Chemical, Biological, Radiological, Nuclear and Explosive (CBRNE)

Hazard Protocol

Updated and Re-designed with assistance from:

71st Civil Support Team (CST)
Davenport Fire Department (DFD)
Des Moines Fire Department (DMFD)
Des Moines County Emergency Management Agency (EMA)
Iowa Department of Health and Human Services (HHS)
Iowa Department of Homeland Security Emergency Management (HSEM)
Iowa State University Environmental Health and Safety (EH&S)
Polk County Emergency Management Agency (EMA)
State Hygienic Laboratory (SHL) at The University of Iowa
Story County Emergency Management Agency (EMA)

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Design - How to use this Protocol

This protocol has been redesigned and updated to provide first responders a quick reference tool for CBRNE response. The protocol was developed utilizing the common acronym **RAIN, which stands for (R) Recognize, (A) Avoid, (I) Isolate, and (N) Notify.** This acronym is often used in first responder training and awareness programs. The intent for use of this document, is to begin at **Tab #1 Recognize the Potential Hazard**, in order to determine the type of hazard and then move to the appropriate tab **(Tabs #2-6)** containing specific actions for the specific hazard type. **Tab #7** contains general decontamination information for all hazard types. **Tab #8** contains information to assist in the termination and/or transition of the incident. In addition to the protocol, a set of supporting annexes **(Annexes #1-7)** provide more specific tools, guidance, and operational policy/procedure recommendations.

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Introduction

Disciplines at the local, state, and federal level continue initiatives to improve preparedness and response to Chemical, Biological, Radiological, Nuclear and Explosives (CBRNE) threats. Potential threats continue to exist, and actual attacks have occurred, such as when the U.S. mail became contaminated with Anthrax in October 2001. No community is immune from these types of threats. In order to protect the health and safety of the citizens of Iowa, it is imperative that multilevel interagency coordination and resource management be achieved through the use of Unified Command (UC) under the Incident Command System (ICS). It is also important that uniform protocols are understood and executed across all disciplines. Additionally, National Incident Management System (NIMS) implementation will be necessary across the state.

All Iowa emergency services should have protocols and operating procedures developed, exercised and in place to respond and manage CBRNE hazards. Multiple local and state agencies have collaborated in developing this protocol to improve multilevel interagency communication, coordination, and resource management in response to CBRNE incidents in Iowa. Lessons learned from exercises, drills, and real-life experiences have been incorporated. Ongoing reviews and updates are necessary to keep pace with changing technology, lessons learned, and real-life experiences.

Purpose

The purpose of this protocol is to provide guidance on safe, efficient, and effective assessment, response and mitigation during an incident involving, or possibly involving, a CBRNE threat. Due to the unique resources, needs, population, and geography associated with these types of incidents in Iowa, local and or state authorities may enhance portions of this protocol to meet local needs. However, if protocol modification is going to occur, it is STRONGLY recommended that appropriate response agencies and authorities be actively involved in the decision-making process and any modifications be communicated and shared with all response partners.

This protocol takes an "incident-based" approach while following NIMS and the incident/unified command system. It focuses on achieving the earliest recognition and response to a CBRNE incident whenever possible. For this protocol, response execution should transition to supporting other local, state and federal plans as the incident develops, grows, or transitions to intermediate or long-term phases or cleanup.

This protocol does not include preventative detection or joint hazard assessment guidance. Contact the Iowa Department of Health and Human Services (HHS), Bureau of Radiological Health for preventative detection guidance and the 71st Civil Support Team (CST) Weapons of Mass Destruction (WMD) for joint hazard assessment guidance.

Intended Audience

This protocol model has been developed for use by fire service, hazardous material (HAZMAT) teams, law enforcement, dispatchers/telecommunicators, public health, emergency management, emergency medical services, and hospitals.

Tab #1 Recognize the Potential Hazard

This section of the CBRNE Hazard Protocol has been developed to provide guidance on identifying indicators that an incident has occurred as a result of the intentional or accidental use/release of CBRNE material. It is also developed for use by Incident Commanders, all first responders and public/private entities. **Annex #1** contains a checklist/form that may be utilized to help document critical information as an incident develops.

Response to a Suspicious Item:
1. Follow your agency or business emergency plan/procedures.
2. Immediately move away from the item as soon as possible.
3. Warn others and prevent them from approaching the item.
4. Notify your supervisor and law enforcement.
5. Remain available for interview by emergency responders, in a safe area.
6. Remain vigilant for secondary devices on your evacuation route and in designated assembly points.

Accidents Involving CBRNE Hazards:
1. Look for placarding.
2. Follow your agency or business emergency plan/procedures.
3. Utilize the **Emergency Response Guidebook (ERG)** or other similar guides and tools.
4. Proceed to the appropriate tab of this protocol for the identified hazard type:

Tab #2 Chemical Hazards
Tab #3 Biological Hazards
Tab #4 Radiological Hazards
Tab #5 Nuclear Hazards
Tab #6 Explosive Hazards

First Responder CBRNE Hazard - General Precautions and Warnings

Try to limit exposure to the hazard. If possible, ensure no additional people (including yourself) come in contact with the suspected item. Also, consider anyone who has been in contact with the suspect item or substance contaminated until proven otherwise by competent authority. Persons in contact with the suspect item should be distanced from others to avoid cross-contamination.

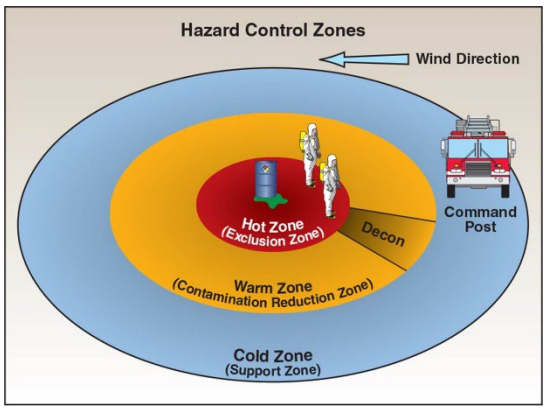
Ask that the suspect item and related packaging be left in place and immediately isolated and secured, and, if possible, control access to the room/area to protect others and minimize the spread of potential contamination.

It is recommended that all persons in contact with the suspect item isolate in the nearest safe location, away from the suspect item. Try to minimize the spread of potential contamination by ensuring exposed persons avoid contact with others.

If experiencing symptoms, it is recommended all affected persons remove their affected clothing and wash their hands; these simple actions should remove the majority of potential contamination.

Responders should reassure victims that additional assistance is on the way and responders will require several minutes after arrival to evaluate the circumstances, prepare to make entry, conduct preliminary monitoring and receive the people affected by the event.

Isolate and initiate hazard control zones. Restrict access inside the cold zone to those with proper personal protective equipment (PPE) and respiratory protection. Remember: It is easier to shrink these control zones later in an incident than it is to expand them.



All incidents and accidents involving suspected CBRNE Materials must be considered crimes, and the locations where they occur must be considered crime scenes. Initial triage, treatment and transportation of patients always takes precedence over the preservation and collection of samples and evidence. Contact and follow the guidance of law enforcement on evidence preservation.

Recognize Possible Indicators of a Chemical Hazard

The effects of chemical events are generally immediate and often severe. Among the possible indicators are:

- Multiple calls of sick or injured persons from the same general geographic area, venue or a specific large gathering of people, without explanation
- Report of a blast or explosion resulting in little to no structural damage
- Reports of unexplained liquids (e.g., droplets, oily substances)
- Reports of unusual odors (e.g., freshly mown grass, garlic, bitter almonds, peach pits)
- Reports of a released spray (e.g., hissing sounds, presence of a mist or vapor)
- Reports of an intentional mixture of chemicals causing harm
- Suspicious devices/packages (e.g., spray devices, damp/wet packages or bags, small explosive device that expelled a material)
- Unexplained dead wildlife or domestic animals
- Placarding indicating toxic or corrosive materials

For information on Chemical Warfare Agents (CWAs), please visit the Center for Disease Control's (CDC) website, Chemicals by Category:

For more information on chemical hazards, visit the following websites:
The CDC's website, Chemical Information for First responders:

Chemical Hazards Emergency Medical Management; Information for the First Responders:

Information for the First Responders - CHEMM (hhs.gov)

If a chemical hazard is suspected, proceed to **Tab #2 Chemical Hazards.**

Recognize Possible Indicators of a Biological Hazard

Initial intelligence, threats or reports of exposures to powders, liquids or infectious diseases that are suspect or unexplained, may indicate the occurrence of a potential biological event. Fortunately, if the event is discovered and reported immediately, there is generally time to conduct laboratory testing and to prescribe appropriate medication or treatment, if necessary. Initial test results are generally available from the State Hygienic Laboratory (SHL) within 6 hours of receipt of a test sample.

Unfortunately, it is difficult to identify a covert biological incident. Signs and symptoms of illness may not appear for days to weeks after an exposure. Senior citizens, children, or those who are immuno-suppressed may begin to experience signs and symptoms before others, due to a decreased immune defense system.

Because the impacts of a biological release may not be obvious for some time, it is important to follow the epidemiological clues to an unnatural event:

- An uncommon occurrence of disease with large numbers of patients, dead animals, and/or unusual manifestations of symptoms across many people
- Unscheduled and unusual spray being disseminated
- Abandoned spray devices
- Laboratory equipment
- Placarding indicating biological materials

Emergency medical personnel may begin to receive an increase in the numbers of calls for patients with flu-like symptoms, respiratory complaints or rashes. If this early recognition occurs, EMS and communications center personnel should notify their command staff of their observations and recommend local public health, medical services, and law enforcement investigators be notified.

For more information on Biological Emergencies, visit the CDC's website, Preparation and Planning for Bioterrorism Emergencies:

If a biological hazard is suspected, proceed to **TAB #3 Biological Hazards.**

Recognize Possible Indicators of Radiological or Nuclear Hazard

The effects of radiological events may be difficult to detect because the presence of radioactive or nuclear material may or may not be obvious. Health effects of most radiation exposures will not be immediately observable. However, in the case of a nuclear detonation or direct handling of an intact source, very high doses are possible and could result in early onset symptoms. Among the possible indicators are:

- A stated threat to deploy a nuclear or radiological device
- Unexplained deaths and illness
    - These will only be evident in very large exposures – 200 rad or above
    - Symptoms will not be immediately evident, even at the highest doses
        - Onset of symptoms will be delayed by several hours or days depending on level of exposure
- The presence of nuclear or radiological equipment
- Radiation hazard placards or warning materials
- Bright flash of light followed by large mushroom cloud reaching several miles in atmosphere
- Extensive radioactive fallout materials (sandy particles)
- Radioactive poisoning of foodstuffs, water sources and long-term illnesses
- Large-scale infrastructure destruction or interruption
- Radiation detection equipment reading more than two times background on two separate pieces of equipment at two different locations

For the purposes of this protocol, radiological and nuclear detonation incidents are categorized as:

1. A radiological incident or accident involves radioactive materials of any isotope. This can include transportation accidents or terrorist activities to disperse the existing radioactive materials using conventional explosives, dispersal spray devices, or other exposure means.

2. A nuclear detonation incident involves an uncontrolled fission reaction to release enormous amounts of energy in an explosion. This results in the creation of countless radioactive fission products in the form of large, sand-like particles called fallout.

This protocol does not include nuclear power plant accidents which are covered by separate local and state Radiological Emergency Preparedness (REP) plans and procedures for areas around a nuclear power plant.

If a Radiological Hazard is suspected, proceed to **Tab #4 Radiological Hazards.**
If a Nuclear Detonation Hazard is suspected, proceed to **Tab #5 Nuclear Detonation Hazards.**

Recognize Possible Indicators of an Explosive Hazard

The effects of explosive events are generally immediate and potentially severe. Explosives may be used to cause massive local destruction or to disperse chemical, biological or radiological agents. Always assume chemical, radiological or biological materials are present in the event of an explosion until determined otherwise. When approaching a scene, ensure all hazardous materials equipment/devices are turned on and ready for use, and keep this CBRNE Protocol available for reference.

Among the possible indicators of an explosive device are:

- Explosions with or without casualties
- Various types of localized blast damage and/or collapsed structures
- Unattended backpacks, boxes, containers, luggage and/or packages in an elevator, hallway, lobby, restroom, snack bar, stairwell, or exterior of a facility
- Any item that could be an improvised explosive device (e.g., items with antennas, batteries, timing devices, metal or plastic pipe with each end capped or covered, etc.)
- Devices attached to compressed gas cylinders, flammable liquid containers, bulk storage containers, pipelines, or other chemical containers
- Oversized packages with oily stains, chemical odors, excessive postage, protruding wires, excessive binding, no return address, etc.
- Rental vehicles/trailers parked at or near a facility without prior authorization
- Any type of vehicle that appears to be overloaded or has any substance leaking from it
- Any type of vehicle parked illegally or parked at an unusual location
- Any type of vehicle that appears to be abandoned (e.g., registration plate expired or missing, etc.)

NOTE: Untrained personnel should not examine or move a possible improvised explosive device (IED); the immediate area around the reported suspect item/vehicle should be cleared pending the arrival of bomb squad personnel.

If an explosives hazard is suspected, proceed to **Tab #6 Explosive Hazards.**

Tele-Communicator Specific Information for Recognizing the Potential Hazard

Through close scrutiny of the information provided, asking appropriate questions and crosschecking other reports, the tele-communicator should be alerted to the possibility

that a potential CBRNE incident may have occurred. These types of incidents will most likely yield a number of requests for assistance and additional resources from multiple disciplines. Properly identifying the incident, describing appropriate precautionary measures to potential victims and relaying vital information to responding units, are among the keys to minimizing the adverse impact of a CBRNE incident on the lives of victims and responders.

It is imperative that tele-communicators gather pertinent information, recommend precautionary measures to potential victims, send an appropriate response, provide updated response information and be prepared to support the unified command system during the response. The pertinent information and possible indicators should be relayed to all responding units. It is also crucial that all responding agencies are aware of the event and each other's response to the event.

Tele-communicators should be trained in terrorism awareness and be familiar with possible indicators of a possible CBRNE incident, whether intentional or accidental.

CBRNE Threat Received by a Tele-Communicator

If the tele-communicator is the direct recipient of a threat, the following should be noted:

- Incoming phone line information (Automatic Number Identification/Automatic Location Identification (ANI/ALI), caller ID, incoming phone line)
- Caller identifiers (sex, age, race, voice qualities, demeanor, sobriety)
- Exact language used (catch phrases, profanity or declaration of responsibility)
- Any specifics related to the threat (target, type of agent, delivery time or method)
- Background (people talking, music, traffic, construction, sirens, train whistles, or other noises that may assist in identifying where the call originated)

If the caller is the person or responder who received the purported threat, witnessed the event or discovered evidence following an incident, the tele-communicator should ask questions that will assist in determining the response to be sent and to provide precautionary information to the caller to minimize the impact of the incident and the potential spread of contamination.

- Confirmation of the caller's identity, location and contact information
- Determine whether the caller or others are experiencing signs or symptoms of illness
- Determine whether the incident is in progress or if a suspect is present or in the immediate area (description of the suspect, vehicles and direction of travel)
- Method the threat was transmitted (via telephone, mail, e-mail, or personal delivery) or if a suspicious letter or package is involved
- Why the caller believes a CBRNE hazard may be involved (presence of suspect, suspicious item, or powders, liquids, vapors or odors, or a specific agent was mentioned)
- Identify the specific location where the event initially occurred and where the suspect material/item is currently located (outside, inside, specific floor or office, or if it has been moved)

- Determine if the caller discovered a suspicious item or device
- Compare information with other reports of similar threats or activity to establish a developing pattern or possible connection between events or other major crimes
- If radiological or nuclear hazard is suspected, ask if any radiation detection equipment is available and record any radiation measurements reported from caller/responder

Tele-Communicator CBRNE Hazard Precautions and Warnings

Recommend that no additional people come in contact with the suspect item or others who may have already been contaminated by the suspect item or substance (individuals contaminated with radioactive materials do not need the same level of isolation from responders as some highly contagious biohazard or toxic chemicals).

