BE PREPARED CALIFORNIA

California Department of Public Health
Nuclear Detonation Operational Plan

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EDMUND G. BROWN JR. *Governor*

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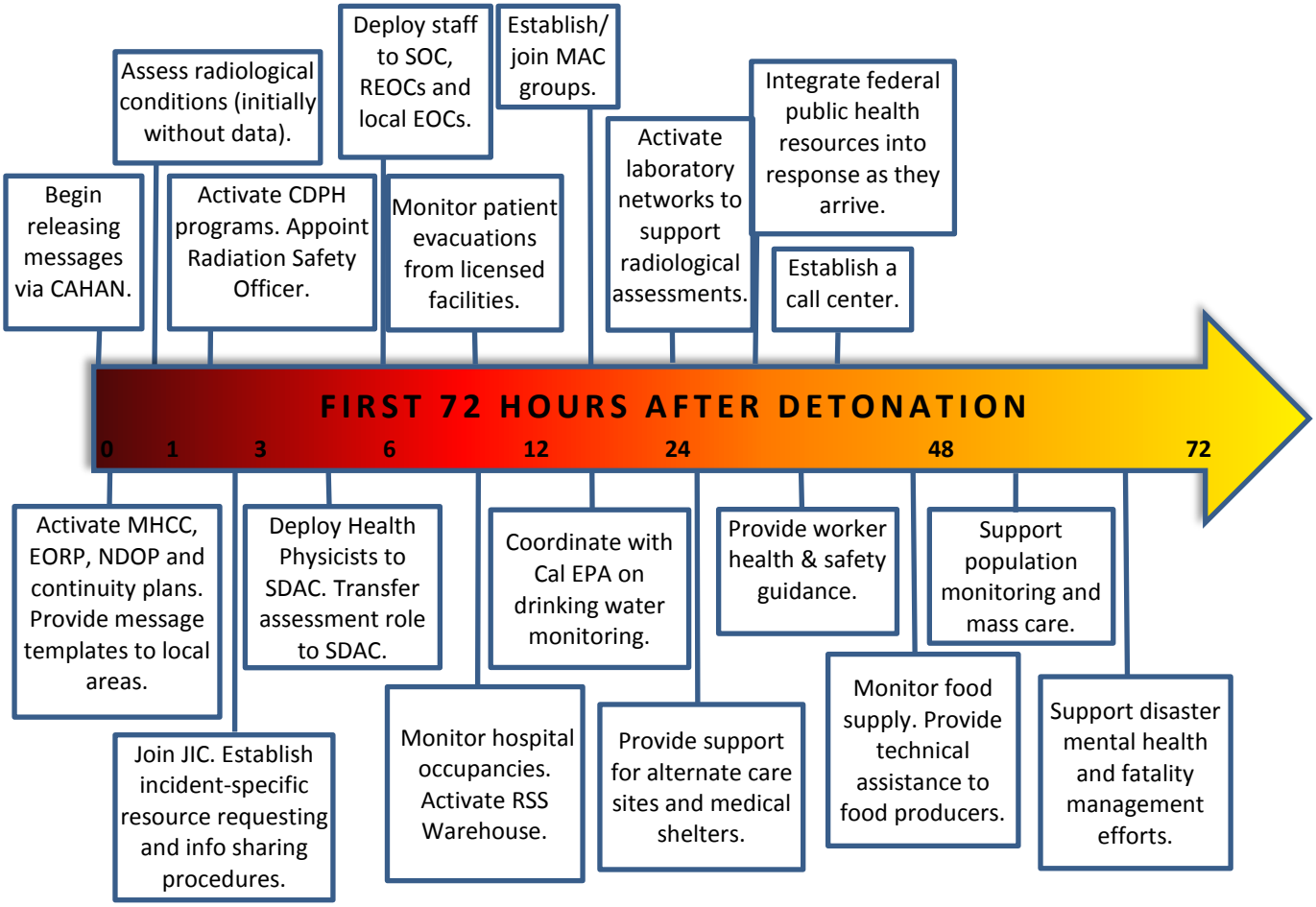
Emergency Procedures

In the event of a nuclear detonation emergency, turn to: Appendix A for emergency messaging templates, and Appendix B for course of action checklists.

CDPH response timeline for first 72 hours after a nuclear detonation



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Letter of Promulgation

Date: November 1, 2016

To: CDPH Staff

The California Department of Public Health (CDPH) is committed to responding to incidents that threaten or impact public health in a rapid, efficient and coordinated manner, and by so doing, reduce morbidity and mortality among California residents and visitors. CDPH maintains the CDPH Emergency Operations Response Plan (EORP) to support emergency response operations in alignment with the State of California Emergency Plan (SEP) and the Federal Emergency Management Agency (FEMA) Comprehensive Preparedness Guide 101. The Nuclear Detonation Operational Plan (NDOP) will function as an incident-annex to the EORP.

The NDOP annex is hereby promulgated and will be activated in accordance with the criteria herein established. It is my expectation that CDPH staff will become familiar with this Plan and take the necessary steps to carry out its provisions.

I would like to thank the dedicated CDPH staff who contributed to the development of this plan. This plan provides CDPH with a coordinated framework to proactively support emergency response efforts to ensure the best possible outcomes for Californians.

Sincerely,

Susan Fanelli

Susan Fanelli
Assistant Director

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Record of Changes

The table below reflects updates and changes to the NDOP annex to the CDPH EORP, including appendices. Upon approval of a change, this table and the updated pages will be distributed to entities identified on the following Record of Distribution.

Change Date	Document Version	Description	Pages Changed	Changes Made By

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Record of Distribution

Name	Program/Division	Date Given	Initials

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Table of Contents

1 - Introduction

The Nuclear Detonation Operational Plan (NDOP) is a hazard-specific annex to the CDPH Emergency Operations Response Plan (EORP), the Department's multi-hazard framework for comprehensive public health and environmental health emergency management. The NDOP is intended to guide CDPH response to the adverse impacts of the detonation of a nuclear device. The NDOP provides the basis for the CDPH response to an emergency based on the United States (U.S.) Department of Homeland Security National Planning Scenario #1: Nuclear Detonation – 10-kiloton (kt) Improvised Nuclear Device (IND).[1]

The NDOP organizes CDPH roles and responsibilities into emergency management phases as follows:

Table 1.1 Phases of a Nuclear Detonation Emergency

Preparedness	**Response**			**Recovery**	
Pre-incident Planning	Immediate Response	Intermediate Response I	Intermediate Response II	Short-term Recovery	Long-term Recovery
Prior to Event	Event +24 hours	1 to 3 days	3 to 14 days	14 to 90 days	90 days+
Without Substantial Federal Resources/Assistance			With Federal Resources/Assistance		

The phases of an actual nuclear detonation event cannot be accurately represented by such precise time periods as shown above given that response and recovery activities would overlap. However, the aforementioned incident phases do provide a useful framework for planning purposes. IND response and recovery phases are described herein differently from phases typically used in federal guidance to suit the unique planning considerations of the public health response.[2] The NDOP uses the set of response and recovery phase time periods shown in Table 1.1 to reflect the public health considerations of a nuclear detonation emergency.

[1]The National Planning Scenario #1 defines an IND "as an illicit nuclear weapon bought, stolen, or otherwise originating from a nuclear state, or a weapon fabricated in a completely improvised manner by a terrorist group from illegally obtained fissile nuclear weapons material that produces a nuclear explosion."

[2]"Early Phase" or "Emergency Phase" is used in federal guidance to describe the initial response period when quick decisions on protective actions are required; the NDOP uses the term "Immediate Phase." Federal guidance uses "Intermediate Phase" to describe the time period when field data is available upon which to make decisions; the NDOP breaks this period into the Intermediate Response I and Intermediate Response II phases.

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2 - Purpose and Scope

The purpose of the NDOP annex is to:

- Describe the unique characteristics of a nuclear detonation incident.
- Define the CDPH roles and responsibilities in responding to a nuclear detonation incident.
- Discuss specific capabilities and assets that CDPH maintains for responding to a nuclear incident that are not fully described in the EORP.
- Define partner agency roles and responsibilities in responding to the public health aspects of a nuclear detonation incident.
- Discuss the unique public health emergency information and warning requirements of a nuclear incident.
- Provide guidelines for the coordination and leadership of the public health response to a nuclear detonation incident.

The scope of the NDOP is focused on CDPH activities related to the following:

- Saving and sustaining life,
- Reducing injuries,
- Protecting responder health and safety,
- Supporting the provision of basic human needs, and
- Supporting recovery.

The NDOP does not address response to nuclear power plant (NPP) -related incidents or other types of radiation devices.

2.1– Relationship to Other Plans

The NDOP is aligned with the National Incident Management System (NIMS), the Standardized Emergency Management System (SEMS) and is consistent with the CDPH responsibilities summarized in the CDPH Administrative Order.

The NDOP is an annex to the CDPH EORP that augments and supports existing plans and orders including:

- *California State Emergency Plan (SEP)*
    - *California Emergency Function #8: Public Health and Medical Annex*
    - *California Radiological Emergency Preparedness Plan (CalREP)*
        - *State Dose Assessment Center (SDAC) Plan*
        - *Nuclear Power Plant (NPP) Plan*
- *California Department of Public Health Administrative Order, revised August 1, 2014*
- *California Public Health and Medical Emergency Operations Manual (EOM)*
- *California Department of Public Health Standards and Guidelines for Healthcare Surge During Emergencies*

- *California Department of Public Health Guidance for Sheltering Persons with Medical Needs*
- *California Department of Public Health Operational Plan and Procedures for Receiving and Distributing Medical Countermeasures*
- *California Department of Public Health Emergency Operations Response Plan (EORP)*
    - *Radiologic Health Branch Emergency Operations Response Plan*
    - *Division of Drinking Water and Environmental Management Emergency Operations Response Plan*
    - *Food and Drug Emergency Operations Response Plan*
- *California Department of Public Health Continuity Plan*

2.2 - Plan Organization

The NDOP is a hazard-specific annex to the CDPH EORP that is designed to identify the roles and responsibilities of CDPH including the Centers, Divisions, Branches and Programs that have emergency response roles as well as federal, state, and local agencies that have response roles. This plan includes appendices with additional information including a list of acronyms common to nuclear/radiological incident response and a glossary of terms used in the document.

3 - Situation and Assumptions

This section provides an overview of the nuclear detonation hazard and describes the assumptions that shaped the development of the NDOP. The actual impact of a nuclear detonation depends on many variables including, but not limited to, device size, placement, population density, local terrain, and meteorological conditions. A 10-kt IND is considered a relatively low yield device; it should be noted that the larger the yield of the nuclear device detonated, the greater the impact.

3.1 – Situation Overview

The National Planning Scenario #1: Nuclear Detonation assumes the discharge of a 10-kt nuclear weapon in a major metropolitan area. For purposes of this plan, it is assumed that the detonation occurs in a heavily urbanized area in California. Nonetheless, a nuclear incident that occurs in another state or nation may also trigger health-related concerns within California as well as possible population migration into or out of the state.

3.2 – Hazard Overview

The primary effects of a nuclear detonation include destructive blast forces, thermal energy, photoflash, electromagnetic pulse, and both initial (prompt) radiation and radioactive dust and particles known as fallout. Response to the incident would overwhelm local public health and medical response and seriously challenge state and federal capabilities, requiring substantial support from all levels of government. The response would be chaotic initially and become more coordinated in the days and weeks following the initial incident.

Impacts to Life and Health

A nuclear detonation in a major metropolitan area can be expected to cause hundreds of thousands of casualties varying in type and severity depending on the victim's proximity to the explosion. Injuries would include those caused by the pressure from the blast on ears and lungs, intense heat, fires, flying debris, and exposure to radiation and high intensity light. Injuries can be expected to include: blunt force trauma, punctures, lacerations, thermal and radiation burns, blindness, radiation sickness, and long-term health effects.

However injurious the detonation blast forces may be, more deaths and injuries can be expected to be caused by radiation exposure. The most critical component of the post-detonation response will be the protection of people from exposure to the fallout that presents a danger to life and health within minutes of the blast. Because evacuation may not be safe or practical immediately following a nuclear detonation and winds can change unpredictably, survivors in the areas surrounding the blast 50 miles in all directions should be initially instructed to shelter-in-place to reduce life-threatening doses of radiation. For sheltering to be effective in minimizing exposure, instructions should be disseminated pre-incident, if a credible threat is received, as

well as immediately and repeatedly after the detonation. Without these instructions, people may not realize the fallout danger and fail to take shelter or move into areas with dangerous levels of radiation through an attempt to self-evacuate. Once reliable radiation monitoring data are available, sheltering instructions will be modified to address actual conditions. Rescue teams and other emergency responders would be in peril of receiving life-threatening doses unless careful dose management is practiced. Dose management controls, including the initial sheltering-in-place for responders located near the detonation site, would be required to prevent injury. Radiation monitoring and application of protective measures (time, distance, shielding) must be employed to ensure responder safety.

