - From the initial incident report, disseminate as much information as possible.

- If possible, identify the hazardous material involved and the severity (degree of threat to people, property, environment, etc.) of the accident before exposing response personnel to possible health hazards.
  - For transportation accidents information sources include placards, container labels, cargo manifests, and shipping papers. These items provide initial information that can be checked against the *North American Emergency Response Guidebook*; shipping papers should also include an emergency contact number. Also, if the above information is not visible or available, an interview with the vehicle operator could provide the information needed.
  - For fixed facility accidents, this information should be readily available from the responsible party.
- Initiate a response to the situation in accordance with the jurisdiction's ICS concept of operations for responding to HAZMAT accidents. Critical actions to address include:
  - Upon arrival at the incident site, identifying the IC and notifying the EOC of the identity of the IC and the location of the ICP.
  - Ensuring response personnel have and don the appropriate protective gear (clothing and breathing apparatus).
  - Ensuring response personnel approach the incident site from upwind and obtain the following information, if not already known:
    - The time of the release.
    - The quantity released.

- Characteristics of the immediately endangered area (e.g., body of water or dense residential/commercial district nearby).
  - Color and odor of vapors (if readily noticeable), and any health effects noted.
  - Direction and height of any vapor cloud or plume (observed and computer-projected).
  - Weather and terrain conditions.
  - Entry of material into the environment (water, drains, soil).
  - Action already initiated by personnel at the scene.
- Ensuring unnecessary people at the site are moved away (in a crosswind direction) and denied entry. For transportation incidents, the *North American Emergency Response Guidebook* contains recommended initial isolation zone distances for substances with poisonous vapors that are not burning and additional instructions in case of fire.
  - Establishing a Protective Action Zone, if necessary. This is an area in which people can be assumed to be at risk of harmful exposure, and in need of either in-place protective shelter or evacuation.
  - Containing the hazardous material. For liquids, it may be necessary to use ditches or dikes to contain spread, so that removal may take place later. It also may be necessary to cover some materials with tarps to prevent vapors from rising.

*Additional  
Notifications*

Various Federal laws and regulations on hazardous materials require notifications from the responsible party (employer, transporter, facility manager)--not necessarily from local or State agencies. Local and State

agencies may establish their own reporting requirements as well. The following are typical notifications jurisdictions may be responsible for or interested in ensuring:

- *Chemical Releases.* Notification should be made to the National Response Center by the responsible party. Legal provisions also may exist for notification of specific State and local authorities.
  - *Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA).* For hazardous substances identified in the CERCLA list, a release that equals or exceeds the reportable quantity (as defined in 40 CFR 302) must be reported to the National Response Center.
  - *Emergency Planning and Community Right-to-Know Act (SARA Title III).* Releases of Extremely Hazardous Substances (under section 302 of the Act) or of CERCLA hazardous substances must be made known to the SERC and the LEPC's community emergency coordinator by the facility owner or operator. In a transportation accident, this requirement is satisfied by contacting 911 or, if 911 is unavailable, the local telephone operator.
  - *Clean Water Act.* For hazardous substances (as listed in 40 CFR 116.4) released into water in excess of reportable quantities (established in 40 CFR 117.3), dischargers must make an immediate report to the National Response Center. Notification must also be made to the Nuclear Regulatory Commission if radioactive material spilled in a waterway exceeds the reportable quantity.
- *General Transportation Accidents.* Notifications are as above. In addition, the *North American Emergency Response Guidebook* recommends contacting the Chemical Manufacturer's Association's Chemical Transportation Emergency Center (CHEMTREC) with initial requests for assistance.

- *Involving Radioactive Materials.* Typically, notification should be made to the State Department of Public Health so that detection and monitoring can take place. For incidents involving nuclear weapons, notification should be made to the nearest military base and to the Joint Nuclear Accident Coordinating Center (JNACC).
- *Involving Infectious (Etiological) Agents.* Local and/or State health departments should be notified. Officials in these departments have the responsibility for notifying the Emergency Response Coordinator for the CDC.

*Reentry to Areas Directly Affected by the HAZMAT Release*

Address the types of detection devices and systems that will be used to determine when a toxic cloud has cleared a particular area and if the concentration of the hazardous material in soils, drinking water, and sewage systems are at a safe enough level to permit return. Also address concerns such as:

- Control of access to the area until it is safe. Only those people directly involved in emergency response operations should be allowed to enter.
- Arrangements for ongoing site control, monitoring of the environment, and compliance with State and Federal regulations regarding disposal of the wastes.
- Protocol for determining the appropriate time to allow evacuees and the general public to re-enter the area.

*Decontamination and Cleanup*

Relevant actions to be addressed are:

- Establish "zones" for controlling contamination (hot zone, transition zone, and clean zone).
- Provide for handling and disposal of:
  - Contaminated soil, water, and other items that could not be adequately decontaminated.

- Contaminated clothing.

*Request for  
Federal  
Assistance*

If the situation exceeds the capability of the responsible State and local authorities, assistance can be obtained through the National Response Center. In accordance with the NCP, upon receiving notification, the National Response Center notifies the appropriate Federal On-Scene Coordinator (OSC), who monitors private and State actions, provides support and advice, and may intervene to direct operations in rare instances when the situation exceeds the capability of the responsible party or State and local government (or when the “responsible party” would be the Department of Defense (DOD) or DOE). Assistance may include support by the National Strike Force, including strike teams for oil spill response and a Public Information Assistance Team; Radiological Emergency Response Teams; salvage teams; scientific support coordinators; and other specialized resources.

For peacetime radiological emergencies, the Federal Radiological Emergency Response Plan (FRERP) provides a mechanism for DOE to dispatch Radiological Assistance Program (RAP) teams in response to a State request for monitoring assistance.

**Warning**

SARA Title III requires that HAZMAT emergency planning address procedures for timely notification to the public that a release has occurred; this depends on facilities making immediate notification to State and local authorities. HAZMAT accidents generally occur without warning, and the speed at which events develop and effects spread varies from incident to incident. For small-scale occurrences, public notification may be made door-to-door, through mobile public address systems, or with portable megaphones. For larger-scale occurrences, a jurisdiction-wide warning system should be used. The following considerations should be addressed, if appropriate, in an appendix to a warning annex:

- If used, description of and responsibility for activating a HAZMAT warning system and its mode of operation (how it is activated, where located, number of warning devices (sirens, horns, whistles, etc.) in the system.

- How **timely** warning information will be disseminated to the public, including immediate notification to local and State authorities.

**Emergency  
Public  
Information**

The flow of accurate and timely emergency information is critical to the protection of lives and property immediately following a HAZMAT release. This section deals with the provisions that should be included in the plan for the preparation and dissemination of notifications, updates, and instructional messages as a follow-up to initial warning. The following planning considerations should be addressed, if appropriate, in one or more appendices to an EPI annex:

- Informing the public of health hazards associated with the HAZMAT involved in the accident.
- Providing personal protective actions instructions, including:
  - Survival tips for people on what to do immediately after a HAZMAT release has occurred.
  - Instructions for in-place protection (when to stay, where to stay, and what to do) when that option is chosen.
  - Event-specific evacuation instructions and information (routes, road closures, available transportation) when that option is chosen.

Note that LEPCs also will be working toward ensuring that area residents are informed of risks in the area, of first aid measures and in-place protective actions they can take, and of what to do if an evacuation is ordered in response to a hazardous materials incident.

**Evacuation**

SARA Title III requires HAZMAT emergency planning to address evacuation, including provisions for a precautionary evacuation and alternative traffic routes. Hazardous materials evacuation planning is little different from evacuation planning in general. The most important difference is that initial movements should be crosswind. Another difference is that some transportation incidents

may involve "selective evacuation" of a small area. The IC's authority to order such an evacuation should be clarified in the appendix, and provision should be made for the necessary coordination with the jurisdiction's EOC.

The following planning considerations should be addressed, if appropriate, in one or more appendices to an evacuation annex:

- Maps that identify primary and alternate evacuation routes for risk zones around locations that present a significant threat to the public.
- Pickup points and government provided transport to move evacuees.
- Provisions for moving special needs population (residents of custodial facilities such as hospitals, jails, mental health facilities, nursing homes, retirement homes, etc.) in a HAZMAT situation.
- Tracking extent of evacuations ordered by the IC(s) during response operations.