Recommend the suspect item and related packaging be immediately laid down and the room where it is located be secured to protect others and minimize the spread of potential contamination.

If indoors, recommend heating, ventilation, and air conditioning (HVAC) systems be turned off to minimize the spread of potential contamination throughout the facility.

Recommend all persons who came in contact with the suspect item evacuate to the nearest safe location. Try to minimize the spread of potential contamination by avoiding contact with others.

If experiencing symptoms, recommend the person or persons remove, and bag their outer layer of clothing and wash their hands; these actions should remove a majority of the contamination.

Reassure victims that assistance is on the way and responders will require several minutes after arrival to evaluate the circumstances, prepare to make entry, conduct preliminary monitoring and prepare to receive the people affected by the event.

Encourage the caller to immediately call back, should anyone experience a change in their health conditions or other circumstances surrounding the event.

Recommend that responders turn on any available hazard detection equipment, including radiation detection equipment, when dispatched and ask them to report if there are any readings as they approach the area around the suspect item.

Tab #2 Chemical Hazards

If a chemical hazard is suspected:

<u>Avoid the hazard</u>:

- Go to a safe location to stage your operations
- Stay uphill and upwind of the hazard location
- If there is a visible cloud, stay well clear of it
- Utilize available personal protective equipment (PPE)
    - Structural firefighters' protective clothing provides thermal protection but limited chemical protection. With full respiratory protection (self-contained breathing apparatus (SCBA)), however, this may be sufficient to affect a line-of-sight rescue - **viability of victim(s) must be considered prior to these actions**

<u>Isolate</u>:

- Set up a perimeter from suspected hazard location: Emergency Response Guide #111 (ERG) for an unknown substance is 100 meters or 330 feet
    - If a tank, rail car, or tank truck is involved in a fire, ISOLATE for 800 meters (1/2 mile) in all directions
- Move ambulatory patients away from the area of highest concentration or source
- Confine all contaminated and exposed victims to a restricted/isolated area at the outer edge of the hot zone
    - Symptomatic patients should be segregated into one area and asymptomatic patients should be placed in another area
- Provide instruction to victims for immediate self-decontamination procedures (remove affected clothing, rinsing, wiping, etc.)
- Initiate Incident Command system
- Consider the effect that ventilation/HVAC systems may be having on agent dispersal. If there are questions regarding this effect, default to shutting off ventilation/HVAC systems

<u>Notify</u>:

Follow local protocols to activate the Hazardous Materials Team.

<u>When dealing with any suspicious CBRNE threat, please notify your local emergency management agency, who will in turn notify HSEM</u>. If you are unable to reach your local EMA, you should then contact HSEM directly. Advise as to the need for consultation, technical assistance, additional resources and/or capabilities from other agencies. HSEM will in turn notify state agencies and state emergency response teams, as appropriate.

County Emergency Management Agency (EMA)	
24-Hour Number (to be filled in by user)	**( )**
Iowa Department of Homeland Security and Emergency Management (HSEM)	
Main Office 24 Hour Number - press "0" and ask for Emergency Management Duty Officer	**(515) 725-3231**

Follow your local protocols for notifying receiving hospitals. Local hospitals will need to be notified that contaminated victims may self-present at the hospital.

Additional Guidance:

Although a device may appear harmless and finished dispersing, it should not be disturbed.

Self-decontamination techniques should be used whenever possible.

Consider the incident a crime scene; while it is imperative that the reaction be mitigated, it is also important to preserve the evidence.

Responders at the HazMat Operations level may have a more hands-on and defensive role in initial chemical response.

Track information (name and contact information at a minimum) of exposed individuals.

For information on decontamination proceed to **Tab #7.**

Tab #3 Biological Hazards

If a biological hazard is suspected:
Avoid the hazard:

- Go to a safe location to stage your operations
- Stay uphill and upwind of the hazard location
- If there is a visible cloud, stay well clear of it
- Utilize available personal protective equipment (PPE)
    - Structural firefighters' protective clothing provides thermal protection but limited biological protection. With full respiratory protection (SCBA), however, this may be sufficient to affect a line-of-sight rescue - **viability of victim(s) must be considered prior to these actions**

Isolate:

- Set up a perimeter from suspected release location: Emergency Response Guide #111(ERG) for an unknown substance is 100 meters or 330 feet
- Confine all contaminated and exposed victims to a restricted/isolated area at the outer edge of the hot zone
    - Symptomatic patients should be segregated into one area and asymptomatic patients should be placed in another area.
- Provide instruction to victims for immediate self-decontamination procedures (remove affected clothing, rinsing, wiping, etc.)
- Initiate Incident Command System
- Consider the effect that ventilation/HVAC systems may be having on agent dispersal. If there are questions regarding this effect, default to shutting off ventilation/HVAC systems

Notify:

- Follow local protocols to activate the Hazardous Materials Team.

When dealing with any suspicious CBRNE threat, please notify your local emergency management agency, who will in turn notify HSEM. If you are unable to reach your local EMA, you should then contact HSEM directly. Advise as to the need for consultation, technical assistance, additional resources and/or capabilities from other agencies. HSEM will in turn notify state agencies and state emergency response teams, as appropriate.

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Follow your local protocols for notifying receiving hospitals. Local hospitals will need to be notified that contaminated victims may self-present at the hospital.

If an incident involving a biological hazard is suspected, public health officials should also be notified. Follow local protocols to make this notification.

Additional Guidance:

To avoid dispersal of a solid biological agent, consider wetting any observable agent prior to removal of outer clothing, PPE removal, decontamination, or destruction.

Although a device may appear harmless and finished dispersing, it should not be disturbed. Self-decontamination techniques should be used whenever possible.

Consider the incident a crime scene; while it is imperative that the reaction be mitigated, it is also important to preserve the evidence.

Responders at the HazMat Operations level may have a more hands-on and defensive role in initial biological response.

Track information (name and contact information at a minimum) of exposures.

For information on decontamination proceed to **Tab #7.**

Tab #4 Radiological Hazards

If a radiological hazard is suspected:

This section is designed to provide basic operational guidelines for managing a radiological incident. These guidelines are for radiological incidents related to transportation, radiological dispersal device, radiological exposure device, or other accident or incident with radioactive materials present.

For nuclear detonation incidents, see **Tab #5 Nuclear Detonation Hazards**.

For nuclear power plant incidents, see Radiological Emergency Preparedness (REP) plans at state and county level.

See Radiological Response Annex #5 For more detailed checklist and information.

Recognize:

Determine what type of radiation incident to guide initial assumptions and actions.

- Readings above 2x background
- Confirm radiation is present using 2 different radiation detectors at 2 different locations Determine the incident type (see tables below)

Overview of Terrorist-related Radiological Incident Types Table

	Radiological Dispersal Device (RDD)/Dirty Bomb (Explosive)	RDD (Non-Explosive) *i.e. spray device*	RED
Primary Radiation Hazard	Exposure and Contamination	Exposure and Contamination	Exposure Only (possible for small amounts of contamination if source was breached)
Estimate Radiological Scope of Incident	Acute exposures only possible within a few feet of blast site or near a piece of radioactive shrapnel *Blast related injuries more of a concern than radiation dose injuries*	Acute exposures unlikely.	Acute doses possible within approximately 3-6 meters around source Dependent on isotope present in source
Estimate Size of Incident Response Area	1-2 miles*	1-2 miles*	5m – 100m radius
Hot Zone Boundary Dose Rate	----------10 mR/hr----------		
Immediate Public Protection Area*	500 m radius 2000 m downwind*	500 m radius 2000 m downwind*	5m – 100m radius*
Immediate Public Protection Recommended**	Shelter in place until extent of contamination is understood Immediate blast area should be managed as appropriate	Shelter in place until extent of contamination is understood Immediate blast area should be managed as appropriate	Leave immediate area Shelter in place to 100m if unable to shield source

Immediate Worker Protection Recommended* **	Regular turnout or response gear Powered Air Purifying Respirator (PAPR) recommended in first 15 minutes only, N-95 mask sufficient after first 15 minutes Time/Distance/Shielding	Regular turnout or response gear PAPR recommended in first 15 minutes only, N-95 mask sufficient after first 15 minutes Time/Distance Shielding	Regular turnout or response gear No respiratory protection recommended Time/Distance Shielding

* Where radiation levels are immediately actionable. Contamination will be detectable much further but no immediate action necessary.
** For radiation hazard only. If other hazards present, those must be balanced with radiation risk.
***Responders should not wait for PPE to perform lifesaving actions (if radiation hazard only).

Overview of Accident-related Radiological Incident Types Table

	TRANSPORTATION	**Fire or Other Incident at Licensee Facility**	**Lost Source**
Primary Radiation Hazard	Exposure and Contamination	Exposure and Contamination	Exposure Only (possible for small amounts of contamination if source was breached)
Estimate Radiological Scope of Incident	Acute exposures not expected *Shielding around high activity sources designed to withstand high temperatures and impacts*	Acute exposures unlikely except for: 1. Blast creating radioactive shrapnel or 2. Breach of shielding around source *Shielding around high activity sources designed to withstand high temperatures and impacts*	Acute doses possible within approximately 3-6 meters around source Dependent on isotope present in source
Estimate Size of Incident Response Area	3 football fields*	1-2 miles*	5m – 100m radius*
Hot Zone Boundary Dose Rate	----------10 mR/hr----------		
Immediate Public Protection Area*	Spill - 25 m – 100 m radius Fire - 300 m radius and evaluate downwind extent	300 m radius Evaluate downwind extent	5m – 100m radius
Immediate Public Protection Recommended**	Shelter in place around accident area up to 300m Immediate accident site should be managed as appropriate	Shelter in place until extent of contamination is understood Immediate accident area should be managed as appropriate	Leave immediate area Shelter in place to 100m if unable to shield source

Immediate Worker Protection Recommended* **	Regular turnout or response gear for a transportation incident N-95 mask sufficient if no other respiratory protection in place Time/Distance/Shielding	Regular turnout or response gear PAPR recommended in first 15 minutes only N-95 mask sufficient after first 15 minutes Time/Distance Shielding	Regular turnout or response gear No respiratory protection recommended Time/Distance Shielding

* Where radiation levels are immediately actionable. Contamination will be detectable much further but no immediate action necessary.
** For radiation hazard only. If other hazards present, those must be balanced with radiation risk.
***Responders should not wait for PPE to perform lifesaving actions (if radiation hazard only).

Avoid the hazard:

Complete avoidance is not necessary for radiation - manage exposures based on dose rates.

- Go to a safe location to stage your operations –
  - Below 2 mR/hr
  - Uphill and upwind of the hazard location outside of the hot zone boundary (10 mR/hr)
- Establish a default initial hot zone based on incident type in above tables in all directions around the detonation or accident site.
  - This can be refined when radiological measurements are available (see image in Radiation Annex on pg. 57)
    - Dangerous Radiation Zone: 10 R/hr
    - Hot Zone: 10 mR/hr – 10 R/hr
    - Warm Zone: 2 mR/hr – 10 mR/hr
    - Move incident command/staging area to lower dose rate area, if necessary
- Use the principles of As Low as Reasonably Achievable (ALARA)
  - Time
    - Keep responders' exposure time as short as possible
    - Use worker stay time chart in **Radiological Response Annex #6**
    - Rotate workers as needed to reduce time in high dose rates
  - Distance
    - Maintain as much distance between responder and radioactive material
  - Shielding
    - Use shielding whenever possible such as fire engines, buildings, etc.
- Utilize available Personal Protective Equipment (PPE)
  - Structural firefighters' protective clothing does not provide protection from gamma radiation and may slow activities leading to higher doses

- Respiratory protection of PAPR, Air Purifying Respirator (APR) or N95 mask is sufficient respiratory protection for all radiation hazards. SCBA is not necessary for protection during line-of-sight rescue of injured victims
  - Immediate/urgent life safety actions should continue within the hot zone regardless of level of PPE or radiological monitoring equipment available for radiological hazards alone
    - Additional consideration should be made regarding other hazards present

Isolate:

Keep people away from detonation site or highest exposure areas

- Set up a perimeter from suspected hazard location based on the incident type in above table
- Move ambulatory patients away from the area of highest concentration or source
- Confine all contaminated and exposed victims to a restricted/isolated area at the outer edge of the hot zone
  - **Note – symptoms of radiation exposure are not immediate (takes many hours to days), so any observable health effects are likely the result of non-radiological causes**
- Provide instruction to victims for immediate self-decontamination procedures (remove affected clothing, rinsing, wiping, etc.)
- Initiate Incident Command system
- Consider the effect that ventilation/HVAC systems may be having on radiological dispersal. If there are questions regarding this effect, default to shutting off ventilation/HVAC systems
- Issue protective actions around the incident site based on information in above tables. See pre-scripted messages provided in **Radiological Response Annex #6**

Notify:

- **Follow local protocols to activate the Hazardous Materials Team**
- **Document and share radiation-specific information from the scene:**
  - Radiation measurement information: value, unit, equipment used, and location
  - Wind direction or any reports of direction of smoke traveled (if observed)
  - Radiation information from any documents, signs, placards

Situational awareness information should be relayed to the Incident Command Post (ICP) and entered into a CBRNResponder event using cbrnresponder.net (**Radiological Response Annex #6** for instructions).

Local hospitals will need to be notified that contaminated victims may self- present at the hospital. Public health officials should also be notified.

When dealing with any suspicious CBRNE threat, please notify your local emergency management agency, who will in turn notify HSEM. If you are unable to reach your local EMA, you should then contact HSEM directly. Advise as to the need for consultation, technical assistance, additional resources and/or capabilities from other agencies. HSEM will in turn notify state agencies and state emergency response teams, as appropriate.

County Emergency Management Agency (EMA)	
24-Hour Number (to be filled in by user)	**( )**
Iowa Department of Homeland Security and Emergency Management (HSEM)	
Main Office 24 Hour Number - press "0" and ask for Emergency Management Duty Officer	**(515) 725-3231**
Iowa HHS Bureau of Radiological Health	
24-Hour Number	**(515) 725-4160**

Additional Guidance:

Although a device may appear harmless and finished dispersing, it should not be disturbed.

Self-decontamination techniques should be used whenever possible. Consider the incident a crime scene.

Record information (name and contact information at a minimum) of exposed individuals.

Use the following values for dose thresholds, if dosimetry is available. If dosimetry is not available, responders can continue to work in the area.

Track location and time that responders were in the area for follow up dose estimation. This type of tracking is important regardless of dosimetry status.

5R	Radiation exposure level for general incident activities (non-life saving measures)
10R	Radiation exposure level for protecting valuable property
25R	Radiation exposure level for life saving measures.
>25R	Lifesaving or protection of large populations on voluntary basis to persons fully aware of risks involved

Radiation Decision Dose Levels for Emergency Workers Table

For information on decontamination proceed to **Tab #7.**

Tab #5 Nuclear Detonation Hazards

If a nuclear detonation hazard is suspected:

This section is designed to provide basic operational guidelines for managing a nuclear detonation incident. These guidelines are for incidents related to detonation of an improvised nuclear device or nuclear weapon. This does NOT include nuclear power plant accidents.

