

STATE OF OHIO EMERGENCY OPERATIONS PLAN



CATASTROPHIC INCIDENT RESPONSE ANNEX

TAB A – IMPROVISED NUCLEAR DEVICE RESPONSE PLAN

FACILITATING AGENCY

Ohio Emergency Management Agency

**OHIO EMERGENCY RESPONSE PLAN
CATASTROPHIC INCIDENT RESPONSE ANNEX**

Tab A – Improvised Nuclear Device Response Plan

FACILITATING

AGENCY: Ohio Emergency Management Agency (Ohio EMA)

SUPPORT AGENCIES: All Ohio Emergency Operations Plan partner agencies, as needed to support response operations.

I. INTRODUCTION

A. Purpose

1. The purpose of this plan is to provide state agencies guidance and response recommendations in the event of a nuclear detonation and to assist and coordinate with all levels of government and the private sector to achieve the following:
 - a. Save and sustain the maximum number of lives and minimize suffering.
 - b. Facilitate and support response force arrival and initial operations of, including protection and support of emergency workers entering the damaged areas.
 - c. Effectively communicate shelter-in place protection guidelines, assist in mass evacuation, and provide temporary housing/shelter.
 - d. Assist in the provision of search and rescue, medical triage, treatment, transport, evacuee care, mass casualty and fatality management.
 - e. Stabilize the impacted area, and restore critical infrastructure and essential services.
 - f. Set conditions for effective command, control and communications.

B. Scope

1. This plan only addresses the unique effects and impacts of a nuclear detonation, such as the scale of destruction, and the unique actions that state agencies should take. For terrorism investigation aspects refer to the Terrorism Incident Annex.
2. A nuclear detonation is different from a nuclear power plant release or other radiological incidents (e.g. Radiological Dispersal Device [RDD]). Although some

terminology and concepts are similar, the protective actions and effects are substantially different.

3. This plan is a tab under the Catastrophic Incident Response Annex. Support agencies should follow the response concepts identified in that annex as well as in the State EOP and its Emergency Support Functions (ESF).

C. Assumptions

1. The assumptions listed in this section are in addition to those listed in the Catastrophic Incident Response Annex.
2. An act of nuclear terrorism directed against a large metropolitan area will have major consequences that will overwhelm the capabilities of local, state, and federal governments to respond, and will seriously challenge existing response capabilities at all levels.
3. The magnitude and effects of a nuclear blast will surpass those of a chemical explosive bomb, but may not be immediately recognized as a radiological incident until the radioactive material is detected or the health effects of radiation exposure manifest.
4. An IND detonation will require responders and survivors to implement self-protective measures and to shelter in place to mitigate radiation contamination and exposure from initial fallout.
5. The capacity to communicate emergency alerts and public messages will be limited.
6. Not all areas with blast damage will be contaminated by fallout, and fallout will affect areas that are otherwise undamaged by the blast. Fallout may be visible as a sand or ash-like particulate.
7. Fallout will be driven by upper atmosphere winds, which can travel much faster than surface winds.
8. A zoned strategy employing existing all-hazard plans and response capabilities and support functions will provide the best structure to manage the response.
9. Utilities and infrastructure systems supporting communication, transportation, energy, water, petroleum and medical care will sustain significant damage from the initial blast and from cascading impacts.
10. Fuel availability may limit or delay the scope of operational response.
11. Private sector stakeholders will have a significant role in response and support operations.

12. Responders at all levels of government and the private sector will be impacted, injured, or killed. Capabilities and staffing requirement shortfalls will exist, or have a delayed response as governments and companies may ensure the safety and well-being of self, family, and the employment organization in unison with beginning response operations.
13. Local first responders that would normally be on scene within the first minutes of the incident could be directly impacted and may be unable to effectively respond. Those who are able to respond may be unable to adequately access the scene, make the determination of a radiological event, communicate with dispatch, or provide useful information to higher-level authorities.

II. CONCEPT OF OPERATIONS

A. Direction, Control, and Coordination

1. Local, state, and federal field response, direction and control will be a unified effort and will be managed by the Incident Commander, per ORC 3737.80.
2. Coordination and situational awareness is expected to be difficult in the first few days due to communications and infrastructure outages and to overwhelming resource needs.
3. As necessary or when requested, the Governor may make extraordinary command and control decisions on behalf of the local jurisdiction in order to save lives, protect property and the environment, and minimize economic impacts.
4. As outlined in the Catastrophic Incident Response Annex, a tiered response (affected, initial response, and support tiers) may be used, to include the use of incident management teams (IMTs) and state area coordination centers to maximize limited resources until the Unified Coordination Group is established.
5. In coordination with the unified area command (local incident command posts), State Emergency Operations Center (State EOC), and federal partners, state area coordination centers have the following responsibilities:
 - a. Develop broad objectives for the impacted area.
 - b. Establish area commands in accordance with the zoned response strategy.
 - c. Allocate or reallocate resources as priorities change.

- d. Ensure effective communications.
- e. Ensure that incident management objectives are met and do not conflict with each other or with agency policies.
- f. Identify critical resource needs and report them to the appropriate organizations.
- g. Ensure that short-term “emergency” recovery is coordinated to assist in the transition to full recovery operations.

B. Notification and Warning

- 1. Notification of an IND event to state agencies may be received through alternate channels, including the media and personal communications. Damage to communication infrastructure (blast and EMP effects) will prevent prompt and accurate reporting from the immediate area. The magnitude of the event will quickly generate a crush of reports that will overwhelm dispatchers across the region with information of questionable accuracy.
- 2. The magnitude of the event may cause delays in the assessment of the situation and its scope. Detection and measurement of radiation or radioactive contamination may take longer than usual. As soon as credible reports suggest that the event is a nuclear detonation, certain assumptions should be made in order to ensure life-saving local emergency public information is distributed in a timely fashion. The state will support local notification of the public through EAS messages and activation of the State EOC and one-or-more Joint Information Centers (JIC).

C. Protective Action Decisions

- a. Primary Protective Actions will be as follows:
 - i. Members of the Public - adequate, early sheltering followed by delayed, informed evacuation.
 - ii. Emergency Responders with Radiation Instruments - Initial sheltering, use instruments to monitor conditions, do not exit the shelter if it would result in entering a dangerous radiation zone
 - iii. Emergency Responders without Radiation Instruments - Shelter, until such time that they are directed to take other actions.
- b. Fallout will trigger the consideration of Protective Action Recommendations and Decisions up to hundreds of miles away.
- c. The use of protective actions should be justified to ensure that they produce more good than harm; in the aftermath of an incident, it not always be mandatory to intervene with protective actions.

