


Nuclear/Radiological Incident Annex to the Response and Recovery Federal Interagency Operational Plans

October 2016 – FINAL

Homeland Security

Handling Instructions

Questions pertaining to the distribution, transmission, or destruction of this Annex should be submitted to the Federal Emergency Management Agency, Office of Response and Recovery, Planning and Exercise Division, National Planning Branch at response-planning@fema.dhs.gov.

Intended Audience

Approved audiences for this Annex include agencies and officials of the Federal Government and state, local, and tribal officials, as well as other Whole Community partners involved in planning for the response to and/or recovery from nuclear/radiological incidents.

Use of this Document

This annex provides guidance and serves as a reference for federal agency planning efforts involving nuclear/radiological incidents. Other stakeholders (e.g., local, state, tribal, territorial, and insular area governments; nongovernmental organizations; voluntary agencies; and the private sector) engaged in their own planning will find this document useful in enhancing their understanding of how the Nuclear/Radiological Incident Annex will be implemented and how their planning efforts can be complementary.

Acronym Usage within this Document

To promote readability, this annex utilizes acronyms only after the first occurrence of the proper name of a Federal Executive Branch department or agency. The exception to this rule applies to acronyms that only appear within tables and figures in the document, where space considerations and readability render the use of abbreviations optimal.

CBP	U.S. Customs and Border Protection	FEMA	Federal Emergency Management Agency
CDC	Centers for Disease Control and Prevention	HHS	U.S. Department of Health and Human Services
DHS	U.S. Department of Homeland Security	HUD	U.S. Department of Housing and Urban Development
DOC	U.S Department of Commerce	NASA	National Aeronautics and Space Administration
DOD	U.S. Department of Defense	NNSA	National Nuclear Security Administration
DOE	U.S. Department of Energy	NOAA	National Oceanic and Atmospheric Administration
DOI	U.S. Department of the Interior	NRC	U.S. Nuclear Regulatory Commission
DOJ	U.S. Department of Justice	OSHA	Occupational Safety and Health Administration
DOL	U.S. Department of Labor	SBA	U.S. Small Business Administration
DOS	U.S. Department of State	USACE	U.S. Army Corps of Engineers
DOT	U.S. Department of Transportation	USAID	U.S. Agency for International Development
EPA	U.S. Environmental Protection Agency	USCG	U.S. Coast Guard
FBI	Federal Bureau of Investigation	USDA	U.S. Department of Agriculture
FDA	U.S. Food and Drug Administration	VA	U.S. Department of Veterans Affairs

Rescission Notice

Publication of this annex to the Response and Recovery Federal Interagency Operational Plans hereby rescinds the following documents: Federal Radiological Emergency Response Plan,[1] 1996; Nuclear/Radiological Incident Annex to the National Response Framework, 2008; and Improvised Nuclear Device Concept of Operations Plan (Version 10), 2009.

[1] Previously rescinded upon development of the National Response Plan in 2004 and later the National Response Framework in 2008 and should no longer be referenced by planners.

Document Change Control

Version	Date	Summary of Changes	Name

TABLE OF CONTENTS

Annex Overview

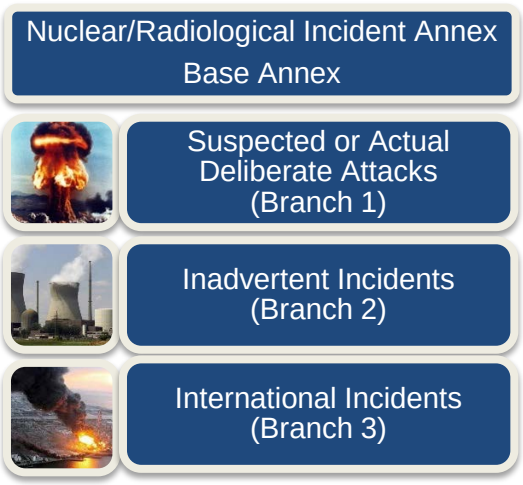


Figure 1- Annex Composition

The Nuclear/Radiological Incident Annex is composed of a base document and three branch plans. The base document is applicable to all nuclear/radiological incidents, whereas the branch plans focus on suspected or actual deliberate attacks, inadvertent incidents, and international incidents, respectively, affecting the United States. The branch plans describe the unique response and recovery aspects of nuclear/radiological incidents and provide detailed information to assist with the implementation of the Response and Recovery Federal Interagency Operational Plans. The plans also detail the importance of establishing operational coordination with the Prevention Mission Area regarding the response to imminent nuclear/radiological terrorist threats or incidents.[2] This annex is supplemental to, and not duplicative of, the Federal Interagency Operational Plans and other subordinate plans.

Although the Nuclear/Radiological Incident Annex provides guidance for the Whole Community, it focuses deliberately on the requirements of those who are involved in delivering core capabilities at the federal level. The Nuclear/Radiological Incident Annex does not alter or impede the ability of any local, state, tribal, territorial, insular area, or federal agency[3] to execute authorities or meet responsibilities under applicable laws, executive orders, and directives.

The term "response" within this annex refers to those activities and capabilities within the Response and Recovery Mission Areas, commonly identified as "consequence management" that are exclusive of any law enforcement and criminal investigation activities and capabilities otherwise described within the Prevention Mission Area. The term "consequence management" is used to describe those Response and Recovery Mission Area activities that include securing the incident site, assessing the dispersal of radioactive material, enhancing first responder capabilities, ensuring availability of decontamination and site remediation resources, providing radiological medical triage capabilities, and increasing population resilience and recovery capabilities. All references to law enforcement "crisis management" or criminal investigative activities and capabilities within this annex are clearly identified.

[2] Planners should anticipate the execution of counterterrorism plans during any response to nuclear and radiological threats involving separate roles and responsibilities of federal, state, and local agencies.

[3] For this annex, "federal agency" includes any Federal Executive Branch department or agency including boards, commissions, government corporations, and any independent agencies of the U.S. Government that have authority for, or provides support to, the response to and recovery from a nuclear/radiological incident.

Base Annex

Situation

Nuclear/radiological incidents can occur anywhere within the United States, in multiple geographical regions, and throughout the world, requiring systems and protocols to respond to, prevent,[4] and recover from any incident, regardless of location. They may occur for a wide variety of reasons and can range significantly in scope and severity.

The most common nuclear/radiological incidents occur because of loss, theft, or mismanagement of relatively minor or low-level radioactive sources or technologically enhanced, naturally occurring radioactive material.[5] Further, natural hazards, such as fires and including severe weather, may impact nuclear or radiological facilities resulting in an incident. The 2011 Fukushima Daiichi nuclear disaster is an example of how this could result in a major international nuclear or radiological incident.

Nuclear/radiological incidents can also result from terrorist attempts to acquire or use nuclear threat devices[6] or the nuclear proliferation. The United States faces the threat of both nuclear proliferation[7] and nuclear terrorism. Nuclear or radiological responses can occur as part as the effort to thwart imminent terrorist threats, or would occur in response to a nuclear or radiological attack.

Nuclear and radiological facilities include fixed facilities that store nuclear material such as U.S. nuclear weapons and special nuclear material; those that store or use radioactive material that includes commercial nuclear reactors and fuel cycle[8] facilities (uranium enrichment, fuel fabrication, and disposal); some non-fuel cycle industries (such as radiation source and radiopharmaceutical manufacturers); and other facilities and industries involved in the production, refinement, handling, storage, transportation, or use of nuclear/radioactive materials to the environment.

Nuclear threat devices include radiological devices and improvised nuclear devices (IND). Radiological dispersal devices (RDD) and radiation exposure devices (RED) release radioactive material into the environment or emit radiation as part of criminal activity or an act of terrorism. The radiological harm caused by a RDD is principally contamination, and denied use of the

[4] The prevention mission area includes the resolution of imminent threats and attacks and stopping follow-on attacks.

[5] Technologically Enhanced Naturally Occurring Radioactive Materials consist of materials, usually industrial wastes, or by-products enriched with radioactive elements found in the environment such as uranium, thorium, and potassium and any of their decay products such as radium.

[6] Nuclear threat devices include INDs, radiological dispersal devices, REDs, and any device that may produce nuclear yield such as nuclear weapons out of state control.

[7] Nuclear proliferation is the spread of nuclear weapons, fissionable material, and weapons-applicable nuclear technology and information to nations not recognized as "Nuclear Weapon States" by the Treaty on the Nonproliferation of Nuclear Weapons.

[8] Nuclear fuel cycle – the steps involved in supplying fuel for nuclear power plants. It can include mining, milling, isotopic enrichment, fabrication of fuel elements, use in reactors, chemical reprocessing to recover the fissile material remaining in the spent fuel, re-enrichment of the fuel material re-fabrication into new fuel elements, and waste disposal.

contaminated area, perhaps for many years. High radiation exposures are unlikely, but costs associated with remediation and loss of access due to an effective RDD could be significant.

In addition, an IND[9] using lost or stolen special nuclear material[10] or introduced into the United States from a program of a nuclear state can achieve a nuclear yield and result in mass destruction of property and radioactive contamination.[11] Even a relatively small nuclear detonation in an urban area could result in tens of thousands of fatalities, a large number of survivors requiring, medical care, behavioral health and dose assessments given concerns of medically relevant exposure, as well as massive infrastructure damage and hundreds of square miles of contamination.

Response and Recovery Mission Area activities for minor nuclear/radiological incidents are usually managed at the local level with occasional state and federal assistance as required. Generally, increased regulatory control, safeguards, and security accompany larger, more hazardous radioactive sources or materials, as they pose a greater threat to human health and the environment. However, for those incidents involving federal crimes relative to the theft, illegal acquisition, or use of weapons of mass destruction (WMD) or that involve federal crimes, including those concerning terrorism, federal law enforcement will lead and coordinate the related law enforcement, investigative, intelligence, and crime scene activities. This law enforcement response is not specific to the amount of material involved, but rather it is applicable based on whether a federal crime has been committed and the threat the material poses for utilization by terrorists. Even very small amounts of certain radiological sources can cause significant contamination of the environment and do not require the use of explosives to spread the contamination.

Purpose

The Nuclear/Radiological Incident Annex provides hazard-specific supplemental information to the Response and Recovery Federal Interagency Operational Plans. Federal interagency partners can respond in a lead role or in support to state and local governments[12] to save lives, protect safety and health, property and the environment, and meet basic human needs when there is a threat of or an actual nuclear/radiological incident. This annex supports operational coordination and information sharing with the Prevention Mission Area when federal crimes, including those concerning terrorism involving nuclear/radioactive material are involved to ensure response and prevention activities and decisions are informed and coordinated. This annex—

- Describes the process and organizational constructs that federal agencies will use for responding to nuclear/radiological incidents.

[9] A device incorporating fissile materials designed or constructed outside an official government agency that has, appears to have, or is claimed to have the capability to produce a nuclear explosion. It could also be a U.S. nuclear weapon that is no longer in the control of a competent authority or custodian or has been modified from its designed firing sequence. It may have been assembled from illegally obtained nuclear weapons components or special nuclear materials.

[10] Fissile nuclear materials (highly enriched uranium or plutonium-239).

[11] Contamination (radioactive) – the deposition of unwanted radioactive material on the surfaces of structures, areas, objects, or people where it may be external or internal.

[12] References in this document to state, local, and tribal governments/officials/authorities are applicable to territorial and insular-area governments.

- Identifies how federal interagency partners will respond, coordinate national response to nuclear/radiological incidents, and provide recovery support under federal authorities.
- Provides information that is specific and unique to federal nuclear/radiological incident response and recovery processes, assets, resources, and teams.
- Details the mechanisms and structures for information sharing and coordination with the Prevention Mission Area involving suspected terrorist incidents.

Scope

This annex applies to federal responses to nuclear/radiological incidents, regardless of size or complexity[13] and addresses suspected or actual deliberate attacks, inadvertent incidents,[14] and international incidents that may affect the United States, including its citizens, property, and/or military capability. Such incidents may involve the following:

- Improvised nuclear device.
- Radiological dispersal device.
- Radiation exposure device.
- U.S. nuclear facilities.[15]
- Research and test reactors.
- Lost/found/orphaned radioactive material sources.
- Transportation incidents involving radioactive materials.
- Domestic nuclear weapons accidents.
- International incidents involving nuclear or radioactive material that impact or threaten to impact the United States.

This annex applies when the Federal Government responds to conduct Response and Recovery Mission Area activities pursuant to federal authorities. The level of federal response and recovery support to a specific incident is based on numerous factors. These factors include the ability of state and local government officials to respond; federal authorities pertinent to the incident involved; federal agency operational agreements with state entities; the type, amount, and custody of (or authority over) radioactive material involved; the extent of the impact or anticipated impact on the public (including emergency responders) and environment; and the size of the affected area. For those incidents involving suspected federal crimes, including those concerning terrorism, the Federal Government will respond, lead, and coordinate related law enforcement and investigative activities to resolve threats and prevent follow on attacks.

Facts, Assumptions, and Critical Considerations

The following information represents facts, planning assumptions, and critical considerations that contribute to the development of an operational environment for the Nuclear/Radiological Incident Annex and are supplemental to those outlined in the Response and Recovery Federal

[13] This annex does not address acts of nuclear war.
[14] All weapons of mass destruction incidents are presumed to be an act of terrorism unless otherwise determined..
[15] Includes Nuclear Power Plants, National Laboratories, Research Facilities, Spent Fuel Sites, Nuclear Fuel Cycle Facilities (Production and Decommissioning), NS Savannah, and Naval Reactors.

Interagency Operational Plans. Facts, assumptions, and critical considerations that pertain only to a specific incident are described in the respective incident-specific branch plan.

Facts

- **Incident Recognition**: A radiological incident may not be recognized until responders detect radioactive material, a breach or theft is reported, or the health effects of radiation exposure are manifested in the population and identified by the public health community.
- **Radiation Exposure**: Proximity to a source may result in direct exposure to radiation even if the source is contained and there are no releases to air or water.
- **Capabilities Will Be Overwhelmed**: A significant nuclear accident or act of nuclear or radiological terrorism, particularly one directed against a large population center will result in a complex, catastrophic disaster that exceeds traditional and specialized response capabilities of the United States at all levels of government and the private sector. The capability to request assistance through established protocols may also be overwhelmed and there should be a mechanism to activate and provide immediate support during a significant radiological incident.
- **Time, Distance, and Shielding**: The three primary methods limiting exposure to radiation are:
  - Time: Minimize time spent near a radioactive source. The less time exposed to the source of radiation, the lower the dose received.
  - Distance: Maximize the distance from a radioactive source. The farther one is from the source of radiation, the lower the dose received.
  - Shielding: Shielding means having something that will absorb radiation (such as concrete) between an individual and the source of the radiation. Keep as much protection between oneself and the source as possible.
- **Exposure to internal contamination**: The primary methods of limiting exposure to internal contamination are to avoid ingesting/breathing radiological contamination and decontamination, although assessment and decontamination methods are readily available.
- **Protective Actions**: The primary protective actions for reducing or eliminating exposure during major nuclear/radiological incidents are—
  - Shelter in place, evacuation, self-decontamination.
  - Food and water restrictions.
  - Long-term relocation and remediation.

Planning Assumptions

In the absence of known fact, planning assumptions represent information presumed to be true and are necessary in order to facilitate planning. Assumptions are a baseline set for planning purposes, and they do not take the place of specific activities or decision points that would occur during an incident. During response and recovery operations, assumptions may be validated as facts.

- **Pre-Incident Preparedness**: Pre-incident preparedness will reduce the number of casualties. Preparedness, public education, awareness of nuclear/radiological risks, community organization, and understanding protective actions are limited.

- **Response and Recovery Mission Area:** Personnel should follow protective protocols, limit time near radioactive material, monitor changing conditions, and not enter any area or zone that would produce an exposure to an acutely lethal dose of radiation for any reason.[16]
- **Terrorism Nexus**: A terrorist threat or incident may occur at any time of day with little or no warning, may involve single or multiple geographic areas and may or may not result in mass casualties. The suspected or actual involvement of terrorists adds a complicating dimension to incident management. The response to a threat or actual incident involves federal law enforcement and investigative activity as an integrated element.
- **Public Anxiety and Lack of Awareness**: Based on historic precedent, high public anxiety over radiation and low understanding of the associated risks and protective actions are expected. There will likely be a demand for messaging and information even at points distant from the incident. Behavioral health impacts may be significant in impacted populations. Public fear of radiation will result in large numbers of concerned citizens seeking medical assistance, which, if not mitigated by radiological, behavioral, and medical triage, will quickly overwhelm medical facilities capacity and capability to assist the sick and wounded. Significant behavioral health impact (e.g., depression, anxiety, post-traumatic stress disorder) will overwhelm existing mental and behavioral health counseling professionals and facilities.
- **Public and Responder Preparedness**: Public and responder preparedness and nuclear/radiological expertise and assets vary widely, being higher near Nuclear Regulatory Commission (NRC)-licensed nuclear facilities or in NRC Agreement States.[17]
- **Significant Resource Shortfalls**: The size, scope, and complexity of a major nuclear/radiological incident will overwhelm existing state and local capabilities and resources, causing significant strain on the Whole Community. For an intentional act, competition for scarce resources may increase due to concerns about subsequent attacks. Such incidents pose a serious challenge to existing federal response capabilities.
- **Protective Measures**: An incident involving the potential release of radioactivity may require implementation of protective actions, such as evacuation, shelter-in-place, and

[16] The federal law enforcement agencies within the Prevention Mission Area are responsible for the health and safety of their personnel entering these areas. However, it is important that responders refrain from undertaking missions in areas where radioactivity may be present until radiation levels can be accurately determined and readily monitored. While law enforcement response should be unimpeded, as their activities may prevent follow-on attacks and save additional lives, all responders, including law enforcement personnel, must be fully informed of the risks of exposure they may experience and are trained, to the extent possible, on actions to be taken. Additionally, all appropriate actions and controls must have been implemented, and any doses exceeding 5 rem (0.05 Sv) must be unavoidable. Missions associated with anticipated doses >5 rem (0.05 Sv) are on a voluntary basis. Appropriate respiratory protection and other personal protection is provided and used. Monitoring is available to project or measure dose.

[17] The Atomic Energy Act authorizes the NRC to enter into agreements that allow states to assume regulatory authority over specified types of radioactive materials. The NRC has relinquished to 37 states portions of its regulatory authority to license and regulate byproduct materials (radioisotopes), source materials (uranium and thorium), and quantities of special nuclear materials under critical mass. The mechanism for the transfer of the NRC's regulatory authority to a state is an agreement signed by the Governor of the state and the Chairman of the Commission.

administration of radioprotectants.[18] State and local governments have primary responsibility for decision-making and implementation of protective actions. Federal agencies are still responsible for ensuring the safety and health of their own response and recovery workers (including contract workers), including for decision-making and implementation of protective actions. See the Protective Action Guide Manual: www.epa.gov/radiation/rert/pags.html.

- **Employers, including federal agencies:** Must still comply with applicable requirements for protecting worker safety and health, including Occupational Safety and Health Administration (OSHA) and NRC dose limits for workers.
- **Radioactive Plume[19] Exposure**: The radioactive "plume" from airborne releases may reach areas distant from the point of release and may rapidly change in intensity and area coverage (based on weather conditions and radioactive decay) until the plume has passed.
- **Plume Deposition**: Response to a large incident will depend on the extent of radiological deposition from the plume and may require certain operations to be conducted in contaminated areas over multi-jurisdictional and multi-state regions.
- **Atmospheric Modeling**: The Interagency Modeling and Atmospheric Assessment Center (IMAAC) will be activated for incidents requiring a coordinated federal response to coordinate and develop federal atmospheric modeling tools, activities, and results. The Center will provide the Federal Government's common operating picture for atmospheric modeling. Once activated, the Center will provide initial modeling analysis through the Federal Emergency Management Agency (FEMA) National Watch Center and available on The Homeland Security Information Network (HSIN) within 30 minutes and will continue to update models as required by the release and weather conditions. The National Atmospheric Release Advisory Center (NARAC) has been designated to produce official atmospheric modeling products for the Federal Government in the event of a radiological release.
- **National Contingency Plan**: A nuclear/radiological incident may require concurrent implementation of the National Contingency Plan and Oil and Chemical Incident Annex to the Response Federal Interagency Operational Plan to address oil, chemical or biological as well as radiological releases into the environment.
- **Law Enforcement Response and Criminal Investigation**: By policy, there is a presumption of terrorist threat for all WMD incidents, unless clearly accidental in nature. If the incident involves suspected federal crimes, including those concerning terrorism, the Federal Bureau of Investigation (FBI) will lead and coordinate the law enforcement response and investigation. The Response and Prevention Mission Areas should establish information-sharing pathways and coordinate interdependent decisions and operational activities. The FBI has mechanisms to share sensitive information and coordinate interdependencies of activities and decisions at both the national and local level with its partners, as appropriate.
- **Unique Resources**: The Federal Government will directly employ unique technical resources that are specific to a radiological incident, detailed in Appendix 1 (Federal Response Capability Inventory – Nuclear/Radiological Specific Assets, Resources, and

[18] Any drug that protects or aids in protecting against cell damage caused by radiation.

[19] Plume – the material spreading from a particular source and traveling through environmental media such as air or ground water. A plume could describe the dispersal of particles, gases, vapors, and aerosols in the atmosphere or the movement of contamination through an aquifer (For example, dilution, mixing, or absorption onto soil).

Teams), to a major incident with or without a disaster declaration. Some assets detailed in Appendix 1may not be specific to a radiological event.

- **Secondary Threats and/or Incidents**: A terrorist attack may involve multiple geographically separated incidents and each location may require simultaneous consequence management and law enforcement and investigative response activities to include crime scene investigation.
- **Response and Recovery Continuum**: Response mission actions, as well as the short-term recovery activities that immediately follow or overlap those actions, include lifesaving, life-sustaining, property protection, and other measures intended to neutralize the immediate threat to life, environment, and property as well as to stabilize the community. These activities influence intermediate and long-term recovery activities, necessitating early integration of recovery considerations into the response phase operations. As response, short-term and intermediate recovery activities begin to wind down, recovery needs gradually take on a more critical role. While some post-incident recovery assessments and initiating activities occur simultaneously with response mission activities, typically the recovery operation is ramping up as the response operation is ramping down.

Critical Considerations

The following critical considerations are supplemental to those outlined in the Response and Recovery Federal Interagency Operational Plans:

- **"As Low As (Is) Reasonably Achievable"**: As defined in 10 Code of Federal Regulations (CFR) 20.1003, "as low as (is) reasonably achievable," means making every reasonable effort to maintain exposures to ionizing radiation as far below the dose limits as practical. This principle applies to all federal, state, and local responders throughout the incident response.
- **Planning guidelines**: Protective Action Guides[20] and Derived Response Levels are for protection of the public during the short-term and intermediate response phase of an incident. In small incidents, standards may be set more conservatively than such guidelines. In catastrophic incidents, immediate health and life safety issues may necessitate allowing more exposure for both responders and the public in order to save the most lives.
- **Radiation Safety**: Any workers deployed to a radiation area must receive radiation safety training before deployment, and should receive radiation measurement training. Response teams should not enter affected areas until radiation levels in these areas can be accurately determined and readily monitored, and personnel must receive pre-entry briefings (in addition to any other required training) before entering such areas.[21] In general, neither responders nor members of the public should exceed OSHA or NRC dose limits, respectively; however, in catastrophic incidents, certain emergency activities—such as those associated with critical infrastructure protection or restoration, lifesaving actions, and protection of large populations—may justify exceeding such limits. In these

[20] Protective Action Guide – a document that informs state and local authorities at what projected dose they should take action to protect people from exposure to unplanned releases of radioactive material into the environment.

[21] See OSHA's Hazardous Waste Operations and Emergency Response standard (29 CFR 1910.120) for additional information.

cases, doses over the established limits must be unavoidable, doses must be monitored, and all reasonable steps must be taken to provide appropriate protection and minimize dose during the emergency activity.

- **Limited Deployment Time:** Workers deployed to a radiation area may reach their exposure limits and would be unable to continue work in the area, requiring replacement with workers who have not been exposed.
- **Limited Deployment Capacity**: Multiple interagency missions (e.g., Counterterrorism, Defense, Continuity, Response, and Recovery) may occur simultaneously. Federal capacity to support deployment requirements of multiple missions is limited.
- **Prioritization**: Prioritization of capabilities will be necessary to balance competing missions and maximize efficiency. Some resources will be prioritized/structured/utilized in a fundamentally different manner than that during non-nuclear/radiological incidents.
- **Nuclear/Radiological Coordinating Capabilities**: Unique coordination capabilities have been set up for implementing the Federal Government's response to a significant nuclear/radiological incident. These include the IMAAC, the Federal Radiological Monitoring and Assessment Center (FRMAC), the Advisory Team for Environment, Food, and Health, the FBI-led Weapons of Mass Destruction Strategic Group (WMDSG), and the National Response Coordination Center Nuclear/Radiological Incident Task Force (NRITF). (See Appendix 1 – Federal Response Capability Inventory – Nuclear/Radiological Specific Assets, Resources, and Teams, for more complete details on response assets). Responders at all levels need to be familiar with the responsibilities of these capabilities.
- **Weather**: Meteorological conditions and weather forecasts throughout the incident will likely play a significant role in decision making, including evacuation routes, locations for staging areas and shelters, and establishing incident response zones.
- **Continuity**: A nuclear/radiological incident may warrant federal continuity of operations actions, even if the incident occurs outside of the National Capital Region.
- **Responder Safety and Health**: Operating safely in a hazardous environment requires appropriate policies, plans, equipment, training, and expertise. Employers, including federal agencies, must also adequately assess worksite hazards and develop site-specific health and safety plans for controlling those hazards. In radiation-contaminated and other hazardous environments, collection and reporting of relevant information to track responders, their health status, and accumulated dose data helps protect workers. Federal agencies should comply with their own worker safety and health policies,[22] including instances where those policies prohibit federal personnel from entering contaminated environments.[23]
- **Environmental Contamination**: Environmental consequences may include contamination of ground and water systems (natural and distributed).
    - Residual radioactivity in the environment (e.g., waterways, livestock, forests, agricultural land, and wildlife) may affect the food supply and drinking water.
    - Storm water runoff may contaminate retention basins, storm water management systems, and larger waterways, affecting drinking water and the maritime industry.

[22] 29 CFR 1960 requires that federal agencies must at least comply with OSHA standards. The Federal Response Framework also specifies worker safety and health policies that federal agencies must follow.

[23] http://erhms.nrt.org.

  - Weather will affect contamination, with precipitation and wind potentially creating "hot spots" some distance away from the initial impact areas.
- **Laboratory Analysis Capabilities**: National capabilities for laboratory analysis during a large-scale nuclear/radiological incident will be severely strained, requiring prioritization and coordination to support response and recovery operations.
- **Public Decontamination**: Decontamination needs for mass care will place additional constraints on responder resources. In some cases, decontamination standards will need to be adjusted to allow entry and reentry into shelters. Radiological decontamination differs from that for chemical or biological agents. Decontamination for chemical or biological agents must be performed immediately. In a radiation emergency, decontamination should be done as soon as possible, but it usually does not require the same immediacy as chemical or biological contamination and should never impede the rapid provision of medical care.
- **Infrastructure Decontamination during Response**: Decontamination efforts should be prioritized to begin with those locations that are necessary to accomplish lifesaving and other critical response activities, including emergency infrastructure (e.g. hospitals) and infrastructure that might facilitate critical response activities (e.g., gas line shutdown).
- **Contamination Migration**: Following a major incident, there could be short- and long-term domestic and international contamination migration issues due to unmonitored and uncontrolled movement of people, household pets and service animals, and transportation conveyances outward from the affected area, which could cause cascading challenges across multiple jurisdictions.
- **Contamination Control**: Access controls and personnel screening/release are needed to ensure the health and safety of responders.
- **Scene Access**: If a national defense/security area or exclusionary zone is established, response assets may have limited access to the incident area. Further, the location of a suspected or actual deliberate incident will be treated as a federal crime scene. The preservation and collection of evidence is critical to determine the identity of culpable parties or information of additional planned attacks. Therefore, it is important to ensure that Response and Recovery personnel understand and recognize possible access restrictions to crime scenes. Further, the Response and Recovery missions should collaborate with the Prevention mission to establish joint priorities to save lives, protect property, and conduct Prevention activities.
- **Water Supply**: Disruptions to the water supply may occur, making firefighting and decontamination difficult and requiring verification of safety for human consumption.
- **Limited Waste Management Options**: There is limited national capacity for large-scale contaminated waste transport, storage, and disposal; waste management for larger scale incidents may require regional and national approaches and facilities. Because of the limited options, Pre-incident waste management plans need to be prepared ahead of time for nuclear/radiological incidents.
- **Communications**:
  - **Public Noncompliance of Instructions**: Concerned individuals may not receive official instructions, or may ignore them, leading to control issues such as self-evacuation and unwanted volunteerism.

  - **Social Media**: Information control may be difficult as social media creates its own information clearinghouse but can also be used beneficially to reach people with important information.
  - **Equal Access Communication**: Provide equal access to effective communication for the delivery of credible, actionable, culturally and linguistically appropriate, and accessible messages. Equal access messages inform ongoing emergency services and the public about protective measures and other life-sustaining actions and facilitate the transition to recovery.
  - **Public Information to Relocated Individuals, Households, and Host Communities**: Ensure long-term, accurate, and consistent public information for relocated individuals and households in their temporary location. Host communities will also require consistent public information to address impacts, public fear, and stigma.
- **Economic Impacts**: Access to business capital, embargos, decontamination of private property, unemployment from displaced businesses and employees, and the disruption of supply chains may have long-term local and nationwide economic impacts.
- **Insurance**: Homeowners and commercial insurance (e.g., property, business interruption) may not cover losses from nuclear/radiological incidents including damage to and decontamination of private infrastructure, homes, and commercial property.
- **Emphasis on Local Primacy in Recovery**: A nuclear/radiological incident will raise significant decisions that are inherently local about whether or not to rebuild communities or to support and facilitate relocation for residents and business out of the area.
- **Permanent Relocation:** Evacuees from the impacted area may require permanent relocation if remediation and reoccupation are not possible within a reasonable timeframe due to increased radiation levels.
- **Alternative Housing**: Long-term and permanent housing solutions may begin earlier than during historical disaster events.
- **Agricultural Embargos**: Embargos or stop movement orders may be placed on the agriculture industry as well as other goods and conveyances.
- **Interstate Coordination**: Neighboring states and countries may close transit hubs and crossings, restricting the flow of resources, waste, response/recovery personnel, and evacuees.
- **Animals**: People will have animals, including household pets and service animals, with them when they evacuate or will attempt to re-enter unsafe areas to care for animals left behind. Animal evacuation, decontamination, and sheltering will be required to protect human life/safety.
- **Contaminated Human Remains**: The disposition of human remains is complicated by both internal and external radiological contamination. Special considerations for personnel handling and processing remains, waste, and final disposition may be required. Religious and cultural norms may also need to be considered.
- **Access to Medical Care**: A radiological event is likely to limit access to medical care. Medical resources are likely to be swamped by casualties and the concerned but unexposed and may be limited by destruction of local medical resources and critical infrastructure. Provision of emergency care, patient transport to definitive care, contamination control, availability of trained medical personnel, and medical logistics are all likely to be negatively impacted.

Mission

The mission of the Whole Community is to save lives, protect health and safety, reduce human suffering, protect property and the environment, restore critical infrastructure capacity, re-establish an economic and social base, and support community efforts to successfully overcome the physical, psychological, and environmental impacts of a nuclear/radiological incident. As a concept, "Whole Community" is a means by which residents, emergency management practitioners, organizational and community leaders, and government officials can collectively understand and assess the needs of their respective communities and determine the best ways to organize and strengthen their assets, capacities, and interests. By doing so, a more effective path to societal security and resilience is built. In a sense, Whole Community is a philosophical approach on how to think about conducting emergency management.

End State

Achieving the desired end state of federal response and recovery operations to a nuclear/radiological incident occurs when—

- All necessary lifesaving and life-sustaining assistance has been provided.
- Federal, state and local governments can meet the needs of citizens.
- Coordination with federal law enforcement has been achieved and maintained until the nuclear/radiological threat has been resolved.
- Environmental impacts have been minimized.
- Infrastructure capacity has been restored.
- Public safety and health protection assurances have been made.
- Processes are in place to support potential multi-year fatality management efforts.
- Measures are in place to enable and restore commercial activity to meet the demand of the population.
- Contaminated waste is effectively managed, transported, contained, and/or disposed.
- Displaced populations have returned or relocated to permanent housing.
- Long-term public health monitoring and behavioral health programs are in place.
- Successful recovery, as defined by the impacted communities and states, is achieved.
- All long-term contaminated areas are identified and contamination and/or access control measures are in place.

Authorities

Authorities applicable to this annex include Presidential Policy Directive 8 ("National Preparedness"), Presidential Policy Directive 25 (classified), Homeland Security Presidential Directive 5 ("Management of Domestic Incidents"), the Homeland Security Act of 2002, the Post-Katrina Emergency Management Reform Act of 2006 (PKEMRA), the Pets Evacuation and Transportation Standards Act of 2006, the Robert T Stafford Disaster Relief and Emergency Assistance Act (Stafford Act), the Sandy Recovery Improvement Act of 2013, the Atomic Energy Act, the Pandemic and All-Hazards Preparedness Reauthorization Act, and numerous federal criminal statutes. Certain federal agencies are authorized to respond directly to specific

nuclear/radiological incidents. Nothing in this annex alters or impedes the ability of federal agencies to carry out their respective authorities and associated responsibilities under law. This annex does not create new authorities nor change existing ones.

Federal agencies may take appropriate independent emergency actions within the limits of their own statutory authority to protect their workers (including contractors) and the public, mitigate immediate hazards, and gather information concerning the emergency to avoid delay. Key authorities applicable to this annex include:

Atomic Energy Act of 1954 (as amended)

Provides the Department of Defense (DOD) and the Department of Energy (DOE) responsibilities for protection of certain nuclear materials, facilities, information, and nuclear weapons under their control. The Atomic Energy Act (42 United States Code [U.S.C]. §§ 2011–2297 (2003)) and the Energy Reorganization Act of 1974 (5 U.S.C. §§ 5313–5316, 42 U.S.C. §§ 5801–5891 (2002)). The Act of 1974 split these functions, assigning to one agency, the DOE, the responsibility for the development and production of nuclear weapons, promotion of nuclear power, and other energy-related work. It assigned to the NRC the regulatory work, which does not include regulation of defense nuclear facilities provide the statutory authority for both DOE and the NRC. They also provide the foundation for NRC regulation of the nation's civilian use of byproduct, source, and special nuclear materials to ensure adequate protection of public health and safety, to promote the common defense and security, and to protect the environment. For incidents involving NRC or agreement state-regulated facilities, activities, or material, the NRC or agreement state has the authority to perform an independent assessment of the safety of the facility or material, evaluate licensee protective action recommendations; perform oversight of the licensee (monitoring, advising, assisting, and/or directing), and report information, as appropriate, to media and public entities.

The Atomic Energy Act also charges the Environmental Protection Agency (EPA) with additional responsibilities regarding radiation matters that directly or indirectly affect public health.[24] Under these authorities, the EPA has a mission for publishing Protective Action Guides, providing technical assistance to state and local governments, conducting long-term monitoring of ambient radiation levels, and taking other actions to prevent adverse effects to public health due to unnecessary exposure to ionizing radiation. The FBI is responsible to investigate and enforce violations of the Act.

Price-Anderson Nuclear Industries Indemnity Act

Title 42 U.S.C. § 2210 establishes an insurance framework applicable to the nuclear energy industry to compensate the public for certain damages, including personal injury and property damages, in the event of a nuclear incident at a commercial nuclear facility. The Price-Anderson Act also covers Department of Energy facilities, private licensees, and their subcontractors. Under the existing framework, owners of nuclear plants pay a yearly premium for private insurance coverage (primary tier). If a nuclear accident were to cause damages in excess of the

24 Reorganization Plan No. 3 of 1970 transferred to EPA certain radiation authorities and responsibilities from other federal departments and agencies. The applicable authorities transferred include certain sections from the Public Health Service Act and the Atomic Energy Act. This includes the authorities of the Federal Radiation Council, originally designated through Executive Order and later codified in the Atomic Energy Act.

primary tier, each owner would be assessed a prorated share of the excess (up to approximately $121 million per reactor). The total amount of the secondary tier of funds will vary as the number of operating reactors changes. A single pool of insurance companies currently issues all policies for the primary and secondary tiers for all U.S. reactors. In the event of a nuclear incident, if the federal court with geographic jurisdiction finds that damages from the nuclear incident may exceed the amount of nuclear liability insurance available under the first and secondary tier funds, prioritization of remaining compensation will be managed by the court. The Price-Anderson Act specifies that the NRC must file with the court a proposed plan for an equitable allocation of available funds. The Price-Anderson Act also requires the President to submit to Congress proposed compensation plans for valid claims in excess of the first and secondary tier funds and any legislative authorities necessary to implement those compensation plans. The Price Anderson Act commits Congress to thoroughly reviewing the particular incident and to take whatever actions it deems necessary and appropriate to protect the public in that situation. Price-Anderson covers bodily injury, sickness, disease or resulting death, property damage, loss, and living expenses for displaced individuals. The current insurance policy covers some environmental cleanup costs for large scale nuclear incidents. The extent of coverage for environmental cleanup will require legal resolution. Price-Anderson also covers DOE facilities, private licensees, and their subcontractors including the United States Enrichment Corporation uranium enrichment plants, national laboratories and the Yucca Mountain nuclear waste repository. Any payments from the fund for accidents arising at DOE facilities come from the U.S. Treasury. The fund size for such installations is set by legislation (also at $12.6 billion), rather than being based upon the number of plants contributing to the fund.

Comprehensive Environmental Response, Compensation, and Liability Act

The Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA)[25] gives the Federal Government authority to respond to the release or threatened release of hazardous substances (including radionuclides[26]) that may endanger public health or the environment. CERCLA also gives the Federal Government the authority to compel responsible

[25] CERCLA provides broad authority to carry out removal and remedial actions and pursue cost recovery for costs incurred. CERCLA authorizes EPA [the President] to sample and investigate as an initial matter. 42 USC 9604(e)(1). This information would allow EPA [the President] to evaluate what was released, including both radioactive and non-radioactive contamination. There may be a potential CERCLA exclusion where it has been determined based on sufficient information that all the relevant conditions in the exclusion (CERCLA Section 101(22)(C)) have been met. See 42 USC 9601(22)(C). Potential application of any exclusion under this CERCLA provision would require more specific factual development. As a result, CERCLA would authorize EPA to proceed in the early data-gathering stages of response, and EPA would need to consider the potential CERCLA exclusion as to later stages of response. In the early stages, CERCLA would authorize EPA [the President] to sample and gather data. 42 USC 9604(e)(1). The data would help show whether the release included commingled non-radioactive hazardous substances (e.g., PCBs from the fire) or radioactive material other than the certain, specified radioactive material listed in the exclusion (CERCLA Section 101(22)). EPA [The President] has full CERCLA authority over non-radioactive hazardous substances and radioactive material other than the certain, specified radioactive material listed in the exclusion (CERCLA Section 101(22)). If, on the other hand, the release consisted of only the certain, specified radioactive substances listed in the exclusion (CERCLA Section 101(22)), then the CERCLA exclusion could possibly limit use of this response authority if the other conditions in that exclusion also were met.

[26] Radionuclide – an unstable and therefore radioactive form of a nuclide. A nuclide is a general term applicable to all atomic forms of an element. Nuclides are characterized by the number of protons and neutrons in the nucleus, as well as by the amount of energy contained within the atom.

parties to respond to releases of hazardous substances. CERCLA is implemented through the National Oil and Hazardous Substances Pollution Contingency Plan, also referred to as the National Contingency Plan, a regulation found in 40 CFR Part 300. At the on-scene level, federal On-Scene Coordinators implement this response authority. On-Scene Coordinators may assist state and local governments in responding to releases but also have the authority to direct and coordinate the response when needed to ensure protection of public health and the environment. Typical response actions include, but are not limited to, air monitoring; assessment of the extent of the contamination; stabilization of the release; decontamination; and waste treatment, storage, and disposal. Four federal agencies have On-Scene Coordinator authority for hazardous substance emergencies: EPA, Department of Homeland Security/United States Coast Guard (DHS/USCG), DOD, and DOE. CERCLA is applicable for releases of certain materials and may not be available as an authority to respond to a nuclear/radiological incident.

The Defense Against Weapons of Mass Destruction Act

In accordance with Title 50 U.S.C. §2313, The Assistant Secretary of Defense for Homeland Defense is responsible for the coordination of DOD assistance to federal, state, and local officials. This responsibility is in responding to threats involving nuclear, radiological, biological, chemical weapons, or high-yield explosives or related materials or technologies, including assistance in identifying; neutralizing; dismantling; and disposing of nuclear, radiological, biological, chemical weapons, and high-yield explosives and related materials and technologies. DOE is directed to designate an Executive Agent for the coordination of DOE assistance to federal, state, and local officials in responding to threats involving nuclear, chemical, and biological weapons or related materials or technologies, including assistance in identifying, neutralizing, dismantling, and disposing of nuclear weapons and related materials and technologies and the coordination of DOE assistance to the DOD in carrying out that department's responsibilities under subsection (a) of this section. The FBI, DHS, the Department of Commerce (DOC), EPA, and other federal entities, to include the intelligence agencies, all have specified roles and responsibilities in domestic emergencies involving WMD.

Resource Conservation and Recovery Act

The objectives of the Resource Conservation and Recovery Act (RCRA) are to protect human health and the environment from the potential hazards of waste disposal, to conserve energy and natural resources, to reduce the amount of waste generated, and to ensure that wastes are managed in an environmentally sound manner. The RCRA regulates the management of solid waste, hazardous waste, and underground storage tanks holding petroleum products or certain chemicals. Under RCRA hazardous waste treatment, storage, and disposal facilities are required to have permits, compliance with operating standards, meet financial requirements in case of accidents, and comply with design requirements. The hazardous waste generated by a nuclear/radiological incident may have to be disposed of at these facilities. Source byproduct or special nuclei waste falls outside of the RCRA and under the jurisdiction of the NRC. If a radioactive waste is mixed with a hazardous waste, the resultant mixture is regulated by both the Atomic Energy Act and the RCRA as a mixed waste.

Clean Water Act

The Clean Water Act employs a variety of regulatory and non-regulatory tools to reduce direct pollutant discharges into the nation's waterways, finance wastewater treatment facilities, and manage polluted runoff. It also gives the EPA the authority to implement pollution control programs and to set wastewater standards for industry and limitations on contaminants in surface waters. The broader goal of the Act is to help restore and maintain the chemical, biological, and physical integrity of the nation's waters.

The Act prohibits industrial sources and publicly owned treatment works from discharging pollutants into navigable waters without a permit. It also provides the EPA and USCG with broad hazardous substance removal authorities. However, these do not include authority over source byproduct or special nuclear material.

Project BioShield Act

In 2004, the Project BioShield Act (the Bioshield Act) amended the Public Health Service Act (PHSA) and the Federal Food, Drug, and Cosmetic Act (FD&C Act) to provide flexible authorities to expedite and enhance research, development, procurement, and stockpiling of medical countermeasures (MCM) for chemical, biological, radiological, and nuclear (CBRN) threat agents, and authorized funding for procurement of those MCM. The Bioshield Act also provided Department of Health and Human Services (HHS) with broader ability to quickly authorize use of certain MCM during emergencies. The BioShield Act amended the FD&C Act to authorize the Commissioner of Food and Drugs to issue Emergency Use Authorizations (EUAs) for the use of MCM during public health emergency (PHE) emergencies. The authorities enacted under the Project BioShield Act were further clarified and expanded under Pandemic and All-Hazards Preparedness Act (PAHPA), Pub. L. No. 109-417, and PAHPRA, Pub. L. No. 113-5.

Pandemic and All-Hazards Preparedness Act

The Pandemic and All-Hazards Preparedness Act (PAHPA) of 2006 addressed a broad range of issues to further strengthen the nation's public health preparedness. It identified the Secretary of HHS as the lead federal official for (PHE preparedness and response and established a new Assistant Secretary for Preparedness and Response (ASPR) within HHS. PAHPA provided new authorities for a number of programs, including the Biomedical Advanced Research and Development Authority (BARDA) within HHS for the advanced development and acquisition of MCM. PAHPA also placed the National Disaster Medical System (NDMS) under the purview of HHS and called for the establishment of a quadrennial National Health Security Strategy. It authorized the ASPR to exercise operational control of federal public health and medical response assets in a PHE operation, with the exception of DOD resources.

Pandemic and All-Hazards Preparedness Reauthorization Act

The Pandemic and All-Hazards Preparedness Reauthorization Act of 2013 (PAHPRA) reauthorized PAHPA and enhanced HHS public health emergency preparedness and response capabilities including funding for public health and medical preparedness programs (i.e., the Hospital Preparedness Program and Public Health Emergency Preparedness Cooperative Agreement) and for the purchase of MCM. PAHPRA increased the flexibility of Project

BioShield as well as the flexibility of state health departments in dedicating staff resources to meet critical community needs in a disaster. In addition, PAHPRA enhanced the authority of the Food and Drug Administration (FDA) to support rapid responses in advance of a PHE by amending EUA authorities to permit EUAs for potential PHEs, and provided additional emergency authorities for FDA relating to emergency dispensing, expiration dating extensions, development and distribution of emergency use instructions, and waivers of certain requirements.

Public Readiness and Emergency Preparedness Act

The Public Readiness and Emergency Preparedness Act of 2005 (PREP Act) authorizes the HHS Secretary to issue a declaration that provides immunity from liability (except for willful misconduct) to covered persons against legal claims arising from administration or use of MCM recommended by the Secretary to address pandemic or epidemic diseases or threats, or CBRN threats to health that the Secretary determines constitute a present or future PHE. Covered persons can include manufacturers; researchers, distributors, states, local governments, private sector partners, and others involved in countermeasure programs; qualified persons who prescribe, administer, or dispense countermeasures; officials, agents, employees of all of these groups, and the U.S. Government. A PREP Act declaration is specifically for the purpose of providing immunity from liability and is different from, and not necessarily dependent on, other emergency declarations. The PREP Act also authorizes a fund in the U.S. Treasury to provide compensation to eligible individuals for physical injuries or death directly caused by administration or use of MCM covered by the declaration.

Public Health Service Act

The PHSA forms the foundation of the HHS legal authority for responding to public PHE. Among other things, it authorizes the HHS Secretary to declare a PHE and take such actions as may be appropriate to respond to the emergency consistent with existing authorities; to lead all federal public health and medical response to PHEs and incidents covered by the National Response Framework (NRF); to direct the U.S. PHS and other departmental response components; to assist states in meeting the requirements of response to PHEs; to control communicable diseases; to maintain the Strategic National Stockpile; to provide for the operation of the NDMS; to establish and maintain a Medical Reserve Corps; and to potentially provide targeted liability immunity for covered countermeasures to manufacturers, distributors, and certain classes of people involved in the administration of a program to deliver covered treatments to patients, their employees, and agents.

Section 311 of the PHSA provides the Secretary of HHS with authority to extend temporary assistance to states or localities to meet health emergencies at the request of states or local authorities, including utilizing HHS personnel, equipment, medical supplies, and other resources, when state resources are overwhelmed by an emergency situation. The HHS Secretary may authorize assistance regardless of a formal PHE or Stafford Act declaration.

Under Section 319 of PHSA, when the Secretary has declared a PHE, he or she can take appropriate actions consistent with other authorities to respond to the emergency, including, making grants, entering into contracts, and investigating the cause, treatment, or prevention of the disease or disorder. In addition, the Secretary may access the Public Health Emergency Fund

if appropriated by Congress. Under 42 U.S. Code § 247d, the Emergency Fund is made available without fiscal year limitation if a PHE has been declared by the HHS Secretary. Funding is authorized to be appropriated to the Public Health Emergency Fund as may be necessary to respond to (1) a disease or disorder that presents a PHE or (2) a PHE, including significant outbreaks of infectious diseases or bioterrorist attacks.

The Strategic National Stockpile is authorized under Section 319F-2 of the PHSA and is maintained by the HHS Secretary to provide for the emergency health security of the United States. The Secretary of HHS may deploy the stockpile to respond to an actual or potential PHEs, or to otherwise protect public health and safety or as required by the Secretary of the DHS to respond to an actual or potential emergency.

Federal Food, Drug, and Cosmetic Act

The FD&C Act is the foundation for FDA authority and responsibility to protect and promote the public health by, among other things, ensuring the safety and effectiveness of human and veterinary drugs, biological products, and medical devices and ensuring the safety and security of the nation's food supply. When certain conditions are met, the FD&C Act authorizes the HHS Secretary to declare circumstances exist justifying EUA of unapproved drugs, devices, or biological products or of approved drugs, devices, or biological products for an unapproved use.

Once a Secretarial determination is made, the Commissioner of the FDA may issue an EUA for particular products, assuming other statutory criteria and conditions are met. The Commissioner may allow unapproved medical products or unapproved uses of approved medical products to be used in an emergency to diagnose, treat, or prevent serious or life-threatening diseases or conditions caused by CBRN threat agents or emerging infectious disease when, among other criteria, there are no adequate, approved, and available alternatives. An EUA can be revoked when it is determined that the criteria for issuance are no longer met or revocation is appropriate to protect public health or safety.

