OHIO EMERGENCY RESPONSE PLAN
CATASTROPHIC INCIDENT RESPONSE ANNEX

Tab A – Improvised Nuclear Device Plan

FACILITATING AGENCY: Ohio Emergency Management Agency (Ohio EMA)

SUPPORT AGENCIES: All Ohio Emergency Operations Plan Primary and Support Agencies

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 Devise [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 and state agencies should follow the concepts identified in that annex as well as the State EOP and its Emergency Support Function (ESF) Annexes for basic response and recovery actions.

4. Actions for local jurisdictions and agencies are detailed in respective emergency operations plans and standard operating procedures.

II. SITUATION

A. This plan was written using the DHS National Planning Scenario #1; a low yield, up to 10 kiloton (KT) improvised nuclear device (IND) detonated at ground level in an urban area. The assumptions, distances, and impacts cited herein are illustrative; a real event is unlikely to match this planning scenario, and actual incident data will be utilized to determine response operations.

B. 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.

C. Nuclear Effects

There are five major effects from a nuclear detonation:

1. Blast- overpressure (blast wave) and dynamic pressure (high wind velocity)

2. Thermal radiation- heat, spontaneous ignition fires, blindness from the light

3. Electromagnetic pulse (EMP)- high-voltage surge damaging electronics

4. Initial nuclear radiation (occurs with the blast)

5. Residual radiation (fallout) and contamination

D. Key Terminology and Concepts for Nuclear Device Effects

1. **Dose** is a term that describes the amount of radiation absorbed by an individual's body.

2. There are several radiation measurement units, including:

   a. **Roentgen** (R)- describes the exposure in air

b. **R/h** = exposure rate per hour

i. mR/h = milliR, e.g. 1mR/h = .001 R/h, 1 R/h = 1,000 mR/h
ii. μR/h = microR, e.g. 1 μR/h = .000001 R/h, 1 R/h = 1,000,000 μR/h

c. **rem**- describes the weighted measurement of biological effect

d. **rad**- describes the absorbed dose

e. Gray (Gy) and Sievert (Sv) are the international (SI) units of measurement

3. For the purpose of this plan these units of measure are approximately equal to each other, or, 1 R = 1 rad = 1 rem.

4. **Fallout** is the process or phenomenon of the descent to the earth's surface of particles contaminated with radioactive material from the radioactive cloud. The term is also applied in a collective sense to the contaminated particulate matter itself.

5. **Radioactive decay** is the process in which radioactive material releases energy and moves to a stable state, effectively reducing the amount of radioactive material. This occurs rapidly within the first few hours; however the original radioactivity may be so high that the residual radioactivity may still be elevated to hazardous levels, even after several days.

a. The 7-10 rule for the decay of nuclear weapons fission products states that for every sevenfold increase in time after detonation, there is a tenfold decrease in the radiation rate.

b. Example dose rate decay: 1 hour = 1,000 R/h; 24 hours = 23 R/h; 48 hours = 10 R/h; 1,000 hours (42 days) = 0.24 R/h

c. There is a small fraction of fallout that remains radioactive for many years.

6. **Yield** denotes the amount of explosive power from a nuclear explosion measured relative to the explosive power of TNT, usually quantified in thousands of tons (KT).

a. A one-kiloton device produces an explosive yield equivalent to 1,000 tons of TNT.

b. The 1995 Oklahoma City bombing was equivalent to two tons of TNT. A 10 KT IND yield would be 5,000 times greater than that event.

E. Damage Zone Descriptions

1. When responding to IND incidents, there are several zones or boundaries that are important to understand, from both a safety and operational priority standpoint.

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. The damage zones are independent of the radiation and fallout area boundaries, and will overlap with one another to various degrees over time.

2. 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 at the ground by early response units and aerial survey rather than precise distances; they are established and will be used throughout the plan to aid in planning response actions, estimating needs, and planning logistical support. Based on a 10 KT ground burst:

    a. **Severe damage (SD) zone**- extends about a ½ mile from ground zero. Blast overpressure is 5-8 psi and greater, with maximum winds of 163-934 mph.

        i. Most buildings and infrastructure are completely destroyed, severely damaged or collapsed. Only heavily reinforced buildings are standing, but with significant damages.
        ii. The nuclear fireball for a 10 KT nuclear device has a diameter of approximately 1,450 ft. and heat reaches millions of degrees where matter becomes plasma.
        iii. Significant amounts of debris creating access issues and making timely response impractical. Near ground zero, all buildings will be rubble (piles of 30 ft. or more).
        iv. Very few people survive the initial blast (potentially only those in stable, underground structures) and very high radiation levels make survival unlikely.
        v. Rescue operations should not be taken in this area until radiation levels allow for the safety of responders, typically after 48 hours. Operations must be carefully planned and only to rescue known survivors. Rescue operations will be focused on the moderate damage zones outside the Dangerous Fallout zone.

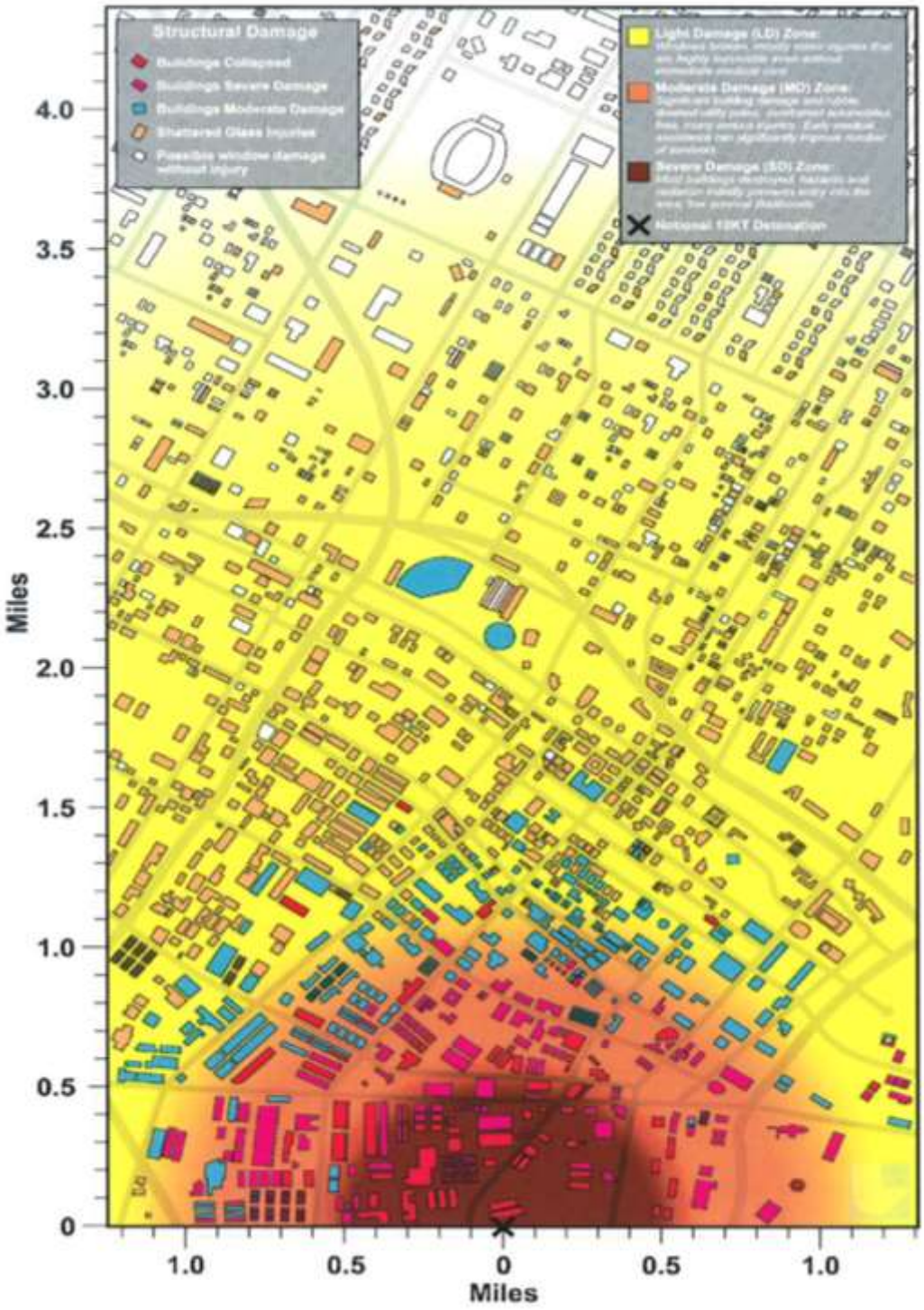
    b. **Moderate damage (MD) zone**- extends about a ½ mile to 1 mile from ground zero. Blast overpressure in the outer boundary of 2-3 psi, with maximum winds of 70+ mph. Inner boundary overpressure of 5-8 psi, with winds from 163+ mph.

        i. Significant building damage such as blown out building interiors, collapsed roofs and some collapsed buildings.
        ii. Sturdier buildings (reinforced concrete) will remain standing, lighter commercial and multi-unit residential buildings may collapse or be structurally unstable, and many wood frame houses will be destroyed.

iii. Debris including substantial rubble and litter, downed utility, phone, and light poles, and overturned automobiles. Closer to ground zero, streets will be impassible.
iv. Broken water, gas, electrical and communications lines are expected, resulting in live downed wires and ruptured lines causing fires. Water shortages are expected.
v. Other hazards include elevated radiation levels, sharp metal objects, broken glass, and ruptured fuel tanks. Reduced visibility for an hour or more due to dust raised from shockwave and collapsed structures.
vi. Many survivors with casualties needing urgent medical care.
vii. Rescue operations will be focused in this zone, however not within the Dangerous Fallout zone. Areas overlapping with the Dangerous Fallout zone will not be entered until radiation has decreased.

c. **Light damage (LD) zone**- extends about 1 mile to 3 miles from ground zero. Blast overpressure in the outer boundary of 0.5 psi, and inner boundary overpressure of 2-3 psi, with winds of 70+ mph.

i. Windows and doors blown in and flying glass. Broken windows as much as 10 miles from ground zero.
ii. Further inward, window shutters, roofs, and lightly constructed buildings will have increasing damage (particularly on the side facing the explosion), rubble, and stalled/crashed automobiles.
iii. Damage varies in this zone due to shock waves rebounding multiple times off of buildings, terrain, and the atmosphere.
iv. Injuries in this area may be more easily managed.
v. Response operations in this zone will be focused only on severe injuries and directing ambulatory survivors to medical assistance. Areas overlapping with the Dangerous Fallout zone will not be entered until radiation has decreased.



Representative damage zones for a 10 KT nuclear explosion over-laid on a notional urban environment.

F. The **Prompt Radiation Zone** is an area that is immediately affected by direct radiation from the blast.

1. The intensity of initial radiation decreases with distance from ground zero. The radiation consists of neutron, gamma, and x-ray.

G. Contamination Zone Descriptions

1. **Contaminated Fallout Zones** represent the areas that are contaminated from radioactive fallout or where residual radiation presents a health threat from ionizing radiation.

2. Other areas are contaminated over time, extend well beyond the point where the explosive forces of nuclear detonation cause physical damage, perhaps several hundred miles across land and up to five miles in the atmosphere, depending on meteorological conditions.

3. Isotopic decay of the constituents of fallout will result in a reduced threat over time, and corresponding decrease in the size/area of these zones.