- d. If the use of protective actions is justified, these actions should be optimized to select the best protective options under the prevailing circumstances.

D. Radiological Evaluation and Assessment

- a. Information and data for radiation readings, meteorological data, extent of damage, locations of fires, locations of spontaneous unrest, etc. will be difficult to obtain in the early stages of the incident. The distributed nature of responders in the community provides an excellent source for regional situational awareness to help establish affected areas and priority actions.
- b. The Radiological Assessment Branch as described in the ESF-10 plan will be activated. Protective actions may be distributed by the state due to the amount of damage and abilities of the locals to respond.
- c. As conditions change, the Radiological Assessment Branch will continue to monitor the situation and make revisions to boundaries and control measures as required.

E. Initial Shelter-in-Place Radius

1. A 50-mile radius from the detonation site should be used for an initial shelter recommendation (default action). Do not wait for predictive modeling or field measurements. As more information becomes available (from observations, modeling, or measurements) to indicate magnitude and direction of fallout, this recommendation will be modified as specifics become known and conditions warrant.

F. Sheltering and Evacuation Strategies

1. Shelter-in-Place Followed by Uninformed Evacuation: Individuals will immediately shelter-in-place to minimize exposure to fallout and evacuate 12-24 hours post deposition using standard established evacuation routes. This option is not recommended for implementation, however it is expected that some public may not have access to communications or follow protective action recommendations from government.
2. Shelter-in-Place Followed by Informed Evacuation: Individuals should immediately shelter-in-place to minimize exposure to fallout, then evacuate when better situational assessment indicates the hazard zones and safest evacuation directions. This is one strategy that will be communicated by government to the public.
3. Shelter-in-Place with Early Move to Better Shelter: Individuals should immediately shelter-in-place to avoid direct contamination during fallout deposition, but soon after the detonation transit to nearby, more effective (higher protection factor) shelters. General education to the public on sheltering techniques will be communicated by

government. Targeted recommendations may result in sheltering analysis based upon typical housing construction by neighborhoods.

4. Reducing immediate injuries and long-term risks from radiation exposure will require a “shelter first, analyze later” policy. Uncertainties in the device’s yield and in weather will make accurate predictions of affected areas in the critical moments after detonation difficult. It will be better to shelter those in a large area initially and then release parts of the area that are unaffected when additional information is available through observations or radiation measurements.
5. Extended Shelter-in-Place: Shelter-in-place for an extended period (1–3 days) to allow deposited radioactive material to decay to a safer level, hence reducing the dangers of potentially leaving through high level contamination. In some areas, the nature of the fallout will be different and the areas that comprise the Dangerous Fallout Zone will need additional recommendations provided by the government.

G. Sheltering Decisions

1. Shelter quality is a critical factor for determining decision time for evacuation. The better the shelter, the longer the time before action is required.
2. A shelter’s protection is described by its protection factor (PF), which is equal to the ratio of the outside radiation exposure to the inside radiation exposure. The higher the PF, the more protection from radiation a sheltered person receives, compared to an unsheltered person in the same area. Adequate protection, which protects occupants against acute radiation sickness, is defined as PF 10 or greater.

H. Decontamination

1. Decontamination needs will place additional constraints on responder resources.
2. At a minimum, initial/rudimentary/gross decontamination will consist of brushing off fallout from outer garments and washing off exposed skin to avoid beta burns. This action should be taken immediately on noticing fallout on the skin or clothing. Removing fallout before entering a shelter will be needed to avoid bringing contamination into the space and exposing others.
3. Effective decontamination from fallout requires removing clothes and showering. These actions must be accomplished as soon as practical to reduce radiation dose for anyone exposed to fallout.
4. Mass decontamination of large amounts of people may not be possible due to resource constraints, including providing large amounts of security to establish perimeters and checkpoints. Recommended solutions include sending people home to change clothes and shower if they do not live in an affected area, or to a designated alternate location

(school, gym, decontamination line, portable decontamination unit) that is providing decontamination services for citizens.

5. Decontamination of infrastructure should be limited to those locations that are absolutely necessary to use or occupy to accomplish lifesaving, including hospitals and other locations that are facilitating lifesaving actions. Decontamination of critical infrastructure should only be initiated after information has been confirmed regarding fallout area boundaries, current and projected dose rates, and the structural integrity of the elements being decontaminated.

I. Incident Response and Damage Zones

1. Focusing response actions by damage zones will increase the effectiveness of limited resources and manage risks to emergency workers. Rescuing survivors in contaminated areas will decrease the number of total rescues due to PPE dress out requirements. Rescues conducted in non-contaminated areas may be a better use of resources and time. Evaluation of rescue locations will need in-depth consideration by Incident Command. Available resources will dictate rescue tactics, which must remain flexible.
2. Damage zones are defined by the blast, which is measured by the overpressure expanding out in all directions from the detonation, and the dynamic pressure related to the wind generated by the passing pressure wave.
3. Damage zones are independent of radiation and fallout area boundaries, and will overlap with one another to various degrees over time.
4. Damage Zones represent the areas where damage is caused primarily by the explosive forces of the nuclear detonation, and they are independent of radioactive effects. Damage will be highly unpredictable due to the complex way shock waves bounce off structures, variance in building construction and age of materials. Damage Zones are not easily delineated, and will be established using observations on the ground by early response units and by aerial survey rather than precise distances. They will be established and will be used throughout the plan to aid in planning response actions, estimating needs, and planning logistical support.
5. The following incident response zones will be established to plan for and execute response operations:
 - a. The **Light Damage (LD) Zone** will contain mostly non-life-threatening injuries that are associated with flying glass, debris, and traffic accidents.
 - b. The **Moderate Damage (MD) Zone** will contain more severe injuries and complex technical rescues. This zone should be the focus of early life-saving operations, which will result in saving the greatest number of lives.

- c. The **Severe Damage (SD) Zone** will have a low survival rate. Response efforts within the SD zone are therefore at great risk and expense, with low benefit, and should not be attempted.
- d. **Dangerous Fallout (DF) Zone** response activities will be guided by the lethal radiation hazard; entry into this zone will not be advised.
- e. The **Hot Zone** is expected to grow in size so rapidly that initial access control into the area is not practical. However, entry must be thoroughly planned due to exposure rates, decontamination, and resource shortages previously discussed.
- f. The **Restricted Zone** will contain deposited fallout contamination areas that are expected to shrink after the detonation. Its boundaries will fluctuate and will be difficult to identify.
- g. The **Ingestion Zone** will have health concerns due to chronic radiation exposure and radiation doses delivered over a long period of time.