A significant number of vehicle accidents can be expected due to the initial flash and debris cloud associated with the explosion. This will impede traffic movement until the roadways are cleared of damaged vehicles. People leaving areas subject to fallout contamination would require screening and assessment, and many would need to be decontaminated to remove radioactive materials. Screening and assessment of evacuees may be performed at locations set up for this purpose known as Community Reception Centers but would also be performed at hospitals, medical stations and alternate care sites for those with injuries. Dose assessment and tracking is necessary for those who have been exposed to radiation as the symptoms of radiation illness may not be immediately noticeable due to the potential for a latency period between exposure and the onset of symptoms. A patient registry should be considered for the purpose of tracking exposed individuals in order to mitigate long-term health effects.

A nuclear detonation has the potential to produce a large number of casualties with a combination of burn, trauma and radiation exposure injuries. Careful medical triage is essential to ensure that an appropriate level of care is provided under what may be extreme healthcare surge conditions. Mental and behavioral healthcare needs would also be acute in survivors, responders, healthcare workers and the public at large due to the traumatic nature of this type of incident. The scenario aftermath would include a continuum of disaster-related mental health impacts that range from temporary distress to mental health disorders that include Critical Incident Stress Reactions and Post Traumatic Stress Disorder, depression and traumatic grief.

Impacts to Critical Infrastructure and the Environment

Response activities would be complicated by damage to utilities, transportation and communication systems. Travel into the impacted area would be limited due to damaged roads and radiation exposure concerns. A phenomenon caused by a nuclear explosion known as an electromagnetic pulse (EMP) can cause significant disruption to electronic equipment making communications and emergency public messaging a challenge after this type of incident. The delivery of emergency medical care, dose assessment services, decontamination, and mass care to the affected population will present a huge logistical challenge. Responder agencies, hospitals,

and healthcare facilities would need to take steps to protect workers from radiation exposure. Concerns over the safety of food, drinking water and environmental contamination would linger for an extended period of time. People living in areas contaminated by fallout may need to be relocated until the areas are deemed safe to reenter and re-occupy. Impacted communities may require decontamination prior to re-occupancy. Re-occupancy and reuse standards would need to be developed for the restoration of property contaminated by fallout. The volume of contaminated material that would be generated in the cleanup of contaminated areas would likely overwhelm existing waste disposal facilities and pose a transportation challenge. Long-term recovery would continue for years and would be complicated by life-long health consequences from radiation exposure.

3.3 – Assumptions

The NDOP was developed using a number of assumptions that serve as the basis of understanding the response to the detonation of a 10-kt nuclear device in a major metropolitan area in California. The assumptions are as follows:

- A nuclear detonation would occur without notice.
- There would be a large number of fatalities in the heavily damaged area.
- There would be an immediate surge in healthcare demand due to trauma, burns and radiation exposure and other injuries that would overwhelm emergency medical systems.
- Local government would maintain primary responsibility for emergency response operations in the impacted areas.
- Responders would operate without substantial federal support for the initial 72 hours.
- A massive medical, public health and environmental health, and mental health response would be required.
- Local jurisdictions not directly affected by the detonation would provide mutual aid and assistance to support the health care surge and evacuation of people from affected area.
- People immediately downwind of the detonation would be exposed to life-threatening levels of radiation that would decrease sharply within the first few days.
- There would be an immediate need for emergency public messaging with instructions on how to avoid life-threatening exposure to radiation within the impacted area and the downwind fallout path.
- Infrastructure damage and/or an EMP can be expected to disrupt communications and other electronic systems in the area surrounding the detonation.
- There would be large numbers of displaced individuals who would require medical triage, dose assessment and decontamination services.
- Without adequate supportive medical care large numbers of individuals suffering from radiation injuries and Acute Radiation Syndrome would die.
- Widespread fear, stress and other mental health issues would require extensive mental and behavioral health support services.
- If more than one nuclear detonation occurs, or is anticipated, federal support would be less than could otherwise be expected.

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4 - Response Concept of Operations

This section describes the roles and resources of local, state and federal agencies and organizations that would be involved with public health response operations. A nuclear emergency would begin locally and quickly become a national event due to population movement, fallout migration, and the demand for resources. Therefore, it can be expected that response and recovery operations would take place across the country in addition to the areas immediate and adjacent to the detonation. Additional resources beyond those described in this section would be available from non-governmental organizations, other states, and the private sector.

A joint state/federal Unified Coordination Group (UCG) would be established using Incident Command System (ICS) concepts and principles consistent with the National Incident Management System (NIMS) and the Standardized Emergency Management System (SEMS), to coordinate the state and federal support to the impacted jurisdictions consistent with the priorities of the Governor, sovereign tribal nations, the local governments and the objectives set forth in this plan. The broad roles and responsibilities of local, state and federal organizations outlined in this section focus on public health operations that begin with emergency response and continue into recovery.

The California Emergency Function 8: Public Health and Medical (EF 8), in coordination with the federal Emergency Support Function 8 (ESF 8), would support local public health and medical response and recovery efforts through the protection, sustainment, and recovery of the public health and healthcare infrastructure. Due to the magnitude of a nuclear detonation emergency, acute care resources will be activated from throughout California, the federal government, other states, non-governmental organizations, and international organizations. Immediately following the event, EF 8 and ESF 8 would activate and coordinate public health and medical resources in support of the affected area(s). Federal health and medical resources would be critical to the response to this type of incident, therefore coordination must begin immediately.

During the healthcare surge triggered by a nuclear detonation in a densely populated urban area, the overall goal moves from individual-based care to population-based outcomes that challenge the professional, regulatory, and ethical paradigms of the healthcare delivery system. The standard of care would focus on saving the maximum number of lives possible.

A guiding principle of the response is that lifesaving actions take precedence over radiological considerations except near the detonation site where life-threatening levels of radiation will prevent responder entry initially. This means that people with life-threatening injuries would be treated and stabilized by medical personnel prior to addressing any radiological contamination.

4.1 – Role of Local Government

A nuclear detonation can be expected to overwhelm local response capabilities and seriously challenge state and federal capabilities. Local, regional, state and federal resources would be needed to care for the large numbers of survivors with medical needs resulting in healthcare surge conditions.[3] Local government would however, maintain primary responsibility for emergency response operations in the impacted areas and must be prepared to operate without substantial outside support for the first 72 hours.

It is recognized that the communities immediately surrounding the affected area, would likely take on responsibility for a large part of the medical and public health response including medical treatment and mass care of evacuees. Cities and counties adjacent to the impacted area can expect to activate their emergency response system to respond to the influx of evacuees who would require triage, monitoring, decontamination and medical care as well as emergency sheltering. More remote areas can expect to receive evacuees and patients transferred out of the impacted area and provide mutual aid assistance.

Evacuated survivors may be perceived as "contaminated" and a public health risk to receiving communities. Public safety officials will need to understand and explain the difference between persons who were exposed to radiation and those who may be contaminated by radioactive material. It should also be understood that survivor contamination by radioactive material is not considered a significant health risk to attending medical personnel or other responders.

The following summary of local roles and responsibilities is for informational purposes only. It must be understood that conditions will affect capabilities and resources will vary by location.

<u>Elected Officials</u>

- In coordination with the Local Health Officer (LHO), local elected officials consider the Protective Action Recommendations (PARs) developed by state and federal agencies and make Protective Action Decisions (PADs).

<u>First Responder Agencies (fire, law enforcement, hazardous materials)</u>

- In coordination with partner agencies, disseminate emergency public information and risk communication messages related to radiation exposure

[3] A healthcare surge is proclaimed by a local jurisdiction when the healthcare delivery system has been impacted, resulting in an excess in demand over capacity in hospitals, long-term care facilities, community care clinics, public health departments, other primary and secondary care providers, resources and/or emergency medical services.

- Hazardous materials response performs monitoring related to emergency responder health and safety, assists with evacuee screening and decontamination
- Develops criteria for emergency responder entry and operations within the radiologically-contaminated areas
- Monitors radiation levels at the Incident Command Post and other response facilities

Hospitals and Health Care Facilities

- Activate mass casualty/medical surge plans
- Triage, treat, and decontaminate incoming patients
- Coordinate patient movement and tracking, dispatching patients to other facilities as needed (e.g., to burn or trauma centers)
- Provide treatment for radiologically-exposed patients
- Address mental health issues due to widespread fear, stress and 'worried-well' concerns
- Coordinate mass fatality management of hospital and health care facility patients
- Provide special handling of radiologically-contaminated decedents and patient possessions
- Monitor healthcare worker radiation exposure

Emergency Management Agency

- In coordination with partner agencies issues critical public messages with protective action instructions
- Coordinates the sheltering-in-place/evacuation of residents
- Activates mutual aid systems
- Assists with activation of Metropolitan Medical Response System (MMRS), Disaster Healthcare Volunteers, Medical Reserve Corps, Government-Authorized Alternate Care Sites
- Activates mass fatality management plans and mutual aid agreements
- Coordinates resource requesting

Local Emergency Medical Services Agency (LEMSA)

- Coordinates the local emergency medical response including
    - Ambulance dispatch/patient transportation
    - Field Treatment Sites
- Manages local disaster medical system
- Coordinates patient distribution and tracking in conjunction with healthcare facilities
- Activates the local Disaster Health Care Volunteer system

Local Health Department (LHD)

- Local Health Officer (LHO) declares a local health emergency

- In coordination with partner agencies, issues emergency public information and risk communication messages related to radiation exposure
- Notifies hospitals of incident and tracks bed availability
- Activates healthcare surge plans including medical shelters, Government-Authorized Alternate Care Sites, et al.
- Provides public health support to general population shelters
- Ensures population monitoring through screening, dose assessment and decontamination services provided at Community Reception Centers
- Works with hospitals and other partners to ensure patient triage, decontamination and crowd control measures are implemented
- Initiates a registry for long-term health monitoring
- Distributes medical countermeasure and supplies
- Assesses radiation exposure and risk to vulnerable populations
- Works with state and federal agencies to identify laboratories that provide bioassay, biodosimetry and environmental services
- Works with local partners such as mental health to address fear, stress, and 'worried-well' mental health concerns
- Provides healthcare worker health and safety guidance
- Recommends disease prevention and control measures for displaced populations

Environmental Health Department (EHD)

- In coordination with partner agencies, issues emergency public information and risk communication messages related to radiation exposure
- Coordinates local radiation monitoring, sampling and laboratory analysis of environmental samples
- Monitors the safety of food, milk and water supplies
- Provides technical assistance to first responders
- Assists with Community Reception Center operations

4.2 – Role of State Government

The information below summarizes state agencies' response roles and responsibilities related to a nuclear detonation incident.

The Governor

- Has overall authority for directing state agency activities in an emergency
- Requests a major disaster or emergency declaration from the federal government
- Directs state agencies to utilize and employ resources to save lives and prevent or alleviate actual and threatened damage due to the emergency
- Can suspend regulatory statutes

State Agencies and Departments

California Governor's Office of Emergency Services (Cal OES)

- Responsible overall for coordination of the State's emergency response and recovery activities as described in the California Emergency Services Act
- Coordinates dissemination of emergency public information and risk communication messages through the activation of the Joint Information System (JIS) and a Joint Information Center (JIC)
- Activates:
    - State Operations Center (SOC) and Regional Emergency Operations Center (REOC)
    - State Dose Assessment Center (SDAC) that
        - Directs radiological field monitoring activities and surveys
        - Integrates complex data including field measurements into dose assessments
        - Develops protective action recommendations (PARs) for local decision makers
- Requests EF 8 Coordinator(s) for the State Operations Center (SOC), Regional Emergency Operations Center (REOC), and the Joint Field Office (JFO)
- Coordinates emergency response and recovery activities with the federal government:
    - Requests activation of Federal Radiological Monitoring and Assessment Center (FRMAC)and other federal assets
    - Requests assistance through the Emergency Management Assistance Compact (EMAC)
- Maintains a *Radiological Resources Guide* that lists teams, equipment and vendors
- Establishes a recovery coordination group

California National Guard (CNG)

- May provide law enforcement support for the movement of medical countermeasure resources in coordination with state and local law enforcement
- Provides the following support to local response:
    - Weapons of Mass Destruction–Civil Support Teams (WMD-CST) radiation survey teams and radiological sample analysis
    - Mass radiation decontamination services
    - Patient movement and evacuation assistance including air ambulance resources
    - Field hospitals, battalion aid stations and medical companies
    - Security forces for site control, medical stations and shelters

California Highway Patrol (CHP)