4. The **Dangerous Fallout (DF) zone** is an area covered by fallout, delineated by measurements where the radiation exposure rate is equal to or greater than 10 R/h.

    a. This area will have acute radiation injury potential to the population and all should immediately seek adequate shelter prior to any consideration for evacuation or rescue operations.

    b. First responder operations should be prevented until sufficient radioactive decay has occurred, however many responders may be unaware of the hazard or will attempt rescues regardless of the exposure.

    c. Responders should not enter the area until radiation levels are determined and monitored. Activities in this area should be planned, justified, optimized, and conducted using appropriate PPE and dose monitoring.

    d. Fallout that is immediately hazardous to the public and first responders will descend to the ground within about 24 hours.

    e. Within a few miles of the blast, exposure rates in excess of 100 R/h during the first four to six hours may be observed.

    f. This zone may extend well beyond the light damage zone, as much as 10-20 miles downwind from the blast site within the first hour. However, the DF zone will immediately begin to shrink in size due to the decay of short-lived isotopes, and will be considerably smaller after the first few hours. After 24 hours the DF zone may be as small as one or two miles.

5. The **hot zone** is defined in federal guidance documents as any area with a measured dose rate of 0.01 R/h or higher. The hot zone boundary marks an area where workers could receive significant radiation exposures.

    a. Appropriate radiation monitoring should always be performed to determine the safety of an area. Most fallout particles are visible as fine sand-sized grains, but lack of visible fallout does not suggest the lack of radiation.

    b. Personal protective equipment (PPE) and dose monitoring for radiation is required. With appropriate planning, emergency operations can be safely performed within this area while minimizing significant acute exposures.

    c. The radiation hazard will increase from 0.01 R/h to 10 R/h as the Dangerous Fallout Zone is approached.

    d. Within a few hours of the initial blast, fallout can reach several hundred miles, and reaches its maximum extent within one to two days (48 hours) and will then begin to decrease.

    e. Outside of the Dangerous Fallout zone, fallout does not present an acute threat (sudden onset, short-term exposure); however, protective actions may be required (shelter and/or evacuation, food prohibitions and water advisories) to minimize long term health risks.

    f. All persons should immediately seek adequate shelter to minimize/avoid potential radiation exposure to fallout prior to any consideration for evacuation.

    g. Staging, triage, and reception centers should be located outside of this area whenever possible.

6. The **Restricted Zone (RZ)** is defined as an area in which initial exposure rates and contamination levels greater than or equal to 0.0025 R/h (2.5mR/h) exceed the threshold for safe long-term habitation as listed in EPA 400.

    a. Initial boundaries of the RZ will be set through coordination between state and local authorities and will be established based on political boundaries, geographic features and/or infrastructure that facilities control of access to the area. The RZ may include areas that are beyond the area that meets or exceeds relocation Protective Action Guides (PAGs).

        i. PAGs are projected radiation doses at which specific protective actions to reduce or avoid that dose is recommended. These guidelines do not establish an acceptable level of risk for normal, nonemergency conditions, nor do they represent the boundary between safe and unsafe conditions. The PAGs are not legally binding regulations or standards and do not supersede any laws.

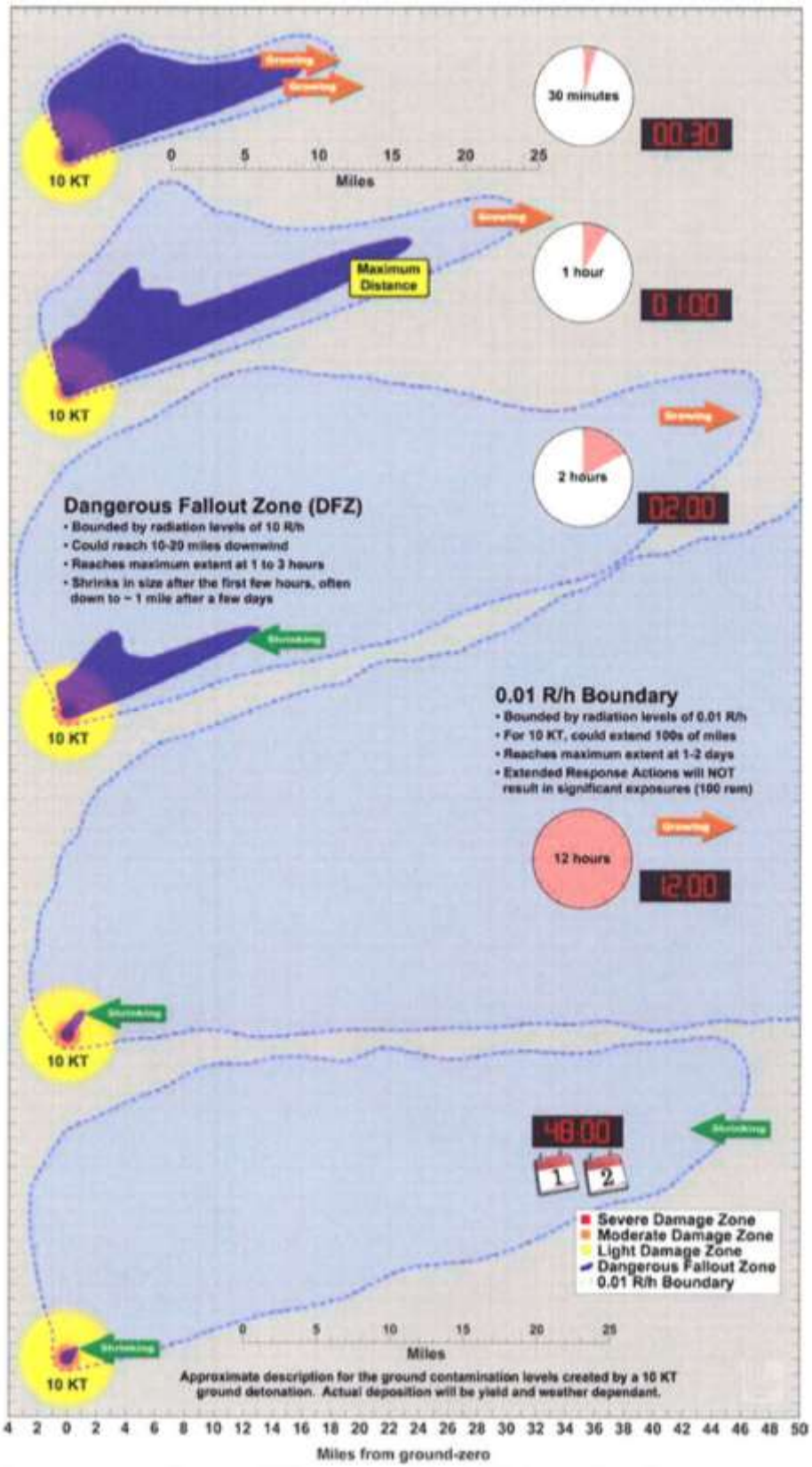
b. Boundaries of the RZ will initially correspond to the evacuated area and will expand or contract over time based on results of radiological surveys and calculations.

c. The radiation environment will change significantly after an IND event. After the first 24 hours, enough information on the radiological release may be available to begin outlining the restricted zone planning.

d. For periods much greater than 24 hours after plume passage, the RZ boundary will be determined and/or adjusted based on actual deposition and other radiological assessment of samples from the affected area. The RZ can change many times during the course of the incident.

7. The **Ingestion Zone** is defined as an area in which levels of contamination on or in foodstuffs (including crops, livestock, produced products, fish, wildlife, and non-cultivated plants) exceeds the limits for safe consumption as defined by the Food and Drug Administration (FDA).

   a. Boundaries of the IZ will initially be determined by the fallout footprint and will expand or contract over time based direct testing of samples.



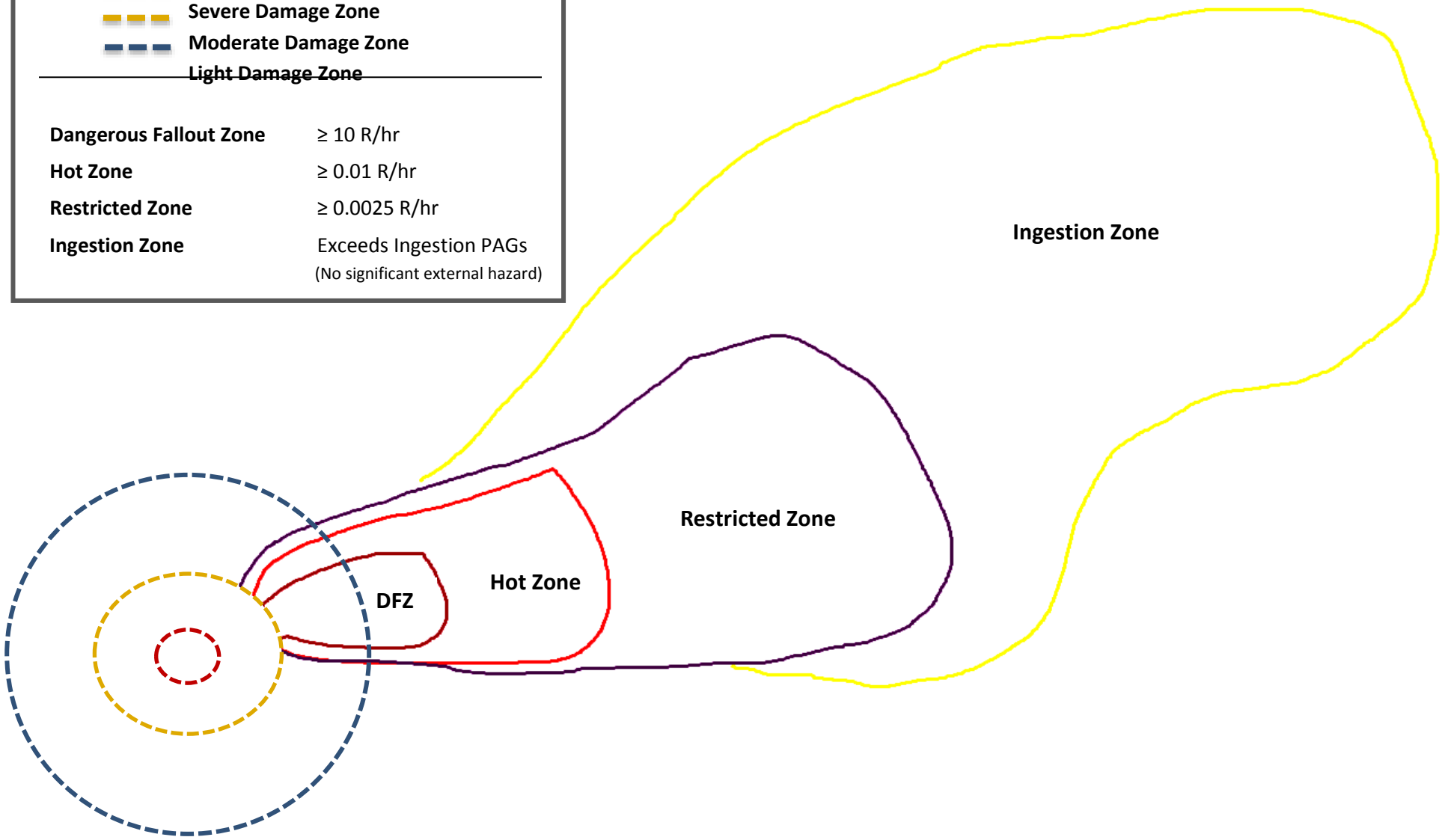
Time-Sequenced Size of DF Zone and 0.01 R/h Boundary for a 10 KT Ground Burst Scenario.

IND Damage and Contamination Zones

Relationship Example

Severe Damage Zone
Moderate Damage Zone
Light Damage Zone

Dangerous Fallout Zone	≥ 10 R/hr
Hot Zone	≥ 0.01 R/hr
Restricted Zone	≥ 0.0025 R/hr
Ingestion Zone	Exceeds Ingestion PAGs (No significant external hazard)



H. Electromagnetic Pulse (EMP) Effects

1. An electromagnetic field is generated from a nuclear detonation that produces a high-voltage surge and damages electronic components. For detonations at high altitudes, the damage area is very large. However the scenario for this plan is a 10KT detonation at the ground level. Scientists still do not have a good understanding of how the pulse would radiate and what degree of damage it will cause.