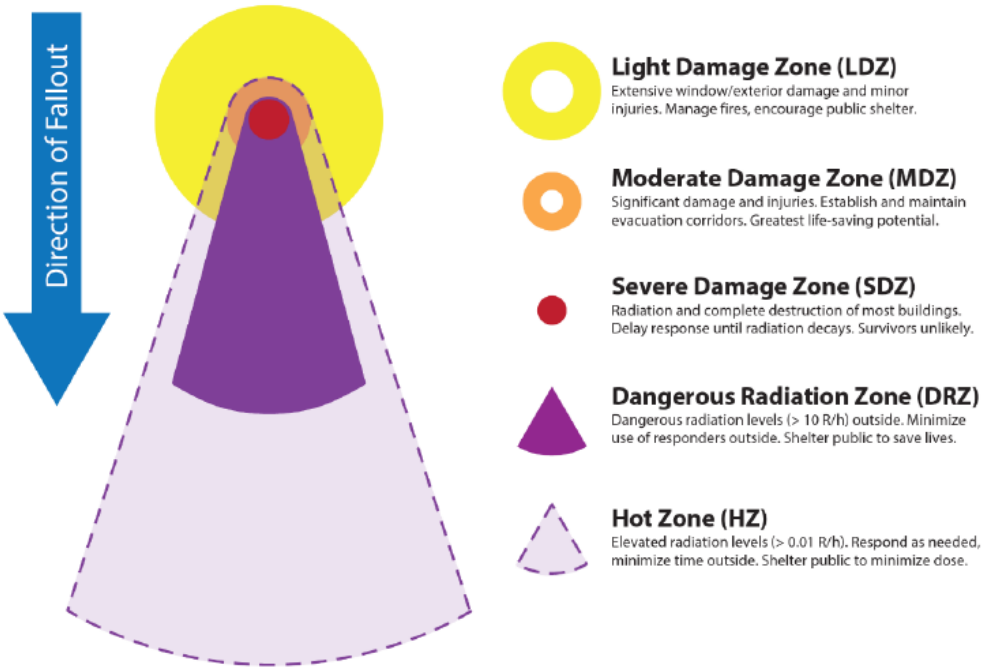
For nuclear power plant incidents, see Radiological Emergency Preparedness (REP) plans at state and county level.

For radiological incidents, see **Tab #4 Radiological Hazards**.

See Nuclear Detonation Response Annex #6 For more detailed checklist and information.

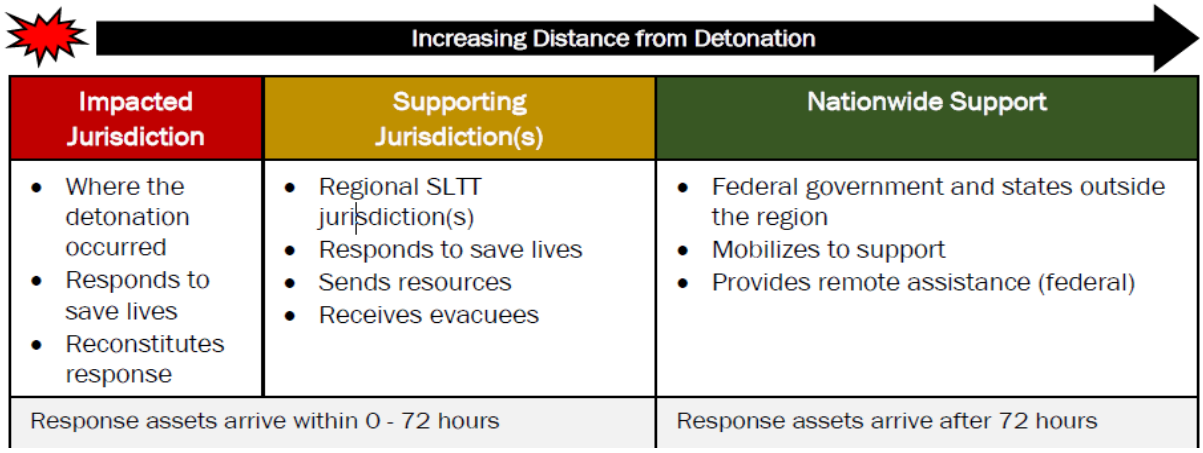
<u>Recognize</u>:

- That a nuclear detonation has or is about to occur:
    - Notification by the Federal Emergency Management Agency (FEMA) or other federal intelligence agencies to begin public messaging
    - Intense flash of light followed by a pressure wave
    - Large mushroom cloud reaching 30,000 feet (level of cruising altitude for airplanes)
    - Sandy particles falling from sky
        - Note fallout has very high radiation exposure rates in first hours and days
        - **Immediately go inside if fallout present – both responders and public**
- What blast and radiation zone(s) you are in:



Emergency Response Zone Types Figure

- Whether you are an impacted or supporting jurisdiction:
    - Determine if your area is impacted or supporting jurisdiction. See Figure below from the FEMA 72-hour Nuclear Response Guidance.



Impacted Jurisdiction, Supporting Jurisdiction(s), and Nationwide Support Figure

- Impacted Jurisdiction: The response infrastructure in this area is significantly disrupted. These jurisdictions should also prepare to receive outside response assets that will deploy and assist with executing operations to support lifesaving activities. During the first 72 hours, these resources will primarily arrive from the Supporting Jurisdiction(s).
- Supporting Jurisdiction(s): Priorities will be to provide assistance to the Impacted Jurisdiction and receive evacuees over time. While these jurisdictions may still experience effects and impacts from the detonation, a critical distinction from the Impacted Jurisdiction is that a Supporting Jurisdiction's emergency response infrastructure is fully operational.

Avoid the hazard:

If you are in the severe damage zone or dangerous radiation zone – impacted jurisdiction.

- **Immediate lifesaving actions take priority but may not be possible in the dangerous radiation zone due to radiation levels >100 R/hr.**
    - Rescue Operations should be limited to only very quick line of sight operations
- **Immediately Issue Alert for Public and Responders to Get Inside:**
    - Immediately issue nuclear detonation protective action messages to public and responders (See templates in **Nuclear Detonation Annex #7**).
        - Get Inside, Stay Inside, Stay Tuned
        - Go to basement or central room of any nearby building for up to 24 hours or until notified it is safe to change locations
            - See sheltering protection factors infographic in **Nuclear Detonation Annex #7**

- All public and responders within a 50-mile radius around the detonation should shelter until the direction and areas of fallout creating dangerous radiation levels are confirmed
  - Radiation exposure rates in fallout areas may be 100 R/hr or higher
  - **Sheltering in nearest structure is critical to reducing acute doses of radiation**
- **People should be told NOT to evacuate**
  - Evacuating may send people outside to receive very high or lethal doses of radiation
  - Buildings provide shielding protection from gamma radiation with factors of 5 – 100x reduction factors (see **Nuclear Detonation Annex #6**)

- **Prioritize lifesaving activities in immediate responder locations based on radiation exposure rates:**
  - Lifesaving operations in the impacted jurisdiction may look very different than for other types of emergencies
    - Instead of a methodical search of damaged structures, this will more likely be "holding the line" against fires, stabilizing and transporting patients as quickly as possible, and providing the public with self-help instructions, such as announcing over a bullhorn, "If you can hear this, come toward the sound of my voice."
  - Responders should shelter indoors until confirmation of radiation exposure rates outdoors in confirmed:
    - If radiation exposure rate is above Dangerous Radiation Zone (DRZ) of 10 R/hr – operate only indoors or underground. Limit outdoor lifesaving actions to quick and critical missions.
      - If possible, consult with command and technical experts before continuing missions in this zone
    - If/when radiation exposure rate is below 10 R/hr, conduct outdoor lifesaving activities using timed mission planning.
    - Do not enter areas greater than 100 R/hr without specific mission consideration and assessment of risks/benefits.
    - If possible, track exposure rates and time in locations, and apply time, distance and shielding (ALARA) while conducting lifesaving missions

Isolate:

If you are in the moderate or light blast zones or hot zone – supporting jurisdiction.

- **Initiate Zone Based Response across regional area:**
  - Initiate and coordinate larger area lifesaving activities
    - Prioritize moderate damage zone where no dangerous radiation levels

- May need to offer more self-care instructions to relatively minor injuries in light damage zone

- Lifesaving efforts in severe damage zone should be avoided
- Limit lifesaving activities in dangerous radiation zone
  - DRZ will shrink rapidly over time – plan for lifesaving efforts by following the shrinking edge of DRZ
- May need to perform critical work in hot zone areas
  - Doses are manageable with mission planning (responders can work for hours in mR/hr rates)

- Establish and support ad hoc triage sites in/near blast damage zones – outside the dangerous radiation zone
  - Prioritize treatment based on trauma and burn triage categories
  - Medical resources will be severely constrained, so most of the minor or moderate injuries that would typically be treated in a typical trauma situation may need to be bypassed to self-care or delayed attention to conserve resources for more immediate lifesaving efforts
  - Many survivors will have physical trauma, burns, acute radiation syndrome, and combined (radiation and trauma) injuries

Zone Type	Shelter and Evacuation Priorities
LDZ	Instruct public to shelter inside. ▪ Conduct targeted evacuation of unsafe areas (e.g., fires, heavy smoke, unstable structures). ▪ Direct evacuees towards safety and away from HZ. Do not prevent spontaneous evacuation.
MDZ	Instruct public to evacuate towards the LDZ and away from the HZ. ▪ Prioritize assisted evacuation for the non-ambulatory. ▪ Recruit volunteers to support evacuation.
SDZ	Instruct everyone – responders included – to remain sheltered indoors. ▪ Move if shelter threatened by fire, collapse, or other hazards. ▪ Prepare to evacuate once radiation levels are less than 10 R/h. ▪ Consider evacuating through subterranean structures (e.g., subways, tunnels).
DRZ*	Instruct everyone – responders included – to remain sheltered indoors. ▪ Prepare to evacuate (in 12–24 hours) once radiation levels are less than 10 R/h. ▪ Consider evacuating through subterranean structures (e.g., subways, tunnels).
HZ (beyond MDZ & LDZ)	Instruct public to shelter inside. ▪ Targeted evacuation of unsafe areas (e.g., fires, heavy smoke, unstable structures). ▪ Direct self-evacuees towards safety and away from HZ: Do not prevent spontaneous evacuation.
* For areas in the MDZ and LDZ that are also in the DRZ, follow the DRZ shelter/evacuation priorities until radiation decays below DRZ levels.	

Initial Evacuation Priorities for Each Zone Table

- **Initiate Responder Protection Strategies:**
  - Establish radiation exposure decision points
    - Should be considered based on resource availability and critical response needs.
      - Note, it will be necessary to consider higher dose levels than typically used
    - Emergency dosimetry should be used:
      - Issue one dosimeter to each group to conduct group dosimetry
      - Prioritize equipment and dosimetry to those working in highest radiation exposure rate areas, such as the HZ or DRZ
      - Some dosimetry, especially in lower exposure rate areas, may need to be conducted with no equipment
      - Record expected radiation rates and time spent in the area, and recalculate the dose after the mission

Decision Dose Levels for Responders	
5 rem	Radiation exposure level for general incident activities in Supporting jurisdiction areas (non-life saving measures)
10 rem	Radiation exposure level for protecting valuable property in Supporting jurisdiction areas
25 rem	Radiation exposure level for life saving measures in Supporting jurisdiction areas
>25 rem	Lifesaving or protection of large populations on voluntary basis to persons fully aware of risks involved in either Supporting or Impacted jurisdiction
50 rad	Decision point for considering whether responder should continue or pull back from lifesaving missions in Impacted jurisdiction
100 rad	Threshold where Acute Radiation Syndrome (ARS) symptoms may begin
450 rad	LD 50/60 for acute radiation exposures

  - PPE should be selected based upon non-radiological hazards
    - In blast damage zones, this includes consideration for hazards such as sharp debris, silica dust, fires, and unstable structures
    - Fires and unstable structures are an especially likely hazard in the MDZ and SDZ
    - Should be considered based on resource availability and critical response needs – **do not wait for PPE based on radiation risks alone**
  - No radiation-specific PPE is required
    - Large, sandy particles of fallout are not respirable
      - N95 or other particulate masks would be sufficient
    - Large bulky PPE could slow responder actions and result in higher external exposures

  - Prioritize dry, rapid decontamination
    - Brushing off sandy particles of fallout is sufficient for decontamination

- **Conserve resources to prepare for coordinated support to impacted jurisdictions:**
  - Significant resources will be needed in moderate damage zone and impacted jurisdictions
    - Prioritize radiation and dosimetry equipment to higher exposure rates areas (10R/hr and higher)
    - Responder priority for search and rescue of injured who can not get out of building rubble on their own
  - Supporting jurisdictions will begin to receive self-evacuees from impacted area

Notify:

- **The impacted jurisdictions may not be able to communicate with outside jurisdictions**
- **The supporting jurisdictions should document and provide radiation-specific information from the scene:**
  - Radiation measurement information: value, unit, equipment used, and location
  - Location and height of mushroom cloud
  - Direction of cloud movement – can be multiple directions based on height
  - If sandy particles are falling in the area
  - Level of damage observed in area

Situational awareness information should be relayed to ICP and entered into a CBRNResponder event using cbrnresponder.net, if possible.

Local hospitals will need to be notified that contaminated victims may self-present at the hospital. Public health officials should also be notified.

When dealing with any suspicious CBRNE threat, please notify your local emergency management agency, who will in turn notify HSEM – however, typical communication channels may be limited in the impacted area.

HSEM will coordinate federal and state agencies and state emergency response teams, as appropriate. **Preplanning should include instructions to supporting jurisdictions on providing rapid support to the impacted jurisdictions if the typical activation or request processes cannot occur after the detonation.**

County Emergency Management Agency (EMA)	
24-Hour Number (to be filled in by user)	**( )**
Iowa Department of Homeland Security and Emergency Management (HSEM)	
Main Office 24 Hour Number - press "0" and ask for Emergency Management Duty Officer	**(515) 725-3231**
Iowa HHS Bureau of Radiological Health	
24-Hour Number	**(515) 725-4160**

Other appropriate nuclear detonation or radiation protection principles:

- Basics of fallout
  - Large, sand-like particles
    - Not respirable
- Wind direction based on upper-level atmosphere winds that are not detected at ground level or reported in typical weather apps
    - May have fallout in multiple directions – not following observed wind direction
- Decontaminate using dry, rapid decontamination methods
    - Brushing off particles or changing clothing is sufficient because particles are very large sandy particles
- Response will cause significant impact on resources
  - Radiation levels can be very high – responders will need to work in exposure rates 10x higher than they are used to
    - Responders will need to walk by injured in LDZ or areas where accidents occurred due to flash blindness to get to those who need critical care in MDZ.

Tab #6 Explosive Hazards

If an explosive hazard is suspected:

Avoid the hazard:

- Move away from the hazard or blast area as quickly as possible, warn others, and look for secondary devices or other suspicious items along the evacuation path, and in the evacuation assembly area
- Determine a safe location to stage your operations
- Turn on appropriate, available detection equipment to determine the presence of radiation, chemical or biological hazards

Isolate:

- Secure the building to protect the scene and prevent unauthorized entry
- **Time** – do not spend more time than absolutely necessary around a suspect device
- **Distance** – move people as far away as possible, 300 feet initial minimum distance
- **Shielding** – if at all possible place a firm barrier between people and the suspected explosive hazard (avoid glass exposures and parking areas, vehicles contain additional glass fragmentation and flammable fuels)

Notify:

- Follow local protocols to contact local law enforcement, who will in turn, notify the local or regional bomb squad for the response area

When dealing with any suspicious CBRNE threat, please notify your local emergency management agency, who will in turn notify HSEM. If you are unable to reach your local EMA, you should then contact HSEM directly. Advise as to the need for consultation, technical assistance, additional resources and/or capabilities from other agencies. HSEM will in turn notify state agencies and state emergency response teams, as appropriate.

County Emergency Management Agency (EMA)	
24-Hour Number (to be filled in by user)	**( )**
Iowa Department of Homeland Security and Emergency Management (HSEM)	
Main Office 24 Hour Number - press "0" and ask for Emergency Management Duty Officer	**(515) 725-3231**

Additional Guidance:

Although a device may appear harmless it should not be disturbed.

Consider the incident a crime scene; it is important to preserve the evidence while safely moving away from the hazard or blast area.

Continue to look for secondary devices or other suspicious items.

Track as much information about the location of, and the physical characteristics of the suspected device as possible, the responding bomb squad will require as much information as possible.