Evacuation may not be always necessary or advisable: **In-place protection** may be the preferred option. For some chemical hazards, using wet towels and shutting off air circulation systems may suffice; sometimes the cloud may move past more quickly than the evacuation can be effected. Also, if the hazardous materials incident results from another hazard event (such as an earthquake or a flood), any protective action decision will have to factor in additional concerns. If appropriate, an appendix or tab should be prepared that outlines the criteria that will be used to determine when to rely on in-place protection instead of evacuation to protect the public at risk. The following concerns should be addressed:

- Health risks (respiratory and skin) associated with duration of exposure.
- Speed of onset and persistence of the HAZMAT.
- Use of barriers (overhead protection, closing windows and doors, seeking shelter in home basements, etc.) to reduce exposure.

- Mass Care** Any HAZMAT appendix to a mass care annex should address the location of shelters, to be upwind and/or out of range of the release. (In-place protective actions might be taken.)
- Health and Medical** The following planning considerations should be addressed, if appropriate, in one or more appendices to a health and medical annex:
- Provisions for keeping people informed of the health risks created by a HAZMAT release.
  - Designation of medical facilities that:
    - Have the capability to decontaminate and medically treat exposed persons.
    - Dispose of contaminated items (clothing, medical supplies, and other waste material).
  - Monitoring of water quality and sanitary conditions in the areas affected by the HAZMAT release.
  - Provisions for continued medical surveillance of personnel performing decontamination tasks (including radiological monitoring, if appropriate).
- Resource Management** SARA Title III requires HAZMAT emergency planning to include a description of emergency equipment and facilities in the community and at each facility in the community subject to Title III, along with identification of persons responsible for the equipment and facilities. The following planning considerations should be addressed, as appropriate, in one or more appendices to a resource management annex:
- Provisions for purchasing, stockpiling or otherwise obtaining essential HAZMAT response items such as spare or replacement protective gear for response personnel, detection devices and sampling equipment (for water, soil, etc.), decontamination supplies, etc.

- Provisions for identifying agencies and contractors that could be involved in cleanup operations and related tasks (including storage, cleaning, and reconditioning of response equipment and supplies).
- Resource lists that identify the quantity and location of the items mentioned in the first bullet, above, along with points of contact (day, night, and weekend).

## Attachment D Hurricane

### The Hazard

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#### **Nature of the Hazard**

The term "hurricane" describes a severe tropical cyclone and sustained winds of 74 miles per hour (mph) or greater that occurs along the Gulf or East Coasts, in the Caribbean, or in the Pacific along the west coasts of Mexico and California or near Hawaii. Tropical cyclones in other areas of the world will have different names (e.g., typhoon).

The hurricane season runs from the first of June until the end of November. Yet hurricanes have occurred in every month of the year.

#### *Hazard Agents*

The primary hazard agents associated with a hurricane are the high, sustained winds; flooding from storm surge or heavy rains; battering from heavy waves; and a variety of secondary hazards:

- *High Winds.* The high winds impose significant loads on structures, both direct wind pressure and drag, and tend to propel loose objects at high velocity.
- *Flooding.* The hurricane can cause many different types of flooding. Along the coast the flooding may occur from storm surge, wind-driven water in estuaries and rivers, or torrential rain. The flooding can be still water flooding or velocity flooding caused by wave action associated with wind driven water along the coast. The rainfall associated with a hurricane is on the order of 6 to 12 inches, with higher levels common. The rain may precede landfall by hours and may persist for many hours after landfall, causing severe flooding.
- *Heavy Waves.* The storm may generate waves up to 25 feet high. These can batter the coastline, causing devastating damage to the shoreline itself and to structures near the shore. The velocity of the water moving back and forth undermines the foundations of building and piers by removing the soil from around them. Debris driven inland by

the waves can cause severe structural damage;

persons exposed to the moving water and debris are likely to receive severe injuries.

- *Secondary Hazards.* Hurricanes can also cause numerous secondary hazards. Tornadoes and electric power outages are common. Contamination of water supplies, flooding of sewage treatment facilities, and even dam failure may occur.

*Estimating the  
Force of  
Hurricanes*

The Saffir-Simpson scale is a widely recognized and accepted practical tool planners rely on to estimate the destructive forces associated with hurricanes. This scale classifies hurricanes into five categories based on wind speed and describes the destructive forces caused by wind, storm surge, and wave action for each category. The categories are listed below.

<u>Hurricane Category</u>	<u>Wind Speed (mph)</u>
1	74-95
2	96-110
3	111-130
4	131-155
5	156+

A copy of the Saffir-Simpson scale is located at the end of this attachment, as Table 6-D-1. It should be used to obtain detailed information on each storm category.

**Risk Area**

To determine the risk area, each jurisdiction's planning team in the hurricane high-risk States should use the Hurricane Evacuation Technical Data Report, if available; FISs and FIRMs; and other local information sources such as maps and historical data on previous hurricanes and other storms that have caused injuries and/or loss of life, property damage, and disruption of essential services.

**Assessment  
of Risk**

A vulnerability assessment should be prepared. The assessment identifies the population, facilities, property, land area, etc. that are vulnerable to the hazard agents associated with a hurricane. The assessment provides the planning team

the essential data it needs to determine the **hurricane category** for which the jurisdiction should prepare. **It is vital that the team plan for the highest category of hurricane that is likely to strike the jurisdiction.** The assessment should:

- Include a narrative description that identifies the parts of the jurisdiction that are subject to flooding caused by a storm surge. Also, maps that pictorially display this information.
- Identify the population at risk.
- Identify essential services (fire, police, utility substations/plants, etc.) and special custodial facilities at risk (hospitals, nursing homes, jails and juvenile correction facilities, etc.).
- Identify government resources such as essential equipment, tools, stockpiles, vital records, etc., that may need to be moved to a safe location.
- Identify facilities that must be evacuated such as trailer parks, campgrounds, etc.

## **Hurricane Unique Planning Considerations**

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This section contains a listing of the functional annexes that typically would require the preparation of a hazard-specific appendix for hurricanes. It also identifies many of the unique and/or regulatory planning considerations that should be examined by the planning team and used, as appropriate, when preparing hurricane-specific appendices.

### **General: Response Schedule**

For this hazard a Hurricane Response Schedule is used in each of the hazard-specific appendices to describe the emergency response actions that should be accomplished when responding to a hurricane. The schedule establishes phases for the approaching hurricane, describes the activities to be completed during each phase, and sets the priority for the activities to be completed. Each phase covers a discrete period of time and details the specific actions that should be completed during the phase.

*Time Phases*

Usually, phases correspond to hours before the estimated time of arrival of gale/hurricane force winds, immediate response actions after landfall of hurricane force winds, through termination of all response activities. Typical phases include:

- *Awareness.* 72-60 hours before the arrival of gale force winds (32-63 mph).
- *Stand-by.* 60-48 hours before the arrival of gale force winds. It is likely that a tropical storm watch would be issued during this period.
- *Response.* 48 hours before arrival of gale force winds through termination of the emergency. Hurricane watches and warnings would be issued by the NWS during this period.

*Keying**Actions to  
Time Phases*

Each phase in the schedule:

- Describes actions to be taken in the phase.
- Identifies the official responsible for the action.
- Defines the hours needed before arrival of gale force winds to carry out the activity.
- Describes the priority of the action to be taken.
- Contains other critical information that tasked organizations need to perform their assigned responsibilities.

**Direction and  
Control**

Initial actions are started before the beginning of the awareness phase when it appears likely that a specific storm could threaten the jurisdiction. They continue through the response phase. Therefore, provisions should be made, as appropriate, to address the following planning considerations in one or more appendices to a direction and control annex:

- Determine when response organizations should:
  - Be placed on stand-by, partial activation, or full activation.

- Suspend or curtail day-to-day functions and services and focus on emergency response tasks.
- Ensure response organizations can continue to perform assigned operational tasks throughout all three phases ( e.g. secure, disperse, or relocate operations centers, vehicles, equipment, vital records, and other essential resources).
- Determine timing for taking action on the following critical concerns:
  - Alerting the public.
  - Closing schools and businesses.
  - Restricting access to the risk area.
  - Opening mass care facilities.
  - Ordering an evacuation.
- Assign specific tasking to each response organization for each phase. Critical concerns include:
  - Decision for and timing to:
    - Initiate coordination and implement mutual aid agreements with other jurisdictions.
    - Suspend non-emergency government services and operations.
    - Release non-emergency government employees from work.
  - Reporting status/observations to the EOC.

**Warning**

Since hurricanes are typically slow-moving storms, sufficient warning time will be available to allow those people at risk to evacuate and find a safe place to stay before the storm reaches land.

The following provisions for notifying the public should be addressed, if appropriate, in one or more appendices to a warning annex.

- Roles and responsibilities of government spokespersons during each phase.
- Coordination with the NWS and media representatives to ensure timely and consistent warning information is provided.

**Emergency  
Public  
Information**

This section deals with the provisions that should be made to prepare and disseminate notifications, updates, and instructional messages to follow up on the initial warning.