- Provides traffic control for the movement of evacuees, emergency equipment and personnel and security for the movement of medical countermeasures
- Assists with the dissemination of emergency public information and warnings

California Environmental Protection Agency (CalEPA)

- Monitors safety of drinking water sources
- Lead state agency for environmental recovery operations
- Supports response operations
- Assists in assessing risk to public health and the environment through fixed and mobile analytical laboratory capabilities
- Monitors management of mixed wastes (hazardous and radiological)

California Department of Food and Agriculture (CDFA)

- Supports assessment activities including disposition of contaminated livestock, food embargo or interdiction, field sampling, and other protective actions related to the food supply

California Department of Fish and Game (CDFG)

- Lead state responsibility for the protection of and recovery of fish, wildlife and other environmental resources

California Department of Transportation (CalTrans)

- Assess the status of roadways
- Supports the counties and the CHP in establishing road closures, traffic control, detours and/or alternate routes
- Assists in the evacuation of impacted populations
- Clears roadways of debris

California Occupational Safety & Health Administration (CalOSHA)

- Supports response operations related to occupational exposures to radiation

California Health and Human Services Agency (CHHS)

- Lead agency for coordination of public health and medical response to disasters
- Department of Public Health (see section 4.2.1)
- Department of Mental Health
    - Supports mental health needs
- Office of Statewide Health Planning and Development
    - Deploys inspection teams for acute care hospitals, skilled nursing facilities, and intermediate care facilities
- Department of Social Services
    - Supports local government in mass care and sheltering operations
- Emergency Medical Services Authority (EMSA)
    - Coordinates medical evacuation/patient movement and tracking at the state level
    - Coordinates with the Federal government for federal and interstate ambulance resources
    - Coordinates intrastate ambulance resources

- In coordination with local EMS agencies, mobilizes medical mutual aid
- Mobilizes and coordinates mutual aid resources and state mobile medical assets
  - Mobile Field Hospitals
  - California Medical Assistance Teams (CAL-MATs)
  - Medical Response Teams
  - Mission Support Teams
  - Medical supply caches
  - Ambulance Strike Teams (ASTs)
  - Disaster Medical Support Units
- Manages the Disaster Healthcare Volunteers (DHV) and Medical Reserve Corps (MRC) programs
- In coordination with CDPH, arranges for emergency procurement and distribution of medical countermeasures and supplies

4.2.1 – Role of CDPH

CDPH has the lead state-level responsibility for public health-related response under the State Emergency Plan (SEP) and is responsible for the coordination of public health activities during the response and recovery phases of an emergency. As such, CDPH administers and coordinates disaster-related public health programs and assesses impacts to the public health and medical systems. After a nuclear detonation, CDPH programs would respond through mission assignments or under their own authorities. The information below summarizes CDPH program response roles and responsibilities related specifically to a nuclear detonation incident.

State Health Officer/CDPH Director

- Primary responsibility is to ensure that the recommended protective actions are timely, adequate and effective to minimize the risk of health effects
- Monitors and coordinates public health response activities with the CHHS Secretary, EF-8 response entities and Local Health Officers and other officials

CDPH Programs

- Coordinate with EF 8 response entities and Cal OES to request activation of federal resources including:
  - Field Medical Stations
  - Disaster Medical Assistance Teams (DMATs)
  - Patient transportation resources
  - Medical Countermeasures
- Coordinate response to healthcare surge conditions:
  - Monitor hospital occupancy via the HAvBED system
  - Assist with patient movement tracking
  - Deploy assets from the Strategic National Stockpile and state caches
- Lead public health-related radiological response:
  - Appoint a state Radiation Safety Officer (RSO)

- Activate the Medical and Health Coordination Center (MHCC) in coordination with EMSA
  - Disseminate public information and warnings, provide message templates
  - Respond to resource requests and mission tasking
- Provide staff and resources to support the SDAC
- Conduct initial dose estimates and make protective action recommendations
  - Activate the Radiological Emergency Monitoring Technical Advisory Group (REM-TAG)
- Advise local population monitoring and decontamination efforts
- Conduct radiological field monitoring and assessment activities
- Provide technical assistance to local and regional response efforts
- Recommend measures to protect the health and safety of response personnel
- Monitor cleanup operations

- Maintain oversight of critical infrastructure:
  - Assess status of healthcare facilities and quality of patient care
  - Assess food and drug supplies
- Provide radiological laboratory analytical services:
  - Environmental samples
    - Air filters and cartridges, water, soil, vegetation, milk
    - Accepts samples with ≤2mR/hour radioactivity
  - Provide radiation-related reference laboratory services

4.3 – Role of Federal Government

Federal response for a nuclear incident is guided by the National Response Framework (NRF) Nuclear/Radiological Incident Annex. Federal responders support the local Incident Commander under a Unified Coordination structure with local government maintaining primary responsibility for emergency response operations. When a nuclear detonation emergency occurs that exceeds or is anticipated to exceed resources within the state, an emergency proclamation would be made. It can be expected that a federal Emergency Declaration and Declaration of a Public Health Emergency would also be made. A Presidential declaration would make federal disaster assistance available under the Stafford Act to support the response.

Immediately following the event, Emergency Support Function (ESF) 8 would activate and coordinate public health and medical resources in support of the affected area(s). Federal health and medical resources would be critical to the response to this type of incident, therefore coordination must begin immediately. In some cases, federal support may be provided directly to state and local agencies prior to complete activation of the emergency management structure. The information below summarizes federal agency roles and responsibilities in responding to a nuclear detonation incident.

<u>Department of Homeland Security (DHS) Federal Emergency Management Agency (FEMA)</u>

- Lead federal coordinating authority for non-technical response and recovery efforts

- Establishes a Joint Field Office (JFO) for federal and state coordination and support of local response
- Deploys intra-agency Incident Management Assistance Teams:
    - DOE/USEPA Nuclear Incident Response Team (NIRT)
    - Advisory Team for the Environment, Food and Health

Interagency Modeling and Atmospheric Assessment Center (IMAAC)

- Federal source for airborne hazards predictions and plume modeling
- Intra-agency group managed by FEMA that includes DHS, DoD, U.S. EPA, National Oceanic and Atmospheric Administration, NRC, National Aeronautics and Space Administration

Federal Bureau of Investigation (FBI)

- Lead federal responsibility for the criminal investigation of terrorist acts
- Establishes a joint task force of local, state and federal law enforcement
- Establishes a Joint Operations Center(JOC) as a coordination point

Department of Energy (DOE) National Nuclear Security Administration (NNSA)

- Lead federal responsibility for technical response to nuclear/radiological emergencies:
    - Consequence Management Home Teams (CMHT)
    - Consequence Management Response Teams (CMRT)
- Deploys Radiological Assistance Program (RAP) Teams:
    - Provides rapid radiological assessment support
    - Assists with radiological monitoring and sampling
    - Provides radiation measurement equipment and personnel
- Deploys the Aerial Measuring System (AMS):
    - Uses aircraft to assess the location, size, dispersion pattern, radioisotope content, and intensity of radiation contamination
    - Creates contour maps showing levels of contamination
- Activates the interagency Federal Radiological Monitoring and Assessment Center (FRMAC):
    - Characterizes radiological conditions
    - Coordinates federal radiological monitoring, sampling and assessment activities
    - Responsible for providing a single source of data for federal and state agencies
    - Co-locates with the SDAC
- Activates National Atmospheric Release Advisory Center (NARAC):
    - Uses AMS and meteorological data, land topography, and computer models to predict the dispersion of airborne radiological materials
    - Develops plume models and predictive maps
- Deploys Nuclear Emergency Support Team (NEST) a specialized nuclear terrorism response team:
    - Identifies and assesses nuclear materials and devices
    - Packages radiological waste for transport

- Activates the medical asset, Radiation Emergency Assistance Center Training Site (REAC/TS), at Oak Ridge Institute for Science and Education (ORISE):
    - Maintains specialized response teams with physicians, nurses/paramedics, health physicists and laboratory services for radiation emergencies
    - Provides consultation services related to medical and radiological triage, decontamination, radiation injury assessment, dose estimates, and treatment

U.S. Department of Defense (DoD)

- Provides field hospitals and mobile treatment teams for patient triage and treatment
- Establishes a National Defense Area and manages the response within its boundaries if a nuclear weapon is involved
- Deploys the Domestic Emergency Support Team (DEST) an interagency team from the FBI, FEMA, DoD, DOE, HHS, and EPA.
- Provides ground and aircraft ambulances
- Coast Guard National Strike Force capable of radiological monitoring
- Naval Nuclear Propulsion Program capable of radiological monitoring
- Marine Corps Chemical, Biological, Radiological/Nuclear and Explosives Incident Response Force capable of radiological monitoring
- Deploys Medical Radiobiology Advisory Team (MRAT),Radiation Assessment Team (AFRAT), and Radiological Advisory Medical Team (RAMT) resources:
    - Conducts radiological measurements and risk assessments
    - Conducts decontamination and radioactive waste management operations
    - Provides medical information to local hospitals and responders
    - Provides radiological support and patient dosimetry services to hospitals

Department of Health and Human Services (HHS)

- Lead federal responsibility for public health, medical, mental health and mass fatality support under ESF 8
- Manages forward movement of patients through Federal Coordination Centers (FCCs)
- Deploys the National Disaster Medical System (NDMS) including:
    - Aeromedical evacuation
    - U.S. Public Health Service Commissioned Corps,
    - Disaster Medical Assistance Teams (DMATs)
    - National Medical Response Teams (NMRTs)
    - Field Medical Station (FMS) teams
    - Disaster Mortuary Operational Teams (DMORTs)
- CDC acts as lead federal agency for assisting state and local health departments with:
    - Assessment of public and responders exposed to radioactive materials
    - Decontamination, medical treatment and follow up of victims
    - Population monitoring
    - Tracking radiologically-exposed individuals through a registry
    - Protection of people and food and water supplies from contamination

- Deployment of Strategic National Stockpile (SNS) resources, including
  - Potassium iodide, chelation drugs, cytokines
- Field investigation, monitoring and laboratory services
- Surveillance and epidemiological studies
- Risk communications
- Protective action measures
- Federal Advisory Team for the Environment, Food and Health

U.S. Environmental Protection Agency (U.S.EPA)

- Deploys Radiological Emergency Response Teams (RERT)
- Leads federal agency during the recovery phase of a nuclear/radiological incident
- Manages the FRMAC in the recovery phase
- Chairs the National Response Team (NRT)
- Maintains the RadNet system of fixed and deployable radiation monitoring stations
- Provides on-site support, including personnel, equipment, mobile and fixed laboratories
- Provides federal on scene coordinators (FOSCs) and funding to mitigate hazards
- Assists in the development and implementation of a long-term monitoring plan
- Maintains protective action guidance for drinking water, community re-occupancy, etc.
- Serves on federal Advisory Team for the Environment, Food and Health

Nuclear Regulatory Commission (NRC)

- Provides technical assistance to include source term estimation, plume dispersion, and dose assessment calculations
- Participates in FRMAC activities

U. S. Department of Agriculture (USDA)

- Assists in the collection of agricultural samples for ingestion pathway assessments
- Assesses damage to crops, soil, livestock, poultry, and processing facilities
- Assists with animal carcasses disposal
- Provides support with screening and decontamination of pets and farm animals

U. S. Department of Food and Drug Administration (FDA)

- Assesses food supply
- Serves on federal Advisory Team for the Environment, Food and Health
- Maintains protective action guidance
  - Administration of prophylaxis potassium iodide (KI)
  - Milk and food contamination

U.S. Department of Labor Occupational Safety and Health Administration (OSHA)

- Provides technical assistance to federal, state and local governments concerning the health and safety of response workers
- Assists with the development of health and safety plans
- Monitors emergency response workers

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5- CDPH Operational Considerations

The nuclear detonation response and recovery phases described in this section represent generalized time periods in which specific actions are needed to protect public health. An actual incident response may not adhere closely to the phase descriptions and in actuality the phases would likely overlap at times. However, nuclear incident phases provide a useful framework for planning purposes. Herein, CDPH operational considerations are organized as follows:

- Preparedness
  - Pre-incident Planning
- Response Phase
  - Immediate Response
  - Intermediate Response I
  - Intermediate Response II
- Recovery Phase
  - Short-term Recovery
  - Long-term Recovery

5.1 – Preparedness

Advance planning is the key to an effective response to a nuclear detonation. In the aftermath of this type of incident, CDPH would be challenged by many aspects of the response including maintaining situational awareness, responding to the demand for information and resources, and the effective integration of department resources into the overall response while at the same time maintaining essential functions. The CDPH Continuity Plan requires the continuation or resumption of essential functions once health and safety measures are in place. For Department personnel and facilities directly impacted by the incident, program emergency response plans and continuity plans would be essential to restoring response capabilities.