Bomb Threat Stand-Off Distances

Threat Description		Explosives Capacity[1] (TNT Equivalent)	Building Evacuation Distance[2]	Outdoor Evacuation Distance[3]
	Pipe Bomb	5 LBS/ 2.3 KG	70 FT/ 21 M	850 FT/ 259 M
	Briefcase/ Suitcase Bomb	50 LBS/ 23 KG	150 FT/ 46 M	1,850 FT/ 564 M
	Compact Sedan	500 LBS/ 227 KG	320 FT/ 98 M	1,500 FT/ 457 M
	Sedan	1,000 LBS/ 454 KG	400 FT/ 122 M	1,750 FT/ 533 M
	Passenger/ Cargo Van	4,000 LBS/ 1,814 KG	600 FT/ 183 M	2,750 FT/ 838 M
	Small Moving Van/ Delivery Truck	10,000 LBS/ 4,536 KG	860 FT/ 262 M	3,750 FT/ 1,143 M
	Moving Van/ Water Truck	30,000 LBS/ 13,608 KG	1,240 FT/ 378 M	6,500 FT/ 1,981 M
	Semi-Trailer	60,000 LBS/ 27,216 KG	1,500 FT/ 457 M	7,000 FT/ 2,134 M

This table is for general emergency planning only. A given building's vulnerability to explosions depends on its construction and composition. The data in these tables may not accurately reflect these variables. Some risk will remain for any persons closer than the Outdoor Evacuation Distance.

Tab #7 Decontamination

Decontamination is the process of rapidly and effectively removing or rendering harmless poisonous or toxic substances from personnel and equipment. The objective of this section is to identify technical and operational issues associated with decontamination after an incident involving chemical, biological, or radiological substances and to recommend the most efficient and effective techniques and procedures to best cope with a medium to large-scale decontamination operation. These actions are not intended to supersede any existing plans currently in place, but offers additional technical advice on conducting large scale mass decontamination.

Radiological incidents typically do not require decontamination as a chemical or biological agent may require. Contamination from radiation incidents is likely to be low levels of exposure rates. Controlled survey for radiation contamination and targeted decontamination is preferred using a community reception center (CRC). For those reporting to the CRC, information should be recorded in accordance with **Annex #3 : CBRNE Hazard Exposure Reporting Template**. For those outside the immediate incident area, self-decontamination at home by changing clothes and showering may be sufficient.

Nuclear detonation decontamination can be effective using rapid dry decontamination procedures, such as brushing particles off with a broom, or the removal of outer clothing. Wet decontamination is not necessary and waiting for equipment/resources before beginning dry decontamination activities may cause higher doses to those with radioactive fallout particles on them.

For most types of exposure/contamination, simple decontamination procedures are considered best practice and will provide substantial progress towards gross decontamination. In these cases, providing direction for self-decontamination maximizes effectiveness and minimizes possibility of spreading contaminants. These procedures include:

- Blot (do not rub), skin, face, hands, and hair with a moist wipe, wet cloth, or damp paper towel to remove the material.
- Remove affected clothing - Avoid removing affected clothing over the head; Cut clothing off if possible. If clothing cannot be cut off, instruct victims to hold their breath and close their eyes while pulling it over the head.
- Wash hair, face, hands, and skin. Wash from head to feet with lukewarm water and mild soap, if available, for at least 2-3 minutes. Try not to let the water run into the eyes, nose, and mouth. Do Not Scrub.

For further information on personal decontamination, Visit the CDC's website, Chemical Emergencies and click "About Getting Clean":

Mass Decontamination:

If the scale of the event rises to the point that the task of providing individual decontamination procedures to the number of impacted civilians would overwhelm the application of the process, mass decontamination procedures may be required. The key to successful mass decontamination is to use the fastest approach that will cause the least harm and do the most good for the majority of the people. The following conditions are considered appropriate for implementation of mass decontamination:

- 8 or more persons are suspected to be contaminated and existing local decontamination resources are expected to be exceeded

Determine number of persons contaminated:

Attempt to ascertain the maximum number of persons requiring decontamination and arrange for follow-up medical and or quarantine attention as indicated. This information should be used to guide the response and resource allocation needed for the decontamination process.

Site Considerations:

Mass Decontamination is deployed in the warm zone of the incident. Attention must be paid to the effect of the decontamination location and its relation to other aspects of the operation, such as medical care, staging and incident facilities. Generally, the following rules for selection of the decontamination site should be applied:

- Up-hill/Up-wind - Set up your decontamination line up-hill and up-wind of the hazard. This must be considered in relation to the hot zone AND as it relates to the placement of post-decontamination collection points and treatment areas
- Water Runoff - The Environmental Protection Agency (EPA) has stated that, in accordance with the limits of liability in Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA), the run-off is not a primary concern. However, run-off is a definite consideration in the placement of post-decontamination collection and treatment areas
- Warmth and shelter for victims - Regardless of the time of year, decontaminated victims will need to be sheltered and warmed after decontamination.
- Water Supply - An adequate water supply needs to be planned for. Either through the use of municipal water supply sources (fire hydrants) or by Fire department water tanker shuttles, the water supply should be one of your top priorities

Decontamination Triage:

A prioritization process should be utilized by first responders to determine whether victims emerging from HAZMAT, or weapons of mass destruction (WMD) incident scene should be directed to area(s) of safe refuge/observation or to a mass casualty decontamination station. Rapid identification of victims who may not require decontamination can significantly reduce the time and resources needed to perform decontamination. When making this

determination, consideration should be given to distinguishing between contamination and an exposure only.

Contamination:

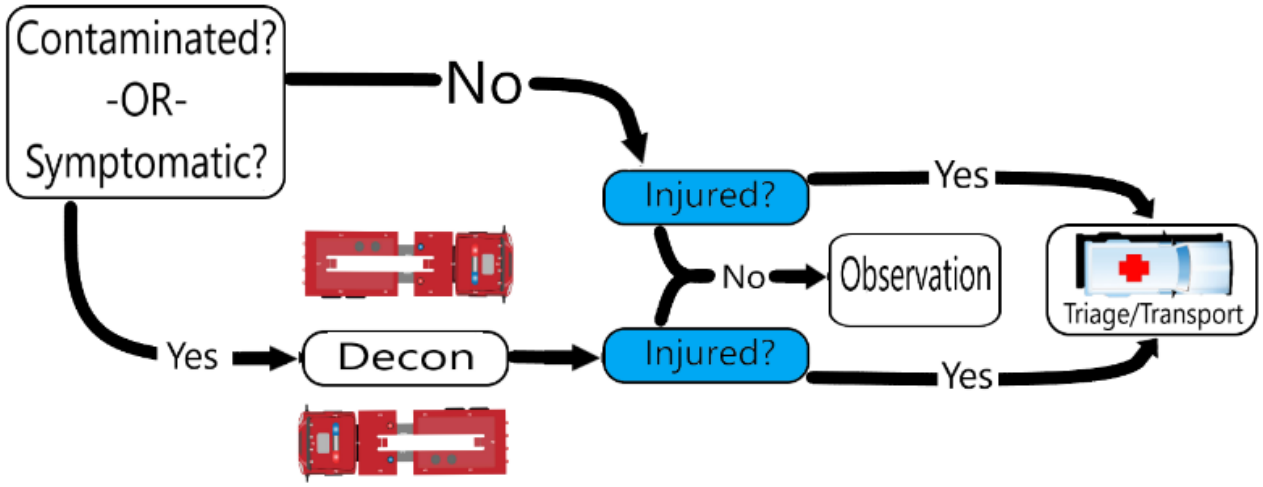
- Product is transferred or deposited on person and/or on clothing
- Dose and effect increase as long as contaminant remains
- Cross-contamination may be possible
- Off-gassing may occur

Exposure only:

- No product is transferred
- Dose is discontinued after exposure ends, but effects may continue
- No cross contamination or off-gassing hazard exists except with biologics

Prioritization of asymptomatic, symptomatic, ambulatory and non-ambulatory casualties is critical:

- Non-ambulatory and symptomatic: priority should be given to assist victim through decontamination and receive medical triage/treatment
- Non-ambulatory and non-symptomatic: assist victim to medical to Safe Refuge/Observation Area for immediate triage/treatment
- Ambulatory and symptomatic: instruct victim to proceed to decontamination
- Ambulatory and non-symptomatic, but contaminated: instruct victim to proceed to decontamination
- Ambulatory and non-symptomatic, with no obvious exposure to contaminant: instruct victims to report directly to Safe Refuge/Observation Area

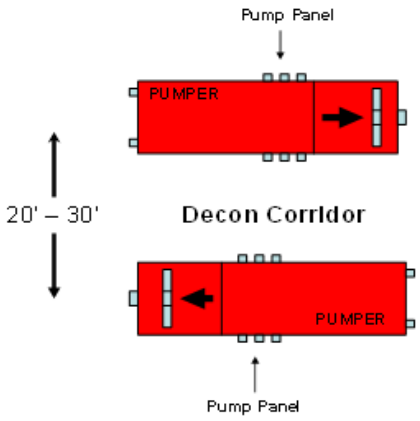


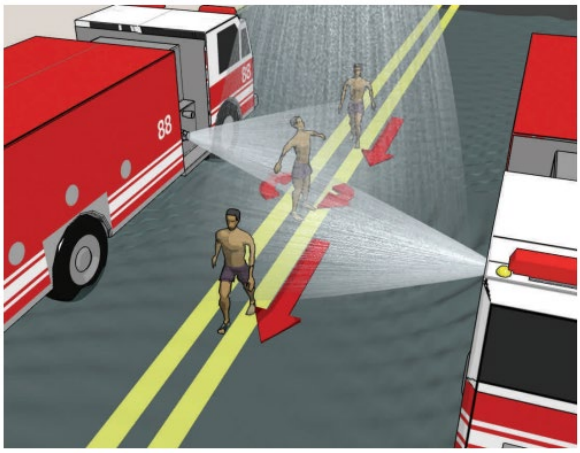
<u>Decontamination Setup/Procedures</u>:

Two engines parked opposite directions, 20-30 feet apart, can create a corridor of water spray from both sides using adjustable nozzles affixed directly to the apparatus. Apparatus should be situated

so the pump panels are facing away from the corridor to protect operators. In the event that only a single apparatus is available, it may be used in conjunction with barrier opposite the stream to form the corridor. Adjustable nozzles should be adjusted to approximately a 30⁰ fog pattern and operated at pressures no greater than 50psi.

When moving through the decontamination shower, victims should tilt their heads back, raise their arms and spread their legs to expose the armpit and groin areas and taking extra precaution to prevent runoff from the head/hair getting into the eyes, nose or mouth. Victims should occasionally turn 90 degrees (1/4 turn) to expose their entire bodies to the water cross stream.





Observation Area:

Following decontamination, victims without additional visible symptoms should be directed to the area(s) of safe refuge for observation where they can be monitored for delayed symptoms. Observing for symptoms generally only applies to chemical, biological and radiological incidents. Medical triage for injuries sustained as the result of an explosive dissemination device or injuries suffered while evacuating the hazard area should also take place.

Additional Guidance:

The legal authority to require decontamination is unclear at best. Based upon related issues such as medical care and evacuation, it is believed that emergency personnel cannot force a victim to undergo decontamination procedures. If possible, record the names and addresses of anyone refusing to be decontaminated.

For further information on mass decontamination, visit Edgewood Chemical Biological Center's website, Guidelines for Mass Casualty Decontamination During a Hazmat/Weapon of Mass Destruction Incident:

Guidelines for Mass Casualty Decontamination During a HAZMAT/Weapon of Mass Destruction Incident. Volumes 1 and 2 (Update) (dtic.mil)

Tab #8 Termination or Transition of the Incident

These guidelines take into consideration that local emergency response organizations have and maintain their own incident termination or transition processes which they know, follow, and practice regularly. The following consists of recommendations and considerations more closely associated with large-scale incidents involving CBRNE.

As an initial incident winds down, several interrelated activities may take place, depending on the needs of the incident and agency policy. These activities may include demobilization of incident resources, utilization of specialty teams/services, transfer of command, agency closeout, team debriefing, and after-action review.

CBRNE incidents will require extensive environmental monitoring and assessment to continually refine various public protective measures for relocation, food embargoes, and other exposure related health considerations. A full assessment and clean-up will take months to years to complete and require significant state and federal resources. The local incident will likely not "close out" in the same manner as a smaller or shorter-lived hazard, but rather transfer to an intermediate or long-term phase guided by other plans or procedures.

Termination and Transition

The Incident Commander/Unified Commander (IC/UC) may choose to incorporate **ICS Form 221** Demobilization Checkout (found at the end of this section) as agencies to check out of the site.

The IC/UC must take similar actions for the transition of an incident as for termination. Transition from response to recovery will apply when the on-going effects are expected to last past the short-term and/or when remediation/decontamination of an incident site is necessary. The remediation is likely to involve HAZMAT clean-up to include removal of contaminated landscape and structures. Intermediate- and long-term recovery is likely not handled by the IC/UC, but instead the jurisdictional executive(s) or other elected officials for the affected jurisdictions.

Jane's CBRN Response Handbook (4th ed.), provides a Post-Incident Response checklist for transitioning an incident for recovery which includes the following (this is not all encompassing).

- Immediate Community
    - Pass as much relevant and timely information to appropriate community and agency leadership as soon as possible
    - Control Rumors – do not allow them to take on a life of their own
    - Ensure appropriate agencies are notified about potential real-time or delayed health effects
    - Follow up with agencies involved in the incident to ensure that proper remediation and recovery operations have been put in place
- Public Works
    - Do they clearly understand run-off issues?

  - Did they receive a list of all chemicals and their properties in order to purge public water systems?
  - Have they posted a restriction on the water supply and a time frame for lifting restrictions?

- Hospitals/EMS

  - Were local hospitals notified of the potential contaminants and provided with supporting product information as requested?
  - Were hospitals and EMS personnel screened for residual effects?
  - Have receiving points at medical facilities been properly decontaminated and check by qualified personnel for residual contamination?
  - Have decontaminated clothing and personal effects been transferred to the appropriate agency for crime scene evidence or disposal?

- Law Enforcement

  - Have personnel been briefed on possible long-term exposure effects?

Hazardous Materials Clean-up

As an incident response winds down, the IC/UC must also coordinate the initial stages of recovery operations. For CBRNE incidents, this may include the disposal of water used during decontamination, as well as the decontamination or removal of contaminated water, soils, natural landscaping, and/or man-made facilities.

The IC/UC should plan to contact their County Emergency Management Agency for assistance in identifying resources to assist with area decontamination or recovery/disposal of contaminated areas. Contact Emergency Management Agencies for a list of possible resources and their capabilities.

Responder Mental Wellbeing

Events involving CBRNE may take a toll on the mental capacities of response personnel. The failure of responders to safely and effectively function during or after a crisis response, not only jeopardizes the lives of victims, but also makes the responder a potential victim.

While many normal responses may deal with a small number of injuries that range in severity, CBRNE events may produce extreme property damage and/or a large number of horrific injuries that may severely impair the ability of the most experienced and competent responders to perform their work or function at the scene. These types of events may present the phenomenon of "stimuli overload" which can impact responders and survivors during and after CBRNE incidents.

Jane's CBRN Response Handbook (4th ed.), also provides guidance on considerations for responder mental wellbeing:

- In addition to the potential effects of the CBRNE involved in the incident, responders should be on the lookout for physical, behavioral, emotional and

cognitive response changes in themselves and others. Note that these same symptoms could be related to the CBRNE agent/substance too.

Physical Symptoms	Emotional Symptoms
▪ Agitation and hyper-arousal ▪ Heart palpitations ▪ High blood pressure ▪ Sweating ▪ Adrenaline rush ▪ Gastrointestinal distress ▪ Recurrence of allergies, asthma, or eczema ▪ Hot or cold flashes ▪ Loss of sleep or appetite ▪ Tightness in the throat or chest ▪ Fatigue	▪ Anxiety and generalized fear ▪ Increased self-doubt ▪ Irritability ▪ Anger or rage ▪ Sadness ▪ Grief or depression ▪ Numbness or blunted affect ▪ Hopelessness and helplessness ▪ Despair and defeat ▪ Survivor guilt

Behavioral Symptoms	Cognitive Response
▪ Insomnia or nightmares ▪ Hyper-vigilance ▪ Easily startled ▪ Isolation, withdrawal ▪ Inability to experience pleasure in daily activities	▪ Decreased ability to cope with daily life ▪ Difficulty in decision-making ▪ Memory loss ▪ Frequent Confusion ▪ Decreased ability to take in new information ▪ Decreased ability to perform complex computation ▪ Intrusive thoughts and images of the violence or its aftermath ▪ Questioning of faith or loss of spiritual beliefs

Critical Incident Stress Debriefings (CISD)

The use of peer support through critical incident stress management defusing, debriefings and one-on-one sessions have proven effective for many responders during and shortly after exposure to catastrophic events. Responders and agencies should develop programs or affiliations with organizations that may assist with peer support programs.