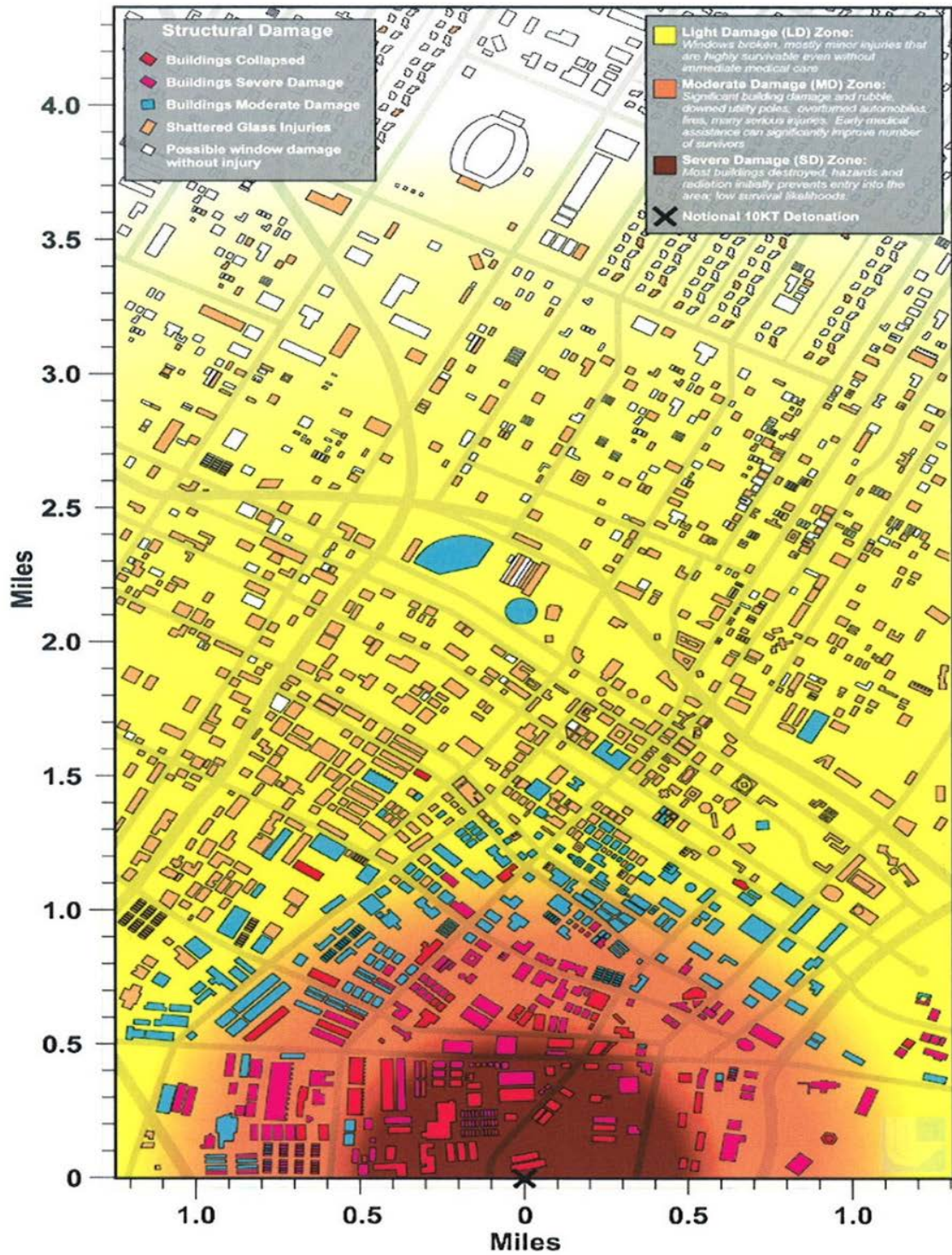


Fig. 1: Representative Damage Zones for a 10 KT Nuclear Explosion Overlaid onto a Typical Urban Environment.

J. General Considerations

Due to the unique hazards of a nuclear detonation, it is important that responders and state agencies understand the nuclear effects and dangers. Being prepared for this scenario will effectively prepare the state for a wide range of such incidents, from very low yield to larger than 10 KT events.

1. Nuclear Effects

There are five major impacts from a nuclear detonation:

- a. Blast-overpressure (blast wave) and dynamic pressure (high wind velocity)
- b. Thermal radiation- heat, spontaneous ignition fires, blindness from the light
- c. Electromagnetic pulse (EMP)- high-voltage surge damaging electronics
- d. Initial nuclear radiation (occurs with the blast)
- e. Residual radiation (fallout) and contamination

2. Electromagnetic Pulse (EMP) Impacts

- a. Nuclear detonations generate an electromagnetic field that produces a high-voltage surge that damages electronic components. For detonations at high altitudes, the damage area is very large. For detonations at a lower level to the ground, the understanding of EMP impacts are more difficult to estimate.
- b. Experts generally believe that the most severe damages from an EMP would not travel beyond two-to-five miles. Because the extent of the EMP effect is expected to occur relatively close to ground zero, other effects of the explosion (blast destruction) are expected to be greater than the potential EMP effect.
- c. Equipment brought in from unaffected areas should function normally. If communications towers and repeaters within impacted areas are destroyed, temporary mobile equipment could be brought in to replace it.
- d. Damages from EMPs can include:
 - i. Stalling of vehicles
 - ii. Destruction and/or disruption of communications equipment, cell towers, electrical components, computer equipment, control systems, water and electrical system control components, other electronic devices (e.g. phone, TV, radio).
 - iii. A phenomenon called source-region EMP may lead to conductance of electricity through conducting materials (e.g. pipes, wires), causing damage much further away.

3. Cascading Effects

- a. As a result of the effects of an IND blast and EMP, cascading effects may lead to other impacts. Often, these impacts will be connected to one another due to interdependencies within systems. The failure of one system may cause failures within others or limit response functions. Below are some examples:
 - i. Damage to energy infrastructure and systems – electricity, natural gas, petroleum, pipelines, solid fuel (coal), fuel (gas), rationing of resources.
 - ii. Damage or power failure to water infrastructure and systems – water and waste water treatment plants, limited drinking water and sewage system backups.