A nuclear incident would gravely impact the State's public health, emergency medical services, and healthcare systems, as well as pose severe difficulties for emergency responders. Pre-incident planning that strengthens the public health, medical and healthcare systems is essential for saving and sustaining lives after a nuclear incident. To ensure an effective response to this type of incident, CDPH must closely coordinate with response partners through planning and exercises using medical surge, explosive device, large-scale radiological, and nuclear scenarios. Multi-agency, pre-incident message planning would encourage consistency in emergency public information and guidance provided to responders, the media, and the public.

The most significant activities CDPH (and local health departments) would take pre-incident are public education and the development of pre-scripted public messages that can be rapidly disseminated after a detonation. The public education effort would provide information on radiation hazards with instructions on actions to take to reduce radiation exposure. Further, pre-incident coordination with partner agencies is necessary to ensure an effective and

coordinated response after a detonation. These pre-incident measures would increase survival rates and reduce radiation injuries.

Pre-incident planning considerations for CDPH include:

- Development of public education materials on nuclear/radiological hazards with health and safety instructions
- Development of pre-scripted public message templates with risk communication information and protective action instructions
- Training for public health and healthcare workers on radiation/nuclear hazards
- Training for CDPH staff on the hazards and priorities of a nuclear incident response
- Training for media spokespersons on radiological terms and the effects of radiation exposure
- Maintaining readiness to perform radiation monitoring/assessment activities by:
  - Developing procedures for the activation and operation of the Radiological Emergency Monitoring Technical Advisory Group (REM-TAG)
  - Maintaining radiation monitoring equipment/stations
  - Maintaining radiochemistry laboratory capabilities
  - Conducting training and exercises
  - Keeping response plans up to date
- Exercising coordination and communication with federal, state and local partners
- Development of radiation-related health and safety guidance for hospital and healthcare workers
- Support of local efforts to identify vulnerable populations
- Support of local healthcare volunteer recruitment efforts
- Support of local medical surge capability building efforts
- Support of mobile field hospitals and alternate care site capabilities
- Support of local nuclear/radiation incident preparedness efforts for patient triage, evacuation, and tracking, and activation of Community Reception Centers
- Adoption of a registry model for tracking radiologically-exposed individuals
- Support of mental health and mass fatality planning efforts for catastrophic incidents
- Exercising continuity and essential function restoration plans

5.2 – Immediate Response (event + 24 hours)

A nuclear detonation is expected to be a sudden, catastrophic event with wide ranging effects that require an immediate response to save lives and reduce injuries. If there is advance warning of a credible threat, activation of the emergency response system may occur prior to the detonation however, the response timeline would likely begin with the explosion. Because radioactive fallout would begin to be deposited within thirty minutes of the detonation,

measures taken to protect public health within the first few minutes and hours after the detonation would largely define the life and safety outcome of the response.

Immediately following the detonation, there would be limited data available on the radioactivity levels in the affected areas but decisions on protective actions should not be delayed by the incompleteness of the information. In lieu of actual radiation data, weather information such as wind direction and speeds would be used to estimate the hazard. The dangerous radiation zone would likely be identified within the first hour(s) to allow for response planning. Emergency responder activity within the dangerous radiation zone would be delayed until actual radiation data is available and operations can be safely conducted. See Appendix D for additional information.

Public information with instructions on protective actions is crucial during this response phase. The first and most important public health response action to be taken immediately (ideally within the first 10 to 15 minutes) is to begin a vigorous public messaging effort with repeated issuance of shelter-in-place and decontamination instructions. The sheltering of downwind populations from fallout can reduce life-threatening doses of radiation if done quickly after the detonation. Effective sheltering messaging would require a coordinated and sustained effort between state and local response agencies. Until a JIC is established, CDPH would use its Duty Officer function to immediately disseminate emergency message templates to local health departments and other response partners. The CDPH Office of Public Affairs would assist in getting emergency public information and warnings to the affect communities.

A delayed, informed evacuation is more protective of public health than a spontaneous one, but it would likely be difficult to manage. Spontaneous mass evacuation, also known as “shadow evacuation,” has the potential to expose evacuees to radiation from fallout contamination and impede the flow of emergency responders into the affected area. Minimizing avoidable radiation exposures would be one of the key public health challenges of the response. Without adequate warning, residents may unknowingly expose themselves to dangerous levels of radiation while attempting to evacuate the area. The appropriate time and routes for organized evacuations of areas in the fallout path would be communicated to the public within hours of the initial sheltering instructions.

CDPH operational response considerations during this phase would include:

- Dissemination of emergency public information and warnings
  - CAHAN message templates to local health departments
  - Press releases
  - Participation in the Cal OES JIC, once activated
- Notification of staff and activation of emergency management system:
  - Activation of continuity and response plans
  - Activation of MHCC/RCCC
  - Coordination with EF 8 and Cal OES

- Activation of the Receipt, Staging and Storing (RSS) warehouse functions:
  - Strategic National Stockpile asset management
- Monitoring hospital occupancy and patient movement tracking:
  - Bed availability assessment (HAvBED)
  - Hospital and nursing facility evacuations and shelter-in-place activities
- Initial radiological monitoring and assessment activities
  - Activation of the REM-TAG
- Deployment of Health Physicists to support to response efforts:
  - Assist with radiological surveys, exposure assessments, and sample processing
  - Provide technical assistance
  - Sample collection from air monitoring stations
- Identifying private sector health physics resources
- Deployment of staff to SOC and REOCs, as needed
- Coordinating on drinking water monitoring
- Preparation for:
  - Demand for information and guidance
  - Resource requests and mission tasking
  - Medical and healthcare surge support
  - Program-specific field-level response activities
- Information sharing and coordination with partner organizations
  - Establish or join Multi-Agency Coordination (MAC) groups
- Maintaining situational awareness

Upon notification of the detonation, CDPH would immediately activate its emergency response structure including activation of the MHCC in coordination with EMSA and the Department of Health Care Services. Health Physicists from the Center for Environmental Health would be deployed to the MHCC, SOC, and REOCs, and the State Dose Assessment Center (SDAC). It may require up to eight hours for the SDAC to be operational, in the interim the Radiologic Health Branch would assess radiological conditions and make protective action recommendations. The MHCC would disseminate these recommendations and provide support to the emergency medical and healthcare surge.

During the first 24 hours, public health decisions would be made with limited data and stakeholder involvement due to the need to act quickly. There would be no substantial federal response resources available during this phase and the full extent of federal resources may not be available for 72 hours or more. The operational considerations listed above should be used to assist with the development of incident action plans and response objectives as well as in advance planning efforts however, conditions presented by the nuclear detonation event would dictate actual priorities and objectives. Table 5.1 presents CDPH response objectives for this phase of the incident and Appendix B provides more detail on specific CDPH program roles.

5.3 – Intermediate Response I (1 to 3 days)

This phase begins when reliable environmental radiation data becomes available as the basis for decision making and may begin within 24 hours of the detonation. This phase continues until substantial federal support becomes available (anticipated within three days) however, it can be anticipated that the full extent of federal assistance may not be available for several days. A federal Joint Field Office (JFO) would be established and federal radiological support resources including the FRMAC would be activated to support SDAC operations. The FRMAC and SDAC work jointly to develop recommendations for protective actions that would assist local officials in decision making related to evacuation, relocation and reentry into the affected areas.

Large-scale, organized evacuation of people in the impacted areas would begin during this phase once radiation monitoring data is available. Community Reception Centers that provide population monitoring services including radiation screening, dose assessment and decontamination may be available to receive evacuated residents. For a large metropolitan area, it is possible that hundreds of thousands of individuals would require screening. The radiological screening effort is expected to be conducted by the impacted and adjacent communities as well as emergency shelters, hospitals, field treatment and alternative care sites. In addition to providing screening services, Community Reception Centers would create radiation exposure records that would aid in long-term tracking and treatment of exposed individuals.

Depending on the population of the impacted area, a nuclear detonation could result in a medical surge of tens to hundreds of thousands of patients needing burn, trauma and other specialized care. This surge may trigger a need for crisis care and careful patient triage in order to effectively allocate scarce medical resources. Access to hospital and healthcare facilities may be limited due to blast damage and fallout contamination requiring a means for patient transportation to distant hospitals. The need for medical and healthcare mutual aid from adjacent communities and elsewhere, including medical volunteers, would be acute during this response phase.

Survivors exposed to significant levels of radiation can be expected to experience Acute Radiation Syndrome (ARS). The severity of this illness is dependent on the radiation dose absorbed -- the larger the dose, the more life-threatening the condition will be. To reduce stress on hospitals it will likely be necessary to conduct pre-hospital patient triage and provide palliative healthcare services in an alternate care setting. Recovering ARS patients requiring supportive care may convalesce in special accommodations such as large-scale medical shelters that provide protection for weakened immune systems. In a large metropolitan area, the population that may require specialized care for ARS could be on the order of tens to hundreds of thousands of people. For additional information on ARS, see Appendix C.

The public health response must include addressing the mental and behavioral health needs of traumatized survivors -- those survivors without serious injuries who should be directed away from hospitals to reduce the stress on emergency medical services. Healthcare and medical personnel would need information and guidance in order to feel safe treating patients who have been exposed to radiation. Fears of radiation, radioactive contamination, and additional attacks have the potential to produce mental health challenges for evacuees as well as responders, receiving communities and the nation. Medical responders and healthcare providers unaccustomed to working with large numbers of suffering and dying people would also need psychological support.

CDPH operational response considerations 24-72 hours post-detonation would include:

- Sustaining MHCC/RCCC/RSS operations
- Dissemination of emergency public information and risk communication messages:
    - Press releases
    - Participation in JIC operations
    - Activation of a public health call center
- Transfer of monitoring and assessment activities to the combined SDAC/FRMAC:
    - Support of SDAC/FRMAC operations
    - Protective action recommendations
- Integration with federal teams, personnel and other resources
- Activating state laboratories and laboratory networks to conduct analyses on:
    - Bioassay/clinical samples
    - Environmental samples
- Supporting population monitoring efforts at Community Reception Centers
- Dissemination of health and safety guidance to staff, responders, healthcare and other emergency workers with advice on PPE, dosimetry, etc.
- Supporting local health care surge response:
    - Respond to requests for SNS assets
    - Alternate care sites
    - Mental health services
- Monitoring the safety of food and drug supplies:
    - Coordinate with the State Water Resources Control Board on monitoring and interim measures to protect drinking water
    - Initiate food impounds/recalls
- Conducting community needs assessments
- Supporting disaster mental health efforts
- Information sharing and coordination with partner agencies:
    - Participation in MAC and coordination groups, etc.
- Maintaining situational awareness

CDPH would maintain activation of its emergency response structure throughout this response phase to support local healthcare surge, mass care operations, and department program field operations. CDPH would monitor the safety and health of employees working in the field and in facilities near the affected area. Federal response resources will become available during this phase however, the full extent of federal resources may not be available for 72 hours or more.

The operational considerations listed above can be used to develop incident action plans and response objectives as well as in advance planning efforts however, conditions presented by the nuclear detonation event would dictate actual priorities and objectives. Table 5.1 presents CDPH response objectives for this phase of the event and Appendix B provides more detail on specific CDPH program roles.

5.4 – Intermediate Response II (3 to 14 days)

This phase is marked by the integration of substantial federal assets into response operations. During this phase, the JFO and multi-agency coordination (MAC) groups comprised of federal, state and local agencies would be working to coordinate response operations. Radiological response teams and other resources from federal agencies including the Department of Energy, the Department of Defense, and the Environmental Protection Agency are expected to become available during this phase although the full extent of federal support may take several days. Three days post-blast may also represent a point in time when the initial emergency responders, healthcare personnel and volunteers need replacement, and medical supplies require replenishment.

The seven to fourteen day period after the detonation is the approximate timeline when a majority of the ARS victims will become symptomatic, some with life threatening conditions that require medical intervention. A large population of immune-compromised ARS patients may be vulnerable to communicable diseases requiring community disease surveillance. This situation will place additional stress on the emergency medical and healthcare systems and require monitoring by the Center for Infectious Diseases. Some hospitals and other healthcare facilities may begin evacuation of patients during this period; other closed initially due to concerns over radiological contamination may reopen creating a demand for technical assistance and support from Licensing and Certification.