2. Experts generally believe that the most severe damages 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.

3. Equipment brought in from unaffected areas should function normally. If communications towers and repeaters are destroyed, temporary mobile equipment would be needed.

4. Damages from EMP effects can include:

    a. Stalling of vehicles

    b. Communications equipment, cell towers, etc. destroyed or disrupted

    c. Electrical components destroyed- computer equipment, control systems, water and electrical system control components, other electronic devices (e.g. phone, TV, radio)

    d. A phenomenon called source-region EMP may lead to conductance of electricity through conducting materials (e.g. pipes, wires) could cause damage much further away, however more scientific research on this topic is still needed

I. Cascading Effects

1. As a result of the effects of the IND blast and EMP, cascading effects may lead to many other hazards becoming an issue. Often, these hazards are connected to one another due to interdependencies within the systems, and failure of one system may cause failures with others or limit response functions. Below are some examples:

    a. Damage to energy infrastructure- electricity, natural gas, petroleum, pipelines, solid fuel (coal), fuel (gas), rationing of resources.

    b. Damage or power failure to water infrastructure- water and waste water treatment plants, limited drinking water and sewage system backups.

    c. Damage to water pressure, firefighting infrastructure, and open ignited gas lines resulting in wide-spread structural fires and firestorms.

d. Damage to transportation infrastructure- roads, bridges, rail, aviation, waterways, limiting evacuation and incoming resources.
e. Damage to communications- phone, cell, internet, radio, electronics, limiting the distribution of emergency public information.

f. Damage to all sectors of government and private industry, manpower scarcities, and the activation of Continuity of Government (COG) or business continuity plans to provide essential services to survivors.

g. Damage to resource supplies limiting industrial production.

h. Damage to natural resources, land, waterways, and reduction in mining and extraction.

i. Damage to the food industry and resource chains, prompting food scarcities/rationing, affecting the agriculture and livestock industry, and impacting the national food supply.

j. Economic impacts of the attack- price gouging/freeze, effect on markets, banks, businesses, and the tax base.

k. Limited supply of health resources, durable medical equipment, and consumables.

l. Law Enforcement concerns such as looting, riots, curfews, and the need to declare martial law.

m. Limited availability of temporary housing and/or permanent housing construction manpower and supplies.

J. Health and Medical Considerations

1. Nuclear explosions produce blast, thermal, and radiation injuries that will often occur in combination, resulting in a mass casualty (injury) and mass fatality (death) event. Levels of injuries will be dependent upon distance from blast and shielding.

2. **Initial nuclear radiation effects:**

a. Unsheltered individuals may receive excessive radiation doses leading to acute health effects (sudden onset, short-term effects) including death, and long-term health risks (e.g. cancer).

b. Moderate to large radiation doses are known to increase risk of cancer, and any radiation dose is assumed to contribute to an increased risk of cancer.

c. Generally, radiation doses received over a longer period of time are less harmful than equivalent doses received instantaneously.

3. **Radiation from fallout** will exist downwind from the blast site.

   a. Fallout effects are potentially avoidable, unlike the initial radiation. Unsheltered individuals remaining in the fallout zone could receive acute and even lethal radiation doses. Sheltering in place, especially in the immediate hours after the blast serves a significant lifesaving function.

   b. Fallout deposited on the ground and roofs will lead to an immediate external radiation exposure from gamma radiation and is the dominant health concern.
   c. There are two principle exposure pathways for the public occupying areas contaminated with deposited radioactive materials- exposure of the whole body to external gamma radiation from deposited radioactive materials, and internal exposure from inhalation of re-suspended materials and ingestion of food and water. The principle protective actions for reducing exposure of the public to deposited radioactive materials are:

      i. Relocation
      ii. Decontamination
      iii. Shielding
      iv. Time limits on exposure
      v. Control of the spread of surface contamination

   d. In the DF Zone the radiation dose from fallout will typically be orders of magnitude greater than internal hazards resulting from inhalation or ingestion of radioactive material.

   e. Internal contamination/ingestion from fallout can occur in the DF zone within 24-48 hours. Ingestion can be mitigated through respiratory protection, and even ad hoc protections (e.g. holding a cloth over mouth and nose) is better than no protection at all. Drinking water or consuming foodstuffs that have collected fallout will result in high dose exposure.

   f. Beta radiation will cause severe tissue damage when fallout material remains in contact with unprotected skin or thin clothing resulting in “beta burns”.

4. **Mass Causalities** will consist of blast injuries, thermal radiation, eye injuries, and illness from radiation.

   a. Blast injuries caused by overpressure and dynamic pressure waves (wind) will cause the majority of casualties.

i. 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.
ii. 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.
iii. 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.

b. Thermal Radiation from the thermal pulse will cause injuries ranging from direct skin exposure (flash burns or profile burns) to incineration.

i. 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.
ii. 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.
iii. 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.

c. Eye Injuries from looking at the thermal flash can range from temporary flash blindness for several seconds to permanent blindness.

i. Flash blindness may last for up to 30 minutes and impact survivors up to 15 miles away from the blast. Other effects include a temporary darkened after-image for several minutes, damage to peripheral vision or loss in visual acuity, macular-retinal burns, and blind spots.
ii. Time of day, pupil dilation, exposure time, and other technical factors determine extent of injury.
iii. Ocular injury is a frequent cause of morbidity in blast victims.

d. 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.

i. Hematopoietic Syndrome: 100 - 800 rem; effects blood components, causing immuno-dysfunction resulting in infection or sepsis.

ii. Gastrointestinal Syndrome: > 600 rem; effects the lining of the gut and related structures, causing severe nausea, vomiting, and diarrhea, as well as eventual renal and cardiovascular failure (about 8 - 14 days).
iii. Central Nervous System Syndrome: > 3000 rem; effects the brain and tissues of the central nervous system, causing confusion, disorientation, and coma, resulting in death (24 - 48 hours).
iv. Since the sub-syndromes are overlapping as related to dose, individuals receiving larger doses will experience the range of impacts associated with those found in lower dose exposures.

5. **Mass Fatalities** will likely be attributed to Acute Radiation Syndrome (ARS) and lethal doses at the moment of detonation may be unavoidable, but exposure post-blast can be minimized through time, distance, and shielding.

   a. 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.

   b. A lethal dose (LD_{50}) 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.

   c. If an untreated patient has compounding injuries (both radiation and traumatic injuries) the lethal dose may as low as 250 rad.

      i. It should be noted that the LD_{50} for humans is in the lower end of the ARS ranges, e.g., most individuals receiving doses that result in ARS will die as a result of the exposure.

   d. 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.

   e. 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.

   f. These estimates are for healthy adults; individuals with other injuries and children will be at greater risk.

III. ASSUMPTIONS

A. The assumptions listed in this section are in addition to those listed in the Catastrophic Incident Response Annex.

B. An act of nuclear terrorism directed against a large metropolitan area will have major consequences that overwhelm the capabilities of local, state, and federal governments to respond, and will seriously challenge existing response capabilities at all levels.

C. 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.

D. 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.

E. The capacity to communicate emergency alerts and public messages may be severely limited.

F. An incident on the scale of an IND detonation does not allow for the luxury of narrowly defined responders that rescue victims. Rather, everyone alive is a survivor who must support other survivors and the nation in response.

G. The public, private sector, and even the injured will play important roles in reducing the burden on traditional response organizations by using actionable information to guide behavior while supporting a whole community response.

H. 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. Fallout is driven by upper atmosphere winds, which can travel much faster than surface winds. Scientific modeling and ground truth assessment will assist in determining the dangerous fallout zones.

I. A unified response of local, state and federal assets is required to save the maximum possible number of lives and mitigate the consequences of a nuclear attack.

J. Response to an IND attack will depend on the plume dispersion and will likely require response operations to be conducted over a multi-jurisdictional and multi-state region.

K. A zoned strategy employing existing all-hazard plans and response capabilities and support functions will provide the best structure to manage the response.

L. Utilities and infrastructure systems supporting communication, transportation, energy, water, petroleum and medical care may sustain significant damage from the initial blast

and cascading impacts. The full extent of damage on any one system will depend on the potential cascading effects from damage on associated supporting systems.

M. Fuel availability may limit or delay the scope of operations.

N. Private sector stakeholders will have a significant role in response and support operations.

O. A State of Emergency may be declared at the state and federal levels, granting special authorities to government officials to ensure the public safety of citizens in the impacted zones (e.g. curfews, evacuations, and pursuant to ORC 5923.231 martial law).

P. There will be responders at all levels of government and the private sector that are 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.

IV. 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 the overwhelming need for resources.

3. Incident coordination, mutual aid, and mission requests will be followed as detailed in the State of Ohio EOP.

4. 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.

5. 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.

6. In coordination with the unified area command (local incident command posts), State Emergency Operations Center (SEOC), 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. State agencies may have to correlate a large number of partial reports (e.g. detonation, light flash, mushroom cloud, etc.) in order to determine the true nature of the event. State agencies will follow SOPs to notify state government officials and Ohio EMA will activate the SEOC.

3. Local first responders that would normally be on scene within the first minutes of the incident may be directly affected and unable to respond at all. 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 assets.

4. The magnitude of the event may cause delays in assessment of the situation and 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 SEOC and the JIC.

5. The most effective life-saving action for local response officials in the first hour will be the decision to order everyone within a certain distance of the event to shelter in place. The most lives will be saved in the first 60 minutes through sheltering in place.

6. Reducing immediate injuries and long-term risks from radiation exposure requires a "shelter first, analyze later" policy. Uncertainties in the yield and weather will make accurate predictions of affected areas in the critical moments after detonation difficult. It is far 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.

C. Protective Action Decisions

Primary Protective Actions

- **Members of the Public -** adequate, early sheltering followed by delayed, informed evacuation
    - Public information and education is critical to effective protective actions for the public
- **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
- **Emergency Responders without Radiation Instruments -** Shelter, until such time that they are directed to take other actions

1. Fallout will trigger consideration of Protective Action Recommendations and Decisions up to hundreds of miles away.

2. The use of protective actions should be justified to ensure that they produce more good than harm; in the aftermath of an incident, it is not always mandatory to intervene with protective actions.

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

4. Decisions on justification and optimization should also consider that individual doses do not become excessive.

5. The following strategies can be used by state officials to guide counties or used to make command decisions from executive leadership at the SEOC.

6. Initial Shelter-in-Place Radius

    a. 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.

7. Sheltering and Evacuation Strategies

    a. **Shelter-in-Place Followed by Uninformed Evacuation:** Individuals 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.

    b. **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.

    c. **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.

    d. **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.

8. Sheltering Decisions

    a. Shelter quality is a critical factor for determining decision time for evacuation. The better the shelter, the longer the time before action is required.

    b. 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.

        i. Good (PF $\geq$ 40) and Adequate (PF $\geq$ 10 $\leq$ 40) Shelters
        - Extended shelter-in-place inside a Good or Adequate shelter is almost always preferred over an evacuation in the first 12 hours.