K. Public Health and Medical Services

General Public Health and Medical Services Concerns

1. All response efforts will be focused on achieving maximum survival rates through minimizing radiation exposure and threats to cascading effects. Even in zones where low radiation doses are observed, priority should be given to manage exposure rates to minimize cancer risk and long-term effects.
2. A lethal dose (LD₅₀) for untreated patients is approximately 300 rad, and refers to the radiation absorbed dose that would prove lethal to 50% of an exposed population without medical care.
3. If an untreated patient has compounding injuries (both radiation and traumatic injuries) the lethal dose may as low as 250 rad.
4. Responders subject to acute doses above about 150 rad will likely be unable to perform their jobs adequately and will be at risk of becoming a casualty themselves.
5. Appropriate medical care may increase one's chance for survival up to a dose of about 600 rad. Victims with doses over that amount are not expected to survive more than a few weeks to a few months.
6. These estimates are for healthy adults; individuals with other injuries and children will be at greater risk.

Radiation Treatment, Triage and Transport System (RTR)

7. Although triage algorithms exist for trauma, burns, and other events, there are no simple algorithms with which to make treatment decisions in a radiation mass casualty event. Despite existing mass-casualty medical event guidelines, the potential for excessive responder radiation dose, along with the destruction of infrastructure, will limit the ability of responders to reach and assist victims.
8. A functional response system can be developed during a catastrophic nuclear event to guide deployment of resources and to direct victims and responders to the most appropriate locations.
9. RTR sites will form spontaneously and will be determined during the course of the event. Due to the nature of fallout decay and changing resources, the establishment and movement of RTR sites will be spontaneous and fluid.

Medical Care Sites

10. Many local healthcare facilities will be off-line due to infrastructure damage, radiation, or simply overwhelmed by large numbers of casualties.
11. Victims requiring immediate medical care will be directed to Medical Care Sites that will be established and/or designated outside of damage or fallout/contamination zones.
12. Cleveland, Cincinnati, Detroit, Pittsburgh, Indianapolis, Chicago, and Buffalo Medical Care Sites will include hospitals, medical centers, and other health care facilities such as long-term care facilities, medical clinics, and alternate care facilities such as Federal Medical Stations.
13. Regional and national-level assets, such as Radiation Injury Treatment Network (RITN) sites (Cleveland, Cincinnati, Detroit, Pittsburgh, Indianapolis, Chicago, and Buffalo), cancer centers, burn centers, and trauma centers will be utilized.

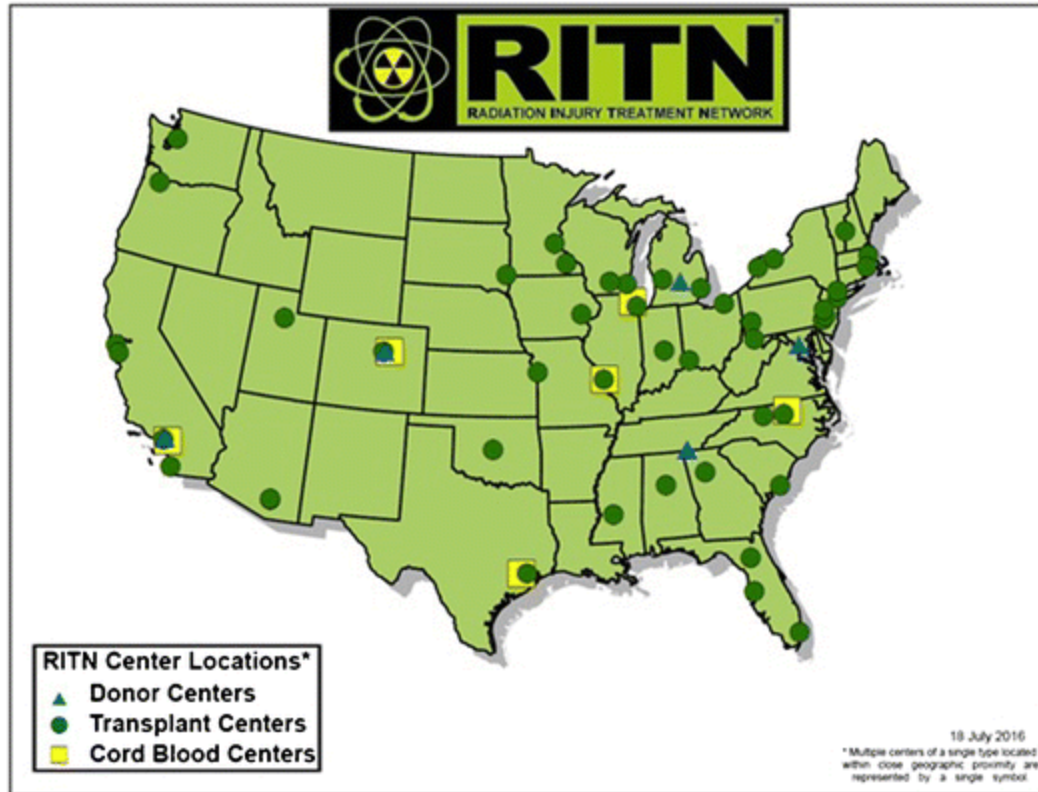


Fig. 2: Map of Radiation Injury Treatment Network sites.

Assembly Centers

14. Assembly Centers (AC) will be planned evacuee-receiving centers at natural collection points such as schools, public stadiums, convention centers, and highway rest stops; where evacuees can obtain food, temporary shelter, and register for evacuee tracking purposes. The purpose of an AC is not generally population monitoring or medical care, though they may be co-located with a medical care (MC) or Community Reception Center (CRC) site.

Evacuation Centers

15. Evacuation Centers (EC) are hubs for major victim and evacuee transport by land, rail, air, and water. These centers may also serve as marshaling areas for incoming supplies and personnel, in addition to transport for outgoing exposed/displaced persons.

Mass Casualties

16. Mass Casualties will include blast injuries, thermal radiation, eye injuries, and illness from radiation. Blast injuries caused by overpressure and dynamic pressure waves (wind) will cause the majority of casualties.
17. While most will survive the blast overpressure itself, many will not survive the high velocity winds, shrapnel/flying debris/glass, or crushing injuries from collapsed buildings.
18. Multiple wounds, blunt trauma, and deep lacerations to the extremities will make up 50% of all injuries; wounds to the thorax, abdomen, and head make up the remainder.
19. Lung and eardrum damage will be minor in comparison, however many will be fatal injuries in the SD and MD zones. The threshold for eardrum rupture is 5 psi, serious lung damage is 15 psi, and there is a 50% incidence of fatal lung damage at 50 psi.