The Office of Federal Procurement Policy Act

The Office of Federal Procurement Act authorizes emergency procurement authorities' government-wide (1) in support of a contingency operation or (2) to facilitate the defense against or recovery from a CBRN attack against the United States. See also Federal Acquisition Regulation Part 18.2.

Foreign Assistance Act of 1961

The Foreign Assistance Act reorganized the structure of existing U.S. foreign assistance programs, separated military from non-military aid, and created a new agency within the Department of State (DOS), the United States Agency for International Development (USAID), to administer those non-military, economic assistance programs. The USAID Office of U.S. Foreign Disaster Assistance is responsible for leading and coordinating the U.S. Government's response to disasters overseas.

Defense Production Act[27]

The Defense Production Act is the primary source of Presidential authorities to expedite and expand the supply of critical resources from the U.S. industrial base to support the national defense and homeland security. In addition to military, energy, and space activities, the Defense Production Act definition of "national defense" includes emergency preparedness activities conducted pursuant to Title VI of the Stafford Act; protection and restoration of critical infrastructure; and efforts to prevent, reduce vulnerability to, minimize damage from, and recover from acts of terrorism within the United States. The President's Defense Production Act authorities are delegated to the heads of various federal departments in Executive Order (EO) 13603.[28]

Hazardous Materials Transportation Act

The Hazardous Materials Transportation Act (HMTA), enacted in 1975, is the principal federal law in the United States regulating the transportation of hazardous materials. Its purpose is to "protect against the risks to life, property, and the environment that are inherent in the transportation of hazardous material in intrastate, interstate, and foreign commerce" under the authority of the United States Secretary of Transportation.

The Act was passed as a means to improve the uniformity of existing regulations for transporting hazardous materials and to prevent spills and illegal dumping endangering the public and the environment, a problem exacerbated by uncoordinated and fragmented regulations. Regulations are enforced through four key provisions encompassing federal standards under Title 49 of the United States Code, Procedures and Policies, Material Designations & Labeling, Packaging Requirements and Operational Rules. Violation of the HMTA regulations can result in civil or criminal penalties, unless a special permit is granted under the discretion of the Secretary of Transportation.

Public Readiness and Emergency Preparedness Act

The Public Readiness and Emergency Preparedness Act (PREP Act) authorizes the Secretary of the HHS (Secretary) to issue a declaration (PREP Act declaration) that provides immunity from liability (except for willful misconduct) for claims of loss caused, arising out of, relating to, or resulting from administration or use of countermeasures to diseases, threats, and conditions determined by the Secretary to constitute a present or credible risk of a future public health emergency to entities and individuals involved in the development, manufacture, testing, distribution, administration, and use of such countermeasures. A PREP Act declaration is specifically for the purpose of providing immunity from liability and is different from and not dependent on other emergency declarations.

The Occupational Safety and Health Act of 1970

The OSH Act was passed to prevent workers from being killed or seriously harmed at work. This law created the OSHA, which sets and enforces protective workplace safety and health standards. OSHA also provides information, training, and assistance to employers and workers. Under the OSH Act, employers in all 50 states and U.S. territories have the responsibility to

27 Defense Production Act of 1950, as amended (50 U.S.C. App. 4501 et seq.).
28 Executive Order 13603 of March 16, 2012: National Defense Resources Preparedness.

provide a safe workplace. Basic program elements for federal employee occupational safety and health programs and related matters are set out in 29 CFR 1960. OSHA's role primarily is to provide oversight and guidance for federal departments and agencies' individual occupational safety and health programs through the Designated Agency Safety and Health Official and agency safety and health management staff.

During disaster response and recovery operations, even when OSHA is operating in a technical assistance and support mode, the agency's established standards remain in effect, and OSHA retains its ability to enforce the standards under its legal authority. For example, certain provisions of the Hazardous Waste Operations and Emergency Response (29 CFR 1910.120), Ionizing Radiation (29 CFR 1910.1096), and other standards may apply during response to and recovery from a nuclear/radiological incident under this annex. Although some states operate their own OSHA-approved occupational safety and health programs (state plans), OSHA's federal offices provide coordination, technical assistance, support services, and oversight in all 50 states, U.S. territories, and the District of Columbia.

EO 12196 extends protections for private sector employees provided under the OSH Act to federal employees. Generally, federal employer responsibilities under the EO and OSH Act apply no matter where the federal employee is located (e.g., outside the continental U.S.). The EO and OSH Act do not cover uniformed military personnel, U.S. Coast Guard personnel, nor members of the National Oceanic and Atmospheric Administration Commission Corps or U.S. PHS commissioned corps serving on active duty.

*Occupational Safety and Health Act of 1970, Pub L. No. 651-678 (as amended at 29 U.S.C.)

10 CFR § 61.55 – Waste Classification

10 CFR 61.55 provides the classification of low-level radioactive waste according to its radiological hazard. The classes include Class A, B, and C, with Class A being the least hazardous and accounting for 96 percent of low-level radioactive waste. As the waste class and hazard increase, the regulations established by the NRC require progressively greater controls to protect the health and safety of the public and the environment. Reorganization Plan No. 3 of 1970 transferred to EPA certain radiation authorities and responsibilities from other federal departments and agencies. The applicable authorities transferred include certain sections from the PHSA and the Atomic Energy Act (AEA). This includes the authorities of the Federal Radiation Council, which were originally designated through EO and later codified in the AEA. Under these and other authorities, EPA has a mission for publishing Protective Action Guides (PAGs),[29] providing technical assistance to state and local governments, conducting long-term monitoring of ambient radiation levels, and taking other actions to prevent adverse effects to public health due to unnecessary exposure to ionizing radiation.

[29] There is a much more extensive write-up of the legal basis for the PAGs in Section 1.3.1 (Legal Basis) of the 2013 PAG Manual (https://www.epa.gov/sites/production/files/2015-06/documents/pag-manual-interim-public-comment-4-2-2013.pdf).

44 CFR § 350 – Review and Approval of State and Local Radiological Emergency Plans and Preparedness

The purpose of 44 CFR § 350 in this part is to establish policy and procedures for review and approval by FEMA of state and local emergency plans and preparedness for the offsite effects of a radiological emergency that may occur at a commercial nuclear power facility.

44 CFR § 351 - Radiological Emergency Planning and Preparedness

44 CFR § 351 sets out federal roles and assigns tasks regarding federal assistance to state and local governments in their radiological emergency planning and preparedness activities. This is applicable to radiological accidents at fixed nuclear facilities and transportation accidents involving radioactive materials. It relates to consequences and activities beyond the boundaries of any fixed nuclear facility with a potential for serious consequences and the area affected by a transportation accident involving radioactive materials. It includes the responsibility for developing federal response plans to implement various agencies' statutory authorities when responding to radiological emergencies.

Title 50, U.S.C., War and National Defense

As it applies to nuclear/radiological accidents or incidents, this statute provides a military commander the authority to establish a temporary National Defense Area around an accident/incident site to protect nuclear weapons and materials in DOD custody. This authority includes denial of access to an accident/incident site and removal of individuals who threaten orderly administration of the accident/incident site.

Title 18 USC: Crimes and Criminal Procedure

Various sections of Title 18 USC: Crimes and Criminal Procedure referenced below apply to nuclear/radiological incidents.

- §831: Prohibited Transactions Involving Nuclear Materials.
- §2332: Use of Weapons of Mass Destruction.
- §2332b(f): The Attorney General of the United States has primary investigative responsibility for all federal crimes of terrorism and certain other designated offenses.
- §2332f: Bombings of places of public use, government facilities, public transportation systems and infrastructure facilities.
- §2332h: Radiological Dispersal Devices.

Convention on Supplementary Compensation for Nuclear Damage

The Convention on Supplementary Compensation for Nuclear Damage was developed under the aegis of the International Atomic Energy Agency (IAEA) to be the basis for a global legal framework and mechanism for compensating victims of nuclear damage that results from a nuclear incident. It entered into force on April 15, 2015; seven countries are presently party to the Convention, including the United States. In the event of a nuclear incident in the United States, funds could be made available to victims; the first level would be from U.S. operators in the amount of 300 Special Drawing Rights or about 420 million dollars. Another subsequent

source of funds, if required, could be made from Parties to the Convention on Supplementary Compensation, presently in the amount of about 140 million dollars.

Convention on Early Notification of a Nuclear Accident and Convention on Assistance in the Case of a Nuclear Accident or Radiological Emergency

The Convention on Early Notification of a Nuclear Accident and Convention on Assistance in the Case of a Nuclear Accident or Radiological Emergency establishes a notification system for nuclear accidents that have the potential for international transboundary release that could be of radiological safety significance for another state. It requires states to report the accident's time, location, radiation releases, and other data essential for assessing the situation. Notification is to be made to affected states directly or through the IAEA and to the Agency itself. DOS is the agency through that notifications are made and received under this Convention. The Convention on Assistance in the Case of a Nuclear Accident or Radiological Emergency sets out an international framework for co-operation among States Parties and with the IAEA to facilitate prompt assistance and support in the event of nuclear accidents or radiological emergencies. It requires States to notify the Agency of their available experts, equipment, and other materials for providing assistance. In case of a request, each State Party decides whether it can render the requested assistance as well as its scope and terms. DOS is the agency through which requests for assistance either to or from the United States are directed. The United States is party to both conventions.

Executive Order 12656 of November 18, 1988

EO12656 (Section701(1)(b)) directs the Secretary of Energy to “manage all emergency planning and response activities pertaining to DOE nuclear facilities.” This EO includes the responsibility for developing federal response plans to implement various agencies' statutory authorities when responding to radiological emergencies. The EO also directs the Administrator of EPA “develop, for national security emergencies, guidance on acceptable emergency levels of nuclear radiation….”

Execution

Radiological Emergency Planning and Preparedness

Federal Radiological Preparedness Coordinating Committee

The Federal Radiological Preparedness Coordinating Committee is composed of 20 federal departments, agencies, and offices that work together to ensure that the United States is prepared for radiological incidents involving nuclear or radioactive materials, including acts of terrorism.

The Federal Radiological Preparedness Coordinating Committee is a national-level forum for the development and coordination of radiological prevention and preparedness policies and procedures. Chaired by FEMA, it provides policy guidance for federal radiological Response and Recovery Mission Area activities in support of state and local government radiological emergency planning and preparedness activities. The Committee is an interagency body

consisting of the coordinating and cooperating agencies' subject matter experts discussed in this Nuclear/Radiological Incident Annex.

The Federal Radiological Preparedness Coordinating Committee coordinates research study efforts of its member agencies related to state and local government radiological emergency preparedness to ensure minimum duplication and maximum benefits to local, state, and tribal governments. The Committee coordinates consequence management planning and validating requirements of each agency, reviewing integration requirements and incorporating agency-specific plans, procedures, and equipment into the response system.

Radiological Emergency Preparedness Program

FEMA's Radiological Emergency Preparedness Program coordinates the national effort to provide state and local governments with relevant and executable planning, training, and exercise guidance and policies necessary to ensure that adequate capabilities exist to protect against, mitigate the effects of, respond to, and recover from incidents involving commercial nuclear power plants. The program assists state and local governments in the development and conduct of offsite radiological emergency preparedness activities within the emergency planning zones of NRC-licensed commercial nuclear power facilities. The Radiological Emergency Preparedness Program's activities integrate and enhance local, state, and Federal Governments' preparedness planning and response capabilities for all types of radiological emergencies.

Concept of Operations

Any response to a nuclear or radiological incident should be well coordinated with the full response of the U.S. Government to include its counterterrorism law enforcement response when appropriate. This will ensure risk-informed decisions across consequence management and counterterrorism communities.

The consequences of nuclear/radiological incidents are managed at the lowest possible level; as incidents change in size, scope, and complexity, the federal response and support for recovery will adapt to meet requirements as described in the Federal Interagency Operational Plans. However, when a federal crime has been or is suspected to have been committed, to include federal crimes, including those concerning terrorism, the FBI will establish an FBI Command Post or Joint Operations Center (JOC) for the purpose of managing the investigation and leading and coordinating the law enforcement response to resolve terrorist threats or incidents. The response community should establish operational coordination with the FBI through these counterterrorism command centers.

The owner/operator of a nuclear/radiological facility or materials (e.g., DOE, DOD, NRC-licensee, or agreement state licensee) is primarily responsible for managing the consequences of an incident, providing notification and appropriate protective action recommendations to state and local government officials, and minimizing the radiological hazard to workers, the public and impact on the environment. For incidents involving nuclear/radiological fixed facilities, the owner/operator has primary responsibility for consequence management actions within the facility boundary and may have responsibilities or liability for response and recovery activities outside the facility boundary under applicable legal obligations (e.g., contractual; licensee; CERCLA). For areas surrounding a nuclear/radiological incident site, state and local

governments have primary responsibility for protecting life, property, and the environment. Federal agencies also respond directly under their own response authorities.

Federal, state and local governments and owners/operators of nuclear/radiological facilities or activities should request assistance through established protocols. Assistance may be requested directly from FEMA, other federal agencies, and/or state governments with which they have existing arrangements or relationships, if the agency with primary authority is notified.

In the event of an incident involving terrorist use of orphan material the Federal Government, acting through DHS and FEMA will take responsibility for response and recovery actions.

When DHS/FEMA, under its various authorities, initiates response and recovery under the NRF and the National Disaster Recovery Framework (NDRF)—and their respective Federal Interagency Operational Plans, existing interagency plans that address nuclear/radiological incident management (e.g., the National Oil and Hazardous Substances Pollution Contingency Plan) are incorporated as supporting plans and/or operational supplements to the Federal Interagency Operational Plans as appropriate.

Authorities for Interagency Coordination

Federal Agencies with Primary Authority for Federal Response

Table 1 below details the agencies with primary authority[30] (statutory or regulatory) to provide the leadership, expertise, and authority to implement and facilitate critical and specific nuclear/radiological aspects of the Response and Recovery Mission Areas in accordance with those authorities and capabilities.

Table 1: Federal Agencies with Primary Authority for Nuclear/Radiological Incident

Incident Type, Facilities, or Materials Involved	Primary Authority for Federal Response
Nuclear Facilities that are: a) Owned or operated by the DOD b) Owned or operated by the DOE c) Licensed by the NRC or an NRC Agreement State[31] d) Not licensed, owned, or operated by a federal agency, an NRC Agreement State or currently or formerly licensed facilities for which the owner/operator is not financially viable or is otherwise unable to respond	 a) DOD b) DOE c) NRC d) EPA
Nuclear Weapons and Components that are: e) In the custody of the DOD f) In the custody of the DOE	 e) DOD f) DOE

[30] In the 2008 version of the Nuclear/Radiological Incident Annex and subsequent documents, the term "coordinating agency" designated the agency with primary authority for federal response. The "coordinating agency" term is hereby replaced with "primary authority" due to conflicts with higher-level plans.

[31] For incidents with offsite consequences, FEMA may assume coordination of the federal response. NRC remains the primary federal authority for onsite response.

Incident Type, Facilities, or Materials Involved	Primary Authority for Federal Response
Radioactive Materials Being Transported: g) By or for the DOD h) By or for the DOE i) Containing NRC or NRC Agreement State licensed materials j) Within the coastal zone for materials that are not licensed or owned by a federal agency or an NRC Agreement State k) All others	 g) DOD h) DOE i) NRC j) USCG k) EPA
Radioactive Materials in Space Vehicles Impacting the United States that are: l) Managed by the National Aeronautics and Space Administration (NASA) m) Managed by the DOD n) Not managed by the DOD or the NASA and impacting the coastal zone o) All others	 l) NASA m) DOD n) USCG o) EPA
Disused and Unwanted Sealed Sources with no Disposition Pathway p) Off-Site Source Recovery	 p) DOE
Unknown or Unlicensed Materials, and Domestic Response to Foreign Materials and International Incidents: q) Outside certain areas of the coastal zone r) Certain areas outside of the coastal zone s) Imported contaminated consumer products that are distributed before detection t) Inadvertently imported radioactive materials u) All others	 q) USCG r) EPA s) EPA t) U.S. Customs and Border Protection (CBP) u) EPA
v) Inadvertent Incidents Involving Lost/Found/Orphaned Radioactive Material	v) DOE/NNSA
U.S. Assistance to Foreign Governments for Incidents with International Impacts w) U.S. Government assistance to foreign government response and recovery efforts	 w) DOS/USAID
All deliberate attacks involving nuclear/radiological facilities or materials (e.g., RDDs, INDs)	DHS
Law Enforcement and Counterterrorism Operations Related to the Incidents in this Table: It is the policy of the United States that until otherwise determined by the Attorney General, generally acting through the FBI Director, any WMD incident will be treated as an actual terrorist incident. Note: DHS/FEMA may be called upon to lead or provide supplemental operational coordination support for the primary authority during complex incidents.	

The federal agencies listed in **Table 1** own, have custody of, license, authorize, regulate, or are otherwise assigned responsibility for the nuclear/radioactive material, facility, or activities involved in the incident and have authorities, technical expertise, and/or assets for responding to the unique characteristics of nuclear/radiological incidents that are not otherwise described in the Federal Interagency Operational Plans. Specific roles and responsibilities are determined by the scope of their particular authorities over relevant aspects of the incident, as described in this section. When a federal agency or component of DHS has responsibility for directing or managing a major aspect of a response to or recovery from the consequences of an incident coordinated by the Secretary of Homeland Security, that organization is part of the national leadership for the incident and is represented in field, regional, and headquarters unified command and coordination organizations (e.g., Nuclear/Radiological Incident Task Force).

Consistent with the NRF, the Federal Government may organize response resources and capabilities under the Emergency Support Function (ESF) construct. The ESFs are the primary, but not exclusive federal coordinating structures for building, sustaining, and delivering the response core capabilities. ESFs are not attributed to, nor based on, the capabilities of a single agency, and the functions for which they are responsible cannot be accomplished by any single agency. ESFs are not mechanisms for executing an agency's authorities.

Although the ESFs are designed for both Stafford Act and non-Stafford Act incidents, the ESFs may not always be the most appropriate response coordinating structures for non-Stafford Act incidents. For incidents in which there is no Stafford declaration, the agency with primary authority should respond in a standard NIMS, Incident Command System structure. In addition to their own structures, departments or agencies responding under their own legal authorities may request that FEMA activate relevant ESFs. This annex describes the coordinating structures, in addition to the ESFs, that may be used to deliver core capabilities and respond to unique to nuclear/radiological incidents.

Consistent with the NDRF, the Federal Government uses Recovery Support Functions to coordinate key functional areas of recovery support. Each Recovery Support Function has a designated coordinating agency along with primary agencies and supporting organizations with programs relevant to the functional area. The Recovery Support Function Coordinating Agency, with the assistance of FEMA, provides leadership, coordination, and oversight for particular Recovery Support Functions. Both pre- and post-incident, the Recovery Support Function Coordinating Agency ensures ongoing communication and coordination between the primary agencies and support organizations, and between federal agencies and corresponding state and local governments and nonprofit and private sector organizations. The NDRF will provide the overarching interagency coordination structure for the recovery phase for Stafford Act incidents, and elements of the framework may be used for significant non-Stafford Act incidents.

State, Local, and Jurisdictional Federal Agency Coordination

The federal response to and recovery support following a nuclear/radiological incident must be coordinated closely with the state and local government and jurisdictional federal agencies in the area affected by the incident. Response to and recovery from nuclear/radiological incidents affecting land owned by the U.S. Government are coordinated with the agency responsible for managing that land to ensure that incident management activities are consistent with federal statutes governing use and occupancy. In the case of tribal lands, tribal governments have a special relationship with the U.S. Government, and federal, state, and local governments may have limited or no authority on tribal lands. The NRF's Tribal Relations Support Annex provides further guidance.

Recovery experiences have consistently pointed to examples of increased coordination efforts as central to an effective recovery. Recovery coordination will enable the appropriate state and local stakeholders to understand the federal programs and other assistance available and if any process or policy changes have occurred because of the incident. To improve communication and enhance federal Recovery Support Function coordination, it is important for federal partners to

understand the state and local governments' established leadership and coordination structures planned for the post-incident environment.[32]

Roles and Responsibilities of Federal Agencies with Primary Authority for Federal Response to a Nuclear/Radiological Incident

Department of Defense (DOD)

DOD is responsible for coordinating federal actions related to nuclear/radiological incidents involving nuclear weapons in DOD custody, DOD facilities (including U.S. nuclear-powered ships), or material otherwise under DOD jurisdiction (e.g., transportation of material by or for DOD).

Under the CERCLA, Executive Order 12580 and the National Contingency Plan, DOD is responsible for hazardous substance responses to releases on or from DOD facilities or vessels under the jurisdiction, custody, or control of DOD, including transportation-related incidents. For responses under these circumstances, DOD provides a federal On-Scene Coordinator or Remedial Project Manager for remedial responses responsible for taking all CERCLA response actions, which includes onsite and offsite response actions.

For incidents occurring on, or where the sole source of the nuclear/radiological release is from, any facility or vessel under DOD jurisdiction, custody, or control, DOD is responsible for—

- Mitigating the consequences of an incident,
- Providing notification and appropriate protective action recommendations to state and local government officials, and
- Minimizing the radiological hazard to the public.

If these incidents described, for which DOD is responsible, require integration of federal consequence management capabilities, DOD will coordinate with other federal entities under the NRF, National Incident Management System (NIMS), and the National Contingency Plan.

For radiological incidents involving a nuclear weapon, special nuclear material, and/or classified components that are in DOD custody, DOD may establish a national defense area. A national defense area is an area established on non-federal lands located within the United States or its possessions or territories for the purpose of safeguarding classified defense information or protecting DOD equipment and/or materiel. Establishment of a national defense area temporarily places such non-federal lands under the effective control of DOD and results only from an emergency event. The senior DOD representative at the scene will define the boundary, mark it with a physical barrier, and post warning signs. The landowner's consent and cooperation will be obtained whenever possible; however, military necessity will dictate the final decision regarding location, shape, and size of the national defense area. DOD will manage the response within the boundaries of the DOD facility or National Defense Area, and will coordinate with state and local officials to ensure appropriate public health and safety actions are taken outside the national

[32] *Effective Coordination of Recovery Resources for State, Tribal, Territorial and Local Incidents* guidance document can be found at http://www.fema.gov/resources-national-disaster-recovery-framework.

defense area. DOD will lead the overall response to safeguard national security information and/or restricted data, or equipment and material.

DOD coordinates the federal response for incidents involving the release of nuclear/radioactive materials from DOD space vehicles or joint space vehicles with significant DOD involvement (i.e., joint venture). A joint venture is an activity in which the U.S. Government has provided extensive design/financial input; has provided and maintains ownership of instruments, spacecraft, or the launch vehicle; or is intimately involved in mission operations. A joint venture with a foreign nation is not created by simply selling or supplying material to a foreign country for use in its spacecraft.

In the event that DHS assumes overall management of the federal response under Homeland Security Presidential Directive 5 to an inadvertent incident involving DOD facilities or materials, DOD will support DHS under the NRF and NIMS.

Department of Energy (DOE)

DOE is responsible for coordinating the federal response to a nuclear/radiological incident at a DOE facility or involving DOE materials (e.g., during the use, storage, and shipment of radioactive materials; the shipment of spent reactor fuel; the production, assembly, and shipment of nuclear weapons and special nuclear materials; the production and shipment of radioactive sources for space ventures; and the storage and shipment of radioactive and mixed waste) and for deploying the FRMAC to coordinate federal airborne and ground based radiological monitoring and assessment in support of other agencies responding to a nuclear or radiological incident.

Under the CERCLA, Executive Order 12580, and the National Contingency Plan, DOE is responsible for hazardous substance responses to releases on or from DOE facilities or vessels under the jurisdiction, custody, or control of DOE, including transportation-related incidents. For responses under these circumstances, DOE provides a federal On-Scene Coordinator or Remedial Project Manager for remedial responses responsible for taking all CERCLA response actions, which includes onsite and offsite response actions.

For incidents at nuclear/radiological facilities that it owns or operates, or incidents involving transportation of DOE nuclear/radioactive materials, DOE is responsible for—

- Minimizing the consequences of an incident,
- Providing notification and appropriate protective action recommendations to state and local government officials, and
- Minimizing the radiological hazard to the public.

For radiological incidents involving a nuclear weapon, special nuclear material, and/or classified components that are in DOE custody, DOE may, in accordance with applicable law," before "establish a national security area establish a national security area. A national security area is an area established on non-federal lands located within the United States or its possessions or territories for the purpose of safeguarding classified defense information or protecting DOE equipment and/or material. Establishment of a national security area temporarily places such non-Federal lands under the effective control of DOE and results only from an emergency event. The senior DOE representative at the scene will define the boundary, mark it with a physical barrier, and post warning signs. The landowner's consent and cooperation will be obtained

whenever possible; however, national security necessity will dictate the final decision regarding location, shape, and size of the national security area. DOE will manage the response within the boundaries of the DOE facility or national security area, and will coordinate with state and local officials to ensure appropriate public health and safety actions are taken outside the national security area. DOE will lead the overall response to safeguard national security information and/or restricted data, or equipment and material.

The DOE Accident Response Group and Consequence Management Response Teams will deploy to evaluate and mitigate the consequences of a nuclear weapon accident in conjunction with specialized assets from the DOD, regardless of whether DOE or DOD has custody of the weapon or special nuclear material.

In the event that DHS assumes overall management of the federal response under Homeland Security Presidential Directive 5 to an inadvertent incident involving DOE facilities or materials, DOE will support DHS under the NRF and NIMS. When incidents involve federal crimes or suspected crimes of terrorism, DOE will join the FBI JOC Command Group to assist counterterrorism efforts.

In cooperation with other federal and state agencies, DOE will also manage the FRMACto provide monitoring data and interpretations, including exposure rate contours, dose projections, and other requested radiological assessments, to the primary authority and the states. DOE also arranges consultation and support services through appropriate federal agencies to all other entities (e.g., private contractors) with radiological monitoring functions and capabilities and technical and medical expertise for handling radiological contamination and population monitoring.

In cooperation with other federal and state agencies, DOE also provides personnel and equipment to perform radiological monitoring in support of other response activities, support for treatment of radiologically injured or contamination personnel and modeling of atmospheric dispersion.

DOE assigns a Senior Energy Official for any response involving the deployment of DOE/National Nuclear Security Administration (NNSA) emergency response assets. The Senior Energy Official will integrate into an appropriate position in the Incident Command/Unified Command and is responsible for the coordination and employment of these assets at the scene of a radiological event. The deployed assets will work in support of and under the direction of the Senior Energy Official.

Department of Homeland Security (DHS)

The Secretary of Homeland Security is the principal federal official for domestic incident management. Pursuant to the Homeland Security Act of 2002, the Secretary is responsible for coordinating federal preparedness activities and operations within the United States to respond to and recover from terrorist attacks, major disasters, and other emergencies. Homeland Security Presidential Directive 5 provides that the Secretary shall coordinate the Federal Government's resources utilized in response to or recovery from terrorist attacks, major disasters, or other emergencies if and when any one of the following four conditions applies: (1) A federal department or agency acting under its own authority has requested the assistance of the Secretary; (2) the resources of state and local authorities are overwhelmed and federal assistance

has been requested by the appropriate state and local authorities; (3) more than one federal department or agency has become substantially involved in responding to the incident; or (4) the Secretary has been directed to assume responsibility for managing the domestic incident by the President. The Secretary coordinates preparedness activities within the United States to respond to and recover from terrorist attacks, major disasters, and other emergencies. As part of these responsibilities, the Secretary coordinates with federal entities to provide for Federal unity of effort for domestic incident management.[33]

Domestic Nuclear Detection Office (DNDO)

DNDO supports the deployment of an enhanced global nuclear detection architecture to detect and report on attempts to import, possess, store, transport, develop, or use an unauthorized nuclear explosive device, fissile material, or radiological material in the United States.

Through the Office's Joint Analysis Center, DNDO provides a coordinated technical adjudication of a nuclear/radiation detection alarm when an unplanned release of nuclear materials, and recommends technical federal asset responses as required.

Federal Emergency Management Agency (FEMA)

Under the Robert T. Stafford Disaster Relief and Emergency Assistance Act created the system in place today by which a presidential declaration of a major disaster or an emergency triggers financial and physical assistance through FEMA. The Act gives FEMA the responsibility for coordinating government-wide relief efforts. This Act constitutes the statutory authority for most federal disaster response activities especially as they pertain to FEMA and FEMA programs.

The FEMA Administrator is the principal advisor to the President, the Secretary of Homeland Security, and the National Security Council regarding emergency management. FEMA responsibilities include operation of the National Response Coordination Center; the effective coordination of all ESFs and Recovery Support Functions; and, generally, preparation for, protection against, response to, and recovery from all-hazards incidents.

FEMA may be called upon to provide supplemental or lead operational coordination support for the primary department or agency for complex and/or high demand incidents.

PKEMRA provided important provisions, including the key principle that after a major disaster or emergency declaration accelerated federal assistance could be sent by FEMA, in the absence of a specific request by a state, to save lives and prevent suffering. Among its important provisions, PKEMRA—

- Requires the development of pre-scripted mission assignments as part of the planning efforts for ESF response efforts.
- Transfers to FEMA various preparedness functions formerly contained within DHS.
- Employs the National NIMS and the NRF as the framework for emergency response and domestic incident management.

[33] Homeland Security Presidential Directive 5

- Requires the development of comprehensive plans to respond to catastrophic incidents to include clear standardization, guidance, and assistance to ensure common terminology, approach, and framework for all strategic and operational planning.
- Directs the development of a National Disaster Recovery Strategy and National Disaster Housing Strategy.
- Amends the Stafford Act to direct FEMA to appoint a Disability Coordinator to ensure that the needs of individuals with disabilities are addressed in emergency preparedness and disaster relief.
- Requires an annual report to Congress on all federal planning and preparedness efforts.
- Adds protection for household pets and service animals

United States Customs and Border Protection (CBP)

CBP coordinates the federal response for incidents involving the inadvertent or illegal import of radioactive material.

For incidents at the border, CBP maintains radiation detection equipment and nonintrusive inspection technology at ports of entry and Border Patrol checkpoints to detect the presence of radiological substances transported by persons, cargo, mail, or conveyance arriving from foreign countries.

Through its National Targeting Center, CBP provides extensive analytical and targeting capabilities to identify and interdict suspect nuclear/radiological materials.

The CBP Weapons of Mass Destruction Teleforensic Center, provides 24/7 support to federal law enforcement personnel in the identification of interdicted suspect hazardous material, as well as providing a link for coordination with and triage to other federal agencies as appropriate for the incident.

The CBP Laboratories and Scientific Services staffs Weapons of Mass Destruction Response Teams in strategic locations nationwide to screen and identify potential radiological threat materials as well as reduce the hazards that may exist by establishing temporary containment parameters.

United States Coast Guard (USCG)

The National Contingency Plan designates the USCG as the on-scene coordinator for directing the removal and mitigation of oil spills and releases of hazardous substances, pollutants, or contaminants into or threatening the waters and adjoining shorelines in certain areas of the coastal zone.[34]

[34] Certain areas" of the coastal zone, for the purposes of this document, means the following areas of the coastal zone ("coastal zone" as defined by the NCP).

- Vessels, as defined in 33 CFR 160.
- Areas seaward of the shoreline to the outer edge of the Economic Exclusion Zone.
- Within the boundaries of the following waterfront facilities subject to the jurisdiction of DHS/USCG: those regulated by 33 CFR 126 (Dangerous cargo handling), 127 (LPG/LNG), 128 (Passenger terminals), 140 (Outer continental shelf activities), 154-156 (Waterfront portions

The National Contingency Plan establishes the USCG National Strike Force and the USCG Public Information Assist Team as special teams. The National Strike Force provides highly trained, experienced personnel and specialized equipment to Coast Guard and other federal agencies to facilitate preparedness for and response to oil and hazardous substance pollution incidents in order to protect public health and the environment. The National Strike Force's area of responsibility covers all USCG Districts and federal response regions. The Public Information Assist Team is an element of the Coast Guard, which is available to assist On-Scene Coordinators to meet the demands for public information during a response or exercise.

The National Response Center, staffed by the USCG, is a 24-hour sole federal point of contact for reporting all hazardous substances releases and oil spills. The National Response Center receives all reports of releases involving hazardous substances and oil that trigger federal notification requirements under several laws.

Department of Justice (DOJ)/Federal Bureau of Investigation (FBI)

The Attorney General has lead responsibility for criminal investigations of terrorist acts or terrorist threats by individuals or groups inside the United States or directed at United States citizens or institutions abroad, where such acts are within the federal criminal jurisdiction of the United States. This includes the coordination of the law enforcement activities to detect, prevent, preempt, and disrupt terrorist threats. The FBI, acting primarily through its Joint Terrorism Task Forces, has lead responsibility for investigative activities involving federal crimes, including those concerning terrorism. This includes the receipt and resolution of suspicious activity reporting of terrorist activities or acts in preparation of terrorist activities. The Attorney General, acting through the FBI Director, has primary responsibility for searching for, finding, and neutralizing WMD within the United States and its territories.

The FBI On-Scene Commander is responsible for leading and coordinating the federal operational law enforcement response and investigative activities necessary to prevent or resolve terrorist threats or incidents. The FBI On-Scene Commander retains the authority to take appropriate law enforcement actions (tactical-response, render safe, and bomb-management operations) at all times during the response. Additionally, the FBI On-Scene Commander has primary responsibility to conduct, direct, and oversee crime scenes, to include those involving WMD, their security, and evidence management through all phases of the response. The FBI also has a WMD Coordinator assigned to each of its field offices. WMD Coordinators are responsible for managing the office's WMD program and serve as the point of contact for emergency responders and public health at the state and local level in the event of a threat or incident potentially involving a WMD. Further, all commercial nuclear power plants have a FBI liaison agent assigned, either an agent or the WMD Coordinator from the local field office. In the event of such an incident, the WMD Coordinator serves as a conduit for obtaining federal assistance for operational response direction and threat evaluation support.

The FBI On-Scene Commander (OSC) also leads the JOC, a multijurisdictional interagency investigative and intelligence operations center, supported by a multiagency command group. The

of oil and hazmat bulk transfer facilities – delineated as per the NCP), 105 (Maritime security – facilities).

JOC is the place from which the FBI leads and coordinates law enforcement investigations, intelligence activities, and counterterrorism in response to terrorist threats or incidents. The FBI OSC establishes the JOC within a regional area of responsibility; the OSC is the designated senior FBI representative responsible for leading and coordinating all law enforcement and investigative operations to prevent or resolve terrorist threats or incidents, and preserving evidence for subsequent criminal prosecution. Additionally, the JOC is staffed by federal departments and agencies and state, tribal, territorial, and insular area law enforcement agencies, private industry, and other entities as may be appropriate. The JOC will be augmented by outside agencies, including representatives from the Domestic Emergency Support Team (DEST) (if deployed), who provide interagency technical expertise, and typically with representatives in its Command Group, which provides strategic advice and its Consequence Management Group, which provides technical expertise. The JOC is established to ensure inter-incident coordination and to organize multiple agencies and jurisdictions within an overall command and coordination structure.

Department of State (DOS)

DOS has the lead responsibility for matters involving protection of U.S. Government personnel on official duty abroad and their accompanying dependents and promoting the safety and security of private U.S. citizens. DOS is the lead coordinating agency for U.S. Government response to U.S. Chief of Mission and/or host nation requests for support to international nuclear/radiological incidents. DOS will manage the provision of humanitarian assistance to refugee populations affected by the incident, in coordination with USAID Office of Foreign Disaster Assistance. For nuclear/radiological incidents that may be terrorist-related and are directed at U.S. citizens or governmental institutions abroad and within the federal criminal jurisdiction of the U.S., DOS coordinates with the Attorney General and the Director of the FBI whenever those incidents are directed at U.S. citizens or governmental institutions abroad, where such acts may be within the federal criminal jurisdiction of the United States. DOS has the responsibility for handling issues related to the safety and security of U.S. private citizens overseas, which includes compliance with the DOS "No Double Standard" policy of providing members of the official and non-official U.S. community with relevant security information, as well as coordinating available assistance to private U.S. citizens. DOS also coordinates U.S. Government assistance to U.S. private citizens, and works to provide information regarding other assistance that may be available to them from host country officials or nongovernmental entities, as appropriate.

DOS serves as the U.S. Government lead in notification of foreign governments and the IAEA in accordance with the Convention on Early Notification of a Nuclear Accident. DOS will immediately notify Canada and Mexico to negotiate cooperative and collaborative cross-border activities. DOS serves as the U.S. Government lead in requesting or accepting assistance in accordance with the IAEA Convention on Assistance in Case of a Nuclear Accident or Radiological Emergency.

Environmental Protection Agency (EPA)

The EPA is responsible for coordinating the federal environmental response to incidents that occur at facilities not licensed, owned, or operated by a federal agency or an NRC Agreement State or currently or formerly licensed facilities for which the owner/operator is not financially viable or is otherwise unable to respond in certain areas of the inland zone.

The EPA is also responsible for coordinating the federal environmental response to incidents involving the release of nuclear/radioactive materials that occur in the inland zone and in areas of the coastal zone not addressed by the USCG, including—

- Transportation incidents involving the release of nuclear/radioactive materials that are not licensed or owned by a federal agency or NRC Agreement State;
- Incidents involving space vehicles not managed by DOD or NASA or addressed by the USCG; and
- Incidents involving foreign, unknown, or unlicensed radiological sources that have actual, potential, or perceived radiological consequences in the United States or its territories, possessions, or territorial waters, and that are not addressed by CBP or the USCG.

For incidents where contaminated consumer goods are distributed before detection, the response is primarily carried out at the state level; however, EPA will provide federal coordination and technical assistance to the states as needed to ensure an effective response to the incident.

For a DHS-led federal response, the EPA will generally provide response coordination support to DHS through this annex and ESF #10 – Oil and Hazardous Materials Response. For an EPA-led federal response, the EPA will generally respond under the National Contingency Plan (which is an operational supplement to the NRF. For some incidents, the EPA may also rely upon its Public Health Service Act and Atomic Energy Act authorities.

National Aeronautics and Space Administration (NASA)

NASA is responsible for coordinating the federal response to incidents involving the release of nuclear/radioactive materials from NASA space vehicles or joint space vehicles with significant NASA involvement. For radiological incidents involving nuclear material in NASA custody, NASA may establish a Security Area per 14 CFR Part 1203a. NASA will manage the response within the boundaries of the Security Area, and will coordinate with state and local officials to ensure appropriate public health and safety actions are taken outside the Security Area.

In the event that the DHS assumes overall management of the federal response under Homeland Security Presidential Directive 5 to an inadvertent incident involving NASA space vehicles, NASA will support the DHS under the NRF and NIMS.

Nuclear Regulatory Commission (NRC)

The NRC is responsible for coordinating response to incidents at or caused by a facility or an activity that is licensed by the NRC or an NRC Agreement State. These facilities include but are not limited to commercial nuclear power plants, fuel cycle facilities, DOE-owned gaseous diffusion facilities operating under NRC regulatory oversight, independent spent fuel storage installations, radiopharmaceutical manufacturers, and research reactors within facility boundaries. For incidents with offsite consequences, FEMA may assume the role of coordinating offsite Federal response. The NRC would remain the primary Federal authority for onsite activities.

The NRC licensee and agreement state licensee primarily are responsible for taking action to mitigate the consequences of an incident and providing appropriate protective action recommendations to state and local government officials.

The NRC—

- Performs an independent assessment of the incident and potential offsite consequences and, as appropriate, provides recommendations concerning any protective measures.
- Performs oversight of the licensee, to include monitoring, evaluation of protective action recommendations, advice, assistance, and, as appropriate, direction.
- Dispatches, if appropriate, an NRC site team of technical experts to the licensee's facility.

Under certain extraordinary situations involving public health/safety or national defense/security, the NRC may order the transfer of special nuclear materials and/or the operation of certain facilities regulated by the NRC.

The NRC closely coordinates its actions with state and local government officials during an incident by providing advice, guidance, and support as needed.

In the event that DHS assumes overall management of the federal response under Homeland Security Presidential Directive 5 to an inadvertent incident involving an NRC-regulated facility, the NRC will support DHS under the NRF and NIMS.

Additional Federal Agency Capabilities

The following additional federal agency capabilities information is for support agency assistance to the agency with primary authority; and supplemental to each agency's baseline capabilities described in the NRF and focuses on those capabilities of particular relevance to nuclear/radiological incidents. Please refer to Appendix 1 for more detailed information on agency capabilities.

United States Department of Agriculture (USDA)

The USDA provides the following capabilities in support of a nuclear/radiological incident:

- Assists in the planning and collection of agricultural samples within the Ingestion Exposure Pathway Emergency Planning Zone.
- Assesses damage to crops, soil, livestock, poultry, and processing facilities and incorporates the findings in a damage assessment report.
- Assists in the evaluation and assessment of data to determine the impact of the incident on agriculture.
- Provides support and advice on screening and decontamination of pets and farm animals that may have been exposed to radiation or contaminated with radioactive materials.
- Assists in the planning and operational aspects of animal carcasses disposal.
- Inspects and assists in the collection of samples of crops, meat and meat products, poultry and poultry products, egg products, and milk and dairy products to ensure that they are safe for human consumption.

- Collects samples of agricultural products to monitor and assess the extent of contamination as a basis for recommending or implementing protective actions (through the FRMAC).
- Assists, in conjunction with the HHS, in monitoring the production, processing, storage, and distribution of food through the wholesale level to eliminate contaminated product and to ensure that the levels of contamination in the product are safe and below the derived intervention levels.

United States Department of Commerce, National Oceanic and Atmospheric Administration (NOAA)

NOAA provides the following capabilities in support of a nuclear/radiological incident:

- Provides near or on-scene weather observations upon request.
- Prepares forecasts tailored to support emergency incident management activities.
- Participates in the IMAAC, when activated, by providing atmospheric transport and dispersion (plume) modeling and forecasts, surface weather observations, and weather forecasts.
- When the IMAAC is not activated, provides atmospheric transport and dispersion (plume) modeling and forecasts to the federal agency with primary authority, in accordance with established procedures.
- Maintains and further develops the Hybrid Single Particle Lagrangian Integrated Trajectory Transport and Dispersion model.
- Archives, as a special collection, the meteorological data from national observing and numerical weather analysis and prediction systems applicable to the monitoring and assessment of the response.
- Provides assistance and reference material for calibrating radiological instruments.
- Provides support in the testing and evaluation of radiation shielding materials.
- In the event of materials potentially crossing international boundaries, provides atmospheric transport and dispersion products to international hydrometeorological services and associated agencies through the mechanisms afforded by the World Meteorological Organization.
- Provides radioanalytical measurement support and instrumentation.
- Provides assistance for collection and monitoring for marine and estuary contamination assessment.
- Advises and provides assistance on building operations (e.g., heating, ventilation, air conditioning) for contamination control and decontamination processes.
- Provides laboratory support for analysis of materials and environmental samples.

Department of Defense/U.S. Army Corps of Engineers (USACE)

The USACE provides the following capabilities in support of a nuclear/radiological incident:

- For RDD and IND incidents, provides response and cleanup support.
- Integrates and coordinates with other agencies, as requested, to perform any or all of the following:
  - Radiological survey functions.

- Gross decontamination.
- Site characterization.
- Contaminated water and debris management.
- Site remediation.

Department of Health and Human Services (HHS)

The Secretary of HHS has the authority to declare a PHE should conditions warrant. The Secretary also may declare an emergency and justify an EUA, and the Commissioner of FDA may authorize the use of an unapproved medical procedure or an unapproved use of a medical product to diagnose, treat, or prevent serious or life-threatening disease or conditions where there are no adequate, appropriate or available alternatives. HHS provides the following capabilities in support of a nuclear/radiological incident:

- Conducts and provides guidance on the conduct of epidemiological surveillance to detect symptoms consistent with exposure to radioactive materials, collect exposure histories, or identify public health needs.
- Provides advice for preventing or reducing exposure of the general population and response workers to radiation or radioactive materials.
- Provides advice on triage, assessment, medical management, behavioral health, and treatment of casualties and response workers for trauma and exposure to or contaminated by radioactive materials.
- Provides available medical countermeasures through deployment of the Strategic National Stockpile.
- Provides assessment and treatment teams for those exposed to or contaminated by radiation.
- Provides advice and guidance in assessing the impact of the effects of radiological incidents on the health and behavioral health of persons in the affected area.
- Manages long-term public monitoring and supports follow-on personal data collection, collecting and processing of blood samples and bodily fluids/matter samples, and advice concerning medical assessment and triage of victims. Tracks patient treatment and long-term health effects.
- Coordinates all aspects of the national medical and public health response to include the National Disaster Medical System and the Radiation Injury Treatment Network as well as radiation specific clinical guidance and training materials.
- Coordinates patient movement.
- Coordinates all aspects of national fatality management efforts.
- Coordinates the behavioral health response and recovery efforts.

Department of the Interior (DOI)

DOI provides the following capabilities in support of a nuclear/radiological incident:

- Provides resources, including personnel, equipment, and laboratory support to advise and assist in evaluating processes affecting radioisotopes in soils.
- Provides resources, including personnel and equipment, to advise and assist in the development of geographic information systems databases to be used in the analysis and assessment of contaminated areas.

- Provides liaison between federally recognized tribal governments and federal, state, and local agencies for coordination of response activities. Additionally, DOI advises and assists DHS on economic, social, and political matters in the U.S. insular areas should a nuclear/radiological incident occur in these areas.

Department of Labor (DOL)/Occupational Safety and Health Administration (OSHA)

DOL/OSHA provides the following capabilities in support of a nuclear/radiological incident:

- Provides advice and technical assistance to the lead federal agency and state and local governments concerning the health and safety of response and recovery workers implementing the policies and concepts in this annex.
- Provides assistance with developing site health and safety plans.
- Provides technical assistance with emergency worker decontamination.
- During the initial emergency response, OSHA will likely operate in a technical assistance and support mode, pursuant to the NRF, rather than issuing citations for workplace violations. However, OSHA retains its enforcement authority under the OSH Act, particularly during clean up, remediation, and other recovery activities.

Department of Transportation (DOT)

DOT provides the following capabilities in support of a nuclear/radiological incident:

- Provides technical advice and assistance on the transportation of radiological materials and the impact of the incident on the transportation infrastructure.
- Regulates the movement of hazardous materials such as radiological materials in transportation. In emergencies, the Pipelines and Hazardous Material Safety Administration can provide technical advice including recommendations for special permit situations.

Department of Veterans Affairs (VA)

The VA provides the following capability in support of a nuclear/radiological incident:

- In coordination with HHS, provides medical assistance using the Medical Emergency Radiological Response Team, which provides direct patient treatment; assists and trains local health care providers in managing, handling, and treatment of radiation-exposed and -contaminated casualties, assesses the impact on human health; and provides consultation and technical advice to local, state, and federal authorities.

Notification

The owner/operator of a nuclear/radiological facility or owner/transporter of nuclear/radiological material is generally the first to become aware of an incident and may be obligated to notify state and local governments as well as the federal agency with primary authority. For example, NRC licensees are legally required to notify state and local governments and the NRC.

Federal, state, and local governments that become aware of a radiological incident should notify the appropriate agency, per **Table 1**. The agency with primary consequence management authority provides notification of a nuclear/radiological incident to the DHS National Operations

Center and other federal agencies, as appropriate, and in compliance with other statutory requirements for notification.

Agencies who become aware of a potential act of terrorism should immediately and comprehensively share this information with their nearest FBI Joint Terrorist Task Force so that threats can be resolved. Agencies performing response missions shall cooperate with the FBI in the conduct of an investigation, giving priority to lifesaving efforts. Further, state and local law enforcement agencies should continue to contact the local FBI Joint Terrorism Task Force regarding potential ongoing terrorist activities, events, instances, or investigations.

If a state requests radiological assistance directly from a federal agency for a nuclear/radiological incident that falls under the jurisdiction of another agency, that federal agency shall notify the agency with primary authority of the request.

Activation

Once notified, the agency with primary consequence management authority (per **Table 1**) initiates the consequence management response in accordance with its authorities.

DHS reviews the situation and determines whether to assume federal leadership for the overall coordination of the consequence management response and recovery in accordance with the NRF and NDRF.

Responding departments or agencies provide representatives to the coordination elements described in the NRF and NDRF elements (e.g., Joint Field Office, National Operations Center) when appropriate. For Stafford Act incidents, the FEMA may issue mission assignments to federal agencies to support response and recovery activities.

If DHS does not assume federal leadership for the coordination of the consequence management response, the agency with primary authority may request that FEMA activate NRF and/or NDRF elements to support response and/or recovery activities. The agency with primary authority may request assistance from other federal agencies.

The agency with primary authority will also be represented in appropriate positions within the Command Staff in the Incident Command/Unified Command structure (as defined by the NIMS), coordinates federal radiological response and recovery activities at appropriate field facilities, and provides personnel to other sections of the Incident Command/Unified Command as needed.

For any nuclear/radiological incident, responding federal agencies may establish a field facility; assist state and local response and recovery organizations; monitor and support owner/operator activities (when there is an owner or operator), provide technical support to the owner/operator if requested, and serve as a federal source of information about incident conditions.