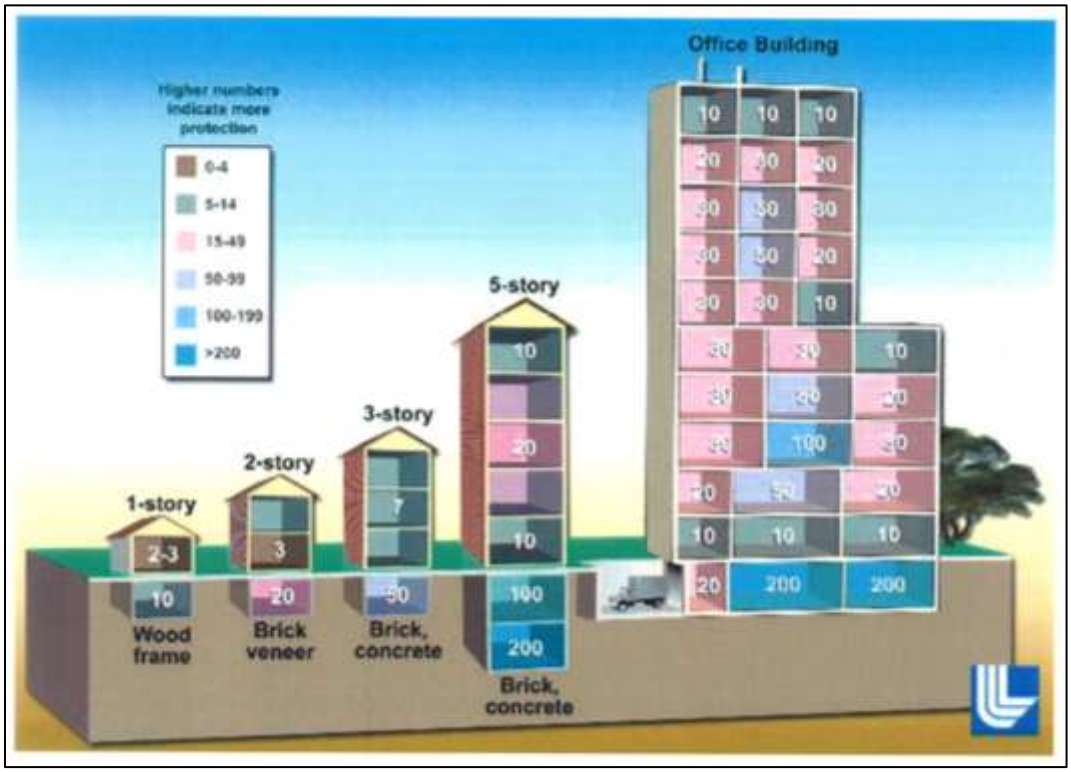
- Gains from an informed evacuation before 12 hours are marginal, while the penalty for an uninformed evacuation can be significant.

ii. Marginal Shelters (PF $\geq 4 \leq 10$)

- Move or evacuate actions should be taken in about 4–12 hours.

iii. Poor Shelters (PF < 4)

- Move or evacuate actions taken in the first few hours. Early evacuation (at 1 hour) from lowest-quality shelters in the DFZ can be life-saving.
- Best Strategy - Poor Shelter: Informed evacuation after approximately an hour (*without an informed route use next strategy*)
- Good Strategy - Poor Shelter: Move to a better shelter. Can result in a significant reduction of casualties as early as 20 minutes post detonation.
- Bad Strategy - Poor Shelter: Extended Shelter in Place.



Variations in shelter protection factors for residential and office structures. (Illustration provided courtesy of Brooke Buddemeier, Lawrence Livermore National Laboratory)

Table 1 - Shelter Quality Examples

Shelter Protection Factor	Illustrative Building Types
Poor PF <4	Vehicles; wood or brick-sided single-story structures without basements (includes homes and strip malls)
Marginal ≥ 4 to ≤ 10	Stand-alone, small-footprint, 2- to 4-story, lightly constructed homes and apartment buildings, without basements
Adequate (≥ 10 to ≤ 40)	Residential, brick apartment, or row home basements; OUTER areas of high- rise buildings or mid-rise buildings with brick or concrete walls
Good (≥ 40)	Large basements or underground areas; INNER areas of mid-rise or high-rise buildings with brick or concrete walls

9. Evacuation Decisions

   a. Decisions with regard to evacuation planning must consider total estimated dose (*sheltering dose + evacuation dose*), based upon multiple factors. Those factors may include:

      i. Current shelter quality (e.g. Protection Factor [PF], structural soundness)
      ii. Time since fallout deposition
      iii. In-shelter and out-of-shelter dose rates
      iv. Status of evacuation pathways (debris, infrastructure collapse)
      v. Availability of transportation or other evacuation assistance
      vi. Estimated time for evacuation (foot speed of <2 mph)
      vii. Distance to lower dose rate area (shelter or triage point)

   b. Routes make a difference for early evacuees. The exposure impact of route choice is more significant in the first few hours.

   c. A key consideration is the possibility that there will be no "straight-line" path out of a given area. Natural features (such as rivers and cliffs) and man-made obstacles (such as security fences, freeways, culverts, and railroads) may block the best potential routes out of an area. In addition, a lateral evacuation strategy (moving away from the centerline of a cigar shaped fallout pattern) may not be feasible because actual fallout patterns may be more complex than those offered by a simple projection.

10. For information on shelter and evacuation actions by state agencies, refer to the ESF-6 section of this plan.

D. State Agency Responder Safety

1. Any state agency employees affected by the event and in the hot zone should initially shelter in place in accordance with protective actions and follow the same guidance as the public.

2. Any state agencies may be deployed into the hot zone on an agency-by agency basis, must be classified as emergency workers, and must be provided appropriate personal protective equipment (PPE) and training.

    a. However, time-critical, life-saving activities should not be delayed if PPE is not immediately available, provided other hazards at the scene do not dictate specific PPE.

3. Required PPE for the radiological hazard is Level C (includes Level C PPE coveralls, over-booties, goggles, latex gloves, a half-face or full-face respirator).

    a. This level of PPE will help protect the responder from alpha and beta radiation. No standard PPE will protect against gamma radiation. Use of higher level PPE (Level B, A or exotic anti-radiation PPE) may adversely affect responder performance without appreciable increase in protection.

    b. Responders without Level C coveralls may use long-sleeve uniforms or clothing instead. For evacuation purposes only, improvisation of PPE (e.g. cloth over mouth) is better than nothing at all.

    c. Other hazards within the hot zone (e.g. chemical facility release) may require additional levels of PPE.

4. State agency responders should not enter these areas without proper training, equipment, including dosimetry.

5. All state agency responders will be required to carefully plan all missions within the hot zone and participate in a dose monitoring program.

6. State responders must maintain situational awareness and be prepared to enter a hazardous zone with the potential to encounter fires, debris, and sharp objects.

7. State responders deployed to the hot zone to conduct missions are required to attend hazardous materials operations level training, which includes radiation safety and measurement training. Responders may need refresher training to use these systems in a new environment.

E. Dose Limits/Evaluation (See table 2 below)

1. The emergency worker dose limit guidelines established by EPA-400 (5, 10, and 25 rem) are applicable for response to an Improvised Nuclear Device.

    a. Due to the potential for uncontrolled situations and unrecognized dose rates, for mission-critical activities such as lifesaving, a Decision Dose that considers operational awareness and mission priorities should be established to evaluate cumulative dose above 25 rem. The individual worker must volunteer to receive doses above 25 rem after a safety briefing.

    b. The decision dose point may be initially set at a level appropriate to accommodate completion of the mission, in excess of the 25 rem upper boundary, without endangering the health and safety of the emergency worker.

    c. When the cumulative absorbed dose for an individual reaches the decision dose point, a collective, informed decision must be made to allow further actions, or withdrawal of the individual from operations. This decision is made jointly between the Executive Group, the Incident Commander, the local authority for operational safety, along with input from health physics staff.

    d. A value of 50 rem may be considered for the decision dose point. This permits actions to be accomplished while allowing for uncontrolled or unrecognized dose, and leaving sufficient margin for not exceeding 100 rem (the point below which clinically-significant early health effects are unlikely to occur). This requires input from the responsible Dosimetry Coordinator, with support from state assessment staff, if needed.

        i. Specifically, a projection of dose associated with a proposed or ongoing assignment needs to be added to the current absorbed dose, and then weighed against the potential to exceed levels at which health effects may occur.

        ii. Additionally, the nature of the mission (e.g., lifesaving vs. traffic control) and the availability of other resources should be considered. The worker must be informed of and agree to the potential dose and associated risks prior to participating in ongoing operations.

2. The use of a Decision Dose is not a clearance for additional assignments beyond the scope of the evaluation, nor is it authorization to enter areas such as the DFZ or Severe Damage Zone.

3. Following the emergency phase, re-entry and recovery dose limits are the same as occupational limits.

    a. Radiation Work Permits (RWP) will be generated for post-emergency operations.

Table 2: Emergency Worker Dose Guidelines (adapted from EPA 400 and NCRP Commentary 19)

CONCEPT	VALUE	EXPLANATION
Operational Boundary	10 R/h	First Responders should establish an operational boundary at 10 R/h. Actions taken inside this boundary should be restricted to time-sensitive, mission- critical activities, such as life-saving. *Note: This boundary is rapidly changing based upon radioactive decay and is an operational tool, designed to limit accumulated dose.*
Emergency Worker Dose Limits (EPA 400)	5 rem	Routine emergency operations. All reasonably achievable actions have been taken to minimize dose.
	10 rem	Protecting valuable property necessary for public welfare. Exceeding 5 rem (50 mSv) unavoidable and all appropriate actions taken to reduce dose. Monitoring available to project or measure dose.
	25 rem	Lifesaving or protection of large populations. Exceeding 5 rem (50 mSv) unavoidable and all appropriate actions taken to reduce dose. Monitoring available to project or measure dose.
Emergency Worker Decision Dose	Situationally Variable 50 rem (0.5 Sv)	The cumulative absorbed dose that triggers a decision on whether to allow ongoing mission-critical work or withdraw an emergency worker from further actions.
Acute Radiation Effects	>100 rad (1.0 Gy)	Nausea and vomiting are among the earliest clinical signs of acute radiation sickness and may occur as whole-body doses become high [i.e., >100 rad (>1.0 Gy)]. Should these occur the affected individual(s) should be removed from the area, and provided appropriate medical care.
US Military Dose Limits (for informational purposes only)	Operational Exposure Guidance (OEG)	• Nuclear war – any exposure level • High- priority missions (including life-saving) - 125 rad (1.25 Gy) • Operations other than war (based on mission priorities and risk analysis) - ≤ 75 rad (0.75 Gy) • Restricted from any further radiological missions once they have exceeded 125 rad (1.25 Gy)

4. Long-term tracking/trending of local and state emergency worker aggregate doses/extremely high doses will need to be assessed, based on reports from Dosimetry Coordinators/Radiological Officers. A task force may need to be developed to coordinate this function.

F. Decontamination

1. Decontamination needs will place additional constraints on responder resources, however it is not generally a life-saving issue.

2. At a minimum initial/rudimentary/gross decontamination consists 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 in order 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 (e.g. large amounts of security needed to establish perimeters and checkpoints). Recommended solutions involve simply sending people to home to change clothes and shower if they do not live in an affected area, or to a designated alternate location (e.g. school, gym, decontamination line, portable decontamination unit) 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 emergency infrastructure and infrastructure that might facilitate lifesaving (e.g. hospital). 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.

G. Response by 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 the Incident Commander. Resources available will dictate the rescue tactics, which must remain flexible.

2. The **Light Damage (LD) Zone** will contain mostly non-life-threatening injuries that are associated with flying glass, debris, and traffic accidents.

    a. The benefits of rescuing ambulatory (walking wounded) survivors in the LD zone are low as response resources will be limited. Responders should consider implementing triage SOPs by stopping only to address severe injuries. Utilizing

volunteers to help direct ambulatory survivors to medical shelters or assembly shelters outside this zone will be the best use of limited resources.

b. Emergency responders should continue quickly through this zone to make entry into the moderate damage zone where victim rescue will be needed most.

3. 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 and will result in saving the greatest number of lives.

   a. There will not be enough resources to address all needs and requests. Early response activities should focus on triaging medical, rescue and evacuation missions.

   b. Entry into this zone may require PPE for physical or chemical hazards. Radiation dose monitoring and should not be attempted until after an initial radiation survey has been completed to avoid responder exposure to radiation.

   c. Additional worker safety issues will be a concern due to unstable structures, downed power lines, ruptured gas lines, fires, hazardous materials releases, etc.

4. The **Severe Damage (SD) Zone** has 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.

   a. Once radiation dose rates have dropped substantially, which may take days, entry may be considered. All response missions must be justified to minimize responder risks based on risk/benefit considerations built into worker safety procedures.