Thermal Radiation

20. Thermal radiation from the thermal pulse will cause injuries ranging from direct skin exposure (flash burns or profile burns) to incineration.
21. Lethality will depend upon nuclear yield, altitude/location of blast (ground blast thermal effects are less than low-altitude blasts), line of sight with respect to the fireball, type of clothing worn, weather, environment, and how soon victims can receive medical care.
22. People within line of sight of the burst may be subject to burn injuries up to two miles away. Early treatment is essential to reducing mortality rates among severely burned victims.
23. Thermal radiation will also cause ignition of fires and flammable materials, especially in the MD zone. Burns from secondary fires are treatable following normal SOPs, but will be compounded by other injury mechanisms associated with the blast.
24. Eye Injuries from looking at the thermal flash can range from temporary flash blindness for several seconds to permanent blindness.

Acute Radiation Syndrome

25. Acute Radiation Syndrome (ARS) is a severe illness following a relatively predictable course, resultant to a large whole body radiation dose delivered over a short period of time. The syndrome has three overlapping sub-syndromes (stages) that are dose related, and can evolve quickly.

Mass Fatalities

26. Mass Fatalities will likely be attributable to Acute Radiation Syndrome (ARS). Lethal doses at the moment of detonation may be unavoidable, but exposure post-blast can be minimized through time, distance, and shielding.
27. Response efforts will be focused on achieving maximum survival rates through minimizing radiation exposure and by reducing threats from cascading events.

L. Ohio National Guard (OHNG) Support

1. As outlined in ESF-10, the OHNG, 52nd WMD-Civil Support Team (WMDCST), will provide technical assistance and identify CBRNE agents and substances, assess current and projected consequences, advise on response measures, and assist with appropriate requests for additional support. Within three hours of notification and mobilization the 52nd WND-CST will deploy to the area.
2. As outlined in ESF-10, the OHNG Homeland Response Force (HRF) provides timely life-saving capabilities and support to the Incident Commander within the first 48 hours of a CBRNE event. Support includes security, search and extraction, decontamination, and limited emergency medical triage/treatment and casualty assistance. Within six hours of notification and mobilization the HRF will deploy to the area.
 - i. Search and extraction capabilities are limited to walking teams locating survivors and executing basic extraction techniques until heavier equipment is brought in.
 - ii. The HRF provides security forces under the National Guard Response Force (NGRF) and Quick Reactions Force (QRF).
 - iii. The HRF is one of two standing HLS/HLD task Forces designated for an initial OHNG response to Terrorist and CBRNE incidents and can expand to provide mission command to subordinate units depending on the situation.
 - iv. When necessary the HRF can establish a regional Brigade and Battalion level command and control to synchronize all SAD/Title 32 CBRNE response forces including Civil Support Teams (CST), CBRNE Enhanced Response Force Packages (CERFP) and prepare for follow-on forces.

- v. While the HRF, CST and other DOD units have level C PPE, entering the hot zone is a capability although unlikely. The IC will determine the required level of response.
3. The Ohio National Guard activates the Joint Planning Group (JPG) which recommends Courses of Action (COA) for The Adjutant General (TAG). The developed COAs will focus on activation and deployment of forces. Additional force mobilization and use of the OHNG will be scaled based on the incident, required OHNG response and capabilities requested by the state or other agencies.
4. The State EOC should anticipate 24-hour window between alerted units and forces available for support in the event of a WMD/IND event.

III. ASSIGNMENTS OF RESPONSIBILITIES

Response actions in this plan will be as assigned in the State of Ohio's Emergency Operations Plan's elements. Actions that are unique to an IND response are identified below by Emergency Support Function (ESF).

A. ESF-1 – Transportation

1. Request temporary flight restrictions (TFR) over impacted and contaminated areas from the FAA, to exclude aviation missions that support search and rescue, medical, damage assessment, or other incident operations.
2. Support evacuation out of the light and moderate damage zones by utilizing established plans for contraflow, detours and Traffic Incident Management as needed.
3. Open and maintain command and control from all available Districts at ODOT's Departmental Operations Centers (DOC's) as well as with executive leadership at the Central Office DOC and the State EOC Executive Room.
4. ODOT resources and personnel do not have protective equipment or training to allow operations in any contaminated areas. ODOT can only work in non-contaminated zones that do not require PPE. Work in other zones would require training, PPE, and Union approval of classification change to radiation workers. Any employee can work in the Ingestion Zone as this is not a restricted or defined radiation area.
5. Coordinate infrastructure maintenance and repair at the local and district level.
6. Repair traffic signal damage due to the EMP affect and blast damage if possible. Temporary traffic control will be provided at the direction of ESF-13 and ESF-1.
7. As able, provide heavy equipment outside of contaminated areas.

8. As able, provide ground and water borne transportation into remote areas outside of contaminated areas.

B. ESF-2 – Communications and Information Technology

1. Assess telecommunications infrastructure equipment and systems and provide repair support coordination as able.
2. Communicate with Federal agencies regarding needs for communications infrastructure and equipment support.

C. ESF-3 – Engineering and Public Works

Emergency Debris Clearance

1. Access and provide radiological detection equipment to responders.
2. As able, deploy resources into the LDZ that does not have radiological contamination to clear rights of way and evacuation routes.
3. Evaluate the deployment of resources further into the MDZ based on radiological hazards to allow for search and rescue operations entry.

Public Water Supply (PWS)

4. Support to supply potable water to affected areas for survivors will be critical, especially in areas where decontamination operations and reception centers are established.

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Public Works

8. Assess critical infrastructure to determine the amount of damage and contamination. A cost benefit analysis will determine whether decontamination or replacement/relocation is more practical.
9. Water supplies will be affected by power outages and stored supplies may run out prior to power being re-established. Power is used for treatment and for pressurizing the system. Emergency generators will be constrained by fuel use.
 - i. Water towers connected to systems with pipe breakage may empty immediately.
 - ii. Isolation valves, if present, are manually operated or electronically controlled.
 - iii. Support to local jurisdictions will be critical to restore PWS operations and fuel allocations to water supply equipment must be considered.
10. Support to supply potable water to affected areas for survivors will be critical, especially in areas where decontamination operations and reception centers are established.

Waste Water Treatment

11. To prevent collateral health impacts, it will be important to restore and maintain sanitation and wastewater infrastructure.
12. Access to sanitary services for survivors will be critical, especially in areas where decontamination operations and reception centers are established.
13. Damage to sewage physical infrastructure is likely in the SD and, to lesser extent, MD zones. LD zones and other nearby areas may be inoperable due to power, supply line issues, and holding capacities.
14. Assessments will need to be conducted to determine what types of emergency treatment may be applicable for areas with destroyed sewage treatment facilities/lift stations that are otherwise habitable.