CDPH operational response considerations 3 to 14 days post-detonation would include:

- Dissemination of emergency public information and risk communication messages:
  - Participation in state JIC operations with OES
  - Continuation of public health call center
- Assessing laboratory surge:
  - Receive and process low level radioactive environmental samples
  - Coordinate support with CDC Laboratory Response Network (LRN)laboratories and other laboratory networks
- Supporting local healthcare surge, medical shelters and alternate care sites:

- Monitor hospital occupancies and patient tracking efforts
- Supporting local population monitoring efforts:
  - Assist with an exposed persons registry
- Supporting SDAC/FRMAC operations
- Supporting local response efforts:
  - Assist with radiological surveys
  - Provide guidance with fatality management
- Dissemination of guidance to public health/healthcare facilities:
  - Licensed facility surveys, decontamination
  - Repopulation and reopening of facilities closed due to contamination
- Receipt and distribution of medical countermeasures, supplies, equipment and other resources
- Monitoring the safety of food and drug supplies
- Conducting community needs assessments:
  - Communicable disease
  - Environmental health
- Supporting mass fatality efforts
  - Advise on the decontamination and disposition of contaminated human remains
- Supporting mental health needs of employees, responders and healthcare workers
- Information sharing and coordination with partner agencies:
  - Participation in MAC and other coordination groups
- Maintaining situational awareness

To accomplish these objectives, CDPH would maintain activation of its emergency response structure with programs integrating with federal resources and local operations as needed through coordination with the MHCC. The operational considerations can be used to develop incident action plans and response objectives as well as in advance planning efforts however, conditions presented by the nuclear detonation event would dictate actual priorities and objectives. Table 5.1 presents CDPH response objectives for this phase of the event and Appendix B provide more detail on specific CDPH program roles.

5.5 – Short-term Recovery (14 to 90 days)

This phase includes the provision of medical care to the injured, restoration of essential public health and medical services and critical infrastructure that provide for basic human needs. The medical management of patients following a nuclear detonation would create a significant demand for supplies, equipment, trained personnel and volunteers to meet the immediate surge and the following wave of ARS patients. The phases used in this plan reflect the public health considerations of a nuclear detonation emergency. Within two weeks of the detonation, the treatment of patients with ARS symptoms would become a large part of the healthcare

demand.[4] Most ARS cases would be identified and resolved within 90 days --deaths that do result can be expected to occur within three months following radiation exposure.

Care for those with moderate to severe ARS or internal contamination would be provided at least initially locally, however, patients requiring specialized supportive care would likely need to be transferred to tertiary care facilities such as cancer centers, located locally, regionally or nation-wide. Specialized medical facilities focused on the supportive care and convalescence for ARS patients may be needed for approximately three months following the detonation as the illness progresses. And many survivors would require long-term management of burn, trauma, and radiation injuries along with lifelong monitoring for other illnesses such as cancer.

As the healthcare system begins to stabilize, attention would be turned toward public health and environmental health issues. Surveillance for disease agents would be required, especially among the immune compromised ARS patients. Food and drinking water supply contamination will require continued risk assessment and protective actions to reduce the public's exposure to radiation including the provision of alternate supplies of food and drinking water. Ongoing monitoring and protective actions such as restrictions on crop harvesting or milk production may also be necessary. Cleanup will be beginning during this phase in areas safe to reenter. CDPH operational response considerations during the short-term recovery phase would include:

- Continued dissemination of public information:
    - Continuation of JIC participation and call center
- Dissemination of guidance for emergency workers, medical and healthcare facilities
- Supporting medical and healthcare surge:
    - Assist with reopening licensed healthcare facilities
    - Process resource requests
    - Continue to monitor hospital occupancies
- Supporting local population monitoring efforts
- Supporting laboratory surge:
    - Process low-level environmental samples
    - Reference laboratory services
- Supporting SDAC/FRMAC operations:

[4] ARS is characterized by four distinct phases: a prodromal period, a latent period, a period of illness, and a period of recovery or death. The onset of the prodromal phase may take minutes or up to several days after radiation exposure. During this period patients experience gastrointestinal symptoms such as loss of appetite, nausea, vomiting, fatigue, and diarrhea; after extremely high doses, additional symptoms such as respiratory distress can occur. In milder cases, these symptoms usually disappear in a day or two, and a symptom-free, latent period follows, varying in length from a few hours to a few weeks depending on radiation dose. A period of manifest illness then follows that is characterized by bone marrow suppression, infection, gastrointestinal, central nervous system, and cardiovascular impairment.

    - Guidance on reentry and re-occupancy of affected areas
    - Monitor cleanup activities
- Responding to requests for supplies, equipment, personnel and other resources
- Monitoring safety of food and drug supplies
- Assisting with drinking water safety monitoring
- Conducting community needs assessments
- Assisting with community surveillance to identify disease agents and health effects
- Supporting mental health efforts
- Information sharing and coordination with partner organizations
    - Continued participation in MAC groups
- Supporting recovery efforts
    - Assist with radiation surveys
    - Provide staff for local assistance centers
    - Development of recovery and restoration plans
- Maintaining situational awareness

During the short-term recovery phase, activities related to re-entry and restoration of the impacted area would begin including population return and/or relocation. The MHCC would concurrently support and coordinate response and recovery activities during this period. The operational considerations listed above can be used to develop incident action plans and recovery objectives as well as in advance planning efforts however, conditions presented by the nuclear detonation event would dictate actual priorities and objectives. Table 5.1 presents CDPH response and recovery objectives and Appendix B provides more detail on specific CDPH program roles.

5.6 – Long-term Recovery (90 days and beyond)

This phase may extend for years as the process of restoring the community to its pre-disaster condition to the extent possible continues. The extent of damage and radiological contamination would determine how difficult and lengthy this phase would be. After 90 days emergency facilities including evacuation shelters, medical shelters, and government authorized alternate care sites/convalescence sites are closing or planning to close. Some federal response teams and other resources would be demobilizing.

Decisions on actions to protect public health including resident relocation and re-occupancy would require extensive environmental monitoring and sampling. During this phase, state, federal, and local authorities work together to establish recovery objectives including cleanup goals and timelines. Some communities impacted by the detonation may require lengthy exclusionary periods while radiation decays to levels that are safe to re-occupy. Land and property contaminated by radioactive fallout may require remediation. The volume of contaminated material that would be generated from recovery operations would likely provide a challenge for existing waste disposal facilities and transportation systems.

CDPH operational considerations during the long-term recovery phase would include:

- Continued dissemination of public information
- Oversight of radiological contamination clean-up:
    - Monitor restoration progress
    - Issue of guidance for cleanup contractors and property owners
    - Modify existing regulatory requirements
    - Monitor management of radioactive wastes
    - Identify locations where radioactive materials will be stored until a final disposition can be identified and agreed upon.
    - Process environmental samples
- Supporting local population monitoring efforts
- Information sharing and coordination with partner agencies
- Ensuring the safety of food and drug supplies
- Assisting with drinking water safety monitoring
- Conducting community needs assessments
- Restoration of affected CDPH facilities
- Assessment of financial impact of incident
- Participation in recovery planning efforts
- Maintaining situational awareness

The MHCC would remain activated as long as the scope and magnitude of the recovery effort requires department-level or interdepartmental coordination. Radiological monitoring and assessment activities would likely continue until there is no longer a threat to public health and safety or the environment. The recovery phase of a nuclear incident may continue for a number of years as remedial activities are carried out and the impacted communities work to regain a state of normalcy.

The operational considerations listed above can be used to develop incident action plans and recovery objectives however, conditions presented by the nuclear detonation event would dictate actual priorities and objectives. Table 5.1 presents CDPH recovery objectives and Appendix B provide more detail on specific CDPH program roles.

Table 5.1 CDPH Response and Recovery Phase Objectives

Response and Recovery Objectives	Immediate Response 0-24 hours	Intermediate Response I 1-3 days	Intermediate Response II 3-14 days	Short-term Recovery 14-90 days	Long-term Recovery 90+ days
Disseminate emergency messages to public/local agencies.	x	x	x	x	x
Conduct radiological assessment.	x	x	x	x	x
Prepare for response operations.	x				
Support healthcare surge.	x	x	x	x	
Support population monitoring.		x	x	x	x
Ensure food and drug safety.		x	x	x	x
Support fatality management.		x	x	x	
Assess community public/environmental health needs.			x	x	x
Support recovery efforts.				x	x

See the Course of Action (COA) checklists in Appendix B for additional information.

Note: Some activities such as coordination and information sharing with partner agencies and maintaining situational awareness would span the entire event from response through recovery.

6 - Emergency Communications and Information Management

This section describes emergency communications and information management considerations specific to a nuclear detonation emergency.

6.1 – Emergency Communications

In the event of a nuclear detonation emergency, the need for accurate and timely information is critical. There would be an immediate need for emergency messaging to people within the impacted area that includes instructions on how to avoid life-threatening doses of radiation. These messages must be delivered without delay at a time when fear, confusion, and anxiety are heightened. Communications with response partners and the affected populations may be complicated by communication system disruptions due to infrastructure damage and/or an electromagnetic pulse (EMP) that incapacitates electronic equipment. These conditions would require the use of multiple, redundant and alternate means of emergency communications.

Effective emergency communications may require use of both routine and non-routine modalities:

- Land line telephones with Government Emergency Telecommunication Services (GETS) priority
- Cellular telephones
- Texting via cellular telephones
- Satellite phones
- Very High Frequency (VHF) radio
- Auxiliary Communications Services (volunteer amateur radio)
- Internet/social media and email
- Messengers/runners
- California Health Alert Network (CAHAN)

CDPH would establish additional or alternate communications protocols at the time of the emergency based on the specific event and the target audience. The CDPH EORP and Center/Program response plans provide detail on the communications systems available. In order to better coordinate activities in an emergency incident of this of scope CDPH programs may activate response centers that would communicate directly with representatives in the MHCC. Incident-specific communications plans would include this information.

6.2 – Information Management

In order for appropriate public health decisions and recommendations to be made in the aftermath of a nuclear detonation, up-to-date situation status information is necessary. This would present a challenge due to the dynamic nature of this type of incident and the number of response agencies involved. Consequently, information on casualties and damages, environmental conditions, available resources, response priorities and activities, etc. must be

communicated to CDPH programs and response partners on a continual basis. Information will be shared through coordination within CDPH and with external partners via a JIC and JIS. Once the SDAC/FRMAC is activated, an information flow process will be established to disseminate radiological monitoring and assessment reports. The SDAC/FRMAC Public Information Officer will prepare releases on dose monitoring and assessment activities including maps showing affected areas.

The CDPH EORP includes information on situation reporting procedures. Infrastructure damage may require that alternate means of information collection and dissemination are required. There would be an acute need to maintain situational awareness and a common operating picture with response partners however, it must be kept in mind that demands for situational reports and data from partners can interfere with efforts to provide needed public health services.

7 - Emergency Public Information and Public Notification

Response to a nuclear detonation emergency requires immediate attention to the dissemination of emergency public information. Effective dissemination of public information is critical to minimizing confusion and maximizing adherence to protective measures intended to reduce the public's exposure to life-threatening radiation. Therefore, local protective action decisions including evacuation and/or shelter-in-place must be made promptly and communicated immediately. Without clear, timely, and continually updated instructions, a sense of confusion or hopelessness could erode the public's confidence in the protective action recommendations made and result in unnecessary injuries and deaths. The degree of success of the public health response to a nuclear incident would depend in a large part on the public's awareness of and adherence to emergency instructions.

Once CDPH is notified of the nuclear detonation emergency, assistance with the release of emergency public information should be the first operational priority. This information will focus on health risks and include instructions on how to limit radiation exposure. Information dissemination would be accomplished through coordination within CDPH and with external partners via a JIC and JIS. *However, until such coordination is established, CDPH will disseminate information critical to public health and safety such as emergency message templates for local jurisdictions through its Duty Officer Program and CAHAN, the Office of Public Affairs, the MHCC and/or individual programs.*

7.1 – Emergency Public Information

In the event of a nuclear incident, CDPH will issue the following types of public messages:

- Pre-approved, pre-scripted messages: Messages with instructions on how to avoid life-threatening exposure to radiation should be disseminated immediately after a nuclear detonation from pre-scripted templates. In the period before a Joint Information Center (JIC) is established, CDPH may use its Duty Officer Program, CAHAN, and Public Information Officer functions to release messages and message templates. The release of public warnings should not be delayed due to the lack of a fully activated emergency response structure or incomplete radiological data. Appendix A contains a template for an initial nuclear detonation public health message.
- Joint messaging**:** A JIC would be established with key partners to assist in the coordination of emergency messages and public information. Once established by Cal OES, the JIC would continually update public messages in coordination with CDPH and other partners. Coordination between federal, state and local JICs and other points of information distribution is very important; for example, the FBI may play a role in the approval of public information release.

- Call center: Activation of a CDPH call center to disseminate information to the public, partner agencies, the media, healthcare providers and others with pre-scripted answers to frequently asked questions including how to avoid contamination, what to do in the case of exposure to radiation and/or fallout contamination, the health effects of radiological exposure, etc. The call center would have CDPH Health Physicists available to answer complex or technical questions. Appendix C contains a sample fact sheet and call center information for hotline operators.
- Incident-specific Public Information– Additional emergency public information would be developed specific to CDPH programs areas including medical countermeasures, food and drugs, worker health and safety, etc. The CDPH Policy Council identifies and prioritizes emergency public information needs based on recommendations and input from Centers/Programs, OPA, the MHCC PIO, the state JIC, and other response partners.
- Risk Communication Plans – Existing risk communication plans would be customized to the nuclear incident.