5. **Dangerous Fallout (DF) Zone** response activities should be guided by the lethal radiation hazard; entry is not advised.

   a. In some areas the DF zone will overlap the LD or MD zones.

   b. Efforts in this zone should focus on communicating protective action orders to the public. Operational support to provide public education and effective communication plans will be important.

6. 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.

   a. The hot zone will overlap the LD or MD zones in some areas, and the same consideration should be given to these overlap areas as for the DF zone.

7. The **Restricted Zone** will contain deposited fallout contamination areas that are expected to shrink after the detonation and the boundaries will take time to identify.

    a. After the decay of the short half-life fission and activation products the rate of the decrease in exposure rate will slow.

    b. Populations in the Restricted Zone will be notified that re-entry into the area will be restricted and to plan accordingly as they evacuate. Depending on the affected infrastructure, utilities needed for occupation may not be available in some areas.

    c. Workers in this area will be allowed to conduct recovery activities.

    d. The Ingestion Zone Re-entry and Recovery Advisory Group (IZRRAG) will evaluate and make recommendations to incident command regarding population re-entry, return, or permanent relocation based on long term exposure projections.

8. The **Ingestion Zone** has health concerns due to chronic radiation exposure and radiation doses delivered over a long period of time.

    a. Doses can come from the ingestion of radioactive materials contaminating foodstuffs and re-suspension of fallout. Fallout will also affect the movement and supply of foodstuffs over large area of initial contamination.

    b. The IZRRAG will address agricultural issues for areas 100 miles or more downwind. These areas will need to be sampled to establish foodstuff embargos.

    c. Discussion will need to include length of time embargos should be in place, what items should be embargoed, and what activities in the Ingestion Zone should be limited (e.g., fishing, boating, hunting, mowing grass, burning, plowing, harvesting).

Table 3. Protective Action Guides for Exposure to Deposited Radioactivity

Protective Action Recommendation	**PAG (Projected Dose) [a]**	**Comments**
Relocate the general population [b]	> 2 rem (20 mSv) in the first year 0.5 rem (5 mSv)/ year in the second and subsequent years	Projected dose over one year
Apply simple dose reduction techniques [c]	< 2 rem (20 mSv)	These protective actions should be taken to reduce doses to as low as practicable levels
[a] Projected dose refers to the dose that would be received in the absence of shielding from structures or the application of dose reduction techniques. These PAGs may not provide adequate protection from some long-live radionuclides.		

[b] People previously evacuated from areas outside the relocation zone define by this PAG may return to occupy their residences. Cases involving relocation of people at high risk from such action (e.g., patients under intensive care) may be evaluated individually.
[c] Simple dose reduction techniques include scrubbing or flushing hard surfaces, minor removal of soil from spots where radioactive materials have concentrated and spending more time than usual indoors or in other low exposure rate areas.

H. Recovery

1. Recovery 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 manage cascading affects.

2. Recovery will include debris removal, discussed in ESF-3, and population relocation to long-term shelters or temporary housing, including in other states, as discussed in ESF-6 and ESF-14.

3. 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. This is discussed in more detail in ESF-11.

    a. Although it is more of an economic impact than direct or long-term injury issue, agricultural embargos are among the more far reaching effects 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.

4. Intermediate and Recovery Phases

    a. The purpose of this section is to assure an efficient and orderly return to an environment of occupancy and use for the affected areas as soon as possible.

    b. 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.

    c. 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.

    d. The Intermediate/Recovery Phases will take the form of four major efforts:

        i. Relocation- to ensure people have been removed from the restricted area.

ii. Ingestion- primarily a State and Federal agency function. It will concentrate on intermediate phase efforts in the 50-mile ingestion pathway (Ref. Section IV of the REP Operations Manual).
iii. Re-entry- to assist people who need entrance into the affected area(s).
iv. Return- to return people to the areas deemed safe enough for occupancy or use.

5. During the Intermediate and Recovery Phases, the IZRRAG (Ingestion Zone Recovery, Re-entry Advisory Group) will make recommendations for protective actions, based on information from and in consultation with assessment, to the Governor and/or the Executive Group.

    a. 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. EMERGENCY SUPPORT FUNCTION-BASED RESPONSE

Response actions in this plan are listed by ESF, to mirror the State EOP ESF Annexes. The roles and responsibilities for each agency can be found in the ESF Annexes, and only actions that are unique to the IND scenario are identified below.

A. ESF-1 Transportation (Primary: ODOT)

1. Unique IND transportation operational actions are outlined below and should be used in conjunction with portions of the State EOP, ESF-1 including:

    a. ESF- 1, Tab A, Aviation Support Plan addresses air operations support to the impacted area, such as damage assessment flights, movement of personnel/teams, search and rescue, etc.

    b. ESF-1, Tab B, SNS Distribution Plan provides guidance on rapid delivery and transport of SNS supplies.

2. ESF-1 will request a temporary flight restriction (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.

3. ESF-1 will support evacuation efforts by full participation in the unified command process and will utilize established plans for contraflow, detours and Traffic Incident Management as needed out of the light and moderate damage zones.

    a. Order of removal of vehicles blocking roadways is an ESF-13 function. However due to the EMP affect and emergency evacuation routes being blocked, ESF-1 and other supporting ESF's could provide equipment to move any blockage from

the right of way and restore traffic flow. ESF-1 will support ESF-13 in the removal of highway obstructions per established policy.

4. ODOT will 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 SEOC Executive Room.

    a. Note: 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. Infrastructure maintenance and repair will be coordinated at the local and district level. Outside support will be utilized through EMAC and will be coordinated from the ESF-1 Desk at the SEOC.

    a. Traffic signal damage due to the EMP affect and blast damage will be repaired if possible. Temporary traffic control will be provided at the direction of ESF-13 and ESF-1.

6. ODNR can support ESF-1 with heavy equipment outside the contaminated area.

7. ODNR can provide ground and water borne transportation into remote areas outside the contaminated area.

B. ESF-2 Communications and Information Technology (Primary: Ohio EMA)

1. Unique communications operational actions are outlined below and should be used in conjunction with portions of the State EOP, ESF-2.

    a. The State of Ohio Emergency Alert System (EAS) Plan can be activated by the state at the SEOC to support counties in distributing warnings and emergency public information.

2. The Electromagnetic Pulse (EMP) affect will cause excessive electronic damages and disruption to all new technology within the affected zone, including communications (radio, cell phones), computers, etc. All equipment brought in from unaffected areas will work as long as infrastructure is not destroyed by the blast (e.g. cell and radio towers). The existing EAS was evaluated as being fairly robust against an EMP attack.

3. Some communications towers and repeaters may remain functioning. Assessment of telecommunications infrastructure and coordination for repair support is conducted by ESF-2 agencies such as Ohio EMA, MARCS and PUCO.

4. Several state agencies can provide inter-operability communications equipment to support operations including: Ohio EMA, ODNR, OSHP, ODH, DAS, and SFM. State communications personnel cannot work in contaminated areas, but could be placed strategically to provide support to areas affected by the EMP.

    a. Communications vans can provide radio ranges of approximately 10 miles for mobile radios and three miles for handheld radios, depending on terrain and buildings in the area.

    b. MARCS portable radio towers could be deployed into contaminated zones and would provide similar coverage. These towers would require personnel able to make entry for delivery and maintenance.

    c. Handheld radios issued to personnel in contaminated areas can be decontaminated.

5. Federal resources such as the National Communications System could provide support to coordinate with major telephone and cellphone companies.

C. ESF-3 Engineering & Public Works (Primary: ODNR)

1. Unique engineering and public works operational actions are outlined below and should be used in conjunction with portions of the State EOP, ESF-3.

2. Emergency Debris Clearance

    a. Emergency debris clearance efforts must initially focus on access for response activities and resources, opening roads to allow for evacuation of survivors, and access to critical infrastructure.

    b. Debris Task Forces will need to include radiological detection equipment and follow safety procedures.

    c. The initial priority will be deploying resources into the LDZ that does not have radiological contamination to clear rights of way and evacuation routes.

    d. Incident Commanders should evaluate deploying resources further into the MDZ based on radiological hazards to allow for search and rescue entry.

    e. Contaminated debris that is cleared to provide immediate access may remain in the immediate area until disposition is determined.

3. Debris Management, Clearance, and Disposal

   a. ESF-3, Tab A, Debris Management Plan outlines debris functions and processes (assessment, collection, site selection, reduction, disposal). Specific actions related to contaminated debris are outlined below.

   b. Clearance and disposition of contaminated debris may be days/weeks before it begins. This is not an emergency function and will be addressed later in the recovery effort.

   c. There will be two types of debris generated, contaminated debris, from either fallout or direct neutron activation, and non-contaminated debris which will mostly be demolition type debris. The Debris Management Working Group will be activated to coordinate state agency resources for mission assignments.

      i. ODH BRP and OEPA to set standards on definition of contamination and methods of decontamination, with federal partners (FRMAC- DOE, U.S. EPA, etc.).
      ii. All debris will be monitored; a determination of contamination will be made, divided and kept separate, and handled accordingly. All debris within the fallout areas is assumed to be contaminated. Non-contaminated debris can be disposed using normal debris handling procedures.

   d. Workers assigned to contaminated debris clearance may consist of ONG, US Military, USACE, contractors, etc.

   e. Contaminated equipment should stay in the contaminated zones and only work in that area until work is complete.

   f. Approaches to debris clearance and disposal will be dependent on the location of the detonation, local conditions, and response priorities. Unique solutions will have to be considered including the potential for locating disposal sites out of state.

   g. Assessment and evaluation of contaminated debris, storage, reduction, and disposal sites will be made by a Debris Management Working Group headed by ESF-3 agencies and federal partners. The Debris Management Matrix outlines state agency roles.

      i. ODH BRP has primacy (3748 ORC and 3701:1-54 OAC) of radiologically contaminated waste material.
      ii. OEPA will assist in finding local disposal sites that will meet ODH criteria.
      iii. This will be an intensive effort with many levels of approval and coordination across many states and federal agencies.

iv. Considerations may also need to be made to temporarily store debris at consolidation/processing sites prior to final disposal.
v. For discussion of waste options/dose related issues see the 2013 revision to EPA 400 PAG Manual.

4. Public Works

a. Assessment of critical infrastructure will be needed to determine the amount of damage and contamination. A cost benefit analysis will determine whether decontamination or replacement/relocation is more practical.

b. Engineering assessments for infrastructure will be coordinated by ESF-3. Assessments inside the contaminated zones will be requested from the US Military or ONG units, as many state agencies may not be able to work in contaminated areas.

i. Preference should be given to those evaluations that will have an immediate impact on essential response and recovery efforts.
ii. OEPA can provide subject matter experts for assessment of water and sewage treatment plants and protective action recommendations for the sites.
iii. ODNR can provide subject matter experts for engineering and dam safety related to flood control structures outside of the contaminated zones.
iv. ODOT can provide engineers for roads and bridges outside of the contaminated zones.
v. The Department of Commerce, Division of Industrial Compliance and Labor can provide building inspectors and building code officials.
vi. The Ohio Building Officials Association can be utilized to obtain additional inspectors.

c. Decontamination of exterior and interior structures to restore critical functions, which may include buildings, streets, and walkways, will be coordinated by OEPA, ODH and U.S. EPA to determine priority and methodology.

d. Public Water Supply (PWS)

i. Damage to PWS physical infrastructure is likely in the SD and, to lesser extent, MD zones, including both production and distribution systems. Production control systems will be affected out to the limits of the EMP as most modern systems use electronic controls affected by EMP or overvoltage scenarios via wired networking.
ii. 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.

- Water towers connected to systems with pipe breakage may empty immediately.
- Isolation valves, if present, are manually operated or electronically controlled.
- Support to local jurisdictions will be critical to restore PWS operations and fuel allocations to water supply equipment must be considered.

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

iv. The ESF-10 plan discusses sampling, monitoring, and testing of water supplies.

e. Waste Water Treatment

i. To prevent collateral health impacts, it will be important to restore and maintain sanitation and wastewater infrastructure.

ii. Access to sanitary services for survivors will be critical, especially in areas where decontamination operations and reception centers are established.

iii. 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.

iv. 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.