Strategies to Counter Stimuli Overload

Several general strategies, outlined below, are used by emergency response personnel in their normal preparedness activities that are also applicable to CBRNE Event awareness and response.

- Advanced planning and training
- Mental preparedness while en route to the scene
- Focus on the mission
- Direct clear assignment of duties
- Maintain a detached clinical state of mind
- Use and offer peer support
- Take advantage of post-traumatic counseling

ICS form 221 on next page

Click to download the ICS 221

DEMOBILIZATION CHECK-OUT (ICS 221)

1. Incident Name:	2. Incident Number:	
3. Planned Release Date/Time: Date: Time:	4. Resource or Personnel Released:	5. Order Request Number:

6. Resource or Personnel:
You and your resources are in the process of being released. Resources are not released until the checked boxes below have been signed off by the appropriate overhead and the Demobilization Unit Leader (or Planning Section representative).

LOGISTICS SECTION

	Unit/Manager	Remarks	Name	Signature
☐	Supply Unit			
☐	Communications Unit			
☐	Facilities Unit			
☐	Ground Support Unit			
☐	Security Manager			
☐				

FINANCE/ADMINISTRATION SECTION

	Unit/Leader	Remarks	Name	Signature
☐	Time Unit			
☐				
☐				

OTHER SECTION/STAFF

	Unit/Other	Remarks	Name	Signature
☐				
☐				

PLANNING SECTION

	Unit/Leader	Remarks	Name	Signature
☐				
☐	Documentation Leader			
☐	Demobilization Leader			

7. Remarks:

8. Travel Information:
Room Overnight: ☐ Yes ☐ No
Estimated Time of Departure: _____
Actual Release Date/Time: _____
Destination: _____
Estimated Time of Arrival: _____
Travel Method: _____
Contact Information While Traveling: _____
Manifest: ☐ Yes ☐ No
Number: _____
Area/Agency/Region Notified: _____

9. Reassignment Information: ☐ Yes ☐ No
Incident Name: _____
Incident Number: _____
Location: _____
Order Request Number: _____

10. Prepared by: Name: _____ Position/Title: _____ Signature: _____

ICS 221 Date/Time: _____

Annex #1 - Incident Command Critical Information Reporting Checklist

Date:_____ **Time:**_____ **Incident Location:**_____

Incident/Unified Commander: **Local/State Liaison Officer:** **Contact Number:**

Critical Information	Report as soon as possible. *(It is recognized that not all information will be immediately available)*	Time & Date Reported	From	To Whom
Assessment Information – Initial Collect as much of this information as possible and report.				
1. Description of the incident [circumstances under which the CBRNE Threat was found, (inside or outside), location, and type of business and description of the business as appropriate].				
2. Who or what agency is in charge (Incident Command) agency, contact name and title?				
3. Who has jurisdictional authority?				
4. How and by whom was the CBRNE Threat found?				
5. Any unusual activity that preceded this incident that could be related?				
6. Has a credible threat been determined by law enforcement? If YES, contact name, agency and telephone numbers.				
7. Has the site/area been contained/secured? If so, how and by whom? Size of area contained/secured.				
8. Have hot, cold, isolation zones/boundaries been established? If so what are they and is there a map available?				
9. How many people have potentially been exposed/contaminated and estimated numbers of people who may still be being exposed/contaminated?				
10. Of those potentially exposed/contaminated what if any signs or symptoms of illness are they presenting. How many people are presenting with these signs and symptoms?				
11. Are people who have been or potentially been exposed being quarantined and or is movement being restricted?				
12. Have all people potentially exposed/contaminated been decontaminated? If so with what, how and at what time?				

Critical Information	Report as soon as possible. *(It is recognized that not all information will be immediately available)*	Time & Date Reported	From	To Whom
13. Who is responsible for tracking all potentially exposed/contaminated individuals, and how is this being done?				
14. If indoors, have the ventilation systems been shut down?				
15. What other agencies have been notified and are at the scene or enroute to the scene (e.g. EMS, Hazmat, law enforcement, public health)?				
16. Provide ALL contact names, titles and phone numbers for agencies at the scene and identify whom the LIAISON (name and contact number) for Incident Command and Resource Management. (use separate sheet if necessary)				
Assessment Information during the course of the incident updates should be reported to HSEMD at regular intervals				
17. How close were people to the CBRNE Threat when exposed/contaminated/injured?				
18. Describe the area that exposures/contamination occurred (e.g. inside, outside, closed room).				
19. Describe the suspicious CBRNE Threat: What does it look like – color (e.g. white, red) and what consistency (e.g. powder, liquid, solid, crystal) and does it have a noticeable odor (e.g. garlic).				
20. How much agent (quantity) is there (e.g. 1 tsp. or 1 gallon) and/or weight (e.g. grams).				
21. Prior to field testing, have you discussed sample needs with SHL? If no, contact SHL prior to field testing.				
22. What field testing (at incident site) was used if any, to determine the chemical/biological agents?				
23. What is the name/identity of the chemical/biologic agent(s) from field testing? How many field tests have been conducted and results of all tests?				

Critical Information	Report as soon as possible. *(It is recognized that not all information will be immediately available)*	Time & Date Reported	From	To Whom
24. Are there any patients being treated by EMS at the incident site? If so, what treatment is being provided and what are the results?				
25. Are there any patients being transported by EMS to hospitals/clinics for evaluation/treatment? If so, where are they being taken?				
Samples				
26. How many samples (bags/containers) are being shipped to SHL?				
27. Transportation mode and agency to be used to get samples to SHL and contact information.				
28. Estimated time samples will be shipped to SHL; actual time samples are shipped to SHL and estimated time of arrival of sample to SHL.				
29. Are each of the samples (bags/containers) properly identified/labeled if so, how and is the chain of custody seal on each bag/container?				
30. Is there a chain of custody form for each bag/container?				
31. Have three (3) separate samples been obtained 1) SHL, 2) 71st CST, and 3) Law Enforcement?				
32. Have photographs been taken of the agent prior to sampling, and after placement in bag/container?				
Termination/Disposition of Incident				
34. Provide contact names and telephone numbers for public health to report results of SHL testing (e.g. law enforcement, hazmat, hospitals, agency/business).				
35. Provide termination/disposition instructions to those at the scene as appropriate.				
36. Ensure appropriate debriefings are established and provided to emergency workers.				

All response and investigative agencies involved in the incident should receive a copy of this report.

Annex #2 Emergency Notification Numbers - Local Template

County Emergency Management

24-Hour Number	

City/County Public Health

Law Enforcement

City	
County	
Bomb Squad	
WMD Tactical Team	

Fire Service/Hazmat/USAR

Fire	
Hazmat	
USAR	

Emergency Medical Services

Hospital(s)

Other Contacts

Annex #2 Emergency Notification Numbers - Local Template

Purpose

Developing a record of the persons exposed to or possibly exposed to a CBRNE substance allows public health practitioners and healthcare providers the ability to quickly locate persons to initiate prophylaxis, treatment or other public health control measures if presence of a CBRNE substance is confirmed. Prompt initiation of prophylaxis, treatment, and other public health control measures is essential to limiting morbidity and mortality among those exposed and possibly reducing the spread of a disease to others.

Use of the Forms

The *CBRNE Exposure Reporting Template* forms may be completed by the entity deemed most appropriate by unified command. Completion of these forms will often be a task delegated to a responding local public health agency representative to perform once decontamination has been completed. Complete and accurate information should be collected for every field listed for every person determined to be exposed/potentially exposed to the CBRNE substance.

This responsibility should rest with public health. The reason for public health completing these forms and establishing a relationship with exposed, possibly exposed or injured persons is that follow-up interview and or surveys and epidemiological investigations will be carried out by public health.

Annex #2 Emergency Notification Numbers - Local Template

This reporting template may be used to list the persons and contact information for those who handled the CBRNE hazard, were in the room or area when the CBRNE Threat was discovered or who may have been exposed or injured in some other way.

NAME (print)	HOME PHONE #	CELL PHONE #
STREET ADDRESS	CITY	STATE

Location of exposure (Where was individual when exposure occurred?)		Length of Exposure (How long was the individual exposed)	
Time of exposure (What time did the exposure occur?)		Nature of exposure (e.g. skin contact, inhalation, ingestion)	
Transported for treatment (By which agency and/ to what facility)			

NAME (print)	HOME PHONE #	CELL PHONE #
STREET ADDRESS	CITY	STATE

Location of exposure (Where was individual when exposure occurred?)		Length of Exposure (How long was the individual exposed)	
Time of exposure (What time did the exposure occur?)		Nature of exposure (e.g. skin contact, inhalation, ingestion)	
Transported for treatment (By which agency and/ to what facility)			

NAME (print)	HOME PHONE #	CELL PHONE #
STREET ADDRESS	CITY	STATE

Location of exposure (Where was individual when exposure occurred?)		Length of Exposure (How long was the individual exposed)	
Time of exposure (What time did the exposure occur?)		Nature of exposure (e.g. skin contact, inhalation, ingestion)	
Transported for treatment (By which agency and/ to what facility)			

NAME (print)	HOME PHONE #	CELL PHONE #
STREET ADDRESS	CITY	STATE

Location of exposure (Where was individual when exposure occurred?)		Length of Exposure (How long was the individual exposed)	
Time of exposure (What time did the exposure occur?)		Nature of exposure (e.g. skin contact, inhalation, ingestion)	
Transported for treatment (By which agency and/ to what facility)			

Annex #2 Emergency Notification Numbers - Local Template

NAME (print)	HOME PHONE #	CELL PHONE #
STREET ADDRESS	CITY	STATE

Location of exposure (Where was individual when exposure occurred?)		Length of Exposure (How long was the individual exposed)	
Time of exposure (What time did the exposure occur?)		Nature of exposure (e.g. skin contact, inhalation, ingestion)	
Transported for treatment (By which agency and/ to what facility)			

NAME (print)	HOME PHONE #	CELL PHONE #
STREET ADDRESS	CITY	STATE

Location of exposure (Where was individual when exposure occurred?)		Length of Exposure (How long was the individual exposed)	
Time of exposure (What time did the exposure occur?)		Nature of exposure (e.g. skin contact, inhalation, ingestion)	
Transported for treatment (By which agency and/ to what facility)			

NAME (print)	HOME PHONE #	CELL PHONE #
STREET ADDRESS	CITY	STATE

Location of exposure (Where was individual when exposure occurred?)		Length of Exposure (How long was the individual exposed)	
Time of exposure (What time did the exposure occur?)		Nature of exposure (e.g. skin contact, inhalation, ingestion)	
Transported for treatment (By which agency and/ to what facility)			

NAME (print)	HOME PHONE #	CELL PHONE #
STREET ADDRESS	CITY	STATE

Location of exposure (Where was individual when exposure occurred?)		Length of Exposure (How long was the individual exposed)	
Time of exposure (What time did the exposure occur?)		Nature of exposure (e.g. skin contact, inhalation, ingestion)	
Transported for treatment (By which agency and/ to what facility)			

Annex #3 PERSON TRACKING FORM TEMPLATE

This reporting template may be used to document contact information for other persons present at the incident site.

NAME (Please print)	ADDRESS	HOME PHONE #	CELL PHONE #

Annex #3 PERSON TRACKING FORM TEMPLATE

NAME (Please print)	ADDRESS	HOME PHONE #	CELL PHONE #

Annex # 4 State Hygienic Lab (SHL) Sampling & Shipping Guidelines for Chem/Bio/Rad Threats

Shall only be accomplished by appropriately trained Iowa HazMat Team, CST or local/state/federal response team, or with direct guidance from SHL, as needed.

General Guidelines

• SHL, along with the incident commander, will assess the risk of each incident and treat all unidentified samples as an "all-hazard" specimen

• Collect samples in triplicate, if possible, and submit with controls (swabs, collection device, etc.). Contact SHL for specific sample collection guidance

• Samples are to be collected, decontaminated, and double-bagged. **Place the double-bagged sample(s) in a hard-sided container or cooler**

• A completed SHL *Credible Threat Sample Intake Form* **MUST** accompany each sample

• Samples MUST be screened for explosive and radiological threats, and if possible, chemical threats, prior to delivery

• SHL will perform chemical, biological and radiological analyses to identify and/or rule-out high-risk chemicals, biological agents, radiological hazards, and toxins

• Transportation of the sample(s) to the laboratory will be the responsibility of local agencies and law enforcement and must be coordinated with SHL. Depending on the level of threat, and urgency, transportation of the sample(s) to the laboratory may be the responsibility of private organizations. They may also be coordinated with SHL to utilize the contracted courier

• Person(s) transporting the samples are not required to wear or use personal protective equipment. As a safety precaution, samples should be placed in the trunk of vehicles for transport

• Testing - Samples will be prioritized and analyzed for biological, chemical, and radiological threats as deemed appropriate. Further testing and microbial culture confirmation may require 72 hours, up to 5 days

• All results will be reported to the affected agencies as deemed appropriate. Positive results will also be reported to the CDC Laboratory Response Network (LRN)

• See following pages for "Chain of Custody" and "Credible Threat Sample Intake Form"

Page _____ of _____

Chain of Custody Form

SHL Accession Number	Brief Physical Description (Include sample type)	Qty if Known (volume, weight)	Comments

Sample Collected By (Sign & Print Legibly)	*MM/DD/YY*	*Sample Received By* (Sign & Print Legibly)	*MM/DD/YY*
Signature	Date	Signature	Date
Print	Time (hh:mm)	Print	Time (hh:mm)

	Sample Relinquished By (Sign & Print Legibly)	*MM/DD/YY*	*Sample Received By* (Sign & Print Legibly)	*MM/DD/YY*
1	Signature	Date	Signature	Date
	Print	Time	Print	Time
2	Signature	Date	Signature	Date
	Print	Time	Print	Time
3	Signature	Date	Signature	Date
	Print	Time	Print	Time
4	Signature	Date	Signature	Date
	Print	Time	Print	Time
5	Signature	Date	Signature	Date
	Print	Time	Print	Time
6	Signature	Date	Signature	Date
	Print	Time	Print	Time
7	Signature	Date	Signature	Date
	Print	Time	Print	Time
8	Signature	Date	Signature	Date
	Print	Time	Print	Time
9	Signature	Date	Signature	Date
	Print	Time	Print	Time
10	Signature	Date	Signature	Date
	Print	Time	Print	Time

NOTIFY SHL SECURITY OFFICER WHENEVER EVIDENCE IS ON PREMISES (w 319-335-4252, cell 319-333-5311)

IOWA

IOWA | State Hygienic Laboratory

Credible Threat Sample Intake Form

Toll Free
1-800-421-IOWA

24 hr. Biological/Chemical Threat Coordinators
319-325-0766

Date/time:	Agency:
Location:	
Contact name:	Phone number:
	E-mail address:
	FAX number:

Agencies involved (71st CST, EMS, LLE):

Patient exposure: ____Yes or ____No If yes, where were they taken? _____

Describe any signs/symptoms.

Sample collection time: _____

Sample description (including sample ID, if applicable):

Is this a potential biological threat sample? Please describe your observations.