15. OEPA will coordinate the assessment and sampling of industrial and municipal waste water facilities.

D. ESF-4 – Firefighting

1. Local jurisdictions' response units within one or two miles from ground zero at the time of the nuclear explosion may be compromised or completely nonfunctional, while those more than five miles away are likely to be operational if not within the dangerous fallout zone.
2. All fire stations not affected by the blast but downwind and within 50 miles of the blast should shelter in place for at least 24 hours or until told it is safe to evacuate.
3. Some mutual aid jurisdictions will be directly affected by fallout and advised to shelter until dose rates have fallen. Response personnel should not enter lethal dose zones for any reason.
4. Most response capabilities will be provided through mutual aid by neighboring cities, counties, and states.
5. The Ohio Fire Chiefs' Association, Ohio Fire Service Emergency Response Plan will be activated to dispatch fire department mutual aid within the state. Accurate and timely information will be imperative to ensure coordination and best use of resources. The OFCA and the SFMs can provide staff to the SEOC and assist with coordination. Resources such as fuel, shelter, food, and decontamination will be needed to support the large number responding units and personnel.
6. Fire control will be important for the safety of those sheltered in hazardous areas. Several hundred fires can be expected within a few a miles of the detonation site, and coalescing fires, smoke plumes, and firestorms may develop.
7. Extinguishing fires near the detonation site may be impossible due to radiological exposure levels, damages from the blast, and collapsed structures blocking access.
8. In other areas' impacts to critical infrastructure, municipal water supply, a lack of water pressure, and the inability to move heavy equipment and personnel to the area will be a restricting factor.
9. Identify and access mutual aid firefighting resources from neighboring municipalities to assist and/or replace damaged and destroyed resources in impacted areas.
10. Activate the Ohio Fire Service Emergency Response Plan to dispatch fire department mutual aid within the state.

11. Identify and access needed fuel, shelter, food, and decontamination resources to support responding units and personnel.

E. ESF-5 – Information and Planning

1. Immediate information and planning (ESF-5) actions will focus on analyzing and sharing the projections of dangerous fallout downwind of the blast.
2. Upon suspicion that an incident was caused by an IND, ESF-5 will activate the Radiological Assessment Branch and make conservative, rough estimates on the areas in danger of fallout for distribution.
3. Plume and dose data will be analyzed and coordinated to provide the public with shelter and evacuation information.
4. ESF-5 will coordinate with federal and state entities with radiological assessment responsibilities to obtain the most accurate situational data available to guide incident planning and response.

Incident Evaluation

5. Incident evaluation factors will include ambient radiation levels, fallout data, infrastructure status, available resources, and environmental conditions (precipitation, winds) to aid hazard zone determination and guide informed evacuations.
6. Other critical information for evaluation will include:
 - i. Damage Zone Evaluation- building integrity, fires, debris distribution
 - ii. Infrastructure status- roads, gas lines, water, pipelines, and electrical service
 - iii. Vehicle accidents and road closures
7. Rapid and frequently updated situational assessment will be provided to guide responder rescue operations near hazard zones and for informing evacuation strategies for individuals within fallout areas.
8. State and local responders will bear the primary responsibility for development and execution of any plan during the first hours following a detonation. That planning will be based upon incident evaluation, to include field monitoring and damage/dose modeling.
9. Depending on the impacted areas, ESF-5 may coordinate the organization of the state's response into regions.
10. Activated Federal or state-level Task Forces will receive their overall direction through the State EOC.

F. ESF-6 – Mass Care

1. Some mass care response agencies will not allow workers in the hot zone and may need to develop additional guidance to protect workers exposed to contaminated survivors.
2. Mass care services in an IND incident will be subject to unique tactical changes based on the proximity of mass care service needs to the incident site (evacuation, triage, decontamination, transportation, shelter assignment, forward movement, etc.).
3. Support from national-level mass care agencies and other states will be needed and will be critical to effectively response to survivors' mass care needs.

Shelter-in-Place Recommendations

4. The initial population protection and life-saving action immediately following a nuclear explosion will be to order everyone within a certain distance of the incident site to immediately shelter-in-place in the nearest protective structure.
5. Population evacuation will not be considered until fallout zones and radiation dose rate information has been assessed by the State EOC Assessment Group.
6. The best time for individuals to leave the safety of a shelter (evacuate) will depend on several factors: the quality of the shelter, the levels of radiation around that shelter, and the feasibility of moving to greater safety quickly.

Evacuation and Mass Care Shelter Operations

7. Dose rate information will be publicly distributed so that survivors can make informed shelter and evacuation decisions.
8. Pre-identified mass care shelters that are outside of the impacted area will need to be utilized to accept self-evacuees and survivors.
9. The Mass Evacuation Support Plan will be activated to coordinate the movement of survivors away from the impacted area. Policy decisions will need to be developed for radiological protection and decontamination of survivors, evacuation workers, and transportation vehicles during evacuation operations.
10. Host cities, counties, and states will need to be identified and coordinated based upon location and proximity to damage and contamination zones, availability of resources, and status of transportation and infrastructure.
11. It may be necessary for evacuation operations to be accomplished in phases due to resource limitations.

12. There will be a need for security, radiological monitoring, and decontamination at various mass care facilities to protect survivors and mass care workers from exposure.

G. ESF-7 – Resource and Logistics Support

1. Tab B to the Catastrophic Incident Response Annex, the Catastrophic Resource Management Plan, addresses the management of resource support from all potential partners in response to catastrophic incidents.
2. An IND incident will require an extraordinary level of resources. State Staging Areas (SSA) located outside of the Hot Zone will be established to manage state-level resources
3. The amount of commodities requested may be increased by 25% or more over non-nuclear catastrophic incident requirements due to unique resources like monitoring and personal protective equipment, consumable supplies, etc.
4. Due to the nature of the incident, it is anticipated that there may be an issue obtaining transportation personnel to deliver supplies, especially to areas that have been contaminated. Supply delivery times could be increased by as much as four hours due to detours, roadblocks, etc.
5. Disruptions to communications may hinder delivery coordination.
6. Decontamination of equipment entering and leaving contaminated areas could add time to transportation missions. Damage to natural resources, land, waterways, and reduction in mining and extraction.
7. Damage to the food industry and resource chains, prompting food scarcities/rationing, affecting the agriculture and livestock industry, and impacting the national food supply.
8. Economic impacts of the attack, including price gouging/freezing, effects on markets, banks, businesses, and the tax base could impact the effectiveness of response operations.
9. Law Enforcement concerns such as looting, riots, curfews, and the need to declare martial law could impact response operations.
10. Limited availability of temporary housing and/or permanent housing construction manpower and supplies could impact population relocation operations.
11. Activate the Catastrophic Incident Response Annex to address the management of resource support from all potential partners.