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

5. Emergency Power Generation

a. Due to significant EMP and blast damages, power infrastructure will 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.

b. ESF-3 will need to develop a generator task force to handle the overwhelming requests for generators. A limited amount of generator requests can be filled by state agencies such as ODNR, ODOT, DOC, ONG, 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).

c. Due to limited resources, requests should be prioritized to support medical and mass care facilities, response operations, and power critical infrastructure first.

d. Qualified personnel will be required to conduct a power assessment, generator install, maintenance and re-fueling checks. A support plan will need to be coordinated with ESF-1 for transportation and ESF-12 to ensure fuel availability.

D. ESF-4 Firefighting (Primary: SFM)

1. Unique firefighting operational actions are outlined below and should be used in conjunction with portions of the State EOP, ESF-4.

   a. ESF-4, Tab B, Fire Season Operations Plan may be partially utilized to assist with fire protection and provide additional resources.

2. 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.

3. 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.

4. 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.

5. Most response capabilities will be provided through mutual aid by neighboring cities, counties, and states.

   a. 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. The SFMs, Ohio Fire Academy could provide responders at staging areas Just In Time Training (JITT) on radiation exposure, monitors, dosimeters, PPE, etc. prior to entering the affected area.

7. 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.

   a. Extinguishing fires near the detonation site may be impossible due to radiological exposure levels, damages from the blast, and collapsed structures blocking access.

b. 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.

c. The tactics of responding fire departments will need to be altered. A defensive approach may be adopted, working from an outward location in, to limit the expansion of the disaster and to maintain the highest level of safety possible for responders. Other tactics not normally used in Ohio, such as aviation support for water drops, back burns, and defensive building drops for fire breaks may be utilized.

d. Prioritized facilitated evacuations near large fires may overcome the protective actions recommended for radiological exposures.

e. Managing fires that are not in danger of spreading, such as those caused by traffic accidents can be delayed to allow response units to focus on immediate life-safety issues in the MDZ or on evacuation support.

E. ESF-5 Information and Planning (Primary: Ohio EMA)

1. Unique emergency management/information and planning operational actions are outlined below and should be used in conjunction with portions of the State EOP, ESF-5, the SEOC Concept of Operations Manual and supporting SOPs.

2. The immediate ESF-5 action will focus on analyzing and sharing the projections of the dangerous fallout downwind of the blast.

   a. 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.

   b. Initially, the key parameters that significantly influence the fallout plume will be uncertain- detonation location, height of burst, and device yield. As the response progresses, observations and radiation measurements on the ground and in the air must be directed toward identification of burst conditions and ground truth regarding the extent of fallout areas.

   c. Plume and dose data will be analyzed and coordinated as described in ESF-10 to provide the public with shelter and evacuation information. Federal technical assets will be requested to assist.

3. ESF-5 will provide coordination of federal and state entities with radiological assessment responsibilities to obtain the most accurate situational data available to guide the planning and response. These capabilities are described in the ESF-10 plan.

4. Incident Evaluation

    a. Incident evaluation 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.

    b. Other critical information for evaluation:
        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

    c. 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. In order to define and execute operations, detailed measurements using local measurements or federal assets (e.g., Civil Support Team, DOE Consequence Management), when they become available, will be required.

    d. 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 which is detailed in ESF-10.

5. Depending on the impacted area, ESF-5 may coordinate the organization of the state's response into regions.

    a. Multi-disciplined task forces will be assigned leaders based on the expertise required in each area or by the skill sets available in state leadership.

    b. These task forces will coordinate efforts with the unified command made up of local first responders and federal agencies.

    c. The task forces will receive overall direction from the State of Ohio's Emergency Operations Center.

F. ESF-6 Mass Care (Primary: Ohio EMA)

1. Unique mass care operational actions are outlined below and should be used in conjunction with portions of the State EOP, ESF-6.

    a. Tab A, Functional Needs Plan will be activated to address needs of special populations with functional limitations.

2. Mass care providers will be responsive to the direction of Incident Command and other officials in carrying out treatment and in providing services to incident survivors.

    a. Mass care providers will need to apply adequate agency-based procedures to ensure that treatment and services promote the health, safety and welfare of incident survivors and service providers.

    b. Some mass care response agencies will not allow workers in the hot zone and may need to develop additional SOPs to protect workers exposed to contaminated survivors.

3. 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.).

4. Support from national-level mass care agencies and other states will be needed and critical to effectively respond to survivors' mass care needs.

5. Shelter-in-Place Recommendations

    a. The initial population protection action immediately following a nuclear explosion will be to quickly take shelter in the nearest and most protective structure. Protective Action Decisions are discussed in detail on page 19.

    b. No evacuation will be considered until fallout zones and radiation dose rate information has been assessed by the SEOC Assessment Group as described in ESF-10.

    c. 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.

6. Evacuation and Mass Care Shelter Operations

    a. After a shelter-in-place order has been lifted, self-evacuees will begin to find more permanent shelter with friends, family, or at a mass care shelter.

    b. Dose rate information will be publicly distributed so that survivors can make informed shelter and evacuation decisions.

    c. Pre-identified mass care shelters that are outside of the impacted area will need to be utilized to accept self-evacuees and survivors.

d. ESF-6, Tab C, Mass Evacuation Support Plan (currently in draft) 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.

e. 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.

    i. It may be necessary for evacuation operations to be accomplished in phases in response to limitations of resources and accommodations, both in the area being evacuated and in the receiving locations.

f. All evacuees will be triaged for medical needs, as detailed in ESF-8.

g. 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 Support and Logistics (Primary: DAS)

1. Unique logistics operational actions and considerations are outlined below and should be used in conjunction with portions of the State EOP, ESF-7 including:

    a. ESF-7, Tab A, Donations Management Support Plan to facilitate the use of donated goods and services.

    b. Catastrophic Incident Response Annex, Tab X, Catastrophic Resource Management Plan (currently in draft) to address the management of resource support from all potential partners.

2. An IND incident will require an extraordinary level of resources. A State Staging Area (SSA) will be established to manage state resources and must be located outside of the hot zone.

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 also be increased by as much as four hours due to detours, roadblocks, etc. A disruption in communications may hinder delivery coordination.

5. Decontamination of equipment entering and leaving contaminated areas could add time to transportation missions, and policy may need to be developed.

H. ESF-8 Public Health & Medical Service (Primary: ODH)

1. Special considerations for the health and medical functions post nuclear blast are outlined in the situation section of this plan. Unique IND operational actions are outlined below and should be used in conjunction with portions of the State EOP, ESF-8 including:

   a. ESF-8, Tab A, Strategic National Stockpile (SNS) Plan to request large quantities of federal medical materiel.

   b. *ESF-8, Tab D, Acute Mass Fatalities Incident Response Plan* for guidance on actions in response to immediate deaths.

   c. ESF-8, Tab E, Non-Acute Mass Fatalities Incident Response Plan to address radiation exposure and trauma fatalities that will occur over a longer time period.

   d. ESF-8, Tab F, Mass Casualty and Medical Surge Plan to address injuries, overwhelmed hospitals and allocation of scarce medical resources.

2. ESF-8 will collect information on the status of hospitals and medical care (MC) facilities equipped to handle medical surge in relation to damage zones using MedMap (HHS GIS system) and Ohio's hospital bed count system- SurgeNet. ESF-8 may also collect information on local medical triage and assembly Centers (AC) that are activated in response to the event.

3. Triage will be an important component of operations due to scarce resource conditions. Initial mass casualty triage will take place in the field by first responders and USAR teams. Subsequent clinical triage will also take place in hospitals and temporary care facilities for more definitive medical management. There is currently no federal or internationally agreed upon medical triage systems specifically for radiation mass casualty incidents, however guidance is available.

4. Crisis Standards of Care

   a. During scarce resource conditions, emergency responders and healthcare facilities will likely have to modify conventional clinical standards of care and adopt Crisis Standards of Care to maximize the number of lives saved, in accordance with ESF-8, Tab F. Under the Crisis Standards of Care, victims are triaged based on levels of injury and survivability, and are provided care using limited resources to benefit the greatest number of patients.

b. The ODH is currently developing a Scarce Resource Situations Plan that may also be utilized.

5. Medical Evacuation and Surge Task Force

a. A Medical Evacuation and Surge Task Force may be created to assist with requests and coordinate mutual aid to local triage and medical centers. Federal assets will also be requested such as the FEMA National Ambulance Contract, , HHS Disaster Medical Assistance Teams (DMATs) and Federal Medical Stations (FMS- mobile hospitals), and assistance to evacuate hospitals through the National Disaster Medical System (NDMS).

b. The following models describe how medical surge response and facilities may be organized by locals and supported by state and federal assets. These models include the following linked concepts: Radiation TReatment, TRiage and TRansport System (RTR), Medical Care (MC), Assembly Centers (AC), Evacuation Centers (EC), and Community Reception Centers (CRC).

c. Radiation TReatment, TRiage and TRansport System (RTR System)

i. 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.

ii. 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.

iii. Radiation TReatment, TRiage and TRansport System (RTR) sites will form spontaneously and 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.

iv. There are three general categories of RTR sites:

- RTR 1 sites will be in the moderate damage zone or just near the severe damage zone and have severely limited time for responders because of radiation exposure. Many or most affected persons are non-ambulatory, or soon will be; victims will have physical trauma, burns, acute radiation syndrome, and combined injuries, making evacuation very difficult. Transportation to MC centers will be extremely limited and delayed, response assets will be difficult to deploy.

v. RTR 2 sites will be in the moderate and light damage zones but along the fallout plume where radiation dose will limit responder time and actions.

- Most victims will be ambulatory, and many fewer victims will have combined injuries. Many victims may have significant radiation exposure from fallout. Transportation to MC centers may still be delayed reaching these sites.

vi. RTR 3 sites will be sites with low radiation dose, with little limitation on time or actions.

- Almost all victims will be ambulatory and many people may have minor to no injuries and no significant radiation exposure. Some will be displaced persons. Following triage and initiation of minor treatments where applicable, available transportation assets will evacuate victims to MC or AC sites as appropriate.

d. Medical Care (MC) Sites

i. Local healthcare facilities will be off-line due to infrastructure damage, radiation, or simply overwhelmed by large numbers of casualties.
ii. Victims requiring immediate medical care will be directed to Medical Care (MC) sites located outside of damage or fallout/contamination zones.
iii. MCs 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.
iv. Regional and national-level assets, such as Radiation Injury Treatment Network (RITN) sites, cancer centers, burn centers, and trauma centers will be utilized.