Emergency public information following a nuclear detonation should provide answers to the questions most likely to arise. Individuals not affected by the immediate blast effects will be deciding what to do about the fallout hazard. Decisions by survivors over whether to self-evacuate or to shelter, especially when separated from children and other family members; decisions by emergency responders on whether rescue victims or not; and decisions by health care personnel on whether to report to work will be made in the immediate aftermath of the detonation. A nuclear detonation Question and Answer sheet is included in Appendix A. Further emergency public information related to nuclear and radiological emergencies can be found on CAHAN, in the Crisis and Emergency Risk Communications (CERC) Toolkit and the "Be Prepared California" website (www.bepreparedcalifornia.ca.gov). Emergency public information and instructions should be translated into appropriate languages for the impacted area and into formats suitable for the hearing and sight impaired.

Evacuated survivors may be perceived as "contaminated" and a public health risk to receiving communities. Public safety officials will need to understand and explain the difference between persons who were exposed to radiation and those who may be contaminated by radioactive material. It should also be understood that victim contamination due to radioactive material is not considered a significant health risk to attending medical personnel or others.

7.2 – Public Notification

Public notification following a nuclear incident would require clear, factual, understandable, and timely information on health risks with instructions on how to take protective action to minimize exposure. Damage to infrastructure including communication and transportation systems would limit outside assistance to the affected areas immediately following the

detonation, therefore public notification is critical. Effective public notification would require redundant and alternate means to deliver messages to those populations within the affected areas and to evacuees if normal methods are disrupted.

Emergency public health information may be disseminated by CDPH Duty Officer Program, CAHAN, OPA/MHCC and/or the JIC, once established. Multiple delivery methods would be required to effectively disseminate emergency public information and may be accomplished through a combination of:

- Media reports via radio/television/internet broadcasts
- Press releases
- Press conferences
- Emergency Broadcast System
- Message templates
- Fact sheets and handouts
- Frequently Asked Questions
- Call center operator scripts
- Reverse 911
- Social media
- Public reports
- Guidance documents
- CDPH and/or Be Prepared California websites
- CAHAN alerts
- Program contacts

CDPH would establish additional or alternate dissemination protocols at the time of the emergency based on the specific event and the target audience.

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8 - Plan Maintenance

The NDOP is a dynamic document maintained with input from CDPH Centers/Programs and response partners on a regular basis. Plan maintenance includes the following steps:

- Updating/revising assumptions, capabilities, etc.
- Dissemination of updated plan
- Training
- Participation in relevant exercises and activations
- Development of After Action Reports (AARs)/Improvement Plans (IPs)
- Implementation of Corrective Action Plans

8.1 – Update Triggers

EPO coordinates and facilitates the annual EORP maintenance cycle, which includes its annexes. In addition to the annual update of the NDOP, a review of the NDOP would be triggered by:

- Reorganization of CDPH Center/Programs
- Changes to CDPH program responsibilities and authorities
- Changes to CDPH response capabilities
- Changes in federal and/or state guidance, capabilities and/or requirements
- Corrective actions to address lessons learned from activations and/or exercises
- An AAR/IP from an actual nuclear or radiological incident

8.2 – Training

EPO coordinates with the CDPH executives and Centers/Programs to conduct trainings on the EORP and its annexes to support readiness to meet federal and state requirements as well as MHCC positions. In addition, each program may have additional, specialized training related to nuclear detonation response. These requirements are documented in emergency response plans developed by CDPH centers/programs.

8.3 – Participating in Exercises and Activations

EPO conducts or facilitates exercises to test all or portions of the CDPH EORP and its annexes. In addition, CDPH programs may participate in exercises with local jurisdictions and other partners related to nuclear detonation response.

8.4 – After Action Reporting/Improvement Planning

EPO conducts or facilitates AARs/IPs after exercises and actual incidents/events. In addition, CDPH programs may conduct an internal after action review and improvement plan related to nuclear detonation response.

8.5 – Annex Distribution

Upon CDPH and OES approval of this annex, copies of the annex are distributed consistent with the procedures described in the EORP and noted on the Records of Distribution table in the front of this document.

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Appendices

Appendix A – Initial Emergency Public Information

Appendix B – Course of Action Checklists

Appendix C – Frequently Asked Questions, Fact Sheet, Call Center Information

Appendix D – Radiation Units and Short-term Dose Effects

Appendix E – Protective Actions

Appendix F – List of Acronyms and Abbreviations

Appendix G – Glossary

Appendix H – References

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Appendix A - Initial Emergency Public Information

Evacuation may not be safe or practical immediately following a nuclear detonation and wind patterns can change unpredictably therefore, survivors in areas up to 50 miles in all directions from the blast site should be instructed to shelter-in-place to reduce life-threatening doses of radiation. Once reliable radiation monitoring data becomes available, sheltering instructions can be modified to match actual conditions.

Following are emergency health alerts for use in the Immediate Phase (first 24 hours after the detonation). These message templates are intended for use by CDPH and to be shared with local health departments and other response partners. The areas highlighted in yellow should be filled in with incident-specific information. These messages should be translated as needed and released as soon as possible and repeated as often and in as many communication methods as possible during the Immediate Phase of the emergency.

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Health Alert

CALIFORNIA DEPARTMENT OF PUBLIC HEALTH

FOR IMMEDIATE RELEASE

DATE:
CONTACT:

CDPH Warns Residents of Radiation Health Risk

This is an urgent safety message from the California Department of Public Health.

A nuclear explosion that released potentially deadly radiation occurred in [CITY] today at [TIME]. Follow these instructions to protect yourself from radiation:

- Go inside a building immediately.
- If you are already in a building, stay there.
- Shut windows and doors.
- If the building has a basement, go there.
- If the building has no basement, go to a middle floor, or the center-most part of the building away from outer walls and windows.
- Do not attempt to pick up children from school. Schools will keep children inside and will not allow them to leave until it is safe to do so.

Taking these actions will reduce your exposure to radiation. Plan to stay indoors until further instructions are provided by state or local authorities. Go inside. Stay Inside. Stay Tuned.

****

Instructions for CDPH Duty Officer:
Message template #1 should be distributed to local agencies via CAHAN within 15 minutes of notification by Cal OES. Local agencies should be encouraged to repeat this message every 30 minutes within 50 miles of the detonation site for at least the first 12-24 hours.

Instructions for CDPH Office of Public Affairs:
This alert should be used for a press release as soon as possible. Translate to the appropriate languages, as needed.

Twitter message: #Nuclear explosion in #[CITY]. Important info: [URL]. Go Inside. Stay Inside. Stay tuned.
Facebook message: A #nuclear that released potentially deadly radiation occurred in #[CITY] today at [TIME]. Important info can be found here: [URL]. Go Inside. Stay Inside. Stay tuned.

Health Alert

CALIFORNIA DEPARTMENT OF PUBLIC HEALTH

FOR IMMEDIATE RELEASE

DATE:
CONTACT:

CDPH Warns Residents of Radiation Health Risk

This is an urgent safety message from the California Department of Public Health.

A nuclear explosion that released potentially deadly radiation occurred in [CITY] today at [TIME]. Follow these instructions to remove any potentially radioactive material on you; this material may look like dust or grit:

- Stay indoors.
- Remove clothing and shoes, place into a bag, and seal the bag.
- If you do not have clean clothes to change into, brush the material from the clothes you are wearing into a bag, and seal it.
- If you can, take a shower with warm water and soap, gently cleaning skin without scrubbing. Clean hair with shampoo. Do not use conditioner.
- If you can't shower, use a wet cloth to gently wipe any skin that was not covered by clothing. Brush the material from your hair into a bag, and seal it.
- Blow your nose, and clean eyes and ears with a wet cloth.
- Store sealed bag away from people and pets.
- Wash pets with soap and water, then wash yourself again.

These actions will reduce your exposure to radiation. Plan to stay indoors until further instructions are provided by state or local authorities. Go Inside. Stay Inside. Stay Tuned.
****

Instructions for CDPH Duty Officer:
Message template #2 should be distributed to local agencies via CAHAN within 30 minutes of notification by Cal OES. Local agencies should be encouraged to repeat this message every 30 minutes within 50 miles of the detonation site for at least the first 12-24 hours.

Instructions for CDPH Office of Public Affairs:
This alert should be used for a press release as soon as possible. Translate to the appropriate languages, as needed.

Twitter message: #Nuclear explosion in #[CITY]. Important info: [URL]. Go Inside. Stay Inside. Stay tuned.
Facebook message: A #nuclear that released potentially deadly radiation occurred in #[CITY] today at [TIME]. Important info can be found here: [URL]. Go Inside. Stay Inside. Stay tuned.

Health Alert

CALIFORNIA DEPARTMENT OF PUBLIC HEALTH

FOR IMMEDIATE RELEASE

DATE:
CONTACT:

CDPH Warns Residents of Radiation Health Risk

This is an urgent safety message from the California Department of Public Health.

A nuclear explosion that released potentially deadly radiation occurred in [CITY] affecting the area north of [DEFINE AREA], south of [DEFINE AREA], east of [DEFINE AREA], and west of [DEFINE AREA]. If you are not in the affected area, follow these instructions to avoid exposure to radiation:

- Stay out of the area.
- Stay off the roads. Unnecessary traffic will delay emergency responders.
- If you have children in school in the area: do not attempt to pick them up. Schools will keep children inside and will not allow them to leave until it is safe to do so.

These actions will reduce your exposure to radiation.

****

Instructions for CDPH Duty Officer:
Message template #3 should be distributed to local agencies via CAHAN within 30 minutes of notification by Cal OES. Local agencies should be encouraged to repeat this message every 30 minutes within 50 miles of the detonation site for at least the first 12-24 hours.

Instructions for CDPH Office of Public Affairs:
This alert should be used for a press release as soon as possible. Translate to the appropriate languages, as needed.

Twitter message: #Nuclear explosion in #[CITY]. Important info: [URL]. Go Inside. Stay Inside. Stay tuned.
Facebook message: A #nuclear that released potentially deadly radiation occurred in #[CITY] today at [TIME]. Important info can be found here: [URL]. Go Inside. Stay Inside. Stay tuned.

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Appendix B – Course of Action Checklists

A Courses of Action (COA) checklist has been developed for each of the response and recovery phases following a nuclear detonation event. A COA is a sequence of activities that CDPH programs follow to accomplish the objectives of the NDOP. Event-specific conditions may require modification of the following COA checklists.

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Table B-1.Immediate Response Phase Checklist

0-24 HOURS: Course of Action				OBJECTIVES			
COMPLETED	TIME	ACTIVITY	CDPH Organization	Disseminate public information	Conduct radiological assessment	Prepare for response activities	Support Healthcare Surge
	0-15 min	Release pre-scripted emergency messages with protective action instructions via CAHAN	Duty Officer/EPO	X			
	0-30 min	Activate MHCC, EORP/NDOP, continuity plans, dispatch CDPH liaison to SOC	EPO			X	
	0-30 min	Provide public health messages, message templates, and guidance to affected area(s)	OPA	X			
	0-1 hr	Assess radiological conditions (conducted initially without actual data)	RHB		X		
	0-2 hr	Appoint a Radiation Safety Officer who will develop health and safety plans	RHB		X		
	0-2 hr	Activate RSS, evaluate need for medical countermeasures and SNS assets	MHCC			X	X
	1-4 hr	Participate in the Joint Information Center (JIC) once activated by Cal OES	OPA	X			
	1-4 hr	Establish resources requesting and information sharing procedures	MHCC			X	X
	1-6 hr	Deploy Health Physicists to SDAC	RHB/EMB		X		
	1-6 hr	Deploy CDPH representatives to SOC, regional and local EOCs	MHCC			X	
	6-24 hr	Establish Public Health, EF 8, MAC groups/Participate in other coordination groups	MHCC			X	
	6-24 hr	Monitor shelter-in-place/evacuations at licensed healthcare facilities	L&C			X	X
	6-24 hr	Coordinate with CalEPA on drinking water monitoring	EPO	X			

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Table B-2.Intermediate I Response Phase Checklist