The following planning considerations should be addressed, if appropriate, in one or more appendices to an EPI annex:

- Instructions for preparing homes/businesses (inside and outside) to weather the storm.
- Hurricane-specific survival tips for those who choose not to evacuate (e.g., remember that the eye of the storm is not the end of the storm).
- Instructions on implementing any hurricane-specific provisions for evacuation (e.g., when and where to go).
- Locations of mass care facilities that have been opened.

**Evacuation**

Where available, hurricane evacuation studies conducted by the States, the U.S. Army Corps of Engineers, the National Hurricane Center, and FEMA should be used to obtain vital evacuation planning data. The information gained from such studies and the risk assessment should be used to develop the planning instructions that will be relied upon to carry out an evacuation for those people at risk. These planning instructions detail the time-phased actions to be taken to evacuate people and relocate, if practical, essential services, special custodial

facilities, and government resources from the risk area. All actions must be completed before the landfall arrival of gale force winds.

The following planning considerations should be addressed, if appropriate, in one or more appendices to an evacuation annex:

- Identifying specific evacuation zones. These zones delineate the natural and manmade geographic features of the areas(s) to be evacuated.
- Designating evacuation routes for each zone.
- Estimating the number of people requiring transportation support to evacuate the risk area.
- Specifying the clearance times needed to conduct a safe and timely evacuation under various hurricane threats. Consider the following complications that could impede or delay evacuation before finalizing the time-phased actions:
  - Heavy rains and localized flooding may slow traffic movement.
  - Bridge approaches may flood before evacuation can be completed.
  - Evacuees will need time to close up their homes and businesses, secure their boats, gather the essentials (medicines, food, clothing, etc.) to take with them, fill their vehicle with gas, etc.
  - Special custodial facility managers will need time to mobilize their staff, close up the facility, and make the necessary arrangements to move the resident population.
  - Traffic entering the evacuation zone to secure homes, businesses, boats, etc.
  - Evacuees from other jurisdictions passing through the zone and occupying the same evacuation route(s).

- The need for special modes of transportation (ferries and air transport) to evacuate people from barrier islands.

- Mass Care** The following planning considerations should be addressed, if appropriate, in one or more appendices to a mass care annex:
- Location of Mass Care Facilities* These safety considerations should be addressed:
- Ensure the facilities designated for use are located outside of the Category 4 storm surge inundation zone.
  - Ensure the facilities are located outside of the 100 or 500 year floodplain, as deemed appropriate.
  - Ensure the facilities are not vulnerable to flooding due to dams or reservoirs that overflow.
- Structural Survivability* Ensure each facility designated for use has been certified as capable of withstanding the wind loads specified by the American Society of Civil Engineers or the American National Standards Institute guidelines. If it is necessary to use uncertified facilities, ensure that a structural engineer knowledgeable of the criteria contained in the guidelines cited, identifies and ranks the facilities that offer the best protection available.
- Resource Management** The following planning considerations should be addressed, if appropriate, in one or more appendices to a resource management annex:
- Provisions for purchasing, stockpiling, or otherwise obtaining essential hurricane response items such as ice machines, water purification systems, polyethylene sheeting, sand bags, fill, pumps (of the right size and type, with necessary fuel, etc.), generators, light sets, etc.
  - Resource lists that identify the quantity and location of the items mentioned above, as well as points of contact (day, night, and weekend) for obtaining them.

## Attachment E

# Lethal Unitary Chemical Agents and Munitions

Public Law 99-145, Section 1412, directs DOD to dispose of the lethal unitary chemical agents and munitions stored at eight Army installations within the continental United States. After an exhaustive study comparing the alternative disposal strategies, the Army issued a Final Programmatic Environmental Impact Statement (FPEIS) for the Chemical Stockpile Disposal Program (January 1988) recommending on-post incineration at each site. In the February 1988 Record of Decision (ROD), the Army committed to establishing an emergency response program as a means of mitigating accidents during storage and for disposal operations.

In August 1988, the Army and FEMA signed a Memorandum of Understanding (MOU) identifying the specific responsibilities of the Army and FEMA, defining areas of each agency's expertise, and outlining where cooperation between the two agencies would result in a more efficient use of personnel and material resources. These obligations were integrated into a program called CSEPP. The Army has overall responsibility for developing on-post preparedness plans, upgrading on-post response capabilities, conducting on-post training and has the lead for technical research, post-incident cleanup standards and data automation activity. FEMA is responsible for working with State and local governments in developing off-post preparedness plans, upgrading off-post response capabilities, and conducting off-post training.

*The chemicals weapons depots affect ten States and their emergency planners. However, chemical munitions, many still containing chemical agents, have been found in old dump sites, current and former military installations, old industrial sites, and at spurious unappreciated non-stockpile locations throughout the United States. It is possible that State and local planners could be contacted by the Army or FEMA to prepare short-term operations plans to address these situations. The information which follows should be helpful in responding to emergencies caused by these non-stockpile munitions.*

## The Hazard

### Nature of the Hazard

The chemical agents of primary concern to CSEPP are the nerve agents GA, GB and VX, and the vesicant (blister) agents H, HT and HD. The chemical and physical properties of these agents have a direct bearing on emergency planning and response because they determine the agents' volatility, behavior in fires, and persistence in the environment. All of the agents are liquids at normal indoor temperatures, although most sulfur mustards (H and HD) freeze at ambient temperatures below 55 to 59° F. In the unlikely event of fires or

explosions, on-post personnel and the off-post general public also could be exposed to agent combustion products as well as uncombusted agents.

The agents GA, GB, and VX are rapidly acting, lethal nerve agents and are toxic as liquids and vapors. The vesicant agents injure the eyes, damage the lungs and severely blister the skin upon exposure. The vesicants often react with tissue constituents, and there is significant evidence that exposure to sufficiently high doses may increase the risk of developing cancer. The vesicant agents are potent in minute quantities and can produce delayed effects as late as 24 hours after contact.

In pure form, the nerve agents are usually odorless, colorless (agent VX may be pale amber), and tasteless. GA and GB are nonpersistent nerve agents which primarily present a vapor hazard. The vapors from these agents would be the primary cause of casualties since they can be carried downwind quickly. Under most release and meteorological conditions GA and GB produce the greatest downwind hazard distance when compared to other agents in the stockpile. VX is not very volatile, so it presents much less vapor hazard than GA and GB; however, it is 100 times more toxic by the percutaneous route. In practical terms, a toxic dose of VX is more likely to result from skin rather than respiratory exposure; however, all nerve agents are sufficiently volatile to pose an inhalation hazard. At agent concentrations of 30 mg/m<sup>3</sup> or greater, median lethal inhalation doses can be attained in a few minutes.

The chemical agents are stored in three basic configurations: (1) projectiles, cartridges, mines, and rockets containing propellant and/or explosive components; (2) aircraft-delivered munitions that do not contain explosive components; and (3) steel one-ton containers. Most of the stockpile (61%) is in this third form. All of the agents are at least 20 years old; some are more than 40 years old.

### **Risk Area**

The stockpiled agents are stored in chemical exclusion at eight U. S. Department of Army installations within the continental United States (all percentage figures are based on weight): Tooele Army Depot (TEAD), Utah (42.3% of the total stockpile); Pine Bluff Arsenal (PBA), Arkansas (12.0%); Umatilla Depot Activity (UMDA), Oregon (11.6%); Pueblo Depot Activity (PUDA), Colorado (9.9%); Anniston Army Depot (ANAD), Alabama (7.1%); Aberdeen Proving Ground (APG), Maryland (5.0%); Newport Army

Ammunition Plant (NAAP), Indiana (3.9%); and Blue Grass Army Depot (BGAD), Kentucky (1.6%). The remaining 6.6% of the stockpile is located on Johnston Island in the Pacific Ocean.

For CSEPP, the EPZ concept involves three concentric zones, reflecting the differing response requirements associated with a fast-breaking chemical event with limited time for warning and response. The innermost planning zone is the immediate response zone (IRZ), the middle zone is the protective action zone (PAZ), and the outermost zone is the precautionary zone (PZ).

Emergency response plans must reflect the fact that a release of chemical agent will affect different areas in different ways and at different times. Areas near the point of release are likely to experience relatively high concentrations of agent very quickly, while areas farther away are likely to experience lower agent concentrations after a longer period of time.

Prompt and effective response is most critical in the IRZ because it would be the first affected by an accidental release of chemical agent and would likely receive the heaviest agent concentrations. This zone encompasses an area requiring less than one-hour response time when affected by an agent release under "typical" weather conditions. The IRZ boundary ranges from 10 to 15 km (6 to 9 miles) from the potential chemical event source, depending on the stockpile location on-post. For these reasons, emergency response plans developed for the IRZ must provide for the most rapid and effective protective actions possible.