Field tests / results: pH (in water): _____ Oxidizer test: _____ Radiation: _____

Gas meter: _____ FTIR/Raman (confirm QA checks):

Comments:

Send final report to:

Name:

Address:

Fax Number: Phone number for phone results:

Information regarding Chain of Custody (CoC)- page two of form:

- Chain of custody MUST be maintained for the life span of the sample. It is the responsibility of the submitting agency to initiate CoC. Please initiate CoC by having the individual who collected the specimen print, sign, and date in row 1 of the "Sample Relinquished By" column. When the specimen is transferred to a new individual they must sign, print, and date in row 1 of the "Sample Received By" column.
- Each custody transfer must be documented until the specimen is received by designated SHL staff.
- The CoC must stay with the sample at all times.
- Each Specimen requires an individual CoC.

Note: Samples shall be returned to the submitting agency or destroyed after 30 days of the final report being provided to the agency liaison.

Note: This form is 2 pages. PLEASE PRINT FRONT AND BACK.

NOTIFY SHL SECURITY OFFICER WHENEVER EVIDENCE IS ON PREMISES (w 319-335-4252, cell 319-333-5311)

IOWA

Annex #5 Radiological Response

Radiological incidents are among the most complicated types of response that response agencies may be faced with. This section is designed to offer a basis for tactical response actions. It is recommended that those who do not have sufficient training or knowledge related to radiation protection and response contact local Emergency Management Agency for additional resources.

NOTE - lifesaving actions take priority, and the items below should be addressed in parallel or with the appropriate prioritization to effectively manage the scene.

1. Determine if radiation is present as a hazard:

- □ Radiation detection equipment registers more than 2x background on:
  - ○ 2 different radiation measurement devices
  - ○ 2 different locations at least 50 feet apart
- □ Radiation detection equipment reads higher or lower than the Transport Index (TI) or expected measurement on a radiation placard or sign
- □ Documentation or information about the radiation source indicates presence of an alpha only radiation type (placards/labels, shipping papers, reported information)

If no – radiation is not a hazard for this incident
If yes – move to 2

2. Determine the incident type *(see below tables for details):*

- □ Radiological Dispersal Device (RDD) – explosion
- □ Radiological Exposure Device (RED) – source(s) placed or found in a location that could cause high doses
  - □ Transportation
  - □ Accident or intentional act

	RDD/Dirty Bomb (Explosive)	**RDD (Non-Explosive)** *i.e. spray device*	**RED**
Primary Radiation Hazard	Exposure and Contamination	Exposure and Contamination	Exposure Only (Possible for small amounts of contamination if source was breached)
Estimate Radiological Scope of Incident	Acute exposures only possible within a few feet of blast site or near a piece of radioactive shrapnel. *Blast related injuries more of a concern than radiation dose injuries.*	Acute exposures unlikely.	Acute doses possible within approximately 3-6 meters around source. Dependent on isotope present in source
Estimate Size of Incident Response Area	1-2 miles*	1-2 miles*	5m – 100m radius
Hot Zone Boundary Dose Rate	----------10 mR/hr----------		

Immediate Public Protection Area*	500 m radius 2000 m downwind*	500 m radius 2000 m downwind*	5m – 100m radius*
Immediate Public Protection Recommended**	Shelter in place until extent of contamination is understood Immediate blast area should be managed as appropriate	Shelter in place until extent of contamination is understood Immediate blast area should be managed as appropriate	Leave immediate area Shelter in place to 100m if unable to shield source
Immediate Worker Protection Recommended***	Regular turnout or response gear PAPR recommended in first 15 minutes only N-95 mask sufficient after first 15 minutes Time/Distance Shielding	Regular turnout or response gear PAPR recommended in first 15 minutes only N-95 mask sufficient after first 15 minutes Time/Distance Shielding	Regular turnout or response gear No respiratory protection recommended Time/Distance Shielding

Overview of Terrorist-related Radiological Incident Types Table

* Where radiation levels are immediately actionable. Contamination will be detectable much further but no immediate action necessary

** For radiation hazard only. If other hazards present, those must be balanced with radiation risk

***Responders should not wait for PPE to perform lifesaving actions (if radiation hazard only)

	Transportation	**Fire or Other Incident at Licensee Facility**	**Lost Source**
Primary Radiation Hazard	Exposure and Contamination	Exposure and Contamination	Exposure Only (possible for small amounts of contamination if source wasbreached)
Estimate Radiological Scope of Incident	Acute exposures not expected *Shielding around high activity sources designed to withstand high temperatures and impacts* 3 football fields*	Acute exposures unlikely Except for: 1. Blast creating radioactive shrapnel or 2. Breach of shielding around source *Shielding around high activity sources designed to withstand high temperatures and impacts*	Acute doses possible within approximately 3-6 meters around source Dependent on isotope present in source

Estimate Size of Incident Response Area	----------10 mR/hr----------	1-2 miles*	5m – 100m radius*
Hot Zone Boundary Dose Rate	Spill - 25 m – 100 m radius Fire - 300 m radius and evaluate downwind extent		
Immediate Public Protection Area*	Shelter in place around accident area up to 300m Immediate accident site should be managed as appropriate	300 m radius Evaluate downwind extent	5m – 100m radius
Immediate Public Protection Recommended ****	Regular turnout or response gear for a transportation incident	Shelter in place until extent of contamination is understood Immediate accident area should be managed as appropriate	Leave immediate area Shelter in place to 100m if unable to shield source
Immediate Worker Protection Recommended* **	N-95 mask sufficient if no other respiratory protection in place Time/Distance/Shielding	Regular turnout or response gear PAPR recommended in first 15 minutes only N-95 mask sufficient after first 15 minutes Time/Distance Shielding	Regular turnout or response gear No respiratory protection recommended Time/Distance Shielding

Overview of Accident-related Radiological Incident Types Table

* Where radiation levels are immediately actionable. Contamination will be detectable much further but no immediate action necessary

** For radiation hazard only. If other hazards present, those must be balanced with radiation risk

***Responders should not wait for PPE to perform lifesaving actions (if radiation hazard only)

3. Document and provide radiation-specific information from the scene:

- □ Incident location and location of potential radiation source
- □ Radiation measurement information: value, unit, equipment used, and location
- □ Wind direction or any reports of direction of smoke traveled (if observed)
- □ Radiation information from any documents, signs, placards

Situational awareness information should be relayed to ICP and entered into a CBRNResponder event using cbrnresponder.net.

4. Establish initial zones for radiation response (before measurements):

□ Establish a safety perimeter for the initial hot zone based on incident type in above in all directions around the detonation until radiological measurements that define the actual Hot Zone boundary are taken.

□ Establish a law enforcement control zone immediately around the incident location based on incident type. Responders should not enter this area unless there are immediate life safety needs

□ Staging areas can be located immediately outside the hot zone perimeter in upwind location until measurements can be taken to confirm radiation levels

5. Perform lifesaving rescue operations:

□ Search and rescue, fire suppression, medical triage and treatment, and other lifesaving rescue operations must take priority over conducting radiological measurements or decontamination

□ Until all hazards on scene are identified, responders should wear PPE that is protective for all potential hazards at the site

□ Radiation monitoring, while desirable to understand exposures for responders, is not required to begin lifesaving rescue operations

□ If occupancy times are minimized until additional radiation instruments are brought to the scene, the risk of acute radiation exposure can be mitigated

6. Issue protective actions to the public in general area surrounding the incident:

□ Use pre-scripted initial messages #1 or #2 to direct a shelter in place order until larger response structure established

- Use appropriate reference guidelines to set size for shelter in place order based on incident type outlined in above
  - Area in radius around incident site
  - Zone in downwind direction of incident site

□ Use pre-scripted message #3 to advise the public on self-decontamination while sheltering in place

PUBLIC MESSAGING – INITIAL MESSAGE TEMPLATES

Public Message #1: Response Units Arrive on Scene to Assess the Hazard

An explosion has occurred at [Location]. Emergency personnel are on scene. If you are near [Location], immediately move inside the nearest structurally sound building, close the windows and doors, and stay inside until further instruction. If you cannot get inside a building, place a dry cloth over your nose and mouth and quickly move away from the area. Please stay clear of [Location.]

Public Message #1a: Radiation is Confirmed at Scene of Explosion

An explosion has occurred at [Location]. Radioactive particles may be in the smoke and on the ground. If you are near [Location] immediately move inside the nearest structurally sound building, close the windows and doors, and stay inside until further instruction. If you cannot get inside a building, place a dry cloth over your nose and mouth and quickly move away from the area. Please stay clear of [Location.]

Public Message #3: Press Conference

An explosion has occurred at [Location] that released radioactive particles. Emergency personnel are on scene providing care to those in need and assessing the extent of the contamination. If you have been asked to shelter-in-place, stay inside a building with the windows and doors closed until instructed by responders that it is safe to evacuate. If you are outside of the area, please stay clear to allow emergency personnel to do their work.

Radioactive particles settle like dust on your clothing, your body and other exposed objects. If you are concerned about contamination because you were outside at the [Location] at the time of the explosion, take the following steps to reduce your radiation exposure:

- *Remove your outer layer of clothing. This can remove up to 90% of radioactive material (this percentage is an estimate and may vary depending on amount of skin covered by clothing, for example, long pants versus shorts).*
- *Seal the clothing you were wearing in a plastic bag or other container and place the container away from people and pets. Do not throw the bag or container into regular garbage collection bins to prevent potential spread of contamination.*
- *Take a warm shower with plenty of soap. Do not scratch your skin.*
- *Wash your hair with shampoo or soap and water. Do not use conditioner because it may cause radioactive material to stick to your hair and skin.*
- *If you cannot shower, use a wipe or clean wet cloth to wipe skin that was not covered by clothing, such as your hands and face.*
- *Gently blow your nose and wipe your eyes and ears with a clean wet cloth.*
- *Put on clean clothing. If you do not have clean clothes, shake or brush off your outer layer of clothing and redress. Be careful to not breathe in the dust-like particles.*

7. Notify radiation specific partners through your local Emergency Management Agency:

- □ Bureau of Radiological Health on-call staff
- □ Civil Support Team
- □ HAZMAT Team, if not already there

Situational awareness information should also be shared with these partners through cbrnresponder.net.

Local hospitals will need to be notified that contaminated victims may self- present at the hospital.

Public health officials should also be notified.

8. Implement worker radiation protection recommendations:

- □ Use the principles of As Low as Reasonably Achievable (ALARA)
  - ○ Time
    - ▪ Keep responder's exposure time as short as possible for mission
      - • Use worker stay time chart below
      - • Rotate workers as needed to reduce time in high dose rates
  - ○ Distance
    - ▪ Maintain as much distance between responder and radioactive material
  - ○ Shielding
    - ▪ Use natural shielding whenever possible such as fire engines, buildings, etc.
- □ Limit the number of personnel operating in the area to those necessary to complete the mission
  - ○ Use as many members as necessary in hot zone to perform rapid victim removal
- □ Control worker exposures
  - ○ Track responder/worker doses for each mission by recording initial dose reading and ending dose reading on personal dosimeter
    - ▪ If no personal dose tracking available, record responder locations and times can be reconstructed later in incident by technical resources

- Keep worker doses below dose levels indicated in table below.
  - These are not hard limits and will not result in any acute health impacts.

Response priorities should come first.

5R	Radiation exposure level for general incident activities (non-life saving measures)
10R	Radiation exposure level for protecting valuable property
25R	Radiation exposure level for life saving measures. Personnel receiving this exposure should not be involved in further operations involving radiation exposure.
>25R	Lifesaving or protection of large populations on voluntary basis to persons fully aware of risks involved

Radiation Decision Dose Levels for Emergency Workers Table

How long can you work in an area based on the radiation dose rate reading on the meter?

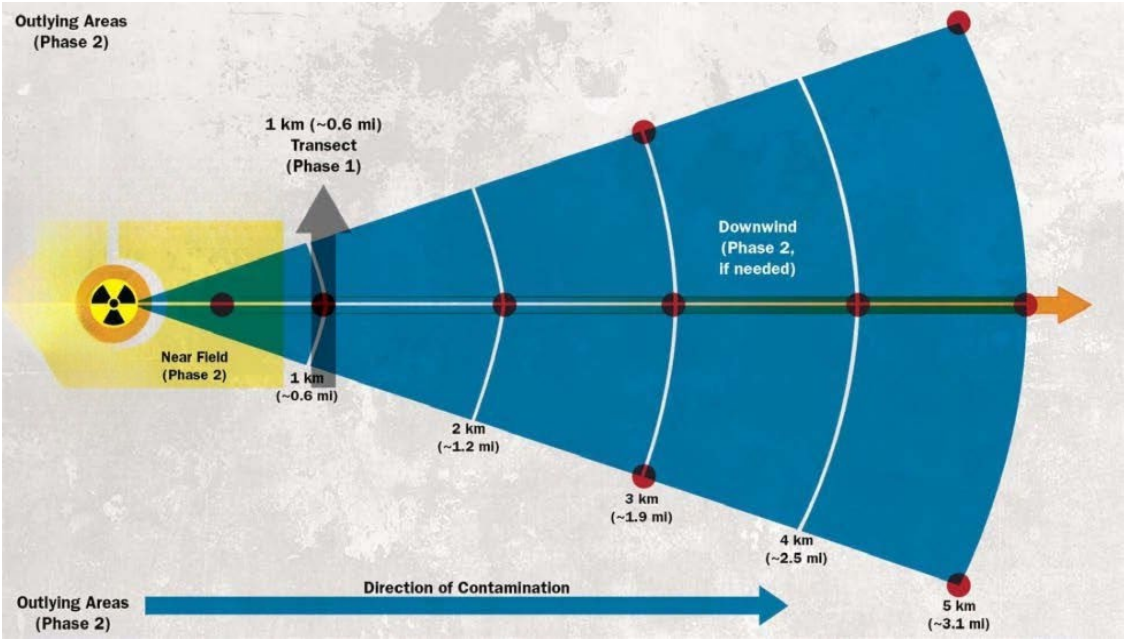
Radiation Dose Rate Reading	General Response Activities Dose	Critical Inrastructure Activites Dose	Life-saving Activities Dose	Higher Life-saving Activites Dose
	5 rem	10 rem	25 rem	50 rem
50 uR/hr				
100 uR/hr				
500 uR/hr	>1 year			
1 mR/hr	208 days	>1 year		
2 mR/hr	104 days	208 days	>1 year	
5 mR/hr	42 days	83 days	208 days	>1 year
Recommended Hot Zone				
10 mR/hr	21 days	42 days	104 days	208 days
50 mR/hr	4 days	8 days	21 days	42 days
100 mR/hr	2 days	4 days	10 days	21 days
500 mR/hr	10 hr	20 hr	50 hr	100 hr
1000 mR/hr	5 hr	10 hr	25 hr	50 hr
1 R/hr	300 min	10 hr	25 hr	50 hr
3 R/hr	100 min	3 hr	8 hr	17 hr
5 R/hr	60 min	2 hr	5 hr	10 hr
Dangerous Radiation Zone				
10 R/hr	30 min	60 min	3 hr	5 hr
30 R/hr	10 min	20 min	50 min	100 min
50 R/hr	6 min	12 min	30 min	60 min

Radiological Stay Time Table

9. Measure and map radiation levels:

- □ As soon as initial operations allow, assemble strike teams to take radiation measurements
- □ Measurements of gamma readings should be taken in the following priority missions as outlined in the image below:
- □ Around detonation site
  - ○ Along a transect of the estimated downwind direction – at 1 km (for explosive RDD) or at a distance where readings are more than 200 mR/hr
  - ○ Around the nearfield area of the incident
  - ○ At 10-point monitoring points
  - ○ Outlying areas or critical areas of interest
- □ Each radiation measurement should include, at a minimum:
  - ○ Location of survey or observation
  - ○ Instrument type
  - ○ Measurement reading
  - ○ Units of measure
  - ○ A photo of the meter readings on the equipment (can be uploaded into CBRNResponder or sent by email text to technical reach back)
- □ Identification of the isotope
  - ○ Markings, labels, or documentation at scene
  - ○ Measurement with isotope identification equipment, if available Field measurements should also be entered into **cbrnresponder.net**