1-3 DAYS: Course of Action			OBJECTIVES					
COMPLETED	ACTIVITY	CDPH Organization	Disseminate Public Information	Conduct Radiological	Support Healthcare Surge	Support Population Monitoring	Assess Community Needs	Ensure Food and Water Safety
	Provide public health information, templates, and guidance to affected areas	OPA	X					
	Establish a call center	MHCC	X					
	Coordinate with CDPH programs on development and release of public information	OPA/MHCC	X					
	Participate In the Joint Information Center (JIC)	OPA	X					
	Provide resources to SDAC/FRMAC	RHB/NERP		X				
	Integrate Health Physicists with federal radiological teams			X				
	Activate laboratory networks. Process low-level environmental samples (<2mR/hr)	DWRLB		X		X		
	Disseminate worker health and safety guidance	OPA/DEODC			X			
	Respond to requests for medical countermeasures	MHCC/RSS			X			
	Monitor hospital occupancies and patient tracking	MHCC			X			
	Support alternate care sites, community reception centers, and medical shelters				X			
	Monitor patient evacuations from licensed facilities	L&C			X			
	Support disaster mental health and fatality management efforts	MHCC			X			
	Provide technical assistance to affected communities, institutions, licensed facilities	EMB/FDB					X	
	Monitor food supply, provide technical assistance to food producers	FDB						X

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Table B-3.Intermediate II Response Phase Checklist

3-14 DAYS: Course of Action			OBJECTIVES						
COMPLETED	ACTIVITY	CDPH Organization	Disseminate Public Information	Conduct Radiological	Support Healthcare Surge	Support Population Monitoring	Ensure Food and Water Safety	Support Fatality Management	Assess Community Needs
	Provide public health information and guidance to affected areas	OPA	X						
	Maintain call center function	MHCC	X						
	Participate In the Joint Information Center (JIC)	OPA	X						
	Continue to support SDAC/FRMAC	RHB/NERP		X					
	Assist with hospital assessments, closures and repopulation	L&C		X	X				
	Provide food subject matter experts to SDAC/FRMAC	FDB		X			X		
	Process low-level environmental samples	DWRLB		X					
	Disseminate worker safety guidance to hospitals and healthcare facilities	MHCC/DEODC			X				
	Distribute medical countermeasures, equipment and supplies	RSS/MHCC			X				
	Monitor patient evacuations and tracking	L&C			X				
	Disseminate worker health guidance and policy decisions to response partners	MHCC			X				
	Support population monitoring.	MHCC/DEODC				X			
	Conduct community needs assessments	EMB/CID/DEODC							X
	Disseminate guidance related to fatality management	MHCC/RHB						X	
	Assist food producers and wholesale food facilities	FDB					X		
	Monitor the safety of ice and vended, bottled and hauled drinking water						X		

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Table B-4. Short-term Recovery Phase Checklist

14-90 DAYS: Course of Action			OBJECTIVES					
COMPLETED	ACTIVITY	CDPH Organization	Disseminate Public Information	Conduct Radiological Assessment	Support Healthcare Surge	Ensure Food and Water Safety	Assess Community Needs	Support Recovery Efforts
	Provide public health information and guidance to affected areas	OPA	X					
	Maintain call center function	MHCC	X					
	Participate In the Joint Information Center (JIC)	OPA	X					
	Continue to support SDAC/FRMAC	RHB/NERP		X				
	Oversee radiological cleanup work	RHB		X				
	License cleanup contractors			X				
	Process low-level environmental samples	DWRLB		X				
	Work with laboratory networks to expand capacity to process radiological samples	DWRLB		X				
	Disseminate worker safety guidance to hospitals and healthcare facilities	MHCC/DEODC			X			
	Monitor reopening/repopulation of licensed hospitals and healthcare facilities	L&C			X			
	Monitor establishment/conversion of beds/facilities for ARS patients				X			
	Distribute medical supplies and equipment to alternate care sites and others	RSS			X			
	Assist food producers and wholesale food facilities with recovery efforts	FDB				X		
	Assist with infectious disease surveillance in populations injured by radiation exposure	DCDC				X		
	Recommend infectious disease control measures				X			
	Participate in recovery MAC groups	MHCC						X

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Table B-5. Long-term Recovery Phase Checklist

> 90 DAYS: Course of Action			OBJECTIVES			
COMPLETED	ACTIVITY	CDPH Organization	Disseminate Public Information	Conduct Radiological Assessment	Ensure Food and Water Safety	Support Recovery Efforts
	Provide public health information and guidance to property owners	OPA	X			
	Modify regulatory requirements for radioactive materials handling	RHB		X		
	Monitor restoration, re-occupation efforts			X		
	Issue guidance for cleanup contractors			X		
	Monitor radioactive cleanup, transportation and disposal contractors and facilities			X		
	Identify sites for low-level radioactive waste temporary storage			X		
	Process low-level environmental samples (low level <2mR/hr)	DWRLB		X		
	Assist hospitals and healthcare facilities to recover from surge	MHCC/L&C				X
	Assist food producers and wholesale food facilities with recovery	FDB			X	
	Support long-term population monitoring	MHCC/programs				

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Appendix C - Frequently Asked Questions, Fact Sheet, Call Center Information

The areas highlighted in yellow in the Call Center Information document should be filled in with incident-specific information.

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FREQUENTLY ASKED QUESTIONS (FAQS)

Frequently Asked Questions About a Nuclear Blast

With the recent threats of terrorism, many people have expressed concern about the likelihood and effects of a nuclear blast. The Centers for Disease Control and Prevention (CDC) has developed this fact sheet to describe what happens when a nuclear blast occurs, the possible health effects, and what you can do to protect yourself in this type of emergency.

What is a nuclear blast?

A nuclear blast, produced by explosion of a nuclear bomb (sometimes called a nuclear detonation), involves the joining or splitting of atoms (called fusion and fission) to produce an intense pulse or wave of heat, light, air pressure, and radiation. The bombs dropped on Hiroshima and Nagasaki, Japan, at the end of World War II produced nuclear blasts.

When a nuclear device is exploded, a large fireball is created. Everything inside of this fireball vaporizes, including soil and water, and is carried upwards. This creates the mushroom cloud that we associate with a nuclear blast, detonation, or explosion. Radioactive material from the nuclear device mixes with the vaporized material in the mushroom cloud. As this vaporized radioactive material cools, it becomes condensed and forms particles, such as dust. The condensed radioactive material then falls back to the earth; this is what is known as fallout. Because fallout is in the form of particles, it can be carried long distances on wind currents and end up miles from the site of the explosion. Fallout is radioactive and can cause contamination of anything on which it lands, including food and water supplies.

What are the effects of a nuclear blast?

The effects on a person from a nuclear blast will depend on the size of the bomb and the distance the person is from the explosion. However, a nuclear blast would likely cause great destruction, death, and injury, and have a wide area of impact.

In a nuclear blast, injury or death may occur as a result of the blast itself or as a result of debris thrown from the blast. People may experience moderate to severe skin burns, depending on their distance from the blast site. Those who look directly at the blast could experience eye damage ranging from temporary blindness to severe burns on the retina. Individuals near the blast site would be exposed to high levels of radiation and could develop symptoms of radiation sickness (called acute radiation syndrome, or ARS [www.bt.cdc.gov/radiation/ars.asp]). While severe burns would appear in minutes, other health effects might take days or weeks to appear. These effects range from mild, such as skin reddening, to severe effects such as cancer and death, depending on the amount of radiation absorbed by the body (the dose), the type of radiation, the route of exposure, and the length of time of the exposure.

People may experience two types of exposure from radioactive materials from a nuclear blast: external exposure and internal exposure. External exposure would occur when people were exposed to radiation outside of their bodies from the blast or its fallout. Internal exposure would occur when people ate food or breathed air that was contaminated with radioactive fallout. Both internal and external exposure from fallout could occur miles away from the blast site. Exposure to very large doses of external radiation may cause death within a few days or months. External exposure to lower doses of radiation and internal exposure from breathing or eating food contaminated with radioactive fallout may lead to an increased risk of developing cancer and other health effects.

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How can I protect my family and myself during a nuclear blast?

In the event of a nuclear blast, a national emergency response plan would be activated and would include federal, state, and local agencies. Following are some steps recommended by the World Health Organization if a nuclear blast occurs:

If you are near the blast when it occurs:

- Turn away and close and cover your eyes to prevent damage to your sight.
- Drop to the ground face down and place your hands under your body.
- Remain flat until the heat and two shock waves have passed.

If you are outside when the blast occurs:

- Find something to cover your mouth and nose, such as a scarf, handkerchief, or other cloth.
- Remove any dust from your clothes by brushing, shaking, and wiping in a ventilated area—however, cover your mouth and nose while you do this.
- Move to a shelter, basement, or other underground area, preferably located away from the direction that the wind is blowing.
- Remove clothing since it may be contaminated; if possible, take a shower, wash your hair, and change clothes before you enter the shelter.

If you are already in a shelter or basement:

- Cover your mouth and nose with a face mask or other material (such as a scarf or handkerchief) until the fallout cloud has passed.
- Shut off ventilation systems and seal doors or windows until the fallout cloud has passed. However, after the fallout cloud has passed, unseal the doors and windows to allow some air circulation.
- Stay inside until authorities say it is safe to come out.
- Listen to the local radio or television for information and advice. Authorities may direct you to stay in your shelter or evacuate to a safer place away from the area.
- If you must go out, cover your mouth and nose with a damp towel.
- Use stored food and drinking water. Do not eat local fresh food or drink water from open water supplies.
- Clean and cover any open wounds on your body.

If you are advised to evacuate:

- Listen to the radio or television for information about evacuation routes, temporary shelters, and procedures to follow.
- Before you leave, close and lock windows and doors and turn off air conditioning, vents, fans, and furnace. Close fireplace dampers.
- Take disaster supplies with you (such as a flashlight and extra batteries, battery-operated radio, first aid kit and manual, emergency food and water, nonelectric can opener, essential medicines, cash and credit cards, and sturdy shoes).
- Remember your neighbors may require special assistance, especially infants, elderly people, and people with disabilities.

Is a nuclear bomb the same as a suitcase bomb?

The "suitcase" bombs that have been described in new stories in recent years are small nuclear bombs. A suitcase bomb would produce a nuclear blast that is very destructive, but not as great as a nuclear weapon developed for strategic military purposes.

Frequently Asked Questions About a Nuclear Blast
(continued from previous page)

Is a nuclear bomb the same as a dirty bomb?

A nuclear blast is different than a dirty bomb. A dirty bomb, or radiological dispersion device, is a bomb that uses conventional explosives such as dynamite to spread radioactive materials in the form of powder or pellets. It does not involve the splitting of atoms to produce the tremendous force and destruction of a nuclear blast, but rather spreads smaller amounts radioactive material into the surrounding area. The main purpose of a dirty bomb is to frighten people and contaminate buildings or land with radioactive material.

Would an airplane crash in a nuclear power plant have the same effect as a nuclear blast?

While a serious event such as a plane crash into a nuclear power plant could result in a release of radioactive material into the air, a nuclear power plant would not explode like a nuclear weapon. There may be a radiation danger in the surrounding areas, depending on the type of incident, the amount of radiation released, and the current weather patterns. However, radiation would be monitored to determine the potential danger, and people in the local area would be evacuated or advised on how to protect themselves.

Do I need to take potassium iodide (KI) if there is a nuclear blast?

Local emergency management officials will tell people when to take KI. If a nuclear incident occurs, officials will have to find out which radioactive substances are present before recommending that people take KI. If radioactive iodine is not present, then taking KI will not protect people. If radioactive iodine is present, then taking KI will help protect a person's thyroid gland from the radioactive iodine. Taking KI will not protect people from other radioactive substances that may be present along with the radioactive iodine.

Where can I get more information?

For more information about radiation and emergency response, see the Centers for Disease Control and Prevention's website at www.bt.cdc.gov or contact the following organizations:

- **CDC** at 800-CDC-INFO
- **World Health Organization**, Radiation and Environmental Health Unit at www.who.int/ionizing_radiation/en
- **Conference of Radiation Control Program Directors** at www.crcpd.org or 502-227-4543
- **Environmental Protection Agency (EPA)** at www.epa.gov/radiation/rert
- **Nuclear Regulatory Commission** at www.nrc.gov or 301-415-8200
- **Federal Emergency Management Agency (FEMA)** at www.fema.gov or 202-646-4600
- **Radiation Emergency Assistance Center/Training Site** at www.orau.gov/reacts or 865-576-3131
- **U.S. National Response Team** at www.nrt.org
- **U.S. Department of Energy (DOE)** at www.energy.gov or 1-800-DIAL-DOE

For more information, visit www.bt.cdc.gov/radiation, or call CDC at 800-CDC-INFO (English and Spanish) or 888-232-6348 (TTY).

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Nuclear Explosion Fact Sheet

What is an Improvised Nuclear Device (IND)?