Support and Coordination Elements

To facilitate federal interagency coordination and information sharing during a nuclear/radiological incident, several support and operational coordination elements may be utilized. These elements, combined with the assets, resources, and teams identified in Appendix

1 – Federal Response Capability Inventory – Nuclear/Radiological Specific Assets, Resources, and Teams, represent unique or critical federal nuclear/radiological capabilities that support Federal, state and local response and recovery operations.

Federal Radiological Monitoring and Assessment Center

The Federal Radiological Monitoring and Assessment Center (FRMAC) is responsible for coordinating all federal ground and aviation-based environmental radiological monitoring, sampling, assessment, and product dissemination for nuclear/radiological incident response. The FRMAC is a DOE-managed interagency asset that is available on request to respond to nuclear/radiological incidents. DOE leads the FRMAC for the initial response, then transitions leadership to the EPA when the continued response shifts predominantly to remediation and/or recovery. The FRMAC is established at or near the incident location in coordination with FEMA, the federal agency with primary authority, other federal agencies, and state and local governments.

The FRMAC normally includes representation from DOE, EPA, DOC (through the NOAA), DOD (specialized assets such as the Air Force Radiation Assessment Team and the Armed Forces Radiobiology Research Institute), HHS (Centers for Disease Control and Prevention [CDC]), and other federal agencies, as needed.

The FRMAC will be activated on request of the Federal Agency with Primary Authority for Federal Response (**Table 1**), when requested by state or local authorities with primary responsibility for the response to the incident, or any time a Stafford Act declaration is made, which requires a radiological response. EPA, USCG, DOD, and DOE On-Scene Coordinators under the National Oil and Hazardous Substances Pollution Contingency Plan may request a FRMAC activation through their headquarters response coordination structure.

When the FRMAC activates, DOE coordinates all federal environmental and agricultural radiological monitoring and assessment activities, including assessment product and data distribution, for the initial phases of the response, regardless of the primary authority, through the DOE Consequence Management Home Team or the deployed FRMAC.[35]

When the FRMAC transfers to the EPA, the EPA assumes responsibility for coordination of radiological monitoring and assessment activities.[36] A transfer most likely will occur in the recovery phase of a response, when immediate emergency operations have largely been completed. The EPA would then be responsible for the transition into long-term monitoring and assessment.

Although it is difficult to specify in advance when the transfer of this coordination responsibility would occur, certain conditions must be met prior to this transfer. DOE may request that the EPA consider the transfer when the DOE believes it practical and appropriate to do so, and the EPA will consider this request. The transfer will be based upon the following five criteria:

- The immediate emergency condition is stabilized.

[35] Does not include offsite air monitoring and exposure data that is collected and collated by EPA's RadNet system.
[36] Source: Guidance Document for the Transfer of Operational Control of the FRMAC from the DOE to the EPA, September 2009.

- Offsite releases of radioactive material have ceased, and there is little or no potential for further unintentional offsite releases.
- The offsite radiological conditions are evaluated and the immediate consequences are assessed.
- An initial long-range monitoring plan has been developed in conjunction with the affected local, state, and tribal governments and appropriate federal agencies.
- The EPA has received adequate assurances from the other federal agencies that they are committing the required resources, personnel, and funds for the duration of the federal response.

DOE may establish a committee or working group during the response phase to address the practical matter of gathering the information necessary to allow for a transfer. Although DOE may select other entities to participate in the discussion, at a minimum, it should include the EPA and the affected states(s).

Once DOE and the EPA have set up an agreement for the appropriate time of transfer, the Unified Coordination Group (UCG), and the state and local governments will be brought in to consult on the organization of the post-emergency FRMAC. At this time, the state(s) and other entities will have the opportunity to suggest modifications to the plan.

Some participating federal agencies have radiological planning and emergency responsibilities as part of their statutory authority. The FRMAC plans and procedures provide for coordination of federal monitoring and assessment activities by providing a framework to implement those responsibilities as part of an integrated response; it does not alter these responsibilities but instead complements them.

State and local governments are encouraged to integrate their radiological monitoring and assessment activities with the FRMAC.

The FRMAC is only responsible for coordinating monitoring efforts in areas affected by the release and those that are adjacent. Other agencies with fixed monitoring capabilities are responsible for maintaining those monitoring activities outside the area adjacent to impacts and reporting the results. For example, the EPA will continue to operate and maintain the RadNet system and report results through the normal channels.

Interagency Radiological Aerial Monitoring Concept of Operations

The Interagency Radiological Aerial Monitoring Concept of Operations provides an integration structure and supporting processes for coordinating all Nuclear Incident Response Team and all aerial assets engaged in radiological surveys during consequence management response and recovery operations. The Concept of Operations can be applied in support of the response to a range of radiological disaster scenarios, including those of national significance covered under a Stafford Act. This Concept of Operations is intended for use by federal, state, and local entities, among others, that have the capability to provide aerial assets to assist in radiological monitoring. Central to the execution of this document is the staffing of a FRMAC position, the Radiological/Nuclear Aerial Coordinator, who will coordinate radiological aerial monitoring as part of the air operations group. This document is available on CMWeb along with the other FRMAC manuals.

Interagency Modeling and Atmospheric Assessment Center (IMAAC)

The IMAAC is an interagency coordination element responsible for production, coordination, and dissemination of federal atmospheric dispersion modeling and hazard predictions for an airborne portion of a hazardous material release. The IMAAC provides the single federal consensus on atmospheric predictions of hazardous material concentration to all levels of the Incident Command and national response organizations. This is achieved through a partnership between DHS, DOC (NOAA), DOD, DOE (NNSA), EPA, HHS, and the NRC. Through plume modeling analysis, the IMAAC provides emergency responders with predictions of hazards associated with atmospheric releases to aid in the decision making process to protect the public and environment.

The NARAC is the primary provider of the modeling for nuclear/radiological incidents for the IMAAC.

Advisory Team for Environment, Food, and Health

The Advisory Team (A-Team) for Environment, Food, and Health includes representatives from the EPA, USDA, HHS (FDA), the CDC, and other federal agencies as needed. The A-Team, supported by the Federal Radiological Preparedness Coordinating Committee, develops coordinated advice and recommendations on environmental, food, health, and animal health matters for the Incident Command/Unified Command, the Joint Field Office, the UCG, the federal agency with primary authority, and/or state and local governments, as appropriate. The A-Team uses information provided by the IMAAC, FRMAC, and other relevant sources. The A-Team makes protective action recommendations not decisions; provides coordinated technical and scientific advice through the state and federal agency with primary authority; and bases its recommendations on science and best practices. The A-Team is a coordinated asset that must be officially requested before it becomes activated. This advisory team is activated whenever the FRMAC is activated or its assistance can be activated via a telephone call to one of the core federal agencies' Emergency Operations Center (HHS, USDA, or EPA). The call can be from any local, state, federal, or tribal entity.

The A-Team provides federal advice in matters related to—

- Environmental assessments (field monitoring) required for developing recommendations with advice from state and local governments and/or the FRMAC.
- Protective Action Guides and their application to the emergency.
- Protective Action Recommendations using data and assessment from FRMAC.
- Measures to prevent or minimize contamination of milk, food, and water.
- Recommendations for minimizing losses of agricultural resources from contamination.
- Recommendations regarding the health; management and disposition of livestock, poultry, pets, and other animals; and the disposition of contaminated foods, especially perishable commodities (e.g., meat in processing plants).
- Availability of food, animal feed, and water supply inspection programs to ensure wholesomeness.
- Relocation, reentry, and other radiation protection measures.
- Recommendations for recovery, return, and remediation issues.

- Health and safety advice or information for the public and for workers.
- Estimated effects of radioactive releases on human health and the environment; and
- Other matters, as requested by the Incident Command or the federal agency with primary authority.

Nuclear/Radiological Incident Task Force (NRITF)

The NRITF is an interagency group that convenes within the National Response Coordination Center to provide standardized nuclear/radiological subject matter expertise in support of national level incident planning and Whole Community core capability delivery. The mission of the NRITF is to recommend answers to executive decision points in this annex regarding technical insight, consequence management support, and other radiological and nuclear critical considerations as needed to inform response/recovery operations and future planning. [37]

The task force is scalable, based on the size, scale, and type of incident, and comprised of but not limited to the following entities who will provide support during a nuclear/radiological incident:

- A-Team
- DOC/NOAA
- DOD
- DOE/NNSA
- DOL
- EPA
- FEMA
- HHS-ASPR
- NRC
- USDA

Other federal agencies, organizations (e.g., private companies or nongovernmental organizations), and liaisons, may support the NRITF on an *ad hoc* basis depending on the shifting needs surrounding the nuclear/radiological incident.

The NRITF will include a recovery liaison staffed by FEMA or a Recovery Support Function coordinating, supporting, or primary agency.

The task force does not take the place of any ESF, Recovery Support Function, or federal agency; rather it augments capabilities to focus on specific priorities defined by leadership. It is recognized that a number of interagency organizations already exist to provide nuclear/radiological subject matter expertise in order to fulfill a mandate by the appropriate authorities or specified agency requirements. The NRITF will ensure to not duplicate efforts, but rather conduct its primary mission within the National Response Coordination Center complementary to other nuclear/radiological subject matter expert organizations.

The NRITF can be activated, based on the scale and need, in two ways. When the Lead Federal Agency for a nuclear/radiological incident requests the NRITF be activated or, the FEMA

[37] Additional operational information can be obtained in the *Nuclear Radiological Incident Task Force Standard Operating Procedure,* August 2015.

Administrator, or his or her delegate activates the NRCC in anticipation of or in response to a nuclear/radiological incident activates the NRITF.

Unified Coordination Group (UCG)

The UCG is composed of senior leaders representing state, tribal, and federal interests and, in certain circumstances, local jurisdictions and the private sector. UCG members must have significant jurisdictional responsibility and authority. The composition of the UCG varies depending on the type, scope, and nature of the incident. Due to the unique nature of nuclear and radiological incidents, additional consideration must be given to ensure that all appropriate entities are represented on the UCG.

Domestic Emergency Support Team (DEST)

The DEST is a specialized, rapidly deployable interagency team that augments the FBI's JOC. As part of its mission, the DEST supports the FBI On-Scene Commander and other officials to integrate and prioritize consequence management decisions within the operational space of the Prevention mission. The Team supports the FBI On-Scene Commander through a JOC WMD Desk and maintains connectivity with the JOC Consequence Management Group and the Consequence Management Coordination Unit. The DEST also provides the FBI On-Scene Commander with expert advice and guidance to shape Prevention operations in order to save lives and protect property. Team composition includes a ready roster from FEMA, FBI, DOD, HHS-ASPR, DOE, EPA, and others as may be appropriate. Based upon the threat and requirements, the FBI determines the composition of the DEST and maintains operational control throughout its activation predicated upon an interagency developed proposed composition. The FEMA Administrator is responsible for policies and planning governing the Team and for facilitating approval for its deployment.

Weapons of Mass Destruction Strategic Group (WMDSG)

When facing WMD terrorist threats, the FBI-led WMDSG crisis action team is activated within the Strategic Information and Operations Center. It supports information exchange and deconfliction of counterterrorism activities to resolve imminent WMD terrorist threats while simultaneously coordinating with the nation-wide effort to save lives and protect property. The WMDSG, through its collection of interagency representatives, facilitates the application of real time investigative information, intelligence, and technical analysis to WMD-CT law enforcement operations; facilitates the identification and acquisition of interagency assets that could support WMD-CT law enforcement operations; and enhances WMD-CT investigative information/intelligence sharing and synchronization of law enforcement operations with counterterrorism-related public health, homeland protection, and consequence management activities. The WMDSG, with its collaborative environment and through the dissemination of WMD Threat Profile products, contributes to the promotion of risk informed operations and decision-making at all levels of the counterterrorism response, including federal, state, local, territory, and tribal law enforcement; public health; border security; and international partners. The WMDSG connects with the FBI field division(s) and appropriate local/regional partners through the JOC(s).

Consequence Management Coordination Unit

FEMA staffs and manages the Consequence Management Coordination Unit, which is the principal advisory unit for consequence management considerations within the WMDSG and provides strategic recommendations and integrated courses of action in light of ongoing and evolving counterterrorism operations. The Consequence Management Coordination Unit links operational coordination and information sharing to DHS and sector-specific agencies' Response and Protection activities. The Consequence Management Coordination Unit is supported by federal technical capabilities provided through DOE/NNSA, HHS, DOD, and DHS. The Consequence Management Coordination Unit responsibilities include:

- Coordination of the identification of potential risks for impacted populations.
- Identification of potential preparatory actions to reduce those risks to life and property by lessening the impact of the event; and
- Positioning the Response community to be able to respond should the event occur.

Nuclear Incident Response Team

While not a "response team" per se, the Nuclear Incident Response Team is, rather, a collection of specialized federal teams and equipment from DOE/NNSA and the EPA that are designed to provide a rapid response capability to nuclear accidents or incidents. These assets can assess situations and advise local, state, and federal officials on the scope and magnitude of response needs. Under the Homeland Security Act of 2002, FEMA has the authority to activate Nuclear Incident Response Team assets in connection with an actual or threatened terrorist attack, major disaster, or other emergency in the United States. When activated under FEMA authorities, Nuclear Incident Response Team assets shall operate as an organization unit and under the direction and control of FEMA. For Stafford Act responses, that direction is expected to be provided through the normal mission assignment process to DOE (ESF #12) and EPA (ESF #10). When not operating as part of the Nuclear Incident Response Team, these assets remain under the control of the parent agency.

Nuclear Incident Response Team assets include:

- Those entities of DOE/NNSA that perform nuclear or radiological emergency support functions, Aerial Measuring System, Accident Response Group, NARAC, Nuclear/Radiological Advisory Team, Radiation Emergency Assistance Center/Training Site, and Radiological Assistance Program.
- Those entities of EPA that perform radiological emergency response functions, Airborne Spectral Photometric Environmental Collection Technology, Radiological Emergency Response Team, Mobile Environmental Response Laboratory, Sample Preparation Lab, RadNet Stationary and Deployable Monitors, National Analytical Radiation Environment Laboratory and Enhanced Radiological Ground Scanning System.

Operational Phases

Operational phases for the response to and recovery from a nuclear/radiological incident vary based upon the size, scope, and complexity of the incident. The operational phases identified in the Response and Recovery Federal Interagency Operations Plans serve as the default posture for

achieving Nuclear/Radiological Incident Annex response and recovery objectives. **Figure 2** provides an overview of this default posture. Catastrophic nuclear/radiological incident response and recovery activities are interdependent and often concurrent. Decisions made and priorities set early in the response will have a cascading effect on the nature and speed of recovery.[38]

1			2			3
Primarily Pre-Incident			Begins when an Incident Occurs or Upon Notification			Sustained Operations
1a	1b	1c	2a	2b	2c	3a
Normal Operations	Increased Likelihood or Elevated Threat	Near Certainty or Credible Threat	Activation, Situational Assessment, and Movement	Employment of Resources and Stabilization	Intermediate Operations	Long-Term Recovery Operations

Figure 2: Default Phased Posture for the Nuclear/Radiological Incident Annex

As appropriate, operational phases are amplified, based on conditions, to address the expected incident-specific environment. Incident-specific operational phases are identified in the appropriate branch plan to this annex.

Deliberate Attacks (See Branch 1)

Operations will begin with discovery or notification of the incident. There may be elevated threat or credible threat information provided by law enforcement officials; therefore, operations may begin with recognition of the threat.

Inadvertent Releases (See Branch 2)

Operations will begin with discovery or notification of the incident.

International Incidents (See Branch 3)

Operations will begin with discovery or notification of the incident.

Protective Action Phases

Federal response and recovery actions are carried out commensurate with appropriate health and safety guidelines and concurrent with state and local decision making. For example, if the area is contaminated by radioactive material and appropriate personal protective equipment and capabilities are not available, response actions may be delayed until (1) the radiological hazard has dissipated to a safe level for emergency response personnel or (2) appropriate personal protective equipment and capabilities arrive. The Federal Government has established Protective Action Guides for nuclear/radiological incidents.[39] Protective action decision making can be

[38] For example, there could be requests to prepare or preposition assets in connection with the U.S. Government's response to an imminent terrorist threat prior to actual incident. This, however, is not addressed within this annex.

39 The EPA's Protective Action Guide Manual: Protective Action Guides and Planning Guidance for Radiological Incidents, Draft for Interim Use and Public Comment, March 2013.

divided into three time phases that are common to all nuclear/radiological incidents: The early phase, the intermediate phase, and the late phase. The phases, which may overlap, represent non-precise time periods in which response officials would be making public health protection decisions. **Figure 3** outlines potential exposure pathways and protective actions by phase.

Potential Exposure Pathways	Incident Phases	Protective Actions
1. External Radiation from Facility	EARLY	1. Sheltering, Evacuation, Control of Access
2. External Radiation from Plume	EARLY	2. Sheltering, Evacuation, Control of Access
3. Inhalation of Radioactivity in Plume	EARLY	3. Sheltering, Administration of Stable Iodine, Evacuation, Control of Access
4. Contamination of Skin and Clothes	EARLY / INTERMEDIATE	4. Sheltering, Evacuation, Decontamination of Persons and Animals, Including Household Pets and Service Animals with Owners
5. External Radiation from Ground Deposition of Activity	EARLY / INTERMEDIATE / LATE	5. Evacuation, Relocation, Decontamination of Land and Property
6. Ingestion of Contaminated Food, Water	INTERMEDIATE / LATE	6. Food and Water Controls
7. Inhalation of Re-Suspended Activity	INTERMEDIATE / LATE	7. Relocation, Decontamination of Land and Property

Figure 3: Potential Exposure Pathways and Protective Actions by Incident Phase

Early Phase (Aligns to operational Phase 2a):

The Early Phase is the period at the beginning of the incident when immediate decisions for effective protective actions are required. There may be little or no information available on actual releases or field measurement data. Protective actions in the early phase are aimed at avoiding inhalation of gases or particulates in a plume and minimizing external exposure.

Intermediate Phase (Aligns to operational Phases 2a, 2b, and 2c):

The Intermediate Phase may overlap with and/or follow the early phase response within as little as a few hours and can last for weeks or months. This phase is assumed to begin after the incident source and releases have been brought under control and protective action decisions can be made based on measurements of exposure and radioactive materials that have been deposited. Protective actions in the intermediate phase are intended to reduce or avoid dose to the public, control worker exposures and the spread of contamination, and prepare for late-phase cleanup.

Late Phase (Aligns to operational Phase 2c and 3):

The Late Phase is the period when actions designed to reduce radiation levels in the environment to acceptable levels are conducted. The late phase entails final clean-up decisions and implementation of remediation strategies. The Late Phase will overlap with the intermediate phase response, making Phase 2c part of both the intermediate and late phases.

The clean-up process described in this document does not rely on and does not affect authority under the Comprehensive Environmental Response, Compensation, and Liability Act, 42 U.S.C.

9601 et seq., and the National Contingency Plan (NCP), 40 CFR Part 300. This document expresses no view as to the availability of legal authority to implement this process in any particular situation.

Concept of Support

The response and recovery support to a nuclear/radiological incident and any cascading effects, require a coordinated effort involving federal, state, and local government; nongovernmental organizations; and private sector partners. Federal coordination centers and agency teams provide their own logistical support consistent with agreed-upon interagency execution plans. State and local governments are encouraged to coordinate with federal efforts yet maintain their own logistical support when possible, consistent with applicable authorities and requirements. The Incident Command/Unified Command and stakeholder groups must continue to protect worker safety and health during cleanup, disposition of damage zones, waste management, and other recovery activities. The concept of support outlined in the Response and Recovery Federal Interagency Operational Plans is unchanged by this annex.

Critical Information Requirements

The following critical information requirements are supplemental to those outlined in the Response and Recovery Federal Interagency Operational Plans and are linked to key decisions where appropriate:

Radiation Identification

- Identification of the radiation source element(s) and their half-life,[40] as well as the area of highly hazardous or lethal radiation, and the identification of areas not subject to elevated radiation.
- Movement and timing of fallout/plume, if present.
- Baseline background radiation[41] levels in affected areas, if available.[42]

Incident Characterization:

- Identification of damage zones and fallout/plume pathway to identify safe locations for initial support bases and, staging areas, and identify where to deploy response teams.
- Deployment of rescue and triage resources requires estimates of where viable victims can be found and extraction considerations.
- Current and projected weather conditions.
- Identify command structure for operational communications.

[40] Radioactive half-life – The time required for any given radionuclide to decrease to one-half of its original quantity. For example, three half-lives are equal to 1/2 times 3 or 1/8 of the original amount.

[41] Background radiation – Ionizing radiation from natural sources such as terrestrial radiation due to radionuclides in the soil or cosmic radiation originating in outer space.

[42] National Council on Radiation Protection and Measurements, Decision Making for Late-Phase Recovery from Major Nuclear Or Radiological Incidents, Report No. 175, Bethesda, MD (2014), 62.

Protective Actions

- Status of protective action recommendations issued to the public and to response and recovery workers, including changes or conflicts with protective actions or boundaries ordered by non-federal entities. (To mitigate actions that would result in increased radiation exposure to the public or responders).
- Identification of response and recovery tasks specific to the incident that workers can safely perform.

Radiation Exposure:

- Projections and real-time data for population and response and recovery worker radiation exposure, food contamination, and environmental contamination.
- Determination of recommended operational exposure guidance.
- Ongoing assessment of the radiation dose threat. To receive a radiation dose, some of the radiation exposure has to be absorbed into the body to impart a dose.

Resource Availability

- Availability of radiological assets within the impacted area will affect response and recovery options.
- Identification of private sector radiological response and recovery resources.
- Status of state and local radiological response resources.

Evacuation and Sheltering

- A map of the plume/fallout to identify safe (lowest risk) locations for triage sites and reception centers.
- Locations of host communities with concentrations of evacuees.
- Long-term evacuee/displaced persons status tracking (employment, temporary housing, preferences for permanent relocation versus return, if applicable).

Health Effects

- Dose and exposure limits for workers (authorities for approving modification of dose/exposure limits).
- Long- and short-term health effects, including dose-response relationships and contextualized with regulatory limits for routine and emergency exposure.
- Availability of treatment and prophylaxis agents (including delivery time and total doses available) for both public and responder use.
- Dosing guidelines for treatment and prophylaxis agents.
- Guidelines for diagnosis and treatment of radiation injury or injury complicated with concomitant radiation exposure.
- Radiation in this context covers both penetrating radiation exposure and internal/external radioactive material contamination.

Reentry/Reoccupation

- Acceptable levels of decontamination to determine reentry and/or relocation of impacted individuals and householders.
- Using the EPA's Protective Action Guide Manual (March 2013) for vetted reentry/reoccupation guidance, determine acceptable levels of radiation to allow homeowners to reoccupy contaminated areas.

Infrastructure Impacts

- Forecasted and cascading impacts to critical infrastructure, which may affect mobility within the area for an extended period of time (e.g., bridges, roads, major highways, railways, and airports).
- Determine whether transportation modes will enter the contaminated area.

Responsible Party Liability

- Insurance coverage, to include the Price Anderson Act (when applicable) and private party resources available.

State and Local Plans/Agreements Related to—

- Pre-incident waste management plans and potential sites for temporary debris/waste storage.
- Host community agreements to support displaced populations, etc.

Mass Fatality Management

- Assess status of known radiation information provided by the radiation identification critical information requirement above and determine what level of personal protective equipment personnel must wear for each phase of the operation.
- Determine under what conditions, if any, human remains can be safely recovered and processed for disposition.
- Identify contaminated remains processing facilities, to include capability and capacity.

Administration, Resources, and Funding

Administration

Federal agencies are responsible for managing their own financial activities during all operational phases and across all mission areas within their established processes and resources. The Financial Management Support Annex to the NRF provides basic financial management guidance for all federal agencies that provide support for incidents that require a coordinated federal response.

Resources

Federal agencies are responsible for personnel augmentation to support operations under this annex. Each federal agency possesses individual policies for personnel augmentation that is predicated on its authorities, various policies, memorandums of understanding, and mutual aid agreements. Federal agencies must ensure that their employees who are engaged in incident response activities are able to perform in accordance with operational requirements.

Pursuant to Homeland Security Presidential Directive 5, the Secretary of Homeland Security is designated as the principal federal official for domestic incident management. Federal agencies are expected to provide their full and prompt cooperation, resources, and support, as appropriate and consistent with their own responsibilities for protecting national security, to the Secretary in the exercise of their leadership responsibilities and missions for domestic incident management.

Funding

Stafford Act

The Stafford Act authorizes the President to issue a disaster or emergency declaration upon the request of a Governor or Chief Tribal Executive when an incident overwhelms state, tribal and local governments.

The Disaster Relief Fund is not available for activities not authorized by the Stafford Act, for activities undertaken under other authorities or agency missions, or for non-Stafford Act incidents requiring a coordinated federal response.

If a state or tribal government is in need of direct federal assistance, it can request (written or verbal) an emergency declaration for direct federal assistance. If a state or tribal entity requests reimbursement or individual assistance, then the standard preliminary damage assessment process applies. Direct federal assistance requested by the state for resources is provided to the affected state and local jurisdictions when they do not have the resources to provide specific types of disaster assistance. This activity is subject to the cost-share provision designated for that specific disaster. Cost-share provisions are normally 75 percent federal share and 25 percent state share. However, the President can waive the cost-share requirement and make this type of assistance 100 percent federally funded. An example of this type of assistance is providing generators.

FEMA may direct another agency to utilize the agency resources to address an identified unmet need. FEMA may mission assign another agency with or without reimbursement.

Other federal agencies have authority to provide assistance to support jurisdictions during nuclear/radiological incidents. Assistance provided by FEMA under the Stafford Act may not duplicate the assistance provided or available under the authority of another federal agency. Where the task falls within the statutory authority of the other federal agency, the mission assignment should be without funding

Federal to Federal Support – Non-Stafford Act

Federal agencies may not have designated funds available to cover emergency/disaster operations; however, they may respond if the requested operations fall within their statutory role and responsibility. For federal agencies requested to provide assistance through FEMA to support a nuclear/radiological incident response, funding may occur through the agencies' existing funding streams. Additional funding to support a specific federal-to-federal support request may likely require implementation of the Economy Act or additional appropriations other than what is appropriated to operate existing department and agency programs.

Federal agencies called upon to provide supplemental capabilities or support will seek reimbursement from the primary agency and funding source through an interagency agreement under the Economy Act.

The Economy Act of 1932

The Economy Act of 1932, as amended, 31 U.S.C. § 1535, permits Federal Government agencies to purchase goods or services from other Federal Government agencies or other major organizational units within the same agency. An Economy Act purchase is permitted only if (1) amounts for the purchase are actually available, (2) the purchase is in the best interest of the Federal Government, (3) the ordered goods or services cannot be provided by contract from a commercial enterprise (i.e., the private sector) as conveniently or cheaply as could be by the Federal Government, and (4) the agency or unit to fill the order is able to provide or get by contract the ordered goods or services.

Defense Production Act

The Defense Production Act is the primary source of Presidential authorities to expedite and expand the supply of critical resources from the U.S. industrial base to support the national defense and homeland security. In addition to military, energy, and space activities, the Defense Production Act definition of "national defense" includes emergency preparedness activities conducted pursuant to Title VI of the Stafford Act; protection and restoration of critical infrastructure; and efforts to prevent, reduce vulnerability to, minimize damage from, and recover from acts of terrorism within the United States. The President's Defense Production Act authorities are delegated to the heads of various federal departments in Executive Order 13603.[43]

Highlights of Defense Production Act Provisions

The following bullets are highlights of the Defense Production Act.

- Authority to require acceptance and priority performance of contracts and orders to promote the national defense.
- Various types of financial incentives and assistance for industry to expedite production and deliveries or services under government contracts and to provide for creation, maintenance, protection, expansion, and restoration of production capabilities needed for national defense.

43 Executive Order 13603 of March 16, 2012: National Defense Resources Preparedness

- Antitrust protection for actions conducted in accordance with voluntary agreements among business competitors to enable cooperation to plan and coordinate measures to increase the supply of materials and services needed for national defense purposes.
- Authority to establish the National Defense Executive Reserve, a cadre of persons with recognized expertise for employment in executive positions in the Federal Government in the event of an emergency.
- A "voluntary agreement" is an association approved by the Federal Government and entered into freely by two or more representatives of industry, business, financing, agriculture, labor, or other private interests. The intent is to plan and coordinate measures to increase the supply of materials and services needed for national defense and homeland security purposes, including emergency preparedness and response activities.
- The Defense Production Act's priorities and allocations authorities can be utilized to ensure the timely delivery of resources required to meet national defense requirements, including emergency preparedness (Nuclear/Radiological Incident) and critical infrastructure protection and restoration activities. USDA, DOE, HHS, DOT, and the DOC have issued priorities and allocations regulations which can be used to prioritize contracts for food resources, all forms of energy, health resources, all forms of civil transportation, and industrial resources under each department's resource jurisdiction from the U.S. industrial base to meet national defense and emergency preparedness requirements of approved programs. The DOC has delegated authority to DHS/FEMA to place priority ratings on contracts for industrial resources to support DHS/FEMA's response efforts under emergency and non-emergency conditions.

Oversight, Coordinating Instructions, and Communications

Oversight

FEMA, in close coordination with the DHS Office of the Secretary and with the Federal Radiological Preparedness Coordinating Committee, is the executive agent for this annex and is responsible for its management and maintenance. This annex will be updated periodically, as required, to incorporate new presidential directives, legislative changes, and procedural changes based on lessons learned from exercises and actual incidents.

Coordinating Instructions

Radiological Data Sharing

The RadResponder Network

The RadResponder Network is the national standard and Whole Community solution for the management of radiological data. It is a product of collaboration between FEMA, DOE/NNSA, the EPA and states within the Conference of Radiation Control Program Directors).[44]

[44] Conference of Radiation Control Program Directors: an organization whose members represent state radiation protection programs. For more information, http://www.crcpd.org.

RadResponder is provided to all local, state, federal, tribal, and territorial response organizations and allows individual users to leverage information from across the nation to uniformly establish a flexible, efficient, and networked approach to radiological data management. RadResponder can be accessed on smartphones, tablets, and via the Web, allowing it to be seamlessly and rapidly employed at all levels of government during a response to a radiological or nuclear emergency. Partnership functions within the Network provide flexibility for organizations allowing them to manage how, with whom and when they share radiological data.

The entire RadResponder initiative adheres to the field data management protocols established by the FRMAC. Moreover, during a radiological and nuclear emergency all environmental data collected by organizations using the RadResponder Network can be quickly verified by the FRMAC to support rapid assessment and critical decision making.

Data Sharing[45]

A well-coordinated response in a nuclear/radiological emergency will be heavily dependent on quick and accurate data analysis across numerous responding organizations. Note that in the event of a nuclear detonation, communications and data sharing could be substantially impeded by the effects of the electromagnetic pulse.

- States have the authority to grant access to their data to other states. Data sharing among state programs can happen at any time.
- When a coordinated federal response is warranted (for a national-level incident), environmental data collected by state programs in RadResponder shall automatically be shared with federal response officials.
- Federal data should be shared with state and local governments in a timely fashion using RadResponder.
- Validated FRMAC and RadNet data should be shared promptly with state and local partners.
- RadResponder should never be locked or turned off during an incident; organizations should always be able to access their input data.
- Access to FRMAC information management systems (i.e., Consequence Management website and Radiological Assessment and Monitoring System) shall not be taken away in an emergency. Previously identified state radiation control program staff and other government emergency response partners need continuous access to view data streams and products.
- Data within FRMAC databases will always be made available to approved representatives of the response organizations responsible for public protection.
- Validated data collected during an emergency should be shared with key state partners with a caveat that it is not yet fully validated to facilitate quick emergency assessments.
- In order to provide confidence in the environmental data posted in RadResponder, each partner organization should provide quality assurance documentation (and/or refer to FRMAC field data collection protocols, which may ease interoperability).

[45] A committee of the Conference of Radiation Control Program Directors provided these data sharing recommendations.

- To account for variability in sample collection and analysis, confidence in data or data providers can be indicated by the organization's quality assurance documentation and a description of the sample collection and analysis protocols (geometry, standard operating procedures, meter type, count time). This will enable independent assessment by other organizations accessing the data. To be considered final, all data shared must have "approved" checkbox before using in products (like in FRMAC data sets and RadResponder).

Coordination with Infrastructure Owner/Operators

The following bullets provide examples of how the Federal Government can coordinate with infrastructure owner/operators.

- Federal agencies collect; share; and disseminate status updates on critical infrastructure operations, impact, and consequences and analysis and recommendations for restoring critical infrastructure in coordination with the DHS Office of Infrastructure Protection and relevant sector specific agencies.
- Coordinate support through public-private partnerships, associations, and contractual agreements in responding to and recovering from a disaster or emergency in collaboration with the appropriate sector-specific agency.
- The DHS Office of Infrastructure Protection Protective Service Advisors will provide visibility on the status of private sector–operated critical infrastructure, identify direct or cascading effects of private sector critical infrastructure failure, and coordinate with private sector partners to identify potential support requirements in order to ensure rapid stabilization and access to impacted private sector critical infrastructure.

Non-Governmental Organizations

The following bullets provide examples of how support nuclear/radiological operations.

- Voluntary Agency Liaisons coordinate federal support for non-governmental organizations' volunteers and programs and should:
    - Assess needs generated by the incident to coordinate the provision of timely and efficient services.
    - Coordinate with state agencies to determine the need for any federal resource requests for needed mass care items and help facilitate their deployment and arrival.
    - Determine federal support for state and local recovery efforts to include referrals for housing, unmet needs, case-management and referral services.

Communications (Telecommunications and Operational)

Immediate action should be taken to identify communication systems for public messaging to provide clear, factual, and timely guidance to the public. Communication systems for federal, state, and local agencies should coordinate to maintain situational awareness and permit timely assessments of the status of critical services, resources, and infrastructure. The primary reporting

method for interagency information flow is HSIN and WebEOC™. Each federal department and agency will use HSIN common operating picture for incident reporting.

FEMA's Integrated Public Alert and Warning System provides significant capability for public messaging including capability to broadcast an alert message to all cellular phones in a given area as a Wireless Emergency Alert, access to the Emergency Alert System, NOAA All Hazards Weather Radio network, and internet connected alerting tools.

Appendix 1: Assets, Resources, and Teams with Unique or Particular Capability for Nuclear/Radiological Incidents

Organization	Resource Name	Description
DHS (CBP Laboratories and Scientific Services)	Weapons of Mass Destruction Response Teams	Provides level "A" hazardous material technical response capabilities.
DHS (Domestic Nuclear Detection Office)	Joint Analysis Center: Collaborative Information System (JACCIS)	Provides federal, state, and local stakeholders adjudication connectivity; a detector database; and status information regarding the events and activities relating to radiological/nuclear detection and nuclear forensics. In this capacity, JACCIS maintains awareness of the Global Nuclear Detection Architecture, which involves facilitating alarm adjudication and monitoring global efforts in radiological/nuclear detection.
DHS (Domestic Nuclear Detection Office)	Mobile Detection Deployment Units	Developed to surge nuclear/radiological resources during National Special Security Events, Special Event Assessment Rating Level 1-4 events, and possible threat-driven surge operations based on Radiological Nuclear Search Operations as defined in the Interagency Domestic Radiological Nuclear Search Plan. Provides radiological/nuclear detection equipment capability that allows end users to screen, search, and detect radiological/nuclear materials.
DHS (Federal Protective Service)	Hazardous Response Program	Includes initial investigations of suspicious or threatening chemical, biological, radiological, nuclear, and explosive (CBRNE) incidents; conduction of CBRNE threat assessments; confirmations of unauthorized presence of CBRNE agents and materials; and the conduct of emergency operations. The Hazardous Response Program also provides evacuation support during CBRNE incidents; CBRNE mutual aid response through agreement; and training assistance. The program is compliant with OSHA and National Fire Protection Association guidance and regulations.
DHS (FEMA)	Radiological Operations Support Specialist Concept	Provides technical radiological/nuclear support to Incident Command at the state Emergency Operations Center level.
DHS (FEMA)	RadResponder Network	A free Cloud-based radiological/nuclear data collection; management; and analysis tool for local, state, federal, tribal, and territorial governments. Assists with radiological/nuclear incident characterization and situational assessment. Provides a common framework to rapidly and accurately collect, aggregate and share radiological monitoring and sampling data; manage specialized equipment and personnel; and track radiological response teams during an emergency. The RadResponder Network can be accessed on computers and smart phone/tablet devices.
DHS/FEMA, DOJ (FBI), DOD, HHS, EPA	Domestic Emergency Support Team (DEST)	A rapidly deployable, interagency team responsible for providing expert advice and support to the FBI Special Agent in Charge

Organization	Resource Name	Description
		concerning the Federal Government's capabilities in resolving a terrorist threat or incident.
DHS/FEMA	Interagency Modeling and Atmospheric Assessment Center (IMAAC)	Provides a single point for the coordination and dissemination of federal atmospheric dispersion modeling and hazard prediction products that represent the federal position during actual or potential incidents involving hazardous material releases. Through plume modeling and analysis, IMAAC provides emergency responders and decision makers with predictions of hazards associated with atmospheric releases to aid in protecting the public and the environment.
DOC/NOAA	Air Resources Laboratory (ARL)	Focuses its dispersion research on the development and improvement of sophisticated dispersion models and other tools for air quality and emergency response applications. This includes volcanic eruptions, forest fires, nuclear accidents, and homeland security incidents. ARL also designs and evaluates high resolution observing networks, develops instrumentation, and conducts tracer field studies to improve the accuracy of atmospheric transport and dispersion predictions.
DOD	CBRN Response Enterprise: Command and Control CBRN Response Elements (C2CREs)	DOD's two C2CREs are designed to be employed by USNORTHCOM or USPACOM in support of a federal response to a CBRN incident and are designed to provide incident commanders with the following capabilities: urban search and rescue, mass casualty decontamination, and emergency medical triage and stabilization. Additionally, the C2CREs may be able to support mission assignments in the functional areas of logistics, transportation, and CBRN assessment. C2CREs can easily scale down for incidents that do not require all resident capability sets.
DOD	CBRN Response Enterprise: Defense CBRN Response Force (DCRF)	DOD's DCRF is designed to be employed by USNORTHCOM or USPACOM in support of a federal response of a CBRN incident. Joint Task Force – Civil Support is the designated headquarters of the DCRF. This DCRF is designed to provide incident commanders with the following capabilities: Urban search and rescue, mass decontamination, emergency medical triage and trauma care (including limited surgical and intensive care), limited patient holding, and patient movement via both ground and rotary-wing MEDEVAC/CASEVAC. Additionally, the DCRF may be able to support mission assignments in the functional areas of logistics, ground/air transportation, site assessment, road clearing, and horizontal engineering. A health physicist from Air Force Radiological Assistance Team or another DOD organization will likely serve as an interface to the FRMAC and Advisory-Team (A-Team). The DCRF can easily scale down for incidents that do not require all resident capability sets. Furthermore, if additional assets are needed, DOD can request forces that are available and appropriate to support Lead Federal Agency requests for capabilities.
DOD	CBRN Response Enterprise: National Guard Teams	The CBRN Response Enterprise includes DOD teams designed to be employed as governor-controlled state capabilities. These teams consist of the following:

Organization	Resource Name	Description
		–Weapons of Mass Destruction Civil Support Teams (WMD-CSTs) – WMD-CSTs assess suspected WMD attacks or potential CBRN incidents, advise civilian responders on appropriate actions, provide expert medical and technical advice, and facilitate the arrival of additional State and Federal military forces. –CBRN Enhanced Response Force Packages (CERFPs) – CERFPs employ search and extraction, casualty decontamination, Fatality Search and Recovery Team (FSRT), and emergency medical triage and treatment capabilities to maximize the lifesaving response to a WMD attack or other CBRN incident. –Homeland Response Forces (HRFs) – HRFs contain the same core lifesaving capabilities as a CERFP (search and extraction, casualty decontamination, FSRT, and emergency medical triage and treatment) plus a casualty assistance support element (CASE).
DOD/Armed Forces Radiobiology Research Institute (AFRRI)	Medical Radio-Biology Advisory Team	Provides health physics, medical, and radiobiological advice to military and civilian command and control operations worldwide in response to nuclear and radiological incidents requiring a coordinated federal response. Through "reach back," the deployed team of radiation medicine physicians and senior health physicists can call on the knowledge and skills of radiobiologists, biodosimetrists, and other research professionals at AFRRI as well as those of other DOD response teams.
DOD (Defense Threat Reduction Agency)	CBRN Military Advisory Team (CMAT)	Provides a technical and scientific subject-matter-experts (SMEs), planners, and hazard prediction modeling support team to Federal Coordinating Agencies or their delegated representatives in response to catastrophic incidents involving WMD. The CMAT is a cadre of WMD response advisors, planners, and modelers that may include but are not limited to public affairs, legal advisors, radiation health physicists, and/or radiation physicians.
DOE (NNSA)	Aerial Measuring System (AMS)	Provides rapid assessment of radioactive contamination on the ground over large areas using highly sensitive detection systems mounted on fixed-wing aircraft and helicopters. AMS reach back provides external aerial assets the ability to collect data utilizing their own assets and have it analyzed via consistent and proven methods for interpretation.
DOE (NNSA)	Consequence Management Home Team	Provides ongoing analytical support to all NNSA consequence management assets once they are established at the incident location and to the federal, state, and local authorities supporting the event. Also provides analysis and interpretation of the initial release based on early data, map products, coordinates laboratory assets, and coordinates and provides situational awareness of NA-42 response teams en route to incident.
DOE (NNSA)	Consequence Management Response Team	Provides DOE/NNSA resources to establish and manage the FRMAC, including radiological monitoring teams, reach back capability, and infrastructure.

Organization	Resource Name	Description
DOE (NNSA), EPA, Others	Federal Radiological Monitoring and Assessment Center	Coordinates federal radiological monitoring and assessment activities with those of state and local agencies.
DOE (NNSA)	NARAC	Provides tools and services to the Federal Government that map the probable spread of hazardous material accidentally or intentionally released into the atmosphere. Also provides atmospheric plume predictions in time for an emergency manager to decide if taking protective action is necessary to protect the health and safety of people in affected areas.
DOE (NNSA)	Nuclear Radiological Advisory Team	Provides an emergency response capability for on-scene scientific and technical advice for both domestic and international nuclear or radiological incidents. It is led by a Senior Energy Official who runs the NNSA field operation and who coordinates NNSA follow-on assets as needed.
DOE (NNSA)	Nuclear Weapons Accident Response Group	Provides technical guidance and responds to U.S. nuclear weapons accidents. The team assists in assessing weapons damage and risk, and in developing and implementing procedures for safe weapon recovery, packaging, transportation, and disposal.
DOE (NNSA)	Radiological Assistance Program	First responder program for assessing and characterizing radiological hazards from nine regional offices at DOE sites throughout the United States. Each region has a minimum of three teams with a standard composition of eight personnel. Teams can be augmented with other specialists and will be tailored to the specific mission. The team conducts field monitoring and sampling measurements and provides radiological advice to protect the health and safety of responders and the public.
DOE (NNSA)	Radiation Emergency Assistance Center/Training Site (REAC/TS)	Treatment, evaluation, and medical consultation for injuries resulting from radiation exposure. Focused on home team to provide reach back capability but includes a small deployable contingent. When Stafford Act is declared, REAC/TS will be doing their work in coordination with ESF #8.
DOJ (FBI)	Evidence Response Team Unit (ERTU): Hazardous Evidence Response Team (HERT)	Provides training, leadership, and subject matter expertise in hazardous evidence collection, as well as in the management and processing of forensic evidence in CBRN crime scenes. ERTU also provides coordination and oversight for operational response and activities of FBI field office HERTs.
DOJ (FBI)	FBI WMD Coordinator	The FBI has a WMD Coordinator assigned to each of its field offices. WMD Coordinators are responsible for managing the office's WMD program and serve as the point of contact for emergency responders and public health at the state and local level in the event of a threat or incident potentially involving a WMD. In the event of such an incident, the WMD Coordinator serves as a conduit for obtaining federal assistance for operational response direction and threat evaluation support.

Organization	Resource Name	Description
DOJ (FBI)	Weapons of Mass Destruction Strategic Group	FBI-led interagency coordination mechanism to address the U.S. Government response to a terrorism incident involving radiological or nuclear threats to include the identification and deployment of specialized interagency elements used to support the Radiological Nuclear Search Operations in locating, identifying, and interdicting the threat.
EPA	Airborne Spectral Photometric Environmental Collection Technology (ASPECT)	The ASPECT aircraft is managed by EPA's CBRN Consequence Management Advisory Team and provides remotely sensed chemical/radiological (gamma and neutron) data and imagery (situational awareness). It can identify, quantify, and map chemical plumes and ground-based radiation. It is also capable of collecting high-resolution digital photography and video products. Data products are transferred to ground base support within minutes of collection through satellite communications, while in flight.
EPA	CBRN Consequence Management Advisory Team (CMAT)	Provides scientific and technical support for all phases of environmental response to a CBRN incident, including health and safety site characterization, environmental sampling and analysis, environmental monitoring, risk assessment building and structure decontamination, waste treatment environmental cleanup, and clearance; manages the EPA's ASPECT fixed-wing aircraft, which provides chemical/radiological data; deploys and operates ground-based characterization and mapping capability for radiological incidents (CMAT Asphalt).
EPA, Integrated Consortium of Laboratory Networks (ICLN)	Environmental Response Laboratory Network	Provides capability to perform routine and emergency radio analysis of environmental samples.
EPA	Environmental Response Team	Provides scientific and technical expertise, including health and safety, environmental sampling, air monitoring, toxicology, risk assessment, waste treatment, contaminated water/scientific divers; and site decontamination and remediation; provides field-analytical and real-time air monitoring with the EPA mobile laboratories known as Trace Atmospheric Gas Analyzers.
EPA	National Criminal Enforcement Response Team	Provides technical, safety, hazardous evidence collection, and other forensic support to law enforcement in the event of a weapon of mass destruction terrorist attack or environmental catastrophe.
EPA, DOE, DOD, DHS (USCG)	On-Scene Coordinators for oil and hazardous materials consequence management	On-Scene Coordinators coordinate the on-scene tactical response to oil and hazardous materials incidents. Actions include assessment of the extent and nature of environmental contamination; assessment of environmental cleanup options; and implementation of environmental remediation, including decontaminating buildings and structures and management of wastes. For nuclear/radiological incidents, USCG provides the federal On-Scene Coordinator for incidents in certain areas of the coastal zone, and EPA provides the federal On-Scene Coordinator for incidents in the inland zone and in other areas of the coastal zone.

Organization	Resource Name	Description
EPA, DHS (USCG)	National Strike Force Strike Teams	The National Strike Force (NSF) provides highly trained, experienced personnel and specialized equipment to Coast Guard and other federal agencies to facilitate preparedness for and response to oil and hazardous substance pollution incidents in order to protect public health and the environment.
EPA	Radiation Task Force Leaders (RTFLs)	A sampling and monitoring force multiplier comprised of EPA Response Support Corps members based throughout EPA's Regions and Labs. The RTFLs are specially trained EPA personnel who will lead small teams of personnel in performance of tasks including field radiological measurements, contamination monitoring, soil sampling, air sampling, decontamination line setup and support, radiological control area support, and dose management support.
EPA	RadNet	Monitors the nation's air, precipitation, and drinking water to track radiation in the environment. RadNet sample testing and monitoring results show the fluctuations in normal background levels of environmental radiation. The RadNet system will also detect higher than normal radiation levels during a radiological incident. During a radiological incident, officials use RadNet data to help make science-based decisions about protecting the public. Scientists use RadNet air monitoring data to help estimate the potential radiation dose to people.
EPA	Radiological Emergency Response Team	Provides advice on protective measures to ensure public health and safety; assessments of dose and impact of release to public health and the environment; monitoring, sampling, laboratory analyses, and data assessments to assess and characterize environmental impact; and technical advice and assistance for containment, cleanup, restoration, and recovery.
EPA	Radiological Environmental Assessment Equipment	Sample preparation trailers and mobile laboratories carry electrical generators and supplies for approximately one week; not applicable for other assets
HHS	Radiation Emergency Medical Management (REMM)	Provides guidance for health care providers and primarily physicians about clinical diagnosis and treatment of radiation injury during radiological and nuclear emergencies; provides just-in-time, evidence-based, usable information with sufficient background and context to make complex issues understandable to those without formal radiation medicine expertise; provides web-based information that is also downloadable in advance so that it would be available during an emergency if the internet is not accessible.
HHS (Assistant Secretary for Preparedness and Response)	Radiation Injury Treatment Network (RITN)	A memorandum of understanding exists between the HHS/Assistant Secretary for Preparedness and Response and the National Marrow Donor Program on behalf of the RITN to utilize expertise available at bone marrow transplant and cancer centers for the treatment of victims of radiation exposure.