The PAZ is an area that extends beyond the IRZ to approximately 16 to 50 km (10 to 30 miles) from the stockpile location. The PAZ is that area where public protective actions may still be necessary in case of an accidental release of chemical agent, but where the available warning and response time is such that most people could evacuate. The primary emergency response is evacuation because it is anticipated that there will be sufficient time to permit an orderly and complete evacuation. However, other responses (e.g., sheltering) may be appropriate for institutions and special populations that could not evacuate within the available time.

The PZ is the outermost portion of the EPZ and extends from the PAZ outer

boundary to a distance where the risk of adverse impacts to humans is negligible. Because of the increased warning and response time available for implementation of response actions in the PZ, detailed local emergency planning is not required, although consequence management planning may be appropriate.

## **CSEPP Planning Considerations**

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The *CSEPP Planning Guidance Document* provides information to be used in preparing emergency plans that cover the most important aspects of CSEPP.

Developed jointly by FEMA and the Army, the CSEPP Planning Guidance serves three principal purposes in the CSEPP:

- To promote the development of a comprehensive emergency response capability at each chemical agent stockpile location by providing guidance and direction to assist State, local, and Army installation planners in formulating, coordinating, and maintaining effective emergency response plans;
- To ensure that critical planning decisions are made consistently at all eight chemical agent stockpile locations by establishing a single adequate and systematic framework for emergency response planning related to the CSEPP; and
- To provide a basis for assessing the adequacy of emergency preparedness planning as a part of the evaluation of proposals for Federal assistance.

The CSEPP Planning Guidance does not contain all of the information and detailed technical criteria that will eventually be required for comprehensive emergency plans and resource programs at the eight stockpile locations. Additional location-specific and programmatic technical guidance is available in a number of technical studies, either completed or ongoing.

The CSEPP planning process involves a number of important tasks: identify the planning team; identify sources of technical and administrative support for the planning team; review existing plans to determine their status, to prevent

overlap, and to eliminate inconsistency; analyze local hazards, determine risk, and assess vulnerability; evaluate response capabilities and resources; upgrade existing plans or develop new plans and procedures; and develop an ongoing program for plan implementation, maintenance, training, and exercises.

**Direction and Control**

The following are direction and control concerns associated with this particular hazard and the CSEPP.

*Chemical Event Assessment*

Chemical event assessment involves determining the type and nature of an incident or accident and its potential or actual impact. Assessment is both initial and extended. Initial assessment (conducted by installation personnel) primarily involves activities such as analysis and monitoring; agent identification and classification; dispersion modeling and dose projection; and conversion of assessment information to emergency response considerations. Extended monitoring activities will be determined by the nature of the accident and release.

*Emergency Notification and Event Levels*

Army and local officials must identify the type and detail of information that the installation must communicate to the off-post authorities to assist the latter in deciding upon protective actions. Such information includes, but is not limited to, name of communicator; verification number (if commercial telephone is used) or authenticator; time of notification; emergency level; time of event; brief description of event; projected areas of impact; meteorological data; and a recommendation for the implementation of protective actions. Transmission of a hard copy of this information should follow as soon as possible. There are significant benefits in a standard emergency assessment and notification system at each Army installation. Four event levels have been established in CSEPP, with increasing degrees of impact: Non-Surety Emergency; Limited Area Emergency; Post Only Emergency; and Community Emergency. The Army installation will notify the designated off-post point(s) of contact of the actual or likely occurrence, its chemical event emergency notification level, and the recommended protective action within 5 minutes from initial detection of an actual or likely chemical agent release at APG, ANAD, BGAD, NAAP, and PBA, and within 10 minutes from initial detection of an actual or likely release at PUDA, TEAD, and UMDA.

*Emergency*

Because the chemical agent stockpile is under Federal jurisdiction, the National

*Operations  
Plan*

Contingency Plan delegates the responsibility for on-scene coordination to the DOD. Therefore, the Federal OSC will be an Army representative. If the release of a chemical agent results in the declaration of Federal emergency or disaster, FEMA also will be involved through its Federal Coordinating Officer (FCO). Each jurisdiction's command and control procedures should include consideration of the relationship between the OSC and the civilian emergency management structure.

In this context, each jurisdiction must identify the organizational structure it will use to respond to a chemical agent release. Key components of the structure include:

- The individual (and alternates) with authority to provide central management of the community's emergency response.
- Other parties that will support the management function by providing advice and information.
- The response forces and other resources available to respond to the emergency (including those under direct control of the jurisdiction as well as those to be obtained from other governments or from private sources).
- The organizational framework that will be used to coordinate the input of all parties to ensure an effective and comprehensive response to the emergency.

*Emergency  
Operations  
Center*

An EOC developed under the CSEPP should provide a command and control center for potential emergencies related to the storage and disposal of the chemical agent stockpile as well as for other potential emergencies identified in the community's hazard assessment. An effective EOC consists of the combination of physical facilities, equipment, personnel, and procedures that enables the jurisdiction to apply its resources efficiently and effectively to respond to an emergency situation. Detailed guidelines for staffing, organization, and operation of the EOC are presented in the CSEPP Planning Guidance.

*Emergency  
Worker  
Operations*

CSEPP takes a two-pronged approach to advancing the safety of civilian emergency response personnel. First, no civilian workers will be intentionally placed in positions where they will encounter chemical agent during the performance of their duties. Second, workers who may incidentally encounter chemical agent while performing their duties will be provided with appropriate protective clothing, equipment, and training.

Under these guidelines, civilian responders will not enter any area where chemical agent is known or suspected to be present while the release of agent is ongoing. While the release is in progress, civilian emergency workers may perform duties (such as traffic and access control and emergency medical services) outside the known/suspected hazard area. After the release has stopped and chemical agent monitoring has confirmed that agent concentrations are within the range for which the protective clothing and equipment provide protection, civilian responders may enter the hazard area to perform necessary duties such as search and rescue and accompanying off-site Army monitoring personnel. All personnel whose duties during or after the release may bring them into contact with chemical agent will be required to use protective clothing and equipment specified in these guidelines.

*Automation*

Automated systems can provide important assistance in performing many of the planning and response functions in CSEPP. The quickness with which a chemical agent release could affect on-post and off-post populations argues strongly in favor of using automated tools to help perform complex analyses during planning and to manage the deployment of personnel and resources during response. State and local jurisdictions are strongly encouraged to make maximum use of automation tools being developed for CSEPP.

**Communications**

Reliable communication systems ensure the notification and subsequent information sharing can occur without delay. In CSEPP, at least two independent methods of simultaneous communications must be available to protect against the possibility of equipment failure. A communications network, consisting of redundant telephone and radio systems, should be designed and installed to link the Army installation EOC and notification point with the EOCs and notification points of all IRZ counties and the State(s). Regardless of whether the telephone or radio system is designated the primary method of communication, the other system must be provided to serve as a backup.

<b>Warning</b>	<p>The objectives of the public alert and notification system (ANS) are:</p> <ul style="list-style-type: none"><li>➤ To alert essentially every person within the IRZ of an emergency that has the potential of causing harm to those persons.</li><li>➤ To notify essentially every affected person within the IRZ of appropriate protective actions.</li></ul> <p>The IRZ warning system must provide both an alerting signal and instructional message within 8 minutes from the time a decision has been made that the public is in danger. To achieve rapid notification, CSEPP endorses the concept of a dual indoor-outdoor warning system.</p>
<i>Outdoor Systems</i>	<p>Only omnidirectional electronic sirens with voice message capability are acceptable as the primary outdoor alerting and notification devices for CSEPP. The network of siren/voice units is configured so that the alert signals and notification messages received in each area of the IRZ are of sufficient volume to be heard distinctly above ambient noise levels in the area. Community characteristic descriptions, with their associated sound pressure level requirements, are identified in the CSEPP Planning Guidance.</p>
<i>Indoor Systems</i>	<p>An acceptable indoor alert and notification device must be reliable and not be easily disabled. CSEPP supports several options: tone alert receivers, NOAA Specific Area Message Encoder (SAME) receivers, and EAS-capable receivers. Two supporting technologies to augment the receivers include simultaneous telephone activations and interruption of cable television programming for special announcements.</p>
<i>PAZ</i>	<p>Alert and notification for the population in the PAZ is provided by a system designed for specific applications such as population centers and institutions, coupled with electronic media, EAS broadcasts, and route alerting. Public alert and notification system requirements within the PAZ should be viewed as transitioning between the exacting requirements for the IRZ to basically no requirements for the PZ.</p>
<b>Emergency Public Information</b>	<p>CSEPP encourages an aggressive public education and information campaign as an essential ingredient of an effective emergency preparedness program. The pre-emergency public education program raises public awareness of the hazards associated with the chemical agent stockpile and advises citizens of</p>

actions they can take, both before and during an emergency, to reduce risks to themselves and their property. Public education also informs individuals of the progress of Chemical Stockpile and Chemical Demilitarization activities as they relate to emergency preparedness. The emergency public information program identifies the information that will need to be communicated to the public in the event of a chemical agent release and a strategy for disseminating this information rapidly.