- There are over 40 RITN centers located across the country. Regionally, facilities are located in: Cleveland, Cincinnati, Detroit, Pittsburgh, Indianapolis, Chicago, and Buffalo.

v. Medical response caches will be mobilized to the 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.

e. Assembly Centers (AC)

i. Assembly Centers (AC) may be planned evacuee-receiving centers or natural collection points such as schools, public stadiums, convention

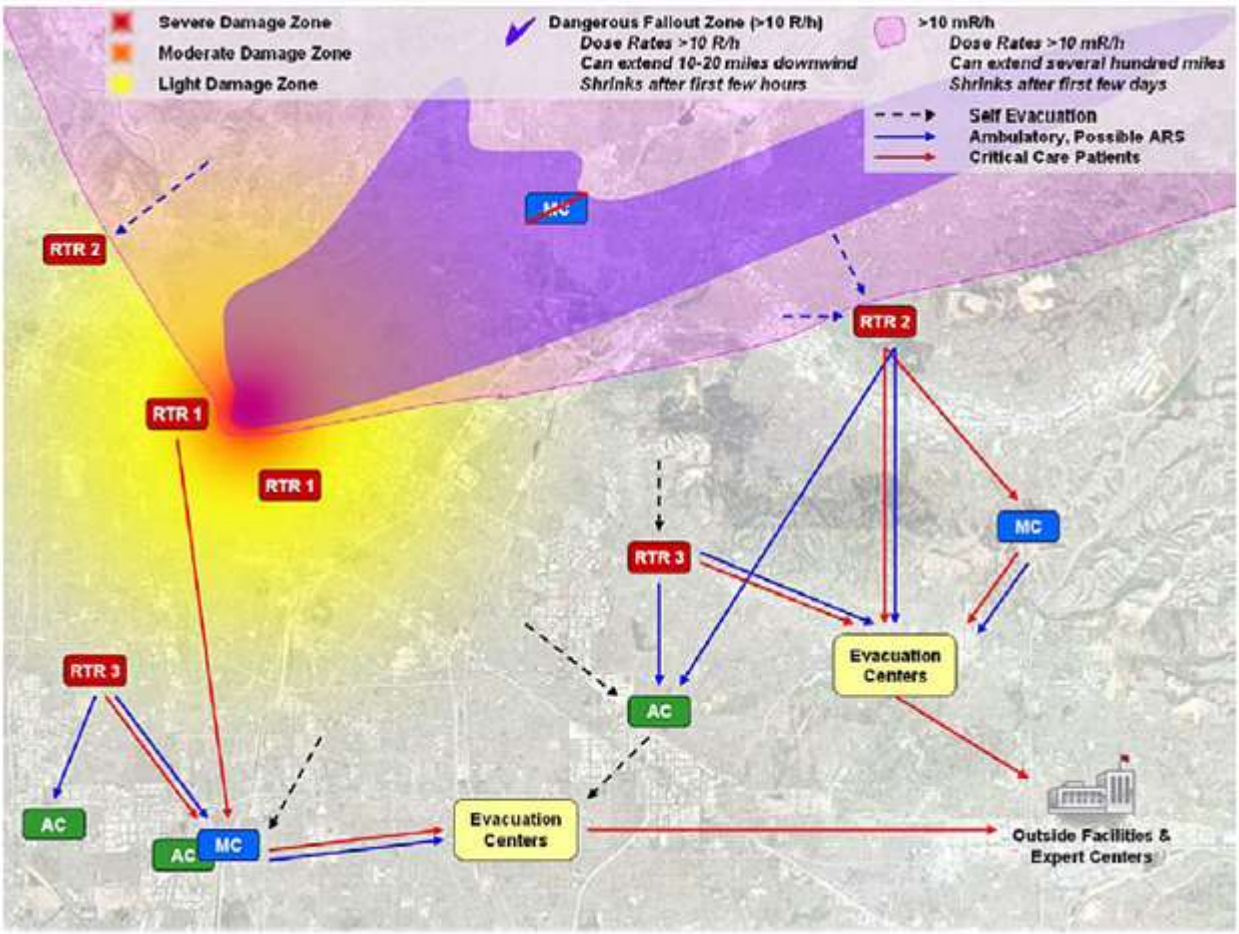
centers, and highway rest stops where evacuees can obtain food, temporary shelter, and register for evacuee tracking purposes.

ii. 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.

f. Evacuation Centers (EC)

i. Evacuation Centers (EC) are hubs for major victim and evacuee transport by land, rail, air, and water.

ii. These centers may also serve as marshaling areas for incoming supplies and personnel, in addition to transport for outgoing exposed/displaced persons.



Conceptual diagram of the RTR system, from initial first aid through transport to medical facilities.

g. Community Reception Centers (CRCs)

i. CRCs are population monitoring locations operated by local public health agencies to assess survivors for exposure, contamination, and

decontamination and referral to medical treatment, other care, or sheltering.

ii. Population monitoring can aid in mitigating the effects of a mass casualty or medical surge by assessing the "worried well", triaging patients for exposure, and easing the patient burden on the medical care infrastructure so it can focus care on more critical patient medical needs.

iii. CRCs should be established at or near AC sites or other shelters operated by the American Red Cross and are approved by ODH.

iv. CRC locations may be pre-determined and have equipment and supplies located in, or nearby, to accommodate CRC functions. CRC locations may be set-up based on circumstance at locations not previously evaluated, provided that they meet the established criteria.

v. CRCs will be staffed by local government agencies with the personnel designated for these functions (e.g., local health, fire, EMS, other local/regional volunteer groups), along with specific support from members of the Radiation Response Volunteer Corps (RRVC).

    - The Radiation Response Volunteer Corps is a sub-set of the Medical Reserve Corps (MRC) managed by ODH. RRVC volunteers are radiation protection professionals who will augment local staffing by functioning as the health physics, medical physics, and radiation protection personnel in CRC operations.

vi. RRVC staffing will be coordinated between ODH, Medical Reserve Corps (MRC), the Ohio Responds System, and state and local planning partners.

vii. ODH will provide project management, technical support, and available resources to CRC and RRVC operations, as required or requested by local entities.

6. Management of the Deceased

    a. Management of the deceased resulting from an IND event may be handled generally in accordance with Tabs D and E of ESF-8, however, specific considerations need to be made.

    b. Due to the hazards involved, locals will rely heavily on Disaster Mortuary Operational Response Teams (DMORT) and the SEOC assist in the coordination of mutual aid, external resources, and volunteer services.

    c. Radiation contamination to morgues and handling of the deceased in regards to radiation dose will be advised by ODH BRP.

        i. All decedents should be subject to a complete radiation survey to confirm the absence or presence of contamination. No radiation-specific precautions are needed for deceased persons with exposure to radiation but no contamination; use standard autopsy procedures and transported to an uncontaminated morgue.
        ii. Decedents with low radiation levels can be processed in field morgue, along with a forensic examination and victim identification. Prior to release of the body, decontamination should be conducted.
        iii. Decedents with significant radiation levels should be moved to refrigerated storage; DMORT or ODH BRP will help determine how long to store the body.
        iv. If necessary to perform an autopsy on an internally contaminated body, refrigerate decedent and defer the procedure until a health physicist can assist in planning as the Pathologist performing the autopsy may receive significant radiation dose to the hands.

    d. Embalming and Funeral Home Guidelines

        i. Embalming increases radiation dose to funeral home staff embalming or working near decedents with unknown radiation levels should be avoided. To minimize radiation dose, staff should bury decedents without embalming whenever possible. Body fluids may be drained into the sewer.
        ii. Funeral home directors may reject radioactively contaminated decedents not properly decontaminated (i.e., with loose surface contamination or shrapnel). Rapid burial of internally contaminated decedents should be encouraged, as well as conducting a memorial service without the body to minimize radiation dose to mourners and funeral home staff.
        iii. Special family circumstances (emotional, religious, cultural) may dictate conduct of funeral service with the body present. Family/friends in close contact with the decedent are at risk for contamination and/or exposure; time, distance, and shielding (closed casket) principles should be encouraged.

e. Cremation and Burial of Contaminated Patients

i. Do not cremate internally contaminated decedents as radioactive contamination of the facility and environment is highly likely.
ii. Burial of a body with internal contamination constitutes only minimal health risk to humans or the environment.
iii. Use of wooden coffins/caskets should be avoided as these are not sealed against elements entering or exiting the container. Use of metal coffins/caskets are preferred as these are sealed and have pressure release capability.
iv. Vaults may be metal or concrete; however a tight seal is key to effective vault use. Discrete radiation warning labels should be posted on the exterior of the vault indicating dose rate and date/time.

I. ESF-9 Search and Rescue (Primary: ODNR)

1. Unique search and rescue operational actions are outlined below and should be used in conjunction with portions of the State EOP, ESF-9.

2. Some search and rescue (S&R) teams in Ohio may be impacted by the event and 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. 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 should 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.

J. ESF-10 Hazardous Materials (Primary: OEPA)

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.)

3. 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.

4. Field Data Collection

    a. State resources in conjunction with local and federal groups establish a network of "field monitors" who are practiced in compiling plume date, fallout data, and general area conditions.

    b. 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.

    c. 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.

    d. 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.

    e. Synthesis of diverse data scattered across the region will help to render a more accurate picture of fallout distribution. Various inputs are needed to construct the broad operating picture: plume projections; visual observations of the fallout cloud; discernible fallout particulates; and most important, actual radiation measurements from the field.

    f. Field monitoring teams would be comprised only of members of the OEPA Radiation Assessment Team (RAT) and ONG 52nd CST-WMD that are trained and equipped to enter the hot zone.

    g. Other state agency personnel with measuring or environmental sampling capabilities will be utilized to collect data readings on the outer boundaries.

    h. Federal resources will be requested from DOE, DHS, etc as outlined in the ESF-10 plan. Coordination with federal partners for field monitoring, sampling, and analysis will be crucial.

    i. Radiological data will be processed by the Radiological Assessment Branch to recommend protective actions to general areas. Additional information on the conditions of shelters in a specific area will be needed to provide more exact protective actions. Information relayed to the public may be such that educational information will be relayed and individual shelter decisions will need to be made on a case-by-case basis.

K. ESF-11 Agriculture (Primary: ODA)

1. Unique agriculture operational actions are outlined below and should be used in conjunction with portions of the State EOP, ESF-11.

   a. ESF-11, Tab A, Animal Disease Incident Plan may be activated to assess and respond to the radiological impact on animals.

   b. ESF-11, Tab B, Veterinary Stockpile Plan 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. Personnel do not have the training or equipment to make entry into the hot zone.

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.

6. Advisories and Precautionary Bans

   a. No transport, sale, processing or consumption of locally produced foods or fibers including vegetables, fruits, eggs, poultry, livestock, milk, honey, mushrooms, herbs, grain and animal feed, forest products and lumber.

   b. Farmers and other food producers are advised not to destroy any food products unless they are spoiled or otherwise advised to by the appropriate state agency.

   c. No farming activities such as plowing, cultivating or harvesting which could re-suspend contaminated materials and create a health hazard for farmers and others.

   d. No use of water drawn from private water supplies that could result in ingestion, such as drinking, washing food, cooking or bathing. Bottled water and water stored in containers before the incident occurred may be used.

Water drawn from a deep well or other protected sources is exempt, but cisterns supplied by run-off or other unprotected sources are not exempted.

e. These advisories do not apply to foodstuffs and water obtained before the radiological incident. Food and water in unopened containers are safe for consumption.

f. In addition, all lactating (dairy) animals should be taken off pasture, sheltered (kept under roof) and placed on stored feed and on well water or other protected water supply. If space permits, secondary consideration should be given to egg producing fowl, breeding stock, and other livestock and poultry.

g. If possible, cover feed and/or hay that are stored outdoors. Store as much water as possible by covering wells, rain barrels, tanks and other storage containers.