Organization	Resource Name	Description
HHS (CDC/Agency for Toxic Substances and Disease Registry)	Rapid Response Registry Team	Enrollment forms give local and state entities a tool to register responders and other persons exposed to chemical, biological, or nuclear agents from a disaster. The enrollment form is a two-page form that can be distributed on paper or electronically. It can be implemented quickly to collect information rapidly to identify and locate victims and people displaced or affected by a disaster.
HHS (CDC)	Strategic National Stockpile Agents for Nuclear/Radiological Incidents	National repository of antibiotics, chemical antidotes, antitoxins, life support medications, IV administration, airway maintenance supplies, and medical/surgical items. Nuclear/radiological-specific resources include chelating agents (Calcium and Zinc Diethylentriamene pentaacetate), Prussian Blue, and Growth Factors/Cytokines for White Blood Cells.
HHS (CDC/NIOSH)	Emergency Responder Health Monitoring and Surveillance (ERHMS) guidance and tools	The ERHMS system is a health-monitoring and surveillance framework that includes recommendations and tools specific to protect emergency responders during all phases of a response, including pre-deployment, deployment, and post-deployment phases. The intent of ERHMS is to identify exposures and/or signs and symptoms early in the course of an emergency response, prevent or mitigate adverse physical and psychological outcomes, ensure workers maintain their ability to respond effectively and are not harmed during response work, evaluate protective measures, and identify responders for medical referral and possible enrollment in a long-term health surveillance program.
HHS Assistant Secretary for Preparedness and Response (ASPR)	Disaster Mortuary Operational Response Team (DMORT)-WMD	A DMORT is equipped for processing of human remains that have been contaminated with hazardous chemicals, radiation, or biological agents. The team can be deployed in response to a weapon of mass destruction incident. Team composition is similar to a standard DMORT except for the addition of hazardous materials/weapons of mass destruction mitigation capability for remains. Unlike standard DMORTs, the DMORT-WMD maintains a specialized equipment cache and a number of support vehicles.
HHS (ASPR)	Tactical Medicine Resources	HHS's Office of Emergency Management's Tactical Programs Division, Tactical Medicine Branch has the capability to provide direct operational medical support (Low Signature/Footprint Medical Capability, High Threat/Risk Medical Response), as well as Tactical Medical Education, Law Enforcement (LE) Medical Direction, LE Liaison/Force Protection Coordination, and Medical Consultation.
HHS (ASPR)	CBRNE Advisory Resource Teams	Produce immediate response informational and guidance products for distribution; can provide decision support, and deploy subject matter experts or liaisons to regional incident operations centers to provide front-line CBRNE medical and public health information and decision support and reach-back to additional SME's.
NRC	Protective Measures Team (PMT)	Advises the NRC Operations Center on the potential consequences of an event, the status of protective actions underway, and any conditions that might impede necessary protective actions. The PMT consists of health physicists, engineers, response specialists, and communicators from throughout the NRC. There are PMTs for

Organization	Resource Name	Description
		reactor incidents, fuel facility incidents, and nuclear materials and transportation incidents to implement NRC response as necessary.
NRC	Reactor Safety Team (RST) or Fuel Cycle Safety Team (FCST)	Performs an independent assessment of facility conditions to provide the NRC Operations Center with a clear understanding of the significance of the event and the possible sequence of future events. Advises on any facility condition that could affect public health and safety or threaten the environment. These teams consist of specialists and engineers with a wide range of technical expertise, communications skills, and ability to perform complex tasks. To support reactor assessments, the RST utilizes the Emergency Response Data System to display real-time plant parameters. Both teams communicate with licensee communicators, resident inspectors, and with NRC regional counterparts.
NRC	Site Team	Implements the NRC on-scene primary authority role. Serves as the NRC's eyes and ears on site allowing a firsthand assessment of the situation and face-to-face communications with all responding organizations. Acts as the coordinating agency representative for significant incidents at NRC-regulated facilities.
U.S. Department of Veteran's Affairs	Medical Emergency Radiological Response Team (MERRT)	The MERRT responds to radiological disasters that require medical assistance and/or radiological decontamination of victims. The MERRT provides medical assistance including direct patient treatment, assisting and training local health care providers in managing, handling, and treatment of radiation-exposed and contaminated casualties; assesses the impact on human health; and provides consultation and technical advice to local, state, and federal authorities. When Stafford Act is declared, MERRT will be doing their work in coordination with ESF #8.
EPA, USCG, DOJ, DOE, DOL/OSHA, USDA, DOS, DOD, NOAA, DOT, FEMA, HHS, GSA, DOI, and the NRC	National Response Team (NRT)	The U.S. NRT is an organization of 15 federal departments and agencies responsible for coordinating emergency preparedness and response to oil and hazardous substance pollution incidents. The NRT provides technical assistance; resources; and coordination on preparedness, planning, response, and recovery activities for emergencies involving hazardous substances, pollutants and contaminants, hazardous materials, oil, WMD destruction in natural and technological disasters, and other environmental nationally significant incidents. The EPA and the USCG serve as chair and vice chair respectively. The National Oil and Hazardous Substances Pollution Contingency Plan, 40 CFR part 300 outline the role of the NRT and Regional Response Teams.
World Health Organization	Biodosimetry Network (BioDoseNet)	Global network of biodosimetry laboratories whose role is to support management and decision making in cases of large radiation emergency events where the capability of individual laboratory is likely to be overwhelmed. In preparedness for such events, the BioDoseNet focuses on harmonization of methodology, quality assurance, knowledge sharing, and intercomparison exercises.

Appendix 2: Data and Models to Support Nuclear/Radiological Response and Recovery

An act of nuclear terrorism, such as detonation of an improvised nuclear device (IND), in an American city would cause widespread devastation. The immediate nuclear blast from a 10-kiloton bomb would catastrophically damage an area up to one to two miles in diameter with very high fatalities. Surrounding areas with less severe damage would be contaminated with radioactive fallout exposure for the following 24 hours as a plume of radioactive material spreads over a large area. An electromagnetic pulse could potentially disrupt communications and electricity far beyond the blast zone.

The radiation profile and scale of the event are dependent on the specific scenario, but other radiological release incidents could cause similar contamination, if not the same degree of widespread destruction. For example, a dirty bomb or explosive radiological dispersion device (RDD) involves a smaller explosion with radiation spread closer to the ground, but would retain high levels of radiation for longer periods of time over a smaller area. The event would only be identified as involving radioactivity following detection because the explosion would not be characterized by the canonical mushroom cloud of a nuclear detonation. A radiological release from a nuclear power plant, either accidental or intentional, would be characterized by a radiological plume with a different radioisotope signature released over a much longer period of time and spread in a weather-dependent pattern.

Each type of event—intentional or accidental—will require a different response. An IND is likely to cause destruction on a scale many times that of any event previously experienced in the continental United States and is expected to immediately overwhelm emergency management efforts. Little would be immediately known about the precise composition of a device, and subject matter experts will be required to interpret post-event sampling data. Furthermore, conditions will change rapidly during the first week.

A nuclear or radiological terrorism event (IND or RDDs) would create a large crime scene with law enforcement collecting evidence and working to balance evidence preservation and public safety. Models and data collected post-event will be used to determine if access to the impacted area is restricted for public safety, for responder safety, or to preserve evidence. Some information will have limitations on who can access it. The results of some IND event characterization and consequence models are classified, which could cause challenges for effective information sharing within the broader emergency management community.

This appendix is focused on the datasets and models used to guide response for nuclear detonation scenarios. However, many of the models and datasets useful for IND detonation response operations may be useful for other types of radiation release. Some information will have limitations on who can access it. The results of some models are classified, which could cause challenges for effective information sharing. The datasets and models useful for operational decision making are described in this appendix; the utility of each for different types of nuclear or radiological release events is highlighted where applicable.

Figure 4 describes how information is processed and transformed over several iterations of data collection and modeling or analysis to address specific issues associated with a large-scale radiological or nuclear event.

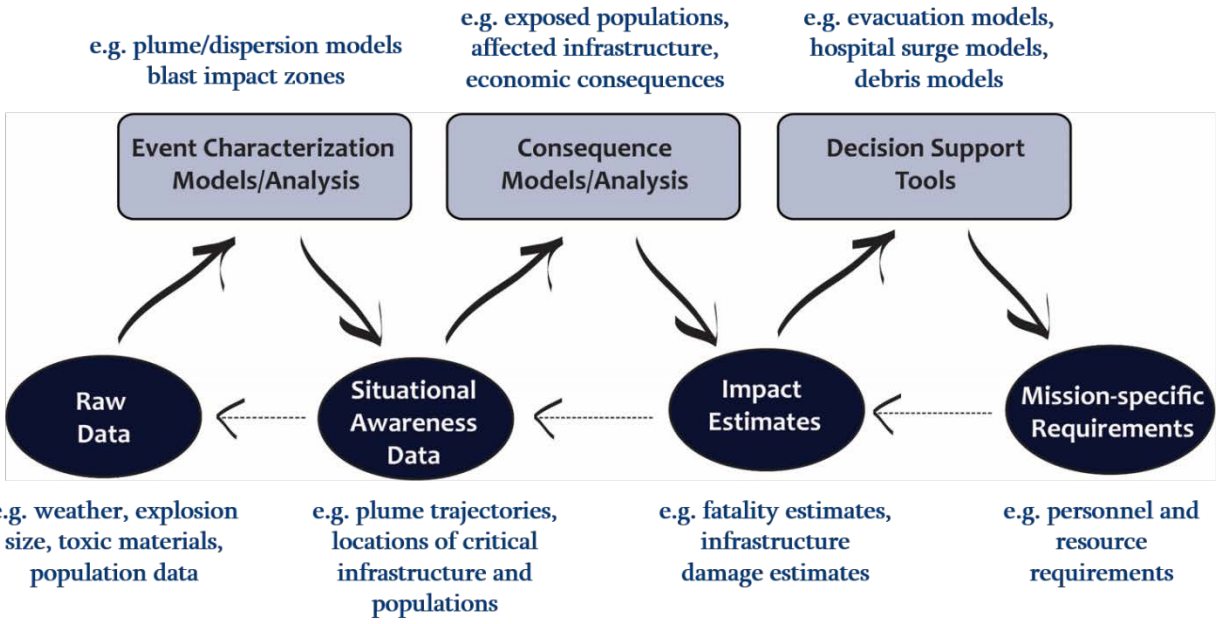


Figure 4: Flow of Information as Data Are Processed to Inform Emergency Management Efforts

In the following sections, specific models and datasets are identified and described with respect to how they meet IND emergency response data requirements. Some of these models will be run by subject matter experts in dedicated modeling centers while some are available to the end user to operate on their smartphone. An explanation of who has access and is expected to run or analyze each type of data or model is described.

Phase 1 – Normal Operations or Elevated/Credible Threat

During normal operations, plans should be developed using this appendix and the Modeling and Data Inventory as resources.

The models and datasets described in this document are specifically those that would be used following an IND detonation. The Modeling and Data Inventory[46] can be used to identify technical contacts for the models in order to request assistance in compiling impact libraries for planning documents. By looking up the Modeling and Data Inventory entry for the models/datasets identified in this document, one can click the "Related Models/Datasets" button to access additional models developed for research and planning. This will allow for identification of models that serve analogous functions: for example, a research tool that can be

[46] http://gis.fema.gov/Model-and-Data-Inventory

used for planning that is analogous to a model run by subject matter expert during event. All relevant models/datasets can be browsed by applying a hazard filter for nuclear detonation and then examining each category of model/dataset (raw data, event characterization, situational awareness, consequence models, impact estimates, decision support tools, and mission-specific requirements).

The Modeling and Data Inventory includes all-hazards models/datasets automatically, even when a hazard-specific filter is applied. Additional filters can be selected to identify models that fulfill particular aspects of planning needs (e.g., filter by Emergency Support Function or by keyword).

Destruction and radiation spread pattern will depend on the location and size of an IND, making it impossible to consider all possible IND sizes and plume trajectories. Still, general planning factors can be considered in advance for detonation in a central location and, for example, for INDs ranging from 0.1 to 10 kilotons. Extensive collaboration with subject matter experts from the agencies and national laboratories who developed them and from other consulting experts will be essential in developing these regional plans.

Interagency Modeling and Atmospheric Assessment Center

The Interagency Modeling and Atmospheric Assessment Center (IMAAC) is mandated as the coordinating body for atmospheric plume modeling for radiological and nuclear incidents. The IMAAC is tasked with requesting and validating the plume model outputs and disseminating those validated results to the interagency in a standardized format within 30 minutes of the event. The outputs released by the IMAAC can then be used to guide protective actions (shelter or evacuation) and emergency management operations for the incident. Standardized IMAAC modeling and analysis products are available for shelter and evacuation strategies/protective action guidelines, guidance for responder exposure by geographic region, casualty estimates, estimated percentages of major injuries and burns, and blast effects including degree of damage to buildings by type of construction. The National Atmospheric Release Advisory Center (NARAC) has primary responsibility for modeling atmospheric releases for nuclear and radiological events. During an event, the IMAAC automatically distributes results to the NARAC, along with interpretations, explanations, and non-technical summaries.

If law enforcement or other intelligence information indicates a probability of an IND attack, then the Department of Homeland Security or the Federal Bureau of Investigation will carry out their respective roles to take a lead role in potential interdiction and initial response. It is anticipated that the same models/datasets and key modeling centers will be used in a similar sequence, as outlined in Phase 2a, Initial Response for all events including a no-notice event. A no-notice event will eventually provide predictive modeling using any available intelligence information as inputs.

Phase 2a. Initial Response

Characterize the Event: Identify What Happened

RadResponder

All pre-established partnerships will have access to this event and additional organizations can be rapidly added. During a Stafford Declaration, all cooperating federal partners will be incorporated into the RadResponder Event Space. RadResponder incorporates nuclear/radiological data and IMAAC models into a mapped database. RadResponder will be useful during an IND or other radiological response to provide real-time data to decision makers. Data can be collected using the RadResponder Website, smartphone/tablet applications, fixed monitoring stations, and any other integrated equipment, networks, or systems.

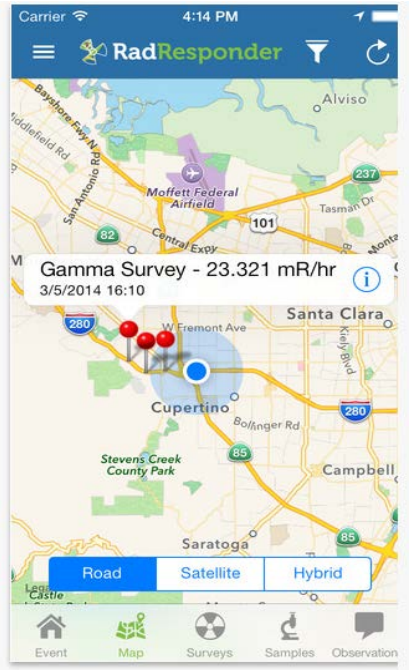


Figure 5: Screenshot with Examples of Radiation Measurement Data Available with the RadResponder website

Source Region Electromagnetic Pulse Targeting Applications and Electromagnetic Pulse Response

Communication following an IND detonation will be disrupted by an electromagnetic pulse (EMP) and the nuclear explosion. EMP is a product of nuclear detonation and does not occur during other radiological events. During an exercise or event, two models may be used to make predictions for the damage caused by EMP: (1) Source Region Electromagnetic Pulse Targeting Applications and (2) Electromagnetic Pulse Response.

Source Region Electromagnetic Pulse Targeting Applications predicts the magnitude of an electromagnetic pulse following an IND and estimates effects on susceptible infrastructure. Source Region Electromagnetic Pulse Targeting Applications is a research tool and should be used as part of pre-event planning. In an actual event, information about electromagnetic pulse consequences on select equipment will be available from the Defense Threat Reduction Agency through reach-back support for the Electromagnetic Pulse Response Model and distributed with IMAAC analysis within 30 minutes. If access is available, the Electromagnetic Pulse Response Model can also be accessed through the DHS Standard Unified Modeling, Mapping, and Integration Toolkit platform.

National Atmospheric Release Advisory Center Modeling System

The IMAAC will support event characterization and the initial guidance for the response by dissemination of the NARAC models within 30 minutes of the detonation. This model will define the areas that should be considered for protective actions based on federal guidance and includes evacuation along with other recommendations. The NARAC will estimate the scale of damage caused by an IND detonation and predict initial trajectory information for the radioactive plume. An example of this product is shown in **Figure 6**. IMAAC analysis products are available through HSIN and naracweb on the llnl.gov website, both of which require prior access requests.

Access and contact information are available in the Modeling and Data Inventory; see the "How do I get it?" shortcut for the NARAC Modeling System.

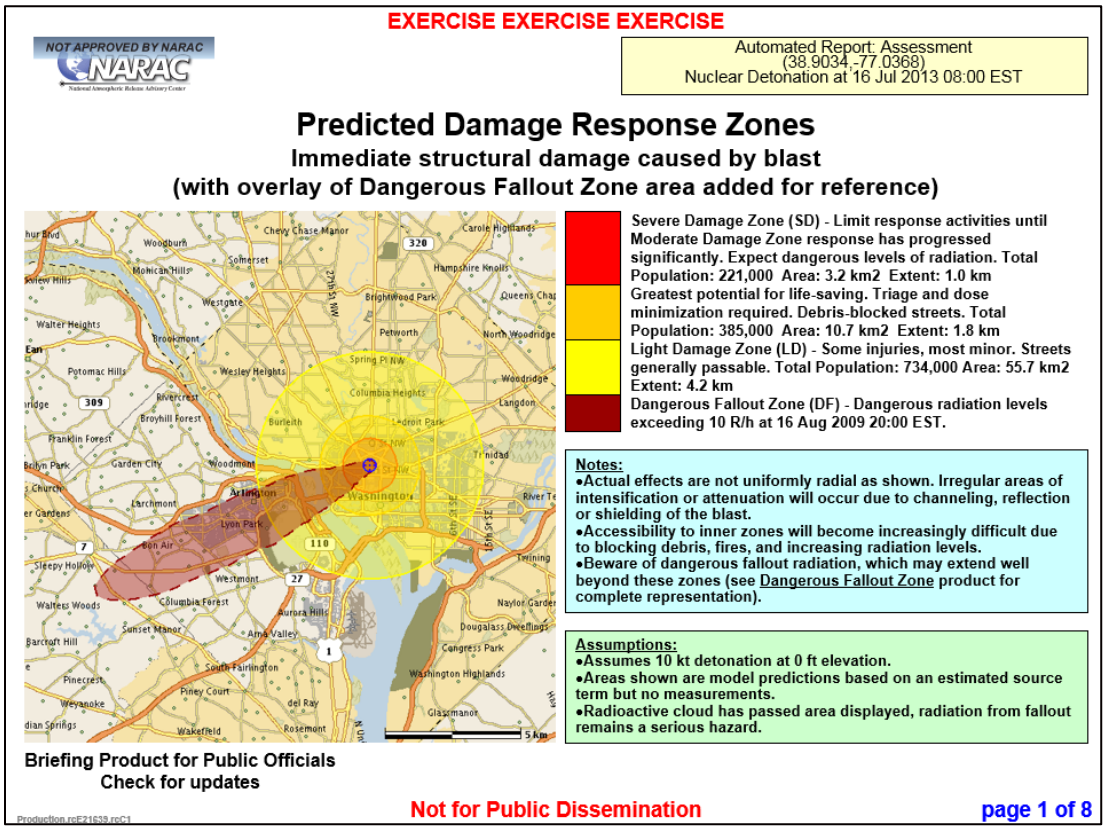


Figure 6: NARAC Analysis Summary for Predicted Damage Zones Integrated with Plume Trajectory to Predict the Dangerous Fallout Zone

Real-time data measuring the radiation levels on the ground and in the atmosphere become available in the hours following the detonation. The data is collated and processed by the FRMAC using TurboFRMAC, a computer based application, and the results are supplied to IMAAC to refine the outputs of the NARAC modeling system and accompanying IMAAC summary analysis products. This analysis continues iteratively throughout the response.

Collect Real Time Radiation Measurements and Update Modeling

Federal Radiological Monitoring and Assessment Center, Aerial Measuring System, Radiological Assessment and Monitoring System, and TurboFRMAC

The Federal Radiological Monitoring and Assessment Center (FRMAC is responsible for collating radiation measurements from various sources and recording those data in the Radiological Assessment and Monitoring System, a data management system managed by the Department of Energy/National Nuclear Security Administration (DOE/NNSA). RadResponder data is included in this data set.

As soon as possible following the release, the FRMAC will incorporate radiation readings taken by aircraft from DOE/NNSA (Aerial Measuring System), Environmental Protection Agency (EPA) (Airborne Spectral Photometric Environmental Collection Technology), or state and local responders. The FRMAC will integrate aerial monitoring data along with RadResponder data, EPA's RadNet monitoring system, and other measurements and runs a suite of models including TurboFRMAC model to assess the impacts of the release. These collated data and additional analysis from FRMAC are provided to state and local responders to be used to develop protective actions and by the IMAAC to provide updated models and more detailed guidance. As sufficient data about the radiation release becomes available, these updates will provide fatality estimates and refine evacuation recommendations to include non-life threatening consequences, such as reducing radiation exposure to minimize the potential increase cancer risk.

Define Evacuation Strategies and Issue Guidance

The IMAAC provides comprehensive analysis regarding life-threatening radiation levels and matches this to shelter evacuation guidance for particular regions to reduce exposure (**Figure 7**), but it does not supply the evacuation procedure itself. Based on data supplied by IMAAC, each region, referring to protective action recommendation areas, should be considered to determine whether more protection is provided by sheltering or evacuation. This should be informed by understanding of regional shelter quality determined during normal operations planning and general knowledge of evacuations in that region. Two models, NUclear EVacuation Analysis Code and Real Time Evacuation Planning Model, are available to analyze specific evacuation strategies with consideration to specialized plume, debris, and time-dependent radiation hazards associated with an IND.

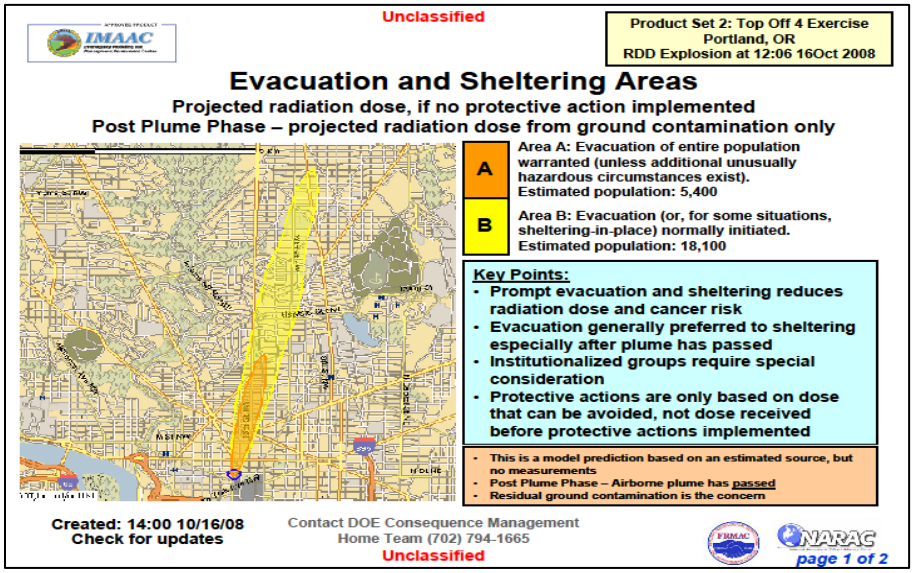


Figure 7: Interagency Modelling and Atmospheric Assessment Center Analysis Summary to Guide Shelter and Evacuation Based on Projected Radiation Exposure

NUclear EVacuation Analysis Code

The NUclear EVacuation Analysis Code model is only available through subject matter experts located at Sandia National Laboratories – Systems Research and Analysis. Current technical contact information is available in the NUclear EVacuation Analysis Code entry in the Modeling and Data Inventory; the model does not have a real-time contact. NUclear EVacuation Analysis Code outputs can automatically integrate over the NARAC Modeling System plume maps and are designed to provide sheltering and evacuation guidance following detonation of an IND. The program analyzes information about the total radiation dose to which evacuees will be exposed based on a combination of initial sheltering and subsequent evacuation routes so that the timing and route can be optimized (**Figure 8**). Practical considerations of whether the population receives and heeds evacuation instructions, whether evacuation routes are clear of debris, and whether evacuees are able to find and follow the safest routes will still impact the final success of the evacuation and are not considered by the model directly. Nevertheless, NUclear EVacuation Analysis Code is critical for integrating the unique time-dependent effects of radiation exposure and plume movement. Since multiple strategies can be considered, it also enables evacuation plans to be rapidly updated as information about real-time conditions becomes available.

Figure 8: Examples of NUclear EVacuation Analysis Code Analysis Outputs. Left: Example of Three Potential Evacuation Routes with an Overlay of Time-Dependent Radiation Exposure Resulting from Use of Each Route. Right: Analysis of the Decrease in Fatality Probability Afforded by a Departure 3 Hours Later Than the Reference Strategy. (From Sandia National Laboratories)

Communicate Evacuation Guidance

Disaster Information Reporting System

The U.S. Federal Communications Commission's Disaster Information Reporting System (DIRS) will be the best tool to understand the actual impacts to the communications system post-event. The DIRS is a voluntary program, supported by a web-based system, where communications companies, including wireless, wireline, broadcast, and cable providers, report the status of communications infrastructure and possible impacts to customers. The data is available through DIRS as soon as a Disaster entry is created. Examples of communications network outages provided through DIRS are telecom switches, Public Safety Answering Points (i.e., 911 Centers), wireless cell sites, broadcast stations, wireline users, and broadband users.

Refine Analysis of What Happened and Prioritize Decontamination and Cleanup

Initial predictions about radiation exposure levels, as produced by the IMAAC, can be used to guide how long responders can safely operate in particular areas. This guidance is largely determined by comparing model outputs for radiation levels with radiation exposure guidelines originally developed for other purposes. **Figure 9** shows a sample IMAAC product with integrated NARAC Modeling System and the EPA Protective Action Guides Manual guidelines.

Decontamination and disposal of radioactive waste will be a long-term process, ongoing throughout recovery, but it will also be an urgent consideration. Access to the damage zones requires the displacement and removal of contaminated debris to make roads passable and remove hazards from response areas. Debris removal will require safe disposal and decontamination efforts, which can be guided by two resources: Incident Waste Assessment and Tonnage Estimator and Waste Estimation Support Tool. Neither of the tools require specific

subject matter expertise or special computing resources for use, but both require advanced access and experience to operate effectively.

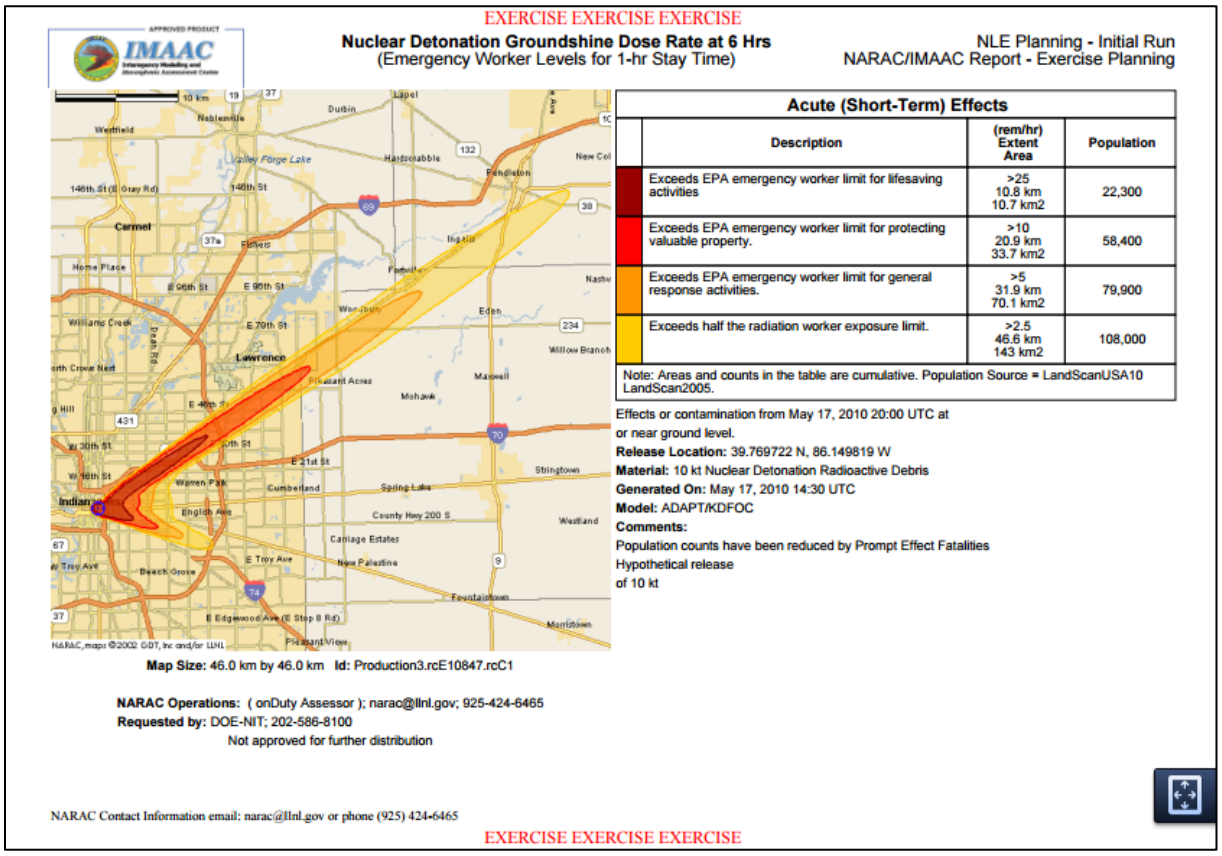


Figure 9: Mapped Dose Estimation from IMAAC to Guide Safe Deployment of Response Workers[47]

Incident Waste Assessment and Tonnage Estimator

The Incident Waste Assessment and Tonnage Estimator provides comprehensive information on the handling, transporting, decontaminating, and disposing of contaminated waste and debris. This includes calculations of waste quantity and guidelines to protect the workers who will handle it. Incident Waste Assessment and Tonnage Estimator was developed to support many types of hazardous waste, but does specifically address radioactive contamination. Incident Waste Assessment and Tonnage Estimator requires a prior access request and then the user can access this suite of resources from the website http://www2.ergweb.com/bdrtool (as of July 2015) and a technical contact is available via the website.

Waste Estimation Support Tool

The RDD Waste Estimation Support Tool is a planning tool for estimating the volume and radioactivity levels of waste generated by a radiological incident (especially RDDs) and determining subsequent decontamination efforts. Though not developed for INDs, the Waste Estimation Support Tool can still be useful. The Waste Estimation Support Tool allows users to

[47] Official plots are those stating "FRMAC Approved."

evaluate various decontamination/demolition strategies to examine the impacts of those strategies on secondary waste generation (e.g., estimating the amount of debris produced by demolitions). The Waste Estimation Support Tool is run from the user's computer after downloading the necessary software from http://cfpub.epa.gov/si/si_public_record_report.cfm?dirEntryId=246738 (as of June 2015) and a technical contact is available via the website.

Phase 2b. Deployment

The initial response to an IND or other radiological incident will primarily focus on evaluating shelter/evacuation strategies to save lives and gathering situational awareness. IMAAC updates will continue throughout the event as FRMAC and IMAAC continue to incorporate additional radiation measurements and update models and guidelines.

Define Medical Response and Prioritize Patient Care and Transport

An IND detonation will cause widespread injuries ranging from minor cuts from broken glass to complex cases of trauma combined with radiation exposure. An IND also has the potential to destroy local medical treatment capability and capacity. The following tools have specific utility for medical response logistics and diagnosis, but each also provide important information useful in conducting the overall emergency response following an IND and other radiological incidents.

National and International Integrated Catastrophic Health Event Preparedness and Response System

The National and International Integrated Catastrophic Health Event Preparedness and Response System is a web-enabled decision support tool providing comprehensive estimation of medical supply and staff needs as well as patient evacuation planning. The System combines the output of accepted interagency models, scientific research, and published planning guidance to generate time-phased response requirements. The System requires a request for access that can be completed on its website. The website links to the Modeling and Data Inventory.

Radiation Emergency Medical Management

Radiation Emergency Medical Management (https://remm.hhs.gov/) provides guidelines and information for patient triage and treatment following a nuclear or radiological incident, including management and treatment of combined physical injuries and radiation exposure (e.g., decontamination of open wounds or burns plus high radiation exposure). The Radiation Emergency Medical Management website maintained by the Department of Health and Human Services contains many specific tools very focused on health care professionals in addition to useful general resources to understand different types of radiological incidents and how radiation injuries and illness result from exposure and contamination. This information is useful for first responders and anyone working to develop a better understanding of the health consequences of radiological events. The tool is open access; a link is available in the Modeling and Data Inventory.

Phase 2c: Sustained Response

Initially, the IMAAC will continue to provide guidance for those areas that contain dangerously high radiation levels. Some areas distant from that detonation that were initially evacuated may be safe enough for people to return. Resources to initiate larger cleanup efforts will be considered as the response continues. While some of the models were originally developed for other incident types, many will be useful for planning sustained recovery efforts after an IND detonation or other radiological incident.

Decide When Some People Can Return to Affected Areas

Reentry (temporary access) and return are informed by Operational Guidelines with stay times dependent on reentry tasks and site-specific conditions (Operational Guidelines, Group D). Stay times are the amount of time a person may access the contaminated area. These times vary based upon site-specific factors or incident characteristics such as indoor or outdoor work, sensitive populations and level of radioactivity. Section 7.1 of the Operational Guidelines, "Worker Access to Businesses for Essential Actions," provides tables and graphs of stay times at various limiting concentrations that may apply to individuals retrieving belongings from homes or to workers providing security patrols or even to people reopening businesses in the area. As contamination levels are reduced during cleanup, stay times can be extended and total doses reduced. Community members will influence decisions such as if and when to allow people to return home to contaminated areas. There will be people living in contaminated areas, outside the evacuation and relocation zones, where efforts to reduce exposures will be ongoing.[48]

Preliminary Remediation Goals Calculator

Radionuclide Preliminary Remediation Goals are radionuclide exposure concentrations that the EPA has developed to prevent harm from long-term radiation exposure. Using exposure assumptions and EPA toxicity data, the Preliminary Remediation Goals Calculator generates target radionuclide concentrations, which can be used as site cleanup goals for areas that have been contaminated with radionuclides. After the detonation of a RDD or IND, the Preliminary Remediation Goals Calculator can be used with site-specific data to ensure cleanup actions are targeted according to priorities. The Preliminary Remediation Goals Calculator is open access and available at http://epa-prgs.ornl.gov/cgi-bin/radionuclides/rprg_search/ (as of July 2015).

Residual Radioactivity Model Family

The Residual Radioactivity Model Family has codes used to develop cleanup and decontamination criteria for residual radioactive material and to assess its associated radiation dose or risks. The models compute soil cleanup guidelines using dose- or risk-based cleanup standards. They can be used to predict annual doses or lifetime risks to workers or members of the public resulting from exposures to residual radioactive material in soil. (The models predict concentrations of radionuclides in various media resulting from residual radioactivity in soil.)

[48] Operational Guidelines (DOE 2009) as in Sections 3.7 and 3.8 of the Protective Action Guides Manual (EPA 2013)

The model suite is limited access and requires prior request for access, but is designed to be run by a skilled end user following an event.

Phase 3: Recovery

The scale of an IND detonation and the long-term contamination characteristics of radiation will extend the recovery phase into years. Recovery will require much of the same information as response; many of the same datasets and models will be useful. In the recovery phase, additional cleanup is targeted to areas that were either not a priority within the first days or were identified as initially too contaminated to remediate immediately post-event. Over time, the same response resources are used to determine whether populations closer to the detonation site can safely return.

Additional Mission Models Available for All-Hazards

Mission models support specific Emergency Support Functions during an event to provide estimates of material and personnel requirements. Since mission models often use information about an event's impacts as input to estimate the response assets needed to address those impacts, they can be used as soon as sufficient data are available to provide as inputs. Key mission models specifically relevant to an IND or radiological release event are outlined below where appropriate for response operations. The complete list of mission models identified that are available to support nuclear/radiological response operations are presented in **Table 2**.

Table 2: Additional Mission Models

Emergency Support Function	Models/Datasets	Model/Data Owner	Description
#1 – Transportation	NUclear EVacuation Analysis Code (NUEVAC)	Sandia National Laboratories	Calculates timing for evacuations and sheltering, including evaluation of shelters, run by subject matter expert
#2 – Communications	Disaster Information Reporting System (DIRS)	Federal Communications Commission	Reports communications infrastructure status
	Source Region Electromagnetic Pulse Targeting Applications (SREMTAPS)	Defense Threat Reduction Agency	Predicts scope of electromagnetic pulse from an IND on electrical and communications infrastructure
	Electromagnetic Pulse Response (EMPREP)	Defense Threat Reduction Agency	Predict size and strength of electromagnetic pulse and effects on a limited suite of electronic equipment
#3 – Public Works and Engineering	Debris Model	FEMA	Cost of debris removal
	Incident Waste Assessment and Tonnage Estimator (I-WASTE)	EPA	Comprehensive contaminated waste calculation and decision support tool
	Waste Estimation Support Tool (WEST)	EPA	Calculates total contaminated waste post radiological release or RDD (not IND) based on different decontamination methods
#4 – Firefighting	None		n/a

Emergency Support Function	Models/Datasets	Model/Data Owner	Description
#5 – Information and Planning	GeoPlatform	FEMA	FEMA situational awareness viewer
#6 – Mass Care, Emergency Assistance, Temporary Housing and Human Services	National Mass Evacuation Tracking System (NMETS)	FEMA	Evacuee tracking and management system
	National Shelter Strategy (NSS)	FEMA	Shelter amenity and capacity data
	Emergency Support Function #6 Mass Care Calculator	FEMA	Estimates emergency meal/water requirements, shortfalls, and costs
#7 – Logistics	Logistics Supply Chain Management System (LSCMS)	FEMA	Tracks meals, blankets, and water supplies in near real-time
	Deployment Tracking System (DTS)	FEMA	Tracks locations/availability of disaster assistance employees in near real-time
	Emergency Support Function #7 Calculator	FEMA	Calculates resources needed to transport water/meals from distribution centers to incident location
#8 – Public Health and Medical Services	MedMap/GeoHEALTH	HHS	HHS situational awareness viewer for health-specific incident and facility data during an event
	BARDA-ADS	HHS	Modeling Tool for IND and Radiation countermeasures
	Radiation Emergency Medical Management (REMM)	HHS	Calculate rad dose from time of symptom onset, numerous tools for triage and treatment
#9 – Search and Rescue	National Geospatial Intelligence Agency (NGA) Atlas	NGA	Hazard-specific maps and data from the NGA designed for FEMA USAR teams
#10 – Oil and Hazardous Materials	Incident Waste Assessment and Tonnage Estimator (I-WASTE)	EPA	Guides decisions on how to decontaminate or safely transport contaminated waste
	Waste Estimation Support Tool (WEST)	EPA	Calculates debris estimates for contaminated waste that must be moved
#11 – Agriculture and Natural Resources	None		n/a
#12 – Energy	Environment for Analysis of Geo-Located Energy Information (EAGLE-I)	DOE	DOE situational awareness viewer for energy system infrastructure and status
#13 – Public Safety and Security	Specialized Hazard Assessment Response Capability (SHARC)	Sandia National Laboratories	Render safe activities for RDD and IND
#15 – External Affairs	None		n/a

Appendix 3: Training to Support Nuclear/Radiological Response and Recovery Incidents

Misperceptions and a lack of knowledge about radiation and its effects can create confusion and mistrust within the general public, with emergency responders, and even among officials who have a responsibility to provide for an effective response to a nuclear or radiological incident.

This appendix provides training resources, for the groups mentioned above, available through both public and governmental web sites that can promote a better understanding of radiation hazards that could commonly result from the type of nuclear and radiological incidents covered in this document. All of this training could be useful in preparation for operations to respond to, and recover from, these incidents either in a real-world scenario or through preparedness exercises.

Below is a listing of websites that provides training opportunities related to nuclear or radiological emergency preparedness. This is not an all-inclusive list but a starting point on available training.

https://www.fema.gov/training-radiological-emergency-preparedness

http://training.fema.gov/apply/

http://www.ritn.net/

http://www.acq.osd.mil/ncbdp/narp/Functional_Areas/Training_and_Certification_Standards.htm

http://www.wood.army.mil/newweb/chemical/

https://dnws.abq.dtra.mil

http://www.ctosnnsa.org/pages/courses/courses_online.htm

http://www2.epa.gov/emergency-response/chemical-biological-radiological-and-nuclear-consequence-management

https://cdp.dhs.gov/training/courses/rero

https://www.radresponder.net/

http://www.osha.gov

Branch 1: Federal Response to and Recovery from Deliberate Nuclear/Radiological Attacks

Situation

This branch plan will address the unique nature of deliberate nuclear/radiological attacks.[49]

Purpose

This branch plan provides scenario-specific supplemental information to the Nuclear/Radiological Incident Annex Base Plan. Federal interagency partners can respond in a lead role or in support to state and local governments to save lives, protect property and the environment, and meet basic human needs when there is a threat of or an actual deliberate attack involving nuclear/radioactive material.

Scope

This branch plan applies to all federal responses to deliberate nuclear/radiological incidents, regardless of size or complexity, unless otherwise noted.[50] Several variations of a radiological/nuclear incident are addressed. The main focus is on a no-notice surface burst[51] IND detonation with a yield of 10 kilotons[52] in a Tier 1 Urban Area Security Initiative City, where the need for immediate federal and state assistance is obvious, resource pre-positioning is not possible, and the exact nature of resource and asset requirements is not known. Other deliberate nuclear/radiological incidents are noted throughout this branch plan.

Improvised Nuclear Device Attack

An improvised nuclear device (IND(is composed principally of sufficiently pure fissile material, usually uranium-235 or plutonium-239, engineered in such a way that when detonated, it releases significant amounts of energy, creating a shock (pressure) wave, intense heat and light, and a cloud of radioactive material, also known as fallout. INDs are improvised in the sense that the nuclear material is stolen and then assembled in a makeshift fashion. The damage and deaths associated with an IND will vary according to the technical skills of the perpetrators, its detonation location, the level of shielding in an urban environment, and building construction materials. Most damage and deaths are likely to be centered nearest the detonation point, and injuries (e.g., burns, blindness, radiation injuries and lacerations) will occur among people farther away. Many injuries within a few kilometers will be caused by the pressure wave. The

[49] Includes radiological/nuclear materials and devices deliberately being imported, possessed, stored, transported, developed, or used without authorization by the appropriate regulatory authority.
[50] This branch plan does not address acts of nuclear war.
[51] Surface burst – A nuclear weapon explosion that is close enough to the ground for the radius of the fireball to vaporize surface material. Fallout from a surface burst contains very high levels of radioactivity.
[52] Kiloton – The energy of an explosion that is equivalent to an explosion of 1,000 tons of TNT. One kiloton equals 1 trillion calories.

largest feasible yield of an IND is estimated to be between 1 to 10 kilotons of equivalent conventional explosives.

A nuclear detonation produces effects that are overwhelmingly more significant than those produced by a conventional explosive, even if the nuclear yield is relatively low. A nuclear detonation differs from a conventional explosion in several ways. A nuclear detonation that occurs on the Earth's surface or at a height of burst low enough for the primary effects to cause damage to surface targets:

- Produces energy which, pound for pound, is much more powerful than that produced by conventional explosives;
- Instantaneously produces a very large and very hot nuclear fireball;
- Instantaneously generates an electromagnetic pulse that can destroy or disrupt electronic equipment;
- Transmits a large percentage of energy in the form of heat and light within a few seconds that can produce burns and ignite fires at great distances;
- Emits highly penetrating prompt nuclear radiation (defined as that radiation emitted within the first minute, although intense radiation will continue to be emitted after one minute) that can be harmful to life and damaging to electronic equipment;
- Creates, if it is a surface or near-surface burst, a shock wave that can destroy underground structures;
- Emits residual nuclear radiation over an extended period of time; and
- Can provide extended interference with communications signals.

The response to an IND is unique compared to most other radiological and nuclear incidents. In particular, actions like prompt evacuation and a focus on mass decontamination common to nuclear power plant emergency response must be replaced with actions including prompt sheltering after the blast, evacuation only after fallout has decayed 12 to 24 hours, self-decontamination, and registration of exposed people in an effort to estimate dose. In addition, an IND is likely to result in very high casualties, and the response will rapidly outstrip available resources because of the magnitude of the incident, significant number of casualties and displaced people, and complications of destruction of critical infrastructure.

Attack Involving an Explosive Radiological Dispersal Device

A radiological dispersal device (RDD) is any device that intentionally spreads radioactive material across an area with the intent to cause harm, without a nuclear explosion occurring. A RDD that uses explosives for spreading or dispersing radioactive material is called an "explosive RDD." Media, government, and others use the term "dirty bomb" as a well-known, non-technical term for an explosive RDD. Another RDD is the deliberate dispersal of radioactive materials into the air or water by mechanical means. Non-explosive RDDs could spread radioactive material using common items such as pressurized containers, fans, building air-handling systems, sprayers, crop dusters, or even spreading by hand. The harm caused by a RDD is principally radioactive contamination, the public's fear of radioactive contamination, and denial of use of the contaminated area, perhaps for many years.

For an explosive RDD, the explosion adds an immediate threat to human life and property. Most RDDs would not release enough radiation to kill people or cause severe illness—the

conventional explosive itself would be more harmful to individuals than the radioactive material. However, depending on the situation, an explosive RDD could create fear and panic, contaminate property, and require potentially costly remediation. Making prompt, accurate information available to the public may prevent the panic sought by terrorists.

The extent of local contamination would depend on a number of factors, including the size of the explosive, the amount and type of radioactive material used, the means of dispersal, and weather conditions. Those closest to the RDD would be the most likely to sustain injuries due to the explosion. As radioactive material spreads, it becomes less concentrated and less harmful. Prompt detection of the type of radioactive material used will assist local authorities in advising the community on protective measures such as sheltering in place or quickly leaving the immediate area.

An explosive RDD is in no way similar to a nuclear weapon or nuclear bomb. A nuclear bomb creates an explosion that is hundreds to millions of times more powerful than that of a RDD. The cloud of radiation from a nuclear bomb could spread tens to hundreds of square miles, whereas an explosive RDD's radiation could be dispersed within a few blocks or miles of the explosion. Some types of radiation can be readily detected with equipment already carried by many emergency responders. The primary hazard from a RDD is trauma from the conventional explosion itself. Immediate health effects from radiation exposure would likely be minimal following dispersion; prior to dispersion, the device might present a substantial radiation hazard on par with a radiological exposure device (see Attack Involving a radiological exposure device [RED] below), depending upon the amount of device shielding. Medical care for those suffering trauma from the blast should never be delayed or impeded because of radiation concerns. Subsequent decontamination of the affected area may involve considerable time and expense.

Attack Involving a Radiological Exposure Device

A RED is also sometimes called a "hidden sealed source." A RED is a terrorist device intended to expose people to significant doses of ionizing radiation without their knowledge. Constructed from partially or fully unshielded radioactive material, a radiological exposure device could be hidden from sight in a public place (e.g., under a subway seat, in a food court, or in a busy hallway), exposing those who sit or pass close by. If the seal around the source were broken and the radioactive contents released from the container, the device could become a RDD, capable of causing radiological contamination.

The dangers of a RED depend on the type and amount of radioactive material, how long people were near the device, and what parts of their bodies were exposed. People exposed to high levels of radiation could develop symptoms of acute radiation syndrome,[53] or could develop radiation burns. Health effects may take hours, days, or weeks to appear. These effects range from mild to severe effects such as death or cancer. Some people may not experience any health effects.

[53] A serious illness caused by receiving a dose greater than 75 rads of penetrating radiation to the body in a short time (usually minutes). The earliest symptoms are nausea, fatigue, vomiting, and diarrhea. Hair loss, bleeding, welling of the mouth and throat, and general loss of energy may follow. If the exposure has been approximately 1,000 rads or more, death may occur within 2 to 4 weeks. For more information, see CDC's fact sheet "Acute Radiation Syndrome" at http://www.bt.cdc.gov/radiation/ars.asp.

The occurrence or threat of multiple or successive RED incidents may significantly reduce the size, speed, and depth of the federal response. If deemed necessary or prudent, the Federal Government may reduce the allocation of finite resources when multiple venues are competing for the same resources.

Hostile Action on a Nuclear Power Plant

Most of the response to a hostile action, a deliberate attack at a nuclear power plant, involving a radiological release will be consistent with a response to an inadvertent release. If the incident involves suspected federal crimes, including those concerning terrorism, the FBI will lead and coordinate the law enforcement response and investigation. By policy, there is a presumption of terrorist threat for all weapons of mass destruction incidents. However, hostile action will require increased coordination with the FBI as the terrorism lead to support and coordinate counter measures, investigation, and other protection and prevention core capabilities as needed. Well-armed and well-trained security personnel who remain ready to respond to an attack 24 hours a day, 7 days a week provide physical security at nuclear power plants. Sensitive intrusion detection equipment, fences, and barriers all of which are monitored by cameras and security patrols protect the sites. Recovery from a hostile action may require coordination of victims' benefits and services with other response and recovery programs and services.

Attack on a Nuclear Material Transport

The Secure Transportation Asset program is a National Nuclear Security Administration (NNSA) Direct Federal Program (government-owned and operated). Its mission is to provide a capability for the safe and secure transport of nuclear warheads, components, and special nuclear material that meets projected NNSA, Department of Energy (DOE), Department of Defense (DOD), and other customer requirements. These shipments are highly guarded for the utmost protection of the public and U.S. national security. The federal agents who do this work are trained to defend, recapture, and recover nuclear materials in case of an attack. The Secure Transportation Asset program is also involved with international shipments to and from Canada, the United Kingdom, and France.