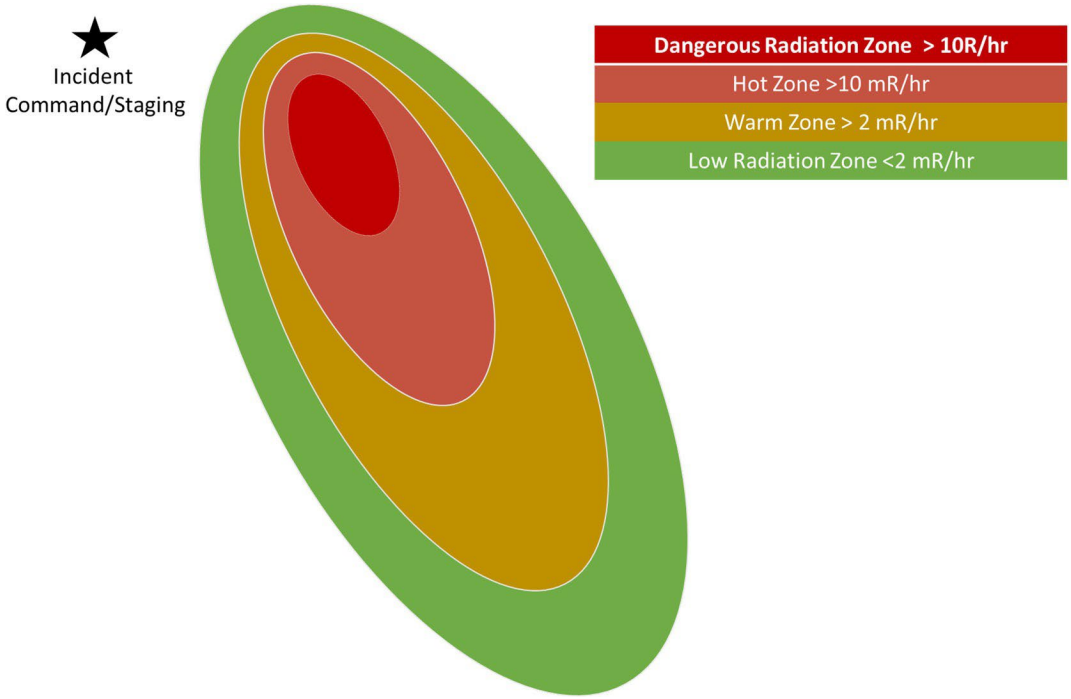
These initial strike team measurements assist in early situational awareness of the radiation hazard using the responder resources available on scene. A request should be made for additional survey teams and resources to plan for and take additional environmental assessment measurements and samples.



Overview of Radiation Measurement Phases and 10-point Monitoring Figure

10. Establish response zones based on radiation measurements:

- ☐ Dangerous Radiation Zone: 10 R/hr
- ☐ Hot Zone: 10 mR/hr – 10 R/hr
- ☐ Warm Zone: 2 mR/hr – 10 mR/hr
- ☐ Move incident command/staging area to lower dose rate area, if necessary



Response Zones by Radiation Measurements Figure

11. Commence phased evacuations:

- ☐ Confirm general areas of contamination and non-contamination based on measurements
- ☐ Create exit routes for sheltered populations to take to minimize traverse through contamination areas
- ☐ Set up reception areas for evacuees to be screened for contamination, decontaminated, and registered
- ☐ Once all routes and reception centers are established, communicate evacuation plan to affected population

12. Establish monitoring and decontamination operations:

- ☐ At hot zone exit points
- ☐ Community Reception Centers (CRC)
- ☐ It is not necessary to capture water used for decontamination efforts in early phase of incident, unless easily implemented
- ☐ **Medical treatment of injuries should take priority over decontamination**

13. Other appropriate radiation protection principles:

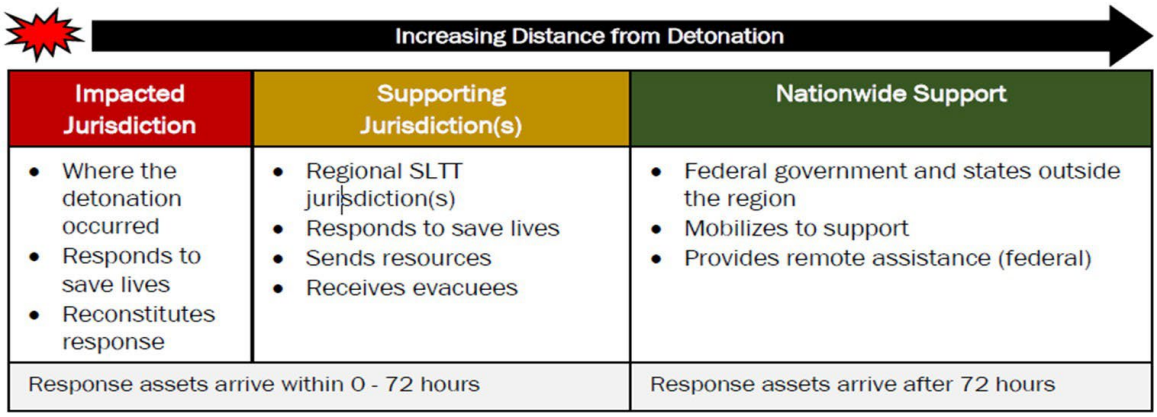
- ☐ If gamma only or mixed alpha/beta/gamma
  - ○ Manage scene based on gamma exposure readings
  - ○ 1 Roentgen = 1rad = 1 rem
- ☐ If alpha or beta radiation only suspected (no gamma)
  - ○ Prioritize respiratory protection to limit inhalation
  - ○ Keep skin covered to reduce contamination and skin dose
  - ○ External radiation will be less of a hazard
  - ○ Gamma measurements will be less helpful in guiding response priorities and zones
- ☐ **Equipment Alarms:**
  - ○ All personnel making entry into an area in which a radiation field is known or suspected to exist should utilize some form of active dosimetry. This may include a personal radiation detector. It is acceptable for only one member of each team to wear dosimeters if the team is to work together in the same area.
  - ○ If available, passive radiation dosimeters (TLD/OSL) should be issued to each individual or team. If unavailable, active dosimeters may be sufficient to track doses until additional dosimetry equipment is available.
  - ○ Insert reference to equipment
  - ○ Equipment Rate Alarms
    - Low-Rate Alarm -- 10mR/hr
      The Low-Rate Alarm is set at 10mR/hr. This alarm is set at a significantly higher rate than natural background so that false positive indications are avoided, but not so high that an emergency responder is likely to receive an exposure that would approach the annual allowable limit for a member of the general public. During an emergency response or in a suspicious situation, units should not go past this point unless there is a compelling reason to do so. Such reasons include the rescue of injured persons and time-sensitive actions to regain control of the scene.
    - High-Rate Alarm -- 10R/hr
      High-Rate Alarm is set at 10R/hr. This should be used to establish the Dangerous Radiation Zone.

      Personnel should only pass this point and operate in the Hot Zone for life saving purposes.

Annex #6 Nuclear Detonation Response

Nuclear detonation incidents are among the most complex types of response that response agencies may be faced with and will quickly overwhelm a jurisdiction's resources and response capacity. The impacted jurisdiction will have serious infrastructure damage that will impact the availability of resources and communications which will result in a decentralized local response. Nuclear detonation response planning for each jurisdiction should include coordination with neighboring jurisdictions, as well as state and local response agencies, to allow for autonomous and immediate deployment of support assets.

A key aspect to this guidance is the concept of Impacted Jurisdiction and Supporting Jurisdiction. See figure below from the DHS 72-hour Nuclear Response Guidance.



Impacted Jurisdiction, Supporting Jurisdiction(s), and Nationwide Support Figure

This section is designed to offer a basis for tactical response actions for the first 72 hours of a nuclear detonation incident. Significant planning among jurisdictions across Iowa is key to supporting the actions presented in this protocol and will guide specific actions outlined in this protocol.

It is recommended that those who do not have sufficient training or knowledge related to nuclear detonation characteristics or radiation protection and response ask for further assistance.

NOTES – The items below should be addressed in parallel or with the appropriate prioritization to effectively manage the scene.

- **Immediate lifesaving actions take priority but may not be possible in the dangerous radiation zone due to radiation levels >100 R/hr.**
- Immediate shelter-in-place communications to both the responders and public in the dangerous radiation are a critical priority to help people avoid lethal doses of radiation and should be considered a lifesaving action.

1. Recognize that a nuclear detonation is imminent or has occurred:

- ☐ Notification by FEMA or other federal intelligence agencies to begin public messaging
- ☐ Intense flash of light followed by a pressure wave
- ☐ Large mushroom cloud reaching 30,000 feet (level of cruising altitude for airplanes)
- ☐ Sandy particles falling from sky

- Note these have very high radiation exposure rates
- **Immediately go inside if fallout present – both responders and public**

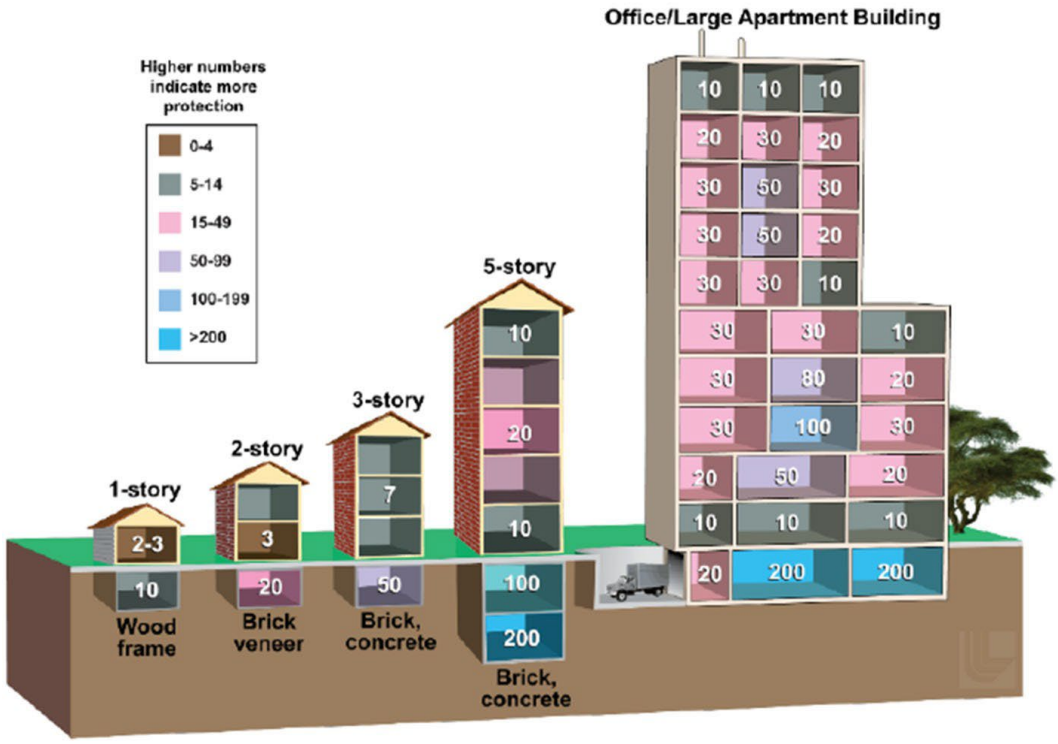
2. Determine if your jurisdiction is Impacted or Supporting:

□ Impacted Jurisdiction: This term describes the jurisdiction(s) or area(s) where the nuclear detonation occurred and encompasses the areas of significant damage and fallout radiation where dangerous radiation levels exist. The response infrastructure in this area is significantly disrupted. These jurisdictions should also prepare to receive outside response assets that will deploy and assist with executing operations to support lifesaving activities. During the first 72 hours, these resources will primarily arrive from the Supporting Jurisdiction(s).

□ Supporting Jurisdiction(s): This term describes the regional jurisdictions, states, and areas mostly or fully outside of the blast damage and dangerous radiation zones that have largely intact and/or quickly recoverable communications, utilities, and infrastructure such that they can assist the Impacted Jurisdiction and receive evacuees over time. While these jurisdictions may still experience effects and impacts from the detonation, a critical distinction from the Impacted Jurisdiction is that a Supporting Jurisdiction's emergency response infrastructure is fully operational.

3. Immediately Issue Alert to Get Inside:

- □ Immediately issue nuclear detonation protective action messages to public and responders.
  - Get Inside, Stay Inside, Stay Tuned
  - Go to basement or central room of any nearby building for up to 24 hours or until notified it is safe to change locations
  - All public and responders within a 50-mile radius around the detonation should shelter until the direction and areas of fallout creating dangerous radiation levels are confirmed
- □ Assist Impacted Jurisdiction with distributing/amplifying protective action messages through public and responder messaging systems (See Communications tab)
- □ Deconflict public alert and warning messages across neighboring jurisdictions
- □ Key Notes:
  - If done before detonation, shelter can significantly mitigate blast, thermal, and radiation effects
  - Radiation exposure rates in fallout areas may be 100 R/hr or higher
  - Sheltering in nearest structure is critical to reducing acute doses of radiation
  - People should be told NOT to evacuate
    - Evacuating may send people outside to receive very high or lethal doses of radiation
    - Buildings provide shielding protection from gamma radiation with factors of 5 – 100x reduction factors (see image below)



Example protection factors for a variety of building types (Credit: LLNL)

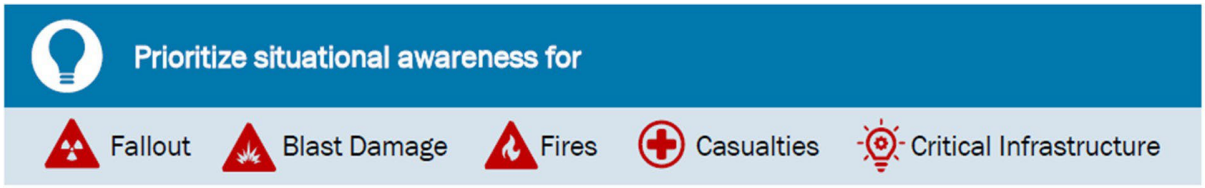
Message for a Nuclear Attack Warning
▪ WEA 360-character compatible (approx. 320 characters): [SOURCExxxxxxxxxx] warns (nuclear) attack is imminent in [LOCATIONxxxxxxxxxx]. Get inside a basement or central room of a sturdy building NOW and stay away from windows and doors. Stay inside. Listen for more info. Do not leave unless officials provide other instructions or your shelter is threatened by fire or collapse.
▪ WEA 90-character compatible (approx. 88 characters): [SOURCExxxxxxxxxx] warns (nuclear) attack in [LOCATIONxxxxxxxxxx]. Get inside, stay inside NOW
Message for a Nuclear Detonation
▪ WEA 360-character compatible (approx. 349 characters): [SOURCExxxxxxxxxx] warns a nuclear detonation has occurred. People in [LOCATIONxxxxxxxxxx] - get inside, stay inside, stay tuned for more information. Prepare to stay inside for at least 24 hours unless officials provide other instructions, or your building is threatened by fire or collapse. Follow instructions from officials – this can save your life.
▪ WEA 90-character compatible (approx. 88 characters): [SOURCExxxxxxxxxx] warns nuclear attack in [LOCATIONxxxxxxxxxx]. Get inside, stay inside NOW

[4] (US Department of Homeland Security (DHS), 2019), (Federal Emergency Management Agency (FEMA), 2013)
[5] (Centers for Disease Control and Prevention (CDC), 2021)
[6] These messages have been adapted from DHS's Emergency Support Function #15 External Affairs, Annex N (2019). Planners are strongly encouraged to review the current editions of the Annex N and Communicating in the Immediate Aftermath which include additional messaging content and other critical context for public warning experts.