CSEPP endorses the use of a single JIC as the most efficient method for gathering, coordinating and disseminating emergency information. Each jurisdiction will develop agreements and procedures, in cooperation with all affected local jurisdictions, State emergency management officials, and the Army installation, that will be followed to ensure the coordinated release of information during an emergency. A related task for JIC personnel is the control of rumors.

**Evacuation  
and In-Place  
Sheltering**

The basic protective action choices are evacuation and four types of shelter-in-place including normal shelter-in-place, and sheltering improved by expedient measures, permanent enhancements, or pressurization.

*Protective  
Action  
Decision-  
Making*

The protective action decision process consists of these steps:

- Identifying the situations under which evacuation would not be appropriate.
- Determining what action provides the best protection when evacuation is inappropriate.
- Evaluating the situation at the time of an emergency to determine whether evacuation or the alternative action should be implemented.

To ensure quick and appropriate emergency response, the first two steps are determined during emergency planning along with a process designed for accomplishing the third step.

*Protective  
Action  
Decision Table*

Emergency planners analyze the interaction of accident categories, as defined by the EPG (Emergency Planning Guide), and population characteristics to identify the protective actions that would be appropriate for different segments of the population under different accident categories. The results of this analysis are

classified into a set of protective action strategies. Each strategy lists the protective action recommended for the population of each area and for each special population and institution under a given set of release and meteorological conditions. Each protective action strategy is concisely summarized in table form.

*Evacuation  
Planning  
Requirements*

CSEPP requires planners to identify the optimum evacuation strategy for each area of the EPZ and all special populations (including any on-post personnel) for which evacuation has been identified as a possible protective action by using a quantitative evacuation time study. This includes an analysis of:

- The number of people and vehicles to be evacuated compared with capacities of the roadways that can be used for the evacuation.
- The number and location of people without access to automobiles compared with the supply of mass transportation vehicles that can be made available.
- The number and location of persons with special evacuation needs (e.g., the disabled) compared with the availability of personnel and vehicles with the capability to meet those needs.

*In-Place  
Sheltering  
Planning  
Requirements*

Communities are required to develop a detailed sheltering-in-place plan for each of the four sheltering strategies. The plan will identify all structures to be used as shelters and will describe the program the jurisdiction will pursue to implement the given strategy in these structures. The plan will determine the resources necessary to implement the protection strategy in all affected structures and present a checklist of actions that inspectors will consider for reducing infiltration in each structure.

The community will develop the capabilities to, assign responsibilities for, and ensure the availability of resources to:

- Notify people in appropriate areas to implement expedient shelter-in-place.

- Determine (in consultation with the Army installation) when the shelters should be abandoned.
- Advise people in selected areas to abandon their shelters without risking the inappropriate abandonment of shelters in other areas.
- Ensure prompt evacuation of all people who have been advised to leave their shelters.

*Access  
Control*

Access control points (ACP) will be pre-designated to allow the immediate dispatch of personnel and commitment of resources. Access control for a chemical event affecting off-post areas also will be necessary if the Army creates a National Defense Area (NDA) off the installation. Off-post law enforcement officials may be needed to assist on-post security personnel in this event. The creation of an NDA permits the Army to use military forces to effectively control non-Federal lands or areas when necessary for reasons of national security.

**Evacuee Support**

The two primary components of an evacuee support system in CSEPP are reception and mass care. Reception is the process of receiving and registering evacuees, determining their needs (i.e., medical, housing, family reunification, etc.) and assigning them to appropriate resources. Mass care includes providing shelter, food, family reunification, limited medical care, and social services for evacuees. Reception and mass care facilities may be collocated when a small number of evacuees are involved. Separate reception and mass-care facilities are appropriate in a larger-scale evacuation.

**Health and Medical**

Health and medical concerns associated with the hazard and CSEPP include the following:

*Decontamination*

Decontamination is an integral part of the treatment of people contaminated with chemical agent. This must be done quickly following exposure. Regardless of the type of chemical agent involved, personal decontamination can be performed by flushing undiluted household bleach on all contaminated areas (except the face) and rinsing off with lukewarm, soapy water. This can be done by the individual who is contaminated, another person or by a decontamination team. CSEPP stresses the importance of self- and buddy-decontamination because of the critical time factors in performing this task.

*CDC Medical Guidelines*

The CDC of the U.S. Department of Health and Human Services have prepared recommendations for medical preparedness for CSEPP civilian communities and have published these recommendations in the Federal Register (60 FR 33308, June 27, 1995).



**Resource  
Management**

A chemical agent event is an unusual emergency requiring certain special response and resource allocations not normally associated with more common emergencies such as floods, windstorms, or some hazardous materials accidents. For this reason, planning for resource coordination and allocation becomes especially critical and should be coordinated with respect to planning zones and their related protective actions.

Critical to implementing the resource management components of the EOP in CSEPP are the automation systems. The objectives of the CSEPP automation system are to:

- Store, manage, and access databases to support planning efforts.
- Interface databases with analytical planning tools and models.
- Provide automation support for daily, weekly, monthly, and yearly planning tasks (e.g., reporting, scenario development, training, exercise planning).
- Organize emergency plan concepts and standard operating procedures.
- Provide rapid access to information and pre-authorized implementation procedures to support command and control and protective action decisions.
- Facilitate effective communication and alert/notification.
- Track and log events.
- Provide a means of effectively managing emergency response resources.

## Attachment F

### Radiological Hazards

Radiological materials have many uses and serve a very important purpose in our country. Some of their most common uses include:

- Use by doctors to detect and treat serious diseases.
- Use by educational institutions and companies for research.
- Use by the military to power large ships and submarines.
- Use by companies in the manufacture of products.
- Use as a critical base material to help produce the commercial electrical power that is generated by a nuclear power plant.
- Use as one of the critical components in nuclear weapons, which are relied upon to help deter the threat of war.

Under extreme circumstances an accident or intentional explosion involving radiological materials can cause very serious problems. Consequences may include death, severe health risks to the public, damage to the environment, and extraordinary loss of, or damage to, property.

This attachment focuses on the unique and regulatory planning requirements associated with the two radiological hazard threats that pose the most significant risks to a community:

- An accident at a nuclear power plant, and
- Nuclear conflict with one or more nations that may be hostile to the United States.

The description of the hazard and both radiological and direct weapons (blast, fire) effects in Tab 2 to this attachment apply also to the threat of nuclear terrorism. That is, the same effects and consequences would be associated with the "intentional" detonation of a nuclear device or weapon by a terrorist group seeking to maximize the blast, fire, and radiological effects.

Planning for response to transportation accidents that involve the accidental spread or release of

radiological waste materials is addressed in the Attachment C, Hazardous Materials. See also FEMA-REP-5, *Guidance for Developing State, Tribal, and Local Response Planning and Preparedness for Transportation Accidents*.

## Tab 1 to Attachment F

### Nuclear Power Plant Accident

Given the regulatory considerations associated with planning for response to a nuclear power plant accident, it is essential that NUREG-0654/FEMA-REP-1, Rev. 1, its supplements, and FEMA Guidance Memoranda be used as the primary source documents for addressing the planning needs associated with this hazard. The information in this attachment complements the planning guidance cited above and is intended to help facilitate the identification of the necessary planning considerations that should be addressed if the jurisdiction chooses to include this hazard in its all-hazard EOP.

#### **The Hazard**

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**Nature of the Hazard**

Radioactive materials are produced in the operation of nuclear reactors. The accidental release of these materials into the atmosphere can harm people and damage the environment.

**Risk Area**

The risk area associated with accidents at a fixed commercial nuclear power reactor is divided into two specific geographic areas called EPZs. EPZs define the areas for which planning is needed to ensure prompt and effective actions are taken to protect the health and safety of the public if an accident occurs. Although in theory an EPZ is a circle centered on the power plant, the size and actual shape of each EPZ will be determined by the characteristics of a particular site (e.g., topography, identifiable landmarks, etc.).

The plume exposure pathway (10-mile EPZ) includes everything within approximately a 10-mile radius of the power plant. Human health and safety risks associated with it include: whole body injury from exposure to gamma radiation; and thyroid, lung, and possibly other organ injury from inhalation of radioactive materials.