12. Establish State Staging Areas (SSA) outside the hot zone to manage state resources.

H. ESF-8 – Public Health and Medical Services

1. Assist in the mobilization of medical response caches to appropriate areas to support trauma injuries, initiate treatment for mitigation of acute radiation syndrome, and to provide symptomatic treatment to affected people who are being prepared for evacuation.
2. Collect and assess information on the status of hospitals and medical care (MC) facilities that are equipped to handle medical surge in relation to damage zones using HHS's MedMap GIS system and Ohio's hospital bed count system, SurgeNet.
3. As needed, create a Medical Evacuation and Surge Task Force to assist with requests and coordinate mutual aid to local triage and medical centers.
4. Collect and assess information on local medical triage and assembly Centers (AC) that are activated in response to the event.

I. ESF-9 – Search and Rescue

1. Some search and rescue (S&R) teams in Ohio may be impacted by the event and be unable to respond. Teams outside the state will need to be utilized and requests for federal urban search and rescue (US&R) teams will be required.
2. Due to the fallout zones and prevailing wind direction, S&R teams west of Ohio are anticipated to be the first assets to arrive. US&R teams through EMAC would need to be used strategically and evaluated to operate in a radiological environment based on the teams' capability, training, equipment, sustainability.
3. Ohio Task Force One (OH-TF1) may not be able to constitute a full team. Members of OH-TF1 may be able to provide subject matter experts or liaisons to local jurisdictions and the SEOC, to assist with coordination and plan logistical support of teams in the field.
4. Before search and rescue operations can begin, teams will require situational awareness and confirmed monitoring of hazards in assignment areas. Initially, teams will be most efficiently and effectively used in the light damage zone that does not have radiological contamination due to entry access and safety concerns.
5. After entry conditions and field monitoring data becomes more certain, qualified teams with appropriate PPE will be able to work in the moderate damage zone following safety protocols and approval from incident commanders. Entry into any hot zone will be carefully considered and may not be the best use of resources.

6. Task forces consisting of search and rescue, emergency debris clearance, heavy equipment, and engineers from civilian, private sector, state, federal, and military assets may be established to work with local jurisdictions to assist clearing ingress routes and accessing the light and moderate damage zones.
7. All responding US&R forces will report to one incident support base outside the hazardous zones for validation of credentials, equipment and training. Daily support, coordination, safety briefings, and just in time training for working a radiological event will be provided.
8. Search and rescue resources will require force protection, including at incident support bases and teams operating in the field.
9. Search and rescue teams will primarily extract victims from the damaged areas. Medical and transportation coordination teams will be needed to provide triage and transport from pick-up-points.
10. Identify and access search and rescue teams from outside the state, including federal urban search and rescue teams.
11. Through the EMAC, engage search and rescue teams from west of Ohio to operate in radiological environments based on the teams' capability, training, equipment, sustainability.
12. Engage Ohio Task Force One (OH-TF1) to provide subject matter experts or liaisons to local jurisdictions and the State EOC, and to assist with coordinating the logistical support of teams in the field.
13. Provide ongoing situational awareness information to search and rescue teams regarding the monitoring of hazards in assignment areas, focusing on operations in lightly-damaged zones that do are not heavily radiologically contaminated.
14. Engage and employ task forces consisting of search and rescue, emergency debris clearance, heavy equipment, and engineers from civilian, private sector, state, federal, and military assets to work with local jurisdictions to assist clearing ingress routes into lightly- and moderately-damaged zones.
15. Coordinate search and rescue teams with medical and transportation coordination teams to provide triage and transport from pick-up-points.

J. ESF-10 – Oil, Gas and Hazardous Materials

1. Unique hazardous materials operational actions are outlined below and should be used in conjunction with portions of the State EOP, ESF-10.

2. OEPA is the primary agency and staffs the ESF-10 desk at the SEOC. Actions include coordinating and reporting on the missions assigned. ODH BRP is the lead agency and state authority for radiological actions and subject matter expertise. (Refer to the State EOP, ESF-10 for an outline of ESF-10 functions, organization of the Assessment Group, and missions supported by state agencies.)

Field Data Collection

3. State resources in conjunction with local and federal groups establish a network of “field monitors” who are practiced in compiling plume data, fallout data, and general area conditions.
4. First responders, who have radiation instruments and are initially sheltered, should begin reporting in-shelter radiation data as soon as communications have been established. Once initial boundaries begin to become apparent, outdoor readings may be made and reported along with any other observations.
5. Fire companies may be used to gather radiological information to establish zone boundaries and verify the status of un-affected areas (“counting zeros”). This function can be further augmented by OEPA, ODH, and OEMA Field Monitoring Teams.
6. During an IND event, field monitoring may extend beyond the expected information on radiation levels alone. Close coordination with ESF-5 and the Planning Section is necessary to share information and situational awareness.

K. ESF-11 – Agriculture

1. The Animal Disease Incident Plan, Tab A to ESF-11, may be activated to assess and respond to the radiological impact on animals; and the Ohio National Veterinary Stockpile Plan, Tab B to [ESF-11](#), may be activated to provide supplies, equipment, disposal and decontamination support of animals.
2. ODA will provide logistical support response personnel in the field in the Ingestion Zone and non-contaminated areas.
3. ODA will assist in the determination of the need for, and provide guidance for, the disposal of contaminated food, plants, or animals.
4. ODA will support state and local emergency management agencies by identifying approved sources of food, bottled water, and feed from outside of the contaminated area.
5. ODA will establish and maintain food and agricultural safety response communication systems and coordinate the provision of timely and accurate

emergency public information through the State Joint Information Center. This includes issuing embargo and quarantine orders as needed, including the quarantine of animals determined or suspected to be contaminated with radioactive material.

L. ESF-12 – Energy and Utilities

1. Due to significant EMP and blast damages, power infrastructure may be affected, and in some areas may need to be repaired or completely rebuilt. Subject matter experts will be needed to assess damages to utility infrastructure at each facility to determine if generators could be used. Long-term power outages will be an issue, perhaps for months or years. Cascading effects may cause areas far outside the damage zones to be impacted, making otherwise habitable areas difficult to live in.
2. ESF-3 will need to develop a generator task force to respond to requests for generators. A limited amount of generator requests can be filled by state agencies such as ODNR, ODOT, DOC, OHNG, and Ohio EMA. The remaining requests will be routed to ESF-7 for procurement or rental. Outstanding requests may be filled through federal assistance (FEMA, USACE Power Team).
3. Due to limited resources, requests for power restorations should be prioritized to support medical and mass care facilities, response operations, and power critical infrastructure first.
4. Qualified personnel will be required to conduct a power assessment, generator install, maintenance and re-fueling checks.
5. A support plan will need to be coordinated with ESF-1 for transportation and ESF-12 to ensure fuel availability.
6. Damage to water pressure, firefighting infrastructure, and open ignited gas lines may be present, resulting in wide-spread structural fires and/or firestorms.
7. Damage to transportation infrastructure – roads, bridges, rail, aviation, water ways may limit evacuation operations and incoming resources.
8. Damage to communications – phone, cell, internet, radio, electronics, may limit the distribution of emergency public information.