4. Prioritize lifesaving activities in immediate responder locations based on radiation exposure rates:

- Radiation is not the only hazard responders should be concerned about.
  - Structurally damaged buildings, large-scale fires, or other hazards may be the real threat to shelter integrity or the lives of the public and responders. The totality of hazards must be considered before conducting a response activity.
- Lifesaving operations in the Impacted Jurisdiction may look very different than they do for other types of emergencies
  - Instead of a very methodical search of damaged structures, this will more likely be "holding the line" against fires, stabilizing and transporting patients as quickly as possible, and providing the public with self-help instructions, such as announcing over a bullhorn, "If you can hear this, come toward the sound of my voice."
- Responders should shelter indoors until confirmation of radiation exposure rates outdoors in confirmed:
  - If radiation exposure rate is above Dangerous Radiation Zone (DRZ) of 10 R/hr – operate only indoors or underground. Limit outdoor lifesaving actions to quick and critical missions.
    - If possible, consult with command and technical experts before continuing missions in this zone
  - If/when radiation exposure rate is below 10 R/hr, conduct outdoor lifesaving activities.
  - Do not enter areas greater than 100 R/hr without specific mission consideration and assessment of risks/benefits.
  - If possible, keep track of exposure rates and time in locations, and apply time, distance and shielding (ALARA) while conducting lifesaving missions

5. Assess and report impacts in vicinity:



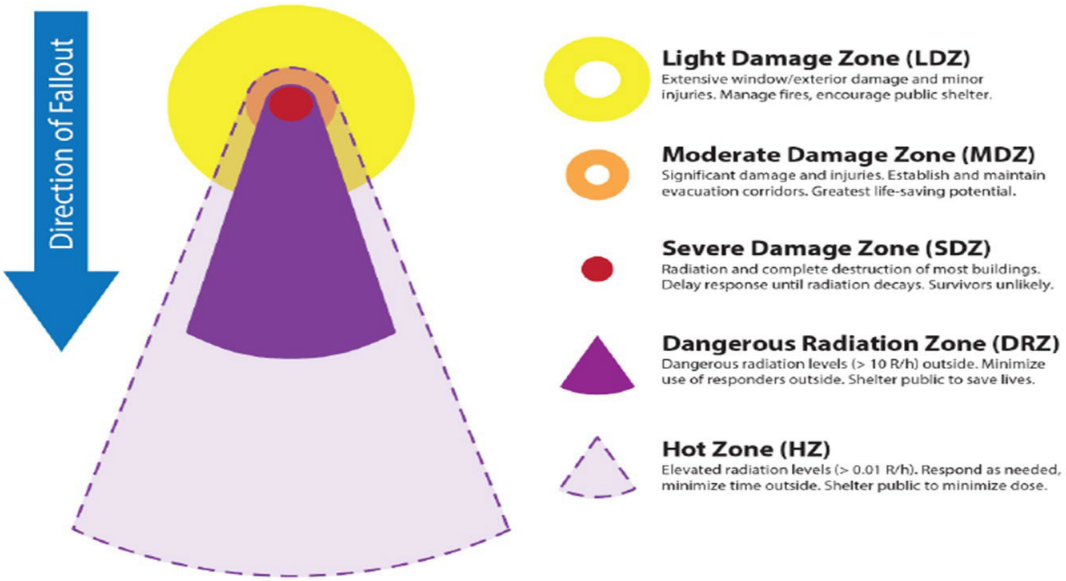
- Radiation levels (if radiation equipment available) to identify dangerous radiation and hot zones (see table below)
- Severity of blast damage in the area based on blast damage zone types (See table below)
- Critical infrastructure impacts
- Road Access
- Injuries
- Fires

Blast Zone Type	Indicators
Light Damage Zone (LDZ)	▪ Nearly all windows shattered and building facades damaged ▪ Most injuries not life-threatening, many injuries from flying glass and debris
Moderate Damage Zone (MDZ)	▪ Light buildings destroyed ▪ Interiors of larger buildings blown out ▪ Significant number of major injuries
Severe Damage Zone (SDZ)	▪ Nearly all buildings destroyed ▪ Hazardous outdoor conditions ▪ Few survivors

Blast Zone Types and Definitions

Radiation Hazard Zone Type	Indicators	Outdoor Response Restrictions
N/A	▪ Below 0.01 R/h (10mR/h)	▪ Assess impacts in the immediate area. Support all operations as needed while monitoring radiation levels.
Hot Zone (HZ)*	▪ Above 0.01 R/h (10mR/h) and Below 10 R/h	▪ Assess impacts in the immediate area. Support only emergency operations (lifesaving, firefighting, etc.) as needed while monitoring radiation levels. Track dose of all responders.
Dangerous Radiation Zone (DRZ)*	▪ Above 10 R/h	▪ Do not exit shelter or enter areas if radiation exposures exceed 10 R/h outside unless there is a time-critical, life-safety issue (e.g., avoiding fire, building collapse) or to conduct quick, critical, lifesaving activities.

Radiation Hazard Zone Types and Definitions



Emergency Response Zone Types

6. Establish communications with other first response facilities:

- It will be difficult to communicate out of the immediate area
  - It is critical to get information for situational awareness from even those areas where responders and public are sheltered
- Network of communication may assist in sharing information across impacted area
- Develop a central reporting jurisdiction/location to collect all information and develop a situational awareness picture
- Establish communication and coordination with Federal partners to coordinate modeling and situational awareness support

7. Develop a common operating picture:

- A picture of the totality of the incident is necessary to plan for and guide appropriate protective actions
- A central Supporting jurisdiction should be tasked with collecting and coordinating all information received and developing a map of fallout, fire, blast, casualty, and infrastructure impacts
- Identify and map response zones:
  - Blast damage zones: Light (LDZ); Moderate (MDZ); Severe (SDZ)
  - Radiation zones: Dangerous Radiation Zone (DRZ); Hot Zone (HZ)
- Continue to update situational awareness and maps often, every 30 minutes if possible
  - Radiation levels in fallout areas will rapidly change over the first 24 hours of the incident
- Set up CBRNResponder/RadResponder (radresponder.net) event to record situational awareness information in central and shareable location
  - Not all responders or jurisdictions will be able to enter or access information, but it is important that a Supporting jurisdiction make efforts to reflect situational awareness in this system to support a whole community common operating picture
  - Federal support agencies will be able to use this system to share modeling products and receive situational information from the jurisdictions

8. Initiate Zone Based Response:

- Initiate and coordinate larger area lifesaving activities
  - Prioritize moderate damage zone where no dangerous radiation zone
  - Lifesaving efforts in severe damage zone should be avoided
  - Limit lifesaving activities in dangerous radiation zone
    - DRZ will shrink rapidly over time – plan for lifesaving efforts by following the shrinking edge of DRZ

9. Initiate Responder Protection Strategies:

- Establish radiation exposure decision points
  - Should be considered based on resource availability and critical response needs.
  - Note, it will be necessary to consider higher dose levels from responders in the Impacted jurisdiction(s)
  - Emergency dosimetry should be used:
    - Issue one dosimeter to each group to conduct group dosimetry

- Prioritize equipment and dosimetry to those working in highest radiation exposure rate areas, such as the HZ or DRZ
- Some dosimetry, especially in lower exposure rate areas, may need to be conducted by recording the measurement and time spent in the area, and recalculate the dose after the mission

5 rem	Radiation exposure level for general incident activities in Supporting jurisdiction areas (non-life saving measures)
10 rem	Radiation exposure level for protecting valuable property in Supporting jurisdiction areas
25 rem	Radiation exposure level for life saving measures in Supporting jurisdiction areas
>25 rem	Lifesaving or protection of large populations on voluntary basis to persons fully aware of risks involved in either Supporting or Impacted jurisdiction
50 rad	Decision point for considering whether responder should continue or pull back from lifesaving missions in Impacted jurisdiction
100 rad	Threshold where Acute Radiation Syndrome (ARS) symptoms may begin
450 rad	LD 50/60 for acute radiation exposures

- PPE other than radiation detection equipment should be selected based upon non-radiological hazards.
  - In blast damage zones, this includes consideration for hazards such as sharp debris, silica dust, fires, and unstable structures
  - Fires and unstable structures are an especially likely hazard in the MDZ and SDZ
  - Should be considered based on resource availability and critical response needs
- Prioritize dry, rapid decontamination
  - Brushing off sandy particles of fallout is sufficient to reduce dose
- No radiation specific PPE is required
  - Large, sandy particles of fallout are not respirable
    - N95 or other particulate masks would be sufficient
- Priority should be limiting time in area, so PPE should be selected to ensure responder can quickly complete mission in the radiation exposure areas

10. Reestablish and Sustain Critical Response Infrastructure:

- Initiate power restoration activities
  - Restoration of power after an electromagnetic pulse (EMP) from a nuclear detonation may require reset of breakers or switches along grid infrastructure
  - Deploy fuel and generators to the Impacted jurisdiction to support lifesaving operations
- Reestablish communications
  - Deploy COW or other mobile radio or cell towers
- Clear debris and open key transportation infrastructure to support logistics of resources and eventual evacuation of affected populations
- Ensure firefighting infrastructure is functional, especially in Impacted jurisdiction

- Identify unstable hazardous material infrastructure in the area and prioritize stabilization of these areas
- Identify key emergency stockpiles or key resources and protect from destruction or theft

11. Plan for Coordinated and Support Spontaneous/Self Evacuations

- Facilitate movement of self-evacuees out of the DRZ or HZ to reduce dose
- Identify evacuation priorities based on zone type
- Assign transportation resources to support both planned and spontaneous evacuations
- Population monitoring for contamination is not necessary
  - Removing highly radioactive fallout particles is priority – no need to measure for or confirm their presence
  - Decontaminate using dry, rapid decontamination methods
    - Brushing off particles or changing clothing is sufficient because particles are very large sandy particles
  - Support ad hoc sites for removing gross contamination
- Supporting jurisdictions should prepare to receive and support evacuees at designated locations
  - Mass shelter, medical care, feeding and housing
  - Radiation decontamination and dose assessment or treatment

Zone Type	Shelter and Evacuation Priorities
LDZ	Instruct public to shelter inside. ▪ Conduct targeted evacuation of unsafe areas (e.g., fires, heavy smoke, unstable structures). ▪ Direct evacuees towards safety and away from HZ. Do not prevent spontaneous evacuation.
MDZ	Instruct public to evacuate towards the LDZ and away from the HZ. ▪ Prioritize assisted evacuation for the non-ambulatory. ▪ Recruit volunteers to support evacuation.
SDZ	Instruct everyone – responders included – to remain sheltered indoors. ▪ Move if shelter threatened by fire, collapse, or other hazards. ▪ Prepare to evacuate once radiation levels are less than 10 R/h. ▪ Consider evacuating through subterranean structures (e.g., subways, tunnels).
DRZ*	Instruct everyone – responders included – to remain sheltered indoors. ▪ Prepare to evacuate (in 12–24 hours) once radiation levels are less than 10 R/h. ▪ Consider evacuating through subterranean structures (e.g., subways, tunnels).
HZ (beyond MDZ & LDZ)	Instruct public to shelter inside. ▪ Targeted evacuation of unsafe areas (e.g., fires, heavy smoke, unstable structures). ▪ Direct self-evacuees towards safety and away from HZ: Do not prevent spontaneous evacuation.
* For areas in the MDZ and LDZ that are also in the DRZ, follow the DRZ shelter/evacuation priorities until radiation decays below DRZ levels.	

Initial Evacuation Priorities for Each Zone

12. Triage, Stabilize, Transport

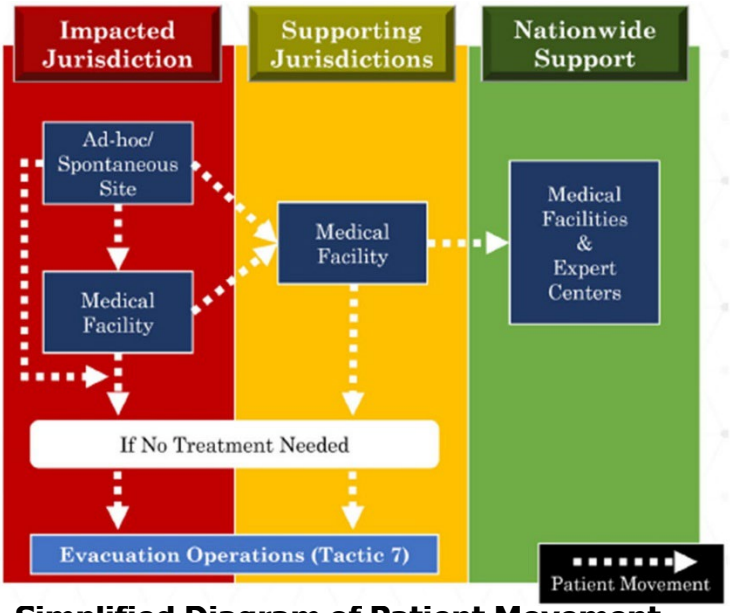
- Establish and support ad hoc triage sites in/near blast damage zones – outside the dangerous radiation zone
  - Prioritize treatment based on trauma and burn triage categories

- Medical resources will be severely constrained, so most of the minor or moderate injuries that would typically be treated in a typical trauma situation may need to be bypassed to self-care or delayed attention to conserve resources for more immediate lifesaving efforts
- Many survivors will have physical trauma, burns, acute radiation syndrome, and combined (radiation and trauma) injuries

- Begin transporting patients to medical facilities
  - Hospitals in Impacted jurisdiction may not be fully functional or available
  - Supporting jurisdictions should be prepared to receive patients from damage zones
  - Establish coordination across health care coordination points to record facility capabilities, resource availability, and damage levels to distribute patients in a manageable approach across all jurisdictions
  - Advise healthcare providers and decision-makers to consider whether to implement crisis standards of care

- Local hospitals will need to be notified that contaminated victims may self- present at the hospital.
- Public health officials should also be notified.

This figure provides a high-level overview of patient movement out of the Impacted Jurisdiction. Medical facilities in the Supporting Jurisdiction must activate their surge plans and begin discharging and transferring patients immediately. People not requiring treatment should be evacuated to safety.



Simplified Diagram of Patient Movement

13. Other appropriate nuclear detonation or radiation protection principles:

- Basics of fallout
  - Large, sand-like particles

- Wind direction based on upper-level atmosphere winds that are not detected at ground level or reported in typical weather apps
  - May have fallout in multiple directions

- Response will be significant impact on resources
  - Radiation levels can be very high – responders will need to work in exposure rates 10x higher than they are used to
  - Responders will need to walk by injured in LDZ or areas where accidents occurred due to flash blindness to get to those who need critical care in MDZ.

Annex #7 Glossary of Acronyms

ALARA	As Low as Reasonably Achievable
ALI	Automatic Location Identification (E911 Phone Service)
ANI	Automatic Number Identification (E911 Phone Service)
APR	Air Purifying Respirator
ARS	Acute Radiation Syndrome
CBRNE	Chemical, Biological, Radiological, Nuclear and Explosive
CDC	Center for Disease Control and Prevention
CERCLA	Comprehensive Environmental Response, Compensation, and Liability Act
CISD	Critical Incident Stress Debriefings
CRC	Community Reception Center
CWA	Chemical Warfare Agent
DRZ	Dangerous Radiation Zone
EMA	Emergency Management Agency
EMS	Emergency Medical Services
EMP	Electromagnetic Pulse
EPA	Environmental Protection Agency
FEMA	Federal Emergency Management Agency
HAZMAT	Hazardous Materials
HVAC	Heating Ventilation and Air-Conditioning
HZ	Hot Zone
IC	Incident Command
ICP	Incident Command Post
ICS	Incident Command System
LDZ	Light Damage Zone
LRN	Laboratory Response Network
MDZ	Moderate Damage Zone

NIMS	National Incident Management System
PAPR	Powered Air Purifying Respirator
PBA	Pharmaceutical Based Agent
PPE	Personal Protective Equipment
RDD	Radiological Dispersal Device
REP	Radiological Emergency Preparedness
RED	Radiological Exposure Device
SCBA	Self-Contained Breathing Apparatus
SDZ	Severe Damage Zone
SHL	State Hygienic Laboratory
SLTT	State, Local, Tribal, Territorial
UC	Unified Command
USAR	Urban Search and Rescue
WMD	Weapons of Mass Destruction

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