The ingestion exposure pathway (50-mile EPZ) includes everything within approximately a 50-mile radius of the power plant. Human health and safety risks associated with it include whole body and thyroid injury from ingestion of radiologically contaminated water and food.

Environmental concerns associated with both EPZs include contamination of:

- People.
- The water supply.
- The crops and feed that people, domesticated animals, and wildlife consume.
- The livestock and milk or milk products that people consume.
- The areas people occupy (i.e. where they work, live, play, etc.).

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## **Nuclear Power Plant Accident Unique Planning Considerations**

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This section contains a listing of the functional annexes that typically would require the preparation of a hazard-specific appendix for nuclear power plant accidents. It also identifies many of the unique and regulatory planning considerations that should be examined by the planning team and addressed, as appropriate, when preparing nuclear power plant accident hazard-specific appendices.

### **Direction and Control**

For this hazard, four emergency classification levels (ECL) have been established. These ECLs describe the specific emergency actions that must be accomplished by the licensee and off-site emergency response organizations. As the emergency situation escalates from a small on-site problem to an emergency with off-site implications, each of the emergency classification levels provides for a gradual expansion of response actions as the situation warrants. The four levels are: 1) Notification of Unusual Event, 2) Alert, 3) Site Area Emergency, and 4) General Emergency, this last being the most severe.

Jurisdictions located in the 10- and 50-mile EPZs should include in their EOPs the appropriate tasking for response organizations to accomplish the response actions required by each of the emergency classification and action levels. When more than one jurisdiction is located in the same EPZ it is necessary for the jurisdictions to work together to sort out the response tasking each jurisdiction will perform.

The State is responsible for specifying the protective measures for the public and response personnel for both the plume exposure and ingestion pathway EPZs.

Provisions should be made, as appropriate, to address the following planning considerations in one or more appendices to a direction and control annex:

- Describing the specific responsibilities assigned to the jurisdictional response organizations located in both EPZs. Typical tasks include:
  - Preparation of written agreements that specify the concept of operations and specify the response roles of Federal agencies and of State, local, and private sector response organizations located in the EPZ.
  - Provisions for sending a member from the emergency response organization to the licensee's near-site Emergency Operations Facility to serve as a liaison officer, if needed.
  - Requirement to:
    - Identify radiological laboratories that can be used to provide radiological monitoring and analyses services.
    - Identify nuclear and other facilities, organizations, and individuals that can provide resources or skills that can be relied upon to support the response effort.
    - Provide the personnel and equipment to perform off-site radiological monitoring.
    - Inspect, inventory, and operationally check radiological detection equipment and instruments at least once each calendar quarter and after each use.
    - Make rapid assessments of the actual or potential magnitude and locations of radiological hazards caused by a nuclear power plant accident.

- Quantify the dose rate and the gross radioactivity measurements for the isotopes specified in NUREG-0654/FEMA REP-1, Rev.1, Table 3.
  - Make arrangements with State or Federal agencies to locate and track the airborne radioactive plume.
- *Tasking applicable to jurisdictional response organizations located in the plume exposure pathway EPZ. Address:*
- Provisions to accomplish field monitoring.
  - The means that will be used to detect and measure radioiodine concentrations in the air (down to  $10^{-7}$  microcurie per cubic centimeter).
  - Provisions for determining the best protective options and measures (evacuation, sheltering, etc.) for the people in the risk area during emergency conditions.
  - Provisions for traffic management and control of access to the affected area.
  - Post-event actions to be taken by emergency response personnel, as soon as environmental conditions and safety considerations permit. These include:
    - Provisions for relaxing the protective measures that have been implemented.
    - Means to be used for determining the appropriate time to allow evacuees and the general public to leave mass care facilities (if used) and return to their homes.
- *Tasking applicable to the jurisdictional response organizations located in the ingestion pathway EPZ. Normally, the State*

emergency management organization will be primarily responsible for the response planning required for this EPZ. An appendix to the State or local EOP (as appropriate) must address the provisions that have been made:

- To detect contamination.
  - For implementing procedures that will protect the public and prevent them from consuming contaminated foodstuffs. Protective actions may include impoundment, decontamination, processing, weathering, and product replacement/substitution.
  - To prepare maps that can be used to record survey and monitoring information applicable to farm crops, livestock, soil samples, dairies, food processing plants, water sheds, water supply intake and treatment plants, and reservoirs. The maps must include all of the activities cited above that are located in the 50-mile EPZ.
- *Requests for Federal assistance.* In order to accurately quantify the potential long term health and environmental consequences of an accident, sophisticated monitoring equipment and scientific analytical techniques are needed. Such equipment and technical expertise usually are not maintained by State and local governments. Accordingly, provisions for requesting Federal agency resources (those available through the FRERP) to meet this need should be included in a tab to the hazard-specific appendix.

### **Communications**

Provisions must be made to ensure the State and local EOCs have a communications link with the nuclear facility and the facility's near-site Emergency Operations Facility, if manned.

### **Warning**

The nuclear facility licensee is responsible for notifying off-site local and State government response organizations in those jurisdictions that may be affected when an emergency occurs.

The following jurisdictional responsibilities for planning should be addressed in one or more appendices to a warning annex:

*Public  
Warning*

Warning of the public is a critical function related to this hazard. The public must be given timely instructions with regard to the specific protective actions to be taken. These instructions should describe the area(s) affected and address evacuation, sheltering in place, etc., as appropriate to the situation and time available. Further, the means chosen to accomplish the warning must ensure public health and safety.

*Adjacent  
Jurisdictions,  
State(s), and  
the Federal  
Government*

Provisions should be made for notifying and coordinating with every jurisdiction and level of government located within the 10- and 50-mile EPZs. Also, local jurisdictions should contact their State EOC to confirm that they have been notified by the licensee. The State EOC should alert the FEMA Regional Office.

**Emergency  
Public  
Information**

This section deals with the provisions made to prepare and disseminate notifications, updates, and instructional messages to follow up on the initial warning information passed to the public located within the plume exposure pathway.

The following planning considerations should be examined and addressed in one or more appendices to an EPI annex:

- The procedures and means that will be relied upon to notify and warn the public (including residential, custodial, and transient populations).
- Instructions for the immediate protective actions to take (e.g., close windows and doors, stay indoors, shut off the heating and cooling system, etc.).
- Evacuation instructions for evacuees (what to take, what to do about pets and livestock, when to leave, evacuation routes, etc.).
- Locations of mass care facilities (also called "congregate care" facilities) and associated reception centers.

**Evacuation**

The jurisdictions located in the plume exposure pathway should use the

population information gained from the risk assessment as a starting point to develop the planning that will be relied upon to carry out an evacuation of people at risk. The range of time between the onset of accident conditions and the start of a major release of radiological materials into the atmosphere may range from a few minutes to several hours, and may affect what protective action needs to be taken. Once a release has started, it may continue for several days. Critical to the evacuation decision are the type of radiological hazard that is threatening the public, conditions at the power plant, time available to implement an evacuation, and the protective measures called for in the State's plan. In all cases the protective actions taken must be consistent with the EPA protective action guide regarding human exposure to the passage of a radioactive airborne plume.

The following planning considerations should be addressed, as appropriate, in one or more appendices to an evacuation annex:

- Identifying specific evacuation zones. These zones delineate the natural and manmade geographic features and boundaries of the risk area(s) to be evacuated.
- Preparing maps that show the specific evacuation routes for each zone, identify the preselected radiological sampling and monitoring points, and show the location of mass (or "congregate") care facilities that may be used to shelter evacuees.
- Maps showing the population distribution around the nuclear facility.
- Provisions for protecting the population residing in a health care or police custodial facility, or are otherwise confined and who cannot be evacuated.
- Coordinating with adjacent jurisdictions and facilities located outside of the boundaries of the plume exposure pathway EPZ to facilitate evacuation.
- Provisions for contacting the sight- and hearing-impaired.

**Mass Care**

The following planning considerations should be addressed, as appropriate, in

one or more appendices to a mass care (or "congregate care," as it is also called in radiological emergency planning) annex:

- Ensure facilities designated for use by the evacuated public are located at least 5 miles, and preferably 10 miles beyond the boundaries of the plume exposure pathway EPZ.
- Operate reception centers to monitor, decontaminate, and register evacuees, and to monitor/decontaminate their vehicles and possessions.
- Ensure a sufficient number of facilities are available to meet the anticipated demand for shelter.
- If facilities are to be located outside of the jurisdiction's boundaries, coordinate with the adjacent jurisdiction(s) to arrange space for evacuees.
- Ensure those responsible for monitoring and decontamination have the necessary equipment and are familiar with procedures for accomplishing these tasks.
- When and as appropriate, identify sites for provision of mass care services to include:
  - Distribution of food, water, ice, clothing, etc.
  - First aid/medical treatment, if needed.
  - Temporary housing, if needed.