7. Agriculture Related Protective Actions

a. Two types of protective actions exist that will help prevent or lessen the possibility of persons consuming contaminated food or water:

i. *Preventive actions* prevent or minimize contamination of milk and food products. Example: Sheltering livestock and placing them on stored feed and covered water.
ii. *Emergency actions* isolate or contain food to prevent its introduction into the marketplace and to enable testing to determine whether condemnation or other action is appropriate. Example: Restricting or withholding (embargoing) agricultural and dairy products from sale by prohibiting transportation to and from the affected areas.

b. Location-specific protective actions are issued during emergencies. The following are examples of general preventive and emergency protective actions for the food supply:

i. *Milk*- Remove all dairy animals from pasture, shelter if possible, and provide them with protected feed and covered water. Government officials may come to farms to take milk, feed, and water samples for laboratory analysis to determine whether any of these products are contaminated. Do not drink milk or consume any dairy product from cows or goats until laboratory results are available.
ii. *Fruits and Vegetables*- Wash, scrub, or peel locally grown fruits and vegetables to remove surface contamination. Prepare roots and tubers in this manner also.
iii. *Meat and Meat Products*- Farmers may be advised to place meat animals on protected feed and covered water and, if possible, to provide them with shelter. If livestock consume feed and water contaminated

with radioactive materials, some of the contamination will be absorbed into their bodies and then could enter the human food supply through meat and meat products.

iv. *Food Processors and Distributors*- Following a radiological emergency, government officials may restrict the movement of food products and withhold them from the marketplace (embargo). These products may not be released for use or distribution until they are determined safe for consumption or until a decision is made to dispose of them. If disposal is necessary, instructions on safe handling and disposal will be provided. State and/or federal agriculture officials will meet to discuss this process and establish timeframes. Food processors and distributors may act to minimize exposure at facilities by:

- Shutting down the air intake system
- Closing windows and doors
- Implementing procedures to monitor incoming food ingredients
- Radioactive contamination of milk or food products can occur during processing or during transportation. This may result from exposure to radioactive materials in the air, on the ground, or from contact with contaminated products. If contamination is verified, food and food products must be sampled prior to use or distribution.

v. *Poultry and Poultry Products*- Poultry raised outdoors, especially those kept for egg production, should be monitored by taking samples and performing laboratory tests to determine the presence of radioactive contamination. Contamination is reduced among poultry raised indoors on protected feed and covered water. If contamination is verified, state or local government officials will advise that poultry and eggs not be consumed or marketed.

vi. *Fish and Marine Life*- Fish and other marine life raised in ponds should not be harvested unless appropriate state or local government officials have analyzed samples and determined that they are safe to eat. Samples of water, fish, and marine life from open bodies of water may be analyzed to ensure that they are safe.

vii. *Soils*- If soil is contaminated, government officials will recommend soil management procedures to reduce contamination to safe levels. Idling, the nonuse of land for a specific period of time, may be necessary in some cases. However, in situations involving highly contaminated soil, removal and disposal may be more appropriate. Planting alternative crops also may be recommended in some situations.

viii. *Grains*- Most contamination on standing crops can be removed by wind and rain, depending on the stage of growth and whether grains are permitted to grow to maturity. Sampling and laboratory analysis will determine if the grain is safe to use. Contaminated and uncontaminated grains should be stored separately when harvested.

ix. *Water*- Covered wells and other covered or underground sources of water probably will not become contaminated. Radiation contaminants deposited on the ground will travel very slowly unless soils are sandy. It is unlikely that underground water supplies will be affected. Water intake valves from any contaminated water source should be closed to prevent distribution of contaminated water by irrigation or other processes.

x. *Honey*- Honey and beehives will need to be sampled and analyzed by state or local government officials if radioactive contamination is detected in the area. Apiaries will be instructed by officials on how to handle the hives and honey.

c. If contamination is verified, the following post-emergency actions will occur:

i. Re-entry- defined as the temporary entry, under controlled conditions, into a restricted zone.

- If evacuated, re-entry may be allowed, when conditions permit, into the restricted zone temporarily to perform essential tasks.
- Re-entry will allow vital activities as milking, watering, and feeding farm animals.
- State or local government officials will advise through official means if a decision is made to permit re-entry.
- Specific instructions on travel routes to use and safety precautions to take will be distributed.

ii. Recovery- the process of reducing radiation in the environment to levels acceptable for normal daily living.

- Following the emergency, state and local government officials will identify the types and levels of contamination.
- Samples of air, water, soil, crops, and animal products from farms or food businesses will be collected.
- Instructions and assistance in decontaminating animals, food, and property if such actions are necessary will be provided.
- Contaminated milk and food products will be isolated (embargoed) to prevent introduction into the market place. S
- State and local government officials will determine whether condemnation and disposal are appropriate.
- Unrestricted activity for homes, farms, processing facilities, or distribution centers may resume after concentrations of radioactive materials are reduced below limits set by the federal government.

L. ESF-12 Energy (Primary: PUCO)

1. Unique energy operational actions are outlined below and should be used in conjunction with portions of the State EOP, ESF-12.

2. PUCO will serve as a utility liaison in the SEOC and establish communications with each utility affected, and work with each company to establish a command and control structure.

3. The ESF-12 desk will facilitate mutual aid assistance to the utilities (e.g. provide customary transportation waivers).

4. PUCO will solicit staff and equipment from the Transportation Department, Hazardous Material Division trained to conduct level 6 radioactive inspections on commercial motor vehicles. Each staff is equipped with a Tyvek suit, gas mask, radiation swipes, thermo luminescent dosimeter, gamma radiation pager, and a survey meter.

M. ESF-13 Law Enforcement (Primary: OSHP)

1. Unique IND law enforcement actions are outlined below and should be used in conjunction with portions of the State EOP, ESF-13.

   a. Tab A, Corrections Facility/Prison Support Plan may be activated if any facilities are impacted.

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

3. 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.

4. 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.

5. 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.

6. The Ohio Bureau of Criminal Investigation's Crime Lab may provide assistance to the FBI if requested.

N. ESF-14 Recovery & Mitigation (Primary: Ohio EMA)

1. Unique IND recovery and mitigation actions are outlined below and should be used in conjunction with portions of the State EOP, ESF-14.

2. 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.

3. ESF-14 personnel and agencies are not equipped or trained to operate within the hot zone.

4. 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.

5. 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.

6. 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.

7. 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.

8. 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.

9. 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 (Primary: Ohio EMA)

1. Unique public information operational actions are outlined below and should be used in conjunction with portions of the State EOP, ESF-15.

2. 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.

3. Expect 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.

4. 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.

5. 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.

6. There are several resources for public messaging that will be utilized, such as the document, IND Response and Recovery, Communicating in the Immediate Aftermath. An example of an initial message follows.

Sample IND Initial Message
Impacted Community: Immediate Action Message
(Suggested for local or state spokesperson: Fire Chief, Mayor, Governor)

We believe a nuclear explosion has occurred at [Location] here in [City].

If you live anywhere in the metropolitan area, get inside a stable building immediately.

You can greatly increase your chance of survival if you take the following steps.

- **Go deep inside:**
    - Find the nearest and strongest building you can and go inside to avoid radioactive dust outside.
    - If better shelter, such as a multi-story building or basement can be reached within a few minutes, go there immediately.
    - If you are in a car, find a building for shelter immediately. Cars do not provide adequate protection from radioactive material.
    - Go to the basement or the center of the middle floor of a multi-story building (for example the center floors (e.g., 3 – 8) of a 10-story building).
    - These instructions may feel like they go against your natural instinct to evacuate from a dangerous area; however, health risks from radiation exposure can be greatly reduced by:
    - Putting building walls, brick, concrete or soil between you and the radioactive material outside, and
    - Increasing the distance between you and the exterior walls, roofs, and ground, where radioactive material is settling.
- **Stay inside:**
    - Do not come out until you are instructed to do so by authorities or emergency responders.
    - All schools and daycare facilities are now in lockdown. Adults and children in those facilities are taking the same protective actions you are taking and they will not be released to go outside for any reason until they are instructed to do so by emergency responders.
- **Stay tuned to television and radio broadcasts for important updates**
    - If your facility has a National Oceanic and Atmospheric Administration **(**NOAA) Weather Radio, this is a good source of information.
    - If you have been instructed to stay inside, stay tuned because these instructions will change.
        - Radiation levels are extremely dangerous after a nuclear detonation, but the levels reduce rapidly in just hours to a few days.
        - During the time when radiation levels are the highest, it is safest to stay inside, sheltered away from the material outside.
    - When evacuating is in your best interest, you will be instructed to do so.
    - People in the path of the radioactive plume – downwind from the detonation may also be asked to take protective measures.

P. Ohio National Guard (ONG) Support (Primary: Adj. General's Office)

1. The ONG serves as support agency role for every ESF, as needed and outlined in the State EOP.

2. As outlined in the ESF-10 plan, the ONG, 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.

3. As outlined in the ESF-10 plan, the ONG 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.

    a. Search and extraction capabilities are limited to walking teams locating survivors and executing basic extraction techniques until heavier equipment is brought in.

    b. The HRF provides security forces under the National Guard Response Force (NGRF) and Quick Reactions Force (QRF).

    c. The HRF is one of two standing HLS/HLD task Forces designated for an initial ONG response to Terrorist and CBRNE incidents and can expand to provide mission command to subordinate units depending on the situation.

    d. 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.

4. 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.

5. 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 ONG will be scaled based on the incident, required ONG response and capabilities requested by the state or other agencies.

6. The Ohio National Guard will provide Liaison Officers (LNO) from the ONG Joint Operations center to the SEOC and possibly other locations as well. These LNOs will coordinate and assist with information between organizations and provide recommendations to the SEOC as well.

7. The SEOC should anticipate 24-hour window between alerted units and forces available for support in the event of a WMD/IND event.

OPERATIONS SYNCHRONIZATION MATRIX

Trigger Points

1- Notification, Warning, & Initial Shelter in Place (H-Hour to H+1)
2- Activation, Deployment (Stage, Force Protection), & Shelter (H+1 to H+24)
3- Initial Response & Evacuation (H+24 to H+72)
4- Federal Response Integration (H+72 to H+96)
5- Long-Term Recovery (H+96 to H+)

Table 4. Operations Synchronization Matrix

Trigger Point	Hour	Organization	Action
Trigger Point 1- Notification, Warning, & Initial Shelter in Place (H-Hour to H+1)			
1	H	ALL	Receive notification of event
1	H	ESF-5 Assessment	Collect initial blast area information
1	H	Commo/Operations	Issue state EAS message and distribute initial warning information from all available sources to shelter in place
1	H	ESF-5 Assessment	Activate SEOC, send out CAS Leader Alert
1	H	Director	Assess need for State Government COG Plan activation
1	H	ESF-5 Assessment OEMA/ODH	Run initial hotspot plume models
1	H	ESF-5 Assessment OEMA/ODH	Identify areas effected and recommend protective action decisions (PADs)
1	H	Commo/Operations	Refine state EAS message and distribute warning information from all available sources
1	H	JIC	Disseminate public messaging on shelter and evacuation recommendations
1	H	ALL	Take initial shelter-in-place actions if in affected area
1	H	Director	Request Governor Emergency Declaration
1	H	Operations	Request recon fly-over of damaged area
1	H	Operations	Activate ONG, CST-WMD, HRF, OEPA RAT
1	H	ALL	Assess impact to workforce and state assets
Trigger Point 2- Activation, Deployment, & Shelter (H+1 to H+24)			

2	H+1	ALL	Prepare for force protection (order/mobilize PPE, provide just-in-time training for responders)
2	H+1	Plans/Ops	Request SEOC SMEs
2	H+1	Plans/Ops	Conduct CAS Brief
2	H+1	Governor/Director	Request Federal Assistance (DOE FRMAC, DOE RAP Teams, AMS flyover, NDMS, SNS, DMATs, burn teams, FMS, ambulance contract, USAR, DMORT, VMAT), special teams, EMAC, etc.
2	H+1	ESF-5 Assessment OEMA/ODH	Run +1hr. plume models and update PADs
2	H+1	JIC	Disseminate updated public messaging on shelter and evacuation recommendations
2	H+1	Operations	Request TFR over area +2 miles except for medical and USAR operations
2	H+2	Commo	Deploy communications support to affected area (COWs, radio caches)
2	H+2	ESF-5	Deploy Field Monitoring Teams, Field Liaisons, etc.
2	H+2	ESF-8	Assess hospital bed availability, activate medical surge, request SNS
2	H+2	ESF-5 Assessment OEMA/ODH	Run +2hr. plume models and update PADs
2	H+2	JIC	Disseminate updated public messaging on shelter and evacuation recommendations
2	H+3	Logistics	Locate potential State Staging Areas
2	H+3	ESF-1 & Operations	Identify evacuation routes
	H+3	ESF-8	Identify potential Assembly Centers and RTRs
2	H+3	ESF-6	Shelter support to locals
2	H+3	ESF-10	Decon & Showers
Trigger Point 3- Initial Response & Evacuation (H+24 to H+72)			
3	H+24		Initial Response
			Evacuation
			Mass Care
Trigger Point 4- Federal Response Integration (H+72 to H+96)			
4	H+72		Federal Response Integration
Trigger Point 5- Long-Term Recovery (H+96 to H+)			
5	H+96		Long Term Recovery