The U.S. Air Force and U.S. Navy have the authority and the responsibility to ensure the safety and security of DOD nuclear weapons and nuclear weapons components in their custody during transportation. The U.S. Air Force, U.S. Navy, and U.S. Marine Corps security forces assigned to nuclear weapons security duty are trained to defend, recapture, and recover nuclear weapons components in case of an attack.

Attack on a Nuclear Weapons Facility

The mission of the DOE/NNSA Nuclear Counterterrorism Incident Response program is to ensure that capabilities are in place to respond to DOE/NNSA facility emergencies or to any nuclear or radiological incident within the United States or abroad. The Nuclear Counterterrorism Incident Response program also provides operational planning and training to counter both domestic and international nuclear terrorism. The Nuclear Counterterrorism Incident Response program administers and directs DOE/NNSA emergency response programs that provide the capability to respond to and mitigate the effects of a nuclear or radiological incident or emergency.

Attack Using a Stolen Nuclear Weapon

It is highly unlikely that a group of terrorists could steal, much less use a nuclear weapon to produce a nuclear detonation. To function, warheads require unique electrical signals to be input through unique electrical circuits. If terrorists do not have the required equipment or lack the technical knowledge about the specific electrical signals required, they will not be able to get the warhead to function. If terrorists take the weapon apart without the required unique tools and technical knowledge, it is likely that they would destroy key weapon components, making the weapon unusable. If terrorists use explosives in an attempt to produce a nuclear detonation, they will most likely fail, but might scatter the weapon's nuclear materials, causing a radioactive hazard to the immediate area and downwind. While this type of event might cause casualties, its effects will be significantly less than a nuclear detonation. If nuclear detonation were somehow achieved, the results would be consistent with those of an IND, further complicating response.

Facts, Planning Assumptions, and Critical Considerations

Facts

The following facts pertain to IND attacks:

- The large number of casualties and requirements for immediate shelter to protect from fallout followed by orderly evacuation (when it is safe to do so), adequate triage and casualty assessment, and, and medical care will quickly overwhelm any city or state.
- The complexity and scope will require an extraordinary level of intergovernmental coordination of medical response, health care, emergency services, law enforcement, criminal investigation, protective activities, emergency management functions, and technical expertise.
- There will be extended elevated radiation levels, damaged buildings, downed power lines, ruptured gas lines, hazardous (perhaps airborne) chemicals, sharp metal objects, broken glass, and fires.
- Radiation exposure rates in dangerous fallout areas can reach hundreds if not thousands of rad/hour and may deliver fatal doses in a relatively short period of time (minutes to hours).
- Certain rescue, trauma care, environmental assessment, and law enforcement operations will need to occur in contaminated environments.
- Critical infrastructure damage will be heavy, i.e., roads impassable, bridges destroyed, communications and electricity distribution systems heavily damaged and inoperable.

Planning Assumptions

The following planning assumptions pertain to IND attacks, and are supplemental to the assumptions listed in the Base Annex:

- **Public Preparedness**: Public education on protective actions and response activities prior to an IND attack and prompt messaging after an attack occurs will minimize the unnecessary loss of life. Failure to inform the public immediately after an attack will result in the unnecessary loss of life. Public messaging issued by local authorities

immediately after the incident, instructing shelter in place for 12 to 24 hours and "get inside, stay inside, and tune in" will be essential to saving and sustaining lives.

- **Responder Preparedness**: Federal agencies and all response organizations at all levels are responsible for ensuring the safety and health of their own response and recovery workers (including contract workers), including for decision making and implementation of protective actions. Federal employers must be prepared before a nuclear/radiological incident by ensuring that their workers have received training about how to protect themselves when responding to such an event; workers have and can properly use appropriate personal protective equipment; and medical monitoring, medical examination, and fit testing programs are in place.[54]
- **Radioactive Fallout**: Fallout from airborne radioactivity will leave radioactive contamination that persists after plume passage. Contamination and radiation concerns will impact all aspects of the response. Not all areas with blast damage will be contaminated by fallout, and fallout will affect areas that are otherwise undamaged by the blast. The plume may be in a different direction than prevailing ground winds, necessitating immediate atmospheric modeling to project fallout zones.
- **Dangerous Fallout Zone**: The dangerous fallout zone may extend 20 miles or more downwind, but rapidly diminishes in size (radiation levels) over the first 12 to 48 hours. Those not taking immediate inside sheltering within the dangerous fallout zone may receive acute exposure to radiation at harmful levels.
- **Response Timeline**: Emergency response is principally a local function. Federal assistance will be mobilized as rapidly as possible; however, for purposes of this document, no significant federal response is assumed for at least 24 hours. Robust and significant federal response assets will not arrive for at least 72 hours.
- **Federal, State, and Local Government Response Delays**:
  - Command and coordination of initial response actions will be delayed due to a lack of degraded communications capability, situation awareness, and a common operating picture.
  - Government decision-making ability will be initially paralyzed as government(s) seeks surviving officials with decision-making authority.
  - Loss of communications and power will disrupt state and local government functions.
  - Availability and deployment will vary depending on asset status, political decisions, infrastructure availability, etc.
  - Adequate federal and state resources (personnel, equipment, commodities, and materiel) capable of safe and efficient operations will require several hours of activation, staging, and deployment prior to the commencement of tactical operations.
- **Reduced Response Capability within Damage and Fallout Zones**: The Severe Damage Zone[55] will experience catastrophic damage, have very dangerous radiation levels, and likely have few if any survivors; therefore, response to the Severe Damage Zone is contraindicated. Response capability in the Moderate Damage Zone will be extremely limited to reporting and immediate local efforts because of structural damage, casualties, road blockages, and equipment failures. Casualties, debris, abandoned vehicles, and evacuee traffic will hinder response capability in the Light Damage Zone.

[54] http://erhms.nrt.org
[55] Damage and fallout zones are defined in more detail in Section 7.2

Response capability in the fallout and dangerous fallout zones will be restricted by exposure guidance and shelter-in-place instructions.

- **Martial Law**: The President of the United States will not declare martial law.
- **All-Hazards Approach**: The response will be based on an all-hazards approach but will include additional response resources unique to a nuclear/radiological response.
- **Transportation Closures**: Ports, airports, and some rail lines will be closed for at least 24 hours as part of post-incident prevention and protection measures.
- **Medical Monitoring**: The incident will require a national effort to identify the self-evacuated public and refer them for medical follow-up.
- **Fatality Management**: Extensive decedent recovery actions will be required within the incident site, the fallout zone, hospitals, alternate care sites, and mass care and residential locations where exposed people will succumb. Most of the accessible fatalities early in the incident will not be contaminated. There is a limited national capacity for large-scale contaminated decedent management. The numerous decedents resulting from an IND incident will require a regional and national approach.
- **Long-Term Recovery**: Recovery of the impacted area will take years.
- **Contamination Control**: Self-evacuating personnel will originate from or transit through contaminated zones, bringing contamination with them into previously uncontaminated areas.
- **Medical Resources**: Surviving local medical resources will be insufficient to deal with casualties, necessitating a robust regional support capability and capacity, likely followed by a substantial federal medical response.
- **Public Health and Medical Support**: Behavioral health services, as well as the need for medical countermeasures to address radiation exposure and traumatic injuries, are a significant public health and medical need. Behavioral health services will be a complex need for casualties, emergency responders, and family members looking for unaccounted individuals.

Critical Considerations

The following critical considerations pertain to IND attacks:

- **Fallout Risk**: The most hazardous fallout particles are readily visible as fine sand-sized grains. However, the lack of apparent fallout should not suggest the lack of radiation; therefore, appropriate radiation monitoring should always be performed to determine the safety of an area. Fallout arrives and begins degrading within 15 minutes to 2 hours. Dangerous fallout can persist for up to 24 to 48 hours or more.
- **Shelter-In-Place Messaging**: The most effective lifesaving opportunities for response officials in the first 60 minutes following a nuclear detonation will be the decision to safely shelter people in possible fallout areas. Because of the unique nature of radiation dangers associated with a nuclear detonation, the most lives will be saved in the first 60 minutes through sheltering in place.
- **Self-Decontamination**: Self-decontamination by brushing off or changing clothing and showering or bathing is the only way to decontaminate the large number of people in this scenario in order to limit radiation dose quickly. Dose from fallout contamination may be life threatening and should be removed promptly. Personnel movement or evacuation to

mass monitoring and decontamination facilities may pose greater risk than self-decontamination when sheltered in place.

- **Public Decontamination:** State and local officials retain primary responsibility for public monitoring, screening, and decontamination operations. The materials generated from these actions would be considered a medical and/or radiological waste. Emphasis prior to and following an IND incident should be on self-decontamination because federal resources will not be readily available to provide monitoring and decontamination. Emergency Support Function #8 can provide technical assistance regarding how they can expand their capability to meet their decontamination requirements.
- **Combined Injuries**: Blast, thermal, and radiation injuries in combination will result in worse prognoses for patients than only sustaining one independent injury. For this reason, and to limit the drain on scarce medical resources, triage protocols must be adjusted and triage systems must be established to account for these unique injury/illness patterns. The Radiation Triage, Transport, and Treatment System is a functional systems approach that accounts for the unique health issues, large numbers of casualties, and limited medical resources and should be used at all levels to maximize lives saved.[56]
- **Evacuees with Access and Functional Needs**: When radiation levels allow, transportation resources will be required to evacuate certain segments of the population (e.g., individuals with access and functional needs, individuals in institutionalized settings, individuals experiencing homelessness, people without personal transportation and, animals, including household pets and service animals with their owners).
- **Waste Management:** Cleanup of the most contaminated areas will not be feasible in the near term. For an IND attack, different remediation strategies may be needed for blast zones and fallout zones. Infrastructure may be damaged and contaminated. There may be limited waste management options. There is limited national capacity for large-scale contaminated waste transport, storage, and disposal; waste management for larger scale incidents may require regional and national approaches and facilities. Because of the limited options, pre-incident waste management plans need to be prepared ahead of time for nuclear/radiological incidents.
- **Secondary Device Threat**: An initial IND attack occurring with or without advanced warning may be followed by a second attack. This will diminish local and national mutual aid capabilities and reduce available federal assets to the primary response.
- **Immediate Public Information**: There will be an immediate need to inform the public on the situation and what protective actions to take; however, the capability to communicate emergency alerts and public messages will be limited due to the effects of the detonation (e.g., electromagnetic pulse, destruction of transmit capabilities).
- **Operating in Damage Zones**: There is limited federal capability to operate within the damage zones. In the first 72 hours, federal response in the Moderate Damage Zone will be extremely limited, and most response in all zones will be local or regional.
- **Simultaneous Mission Requirements**: Multiple interagency missions (e.g., Counterterrorism, Defense, Continuity, Response, and Recovery) will occur simultaneously.
- **Limited Capacity to Support Deployments**: There is limited federal capacity (e.g., military air support) to support the deployment requirements of multiple missions.

[56] https://remm.hhs.gov/RTR.html

- **Responder Access**: Access by first responders to critical areas will be difficult to impossible in the first few hours due to radiation dose rates, traffic accidents, blast effects, and uninformed evacuation.
- **Host State Resources:** Neighboring and host states may withhold emergency services resources to ensure that sufficient capability exists to secure their own jurisdictions. Other states may not honor Emergency Management Assistance Compact requests.
- **Situational Awareness:** An IND attack will result in prompt and delayed radiation effects, along with cascading impacts, which may restrict access to the immediate area, prolong reporting, and delay situational awareness.
- **Radiation or Nuclear Detonation Safety and Health**: An IND attack will create a massive hazardous materials site with multiple potential exposure issues beyond radiation.
- **Public and Private Capacity**: A nuclear incident is likely to exceed all public and private capabilities and assets and create prioritization challenges for resource allocation.
- **Source Region Electromagnetic Pulse**: An electromagnetic pulse will cause extensive disruption and damage to communications, computers, and other essential electronic equipment. Equipment brought in from unaffected areas should function normally but only if communications towers and repeaters remain functioning.
- **Devastated Infrastructure**: An IND attack will cause devastation of critical infrastructure and will disrupt nodes used for information collection (e.g., assessments, monitoring), delaying the delivery of timely information.
- **Communications Infrastructure Impacts**:
  - Limited resources and mobility within the impacted area may hinder attempts to repair and reestablish communications.
  - Wireless communications transmissions will be disrupted or degraded in the hours following a detonation due to electromagnetic pulse or the presence of ionizing radiation.
  - Increased national concerns may quickly exceed the designed bandwidth of communications systems, especially in the affected area, causing voice and data congestion.
  - Damage to the communications infrastructure and/or the electrical grid may limit the effectiveness of equipment brought in from unaffected areas.
- **Mass Evacuation Challenges**: Spontaneous mass evacuations may overwhelm shelter and healthcare services and resources and possibly result in contamination of general population shelter facilities. While primarily a state and local responsibility, federal support may be required for large-scale evacuations, organized or self-directed, that may occur. There may also be a need for evacuation of large numbers of people, including patients in local hospitals, nursing homes, and extended care facilities as well as those with special needs, household pets, and service animals, out of the impacted area to safe areas in other states. Significant transportation and shelter coordination and resources may be required. There is likely to be significant shortage of response and casualty and/or evacuee reception capabilities throughout the impacted area. Impassable roads will severely inhibit the delivery of resources to the impacted area. Airborne transportation should be considered.
- **Community Reception Centers**: Community reception centers for population monitoring and community reception centers for mass care and shelter are distinct and

complementary operations that specialize in specific components of the response effort. Community reception centers for population monitoring services include contamination screening, decontamination, registration, and limited medical evaluation. Community reception centers for mass care and shelter provide temporary housing, security, food service, health and behavioral health services, ongoing health surveillance, and other similar services. Community reception centers should be equipped to manage household pets and service animals that arrive with their owners. Closer into the center of the incident, screening centers with decontamination facilities may be co-located with community reception centers for mass care. In receiving cities, robust community reception center operations for population monitoring will be conducted.

- **Proactive Response**: Notification and full coordination with states occur, but the coordination process should not delay or impede the rapid mobilization and deployment of critical federal resources.
- **Incident Condition:** Normal procedures for Emergency Support Functions may be expedited or streamlined to address the magnitude of urgent requirements of the incident. All Emergency Support Functions must explore prioritization to maximize utilization and efficiency of limited resources.

In response to an IND detonation, it is expected that the Federal Government or other national entities will provide expedited assistance in one or more of the following areas:

- **Public Information**: When state and local public communications channels are overwhelmed, the Federal Government must immediately provide resources to assist in delivering clear, coherent, and consistent public information guidance and messages. Every effort will be made to communicate to survivors, but the ability to do so will likely be severely compromised by degraded public communications
- **Environmental Assessment**: An IND detonation will create significant environmental contamination, resulting in the immediate need to generate information on environmental contamination levels to support emergency decision making to ensure both public and responder protection. In addition, environmental decontamination and remediation needs for buildings, critical infrastructure, and other areas will overwhelm state and local capabilities.
- **Public Health and Medical Support**: There is a significant need for public health and medical support, including behavioral health services. Medical and behavioral health support is required at medical facilities, casualty evacuation, embarkation, debarkation, reception points, shelters, and other locations to support field operations. In addition, contamination increases the requirement for technical assistance/resources.
- **Life-Sustaining Support Challenges**: The ability to support the provision of temporary shelter, food, emergency first aid, and other essential life support to people, household pets, and service animals in the affected area may be complicated by contaminated resources or facilities and impact the ability to quickly transport resources into the area.
- **Law Enforcement**: In all suspected nuclear and radiological terrorist incidents, the Federal Bureau of Investigation (FBI) will lead and coordinate the law enforcement and investigative response. Operational coordination with the FBI On-Scene Commander is critical to risk informed operations and decisions across the response and prevention communities.

- **Food Supply Protection**: Immediate actions will be needed to control the movement of elements of the food supply, including livestock, poultry, crops, and processed food, ensuring that no unsafe product reaches consumer markets.

Mission

The primary mission outlined in this branch plan is to save lives; protect the health and safety of the general population, response and recovery workers, and the environment; restore critical infrastructure capacity; re-establish an economic and social base; and support community efforts to overcome the physical, psychological, and environmental impacts of a deliberate nuclear/radiological attack.

End State

Achieving the desired end state of response and recovery operations to an IND detonation occurs when—

- All necessary lifesaving and life-sustaining assistance has been provided.
- Federal, state and local governments can meet the needs of citizens.
- Coordination among federal, state, local, territorial and tribal law enforcement has been achieved and maintained until the nuclear/radiological threat is resolved.
- Environmental impacts are minimized.
- Infrastructure capacity has been restored.
- Public safety and health protection messaging has been conducted.
- Response and recovery worker safety and health protection assurances have been made.
- Measures are in place to enable and restore commercial activity to meet the demand of the population.
- Contaminated waste is effectively managed, transported, contained, and/or disposed.
- Processes are in place to support potentially multi-year fatality management efforts.
- Displaced populations have returned or relocated to permanent housing.
- Long-term public health monitoring and behavioral health programs are in place.
- Successful recovery, as defined by the impacted communities and states, is achieved.
- Nationally, healthcare systems are fully engaged and systems are in place to ensure adequate care for all casualties and other evacuees.

Execution

The DHS Improvised Nuclear Device Strategy[57] identified seven key required capabilities as critical to an effective IND response and recovery operation:

- Manage the Response
- Characterize the Incident
- Mass Evacuation/In-Place Protection

[57] DHS Improvised Nuclear Device Strategy, 2010.

- Medical Triage
- Provide Casualty and Evacuee Care
- Stabilize and Control Impacted Area
- Perform Site Recovery and Restore Essential Functions

In response to an IND detonation, immediate priority must be given to addressing self-decontamination and shelter-in-place messaging to affected populations to save lives. Immediate removal of contaminated clothing, showering, and staying indoors will have the greatest impact on the health of affected populations in the first 24 hours. Immediate response actions must focus on—

- Delivering shelter-in-place messaging
- Delivering self-decontamination messaging
- Identifying operating communications systems
- Coordinating messaging with state and local officials

The response to an IND detonation will, generally speaking, result in an emergency that will overwhelm state and local capabilities and will require a Whole Community approach. An IND will cause mass casualties, high levels of radiation, widespread structural and infrastructural damage, displacement of people, traffic jams, and other obstacles to response. FEMA will not wait for a disaster declaration before activating all Emergency Support Functions and positioning federal capabilities; however, federal asset engagement will be conducted in concert with and at the request of the state and local authorities that will retain leadership of response operations.

The Federal Government response includes coordination of resources and some teams to support the following state and local priorities:

- Incident characterization
- Additional public messaging (e.g., health and safety information, evacuation process, response progress, etc.)
- Evacuation operations
- Mass casualty care and patient evacuation
- Search and rescue operations
- Security/law enforcement operations
- Fire control
- Contaminated agricultural and animal control

Operational Phases – Radiological Incident

Operational phases for the response to and recovery from a radiological/nuclear incident vary based upon the size, scope, and complexity of the incident. While focused on an IND incident, these phases are applicable to other deliberate attacks. The operational phases identified in the Response and Recovery Federal Interagency Operational Plans serve as the default posture for achieving Nuclear/Radiological Incident Annex response and recovery objectives. The Base Annex provides an overview of this default posture. It is noted that for a deliberate catastrophic radiological/nuclear incident, Response, Recovery, and Prevention mission activities are interdependent and often concurrent. Decisions made and priorities set early in the response will

have a cascading effect on the nature and speed of recovery and resolution of the threat. The phases detailed below are where certain actions during response and recovery to a deliberate radiological/nuclear incident may diverge from actions detailed in the Base Annex of the Nuclear/Radiological Incident Annex.

Phase 1a (Normal Operations)

Phase 1a activities include public preparedness messaging, educational opportunities, general response awareness (e.g., "Get in, Stay in, Tune in"), and training of emergency responders to recognize the signs and dangers associated with response to a radiological release or IND detonation.

The FBI and law enforcement are constantly vigilant for threats of terrorism, including radiological/nuclear-terrorism. The public health community and emergency management officials should work closely with law enforcement regarding posturing resources and appropriate capabilities in the event of a deliberate radiological/nuclear incident.

Phase 1b (Elevated Threat) and 1c (Credible Threat)

Phase 1b and 1c activities involve employing preventive radiological/nuclear detection capabilities to detect illicit radiological/nuclear materials and radiological/nuclear weapons of mass destruction at the points of manufacture, transportation, and use, and to identify the nature of material through adjudication or resolution of the detection alarm. This does not include actions taken to respond to the consequences of the release of radiological/nuclear materials. Discovering and locating radiological/nuclear threats and/or hazards may be accomplished through active and passive surveillance and search procedures, which may include the use of systematic examinations and assessments, sensor technologies, or physical investigation and intelligence.

Possible incidents are immediately evaluated to determine if they are a weapon of mass destruction event and possibly linked to crime or terrorism. Law enforcement personnel may be confronted with a number of situations involving the actual or threatened use of a radiological/nuclear material as a weapon. These can range from non-credible threats (hoaxes[58]), announcements or indications that a release of radiological/nuclear material has occurred (overt), or unannounced releases of radiological/nuclear material (covert). Threat information is provided through a variety of sources, including open source, private sector, local, state, tribal, and territorial partners, federal departments and agencies, the intelligence community, or from foreign governments.

No single agency, department, or level of government can independently complete a threat picture of all terrorism and national security threats. With this in mind, terrorism threat intelligence and information sharing involves engagement across local, state, tribal, territorial, federal, private sector, faith-based organizations, and international partners to facilitate the collection, analysis, and sharing of suspicious activity reports to further support the identification

[58] If the threat is deemed non-credible, the FBI may initiate an investigation to identify and prosecute those responsible for creating the perception that there was a threat (i.e., a hoax). Under federal law (18 U.S.C. 2332a, 18 U.S.C. 831, and 18 U.S.C. 832), a threat involving radiological/nuclear material is a criminal act, whether or not the perpetrator actually possesses the radiological/nuclear material.

and prevention of crimes and terrorist threats; enhance situational awareness of threats, alerts, and warnings; and develop and disseminate risk assessments and analysis of national intelligence to state, local, and private sector partners and across mission areas as appropriate.

Phase 2a, Immediate Response

This phase begins with discovery or notification of the incident. This phase is dominated by efforts to provide accurate and credible information to survivors to enable initial shelter in place and delayed evacuation actions. This phase involves all lifesaving operations at local, state, and federal levels.

In addition, law enforcement and counterterrorism operations are now actively underway. Further, the White House Director of Communications will coordinate risk communication strategies by implementing the Domestic Communications Strategy using primarily Emergency Support Function #8 (Public Health and Medical) and Emergency Support Function #15 (Public Information and Warning).

Phase 2b, Deployment

Phase 2b begins when lifesaving operations are implemented and ongoing, dose-monitoring capabilities are in place and personal protective equipment is available. The majority of survivors have been located, evacuated, and are receiving life-sustaining support services.

Phase 2c, Sustained Response

This phase begins when all survivors have been evacuated and are being sustained through mass care and recovery efforts and it is deemed acceptable to resume normal response operations in the impacted area (except for the Severe Damage Zone).

Phase 3, Recovery

This phase begins when displaced residents are in suitable shelters or temporary housing, also state and local planners and decision makers, in collaboration with federal agencies, are engaging stakeholders and technical experts to establish clearance priorities and levels.

Key Issues for Coordinated Federal Decision Making

Federal decisions regarding the following key issues are to be made in close coordination with state and local decision makers and Whole Community stakeholders to ensure a unity of effort in the response to and recovery from a nuclear/radiological incident. Each key issue below is addressed via an executive decision in this branch plan. The Federal Government may need to explore authorities and policy to make decisions in the absence of the ability of the state to make decisions until the state government can be restored. Decisions should not be made unilaterally to avoid unintended consequences and limiting options to save more lives and to protect property.

Public Information and Warning[59]

In a major incident, immediate public information requirements will exceed those for normal disaster operations. Decisions that enable rapid public messaging regarding appropriate shelter in place, self-decontamination, and evacuation guidance can save lives. Providing honest, accurate, timely, and frequent incident-related actionable information through the media is important. In addition, other sources in accessible formats and multiple languages to individuals, households, businesses, and industries directly or indirectly affected by the incident, including individuals with disabilities and others with access and functional needs is critical to building and maintaining public confidence in governmental decisions and direction. Coordinated messaging with both impact and host jurisdictions will be necessary due to dispersed, displaced populations. In incidents involving a federal crime or terrorism, a Joint Information Center may be activated to manage public messages and media inquiries. In a case of a suspected or actual deliberate nuclear/radiological incident, the release of information will be coordinated through the White House, the Secretary of DHS, and the Attorney General, prior to release.

Public Self-Decontamination

Due to the shortfall of capability to support public gross decontamination, including provisions for household pets and service animals, a decision could be reached to set a different standard for an acceptable level of decontamination for application in an IND event.[60] Survivors that have changed clothing and footwear, and washed their heads and hands should be considered not contaminated.

Personal Protective Equipment

In a major incident, demand for personal protective equipment will be high and will exceed initial supply. Federal agencies will need to actively coordinate and prioritize personal protective equipment purchasing and logistics based on incident priorities. Federal agencies must understand personal protective equipment and industrial base capacity (to include max production, lead-time to max production and status of raw materials) in order to establish an adequate planning horizon. Contracts and other mechanisms that restrict local access should be prevented. Federal agencies must plan for the personal protective equipment needs of their response and recovery workers. Some types of personal protective equipment, such as respirators, must be used in conjunction with a comprehensive worker protection program that involves training before use of the equipment, medical examinations and monitoring, and fit testing.

Mass Care

Mass care, general population shelters will not be established in the damage or fallout zones. In addition, heavily contaminated survivors may not be permitted entry into mass care, general population shelters based on shelter operator protocols. There is limited planning for or capability to shelter contaminated survivors at state and local levels. The shelter screening process should focus on self-decontamination, not on measured radiation. Alternative clothing should be provided for anyone that has not self-decontaminated. There may be limited access to

[59] Degraded communications may limit the ability to communicate directly with the affected public.

[60] In virtually all the other radiological scenarios, the ability to provide the necessary decontamination to meet current protective action guides would probably be adequate.

advanced medical care for sheltered survivors depending on the scope of the event. Additionally, there is a critical transportation capacity gap for moving individuals from damage zones to shelters outside of the damage zones.

Medical Countermeasures

Demand for medical countermeasures may be high. The administration of medical countermeasures should be coordinated with official state and local public health programs.

Crisis Standards of Care

There may be limited personnel, resources, and medical surge capability, whereby the establishment of Crisis standards of care may be necessary in order to maximize resources and save lives. Crisis standards of care are defined as the level of care possible during a crisis or disaster due to limitations in supplies, staff, environment, or other factors. Crisis standards of care will usually follow a formal declaration or recognition by state government during a pervasive (pandemic influenza) or catastrophic (earthquake, hurricane) disaster which recognizes that contingency surge response strategies (resource-sparing strategies) have been exhausted, and crisis medical care must be provided for a sustained period. Formal recognition of these austere operating conditions enables specific legal/regulatory powers and protections for healthcare provider allocation of scarce medical resources and for alternate care facility operations. Under these conditions, the goal is still to supply the best care possible to each patient. During disasters, medical care must promote the use of limited resources to benefit the population as a whole.[61]

Decontamination Capability

There is no timely federal capability to support gross public decontamination. Limited federal capability exists to conduct decontamination of federal response personnel, assets, and infrastructure. Federal agency teams with resident decontamination capability will retain responsibility to support their own operational requirements. Available federal resources must be prioritized in close coordination with state and local stakeholders. Public decontamination, including provisions for household pets and service animals, must be supported through state and local/mutual aid capabilities and public self-help (self-decontamination) messaging.

Management of Waste/Contaminated Debris

The current radioactive waste regulatory structure does not provide limits below which materials no longer need to be disposed of as radioactive waste. During a large-scale contamination event, the need to dispose of waste and debris in local landfills will need to be addressed. Guidelines will need to be issued during the intermediate phase pertaining to the collection and storage of debris generated during response and recovery operations.

The prompt removal of contaminated debris is a key component of any recovery strategy. Once debris has been removed from affected areas, it must be characterized, stored, and packaged for

[61] Source: Institute of Medicine of the National Academies, http://iom.edu/About-IOM/Leadership-Staff/Boards/Board-on-Health-Sciences-Policy/CrisisStandardsReports.aspx.

shipment to an appropriate treatment or disposal facility. This requires identification of suitable temporary debris management/storage sites near the affected areas.[62]

Mass Fatality Management

State and local medical examiner/coroner systems hold the authority to manage fatalities within their jurisdictions. For an IND detonation, the large number of fatalities may overwhelm the existing capabilities creating requirements for federal augmentation of state and local medical examiner/coroner staff and operations. This may also require policies, procedures, and authorities for federal fatality management operations.

However, for suspected or actual terrorist incidents, the FBI On-Scene Commander has primary responsibility to conduct, direct, and oversee crime scenes, to include security, evidence management, and fatalities management. A FBI Joint Operations Center will manage these responsibilities through all phases of the response. Joint priorities for fatalities management should be established between the Prevention and Response Mission Areas in these cases.

Decontamination Standards/Clearance Goals

There is no universally accepted radiation level to inform long-term recovery. Instead, a process should be used to determine acceptable criteria based on the societal objectives for expected land uses and the options and approaches available. Implicit in these decisions is the ability to balance health protection with the desire of the community to resume normal life. Federal agencies will need to work closely with state and local officials to implement existing guidance to develop and communicate acceptable radiation levels to guide recovery. Consideration should also be given to the decontamination limits for cars, equipment and other materiel.

Radiation Dose Monitoring

Protocols, equipment, and expertise are needed to operate within acceptable safety constraints in a hazardous environment, requiring collection and dissemination of relevant information to track responders and their accumulated radiation dose data.

- Currently, dose-monitoring equipment is disseminated only to trained radiation workers. Federal agencies will need to coordinate just in time training.
- There is limited federal capacity (both equipment and technical expertise) to conduct or provide for responder/public dose monitoring. Federal agencies should work closely with state, local, and other Whole Community partners to identify additional dose monitoring capability.
- Many states have considered utilizing the cadre of epidemiologists and other public health specialists at their health departments. These individuals are accustomed to tracking personal exposure and medical data, sometimes for large populations, and can adapt their methodologies to radiation dose. The CDC also has tools (e.g. Epi Info, the Acute Concussion Evaluation tools, and the Emergency Response Health Monitoring and Surveillance tools) that may be useful for radiation dose monitoring.

[62] National Council on Radiation Protection and Measurements, Decision Making for Late-Phase Recovery from Major Nuclear Or Radiological Incidents, Report No. 175, Bethesda, MD (2014), 51.

Relocation, Alternative Housing, and Reoccupancy

State and local governments hold authority and are responsible for relocation and housing decisions. Housing may be destroyed and/or contaminated causing a long-term displacement of the population and necessitate relocation. Long-term and permanent housing solutions may require unique consideration and implementation compared to other major disasters due to long-term denial of use. State and local governments may require federal decision support and federal resources to implement their relocation, alternative housing, and reoccupancy strategies. Support for the needs of large displaced populations will require closely coordinated decision making and communications with both impacted and host jurisdictions. Reoccupancy decision making and timing is integrally linked to remediation planning and decisions. Federal agencies can leverage the Environmental Protection Agency (EPA Protective Action Guide Manual to inform decision making.

Reentry Guides

Federal decision support may be necessary as state and local jurisdictions plan for reentry into contaminated areas. The Protective Action Guide Manual provides a matrix of decision points based on the Operational Guidelines[63] recommended to manage reentry into contaminated areas to protect workers and the public. The Operational Guidelines include detailed numeric guidance and discussions about applicable dose-based limits, timeframes, and pathways of exposure related to reentry tasks.[64]

Coordination of Benefits

Financial assistance following a nuclear or radiological incident poses a risk for duplicate services and financial support. A coordinated system to deconflict survivor assistance will be required. Emergency Support Function #6, Department of Health and Human Services (HSS) Recovery Support Function and Small Business Administration, FEMA, U.S. Department of Housing and Urban Development, and others may establish a benefits workgroup to avoid duplicate services and financial support, while ensuring streamlined assistance to survivors.

Infrastructure Remediation

State and local decision makers may require support from the Department of Homeland Security (DHS Office of Infrastructure Protection regarding prioritization of infrastructure remediation. The federal role is to provide technical assistance and support including modeling, measurement, and sampling to state and local governments to support decision-making. Federal agencies will identify, prioritize, and coordinate the protection of critical infrastructure in order to prevent, deter, and mitigate the effects of deliberate efforts to destroy, incapacitate, or exploit them. Federal agencies will work with state and local governments and the private sector to accomplish this objective.

63 "Preliminary Report on Operational Guidelines Developed for Use in Emergency Preparedness and Response to a Radiological Dispersal Device Incident" (Department of Energy, 2009)

64 These reentry guides do not pertain to the federal law enforcement response.

Defense Production Act Resource Adjudication

In a major incident, there will likely be situations where multiple departments and agencies will use Defense Production Act priority ratings for the same resources (e.g. personnel protective equipment, dosimeters). Adjudication of these resources should be coordinated across the involved departments and agencies in accordance with the process outlined in Executive Order 13603.

Long-Term Waste Management

The existing infrastructure for radioactive waste storage, transport, treatment, and disposal is not sufficient to handle the magnitude of waste produced during a large-scale nuclear/radiological incident. If a large-scale radiological incident were to occur in the United States, the complexity of radiological waste disposal would depend on the magnitude of the release and the decisions related to site cleanup, both of which would determine the amount and types of waste requiring disposal. Close coordination between federal, state, tribal, territorial, and local jurisdictions will be necessary to identify suitable temporary management/storage sites. If there is a limited radiological incident with relatively small waste volumes, existing licensed radioactive waste capacity is available and may be sufficient to address waste disposal. However, in a situation involving a more significant release, the waste resulting from such an incident would likely overwhelm current disposal capacity. For waste volumes that exceed existing capacity, supplements to existing commercial licensed radioactive waste disposal facilities would need to be considered such as a combination of hazardous waste landfills, some solid waste landfills, DOE facilities, and construction of one or more new disposal facilities. New disposal capacity could be located at the site where the radionuclide release originated, elsewhere within the contaminated area, or away from the affected area altogether.

Remediation Cleanup Process

The remediation cleanup process involves a change in approach from strategies predominantly driven by urgency during the early and intermediate phases, to strategies aimed at both reducing longer-term exposures and improving living conditions. The late phase involves the final cleanup of areas and property at which contamination directly attributable to the incident is present.

The remediation cleanup process consists of multiple steps, including (1) characterization and stabilization, (2) development of goals and strategies, and (3) implementation and reoccupancy. Longer-term decisions must be made with stakeholder involvement and can include incident-specific technical working groups to provide expert advice to decision makers on impacts, costs, and alternatives. Community members will provide input to decisions such as if and when to allow people to return home to contaminated areas. The affected local community will need to be involved until the site cleanup activities are complete, and possibly beyond that if institutional and engineering controls are placed on some subareas of the site.

While it may take many years to achieve final cleanup levels, a timely return to normalcy, including reoccupancy and a viable community, will require a remediation cleanup process that is flexible, iterative, and inclusive. Decisions must be made on a site-specific basis and should reflect the interim risks that are reasonable and acceptable to the affected community as active remediation, radioactive decay, and natural weathering move the site toward long-term cleanup

goals. The National Council on Radiation Protection and Measurements Report No. 175 provides detailed guidance for late phase remediation planning and decision making.[65]

In complex cases such as that following an IND detonation, remediation and reoccupation are likely to occur sub-area by sub-area in order of priority and community assessments. Critical infrastructure is likely to be restored to some level of functionality; further remediation should be evaluated against the overall cleanup goal. A community-based and transparent development of that goal and associated priorities guides sequential actions. Areas (e.g., residential, commercial) are remediated and reoccupied utilizing temporary levels considered acceptable for an interim period prior to final cleanup goals being achieved.

- For example, the Incident Command/Unified Command may choose to establish a Cleanup Planning Unit within the Planning Section to analyze and coordinate interim cleanup options. The Incident Command/Unified Command may then convene a technical working group and a stakeholder working group to analyze final cleanup options and develop recommendations.
- The technical working group should be convened as soon as practicable, ideally within days or weeks of the incident. This group provides multi-agency, multi-disciplinary expert input and analysis of cleanup options. Their outputs include advice on technical issues, analysis of relevant regulatory requirements and guidelines, risk analyses, and development of cleanup options. The technical working group is not a decision-making body. Membership is incident-specific but generally includes selected federal, state, local, and private sector subject matter experts in such fields as environmental fate and transport modeling, risk analysis, technical remediation options analysis, cost, risk and benefit analysis, health physics and radiation protection, construction remediation practices, and relevant regulatory requirements. The Advisory Team for Environment, Food, and Health or some of its members may be incorporated into this group as appropriate.
- The stakeholder working group should also be convened within days or weeks of the incident. This second group provides advice concerning local needs and desires for site recovery, proposed cleanup options, and other recommendations. The stakeholder working group is not a decision-making body. The group should present local goals for the use of the site. It should also prioritize current and future potential land uses and functions, such as utilities and infrastructure, light industrial, downtown business and residential. Membership, while incident specific, typically should include selected federal, state, and local representatives and local nongovernmental representatives, as well as local and regional business stakeholders.
- The stakeholder working group would provide input to the Incident Command/Unified Command concerning local needs and desires for site recovery, proposed cleanup options, and other recommendations. The group would present local goals for the use of the site, prioritizing current and future potential land uses and functions, such as utilities and infrastructure, light industrial, downtown business, and residential land uses. The Cleanup Planning Unit would coordinate working group processes and interactions and

[65] National Council on Radiation Protection and Measurements, Decision Making for Late-Phase Recovery from Major Nuclear Or Radiological Incidents, Report No. 175, Bethesda, MD (2014).

report the results of the cleanup options analysis and workgroup efforts to the Incident Command/Unified Command through the Planning Section Chief.

- With limited local technical resources, this multi-team approach may be most effectively coordinated through the State Emergency Operations Center or other scalable local or regional level structure.

The cleanup process described in this document does not rely on and does not affect authority under the Comprehensive Environmental Response, Compensation, and Liability Act, 42 U.S.C. 9601 et seq., and the National Contingency Plan, 40 CFR Part 300. This document expresses no view as to the availability of legal authority to implement this process in any particular situation.

Disposition of the Severe Damage Zone

Maintaining access control in the impacted area, particularly for the Severe Damage Zone will be challenging. Determinations as to whether to rebuild within the impacted area as well as the disposition of waste management of the contaminated debris are impacted by possession of the impacted area.

Long-Term Health Follow-up

This will include exposure/dose assessments similar to those conducted by Radiation Effects Research Foundation for Hiroshima and Nagasaki; there are military deployment health registries that could be used as a model.

Core Capability Specific Guidance

The following information references external guidance or recommendations to further inform the user of the Nuclear/Radiological Incident Annex. For guidance related to core capabilities not shown, refer to the Response and Recovery Federal Interagency Operational Plans.

Planning

Planning Guidance for Protection and Recovery Following Radiological Dispersal Device and Improvised Nuclear Device, DHS/FEMA, August 1, 2008. The Guidance recommends protective action guides consistent with the Protective Action Guide Manual to support decisions about actions that should be taken to protect the public and emergency workers when responding to or recovering from a RDD or IND incident. The Protective Action Guide Manual (www.epa.gov/radiation/rert/pags.html) outlines a process to implement the recommendations. The manual also discusses existing operational guidelines that should be useful in the implementation of the protective action guides and other response actions. It encourages federal, state and local emergency response officials to use these guidelines to develop specific operational plans and response protocols for protection of emergency workers responding to catastrophic incidents involving high levels of radiation and/or radioactive contamination. Available at http://www.gpo.gov/fdsys/pkg/FR-2008-08-01/pdf/E8-17645.pdf.

Key Planning Factors for Recovery from a Radiological Terrorism Incident is a draft document developed by Lawrence Livermore National Laboratory. It is designed to identify key planning factors that could substantially aid the recovery process by decreasing the recovery timeline and

costs, improving public health and safety, and addressing major resource limitations and critical decisions. Available at https://www.fema.gov/media-library/assets/documents/31723.

"The Federal Radiological Monitoring and Assessment Center Manual, DOE/NV 25946-980, May 2010. Available at http://www.nv.doe.gov/library/publications/frmac/FRMAC%20Division/FRMAC%20Operations/FRMAC%20Operations%20Manual/FRMAC%20Operations%20Manual%202010.pdf.

Planning Guidance for Response to a Nuclear Detonation (2nd Ed), National Security Council Staff, June 2010. Available at http://www.epa.gov/radiation/docs/er/planning-guidance-for-response-to-nuclear-detonation-2-edition-final.pdf.

Improvised Nuclear Device Planning Guide and Planning Tool website. Available at http://www.cbrne-rc.org/user/login?destination=/.

Health and Safety Guide for Protecting First Responders Following a Nuclear Detonation and Health and Safety Handbook for First Responders Following a Nuclear Detonation, National Security Council Staff, DHS, HHS, DOL/OSHA, EPA.

Public Information and Warning

Improvised Nuclear Device Response and Recovery: Communicating in the Immediate Aftermath (June 2013), is a resource for emergency responders and federal, state, and local officials communicating with the public in the immediate aftermath of an improvised nuclear detonation in the United States. Available at http://www.fema.gov/media-library/assets/documents/33036?id=7659.

FEMA's Integrate Public Alert and Warning System is a resource that emergency responders and federal, state, and local officials can use to effectively communicate emergency information to the public using broadcasts to cellular phones, radio, television, NOAA Weather Radio, internet feeds. Information available at http://www.fema.gov/integrated-public-alert-warning-system/.

Operational Coordination

Responding to a Radiological or Nuclear Terrorism Incident: A Guide for Decision Makers, National Council on Radiation Protection and Measurement (2011), Report No. 165. Available at http://www.ncrponline.org/Publications/Press_Releases/165press.html.

Fatality Management

Management of Persons Contaminated with Radionuclides: Handbook, National Council on Radiation Protection and Measurement (2008), Report No 161I. Available at http://wwwncrppublications.org/Reports/161I. This report expands upon and updates the 1980 Report No. 65 that served as a major resource for responders to accidents and incidents involving human contamination by radionuclides.

Guidelines for Handling Decedents Contaminated with Radioactive Materials, the CDC. This guidance suggests ways for medical examiners, coroners, and morticians to deal with loose surface contamination, internal contamination, or shrapnel on or in decedents' bodies. Available at http://emergency.cdc.gov/radiation/pdf/radiation-decedent-guidelines.pdf.

Infrastructure Systems

Critical Infrastructure and Economic Impact Considerations: For Recovery from Chemical, Biological, and Radiological Incidents, Sandia National Laboratories. Provides guidance for state and local governments on the prioritization of infrastructure restoration after a nuclear/radiological incident. It identifies key considerations for infrastructure restoration, outlines a process for prioritizing critical infrastructure for restoration, and identifies critical considerations for promoting regional economic recovery following a wide-area disaster. Available at https://www.fema.gov/media-library/assets/documents/31717.

Decontamination efforts should be limited to those locations that are necessary to use or occupy to accomplish lifesaving, including emergency infrastructure and infrastructure that might facilitate lifesaving (e.g., emergency gas line shutdown).

Decontamination of critical infrastructure should be initiated only when basic information becomes available regarding fallout distribution, current and projected radiation dose rates, and structural integrity of the elements to be decontaminated.

Mass Care Services

A Guide to Operating Public Shelters in a Radiation Emergency, Centers for Disease Control, February 2015. This guide was developed to assist with planning and response efforts related to shelter operations in a radiation emergency. The guide provides information and guidance about screening for radioactive contamination, decontamination, radiation monitoring, registration, health surveillance, and communications. Available at http://emergency.cdc.gov/radiation/pdf/operating-public-shelters.pdf.

Public Health and Medical Services

Radiation Emergency Medical Management is a web/desktop/mobile application and suite of tools that provides evidence-based information for healthcare professionals about radiation emergencies. Radiation Emergency Medical Management was produced by the HHS, Office of the Assistant Secretary for Preparedness and Response, Office of Emergency Management (formerly the Office of Planning and Emergency Operations), in cooperation with the National Library of Medicine, Division of Specialized Information Services, with subject matter experts from the National Cancer Institute, the Centers for Disease Control and Prevention, and many U.S. and international consultants. The medical recommendations provided are not the official policy of the U.S. Government, HHS, or any of its agencies, including those agencies of the Radiation Emergency Medical Management developers. Recommendations are based on what is considered the best available clinical evidence. Available for Windows/Mac/iOS/Android/ Blackberry/Windows Mobile/Palm at https://remm.hhs.gov/.

Population Monitoring in Radiation Emergencies, Centers for Disease Control and Prevention, Second Edition, April 2014. Focuses on the significant effort required to identify, screen, measure, and monitor populations (people and their pets) for exposure to radiation or contamination from radioactive materials. The guide also presents the concept of establishing community reception centers to provide contamination screening and decontamination services to people displaced by a large-scale radiation incident. Available at http://emergency.cdc.gov/radiation/resourcelibrary/populationmonitoring.asp.

Crisis Standards of Care: A Systems Framework for Catastrophic Disaster Response, Institute of Medicine of the National Academies, March 2012. Available at http://www.iom.edu/Reports/2012/Crisis-Standards-of-Care-A-Systems-Framework-for-Catastrophic-Disaster-Response.aspx.

Economic Recovery

Critical Infrastructure and Economic Impact Considerations: For Recovery from Chemical, Biological and Radiological Incidents, provides guidance for state and local governments on the prioritization of infrastructure restoration after a nuclear/radiological incident. It identifies key considerations for infrastructure restoration, outlines a process for prioritizing critical infrastructure for restoration, and identifies critical considerations for promoting regional economic recovery following a wide-area disaster. Available at https://www.fema.gov/media-library/assets/documents/31717.

Housing

Catastrophic Housing Annex to the 2012 Federal Interagency Operations Plan – Hurricane, FEMA, August 2012.

Administration, Resources, and Funding

Consistent with the Nuclear/Radiological Incident Base Annex.

Oversight, Coordinating Instructions, and Communications

Oversight

The President will appoint a Federal Coordinating Officer under the Stafford Act and a Federal Disaster Recovery Coordinator for each affected state who will have the full authority and responsibility to coordinate federal assistance to state and local governments.

The President may direct the establishment of, and Congress may authorize the funding for, a special long-term recovery office to oversee the nation's support of long-term regional and national recovery from an IND incident. The heads of federal agencies are responsible for maintaining oversight of their respective agencies.

The designated FEMA Region will support the coordinated efforts of all incidents requiring federal response operations within the region's area of responsibility. The state will provide oversight over unified response operations and federal response agencies operating in the field until the Unified Coordination Group assumes control.

Coordinating Instructions

To facilitate the rapid, coordinated, and seamless integration of federal and federally accessible resources into a localized response effort, state and local governments are encouraged to

incorporate the concepts of this annex into their respective plans to support the delivery of federal assistance. Successful incident management operations will depend on the involvement of multiple jurisdictions as well as personnel and equipment from federal agencies. Federal agencies should assume that state and local capabilities will be insufficient, or have been exceeded, as soon as they recognize that a nuclear device has detonated.

Communications

The Domestic Communications Strategy developed and maintained by the DHS Office of Public Affairs, will be activated for an IND incident. The Domestic Communications Strategy is a dynamic, evolving strategy that includes federal agency options and actions that can be quickly employed because of a credible threat or detonation. The White House Office of Communications reviews and approves its content and provides strategic direction during its employment. This public information strategy not only takes key communications assumptions into account, but also supports counterterrorism objectives. The Domestic Communications Strategy is intended for the United States domestic audience, but its execution is coordinated and shared with federal partners to ensure consistency with international efforts. The strategy is adaptable and can be adjusted as necessary to support emergency planning efforts, particularly during the pre-incident phase.

The blast effects of an IND will destroy/degrade communication infrastructure in the immediate area and severely hinder communications. The survivability and operational capacity of existing emergency communications networks is generally unknown as is the capability of interoperability communication systems.

The National Response Framework Emergency Support Function #2 Communications Annex provides support to federal, state, and local governments and first responders when their systems have been impacted, and provides communication and information technology support to the Joint Field Office and federal field teams.

The FEMA Mobile Emergency Response Support (MERS) element will provide communications connectivity for FEMA and other federal responders to the maximum extent possible. This connectivity consists of, but is not limited to, satellite, high frequency, and microwave line-of-sight interconnected by fiber optic cables to voice and data switches, local area networks, and desktop devices such as personal computers and telephones. The MERS element will assist in establishing initial communications operations at the Joint Field Office once it is established.

Prior to the release of information involving a terrorist incident, the communication will be coordinated with the Attorney General of the United States.