**Health and  
Medical**

The following planning considerations should be addressed, as appropriate, in one or more appendices to a health and medical annex:

- Provisions for determining the exposure risks and dispersal of radiological contamination.

- Identification of medical facilities capable of receiving injured people who are contaminated.
- Provisions to estimate the amount of exposure the population in the risk area has received.
- Provisions/procedures for determining when it would be appropriate to obtain (from the State Health Department) and administer radioprotective drugs to emergency workers and individuals (e.g. institutionalized people) who were not able to get out of the plume exposure pathway risk area, as well as the general population. These procedures must address the conditions under which these drugs would be administered and identify who will be responsible for making the decision for the use of radioprotective drugs.
- Provisions for emergency personnel:
  - To determine, record, and maintain the daily and accumulated dose they receive.
  - To receive self-reading dosimeters and permanent record devices.
- Guidelines for authorizing workers to incur radiation exposure in excess of limits established by the EPA.
- Provisions to radiologically decontaminate workers, equipment, and supplies.
- Provisions for disposal of contaminated items (clothing, medical supplies, and other waste items).
- Provisions for the medical treatment and ongoing medical evaluation of victims and workers that have been exposed to radiological hazards.

**Resource Management**

The following planning considerations should be addressed, as appropriate, in one or more appendices to a resource management annex:

- Ensure radiological survey instruments and direct-reading dosimeters that can be used to detect and measure gamma radiation are available and that members of the mass care facility management team can operate them.
- Prepare resource lists that identify the type, quantity, and location of radiological equipment by category (protective equipment, monitoring equipment, and decontamination supplies) maintained by the jurisdiction.

## Tab 2 to Attachment F

### Nuclear Conflict

#### The Hazard

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##### **Nature of the Hazard**

The possibility of a nuclear conflict involving the United States is extremely remote. Our nation's relationships with the foreign governments that possess nuclear weapons remain fluid. The scope of the nuclear conflict threat can vary from a single accidental launch or detonation by terrorists to a large scale strike against the United States.

Nuclear radiation is the major effect that is unique to nuclear weapons. The other effects differ from conventional weapons only in degree. A brief description of the weapons effects that are of concern to the planner follows.

##### *Nuclear Radiation Effects*

About half of the energy produced in the detonation of a nuclear weapon results from nuclear fission, a process in which radioactive substances are produced. When detonations occur on or near the earth's surface, the debris produced by the explosion becomes radioactive. Much of this debris is carried high into the atmosphere by the rising fireball. After the debris cools, it subsequently falls back to earth in the form of particles commonly called "fallout." The radiation emitted from these particles is called gamma radiation. The health consequences of exposure to gamma radiation include:

- *Radiation sickness.* The immediate consequence of human exposure to gamma radiation is called radiation sickness. The effects may occur within hours or days following exposure. Depending on the amount and duration of exposure, health problems range from nausea, fatigue, vomiting, diarrhea, loss of hair, hemorrhages, infections, to death.
- *Somatic effects.* Radiation injuries that may occur months to years after exposure are categorized as somatic effects. They include sterility or reduced fertility, leukemia, and other forms of cancer.

##### *Direct Weapons*

The energy released by a nuclear detonation alters the environment in several ways. In the immediate area of the detonation, the main effects are due to the

*Effects*

blast wave, thermal pulse, and electromagnetic pulse.

- *Blast wave.* The force of wind caused by the blast wave destroys or damages structures and other objects. It propels and spreads the debris that is created by the explosion. Deaths and injuries result from people being thrown about or struck by the things that were turned into projectiles or missiles by the force of the wind associated with the explosion.
- *Thermal pulse (heat flash).* The thermal pulse ignites exposed combustible materials, causing many fires. People in the open may be severely burned by the heat from the detonation.
- *Electromagnetic Pulse.* When the radiation energy generated by a high altitude (60 miles and above) nuclear detonation interacts with the earth's atmosphere it produces low frequency electromagnetic waves. These waves are referred to as the EMP. When EMP interacts with the electric and electronic equipment components of radio and television systems, the resulting "energy surge" can cause severe damage. EMP is not a threat to most people. Only those who rely on an electrically driven life support system (e.g., pacemaker) are at risk.

**Risk Area**

The end of the cold war and collapse of the military alliance between the Soviet Union and its allies have significantly diminished the possibility of a massive coordinated attack on the United States. Control of a significant portion of the former Soviet Union's nuclear arsenal is in the hands of several independent nations. These nations now chart their own foreign policy and are not obligated to support any military action in which the new "Russia" may become involved. There are now upwards of twenty nations that may possess the capability to use nuclear weapons. However, it is unlikely that any one of them possesses or controls a large enough stockpile of weapons to carry out the kind of massive attack on the United States that was previously envisioned.

Under the current international climate, it is unlikely that an **organized** attack on the United States would occur. However, if an attack did occur, areas potentially at risk might include:

- Military installations that **directly** support our nation's nuclear retaliatory capabilities. Such installations may include intercontinental ballistic missile launch facilities, bases that house fixed wing bombers, and those that are involved in command and control of offensive nuclear weapons.
- Large, densely populated metropolitan areas that play a significant role in support of the nation's governmental or financial management activities.

## **Nuclear Conflict Unique Planning Considerations**

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This section contains a listing of the functional annexes that typically would require the preparation of a nuclear conflict hazard-specific appendix. It also identifies many of the unique planning considerations that should be examined by the planning team and addressed, as appropriate, when preparing nuclear conflict hazard-specific appendices.

### **Direction and Control**

For this hazard it is vital for emergency response personnel to be able to detect and quantify the location and amount of gamma radiation present in the jurisdiction.

Provisions should be made, as appropriate, to address the following planning considerations in one or more appendices to a direction and control annex:

- Coordinating, when appropriate (during an international crisis, U.S. military intervention overseas, etc.) with the next level of government to obtain essential information concerning:
  - Intelligence estimate of the intent of adversary nations that possess weapons of mass destruction.
  - Appropriate increased readiness actions to take and the timing for their implementation.
- Ensuring that personnel with expertise in dealing with hazards associated with the nuclear conflict threat are assigned to work in the EOC.

Typical tasks may include:

- Advising decision makers on the scope of the radiological hazards.
- Determining when it would be appropriate to distribute radiological instruments to emergency response organizations and mass care facility management teams.
- Disseminating essential radiological information to emergency response personnel and shelter management teams.
- Analyzing radiological information reported by emergency response teams and facility managers. Then:
  - Determine the relevant exposure data of shelter occupants and personnel performing emergency response duties and ensure that this information is tracked and recorded.
  - Implement a procedure that would limit the exposure of personnel performing emergency response duties.
  - Ensure facilities and areas that must be inhabited or used by humans are monitored and decontaminated, if appropriate.
  - Ensure facilities and areas that are unsafe for human use are identified.
  - Ensure people remain sheltered (in their mass care facility or risk area shelter) until the gamma radiation hazard has passed.
  - Determine the appropriate time to allow evacuees and the general public to leave mass care facilities

**Warning**

Warning of the public is a critical function related to this hazard. Lead time is necessary to make the arrangements needed to ensure the people that are located in risk areas evacuate or seek shelter. Approximately 48 or more hours may be needed to carry out the necessary actions to ensure the public is protected from this hazard. The following planning considerations should be addressed, if appropriate, in one or more appendices to a warning annex:

- Coordination with the next level of government, when appropriate, (during international crisis, U. S. military intervention overseas, etc.) to obtain information concerning the appropriate time to disseminate warning.
- Use of a jurisdiction-wide warning system to disseminate timely warning to the public and members of the emergency response organization.

**Emergency  
Public  
Information**

A nuclear conflict appendix to an EPI annex should address survival tips for people living in jurisdictions vulnerable to nuclear effects who choose to shelter themselves in their homes.

**Evacuation**

Evacuation is the primary protective action option that should be used to protect people from this hazard. The information gained from the risk assessment should be used to develop the planning instructions that will be relied upon to carry out an evacuation of those people at risk to direct weapons effects. These planning instructions detail the time-phased actions to be taken to evacuate people and relocate, if practical, essential services, special custodial facilities, and government resources from the risk area. All actions must be completed before a nuclear detonation occurs. For this reason, a nuclear conflict appendix to the evacuation annex should address the clearance times needed to conduct a safe and timely evacuation of the population at risk.