M. ESF-13 – Law Enforcement

1. OSHP will coordinate law enforcement response with support agencies through the State EOC. OSHP will open and maintain command and control from all available OSHP District Operations Centers as well as with OSHP/ODPS executive leadership, and the State EOC Executive Group.

2. Requests for local and state law enforcement mutual aid will be coordinated through ESF-13 and Ohio Homeland Security utilizing the Law Enforcement Response Plan.
3. Many law enforcement personnel do not have the training or equipment to operate in the hot zone. Some departments do have limited PPE issued to assist officers in evacuating the hot zone.
4. The OSHP Special Response Team has some limited capabilities to accept life safety missions. Team members are trained to the WMD Technician level, have PPE, and have some radiological sensors.
5. The Ohio Bureau of Criminal Investigation's Crime Lab may provide assistance to the FBI if requested.

N. ESF-14 – Recovery & Mitigation

1. ESF-14 will ensure the coordination of short- and long-term recovery and mitigation activities in Ohio for individuals, families, businesses, governmental entities and certain private non-profit organizations.
2. Coordination to conduct functions such as damage assessments and housing inspections will need to be completed using innovative techniques. It may be weeks before some areas are safe to enter. Air damage assessments with the use of drones, or satellite images may be initially utilized to provide data to support a federal declaration request.
3. Disaster Assistance Centers will be established outside of the contaminated areas. Security, radiological monitoring, and procedures will need to be developed to ensure the safety of visitors and workers at the DACs.
4. Traditional recovery grant and loan programs (IA, PA, SBA) will be utilized to provide assistance to survivors. Insurance coverage will depend on individual policies, however many do not cover acts of terrorism. The Terrorism Risk Insurance Program was created by Congress in response to 9/11, and may provide some compensation to insured public and private policy holders.
5. Unmet Needs programs and Long-Term Recovery Committees will be needed to assist survivors after all other forms of insurance, state, and federal assistance are used. ESF-14 can provide technical assistance and guidance to local jurisdictions and organizations.
6. The State of Ohio Disaster Housing Strategy will be activated to assist survivors with finding more permanent, long-term housing and transition out of mass care shelters.

7. Coordination of long-term community recovery issues with all local, state, and federal agencies, non-governmental organizations, and the private sector will be critical to ensure the protection and support of survivors, reconstruction, and a return of businesses and home owners.

O. ESF-15 – Emergency Public Information and External Affairs

1. Although blast and EMP effects will damage some parts of the public communications infrastructure, some capability may exist to send public information. All communications capabilities will be utilized, such as EAS, cell phone alerts, text messaging, and social networking. The ESF-2 section of this plan expands on communications capabilities.
2. It should be expected that enough of the public will be able to receive information to ensure that messages will be broadly disseminated even in heavily impacted areas. Battery (and hand-crank) radios and most cars (and their radios) will function outside the SDZ.
3. Radio and television broadcast capability outside of the impacted area should continue to function in some capacity to provide messages to those with radios in the affected area.
4. Messaging should continue to evolve over time as more information is known; however, initial messages must be performed in the first few minutes following a detonation, when little more is known than that a suspected nuclear detonation occurred.

IV. Incident Recovery Operations

- A. Recovery operations will begin as response operations and lifesaving actions transition to actions focusing on restoring infrastructure. Some recovery actions may need to begin immediately to support response needs and to manage cascading impacts.
- B. Recovery operations will include debris removal, population relocation to long-term shelters or temporary housing, including in other states.
- C. Advisories from ODA and USDA regarding crop and food movement embargos will be needed, as well as the establishment of inspection stations or outright closure at the borders by other states.
- D. Although it is more of an economic impact than direct or long-term injury issue, agricultural embargos are among the more far-reaching impacts of an IND detonation, and are representative of areas in which fallout contamination would be readily detectable with hand-held survey equipment in the first few days following the detonation.

E. Intermediate Recovery Phases

1. The purpose of this section is to assure an efficient and orderly return to an environment of occupancy and use for impacted areas as soon as possible.
2. The intermediate phase is arbitrarily defined as the period beginning after the source and releases have been brought under control, and environmental measurements are available for use as a basis for decisions on protective actions, and extending until these protective actions are terminated. This phase may overlap the Emergency Phase and the Recovery Phase.
3. The Recovery Phase is the period beginning when recovery actions designed to reduce radiation material in the environment to levels safe enough for occupancy or use are commenced and ending when all recovery actions have been completed.
4. The Intermediate Recovery Phase will include the following operations:
 - a. Population Relocation – Ensuring that people have been removed from the restricted area.
 - b. Ingestion Control – Primarily a State and Federal agency function that will concentrate on intermediate phase efforts in the 50-mile ingestion pathway.
 - c. Population Re-entry – Assisting people who need entrance into impacted areas.
 - d. Population Return – Managing the return of people to areas that are deemed safe enough for occupancy or use.
5. During the Intermediate Recovery Phase, the IZRRAG will make recommendations for protective actions, based on information from and in consultation with assessment, to the Governor and/or the Executive Group.
6. The Governor and/or the Executive Group will determine the protective actions to recommend to county officials. The counties will determine the protective actions to take, inform state officials and the public, and implement appropriate actions.

V. ADDITIONAL RESOURCES

Additional information is contained in an *Improvised Nuclear Device Response Operations Resource Manual* that is maintained in Ohio's State EOC. This Manual includes information on:

- A. Key Terminology and Concepts for Nuclear Device Effects.

- B. Expected Injuries by Damage Zones for a 10-Kiloton Nuclear Ground Burst
- C. Expected impacts by damage zones for a 10-kiloton nuclear ground burst.
- D. Decision guidance for selecting buildings post-incident for use as public shelters.
- E. Decision guidance for establishing evacuation operations.
- F. State agency responder safety protocols.
- G. Dose limit and site access evaluation parameters for the public and emergency workers.
- H. Additional operational considerations for selected emergency support functions.
- I. The role of the Ohio National Guard resources in radiological response.
- J. Expected impacts of radiological fallout and response.
- K. Pre-scripted Immediate Action Messaging.
- L. Synchronization and trigger points for operational response.