Appendix 1 to Branch 1: Improvised Nuclear Device Background

Expected Timeline of Events

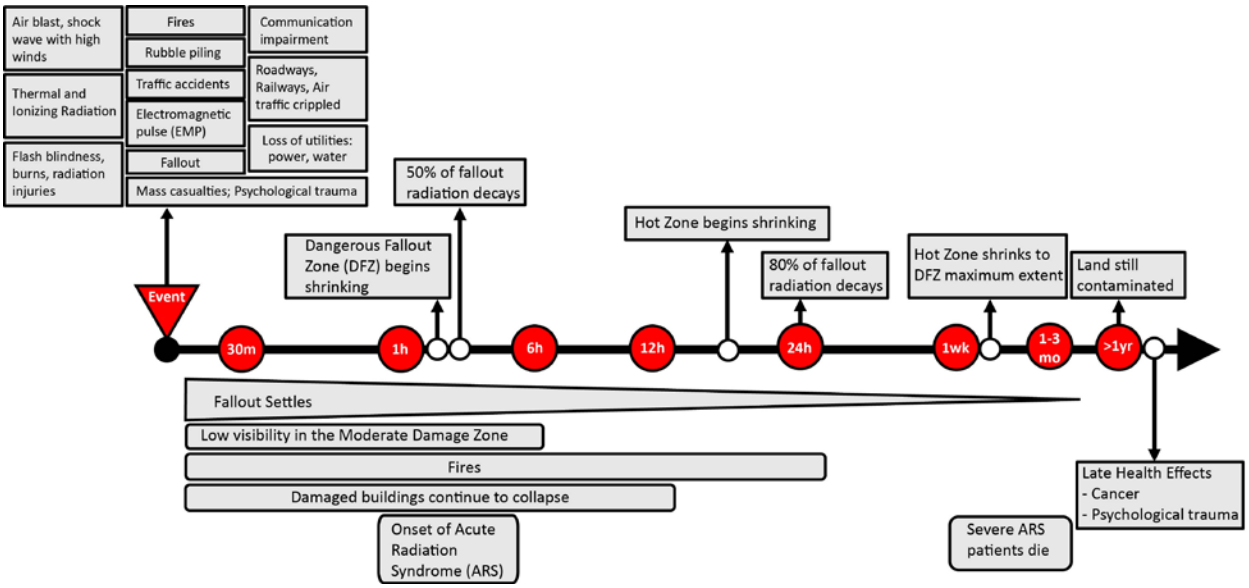


Figure 10: Expected Timeline of Events for a 10-Kiloton Improvised Nuclear Device Detonation

Source: Role of Data and Models in Supporting Planning and Response to an improvised nuclear device Detonation, FEMA and the Modeling and Data Working Group, May 2014.

Improvised Nuclear Device Effects

An IND attack will result in a complex, catastrophic disaster causing unprecedented strain on traditional response operations and capabilities, exceeding resource capacities and accessibility, and prolonging restoration and recovery operations. Nuclear detonations produce "prompt" effects that radiate outward from the detonation location and "delayed" effects. Prompt effects usually occur within the first minute after a detonation and include an intense flash of light, blast shockwave, extreme heat, prompt radiation, and Source Region Electromagnetic Pulse. The delayed effects are primarily the neutron-activated debris around the detonation site and the atmospherically dispersed radioactive fallout.

Prompt Effects

Blast and overpressure

Blast is measured by the overpressure expanding out in all directions from the detonation and the dynamic pressure related to the wind generated by the passing pressure wave. The combination of these two forces produces extensive physical damage to structures. The amount of this damage describes zones used for planning and prioritizing response actions. The medical effects include rupture of eardrums and pleural spaces as well as injury from objects picked up by the wind and thrown into the patient (missiling) and the patient being tossed into objects (tumbling). Building collapse and shattering windows will contribute to further injury.

Thermal Radiation (Heat and Blindness)

Nuclear detonations generate an intense thermal pulse of energy known as "nuclear flash." The intensity of the thermal pulse depends on distance from the detonation site, the height of burst, and shielding. The initial thermal effect results from instant ignition of flammable materials and secondarily from the ignition of exposed natural gas and petroleum sources. Fire becomes a secondary threat to survivors unable to evacuate. The likeliness of a firestorm is unknown in an urban environment; some theories suggest modern construction and designs may buffer the fire's ability to grow uncontrollably. The Moderate Damage Zone[66] is most at risk for firestorms caused by nuclear flash and secondary ignition sources. The Light Damage Zone is at risk for secondary ignition sources but will be most accessible to responders working to contain and suppress fires.

Ionizing Radiation

Radioactive effects of a nuclear explosion consist of prompt radiation, occurring instantaneously with the detonation, and residual radiation, which is the radioactive fallout. The intensity of initial nuclear radiation decreases with distance from the detonation site due to dispersion of radiation and the absorption, scattering, and capture of radiation by the atmosphere and buildings. Victims located close enough to the detonation site to receive a lethal dose of prompt radiation are also likely to have received fatal injuries from other effects of the blast. Other effects of radiation exposure include loss of hair, reddening of the skin, and permanent or temporary sterility for higher exposures, as well as long-term increased risk of cancer for all exposure levels.

Optical Effects

The detonation also creates a brilliant flash of light that can cause temporary "flash blindness" to permanent total blindness, depending on the distance from and an individual's orientation at the time of detonation. The effect is also dependent on weather conditions and time of day. Flash blindness can occur even if an individual is not looking in the direction of the detonation. It may last several seconds to minutes. Although flash blindness does not cause permanent damage, the sudden loss of vision to drivers and pilots could cause a large number of traffic casualties and make many roads impassable.

[66] Please refer to Section 7.2, Damage and Fallout Zones for additional details.

Electromagnetic Pulse

Electromagnetic pulse is a phenomenon with the potential to damage electronic equipment and compromise key technological components. Electromagnetic pulse is an electromagnetic field generated from the high-voltage surge produced by the detonation. Generally, experts believe the most severe consequence of an electromagnetic pulse would be limited to between two to five miles from a ground level 10-kiloton explosion.

Potential impacts include stalling of vehicles and destruction or disruption of communications equipment (cell towers, etc.), computer equipment, water and electrical system control components, and other electronic systems. Because the extent of the electromagnetic pulse effect is expected to occur relatively close to the detonation site, other effects of the explosion will have more impact on sensitive systems than electromagnetic pulse. The exceptions to this assumption are aircraft in flight, where there is direct line of sight to the explosion not ameliorated by the ground or structures and the effects of electromagnetic pulse that are transmitted along data transmission lines. Aircraft in flight over the city or on approach or take-off from airports could be subject to electromagnetic pulse effects on their communications, navigation, and control equipment. Electromagnetic pulse impact on communications systems presents a serious threat to the capability to respond effectively. There are no direct health effects due to electromagnetic pulse exposure, but there are numerous secondary effects derived from failing electronic systems—Vehicle crashes, medical equipment failure, and loss of power leading to heat or cold injuries, to name but a few.

Delayed Effects from Fallout

Nuclear fallout is neutron-activated dust and debris excavated by the blast combining with radioactive fission products produced in the nuclear explosion and drawn upward by the heat of the incident. This “mushroom” cloud from a 10-kiloton blast could climb up to 5 miles into the atmosphere. As the cloud cools, highly radioactive particles drop back down to earth. The dispersion of these particles depends on atmospheric conditions and wind direction. Fallout particles are readily visible as fine sand-sized grains. Fallout posing the greatest hazard to emergency responders and the public will subside within 24 hours of the blast. The most significant fallout hazard area will extend 10 to 20 miles downwind from the detonation site for a 10-kiloton explosion. Within a few miles of the detonation site, there will be exposure rates in excess of .933 sievert[67] (100 roentgen[68]/hour) during the first 4 to 6 hours after the detonation. The medical effects of the detonation are magnified when considered together: Trauma, burns, and radiation exposure. Survival is decreased when injuries are seen together in the same patient, as compared to one or the other alone.

[67] The sievert is a derived unit of ionizing radiation dose. It is a measure of the health effect of low levels of ionizing radiation on the human body. Quantities that are measured in sieverts are intended to represent the stochastic health risk, which for radiation dose assessment is defined as the probability of cancer induction and genetic damage. Doses greater than 1 sievert received over a short time period are likely to cause radiation poisoning, possibly leading to death within weeks.

[68] The roentgen is a unit of exposure to x-rays or gamma rays. One roentgen is the amount of gamma or x-rays needed to produce ions carrying 1 electrostatic unit of electrical charge in 1 cubic centimeter of dry air under standard conditions.

Damage and Fallout Zones

Generally, there are no clear boundaries between the representative damage zones resulting from a nuclear detonation. The Light Damage Zone is characterized by broken windows and few serious injuries; the Moderate Damage Zone by significant building damage, rubble, downed utility lines and some downed poles, overturned automobiles, fires, and serious injuries; and the Severe Damage Zone by completely destroyed infrastructure and high radiation levels resulting in unlikely survival of victims. The damage and fallout zones are depicted in **Figure 11.**

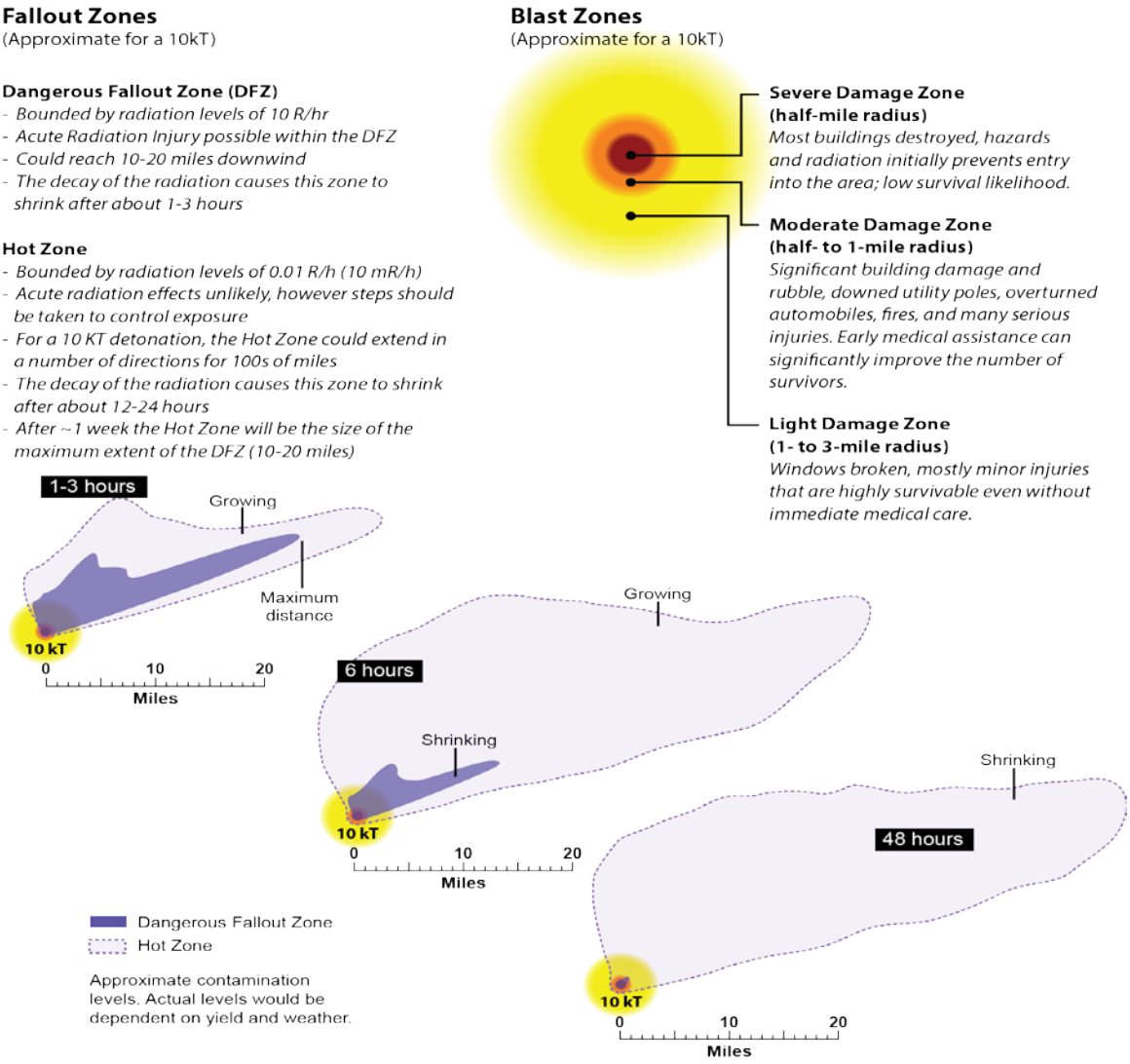


Figure 11: Fallout and Damage Zones for a 10-Kiloton Improvised Nuclear Device Detonation

Light Damage Zone

Damage is caused by shocks, similar to those produced by a thunderclap or a sonic boom but with much more force. Although some windows may be broken over 10-miles away, the injury

associated with flying glass will generally occur at overpressures above 0.5 pounds per square inch. Blast overpressures for the Light Damage Zone will be about 0.5 pounds per square inch at the outer boundary and 2 to 3 pounds per square inch at the inner boundary. This damage may correspond to a distance of about 1 to 3 miles from the detonation site for a 10-kiloton nuclear explosion. The damage in this area will be highly variable as shock waves rebound multiple times off buildings, the terrain, and even the atmosphere.

Windows and doors will be blown in and gutters, window shutters, roofs, and lightly constructed buildings will have increasing damage. Litter and rubble will increase progressively toward the detonation site, and increasing numbers of stalled and crashed automobiles will make emergency vehicle passage difficult.

Most of the injuries incurred within the Light Damage Zone are not expected to be life threatening. Most of the injuries would be associated with flying glass and debris from the blast wave and traffic accidents. The benefits of rescue of ambulatory survivors in the Light Damage Zone are low. If injured survivors are able to move on their own, emergency responder actions should focus on directing citizens to medical care or assembly shelters and proceeding towards the Moderate Damage Zone where victim rescue will be most effective in saving lives.

Responders should focus medical attention in the Light Damage Zone only on severe injuries and should encourage and direct individuals to shelter in safe locations to expedite access to severely injured individuals.

Moderate Damage Zone

Transitioning from the Light Damage Zone to the Moderate Damage Zone occurs when building damage becomes substantial. This damage may correspond to a distance of about one mile from the detonation site. The determination is made by ground level and/or overhead imagery. Damage in the Moderate Damage Zone includes significant structural damage, blown out building interiors, blown down utility lines, overturned automobiles, caved roofs, collapsed buildings, and extensive fires. Telephone poles and street light poles will be blown over. Sturdier buildings (e.g., reinforced concrete) will remain standing; however, lighter commercial and multi-unit residential buildings may collapse or become structurally unstable, and most wood frame houses will be destroyed.

Substantial rubble and damaged vehicles in the streets will make evacuation (when radiation dose rates allow) and access difficult or impossible without street clearing. Moving towards the detonation site in the Moderate Damage Zone, rubble will completely block streets and require heavy equipment to clear. Urban search and rescue operations will be most efficiently and effectively engaged in non-radiation contaminated areas of the Moderate Damage Zone.

Slightly less than 50 percent of the population of the Moderate Damage Zone will survive. Of the survivors, most would require urgent medical care. The Moderate Damage Zone will be encumbered with a number of hazards including elevated radiation levels; potentially live power lines; ruptured, burning gas lines; unstable structures; sharp metal objects and broken glass; burning vehicles; and other hazards. Visibility in much of the Moderate Damage Zone will be

limited for an extended period after the explosion because of dust raised by the shock wave and from collapsed buildings. Smoke from fires will also obscure visibility.

The Moderate Damage Zone should be the focus of early lifesaving operations. Early response activities should focus on medical triage with constant consideration of radiation dose minimization.

Blast overpressures for the Moderate Damage Zone will be about two to three pounds per square inch at the outer boundary of and five to eight pounds per square inch at the inner boundary.

Severe Damage Zone

The border of the Moderate and Severe Damage Zones will be the point at which most buildings are severely damaged or collapsed. For a 10-kiloton IND, the Severe Damage Zone may have a radius approximately a 0.5-mile. Blast overpressure that characterizes the Severe Damage Zone is five to eight pounds per square inch and greater. Few, if any, buildings are expected to be structurally sound or even standing in the Severe Damage Zone, and very few people would survive. Radiation and other hazards will be extremely dangerous in the Severe Damage Zone; thus, it may be more advantageous for responders to focus on lifesaving and critical infrastructure missions in the other damage zones. Rubble will make remaining streets impassable in the Severe Damage Zone making response impossible. Approaching the detonation site, all buildings will either be completely vaporized or reduced to rubble and the debris may be 30 feet deep or more.

Response within the Severe Damage Zone should not be attempted until radiation dose rates have dropped substantially in the days following a nuclear detonation, and the Moderate Damage Zone response is significantly advanced. All response missions must be justified to minimize responder risks based on risk/benefit considerations built into worker safety and ensuring that responders radiation exposures are below the occupational exposure limit.

Dangerous Fallout Zone

Unlike the Damage Zones, the Dangerous Fallout Zone is distinguished by radiation levels not by structural damage. Exposure to radioactivity levels within the Dangerous Fallout Zone has the potential to produce Acute Radiation Syndrome. When planning entry into the Dangerous Fallout Zone, return transportation out of the zone should be provided.

Radiation exposure rates in high-fallout areas can deliver doses that are fatal. The Dangerous Fallout Zone is the area covered by fallout that could cause acute radiation injury and poses the greatest obstacle for lifesaving operations. The Dangerous Fallout Zone is defined as a radiation exposure rate of .093 sievert/hour (10 roentgen/hour) or greater. The area may span across both the Light Damage Zone and Moderate Damage Zone. The highest hazard from fallout occurs within the first four to six hours and continues to drop as the fission products decay. As

radioactivity levels drop, the Dangerous Fallout Zone will steadily shrink in size. Response operations within this zone must be avoided and if necessary, undertaken by extreme exception only. Any operation near the Dangerous Fallout Zone must be justified, optimized, and planned to ensure responders refrain from undertaking missions in areas where radioactivity may be present until levels can be accurately determined and readily monitored.

In physical locations where the Dangerous Fallout Zone overlaps the Light or Moderate Damage Zones, response activities should be guided by the potentially lethal radiation hazard of the Dangerous Fallout Zone.

The most important mission in the Dangerous Fallout Zone is communicating protective action guidance to the public. Effective preparedness requires public education, effective communication plans, messages, and means of delivery in the Dangerous Fallout Zone.

Hot Zone

The Hot Zone is the area covered by fallout that creates radiation exposure rates from .093 millisievert to 0.093 sievert/hour (0.01 to 10 roentgen/hour). These levels do not present an acute threat; however, the Hot Zone may warrant protective actions (e.g., sheltering and/or evacuation, food restrictions, and water advisories). Fallout deposition at great distances (e.g., 100 miles) is dictated by the parameters of winds at altitudes of the fallout cloud. The .093 millisievert/hour (0.01 roentgen/hour) line can reach a maximum extent of several hundred miles within hours of the incident and then shrink in size due to decay. Using personal protective equipment and properly monitoring radiation levels are essential for entering the Hot Zone.

Emergency operations can be safely performed in the Hot Zone as long as responders undertake appropriate planning, dose monitoring measures, and protective measures (e.g., using personal protective equipment). Responders entering and operating in the Hot Zone should maintain increased awareness. Staging, triage, and reception centers should be established outside of this area whenever possible.

Appendix 2 to Branch 1: Operations

In rare instances, state and local jurisdictions may not be able to establish an effective incident command structure and lead the response, resulting in gaps in continuity of government and public and private sector operations. In these situations, the Federal Government may temporarily assume certain roles typically performed by state, tribal, territorial and local governments. At the direction of the Secretary of Homeland Security, the Federal Government may establish a unified command structure to save lives, protect property, secure critical infrastructure, contain the event, and protect national security. As soon as state and local authorities reestablish the incident command structure, the Federal Government will transition to its normal role supporting the incident.

Zoned Approach

The traditional approach of deploying the maximum number of resources and responders to the incident area as quickly as possible is not realistic or effective for some types of nuclear/radiological incidents—notably IND attacks—due to the scope and complexity of the scenario (e.g., degree of immediate destruction, high levels of residual radiation in near term). The goal of a zoned approach is to save lives while managing risks to emergency response worker life and health.

A zoned approach (**Figure 12**) using Light, Moderate, and Severe Damage Zones to plan response operations and prioritize actions helps to maximize—

- Lifesaving operations
- Safety of responders
- Effectiveness of responder activities

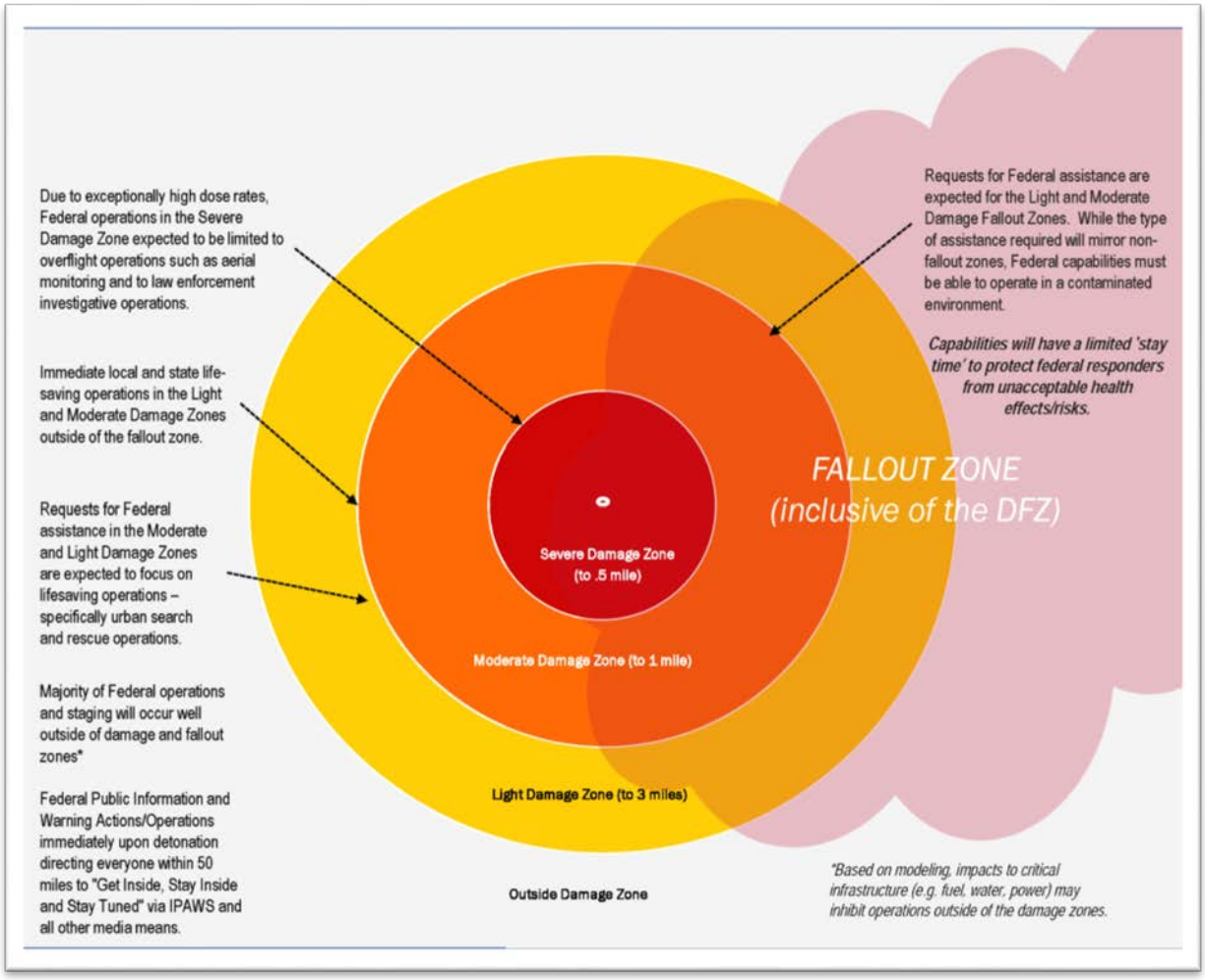


Figure 12: Zoned Approach for Improvised Nuclear Device Response in Phase 2a

Response Posture

The prioritization of Response Core Capability (**Figure 13**) delivery based on those that have the greatest impact on lifesaving operations while also ensuring the safety of all responders. This prioritization is for use adjudicating resource requests within Phase 2a, and some core capabilities become pivotal as the incident progresses. Many core capabilities are not dependent on the same resources; therefore, they could be supported simultaneously without affecting a higher priority core capability.

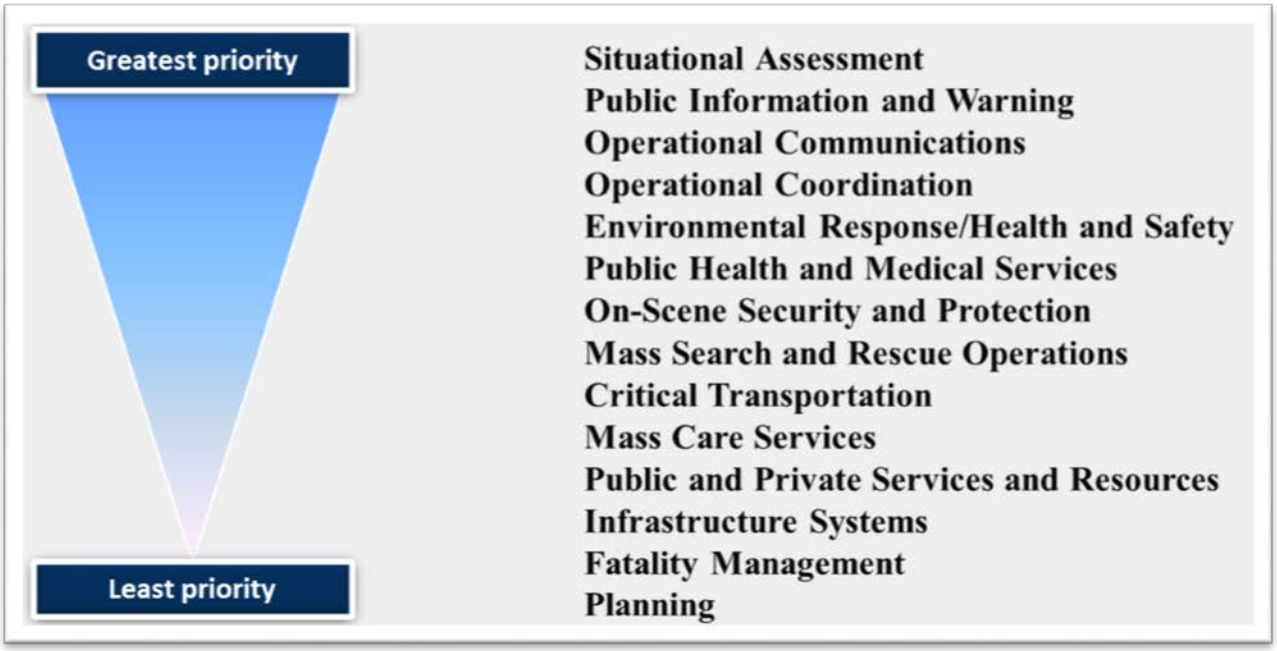


Figure 13: Prioritization of Response Core Capability Delivery

Resource Prioritization

In coordination with state and local authorities, the following federal resources could conduct operations within the damage and/or fallout zones in Phase 2a:

Severe Damage Zone and Dangerous Fallout Zone

- FBI Hazardous Evidence Response Team
- DOE Aerial Measuring System
- EPA Fixed-Wing Aircraft for Aerial Monitoring

Moderate Damage Zone

- DOD Chemical, Biological, Radiological, Nuclear Response Enterprise
- DOE Radiological Assistance Program
- EPA Environmental Response Team
- EPA Chemical, Biological, Radiological, Nuclear Consequence Management Advisory Team
- EPA On-Scene Coordinators
- FRMAC
- EPA National Counterterrorism Evidence Response Team
- EPA Radiological Emergency Response Team

Light Damage Zone

- FEMA Urban Search and Rescue Task Forces and Incident Support Teams

Fallout Zone (Exclusive of the Dangerous Fallout Zone)

- All assets, resources, and teams capable of operating in the Severe Damage Zone, Moderate Damage Zone, and Light Damage Zone.

Outside of the Damage and Fallout Zones

- The majority of federal assets, resources, and teams will deploy to and stage outside of the damage and fallout zones.

Appendix 4 to Branch 1: Logistics

Federal logistic management operations will follow the procedures described in the National Response Framework Emergency Support Function #7 Logistic Management and Resource Support Annex and the FEMA Logistics Operations Manual (FEMA publication 9380.1-PR, August 2010). This manual provides a detailed list of responsibilities for the logistics section. FEMA and other federal interagency partners will operate under their statutory authorities to stage personnel and resources in locations favorable to providing timely and efficient access to the impacted area(s).

Appendix 5 to Branch 1: Communications

Consistent with the Nuclear/Radiological Incident Base Annex.

Appendix 6 to Branch 1: Execution Schedule

The execution schedule will be maintained separately as a part of a master execution schedule for Federal Response and Recovery Operations.

Appendix 7 to Branch 1: Executive Decisions

This section will identify specific executive decision points and appropriate supporting information. Each decision is linked to a task in the Execution Schedule for this Branch Plan.

Phase 1 Decisions

None required.

Phase 2a Decisions

Decision ID	Decision
B1D2a1	Should Protective Action Recommendations be provided to the Governor, Mayor, or other local authority based on predicted or measured fallout levels?
Criteria:	Significant fallout levels are predicted or measured
Timeframe:	As soon as fallout data or plume predictions are available that indicate a potential for significant health effects resulting from radioactive fallout, and revised as necessary as additional information is available
Responsible Entity:	The Advisory Team for Environment, Food, and Health
Support Information:	IMAAC plume predictions, RadNet monitoring data
Notification:	The states and localities in the affected areas, federal response partners, and the public via Public Information Officers
Execution:	Environmental Response, Health and Safety Core Capability and Emergency Support Functions #8, #10, and #11

Decision ID	Decision
B1D2a2	Adjudication of resources with Defense Production Act (DPA) priority ratings
Criteria:	Multiple federal departments use DPA priority ratings for the same resource
Timeframe:	During the response phase after shortfalls are identified and DPA priority ratings are assigned to expedite delivery of resources
Responsible Entity:	DPA Resource and Determination Departments in conjunction with the NRCC leadership
Support Information:	All departments that have placed a DPA priority rating for the same resource, service, or facility The Resource Department that has jurisdiction for the resource being procured Capability of the private sector to provide the resource Potential alternatives for procuring the resources NRCC priorities and objectives
Notification:	The departments that placed the priority ratings and the Federal Coordinating Officer and the entities that needed the resource
Execution:	Based on the resource

Phase 2b Decisions

Decision ID	Decision
B1D2b1	Waste management of contaminated debris under Stafford Act events
Criteria:	An event involving the release of nuclear/radioactive material that receives an emergency or major disaster declaration under the authority of the Stafford Act The identification of debris that is generated by the event or debris that may potentially be contaminated by the release of nuclear/radioactive materials
Timeframe:	Presumably during the initial response phase; however, the timeframe is based on consultation between the FEMA, the EPA acting under Emergency Support Function #10, and the USACE acting under Emergency Support Function #3
Responsible Entity:	The FEMA issues mission assignments for contaminated debris activities in consultation with the EPA and the USACE The EPA, acting under Emergency Support Function #10, is responsible for the assessment of the character and extent of contamination[69], and the removal, collection, treatment, transportation, and disposal of contaminated debris; "this may be done in consultation with and/or the assistance of USACE as an ESF #10 support agency

[69] Federal Radiological Monitoring and Assessment Center (FRMAC), when activated, would maintain its role for environmental monitoring of radiological contaminants; EPA would combine FRMAC data with data on non-radiological contaminants to develop an overall assessment of contaminated debris.

Decision ID	Decision
	The USACE, acting under Emergency Support Function #3, is responsible for clearance of contaminated debris from roads and other infrastructure; the scope of this action is expected to be limited to moving contaminated debris to create safe ingress and egress corridors for emergency personnel and/or the public
Support Information:	Information on the nature of the event, the radioactive materials identified, and the character and extent of contamination The EPA takes a holistic approach to events involving radioactive contamination which would include the assessment and appropriate response for any potential environmental contamination (e.g., soil, water, air) in conjunction with its debris mission If emergency work is performed by a state or local entity (or other eligible applicant) with proper radiological equipment and trained personnel during initial response to a nuclear/radiological event that receives a Stafford Act declaration, reimbursement may be eligible under the Public Assistance Program assuming all other eligibility requirements are met
Notification:	The Federal Coordinating Officer and Joint Field Office leadership
Execution:	The FEMA and Emergency Support Functions #3 and #10, Natural and Cultural Resources Recovery Support Function

Decision ID	Decision
B1D2b2	Prioritization for critical infrastructure cleanup
Criteria:	The decision will be necessary whenever there is a need to restore critical infrastructure such as utilities and there are limited resources to restore infrastructure
Timeframe:	As soon as an assessment is completed for levels of contamination for critical infrastructure, overall infrastructure impacted, population served, where would more lifesaving needs be, what is the ability of the infrastructure operator to recover, etc.
Responsible Entity:	Unified Command with the Safety Officer
Support Information:	The latest assessment information from the FRMAC. Critical infrastructure information from the National Infrastructure Simulation and Assessment Center.
Notification:	Response personnel and utilities
Execution:	Environmental Response, Health and Safety Core Capability, Emergency Support Functions #1, #2, #3, #8, #10, and #12, Infrastructure Systems Recovery Support Function

Decision ID	Decision
B1D2b3	Interim cleanup goals for critical infrastructure
Criteria:	The decision will be necessary whenever there is a need to restore critical infrastructure such as utilities

Decision ID	Decision
Timeframe:	As soon as an assessment is completed for levels of contamination for critical infrastructure
Responsible Entity:	Incident Command with the Safety Officer
Support Information:	The latest assessment information from the FRMAC
Notification:	Response personnel and utilities
Execution:	Environmental Response, Health and Safety Core Capability, Emergency Support Functions #1, #2, #3, #8, #10, and #12, Infrastructure Systems Recovery Support Function

Decision ID	Decision
B1D2b4	Long-term clean-up goals
Criteria:	Once the extent of contamination is understood
Timeframe:	Once a full characterization of the incident can be made to determine extent of contamination
Responsible Entity:	State and local decision makers and in conjunction with coordinating agency
Support Information:	Input from the stakeholder and technical working groups for long-term clean up goals
Notification:	Unified command and public
Execution:	Most Emergency Support Functions and Recovery Support Functions

Decision ID	Decision
B1D2b5	Long-term waste management
Criteria:	Once the determination is made that existing capacity for disposition of radioactive waste will be exceeded
Timeframe:	When there are reliable estimates for volume of waste that will need disposal
Responsible Entity:	State and local decision makers in coordination with FCO/UCG for Stafford Act Declarations
Support Information:	Input from the stakeholder and technical working groups for waste disposal options
Notification:	Unified command
Execution:	Environmental Response, Health and Safety Core Capability, Emergency Support Functions #3, #8, #10, and #12, Natural and Cultural Resources Recovery Support Function

Decision ID	Decision
B1D2b6	When and how to make radiation monitoring data to the public.
Criteria:	When radiation monitoring data indicate levels of radioactive materials in the environment at greater than background levels.
Timeframe:	Once radiation monitoring data have been collected and necessary quality assurance checks have been completed.
Responsible Entity:	Unified Command, in coordination with the Joint Information Center
Support Information:	Fully quality assured radiation monitoring data
Notification:	The states and localities in the affected areas, and then the public
Execution:	Environmental Response, Health and Safety Core Capability, Emergency Support Functions #8, #10, and #15, Health and Social Services Recovery Support Function

Phase 2c Decisions

Decision ID	Decision
B1D2c1	Whether to allow members of the public to return to their homes after an evacuation.
Criteria:	The public has been evacuated from an impacted area.
Timeframe:	Within a reasonable timeframe after the event.
Responsible Entity:	State and local government in conjunction with federal partners.
Support Information:	The EPA Protective Action Guides. Public perception and acceptance of radiation risk. Scientific understanding of radiation risk. Socio-economic consequences of a temporary or permanent relocation.
Notification:	Affected Population
Execution:	Most Emergency Support Functions and Recovery Support Functions

Decision ID	Decision
B1D2c2	Emergency work involving radiation contaminated structures under Stafford Act events.
Criteria:	An event involving the release of radiation, whether deliberate or inadvertent, that receives an emergency or major disaster declaration under the authority of the Stafford Act

Decision ID	Decision
	The identification of radiation-contaminated structures, whether publicly or privately owned, that pose an immediate threat to public health and safety or the environment
Timeframe:	Presumably in the response phase; however, the timeframe is based on consultation between FEMA, the EPA, acting under Emergency Support Function #10, and the USACE, acting under Emergency Support Function #3
Responsible Entity:	The FEMA issues mission assignments in consultation with the EPA and the USACE The EPA, acting under Emergency Support Function #10 in consultation with the FEMA, is responsible for the assessment, stabilization, and decontamination of radiation-contaminated structures The USACE, acting under Emergency Support Function #3 is responsible for evaluating the structural instability of radiation-contaminated structures If demolition is required, USACE is responsible for the demolition of contaminated structures in consultation with EPA and FEMA
Support Information:	The identification of the character and extent of contamination of the structure The EPA takes a holistic approach to events involving radiation-contamination that would include the assessment and appropriate response for any potential environmental contamination (e.g., soil, water, air) in conjunction with its response to contaminated structures If emergency work is performed by a state or local entity (or other eligible applicant) with proper radiological equipment and trained personnel during initial response to a nuclear/radiological event that receives a Stafford Act declaration, reimbursement may be eligible under the Public Assistance Program assuming all other eligibility requirements are met
Notification:	The Federal Coordinating Officer and Joint Field Office leadership
Execution:	The FEMA and Emergency Support Functions #2, #3 and #10

Phase 3 Decisions

Decision ID	Decision
B1D3a1	Permanent work involving contaminated structures under Stafford Act events.
Criteria:	An event involving the release of radioactive material that receives an emergency or major disaster declaration under the authority of the Stafford Act The identification of publicly owned radiation-contaminated structures that were not addressed during the response phase as part of emergency work The contaminated structure would require an assessment by the EPA to determine the character and extent of contamination, and an assessment by the USACE to determine structural instability Based on available radiological and nuclear capabilities, eligible work may be performed through FEMA mission assignments in consultation with Emergency Support Functions #3 and #10 Reimbursement may be authorized under a Stafford Act declaration for eligible work performed by eligible applicants with radiological and nuclear capabilities or contracted by an eligible applicant, assuming all other eligibility factors are met

Decision ID	Decision
	The incident specific cleanup standards determined through the stakeholder and technical working group process described in the EPA Protective Action Guide Manual will impact the scope and cost of eligible work
Timeframe:	Recovery phase based on consultation with FEMA, Emergency Support Functions #3 and #10, the Infrastructure Systems Recovery Support Function, and the applicant
Responsible Entity:	FEMA
Support Information:	The character and extent of the contamination An assessment of the contamination by the EPA An evaluation of the structural instability by the USACE Available radiological and nuclear capabilities
Notification:	The Federal Coordinating Officer and Joint Field Office leadership
Execution:	FEMA, Emergency Support Functions #2, #3 and #10, the Infrastructure Systems Recovery Support Function, and the applicant

Decision ID	Decision
B1D3a2	Does a 'Disaster Initiated Review' need to be accomplished?
Criteria:	Possible reduction of offsite response organization preparedness outside a nuclear power plant (state, local, and tribal)
Timeframe:	Prior to nuclear power plant restart or as a criterion for nuclear power plant shutdown due to lack of preparedness.
Responsible Entity:	The FEMA Radiological Emergency Preparedness Program in conjunction with the NRC
Support Information:	Situational awareness
Notification:	The NRC and the Nuclear/Radiological Incident Task Force
Execution:	FEMA/NRC

Decision ID	Decision
B1D2a3-3a3	How will the Comprehensive Environmental Response, Compensation, and Liability Act and Stafford Act authorities be applied in a coordinated manner that expedites decision making and limits confusion for both federal and nonfederal partners and stakeholders?
Criteria:	In the event of deliberate radiological incidents to which both the CERCLA and Stafford Act apply.
Timeframe:	Early in the incident.

Decision ID	Decision
Responsible Entity:	Clarification by the DOJ, FEMA, and the EPA.
Support Information:	Incident specific factors will impact which authorities apply and how.
Notification:	All Emergency Support Function and Recovery Support Function partners as well as state and local partners and stakeholders
Execution:	Most Emergency Support Functions and Recovery Support Functions

Branch 2: Federal Response to and Recovery from Inadvertent Nuclear/Radiological Incidents

Situation

This branch plan will address the unique nature of an inadvertent or otherwise accidental nuclear/radiological incident.

Purpose

This branch plan provides scenario-specific supplemental information to the Nuclear/Radiological Incident Annex Base Annex. Federal interagency partners can respond in a lead role or in support to state and local governments to save lives, protect property and the environment, and meet basic human needs when there is an inadvertent incident involving nuclear/radioactive material.

Scope

While focused on an incident at a nuclear power plant, this branch plan applies to all federal response and recovery efforts as they pertain to the unique circumstances of the following inadvertent nuclear/radiological incident types/locations.

Inadvertent incidents involving Nuclear Power Plants

The Nuclear Regulatory Commission (NRC) has technical leadership for the federal response to a nuclear power plant incident within their licensees' boundaries. If the severity of an incident rises to the level of General Emergency or is hostile action based, Department of Homeland Security/Federal Emergency Management Agency (DHS/FEMA) may assume coordination of the overall federal response to the incident while the NRC would retain a technical leadership role at the licensee's facility. Coordination would occur under a Stafford Act declaration or on a request from the NRC. The NRC's Office of Nuclear Security and Incident Response directs the NRC response to incidents acting as the interface with the FEMA and other agencies. The Federal Bureau of Investigation (FBI) On-Scene Commander will lead and coordinate the law enforcement and investigative response. It is the policy of the United States that, until otherwise determined, any possible terrorist incident will be treated as an actual terrorist incident.

The assignment of offsite emergency planning and preparedness activities aligns with FEMA's statutory role in promoting, funding, coordinating, and providing technical assistance for disaster preparedness. To meet this requirement, FEMA established the Radiological Emergency Preparedness Program. Federal law requires nuclear operating companies to develop emergency response plans for their nuclear energy facilities and to ensure that emergency preparedness plans are in place to protect the public. The NRC approves each facility's plan, while approval of companion state and local plans is coordinated between the NRC and FEMA. The plans must be approved for a facility to obtain and retain an operating license from the NRC. FEMA's responsibilities encompass only offsite activities defined as state, local, tribal, and territorial

government emergency planning and preparedness activities taking place beyond the physical boundaries of a nuclear power plant.

State and local governments retain primary responsibility for determining and implementing protective measures as well as notifying the public. The Federal Government will coordinate its response to a nuclear power plant incident in conjunction with the state and local governments having jurisdiction over the area affected by the incident. An incident involving the potential release of radioactivity may require implementation of protective measures, such as evacuation and shelter-in-place.

Inadvertent Incidents Involving Lost/Found/Orphaned Radioactive Material

Radioactive materials are routinely used at hospitals, research facilities, industrial activities, and construction sites. These radioactive materials are used for such purposes as diagnosing and treating illnesses, sterilizing equipment, and inspecting welding seams. The NRC, together with 37 Agreement States, which also regulate radioactive material, administers more than 22,000 licenses of such materials.

The NRC and state regulations require owners licensed to use or store radioactive material to secure it from theft and unauthorized access. Licensees must promptly report lost or stolen risk-significant radioactive material. “Risk-significant” refers to radioactive sources that may pose a significant risk to individuals, society, and the environment if not properly used, protected, and secured. Local authorities conduct searches to find and retrieve such sources. Most reports of lost or stolen material involve small or short-lived radioactive sources; however, some higher activity sources have also been involved.

NRC licensees and Agreement States are required to report the loss or theft of radioactive sources that they have responsibility over. Upon notification of a loss or theft of a highly radioactive source (International Atomic Energy Agency [IAEA] category 1 or 2), the NRC will notify Department of Energy (DOE), Environmental Protection Agency (EPA), the Federal FBI, and state and local government organizations. Notification of a found source may also come through the National Response Center.

The NRC and Agreement States work with other federal agencies, the IAEA, and licensees to protect radioactive material from theft and unauthorized access. The NRC and DOE maintain a joint database that tracks the location and movement of certain forms and quantities of source and special nuclear material. In addition, the NRC utilizes a National Source Tracking System, designed to track high-risk sources in the United States on a continuous basis.

The Conference of Radiation Control Program Directors, Inc., whose membership consists of approximately 950 radiation professionals from the radiation control programs of the 50 states, tribes, territories, federal agencies, academia, and other affiliate members, also plays an important role in protecting radioactive material from unauthorized access. The Conference of Radiation Control Program Directors maintains a National Radioactive Material Disposition Program for assisting individuals and regulatory programs to find means of transfer or disposal of unwanted and orphan sources. A fundamental concept of the Conference of Radiation Control Program Directors program is prevention of radioactive material from becoming an orphan in need of financial assistance. To that purpose, the Conference of Radiation Control Program Directors provides extensive information on disposition options and related services to

custodians of material and their regulatory agencies, both through direct inquiries and through the Conference of Radiation Control Program Directors website (https://www.crcpd.org/RadioactiveMaterials.aspx). The Conference of Radiation Control Program Directors maintains a directory of personnel involved in radiological health at the state, local, tribal, territorial, and federal levels and is able to effectively coordinate with these agencies on a broad range of issues, including unwanted and orphan radioactive material.

The Conference of Radiation Control Program Directors has a cooperative agreement with DOE/National Nuclear Security Administration (DOE/National Nuclear Security Administration [NNSA]) for the Source Collection and Threat Reduction Program, begun in 2007, which provides cost sharing for disposal of licensed unwanted radioactive sources for the purpose of reducing the threat of their being used for malicious purposes. The Source Collection and Threat Reduction Program has provided a positive incentive for licensees to dispose of unwanted sources thereby reducing the inventory of potential orphan sources. Since its inception in 2007 through March 2015, the Source Collection and Threat Reduction Program has facilitated the disposal of 13,888 sealed sources containing 160.07 Curies.

Although some Agreement States have their own funds to collect found sources and cleanup any associated contamination, many states depend on the assistance of the Conference of Radiation Control Program Directors to help with the disposition of orphan radioactive sources. Since 1998, the Conference of Radiation Control Program Directors has operated an Orphan Source Program, under cooperative agreements with federal agencies. This program funds the disposition of radioactive material that is discovered in scrap metal, municipal waste or otherwise abandoned, is not traceable to a responsible party, and does not qualify for any other government program. The major concern is public health; therefore, reuse of the source by a properly licensed entity is as acceptable as disposal. The program also includes material for which control could easily be lost such as radioactive sources in the possession of a licensee in Chapter 11 bankruptcy or seizures of sources by unlicensed entities. Currently, the Conference of Radiation Control Program Directors works cooperatively with NRC in this effort.

DOE/NNSA, Office of Radiological Security Off-Site Source Recovery Project recovers disused and unwanted sealed sources with no disposition pathway in the interest of national security and/or public health and safety for disposal. DOE/NNSA prioritizes recovery of sources registered with Off-Site Source Recovery Project based on threat reduction criteria developed in coordination with NRC. Since 1997, the Off-Site Source Recovery Project has recovered over 30,000 sources consisting of over 1.4 million curies of radioactive material.

Inadvertent Incidents Involving Transportation of Nuclear/Radioactive Materials (Non-DOD/DOE)

Radioactive material is transported by highway, rail, air, and sea. Shipments of radioactive material are required to have hazard communications such as documentation, markings, and possibly labels and placards identifying the cargo as radioactive. Radioactive material must be packed in special protective containers that are designed and tested to withstand damage. The main dangers of transportation accidents involving radiation are contact with and exposure to radioactive material in the rare event that the shipping container is damaged. It is very unlikely that accidents involving transport of radioactive material will cause any radiation-related injuries or illnesses.

The NRC and the Department of Transportation (DOT are the principle federal agencies that regulate the transportation of nuclear materials with the exception of hazardous shipments made by or under the direction of the DOE or Department of Defense (DOD) for the purposes of national security. The NRC will respond and work with state representatives if it is known that an accident may be a serious health hazard to members of the public. DOT establishes the overall safety requirements for radioactive materials transport and the states have responsibility for those accidents that take place after delivery of radioactive materials to a carrier for transport and before delivery of radioactive materials to a consignee.

The NRC regulates users of radioactive material and the design, construction, use, and maintenance of shipping packages by establishing regulatory requirements, transportation package certification, inspections, and a system of monitoring to ensure that safety requirements are met. Additionally, the NRC regulates the use of special nuclear material through licensing and oversight of licensee operations.

DOT regulates shippers and carriers of radioactive material and the conditions of transport.[70] Regulated materials include special nuclear material, source material, and by-product materials. Regulated activities include medical, industrial, and academic uses of nuclear materials; fuel cycle facilities; source material facilities; materials decommissioning; and materials transportation. During the transportation process, security measures such as the use of global satellites to monitor high-risk material transport minimize the likelihood of theft or disaster. Routes must be chosen to reduce risk in the transportation of radioactive material. The transportation of nuclear materials is highly regulated. During the past 40 years, more than 3,000 shipments of used nuclear fuel have navigated more than 1.7 million miles of U.S. roads and railways without any accidental release. Nuclear material is transported in casks approximately 15 times thicker than a gasoline truck shell, with a three-inch thick, stainless steel radiation shield. Typically, for every ton of fuel, more than three tons of protective packaging and shielding is provided. The casks must pass a series of four tests before they are certified to carry nuclear waste: The ability to withstand high-speed crashes, fire, water immersion, and puncture.