Since a jurisdiction cannot guarantee that it will receive warning in time to evacuate fully, provisions should be made for **relocation within the risk area** of the public at risk in situations where the warning comes too late to permit evacuation. The following needs should be addressed:

- *Facilities.* Provisions should be made to:

- Identify the facilities in the risk area that:
    - Offer the best protection available.
    - Can be used to house large numbers of people.
  - Use tabs to reflect key information (protection factor, capacity, cooking, sleeping, water, medical, recreational capabilities, telephone numbers, point of contact for access, etc.) associated with each facility.
- *Special Equipment.* Provisions should be made to:
- Move radiac meters and dosimeters (that can be used to detect and measure gamma radiation) to those facilities selected for use as shelters within the risk area.
  - Ensure members of the facility management team can operate available radiological detection and decontamination equipment.
  - Ensure that mass care facility management team members are assigned to work at any shelter facility to be opened within the risk area, if their facility is not scheduled to be opened.
- *Decontamination.* Ensure members of each facility management team are familiar with procedures for decontaminating people and the shelter.

**Mass Care**

The following planning considerations should be addressed, if appropriate, in one or more appendices to a mass care annex:

- Ensure facilities designated for use are located outside of the area vulnerable to direct weapons effects.
- Tabs should be used to reflect key information (protection factor, capacity, cooking, sleeping, water, medical, recreational capabilities, telephone numbers, point of contact for access, etc.) associated with

each facility.

- If facilities are located outside of the jurisdiction's boundaries, coordinate with the adjacent jurisdiction(s) to arrange space for evacuees.
- Identify mass care facilities suitable for housing custodial care groups.
- Ensure the facilities designated for use provide protection from gamma radiation to shelter occupants.
- Ensure provisions have been made regarding necessary special equipment:
  - Move radiac meters and dosimeters (that can be used to detect and measure gamma radiation) to those mass care facilities that have been selected for opening.
  - Ensure members of the facility management team can operate available radiological detection and decontamination equipment.
- Ensure members of each mass care facility management team are familiar with procedures for decontaminating people and the facility.

### **Health and Medical**

The following planning considerations should be addressed, if appropriate, in one or more appendices to a health and medical annex:

- Provisions for determining the levels of radiation exposure of exposed people.
- Designation of facilities that:
  - Have the capability to decontaminate and medically treat people exposed to radiation.

- Dispose of contaminated items (clothing, medical supplies, and other waste items).
- Provisions for continued medical surveillance of personnel performing essential operational tasks.

**Resource  
Management**

The following planning considerations should be addressed, if appropriate, in one or more appendices to a resource management annex:

- Provisions for purchasing, stockpiling, or otherwise obtaining essential gamma radiation detection devices for use in shelters within the risk area and in mass care facilities.
- Provisions for purchasing, stockpiling, or otherwise obtaining the essential stocks (food, water, medical, etc.) needed to support an extended stay (3-14 days) in shelters within the risk area or in mass care facilities.

# Attachment G

## Terrorism

TO BE DEVELOPED

## Attachment H Tornado

### **The Hazard**

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#### **Nature of the Hazard**

A tornado consists of violent whirling wind accompanied by a funnel-shaped cloud. Usually, tornadoes are associated with severe weather conditions such as thunderstorms and hurricanes. Tornadoes are very destructive. The average width of a tornado is 300 to 500 yards. Their path may extend up to fifty miles, and the funnel cloud moves at speeds between 10 and 50 mph. The wind speed within the funnel cloud has been estimated at between 100 and 500 mph. Roughly two percent of all tornadoes are "violent" tornadoes, with wind speeds of 300 mph or more, an average path width of 425 yards, and an average path length of 26 miles. Tornado season runs from March to August in the United States, with peak activity from April to June; however, tornadoes can occur year-round.

#### **Risk Area**

Tornadoes have occurred in every State. Historically, they have been most frequent in Texas, Oklahoma, Florida, Kansas, Nebraska, Iowa, South Dakota, Illinois, Missouri, Mississippi, Louisiana, Colorado, Wisconsin, Arkansas, Georgia, North Dakota, Minnesota, Indiana, and Michigan. More than 50 percent of the land mass in the United States is within the area of significant tornado risk.

### **Tornado Unique Planning Considerations**

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This section contains a listing of the functional annexes that typically would require the preparation of a hazard-specific appendix for tornadoes. It also identifies many of the unique planning considerations that should be examined by the planning team and used, as appropriate, when preparing tornado-specific appendices.

#### **Direction and Control**

For this hazard it is essential for emergency response personnel to take immediate action, as soon as conditions permit, to gather initial damage assessment information in the area that was impacted by the tornado. This information is needed to determine the severity and extent of injuries and

damages.

High-risk jurisdictions may want to use a network of trained spotters. This spotting network would be relied on to rapidly communicate information that can be helpful to the appropriate authorities responsible for making the decision for when to upgrade from a Tornado Watch to Tornado Warning. The network can also assist in tracking the tornado's path.

This data gathering effort should provide much of the information decision makers will need to implement and prioritize response actions for: search and rescue activities; access control and re-entry to the impacted area; debris clearance; restoration of utilities and lifeline repairs; and the inspection, condemnation, and/or demolition of buildings and other structures.

Provisions should be made, as appropriate, to address the following planning considerations in one or more appendices to a direction and control annex:

<i>Damage Assessment</i>	Conduct of immediate ground and air surveys to determine the extent of damage, casualties, and the status of key facilities.
<i>Search and Rescue</i>	Use of damage assessment information to identify the facilities and areas where search and rescue operations may need to be conducted and to establish a priority for conduct of these operations. Planning should focus on the actions that need to be carried out in order to remove trapped and injured persons from homes, buildings collapses, and other structural collapses, administer first aid, and assist in transporting the seriously injured to medical facilities.
<i>Access Control and Re-entry</i>	Control of access to the area severely affected by the tornado until the area is safe. Only those directly involved in emergency response operations should be allowed to enter.
<i>Debris Clearance</i>	<p>Actions taken to identify, remove, and dispose of rubble, wreckage, and other material which block or hamper the performance of emergency response functions. Activities may include:</p> <ul style="list-style-type: none"> <li>➤ Demolition and other actions to clear obstructed roads.</li> </ul>

- Repairing or temporarily reinforcing roads and bridges.
- Construction of emergency detours and access roads.

*Inspection,  
Condemnation  
, and  
Demolition*

Actions taken to inspect buildings and other structures to determine whether it is safe to inhabit or use them after a tornado has occurred. Activities may include:

Inspection of buildings and structures which are critical to emergency operations.

- Inspection of buildings and structures that may threaten public safety.
- Inspection of less critically damaged structures. Designate those that may be occupied and identify/mark those that are to be condemned.
- Arrangements for the demolition of condemned structures.

**Warning**

Warning of the public is critical for this hazard. The NWS will place areas under a Tornado Watch when conditions are particularly favorable for tornadoes and severe storms. NWS will issue a Tornado Warning when a tornado has been visually spotted or picked up on radar. Television, radio, and NOAA tone alert radio are sources of information for the public.

The following planning considerations should be addressed, if appropriate, in one or more appendices to a warning annex:

- Provision for the jurisdiction's central warning point to obtain timely Tornado Watch and Warning information (direct link to area weather stations, continuously monitor NWS and other sources, etc.).
- Provisions for notifying institutions and facilities (e.g., schools, hospitals, nursing homes, jails, prisons, shopping malls, major factories, and sporting events) that a Watch or Warning has been issued.

- Provisions for activating the jurisdiction-wide (if available) warning system to disseminate timely warning to the public and emergency response organization members that a tornado has touched down in the jurisdiction.

**Emergency  
Public  
Information**

The flow of accurate and timely emergency information is critical to the protection of lives and property. This section deals with the provisions made to prepare and disseminate notifications, updates, and instructional messages to follow up on the initial warning.

The following planning considerations should be addressed, if appropriate, in one or more appendices to an EPI annex:

- Survival tips for people on what to do during and immediately after a tornado. During a Tornado Watch information should be disseminated to the public on the appropriate protective actions to take if a Tornado Warning is issued (e.g., encourage people without underground shelter to seek out an interior room or hallway on the lowest floor and there to seek cover under something sturdy, like a table, etc.).
- Warnings and advice on the continuing threat of storms, unsafe areas, buildings and structures, and other hazards.

**Evacuation**

Evacuation is not a practical option for this hazard since the point of touchdown and the track of a tornado are unpredictable. The typical protective action option for a tornado is shelter-in-place.

**Mass Care**

A tornado-specific appendix is probably unnecessary, since the mass care functional annex should adequately address the immediate actions to be taken, as soon as conditions permit, in the area that was severely impacted by a tornado. Damaged houses may not be habitable; residents should be dissuaded from entering unsafe buildings and persuaded instead to seek temporary shelter.