Under the National Contingency Plan or Emergency Support Function (ESF) #10, USCG may respond to transportation incidents involving the release of nuclear/radioactive materials that are not licensed or owned by a federal agency or NRC Agreement State, in certain areas of the coastal zone, and EPA may respond to such incidents in the inland zone and in coastal areas not addressed by USCG. EPA provides support when requested or when state and local first responder capabilities have been exceeded. In addition, under the Atomic Energy Act and Public Health Service Act, EPA provides advice and assistance to state and local responders upon request.

Inadvertent Incidents Involving Domestic U.S. Nuclear Weapons and Weapon Components

A nuclear weapons accident is an unexpected event involving nuclear weapons or nuclear components that could result in the burning of a nuclear weapon or nuclear component; radioactive contamination; a public hazard, actual or perceived; or a nuclear detonation. In the

[70] 49 CFR Parts 171-180 – Hazardous Materials Regulations

entire history of the U.S. nuclear weapons program, the United States has never had an accidental nuclear detonation.

DOD and DOE, through the NNSA, share primary responsibility for the safety, security, and control of U.S. nuclear weapons. Nuclear weapons security is essential for both DOD and DOE. Each department is responsible for providing appropriate security for all nuclear weapons in its custody. Custody is defined as the responsibility for controlling the transfer, movement, and access to a nuclear weapon or its components. Because a nuclear weapon is in DOD custody for the majority of its lifetime, DOD is responsible for a wide range of operational requirements, including accident prevention and response. DOE, through the NNSA and the national laboratories, is responsible for the design, production, assembly, surety technology, disassembly, and dismantlement of U.S. nuclear weapons. DOE is also responsible for the transportation of weapons to and from the Military First Destination.

Nuclear Weapons Storage and Staging

Nuclear weapons are usually stored or staged in secure, earth-covered bunkers or in a secure staging area awaiting disassembly or dismantlement. Currently, storage of nuclear warheads occurs only at DOD facilities. Currently, nuclear materials are stored in two secure NNSA locations until the United States decides on their final disposition.

Nuclear Weapons Transportation

Nuclear weapons are moved for several reasons. They may be moved within an operational base area, moved to the Pantex Plant for disassembly, or returned from the Pantex Plant after reassembly. Normally, all movements from one installation to another within the continental United States are accomplished using NNSA secure safeguards ground transport vehicles. The U.S. Air Force uses its own certified ground vehicles and security for moves within an operational base area. The Air Force, using certified cargo aircraft, accomplishes movements of weapons to and from Europe.

Nuclear Detonation Safety

Nuclear weapons are difficult to detonate, and U.S. nuclear weapons are designed to remain safe even if hit by a bullet, struck by lightning, or involved in an aircraft accident. All U.S. nuclear weapons are designed to be “one point” safe, meaning that if a weapon was to sustain a blow at any single point it would not produce a nuclear detonation.

Nuclear detonation safety deals with preventing nuclear detonation through accidental or inadvertent causes. Modern nuclear weapons incorporate a number of safety design features. These features provide an extremely high assurance that an accident or other abnormal environment will not produce a nuclear detonation. They also minimize the probability that an accident or other abnormal environment will cause the scattering of radioactive material.

The goal of nuclear safety design is to prevent inadvertent detonation by isolating the components essential to weapon detonation from significant electrical energy. This involves the enclosure of detonation-critical components in a barrier to prevent unintended energy sources from powering or operating the weapon’s functions.

Inadvertent Incidents Involving NNSA Nuclear Security Enterprise Facilities

In partnership with DOD/NNSA provides the research, development, production, and dismantlement capabilities necessary to support U.S. nuclear weapons; NNSA manages the physical infrastructure required to maintain those capabilities. Each site within the NNSA Nuclear Security Enterprise provides a unique contribution to ensure the safety, security, and effectiveness of the U.S. nuclear deterrent, as well as to support U.S. nuclear counter-terrorism and counter-proliferation missions.

For large fuel cycle and materials facilities, only an onsite radiological emergency response plan is required. No offsite radiological emergency plan is required since accidents at these facilities are not expected to impact individuals located much beyond the site boundary. This arrangement is similar to that of other industrial facilities in which accidents are dealt with by offsite firefighters and police routinely with an all hazards response plan.

The NNSA Nuclear Security Enterprise spans eight sites, including three national laboratories. All of the NNSA Nuclear Security Enterprise sites are owned by the U.S. Government, and managed, and operated through a contract between the NNSA and a contractor selected by NNSA through a competitive bid process. These sites are—

Manufacturing sites

- Kansas City Plant, Kansas City, Missouri
- Pantex Plant, Amarillo, Texas
- Savannah River Site, Aiken, South Carolina
- Y-12 National Security Complex, Oak Ridge, Tennessee

Test site

- Nevada National Security Site, Nevada

National Laboratories

- Lawrence Livermore National Laboratory, Livermore, California
- Los Alamos National Laboratory, Los Alamos, New Mexico
- Sandia National Laboratories, Livermore, California and Albuquerque, New Mexico

Inadvertent Incidents Involving Research and Test Reactor Facilities

Research facilities are required by regulation to maintain and follow emergency plans that meet NRC requirements. The emergency action levels for research reactors are the same as power reactors; however, the NRC recognizes that the potential hazards associated with the operations of research reactors are less than those associated with power reactors.

Due to the low power level, small amount of radioactivity in the reactor fuel core, and required safety features, the risk from most research and test reactor facilities is small. NUREG-0849[71] specifies emergency planning zones designed to prevent radiological doses to the public

[71] NUREG 0849, The NRC's Standard Review Plan for the Review and Evaluation of Emergency Plans for Research and Test Reactors. More information available at http://www.nrc.gov/about-nrc/emerg-preparedness/about-emerg-preparedness/research-test.html

exceeding EPA Protective Action Guides. It also specifies acceptable emergency planning zones that are a function of the steady-state thermal power of the reactor. Research and test reactors are required to identify emergency planning zones to meet these criteria. These emergency planning zones range in size from the operations boundary for a reactor for power levels of less than or equal to 2 megawatts to 800 meters for a reactor up to 50 megawatts.

Inadvertent Incidents Involving Spent Fuel Sites

Independent Spent Fuel Storage Installations are principally used to store spent fuel in dry storage casks that have been reviewed and certified by the NRC. Licensees are required to report upon declaration of an emergency as specified in the approved emergency plan. The licensees are also required to notify the NRC immediately after notification of the appropriate state or local agencies.

Inadvertent Incidents Involving Naval Reactors and Naval Propulsion Program Facilities

50 U.S.C §§ 2406, 2511 (codifying Executive Order 12344) established the Naval Nuclear Propulsion Program under the DOE and Department of the Navy to provide for the safety of, the control of radiation and radioactivity associated with, and the response to radiological emergencies involving U.S. naval nuclear reactors and associated propulsion plants. The Naval Nuclear Propulsion Program is the primary authority for emergencies involving U.S. naval reactors, associated radiological and nuclear material, and radiological and nuclear material at Naval Nuclear Propulsion Program DOE facilities. Therefore, the Naval Nuclear Propulsion Program, as the primary authority, is responsible for coordinating federal actions to these emergencies with the assistance of other agencies. During an emergency, the Naval Nuclear Propulsion Program keeps DHS and other federal agencies fully informed and requests assistance, if needed.

All Naval Nuclear Propulsion Program activities, both shipboard and ashore, have plans in place that define program responses to a wide range of emergencies. The Naval Nuclear Propulsion Program has established relationships with state and local officials where U.S. nuclear powered warships are home ported and maintained and Naval Nuclear Propulsion Program facilities and prototype reactors are located. In addition, notification and communication procedures exist for coordination with these state and local officials.

U.S. naval reactors are built to survive wartime attack and to continue to fight while protecting their crews against hazards. The fuel is designed for battle shock and can withstand combat shock loads greater than 50 times the force of gravity, which is 10 times the earthquake shock loads used for designing U.S. commercial nuclear power plant. The largest naval reactors are rated at less than one-fifth of a large U.S. commercial nuclear power plants. In addition, naval reactors do not normally operate at full power. U.S. nuclear powered warships typically operate at low power or are shut down in or near port because power levels are directly linked to propulsion requirements. Prototype reactor plants are typically operated at low power because of their training mission. Therefore, less than about 1% of the radioactivity contained in a typical commercial nuclear power plant could be released from a naval nuclear propulsion plant in port or based on land, limiting the possible dose to the public and the size of the area of potential concern. Due to the small size, low operating power, and other design and operational details, the

maximum possible effect of an emergency involving a U.S. naval reactor and associated radioactive material is expected to be localized and not severe and not expected to rise to the level of a General Emergency.

Therefore, there is no need for towns and cities to have special emergency response plans such as those required for cities near commercial nuclear power plants. Instead, civil emergency response plans that are sufficient for protecting the public from industrial and natural events (e.g. chemical spills or earthquakes) are sufficient to protect the public in the highly unlikely event of an emergency involving a U.S. naval reactor or associated radioactive material.

Due to differences from commercial nuclear power plants, planning for commercial nuclear power plants (e.g., NUREG-0654/FEMA-REP-1) is not applicable to naval nuclear propulsion plants. Planning for Naval Nuclear Propulsion Program emergencies is based on extensive Naval Nuclear Propulsion Program technical analysis, as well as recommendations and guidance provided by the DHS/FEMA, the Navy, DOE, NRC, EPA, the National Council on Radiation Protection and Measurements, and the IAEA.

Facts, Planning Assumptions, and Critical Considerations

Facts

- **Nuclear Liability Insurance**: The Price-Anderson Act requires that all commercial nuclear reactors maintain primary and secondary tiers of public liability insurance. All owner/operators of nuclear power reactors in the United States currently do so by purchasing nuclear liability insurance from American Nuclear Insurers (ANI). The two tiers of insurance represent the owner/operator limit of liability under the Price-Anderson Act.
- **Emergency Planning Zones**: To facilitate a preplanned strategy for federal response and protective actions during an emergency, there are two emergency planning zones around each commercial nuclear power plant, a plume exposure pathway, and an ingestion exposure pathway. The plume exposure pathway has a radius of approximately 10 miles from the reactor site and the ingestion exposure pathway emergency planning zone with a radius of approximately 50 miles from the reactor. The exact size and configuration of the Emergency Planning Zones surrounding a particular nuclear power facility shall be determined by state and local governments in consultation with FEMA and NRC, taking into account such local conditions as demography, topography, land characteristics, access routes, and local jurisdiction boundaries.
- **Mitigating Consequences/Minimizing Hazard**: The owner/operator of a nuclear/radiological facility or materials is responsible for mitigating the consequences of an incident and minimizing the radiological hazards to the public.

Planning Assumptions

The following planning assumptions assist in the development of an operational environment for response to and recovery from an inadvertent nuclear/radiological incident.

- **State and Local Preparedness**: State and local governments located in the Emergency Planning Zones for NRC-licensed nuclear power plants have robust preparedness efforts that are overseen and supported by FEMA's Radiological Emergency Preparedness Program. These capabilities are demonstrated and evaluated frequently through exercises and drills conducted in accordance with *Criteria for Preparation and Evaluation of Radiological Emergency Response Plans and Preparedness in Support of Nuclear Power Plants* (NUREG-0654/FEMA-REP-1).
- **State and Local Response Capability:** States have the primary responsibility to respond to and recover from inadvertent incidents at nuclear plants and other fixed nuclear/radiological facilities including protective action decision making, evacuation orders, and requesting federal assistance. Federal assistance will primarily focus on supporting and supplementing the impacted state(s) by providing modeling, monitoring, messaging, remediation, and recovery technical assistance, resource support, and guidance in accordance with applicable laws and plans.
- **Transfer of Primary Federal Authority:** If an inadvertent incident becomes so complex that the Primary Federal Authority for Federal Response listed in Table 1 of the Base Annex cannot effectively coordinate Federal response, the lead for coordinating Federal response may be transferred to DHS/FEMA. That transfer will be made by mutual agreement of the Department/Agency Head or designee and the FEMA Administrator or designee.

Critical Considerations

The following critical considerations pertain to inadvertent radiological incidents.

- **Protective Action Recommendations**: Immediately upon becoming aware that an incident has occurred that may result in a radiation dose that exceeds federal protective action guides, or when Emergency Action Levels[72] warrant classification of a General Emergency (such as in the event of a hostile action), responsible nuclear power plant personnel evaluate plant conditions and then make protective action recommendations to state and local government agencies on how to protect the population. Nuclear power plant personnel are required to report the protective action recommendations to the state and local government agencies (within 15 minutes of declaring a General Emergency), and report the protective action recommendation to the NRC within one hour.
- **Protective Action Decision Making**: State and local officials have the overall responsibility for developing and implementing the appropriate protective action decisions for the public during a nuclear power plant radiological emergency. They are responsible for notifying the public to take protective actions such as evacuation, sheltering in place, or taking potassium iodide as a supplement. State and local officials base their decisions on the protective action recommendations provided by the nuclear power plant operator and their own radiological or health organizations. The NRC provides advice, guidance, and support to state and local government officials. Neither the nuclear power plant operator nor the NRC can order the public to take protective actions.

[72] An Emergency Action Level is a pre-determined, site-specific, observable threshold for a plant condition that places the plant in an emergency class.

- **Insurance and Coordination of Benefits and Services**: Following a nuclear power plant incident, ANI coverage will be a factor in supporting community recovery.[73] While duplication of benefits is not an issue with respect to compensation for damages covered by the Price-Anderson Act (ANI has a fiduciary duty to compensate for these damages per their policies and as required by the Price-Anderson Act), some Federal assistance (FEMA Individual Assistance and Public Assistance programs, Small Business Administration (SBA) loan programs, U.S. Department of Agriculture programs, and other reimbursement, relief, benefit, and recovery programs) may need additional coordination and intervention to avoid or remedy any duplication of benefits.

Mission

The primary mission outlined in this branch plan is to protect the public, response and recovery workers, property, and the environment as well as restore critical infrastructure capacity; re-establish an economic and social base; and support community efforts to overcome the physical, psychological, and environmental impacts of an inadvertent nuclear/radiological incident.

End State

Achieving the desired end state of response and recovery operations to a Nuclear Power Plant incident occurs when—

- All necessary lifesaving and life-sustaining assistance has been provided,
- Federal, state and local governments can meet the needs of citizens,
- Coordination among federal, state, local, territorial and tribal law enforcement has been achieved and maintained until the nuclear/radiological threat is resolved,
- Environmental impacts are minimized,
- Infrastructure capacity has been restored,
- Public safety and health protection assurances have been made,
- Response and recovery worker safety and health protection assurances have been made,
- Measures are in place to enable and restore commercial activity to meet the demand of the population,
- Contaminated waste is effectively managed, transported, contained, and/or disposed,
- Displaced populations have returned or relocated to permanent housing,
- Long-term public health monitoring and behavioral health programs are in place, and
- Successful recovery, as defined by the impacted communities and states, is achieved.

73 American Nuclear Insurers is a joint underwriting association that acts on behalf of its member companies. American Nuclear Insurers directly writes nuclear liability insurance for nuclear facilities in the United States. American Nuclear Insurer's Emergency Response program is designed to compensate, on behalf of its policyholders, nuclear accident evacuees for essential expenses such as food, shelter, transportation, and emergency medical costs. Source: www.nuclearinsurance.com.

Execution

Nuclear Regulatory Commission Response

If an emergency occurs at a licensed facility, the licensee's primary responsibility is to mitigate the emergency to protect public health and safety and the environment. The licensee will promptly notify state and local governments and, when required, will provide a protective action recommendation such as evacuation or sheltering of the public. The licensee will notify the NRC Headquarters Operations Center, which is continuously staffed 24 hours a day, 7 days a week.

The Headquarters Operations Officer/Headquarters Emergency Response Official is the initial point of contact for the licensee. Depending on the nature of the reported incident, the Headquarters Operations Officer/Headquarters Emergency Response Official notifies designated Headquarters and regional management-level decision makers. In addition to internal notifications, the Headquarters Operations Officer/Headquarters Emergency Response Official notifies other federal agencies and, if necessary, state agencies and other licensees. The headquarters and regional offices are staffed with response teams, and the Chairperson or designee, leads the NRC Executive Team. These response teams include scientists, engineers, and operations experts who analyze the incident and evaluate possible recovery strategies. They perform independent assessments, project the future status of the plant, and continuously assess the licensee's response to ensure that procedural actions taken to mitigate the emergency are appropriate. The Headquarters Operations Center response teams provide technical expertise and support to the Executive Team. These teams are as follows:

Nuclear Regulatory Commission Response Teams

NRC response teams maintain communications with their licensee counterparts in their response facilities and the control room of the power plant. NRC resident inspectors assigned to the specific nuclear power plant maintain communications with their respective regional office and headquarters. The NRC continues these assessments and maintains communications with the plant and stakeholders until the emergency is over and the plant is stable.

Reactor Safety or Fuel Cycle Team

These teams evaluate incident information, assess licensee actions to ensure safety, perform independent calculations to confirm the extent of damage, and project what may happen next during the incident.

Protective Measures Team

The Protective Measures Team prepares an independent assessment of possible radiological exposure to the public and reviews the licensee's protective action recommendations and the state and local protective action decisions. This team provides the "source term" to the Interagency and Modeling and Atmospheric Assessment Center to develop plume projections for federal decision making.

Safeguards Team

The Safeguards Team assesses licensee actions during security-related events and coordinates the security response with law enforcement and intelligence agencies.

Site Team

The Site team implements the NRC on-scene primary authority role and serves as the NRC's eyes and ears on site allowing a firsthand assessment of the situation and face-to-face communications with all responding organizations. The Site Team carries out all of the assessment and many of the liaison functions of the other response teams with their support.

Key Issues for Coordinated Federal Decision Making

Federal decisions regarding the following key issues are to be made in close coordination with state and local decision makers and Whole Community stakeholders to ensure a unity of effort in the response to and recovery from a nuclear/radiological incident. Each key issue below is addressed via an executive decision in this branch plan. The Federal Government may need to explore authorities and policy to make decisions in the absence of the ability of the state to make decisions, until the state government can be restored. Decisions should not be made unilaterally to avoid unintended consequences and limiting options to save more lives and to protect property.

Public Information and Warning

In a major incident, immediate public information requirements may exceed those for normal disaster operations. Decisions that enable rapid public messaging regarding appropriate shelter in place, self-decontamination, and evacuation guidance can save lives. Providing honest, accurate, timely, and frequent incident-related actionable information through the media and other sources in accessible formats and multiple languages to individuals, households, businesses, and industries directly or indirectly affected by the incident, including individuals with disabilities and others with access and functional needs is critical to building and maintaining public confidence in governmental decisions and direction. Coordinated messaging with both impact and host jurisdictions will be necessary due to dispersed, displaced populations.

Personal Protective Equipment

In a major incident, demand for personal protective equipment will be high and will exceed initial supply. Federal agencies will need to actively coordinate and prioritize personal protective equipment purchasing and logistics based on incident priorities. Contracts and other mechanisms that restrict local access should be prevented. Federal agencies must plan for the personal protective equipment needs of their response and recovery workers. Some types of personal protective equipment, such as respirators, must be used in conjunction with a comprehensive worker protection program that involves training before use of the equipment, medical examinations and monitoring, and fit testing.

Medical Countermeasures

Demand for medical countermeasures may be high. The administration of medical countermeasures should be coordinated with official state and local public health programs.

Decontamination Standards/Clearance Goals

There is no universally accepted radiation level to inform long-term recovery. Instead, a process should be used to determine acceptable cleanup criteria based on the societal objectives for expected land uses and the options and approaches available. Implicit in these decisions is the ability to balance health protection with the desire of the community to resume normal life. Federal departments/agencies will need to work closely with state and local officials to implement existing guidance to develop and communicate acceptable radiation level to guide recovery.

Infrastructure Remediation

State and local decision makers may require support from the DHS Office of Infrastructure Protection regarding prioritization of infrastructure remediation. The federal role is to provide technical assistance and support including modeling, measurement, and sampling to state and local governments to support decision making. Federal agencies will identify, prioritize, and coordinate the protection of critical infrastructure in order to prevent, deter, and mitigate the effects of deliberate efforts to destroy, incapacitate, or exploit them. Federal agencies will work with state and local governments and the private sector to accomplish this objective.

Coordination of Benefits

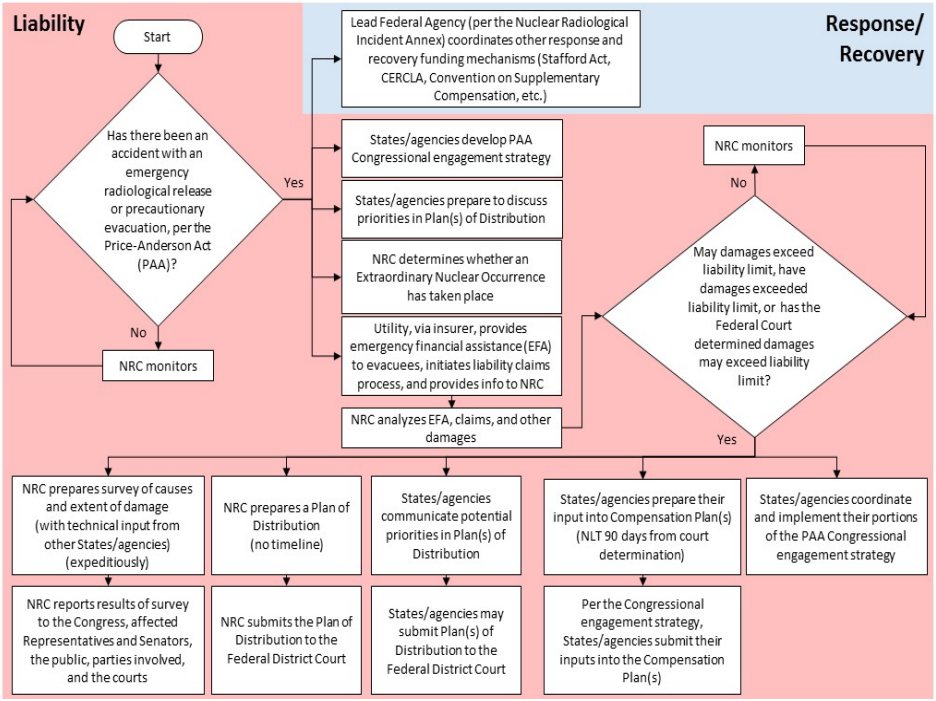
Financial assistance following a nuclear or radiological incident poses a risk for duplicate services and financial support. A coordinated system to deconflict survivor assistance will be required. ESF #6, HSS Recovery Support Function and SBA, FEMA, Housing and Urban Development, NRC, ANI, and others may establish a benefits workgroup to avoid duplicate services and financial support, while ensuring streamlined assistance to survivors.

Compensation and Funding Mechanisms

Compensation

Below is a Price Anderson Act decision tree spelling out Nuclear Power Plant post event liability funding activities.

Nuclear Power Plant Post-Event Liability and Response/Recovery Funding Activities



The Price Anderson Act provides the system of indemnification for public liability in this scenario.

- The main purpose of the Price-Anderson Act is to ensure the availability and distribution of funds to promptly compensate members of the public who incur damages from a nuclear incident.
- The Federal District Court with jurisdiction where the nuclear incident occurred will determine whether public liability from a specific nuclear incident may exceed current liability limits. If the Court determines that public liability from the incident may exceed current liability limits:
    - Payments made shall not exceed 15% of the current liability limit without prior Court approval.
    - The Court shall not approve payments above 15% of the current liability limit unless in accordance with a Court approved plan of distribution or such payments will not prejudice subsequent adoption of a plan of distribution.
    - The Commission shall, and other interested parties may, submit to the Court a plan for disposition of remaining claims and distribution of remaining funds.
    - The President shall submit to Congress—
        - An estimate of the aggregate amount of personal injury and property damage due to the incident that exceed current liability limits.
        - Recommendations for additional funds to pay claims above current liability limits.
        - One or more compensation plans that provide full and prompt compensation for all valid claims.

        - Any additional legislative authorities necessary to implement such compensation plans.
- Pursuant to the terms of the primary insurance policies, American Nuclear Insurers (ANI) will compensate for bodily injury, sickness, disease, or resulting death, property damage and loss, reasonable living expenses for individuals evacuated, and limited environmental clean-up costs. Currently ANI policy states that the NRC must classify the accident as an "extraordinary nuclear occurrence" or a "transportation incident," before ANI will pay claims for environmental clean-up costs. ANI will compensate state and local governments for reasonable additional costs incurred in the course of responding to a nuclear incident or precautionary evacuation for emergency food, shelter, and transportation or police services in evacuating the public within a reasonable area near the facility for 30 days following the evacuation.

Funding

The Stafford Act may not be the primary source of response and recovery funding for a nuclear facility incident.

- Outline of Key Funding Decisions:
    1. Presidential Emergency Declaration to facilitate federal coordination support and fund immediate support actions:
        a. Presidential Major Disaster Declaration if the facility damage was caused as a result of a Stafford Act event (e.g., earthquake, terrorism).
        b. Emergency Declarations.
    2. Federal departments and agencies immediately respond to support the state(s) pursuant to their existing authorities, re-programming resources as needed.
    3. Access and execution of Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) funding for environmental monitoring and remediation under the National Contingency Plan (assuming EPA/U.S. Coast Guard (USCG) leans forward).
    4. There may be circumstances where the EPA cannot take environmental remediation actions because the CERCLA exclusion applies, FEMA cannot perform such work directly or provide financial assistance for those actions under the Stafford Act, Price-Anderson Act compensation funds are either exhausted or otherwise already accounted for elsewhere, and the claim is not valid under the Price-Anderson Act. There is no legal limitation on EPA's [the President's] capacity to use CERCLA's investigative authorities in section 104(e) [42 USC 9604(e)] to determine the nature and scope of the release during the early phase of the incident. However, there may be a potential exclusion pursuant to CERCLA section 101(22) [42 USC 9601(22)(C)] for some releases of radioactive materials that are subject to the Price-Anderson Act. It is quite likely that there will be commingling of contamination which at least initially will make it difficult or impossible to accurately and precisely apply the potential statutory limitation on CERCLA response authority found in the definition of "release" in CERCLA section 101(22). A final determination regarding that potential limitation can only be made after sufficient information is available to make a full and accurate evaluation of what exactly is released. However, unless and until information clearly establishes that the release meets all the conditions set forth in the

CERCLA section 101(22)(C) exclusion, as a legal matter CERCLA authority may be used, both on-site and off-site. The CERCLA exclusion will only apply once information clearly establishes that the release meets all the conditions set forth in the CERCLA section 101(22)(C) exclusion, and if a release is determined to consist of only those radioactive materials specified in the exclusion. In these circumstances, compensation for environmental remediation costs incurred by an individual or state or local government should be sought via—

   a. Supplemental appropriations from Congress in order to quickly enable large-scale federal interagency coordination and operations as well as to support survivors/states without having to wait for legal actions and resourcing from the responsible party. Supplemental funds should cover remediation costs that were not covered under CERCLA.
   b. Supplemental funds should cover public costs the local courts determine are outside the definition of "public liability".
   c. While appropriations are pending, the Federal Government shall assume a forward-leaning posture and not wait until detailed environmental analysis is completed. EPA/USCG would serve this function as ESF #10 consistent with the National Response Framework and National Continuity Plan. In the low likelihood that only pure radiation was disseminated, then efforts to seek reimbursement from the responsible party would need to occur afterwards.

5. Initiation of litigation against the alleged responsible party.
6. Development of a Presidential compensation plan under Section 170(i) of the Price-Anderson Act used to seek legislative action to address environmental remediation costs.
7. Resolution of funding reimbursements to Federal agencies by the Responsible Party of claims made by Federal agencies for covered activities undertaken on behalf of the State under the Price-Anderson Act.

Long-Term Waste Management

The existing infrastructure for both low-level and high-level radioactive waste storage, transport, treatment, and disposal is not sufficient to handle the magnitude of waste produced during a large-scale nuclear/radiological incident. If a large-scale radiological incident were to occur in the United States, the complexity of radiological waste disposal would depend on the magnitude of the release and the decisions related to site cleanup, both of which would determine the amount and types of waste requiring disposal. Close coordination between federal, state, and local jurisdictions will be necessary to identify suitable temporary management/storage sites. If there is a limited radiological incident with relatively small waste volumes, existing licensed low-level radioactive waste capacity is available and may be sufficient to address low-level radioactive waste disposal. However, in a situation involving a more significant release, the waste resulting from such an incident would likely overwhelm current disposal capacity. For waste volumes that exceed existing capacity, supplements to existing low-level radioactive waste commercial licensed radioactive waste disposal facilities would need to be considered, such as a combination of hazardous waste landfills, some solid waste landfills, DOE facilities, and construction of one or more new disposal facilities. New disposal capacity could be located at the site where the radionuclide release originated, elsewhere within the contaminated area, or away from the affected area altogether.

Relocation, Alternative Housing, and Reoccupancy

State and local governments hold authority and are responsible for relocation and housing decisions. Housing may be contaminated, causing a long-term displacement of the population and necessitate relocation. Long-term and permanent housing solutions may require unique consideration and implementation compared to other major disasters due to long-term denial of use. State and local governments may require federal decision support and federal resources to implement their relocation, alternative housing, and reoccupancy strategies. Support for the needs of large displaced populations will require closely coordinated decision making and communications with both impacted and host jurisdictions. Reoccupancy decision making and timing is integrally linked to remediation planning and decisions. Federal agencies can leverage the EPA Protective Action Guide Manual to inform decision-making.

Reentry Guides

Federal decision support may be necessary as state and local jurisdictions plan for reentry into contaminated areas. The Protective Action Guide Manual provides a matrix of decision points based on the Operational Guidelines[74] recommended to manage reentry into contaminated areas to protect workers and the public. The Operational Guidelines include detailed numeric guidance and discussions about applicable dose-based limits, timeframes, and pathways of exposure related to reentry tasks.[75]

Remediation Cleanup Process

The remediation cleanup process involves a change in approach from strategies predominantly driven by urgency during the early and intermediate phases, to strategies aimed at both reducing longer-term exposures and improving living conditions. The late phase involves the final cleanup of areas and property at which contamination directly attributable to the incident is present.[76]

The remediation cleanup process consists of multiple steps, including (1) characterization and stabilization, (2) development of goals and strategies, and (3) implementation and reoccupancy. Longer-term decisions must be made with stakeholder involvement and can include incident-specific technical working groups to provide expert advice to decision makers on impacts, costs, and alternatives. Community members will provide input to decisions such as if and when to allow people to return home to contaminated areas. The affected local community will need to be involved until the site cleanup activities are complete and possibly beyond that if institutional and engineering controls are placed on some subareas of the site.

While it may take many years to achieve final cleanup levels, a timely return to normalcy, including reoccupancy and a viable community, will require a cleanup process that is flexible, iterative, and inclusive. Decisions must be made on a site-specific basis and should reflect the interim risks that are reasonable and acceptable to the affected community as active remediation,

74 "Preliminary Report on Operational Guidelines Developed for Use in Emergency Preparedness and Response to a Radiological Dispersal Device Incident" (Department of Energy, 2009).

75 These reentry guides do not pertain to the federal law enforcement response.

76 The cleanup process described in this document does not rely on and does not affect authority under the Comprehensive Environmental Response, Compensation, and Liability Act, 42 U.S.C. 9601 et seq., and the National Contingency Plan, 40 CFR Part 300. This document expresses no view as to the availability of legal authority to implement this process in any particular situation.

radioactive decay, and natural weathering move the site toward long-term cleanup goals. The National Council on Radiation Protection and Measurements Report No. 175 provides detailed guidance for late phase remediation planning and decision-making.

The cleanup process described in this document does not rely on and does not affect authority under the Comprehensive Environmental Response, Compensation, and Liability Act, 42 U.S.C. 9601 et seq., and the National Contingency Plan, 40 CFR Part 300. This document expresses no view as to the availability of legal authority to implement this process in any particular situation.

In complex cases involving widespread radioactive contamination, remediation and reoccupation are likely to occur sub-area by sub-area in order of priority and community assessments. Critical infrastructure is likely to be restored to some level of functionality; further remediation should be evaluated against the overall cleanup goal. A community-based and transparent development of that goal and associated priorities guides sequential actions. Areas (e.g., residential, commercial) are remediated and reoccupied utilizing temporary levels considered acceptable for an interim period prior to final cleanup goals being achieved.

For example, the Incident Command/Unified Command may choose to establish a Cleanup Planning Unit within the Planning Section to analyze and coordinate interim cleanup options. The Incident Command/Unified Command may then convene a technical working group and a stakeholder working group to analyze final cleanup options and develop recommendations.

The technical working group should be convened as soon as practical, ideally within days or weeks of the incident. This group provides multi-agency, multi-disciplinary expert input and analysis of cleanup options. Their outputs include advice on technical issues, analysis of relevant regulatory requirements and guidelines, risk analyses, and development of cleanup options. The technical working group is not a decision-making body. Membership is incident-specific but generally includes selected federal, state, local, and private sector subject matter experts in such fields as environmental fate and transport modeling; risk analysis; technical remediation options analysis; cost, risk and benefit analysis; health physics and radiation protection; construction remediation practices; and relevant regulatory requirements. The Advisory Team for Environment, Food, and Health or some of its members may be incorporated into this group as appropriate.

The stakeholder working group should also be convened within days or weeks of the incident. This second group provides advice concerning local needs and desires for site recovery, proposed cleanup options, and other recommendations. The stakeholder working group is not a decision-making body. The group should present local goals for the use of the site. It should also prioritize current and future potential land uses and functions such as utilities and infrastructure, light industrial, downtown business and residential. Membership, while incident specific, typically should include selected federal, state, and local representatives and local nongovernmental representatives as well as local and regional business stakeholders.

The stakeholder working group would provide input to the Incident Command/Unified Command concerning local needs and desires for site recovery, proposed cleanup options, and other recommendations. The group would present local goals for the use of the site, prioritizing current and future potential land uses and functions such as utilities and infrastructure, light industrial, downtown business, and residential land uses. The Cleanup Planning Unit would

coordinate working group processes and interactions and report the results of the cleanup options analysis and workgroup efforts to the Incident Command/Unified Command through the Planning Section Chief.

With limited local technical resources, this multi-team approach may be most effectively coordinated through the State Emergency Operations Center or other scalable local or regional level structure.

Defense Production Act Resource Adjudication

In a major incident, there will likely be situations where multiple departments and agencies will use Defense Production Act priority ratings for the same resources (e.g. personnel protective equipment, dosimeters). Adjudication of these resources should be coordinated across the involved departments and agencies in accordance with the process outlined in Executive Order 13603.

Radiation Dose Monitoring

Protocols, equipment, and expertise are needed to operate within acceptable safety constraints in a hazardous environment, requiring collection and dissemination of relevant information to track responders and their accumulated radiation dose data.

- Currently, dose-monitoring equipment is disseminated only to trained radiation workers. Federal agencies will need to coordinate just in time training.
- There is limited federal capacity (both equipment and technical expertise) to conduct or provide for responder/public dose monitoring. Federal agencies should work closely with state, local, and other Whole Community partners to identify additional dose monitoring capability.
- Many states have considered utilizing the cadre of epidemiologists and other public health specialists at their health departments. These individuals are accustomed to tracking personal exposure and medical data, sometimes for large populations, and can adapt their methodologies to radiation dose. The Centers for Disease Control and Prevention (CDC) also has tools (e.g. Epi Info, the Acute Concussion Evaluation tools, and the Emergency Responder Health Monitoring and Surveillance tools) that may be useful for radiation dose monitoring.

Operational Phases – Commercial Nuclear Power Plant Incident

Operational phases communicate relative start and end states for each element of response and recovery operations. While focused on a nuclear power plant incident, these phases are generally applicable to other inadvertent incidents.

Phase 1a

FEMA's Radiological Emergency Preparedness Program provides oversight, program support, and technical assistance for offsite response organizations in the form of reviewing and approving radiological emergency preparedness plans, evaluating exercises, training emergency personnel, and performing assessments that serve as a condition for the licensing of commercial

nuclear power plants. These steady-state activities ensure that offsite response organizations are fully prepared for and capable of responding to incidents at fixed nuclear facilities.

Phase 1b/c

This phase(s) begins with discovery of conditions at a facility, which if uncorrected, may lead to a radiological incident. NRC licensees must abide by strict notification timelines, processes, and resources to enable rapid notification of state and local governments, the Federal Government, and the public. Licensee actions during Phase 1b/c are focused on correcting conditions and either restoring normal operations or ensuring safe shut down.

Phase 2a

Phase 2a begins with discovery or notification of a radiological incident. NRC licensees must abide by strict notification timelines, processes, and resources to enable rapid notification of state and local governments, the Federal Government, and the public. This phase is dominated by efforts to stabilize the incident, prevent radioactive releases, and provide accurate and credible information to the public to convey protective action decisions and reinforce pre-planning, as well as the mobilization of resources and personnel at the state and local levels to support the implementation of protective actions guidance for the public.

Phase 2b

This phase begins when initial operations are complete, dose-monitoring capabilities are in place, and personal protective equipment is available. The majority of the affected population has been evacuated (if appropriate) and is receiving support services through mass care and recovery efforts.

Phase 2c

Phase 2c begins when the affected population has been evacuated (if appropriate) and is being sustained through mass care and recovery efforts and it is deemed acceptable to resume normal response operations in the impacted area.

Phase 3

This phase begins when displaced residents are in suitable non-congregate shelters or temporary housing. State and local planners and decision makers, in collaboration with federal agencies, are engaging stakeholders and technical experts to establish cleanup (or clearance) priorities and levels. Phase 3a for an inadvertent nuclear/radiological incident may also involve coordination of benefits related to insurance claims handling and settlement.

Emergency Classification

An Emergency Classification is one of a set of names or titles established by the NRC for grouping off-normal events or conditions according to (1) potential or actual effects or consequences and (2) resulting onsite and offsite response actions. The emergency classification levels, in ascending order of severity, are Notification of Unusual Event, Alert, Site Area Emergency, and General Emergency. Nuclear power plants and research and test reactors use these emergency classifications as defined below.

Notification of Unusual Event

Events are in progress or have occurred that indicate a potential degradation of the level of safety of the plant or indicate a security threat to facility protection has been initiated. No releases of radioactive material requiring offsite response or monitoring are expected unless further degradation of safety systems occurs. Note: This term is sometimes shortened to Unusual Event.

Alert

Events are in progress or have occurred that involve an actual or potential substantial degradation of the level of safety of the plant or a security event that involves probable life-threatening risk to site personnel or damage to site equipment because of hostile action. Any releases are expected to be limited to small fractions of the EPA protective action guidance.

Site Area Emergency

Events are in progress or have occurred which involve actual or likely major failures of plant functions needed for protection of the public or hostile action that result in intentional damage or malicious acts—

(1) Toward site personnel or equipment that could lead to the likely failure of or

2) That prevent effective access to equipment needed for the protection of the public. Any releases are not expected to result in exposure levels that exceed the EPA Protective Action Guide exposure levels beyond the site boundary.

General Emergency

Events are in progress or have occurred which involve actual or imminent substantial core degradation or melting with potential for loss of containment integrity or hostile action that results in an actual loss of physical control of the facility. Releases can be reasonably expected to exceed the EPA Protective Action Guide exposure levels offsite for more than the immediate site area.

Emergency Classifications for Nuclear Materials and Fuel Cycle Facility Licensees

Alert

Events may occur, are in progress, or have occurred that could lead to a release of radioactive material[s], but the release is not expected to require a response by an offsite response organization to protect people offsite.

Site Area Emergency

Events may occur, are in progress, or have occurred that could lead to a significant release of radioactive material[s], and the release could require a response by offsite response organizations to protect people offsite.

Core Capability Specific Guidance

The following information references external guidance or recommendations to further inform the user of the Nuclear/Radiological Incident Annex. For guidance related to core capabilities not shown, refer to the Response and Recovery Federal Interagency Operational Plans.

Planning

FEMA-REP-5, Revision 2, Guidance for Developing State, Tribal, and Local Radiological Emergency Response Planning and Preparedness for Transportation Accidents contains planning and preparedness guidance for transportation accidents involving radioactive materials. The document provides information for state and local governments to use in developing and enhancing their emergency capabilities for responding to transportation accidents involving radioactive materials. Available at https://www.fema.gov/media-library/assets/documents/26290.

Health and Safety Guide for Protecting First Responders Following a Nuclear Detonation and Health and Safety Handbook for First Responders Following a Nuclear Detonation, National Security Council Staff, DHS, HHS, DOL/OSHA, EPA, [DRAFT]

Public Information and Warning

Communicating During and After a Nuclear Power Plant Incident (June 2013), provides communications guidance for domestic nuclear power plant incidents, including sample text and suggested answers to anticipated public and media questions. This document also provides background information explaining roles and responsibilities across all levels of government during a nuclear power plant incident. While primarily created for federal leaders who will speak to the public, this document should also complement the routinely exercised communication materials used by state, local, and tribal officials. Available at http://www.fema.gov/media-library/assets/documents/33011?id=7651.

FEMA's Integrate Public Alert and Warning System is a resource that emergency responders and federal, state, and local officials can use to effectively communicate emergency information to the public using broadcasts to cellular phones, radio, television, NOAA Weather Radio, internet feeds. Information available at http://www.fema.gov/integrated-public-alert-warning-system/.

Environmental Response/Health and Safety

FEMA REP-2, Guidance on Offsite Emergency Radiation Measurement Systems, Phase 1 - Airborne Releases, was prepared for use by federal, state, and local officials who are responsible for radiological emergency preparedness and includes guidance on airborne particulate monitoring to provide complete coverage of monitoring an offsite airborne release of radioactivity from a nuclear power plant accident. Available at https://www.fema.gov/media-library/assets/documents/26284/.

Contamination Monitoring Standard For A Portal Monitor Used For Radiological Emergency Response is published as FEMA's Contamination Monitoring Standard for portal monitors used by state and local governments in response to commercial nuclear power plant accidents. Available at https://www.fema.gov/media-library/assets/documents/26286/.

The Federal Radiological Monitoring and Assessment Center Manual, DOE/NV 25946-980, May 2010. Available at http://www.nv.doe.gov/library/publications/frmac/FRMAC%20Division/FRMAC%20Operations/FRMAC%20Operations%20Manual/FRMAC%20Operations%20Manual%202010.pdf.

Fatality Management

In support of the Lead Federal Agency, Departments and Agencies will act within proper authorities and legislation and follow the appropriate guidelines to provide assistance to mitigate the potential health risks posed by mass fatalities and assist in incident response and recovery operations.

Guidelines for Handling Decedents Contaminated with Radioactive Materials, the CDC. This guidance suggests ways for medical examiners, coroners, and morticians to deal with loose surface contamination, internal contamination, or shrapnel on or in decedents' bodies. Available at http://emergency.cdc.gov/radiation/pdf/radiation-decedent-guidelines.pdf.

Management of Persons Contaminated with Radionuclides: Handbook, National Council on Radiation Protection and Measurement (2008), Report No 161 vol. 1. Available at http://wwwncrppublications.org/Reports/161I/. This report expands upon and updates the 1980 Report No. 65 that served as a major resource for responders to accidents and incidents involving human contamination by radionuclides.

Infrastructure Systems

Critical Infrastructure and Economic Impact Considerations: For Recovery from Chemical, Biological and Radiological Incidents provides guidance for state and local governments on the prioritization of infrastructure restoration after a nuclear/radiological incident. It identifies key considerations for infrastructure restoration, outlines a process for prioritizing critical infrastructure for restoration, and identifies critical considerations for promoting regional economic recovery following a wide-area disaster. Available at https://www.fema.gov/media-library/assets/documents/31717/.

Mass Care Services

A Guide to Operating Public Shelters in a Radiation Emergency, CDC, February 2015. This guide was developed to assist with planning and response efforts related to shelter operations in a radiation emergency. The guide provides information and guidance about screening for radioactive contamination, decontamination, radiation monitoring, registration, health surveillance, and communications. Available at http://emergency.cdc.gov/radiation/pdf/operating-public-shelters.pdf.

Public Health and Medical Services

Radiation Emergency Medical Management is a web/desktop/mobile application and suite of tools that provides evidence-based information for healthcare professionals about radiation emergencies. Radiation Emergency Medical Management was produced by the HHS, Office of the Assistant Secretary for Preparedness and Response, Office of Planning and Emergency Operations, in cooperation with the National Library of Medicine, Division of Specialized Information Services, with subject matter experts from the National Cancer Institute, the CDC,

and many U.S. and international consultants. The medical recommendations provided are not the official policy of the U.S. Government, HHS, or any of its agencies, including those agencies of the Radiation Emergency Medical Management developers. Recommendations are based on what is considered the best available clinical evidence. Available for Windows/Mac/iOS/ Android/Blackberry/Windows Mobile/Palm at https://remm.hhs.gov/.

Economic Recovery

Critical Infrastructure and Economic Impact Considerations: For Recovery from Chemical, Biological and Radiological Incidents provides guidance for state and local governments on the prioritization of infrastructure restoration after a nuclear/radiological incident. It identifies key considerations for infrastructure restoration, outlines a process for prioritizing critical infrastructure for restoration, and identifies critical considerations for promoting regional economic recovery following a wide-area disaster. Available at http://www.fema.gov/media-library-data/20130726-1910-25045-7188/40_rrkp_critical_infrastructure_and_econ_impact_considerations_cbr_incidents.pdf

3.4.6.9 Housing

Catastrophic Housing Annex to the 2012 Federal Interagency Operations Plan – Hurricane, FEMA, August 2012.

Administration, Resources, and Funding

See the Nuclear/Radiological Incident Base Annex.

Oversight, Coordinating Instructions, and Communications

Oversight

See the Nuclear/Radiological Incident Base Annex.

Coordinating Instructions

See the Nuclear/Radiological Incident Base Annex.

Communications

Federal, state, and local officials share responsibility for coordinating and communicating information to the public during a nuclear power plant radiological release incident. State and local authorities possess the primary responsibility for making protective action decisions and communicating health and safety instructions to their affected populations. Additional information can be found in the interagency document *Communicating During and After a Nuclear Power Plant Incident* (June 2013).

Appendix 1 to Branch 2: Intelligence

Incident characterization is a critical activity that begins immediately and continues throughout the response. It is necessary to inform response operations, expectations, responder safety, public health, and future recovery efforts. The NRC maintains radiation monitoring instrumentation at nuclear power plant boundaries, relief valves, and venting stacks. Incident characterization assets that can augment state and local capabilities are available through the Federal Government and will be requested through the Joint Field Office and National Response Coordination Center. The RadResponder Network, provided through FEMA's Chemical, Biological, Radiological, Nuclear, and Explosive Office, as well as other data collection capabilities available from EPA, DOE, DOD, and FEMA, provide multiple sources of incident data to the Federal Radiological Monitoring and Assessment Center for the purpose of incident characterization. Analyses of the aggregated data serve to inform operations planners. The response should coordinate all the various federal, state, and local agencies with radiation monitoring capabilities (e.g., fire, hazardous material, police, and emergency medical services) to report data to a regional assessment center for consolidation and analysis. **Figure 14** describes this cycle. Generating plume models is a high priority early in the response, before reliable environmental measurements are available. Actual environmental measurements of confirmed quality, once available, offer the best understanding of the radiological risk.

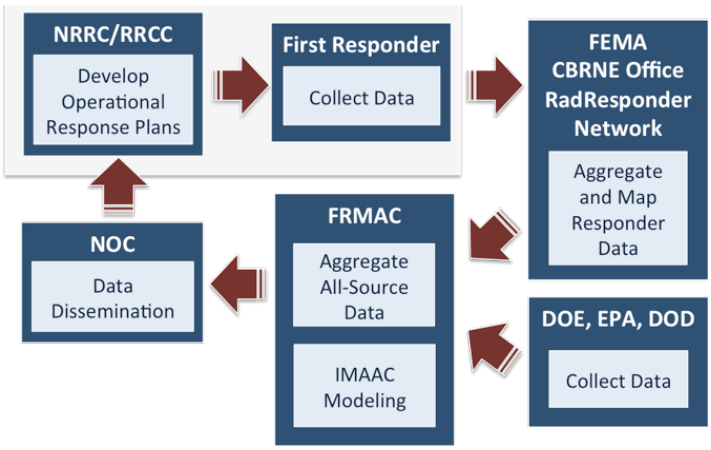


Figure 14: Radiation Monitoring and Data Analysis Cycle

Appendix 2 to Branch 2: Operations

For Nuclear Power plant incident, FEMA may coordinate the incorporation of federal response teams, assets, and resources supporting state and local agencies managing the incident outside the facility boundaries. DHS/FEMA will activate the Nuclear Incident Response Team, which collects specialized DOE and EPA nuclear/radiological response assets and teams under DHS command and control. The Nuclear Incident Response Team coordinates characterization, surveillance, operational and logistics management, modeling, medical, subject matter expertise, and other DOE and EPA related capabilities.

Zoned Approach

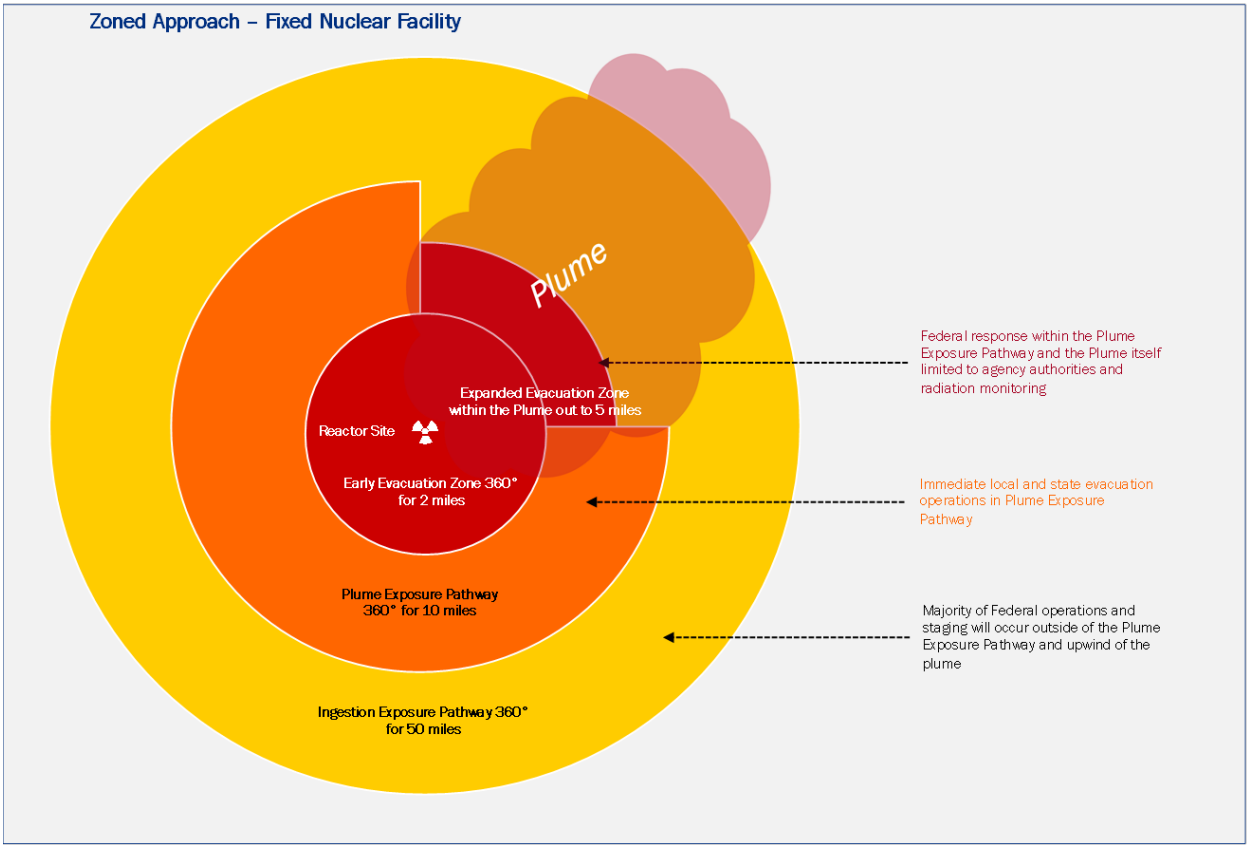


Figure 15: Zoned Approach for Nuclear Power Plant Response in Phase 2a[77]

Emergency Planning Zones

To facilitate a preplanned strategy for protective actions during an emergency, there are two emergency planning zones (**Figure 15**) around each commercial nuclear power plant. The exact size and shape of each emergency planning zone is a result of detailed planning which includes

77 The zoned approach depicted in Figure 15 is consistent with the guidance set forth in NUREG-0654/FEMA-REP-1, which codified a structure of Emergency Planning Zones and corresponding Exposure Pathways.

consideration of the specific conditions at each site, unique geographical features of the area, and demographic information. This preplanned strategy for an emergency planning zone provides a substantial basis to support activity beyond the planning zone in the extremely unlikely event it would be needed. The two emergency planning zones are described as follows:

Plume Exposure Pathway Emergency Planning Zone

The Plume Exposure Pathway[78] Emergency Planning Zone has a radius of about 10 miles from the reactor site. Predetermined protective action plans are in place for this emergency planning zone and are designed to avoid or reduce dose from potential exposure of radioactive materials. These actions include sheltering, evacuation, and the use of potassium iodide where appropriate.

Ingestion Exposure Pathway Emergency Planning Zone

The Ingestion Exposure Pathway Emergency Planning Zone has a radius of about 50 miles from the reactor site. Predetermined protective action plans are in place for this emergency planning zone and are designed to avoid or reduce dose from potential ingestion of radioactive materials. These actions include evaluation, movement control, and dispositions for unsafe livestock, poultry, water, crops, food, and medicines.

Protective Action Strategies for Rapidly Progressing Scenarios

Early and Expanded Evacuation Zones

Evacuation does not always call for completely emptying the 10-mile zone around a nuclear power plant. In most cases, the release of radioactive material from a plant during a major incident would move with the wind, not in all directions surrounding the plant. The release would also expand and become less concentrated as it travels away from a plant. Therefore, evacuations should be mapped to anticipate the path of the release. Generally as a minimum, in the event of a General Emergency, a two-mile ring around the plant is evacuated, along with people living in the five-mile zone directly downwind and slightly to either side of the projected path of the release. This helps account for potential wind shifts and fluctuations in the release path. Evacuation beyond five miles is assessed as the accident progresses. Also in response to a General Emergency, people living in the remainder of the 10-mile zone will most likely be advised to go indoors to monitor Emergency Alert System broadcasts.

Resource Prioritization

In coordination with state and local authorities, the following federal resources could conduct operations within the Plume, Early and Expanded Evacuation Zones, Plume Exposure Pathway, and Ingestion Exposure Pathway in Phase 2a:

[78] Exposure pathway – A route by which a radionuclide or other toxic material can enter the body. The main exposure routes are inhalation, ingestion, absorption through the skin, and entry through a cut or wound in the skin.

Within the Plume and Within the Early and Expanded Evacuation Zones

The following federal resources could conduct operations within the Plume, Early and Expanded Evacuation Zones.

- NRC Onsite Resident Inspection staff assigned to the facility (commercial nuclear power plants only)
- DOE Aerial Measuring System
- DOE Radiological Assistance Program
- EPA Airborne Spectral Photometric Environmental Collection Technology
- EPA Environmental Response Team
- The Federal Radiological Monitoring and Assessment Center (FRMAC)
- DOD Chemical Biological Radiological Nuclear Response Enterprise
- Advisory Team for Environment, Food, and Health

Within the Plume Exposure Pathway – 10 miles

The following federal resources could conduct operations within the Plume Exposure Pathway.

- NRC Site Team
- EPA Chemical Biological Radiological Nuclear Consequence Management Advisory Team
- EPA On-Scene Coordinators

Within the Ingestion Exposure Pathway – 50 miles AND Outside of the Plume Exposure Pathway AND Upwind of the Plume

The following federal resources could conduct operations within the Ingestion Exposure Pathway.

- The majority of federal assets, resources, and teams will deploy and stage outside of the affected area.

Appendix 3 to Branch 2: Logistics

See the Nuclear/Radiological Incident Base Annex and the Response and Recovery Federal Interagency Operational Plans.

Appendix 4 to Branch 2: Communications

In accordance with the National Response Framework, federal, state, and local officials share responsibility for coordinating and communicating information to the public during a nuclear power plant radiological release incident. State and local authorities possess the primary responsibility for making protective action decisions and communicating health and safety instructions to their affected populations. Public officials, incident managers, and their spokespeople should provide specific and frequent information updates. These updates will cover what has occurred, how to protect people, actions taken to mitigate the incident, what residents can expect in the future, and other details. National spokespeople will reinforce the actions of state and local decision-makers to build confidence that all levels of government are engaged to resolve the situation and protect the public. Additional information can be found in the interagency document *Communicating During and After a Nuclear Power Plant Incident* (June 2013).

FEMA can identify primary communications systems to augment the response (e.g., HSIN, Law Enforcement Online, FBI InfraGard, FEMA's Integrated Public Alert and Warnings System, and WebEOC). The FEMA National Response Coordination Center will coordinate response efforts using WebEOC. However, the Homeland Security Information Network (HSIN) may serve as primary federal information sharing and collaboration network during a nuclear power plant incident to provide a common operating picture. The HSIN-Intelligence portal will be used for the dissemination, collaboration, and notification of unclassified information and intelligence. HSIN provides information capability that supports both National Infrastructure Protection Plan-related steady-state critical infrastructure protection and National Response Framework-related incident management activities during emergency operations. In addition, HSIN provides situational awareness and facilitates information sharing and collaboration with homeland security partners throughout federal, state, and local government and the private sector. Each federal agency will use HSIN common operating picture for incident reporting. There are additional threat-reporting mechanisms in place through the FBI where information is assessed for credibility and possible criminal investigation. The FBI-led interagency Weapons of Mass Destruction Strategic Group threat products may also be useful to inform operations and decisions by the response community.

Appendix 5 to Branch 2: Execution Schedule

The execution schedule will be maintained separately as a part of a master execution schedule for Federal Response and Recovery Mission Area Operations within FEMA WEBEOC.

Appendix 6 to Branch 2: Executive Decision Points

This section will identify specific executive decision points and appropriate supporting information. Each decision is linked to a task in the Execution Schedule to this Branch Plan.

Phase 1 Decisions

None required.

Phase 2a Decisions

Decision ID	Decision
B2D2a1	Should Protective Action Recommendations be made based on predicted or measured fallout levels?
Criteria:	Significant fallout levels are predicted or measured
Timeframe:	As soon as fallout data or plume predictions are available that indicate a potential for significant health effects resulting from radioactive fallout
Responsible Entity:	The Advisory Team for Environment, Food, and Health
Support Information:	IMAAC plume predictions, RadNet monitoring data
Notification:	The states and localities in the affected areas
Execution:	ESFs #8, #10, and #11

Decision ID	Decision
B2D2a2-3a3	How will the Price Anderson Act, Comprehensive Environmental Response, Compensation, and Liability Act, and Stafford Act authorities be applied in a coordinated manner that expedites decision making and limits confusion for both federal and non-federal partners and stakeholders?
Criteria:	In the event of deliberate radiological incidents to which both the CERCLA and Stafford Act apply
Timeframe:	Early in the incident.
Responsible Entity:	Clarification by the DOJ, FEMA, and the EPA
Support Information:	Incident specific factors will impact which authorities apply and how.
Notification:	All ESF and Recovery Support Function partners, as well as state and local partners and stakeholders
Execution:	Most ESFs and Recovery Support Functions are impacted

Decision ID	Decision
B2D2a4	Adjudication of resources with DPA priority ratings
Criteria:	Multiple federal departments use DPA priority ratings for the same resource
Timeframe:	During the response phase after shortfalls are identified and DPA priority ratings are assigned to expedite delivery of resources
Responsible Entity:	DPA Resource and Determination Departments in conjunction with the NRCC leadership
Support Information:	All departments that have placed a DPA priority rating for the same resource, service, or facility The Resource Department that has jurisdiction for the resource being procured Capability of the private sector to provide the resource Potential alternatives for procuring the resources NRCC priorities and objectives
Notification:	The departments that placed the priority ratings and the Federal Coordinating Officer and the entities that needed the resource
Execution:	TBD, based on the resource.

Phase 2b Decisions

Decision ID	Decision
B2D2b1	The management and removal of contaminated debris under Stafford Act events
Criteria:	An event involving the release of nuclear/radioactive material that receives an emergency or major disaster declaration under the authority of the Stafford Act The identification of debris that is generated by the event or debris that may potentially be contaminated by the release of nuclear/radioactive materials
Timeframe:	Presumably during the initial response phase; however, the timeframe is based on consultation between the FEMA, the EPA acting under ESF #10, and the USACE acting under ESF #3
Responsible Entity:	The FEMA issues mission assignments for contaminated debris activities in consultation with the EPA and the USACE The EPA, acting under ESF #10, is responsible for the assessment of the character and extent of contamination[79], and the removal, collection, treatment, transportation, and disposal of contaminated debris; this may be done in consultation with and/or the assistance of USACE as an ESF #10 support agency The USACE, acting under ESF #3, is responsible for clearance of contaminated debris from roads and other infrastructure; the scope of this action is expected to be limited to moving contaminated

[79] FRMAC, when activated, would maintain its role for environmental monitoring of radiological contaminants; EPA would combine FRMAC data with data on non-radiological contaminants to develop an overall assessment of contaminated debris

Decision ID	Decision
	debris to create safe ingress and egress corridors for emergency personnel and/or the public and will be done in consultation with ESF #10
Support Information:	Information on the nature of the event, the radioactive materials identified, and the character and extent of contamination The EPA takes a holistic approach to events involving radioactive contamination which would include the assessment and appropriate response for any potential environmental contamination (e.g., soil, water, air) in conjunction with its debris mission If emergency work is performed by a state or local entity (or other eligible applicant) with proper radiological equipment and trained personnel during initial response to an nuclear/radiological event that receives a Stafford Act declaration, reimbursement may be eligible under the Public Assistance Program assuming all other eligibility requirements are met
Notification:	The Federal Coordinating Officer and Joint Field Office leadership
Execution:	The FEMA and ESFs #3 and #10, Natural and Cultural Resources and Health and Social Service Recovery Support Functions

Decision ID	Decision
B2D2b2	Prioritization for critical infrastructure cleanup
Criteria:	The decision will be necessary whenever there is a need to restore critical infrastructure such as utilities and there are limited resources to restore infrastructure
Timeframe:	As soon as an assessment is completed for levels of contamination for critical infrastructure, overall infrastructure impacted, population served, where would more lifesaving needs be, what is the ability of the infrastructure operator to recover, etc.
Responsible Entity:	Incident Command with the Safety Officer
Support Information:	The latest assessment information from the FRMAC. Critical infrastructure information from the National Infrastructure Simulation and Assessment Center.
Notification:	Response personnel and utilities
Execution:	Environmental Response, Health and Safety Core Capability, ESFs #1, #2, #3, #8, #10, and #12

Decision ID	Decision
B2D2b3	Interim cleanup goals for critical infrastructure
Criteria:	The decision will be necessary whenever there is a need to restore critical infrastructure such as utilities
Timeframe:	As soon as an assessment is completed for levels of contamination for critical infrastructure

Decision ID	Decision
Responsible Entity:	Incident Command with the Safety Officer
Support Information:	The latest assessment information from the FRMAC
Notification:	Response personnel and utilities
Execution:	Environmental Response, Health and Safety Core Capability, ESFs #1, #2, #3, #8, #10, and #12

Decision ID	Decision
B2D2b4	Long-term clean-up goals
Criteria:	Once the extent of contamination is understood
Timeframe:	Once a full characterization of the incident can be made to determine extent of contamination
Responsible Entity:	State and local decision makers and in conjunction with Lead Federal Agency
Support Information:	Input from the stakeholder and technical working groups for long-term clean up goals
Notification:	Unified command and public
Execution:	Environmental Response, Health and Safety Core Capability, ESFs 2#, #3, #8, #10, #11, and #12

Decision ID	Decision
B2D2b5	Long-term waste management
Criteria:	Once the determination is made that existing capacity for disposition of radioactive waste will be exceeded
Timeframe:	When there are reliable estimates for volume of waste that will need disposal
Responsible Entity:	State and local decision makers in coordination with FCO/UCG" (at least for Stafford incidents)
Support Information:	Input from the stakeholder and technical working groups for waste disposal options
Notification:	Unified command
Execution:	Environmental Response, Health and Safety Core Capability, ESFs #3, #8, #10, and #12

B2D2b6	When and how to make radiation monitoring data available to the public.
Criteria:	When radiation monitoring data indicate levels of radioactive materials in the environment at greater than background levels.

Decision ID	Decision
Timeframe:	Once radiation monitoring data have been collected and necessary quality assurance checks have been completed.
Responsible Entity:	Unified Command, in coordination with the Joint Information Center
Support Information:	Fully quality assured radiation monitoring data
Notification:	The states and localities in the affected areas, and then the public
Execution:	Environmental Response, Health and Safety Core Capability, ESFs #8, #10, and #15, Health and Social Services Recovery Support Function

Phase 2c Decisions

Decision ID	Decision
B2D2c1	Emergency work involving contaminated structures under Stafford Act events
Criteria:	An event involving the release of nuclear/radioactive material, that receives an emergency or major disaster declaration under the authority of the Stafford Act The identification of contaminated structures, whether publicly or privately owned, that pose an immediate threat to public health and safety or the environment
Timeframe:	Presumably in the response phase; however, the timeframe is based on consultation between the FEMA, the EPA, acting under ESF #10, and the USACE, acting under ESF #3
Responsible Entity:	The EPA, acting under ESF #10, in consultation with the FEMA, is responsible for providing technical assistance for the assessment and stabilization of contaminated structures The USACE, acting under ESF #3, is responsible for evaluating the structural instability of contaminated structures If demolition is required, the USACE is responsible for the demolition of contaminated structures in consultation with the EPA and the FEMA
Support Information:	The identification of the character and extent of contamination of the structure The potential threat the contaminated structure poses to public health and safety or the environment
Notification:	The Federal Coordinating Officer and Joint Field Office leadership
Execution:	The FEMA and ESFs 2#, #3 and #10

Phase 3 Decisions

Decision ID	Decision
B2D3a1	Permanent work involving contaminated structures under Stafford Act events
Criteria:	An event involving the release of radioactive material that receives an emergency or major disaster declaration under the authority of the Stafford Act The identification of publicly owned radiation-contaminated structures that were not addressed during the response phase as part of emergency work The contaminated structure would require an assessment by the EPA to determine the character and extent of contamination, and an assessment by the USACE to determine structural instability Based on available radiological and nuclear capabilities, eligible work may be performed through FEMA mission assignments in consultation with ESFs #3 and #10 Reimbursement may be authorized under a Stafford Act declaration for eligible work performed by eligible applicants with radiological and nuclear capabilities or contracted by an eligible applicant, assuming all other eligibility factors are met The incident specific cleanup standards determined through the stakeholder and technical working group process described in the EPA Protective Action Guide Manual will impact the scope and cost of eligible work
Timeframe:	Recovery phase based on consultation with FEMA, ESFs #3 and #10, the Infrastructure Systems Recovery Support Function, and the applicant
Responsible Entity:	FEMA
Support Information:	The character and extent of the contamination An assessment of the contamination by EPA An evaluation of the structural instability by USACE Available radiological and nuclear capabilities
Notification:	The Federal Coordinating Officer and Joint Field Office leadership
Execution:	FEMA, ESFs 2#, #3 and #10, the Infrastructure Systems Recovery Support Function, and the applicant

Decision ID	Decision
B2D3a2	Does a 'Disaster Initiated Review' need to be accomplished?
Criteria:	Possible reduction of outside response organizations preparedness outside a nuclear power plant
Timeframe:	Prior to nuclear power plant restart or as a criteria for nuclear power plant shutdown due to lack of preparedness.
Responsible Entity:	The FEMA Radiological Emergency Preparedness Program in conjunction with the NRC

Decision ID	Decision
Support Information:	Situational awareness
Notification:	The NRC and the Nuclear/Radiological Incident Task Force
Execution:	FEMA and NRC

Branch 3: Federal Response to International Nuclear/Radiological Incidents

Situation

A significant nuclear/radiological incident, whether caused by inadvertent or deliberate means, may disperse radioactive material beyond the site of release causing harm not only to a specific area or country but also to the international community, resulting in unforeseen consequences for the health, safety, and security of populations. Advances in technology, the speed of knowledge transfer, and accessibility to materials, as well as accidents caused by human error or natural disasters, may make this event increasingly likely. An international nuclear/radiological incident demands careful and thorough coordination of all U.S. national capabilities and capacities to mount an appropriate response to such a catastrophic event. In particular, special consideration must be paid to Chief of Mission authority and all federal agencies conducting work in the affected foreign country must do so with the approval of the U.S. Chief of Mission in that country.

Purpose

This branch plan provides supplemental information regarding overseas events to the Nuclear/Radiological Incident Annex Base Plan. The branch plan also addresses U.S. assistance for incidents that originate in the United States. (domestic incidents) that have international impacts leading to requests for U.S. assistance. This branch of the annex will help guide federal interagency partners to respond in a coordinated fashion to support foreign government efforts to save lives, protect property and the environment, and meet basic human needs when there is an incident involving nuclear/radioactive material. There is also a responsibility to protect U.S. citizens abroad, as well as other U.S. resources such as military installations and equipment, embassies and consulates.

Scope

This branch plan applies to all federal response and recovery efforts, both domestic and international, as they pertain to the unique circumstances of international nuclear/radiological incident types listed below:

- Inadvertent or deliberate foreign incidents involving nuclear/radioactive material that directly impact or threaten to impact the United States.
- U.S. Government support of foreign government efforts in response to and/or recovery from a foreign incident that may/may not affect the territory of the United States.
- U.S. Government support to foreign government efforts in response to and/or recovery from a foreign incident.

International Incidents that Directly Impact or Threaten to Impact the United States

Incidents at foreign facilities could directly impact U.S jurisdictions and interests. A nuclear liability insurance framework does not exist to protect those impacted by these foreign radiological incidents. Impacted state and local governments may require additional federal support to respond to and recover from these foreign incidents. The Department of State (DOS) will lead coordination with foreign governments and the International Atomic Energy Agency (IAEA).

Depending upon the nation where the nuclear/radiological incident is located, nuclear liability insurance may be available to protect those impacted. U.S. citizens may be able to make claims for damages or injuries incurred in the incident nation. If the incident nation is a party to the Convention on Supplementary Compensation for Nuclear Damage, U.S. victims should be able to obtain compensation for damages and injury.

U.S. Government Support to Foreign Governments

In June 2014, a National Security Council Interagency Policy Committee finalized and approved the International Chemical, Biological, Radiological, Nuclear Response Protocol. The Protocol provides principles, guidance, and considerations for the U.S. Government response to a catastrophic, international chemical, biological, or radiological, nuclear incident. In addition, the Protocol calls for the development of an associated concept of operations that will be used as an implementing guide for all U.S. departments and agencies involved in a chemical, biological, radiological, and nuclear response. All planning and guidance being offered within this document regarding international response shall adhere to the International Chemical, Biological, Radiological, Nuclear Response Protocol and any associated Overseas Response Concept of Operations. This branch plan also addresses U.S. assistance for incidents that originate in the U.S. (domestic incidents) that have international impacts leading to requests for U.S. assistance.

Planning Assumptions and Critical Considerations

Planning Assumptions

The following planning assumptions assist in the development of an operational environment for response to and recovery from an inadvertent nuclear/radiological incident:

- An international nuclear/radiological response will most likely be conducted by the affected country, along with members of the international community, including the United States.
- The scale of the event will overwhelm the affected nation’s capability to respond.
- The affected nation will have primary responsibility for all aspects of incident command and response to nuclear/radiological events, including requesting bilateral and/or multilateral international assistance, deploying its domestic emergency response forces, and coordinating with foreign partners and international organizations to augment existing domestic capabilities and resources.

- It may take several days after a catastrophic international nuclear/radiological incident before the affected nation can assess the magnitude of hazards associated with the nuclear/radiological incident, its internal ability to respond effectively to those hazards, and its need for assistance from the U.S. Government and international community.
- Requests for U.S. Government assistance after an international nuclear/radiological incident may come from affected partner nations or international organizations, such as the IAEA or the World Health Organization, and are coordinated by DOS.[80]
- All requests for U.S. Government assistance following an international nuclear/radiological event will follow the structure outlined in the International Chemical Biological Radiological Nuclear Response Protocol and associated concept of Operations.
- As such, DOS will serve as the lead federal agency for U.S. response assistance to a nation affected by an international nuclear/ radiological incident for proper coordination.
- Requests for U.S. Government resources will depend on the capabilities and capacity of the affected nation, its allies, and neighboring countries, as well as intergovernmental, international, and nongovernmental organizations; Requests for U.S. Government assistance may also be made by nations party to the Convention on Assistance in the Cases of a Nuclear Accident or Radiological Emergency.
- National and international media will have an intense interest in any response to an international nuclear/radiological incident, and their coverage will influence the decisions of important political decision makers in the United States and abroad.
    - There will be an immediate need for a coordinated U.S. Government public communication effort incorporating risk communication principles to address the scope and extent of the event, the potential consequences, and potential posture for potential U.S. Government support.
    - Any such U.S. Government public communication effort will be coordinated with affected partner nations and international organizations via DOS, where appropriate, to avoid inconsistent messaging.

Critical Considerations

The following critical considerations pertain to international nuclear/radiological incidents:

- The U.S. Government decision-making processes must be adaptable and agile enough to meet the unique needs appropriate to each international nuclear/radiological incident. In addition, while considering domestic implications, federal agencies must—
    - Ensure U.S. Government response operations or activities are respectful of the affected nations' sovereignty and laws and must comply with relevant U.S. statutory requirements and restrictions on foreign aid, existing international treaties and conventions, agreements, and applicable policy arrangements with foreign countries and international organizations.
    - In extreme situations, be prepared to develop options to exercise the President's responsibilities to safeguard the lives of U.S. citizens when the affected nation(s) are unable to do so after an international nuclear/radiological incident.

[80] Under the International Health Regulations (2005) Framework, the World Health Organization is responsible for declaring a Public Health Emergency of International Concern, which may include a nuclear/radiological incident.

  - Be guided by an understanding of the mechanisms and authorities that may be available to allocate funding for nuclear/radiological support, when required.
- In any case involving an international nuclear/radiological incident, all federal agencies must conduct their activities abroad under the auspices and with the knowledge and permission of the U.S. Chief of Mission in the applicable foreign nation(s). In addition, federal agencies must report all requests and offers of assistance and stand prepared to work with any task force established by the DOS to address the U.S. Government's response to the incident.

Mission

There are two missions outlined in this branch plan: (1) to save lives, protect property and the environment, restore critical infrastructure, re-establish an economic and social base, and support community efforts to successfully overcome the physical, psychological, and environmental impacts of an international nuclear/radiological incident at the site of the incident and (2) to coordinate the assessment of potential impacts of a foreign nuclear incident and to communicate risks, consequences and protective actions to inter-government partners and the public within the United States and abroad.

Execution

Operational Phases

Phase 2a

Phase 2a begins with discovery or notification of a radiological incident. This phase is dominated by efforts to understand the potential and actual radioactive releases impacting the United States and provide accurate and credible information to the public to convey protective action decisions and reinforce pre-planning. Actions intended to support U.S. citizens overseas will likely be an initial priority of the U.S. Government, over the delivery of resources intended to assist the affected nation. The Chief of Mission will engage the affected nation on needs, capabilities, and assistance requests.

Phase 2b

Phase 2b begins when monitoring and sampling capabilities are operational and public information has been provided. Phase 2b will likely include the receipt of requests for assistance from the affected nation and initial development of offers of assistance by U.S. Departments and Agencies.

- As part of the Emergency Action Plan, DOS and the U.S. Mission maintain formal processes for crisis management and coordination at post for incidents that affect the Mission or the host country. The Chief of Mission, based on plan, may make a disaster declaration, as appropriate.
- DOS will open dialogue with other foreign governments and nongovernmental organizations to seek information transfer and response support.

- DOS will determine the content and timing of public messaging, coordinating with the National Security Council Staff as necessary.

Phase 2c

Phase 2c begins when all in-country U.S. citizens have been evacuated (if appropriate) and are being sustained through mass care and recovery efforts. Phase 2c might also include the delivery of requested assistance packages to the affected nation by U.S. departments and agencies.

Federal Agency Roles and Responsibilities

National Security Council

The National Security Council is the President's principal forum for considering national security and foreign policy matters with his senior national security advisors and cabinet officials, and is the forum for providing input to the President to determine U.S. Government policy in the event of a significant international nuclear/radiological event. Among its other considerations in determining the U.S. Government's response to a significant international nuclear/radiological event, the National Security Council will be required to balance the needs of the requesting country/international organization with any potential domestic needs within the United States, especially when directing national resources. The National Security Council will coordinate with the DOS, Office of Management and Budget and other White House offices when managing the U.S. Government's response to an event.

The National Security Council staff supports all White House policymaking activities related to international, transnational, and homeland security matters, in support of the President and the National Security Council. This support includes meetings at the Cabinet Secretary (Principals) and/or Deputy Secretary (Deputies) level and establishment of an interagency policy committee to provide policy coordination at the Assistant Secretary level, in accordance with Presidential Policy Directive – 1.

Department of State

DOS has the lead responsibility for matters involving protection of U.S. Government personnel on official duty abroad and their accompanying dependents and promoting the safety and security of private U.S. citizens. DOS is the lead coordinating agency for U.S. Government response to U.S. Chief of Mission and/or host nation requests for support to international nuclear/radiological incidents. DOS will manage the provision of humanitarian assistance to refugee populations affected by the incident, in coordination with United States Agency for International Development/Office of Foreign Disaster Assistance. For nuclear/radiological incidents that may be terrorist-related,

DOS coordinates the overall U.S. Government response to the incident and will also coordinate with the Attorney General and the Federal Bureau of Investigation (FBI) Director whenever those incidents are perpetrated by or directed at U.S. citizens or are directed at U.S. interests or institutions abroad and fall within the federal criminal jurisdiction of the United States. DOS has the responsibility for handling issues related to the safety and security of U.S. private citizens overseas, which includes compliance with the DOS "No Double Standard" policy of providing members of the official and non-official U.S. community with relevant security information as

well as coordinating available assistance to private U.S. citizens. DOS also coordinates U.S. Government assistance to U.S. private citizens and works to provide information regarding other assistance that may be available to them from host country officials or nongovernmental entities, as appropriate. DOS will be the point of contact for notifications under the Convention on Early Notification of a Nuclear Accident and for requests under the Convention on Assistance in the Case of a Nuclear Accident or Radiological Emergency.

U.S. Mission

The U.S. Chief of Mission, typically an ambassador, is the President's official representative in a foreign country and, under the direction of the President, has responsibility for the direction, coordination, and supervision of all U.S. Government executive branch employees in that country (except for those under the command of a U.S. area military commander, under another chief of mission, or on the staff of an international organization). These responsibilities include, among other things, speaking with one voice to others on U.S. policy and ensuring mission staff do likewise; cooperating with the U.S. legislative and judicial branches so that U.S. foreign policy goals are advanced, security is maintained, and executive, legislative, and judicial responsibilities are carried out; reviewing communications to or from mission elements; and taking direct responsibility for the security of the mission and protecting U.S. Government personnel on official duty (other than those personnel under the command of a U.S. area military commander) and their dependents. The mission's Emergency Action Committee supports the U.S. Chief of Mission in security and crisis planning and management. Through the Emergency Action Plan, DOS and the U.S. Mission maintain formal processes for crisis management and coordination at post for incidents that affect the Mission or the host country.

United States Agency for International Development's Office of U.S. Foreign Disaster Assistance

The U.S. Agency for International Development/Office of Foreign Disaster Assistance (OFDA) is the federal lead for managing the provision of U.S. Government international humanitarian assistance and disaster response as specified under the Foreign Assistance Act of 1961, in that the Agency's Administrator is the President's Special Coordinator for International Disaster Assistance as established in section 493 of the Foreign Assistance Act. With a mandate to save lives and reduce human suffering, OFDA's approach to a nuclear/radiological response will focus on providing lifesaving assistance (food, water, shelter, and medicine) to the population that is affected by the incident as afforded in the Agency's broad authority to provide disaster assistance pursuant to section 491 of the Foreign Assistance Act. OFDA provides yearly guidance to all posts for Disaster Planning and Response outlining the support from OFDA before, during, and after the occurrence of natural and man-made disasters abroad. Procedures highlight the need for continuous collaboration in the planning process for disaster response as well as regular and sustained communication between mission disaster relief officers and the U.S. Agency for International Development/OFDA regional staff to ensure timely, appropriate, and effective U.S. Government emergency response and humanitarian assistance.

Department of Defense

When requested by DOS and directed by the Secretary of Defense, DOD can support international nuclear/radiological incident operations to the extent allowed by law and agreement

and subject to the availability of DOD nuclear/radiological capabilities and resources. At the request of foreign civilian officials in geographic proximity to DOD installations in affected partner nations, a U.S. military commander with assigned forces at or near the immediate scene of a foreign disaster may take prompt action to save human lives.

Department of Energy/National Nuclear Security Administration

Department of Energy/National Nuclear Security Administration (DOE/NNSA) leverages its unique expertise in nuclear security to provide the U.S. Government response with the capability to respond to any nuclear or radiological incident abroad. DOE/NNSA supports international initiatives in radiological/nuclear emergency response and implements state-of-the-art radiological environmental and atmospheric monitoring and modeling, coupled with state-of-the-art assessment techniques and technologies, for use by its deployed incident response teams worldwide. DOE/NNSA's consequence management mission capabilities support response and short-term recovery activities by characterizing the environment in support of public health and safety decision making, including subject matter expert consultation relevant to medical management. DOE/NNSA works with many foreign governments and international counterparts to build capacity for effective emergency response.

United States Nuclear Regulatory Commission

The Nuclear Regulatory Commission (NRC) provides subject matter expertise on radiological and technical issues related to nuclear power plant and nuclear fuel cycle technologies, and radioactive materials to the U.S. Chief of Mission in the affected country. In support of the U.S. Chief of Mission, the NRC can provide ongoing assessment of radiological conditions, dose predictions, and protective action recommendations for U.S. citizens abroad. The NRC also maintains working relationships with many international regulatory counterparts. Depending upon incident specifics, the NRC could use these established relationships to facilitate incident - related communication and provide technical advice and assistance to the affected country.

Department of Health and Human Services

The Department of Health and Human Services (HHS), through the Office of the Assistant Secretary for Preparedness and Response—

(1) Provides leadership in international programs, initiatives, and policies with public health and medical emergency preparedness and response.

(2) Provides leadership for HHS activities during the U.S. nuclear/radiological response to an affected nation in close coordination with other U.S. Government agencies.

(3) In collaboration with the Centers for Disease Control and Prevention and Secretary of Homeland Security—

a. Exercises the responsibilities and authorities of the HHS Secretary with respect to coordination of the Strategic National Stockpile (a stockpile of drugs, vaccines, biological products, medical devices, and supplies to provide for U.S. emergency health security),

b. Directs the deployment of Strategic National Stockpile assets in Emergency Support Function (ESF) #8 responses and has deployment authority for federal (non-DOD) medical personnel (including the National Disaster Medical System). The HHS Assistant Secretary for Global Affairs coordinates international health and human services policy, research, and global health diplomacy for the HHS.

(4) Manages the U.S. International Health Regulations National Focal Point. The National Focal Point manages the U.S. assessment and notification process related to domestic potential public health emergencies of international concern emergency communications, including nuclear/radiological events, and the sharing of information related to potential public health emergencies of international concern with the World Health Organization and other International Health Regulations National Focal Points worldwide.

In response to an international event, HHS core public health capabilities that may support the U.S. Government response efforts include Public Health Assessment and Disease Control (Emergency Environmental Health Service; Disease Surveillance, Prevention, and Control); Mass Disaster Response (Direct Medical Care, Patient Evacuation Support, and Mass Fatality Management); Protect Responder/Worker Safety and Health; Nuclear/Radiological Public Health and Medical Consultation, Technical Assistance, and Support; and Health/Medical Equipment and Supplies (medical countermeasures including medical supplies, biologics, pharmaceuticals, blood products, vaccines and antitoxins).

Department of Homeland Security

In the event that a major nuclear/radiological incident happens anywhere in the world, The Department of Homeland Security (DHS) would immediately begin reassessing the threats, vulnerabilities, and protective posture for the homeland. DHS, in coordination with interagency partners, will monitor the requests for international deployment of federal resources. When the international deployment of a federal resource creates a potential shortfall in the U.S. Government's ability to safeguard the homeland, DHS shall immediately notify the parent department/agency and the National Security Council of the potential conflict. DHS would also take steps to assess and mitigate any direct impacts from the nuclear/radiological event on DHS operations, particularly in cases that involve its neighbors in the Caribbean, Mexico, or Canada. For example, DHS will assess the need to increase its border and/or transportation security screening procedures, implement specific protocols to resolve any security or safety risks that are identified with inbound travelers and/or cargo and consider requests for deployment of specialized DHS capabilities within its existing authorities. The DHS National Operations Center will produce a common operating picture available on the Homeland Security Information Network for an international nuclear/radiological event when the incident affects or threatens U.S. interests. DHS will include consolidated State Task Force status reports in the national common operating picture which enables all agencies, including embassy personnel, to have situational awareness from anywhere in the world. FEMA will activate the Interagency Modeling and Atmospheric Assessment Center (IMAAC) to coordinate the U.S. Government's atmospheric modeling efforts consistent with interagency agreements.

Environmental Protection Agency

The Enviornmental Protection Agency's (EPA) primary mission is the protection of human health and the environment. The EPA maintains a continuous nationwide environmental radiation-monitoring program, RadNet. During a foreign incident that causes real or perceived environmental effect in the United States or its territories, the EPA's response focuses on assessing any radiological effects on the United States and informing the public of public health risks or long-term consequences. The EPA Airborne Spectral Photometric Environmental Collection Technology aircraft can respond to an international incident upon request. The EPA has broad experience in dealing with large-scale environmental disasters and complex hazards. Using this experience, the EPA can support foreign assistance efforts with technical expertise relating to preparedness, assessment, and cleanup. Within the United States, the EPA can provide dose assessment and environmental survey support, remediation and waste management advice, and technical recommendations on various environmental concerns relating to the release of radioactive material. The EPA has agreements in place with Canada and Mexico in that regard, but has historically provided assessment and technical assistance all over the world.

U.S. Department of Agriculture

The U.S. Department of Agriculture capabilities in supporting an international nuclear/radiological incident include assistance in assessment of damage to crops, soil, livestock, and poultry, and related processing facilities; assessments of agricultural trade impacts; technical assistance for the management of contaminated animals, crops, and related products and facilities; and technical assistance for the management of contaminated non-agricultural animals.

Department of Commerce/National Oceanic and Atmospheric Administration

The Department of Commerce/National Oceanic and Atmospheric Administration (NOAA) provides predictions of weather, atmospheric and oceanic dispersion, ocean state, and marine debris. NOAA is the U.S. participant in the World Meteorological Organization Regional Specialized Meteorological Center program. In that role, NOAA provides atmospheric dispersion predictions to other World Meteorological Organization member states and would be prepared to share its predictions with requesting federal agencies, including the State Task Force. NOAA is a member of the IMAAC, which would coordinate any use of these predictions as the U.S. Government position.

Department of Justice/Federal Bureau of Investigation

The Attorney General, generally acting through the FBI, has lead responsibility for investigations of terrorist acts or terrorist threats, including those involving weapons of mass destruction, and those that are perpetrated by or directed at U.S. citizens or U.S. interests or institutions abroad where such acts are within the federal criminal jurisdiction of the United States. In coordination with DOS, where appropriate and in a manner consistent with U.S. Chief of Mission authorities, the Attorney General/FBI has lead responsibility for the U.S. Government's investigative response overseas to acts of terrorism. By policy, if a U.S. citizen or interest is affected by an actual international nuclear/radiological incident, the presumption is terrorism, and it will be investigated by the FBI as such until determined otherwise by the Attorney General. The FBI will designate a senior representative who will coordinate the FBI's response with the

appropriate embassy personnel. Requests for access to FBI crimes scenes should be coordinated with this senior representative.

Office of Science and Technology Policy

The White House Office of Science and Technology Policy serves as a source of scientific and technological analysis and judgment for the President with respect to major policies, plans, and programs of the Federal Government. The Office of Science and Technology Policy Director's primary function is to provide "advice on the scientific, engineering, and technological aspects of issues that require attention at the highest levels of Government," including advising the President on the effects of science and technology on domestic and international affairs.

International Nuclear and Radiological Event Scale

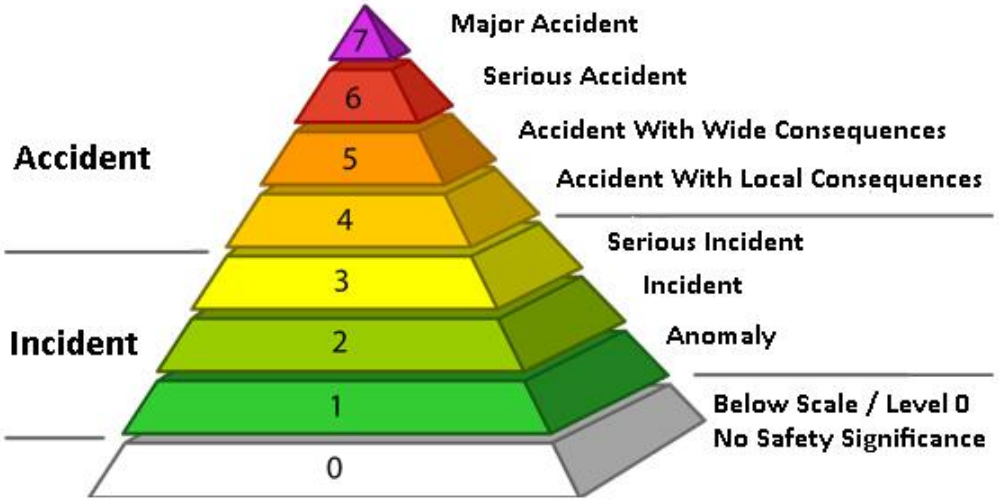


Figure 16: International Nuclear and Radiological Event Scale

The International Nuclear and Radiological Event Scale (**Figure 16**) is a worldwide tool for communicating to the public in a consistent way the safety significance of nuclear and radiological events. The Event Scale explains the significance of events from a range of activities, including industrial and medical use of radiation sources, operations at nuclear facilities, and transport of radioactive material. Events are classified on the scale at seven levels: Levels 1 to 3 are called "incidents" and Levels 4 to 7 "accidents." The scale is designed so that the severity of an event is about 10 times greater for each increase in level on the scale. Events without safety significance are called "deviations" and are classified Below Scale/Level 0. The scale is only intended for use in civil (non-military) applications and only relates to the safety aspects of an event. The International Nuclear and Radiological Event Scale is not intended for use in rating security-related events or malicious acts to deliberately expose people to radiation.

The International Nuclear and Radiological Event Scale applies to any event associated with the transport, storage, and use of radioactive material and radiation sources, whether or not the event occurs at a facility. It covers a wide spectrum of practices, including industrial use such as

radiography, use of radiation sources in hospitals, activity at nuclear facilities, and transport of radioactive material. It also includes the loss or theft of radioactive sources or packages and the discovery of orphan sources such as sources inadvertently transferred into the scrap metal trade. When a device is used for medical purposes (e.g., radiodiagnosis or radiotherapy), the Event Scale is used for the rating of events resulting in actual exposure of workers and the public, or involving degradation of the device or deficiencies in the safety provisions. Currently, the scale does not cover the actual or potential consequences for patients exposed as part of a medical procedure. In addition, the apparent severity of the incident and accident levels does not necessarily reflect the severity of worker exposure during such incidents.

Table 3 below details a general description of nuclear and radiological accidents and incidents by considering three areas of impact along with the seven event levels.

Table 3: General Description of International Nuclear and Radiological Event Levels

INES Level	Impact on People and Environment[81]	Impact on Radiological Barriers and Control[82]	Impact on Defense-in-Depth[83]
Major Accident Level 7	• Major release of radioactive material with widespread health and environmental effects requiring implementation of planned and extended countermeasures		
Serious Accident Level 6	• Significant release of radioactive material likely to require implementation of planned countermeasures		
Accident with Wider Consequences Level 5	• Limited release of radioactive material likely to require implementation of some planned countermeasures • Several deaths from radiation	• Severe damage to reactor core • Release of large quantities of radioactive material within an installation with a high probability of significant public exposure. This could arise from a major criticality accident or fire	
Accident with Local Consequences Level 4	• Minor release of radioactive material unlikely to result in implementation of planned countermeasures other than local food controls. • At least one death from radiation	• Fuel melt or damage to fuel resulting in more than 0.1% release of core inventory • Release of significant quantities of radioactive material within an installation with a high probability of significant public exposure	
Serious Incident Level 3	• Exposure in excess of ten times the statutory annual limit for workers • Non-lethal deterministic health effect (e.g., burns) from radiation	• Exposure rates of more than 1 Sievert/hour in an operating area • Severe contamination in an area not expected by design, with a low probability of significant public exposure	• Near accident at a nuclear power plant with no safety provisions remaining • Lost or stolen highly radioactive sealed source • Mis-delivered highly radioactive sealed source without adequate procedures in place to handle it
Incident Level 2	• Exposure of a member of the public in excess of 10 millisieverts • Exposure of a worker in excess of the statutory annual limits	• Radiation levels in an operating area of more than 50 millisieverts/hour • Significant contamination within the facility into an area not expected by design	• Significant failures in safety provisions but with no actual consequences • Found highly radioactive sealed orphan source, device or transport package with safety provisions intact • Inadequate packaging of a highly radioactive sealed source
Anomaly Level 1			• Overexposure of a member of the public in excess of statutory annual limits • Minor problems with safety

[81] Considers the radiation doses to people close to the location of the event and the widespread, unplanned release of radioactive material from an installation.

[82] Covers events without any direct impact on people or the environment and only applies inside major facilities. It covers unplanned high radiation levels and spread of significant quantities of radioactive materials confined within the installation.

[83] Also covers events without any direct impact on people or the environment, but for which the range of measures put in place to prevent accidents did not function as intended.

INES Level	Impact on People and Environment[81]	Impact on Radiological Barriers and Control[82]	Impact on Defense-in-Depth[83]
			components with significant defense-in-depth remaining • Low activity lost or stolen radioactive source, device or transport package
No Safety Significance (Below Scale / Level 0)			

Core Capability Specific Guidance

The following information references external guidance or recommendations to further inform the user of the Nuclear/Radiological Incident Annex. For guidance related to core capabilities not shown, refer to the Response and Recovery Federal Interagency Operational Plans.

Planning

The EPA has conducted preparedness drills for foreign nuclear incidents and has a regionally dispersed radiation expertise to provide assessment of potential impacts from foreign incidents, public information, and detailed monitoring using RadNet: http://www2.epa.gov/radnet.

Public Information and Warning

Improvised Nuclear Device Response and Recovery: Communicating in the Immediate Aftermath (June 2013). Available at http://www.fema.gov/media-library/assets/documents/33036?id=7659.

Operational Coordination

When international incidents affect domestic U.S. populations, domestic coordination tools are a useful way to share information between federal, state, territory tribal and local entities (e.g., National Incident Communications Coordination Line calls and State Incident Communications Coordination Line calls). Radiological data may be shared among state, tribal, territorial, local, and federal organizations that conduct radiation monitoring on the RadResponder Network.

When international incidents require U.S. assistance delivered to an affected nation, DOS will lead U.S. response efforts. DOS and the appropriate Chief of Mission will configure themselves in order to manage the requests and offers of assistance regarding the affected nation, monitor events, and act as a conduit of information to policymakers and the impacted posts.

Department of State: DOS will likely stand up a State Task Force in order to expedite communication and coordination within the U.S. Government and provide decision makers with the most current and accurate information available. The State Task Force will receive all requests/offers of assistance from U.S. Government departments and agencies and the embassy Emergency Action Committee. Furthermore, the State Task Force consolidates, validates, and disseminates requirements to the interagency for the development of solution packages. The State Task Force will recommend completed interagency-formed solutions packages to the NSC for approval. The DOS Bureau of International Security and Nonproliferation will contact relevant U.S. Government Departments and Agencies in order to request the necessary interagency personnel to augment the State Task Force, if needed.

U.S. Mission: The Chief of Mission will lead the coordination of the U.S. Government response within the affected nation. The Chief of Mission may request the deployment of an interagency team to support the collection of information, validation and review of requests to/from the affected nation, and coordination of assistance packages from the United States and their corresponding implementation. This interagency team will serve as an interlocutor between the host country and U.S. Embassy. DOS will contact relevant departments and agencies in order to request the necessary personnel to augment the U.S. Mission, as necessary.

Administration, Resources, and Funding

See the Nuclear/Radiological Incident Base Annex.

Oversight, Coordinating Instructions, and Communications

See the Nuclear/Radiological Incident Base Annex.

Appendix 1: Executive Decision Points

This section will identify specific executive decision points and appropriate supporting information. Each decision is linked to a task in the Execution Schedule to this Branch Plan.

Phase 1 Decisions

None required.

Phase 2a Decisions

Decision ID	Decision
B3D2a1	Deployment of Additional Radiation Monitoring Resources within the United States and its Territories.
Criteria:	The spatial resolution of existing monitoring stations is insufficient to determine whether there are potential health impacts to the United States and its territories from a foreign nuclear incident
Timeframe:	As soon as global-scale atmospheric modeling products predicting the magnitude and extent of the release are available
Responsible Entity:	EPA
Support Information:	Global-scale atmospheric modeling products predicting the magnitude and extent of the release
Notification:	Advisory Team for Environment, Food, and Health, IMAAC
Execution:	Emergency Support Function #10

Phase 2b Decisions

None required.

Phase 2c Decisions

None required.

Phase 3 Decisions

None required.