- An Improvised Nuclear Device (IND) is an atomic bomb that may have been fabricated from scratch or adapted from existing military nuclear weapons with its destructive energy, or yield, measured in kilotons (kt) compared to the conventional explosive TNT.
- An IND may be as small as 0.01 kt (comparable to 10 tons of TNT) to 20 kt (20,000 tons of TNT) or more.
- Detonation of an IND results in a nuclear explosion.
- An IND should not be confused with a radiological dispersal device (RDD), which is commonly called a "dirty bomb." A dirty bomb uses an explosive device to spread radioactive material without a nuclear explosion.

What is a nuclear explosion?

- A nuclear explosion results in a large blast that produces an intense wave of heat, light, and air and releases radioactive material which makes it much more dangerous than other types of explosions.
- A nuclear explosion can cause significant destruction. A 10 kt IND can destroy or severely damage people, buildings, roads, and cars within 3-5 miles of the explosion. The resulting dust and debris will be pulled upward and form a cloud above the explosion.

Why is a nuclear explosion so dangerous?

- The blast, heat, and radiation effects from a nuclear explosion can cause significant casualties and massive damage to buildings and property.
- A nuclear explosion releases extremely dangerous levels of radiation that is harmful to people, animals and the environment.
- Radiation levels can be extremely dangerous after a nuclear explosion but decrease rapidly, in just hours to a few days.

What is nuclear fallout?

- After a nuclear explosion radioactive material in the explosion cloud will cool and fall to the ground -- this is known as fallout.
- People hundreds of miles away from a nuclear explosion could be exposed to radioactive fallout carried by winds.
- Fallout looks like dust, sand, or ash, and can be seen as its falls from the sky after a nuclear explosion.

What types of radioactive material are spread by the nuclear explosion?

- A variety of radioactive materials can be spread over a wide area after a nuclear explosion.
- Many types of radioactive material may be identified over time, but the initial response efforts do not depend on knowledge of the specific materials.
- Initial safety instructions are the same regardless of the specific radioactive materials.

What are the immediate health effects of radiation exposure?

- Radiation can affect the body in a number of ways.
- Exposure to a small dose of radiation will not result in immediate health effects. According to radiation safety experts, radiation exposure between 5–10 rem usually results in little to no harmful health effects.
- Exposure to a large dose of radiation can result in immediate health effects, such as acute radiation sickness, skin reddening and/or skins burns. These symptoms can develop several days after exposure to radiation.
- If skin burns, nausea or vomiting occur shortly after radiation exposure, medical attention is required as soon as it safe to seek help.

What is radiation sickness?

- You cannot get ARS from long-term exposure to low levels of radiation.
- Acute radiation sickness (ARS) occurs when a person is exposed to large dose of radiation — more than 75 rem—in a short amount of time (usually minutes).
- Symptoms of ARS can include skin burns, nausea and vomiting after radiation exposure. These symptoms can develop within minutes to several days after exposure.
- If skin burns, nausea or vomiting occur shortly after radiation exposure, medical attention is required as soon as it is safe to seek help.
- There are medical treatments available for people exposed to certain types of radioactive materials. Medical professionals will determine if these treatments are appropriate.

Are there any treatments for radiation sickness?

- If skin burns, nausea or vomiting occur shortly after radiation exposure, medical attention is required as soon as it is safe to seek help.
- Medical treatment focuses on treating major injuries and burns, reducing infections, and maintaining hydration.
- Some treatments are available for blocking, limiting or removing internal contamination for certain types of radioactive materials. Medical professionals will determine if these treatments are appropriate.

Does radiation cause cancer?

- The risk of radiation-related cancers increases with the dose of radiation received.
- There is clear evidence that exposure to significant doses of radiation can raise the risk of cancer that may not appear for many years or decades after exposure.
- Exposure to low doses of radiation may affect cancer risk so slightly that it cannot be distinguished from risks caused by genetic pre-disposition, exposure to chemicals, or lifestyle.
- Radiation exposure from natural background and other routine sources is a minor contributor to overall cancer risk.
- Health officials and medical professionals will monitor people affected by a nuclear explosion for health effects including cancer.

What populations are most at risk to radiation exposure?

- Infants, children, the elderly, pregnant women, and people with compromised immune systems are more susceptible to health effects from radiation exposure than healthy adults.

- A developing fetus is most susceptible to health effects from radiation exposure because of rapidly developing cells.
- The steps for reducing radiation exposure are the same for all populations:
  - Increase your distance from radiation,
  - Shield yourself from the radiation with thick, dense materials, and
  - Reduce your time exposed to radiation or near radioactive materials.

What to do during a nuclear explosion emergency

- Go Inside, Stay Inside, Stay Tuned!
- If you are outside near the explosion, get inside a building as quickly as possible.
- If you are in a car, find a building immediately and get inside. Cars cannot protect you from radiation or radioactive materials.
- If a multi-story building or a basement can be safely reached within a few minutes of the explosion, go there immediately.
- Go into the basement or center-most part of the building, away from windows, doors and outside walls.
- Close all windows and doors and shut off ventilation systems.
- Stay informed by tuning in to television, radio, or Internet emergency broadcasts and news and follow instructions on what to do.
- Stay inside until you are told it is safe to leave by officials unless you have immediate, life-threatening injuries.
- Plan to stay sheltered indoors until officials tell you it is safe to leave.
- If you must go outside, cover your mouth and nose with a damp towel.
- If people or pets were outside near the explosion they may have been contaminated with radioactive materials.
- Removing radioactive materials from your body and clothing can reduce your risk of experiencing harmful health effects from radiation.
- To remove radioactive materials from your body, remove clothing and take a shower using lukewarm water and lots of soap to wash skin and hair. Avoid scratching your skin. Do not use conditioner on your hair.
- If you cannot take a shower, carefully remove your clothing and put on clean clothes. If you cannot shower or do not have clean clothes, remove clothing and brush away any loose particles before putting your clothes back on.
- Do not breathe in any dust-like particles. Blow your nose and wipe your eyes, nose and ears with a clean cloth.
- Seal contaminated wash cloths and discarded clothes in a plastic bag and store it away from people and animals.
- Clean and cover any open wounds on your body.
- Do not eat food that was outside at the time of the explosion.
- Food in sealed containers and in your refrigerator or freezer is safe to eat. Bottled water will be free of radioactive contamination.
- Use a damp towel or cloth to clean the outside of all food cans, bottles, packaged foods, counters, plates, pots and utensils before using them.

- Seal contaminated cleaning cloths in a plastic bag and place them away from people and animals.

How do people know if they have been exposed to radiation or contaminated by radioactive materials?

- If you were near the location of a nuclear explosion, you may have been exposed to radiation and you may be contaminated with radioactive material.
- If you came in contact with any dust-like particles falling from the sky following a nuclear explosion, you may have been exposed to radiation and you may be contaminated by radioactive material.
- Federal, State and local authorities will monitor radiation levels after the explosion to determine which geographic areas have been exposed to dangerous levels of radiation and radioactive material.
- Tune in to television, radio, or Internet news for information about the areas where dangerous levels of radiation and radioactive material may have fallen and follow instructions on what to do if you were in these areas.

What is being done to protect those in schools, hospitals and nursing homes?

- Children and adults in schools, hospitals, nursing homes, daycare and other facilities will be cared for at those facilities and will not be released until instructed by officials that it is safe.
- Schools, hospitals, and nursing homes have emergency plans in place to protect people at the facility in the event of an emergency such as a nuclear explosion.
- These plans include keeping everyone inside, providing assistance, and, if necessary, ensuring a safe evacuation.
- Going outside during a nuclear explosion emergency to retrieve your loved ones could expose you and them to dangerous, and potentially deadly, levels of radiation.

Radiation Health Information:
Centers for Disease Control and Prevention: 1-800-232-4636 *www.bt.cdc.gov/radiation/*
Potassium Iodide: *www.emergency.cdc.gov/radiation/ki.asp*

Basic Radiation Information:
U.S. Environmental Protection Agency: http://www.epa.gov/radiation/basic/index.html

For information on preparing for disasters:
www.BePreparedCalifornia.ca.gov
www.calema.ca.gov/PlanningandPreparedness/Pages/How-You-Should-Prepare.aspx

Nuclear Detonation Call Center Information

Source: Department of Homeland Security Federal Emergency Management Agency
***Improvised Nuclear Device Response and Recovery; Communicating in the Immediate Aftermath*, 2012**

This question bank is an excerpt from the above referenced document and should be customized to the situation and audience and used for answering requests for information.

Situation Specifics

What happened?

- A nuclear explosion occurred at [LOCATION] in [CITY].
- If you are in [DEFINE AREA], get inside and stay inside.
  - o Emergency responders and radiation experts are working to identify the path of the radioactive material.
  - o Weather conditions, like rain, snow or wind, will affect the spread of radiation.
  - o Even if your location appears normal, radiation outside may still be a danger.
  - o Staying inside, away from the radioactive material outside, can save your life.
- Radiation experts are gathering information and will provide updates as we learn more.
  - o Radiation levels are extremely dangerous after a nuclear explosion, but the most dangerous radiation levels will decrease significantly during this first 24 hours.
  - o People will be evacuated when radiation experts confirm it is safe to leave their building.
  - o Until you are instructed to leave, you are safest if you stay inside a building with brick or concrete walls or in a basement.

Where did the IND come from?

• Early indications are that this was a deliberate attack using an improvised nuclear device.
• The Federal government is using all available means, including law enforcement, intelligence and technical resources, to determine who is responsible for this attack.
    o It will take time to determine those responsible.
    o We ask that you not rush to judgment until more information is available.

How big was the explosion?

• It is too early to know the size of the explosion.
• However, this is a very serious disaster.

Is there an immediate danger?

• If you are in [LOCATION], you are in danger of exposure to extremely high levels of radiation.
• Go to a basement or the center of the building, and close all windows and doors. Stay as far away from the radiation outside as possible.
• If you are told to stay inside, it is because the radiation outside is dangerous.
• Follow the safety instructions provided by emergency response officials. These instructions will be updated as more information is available.

What should I do if I am in the area where the explosion occurred?

• Stay inside unless told otherwise by authorities. This will protect you from harmful radiation and keep roads clear for emergency vehicles.
    o People without power can use a battery-powered device like a radio, cell phone, or computer to get information.
• Unless you are critically injured, stay away from hospitals, fire and police stations.
• Use text messaging rather than phone calls to communicate with friends and family. Try and keep your messages as short as possible.
• If you were in a vehicle or outside when the explosion occurred, get inside a building immediately.
    o If a multi-story building or an underground structure like a basement can be safely reached within a few minutes, go there immediately.
    o If a brick or concrete building is not available, quickly get inside the nearest building with the thickest walls.
• Do not abandon your car on the road. Instead, park your car without impeding traffic. This will allow emergency responders to help people in need of assistance.

How many people have been hurt or killed?

• We cannot speculate on the specific number of casualties right now.
• We know that people need help.
• We are focused on getting people in the affected area help as quickly and safely as possible.

Are people safe?

• If you are in [LOCATION], you are in danger of exposure to extremely high levels of radiation.
• You are safest inside a basement or building made of brick or concrete for the first 12-24 hours, while radiation levels outside are most dangerous.
• If you were instructed to stay inside, remain inside until you are told otherwise by authorities.
• Instructions given by officials or emergency responders are for your safety. The instructions will be updated as more information is available.

How can people learn about the safety of their family members?

• Use text messaging, e-mail and social media, like Facebook and Twitter, to communicate with family and friends.
    o After a nuclear explosion, you are unlikely to be able to complete a phone call.
    o This using text messaging and social media will free up phone lines, allowing people in extreme need to call for help and emergency personnel to communicate with each other.
• Emergency responders are gathering and organizing all personal information as quickly as possible.
    o If you are separated from your children or loved ones, search online for registries where people can identify themselves and their location.
    o Registries will take some time to populate and gaining computer access to register or search may take hours to days.
• You can seek additional information and counseling services at [LIST Of LOCATIONS].

What types of radioactive material were spread by the nuclear explosion?

• A variety of radioactive materials are spread over a wide area after a nuclear explosion.
    o Many of the types of radioactive material will be identified over time, but the initial response efforts do not depend on knowledge of the specific materials.
• What we do know is that radiation levels are extremely dangerous after a nuclear detonation but the levels reduce rapidly, in just hours to a few days.
• Initial safety instructions are the same regardless of the specific radioactive materials.

Where is the radioactive material located?

• Weather conditions like wind and rain will affect the spread of radioactive material.
• Radiation experts are monitoring air and ground to determine the location of radioactive material.
• Emergency responders are working to get people out of dangerous areas.
    o If you are in [LOCATION], stay inside and wait for the most dangerous radiation levels to decrease. This can take from a few hours to a few days.
    o Until radiation levels decrease, the public and emergency responders are safer staying inside rather than evacuating. You will not be able to outrun radiation.
    o People will be instructed to leave when the danger decreases.
• Safe evacuation routes and available shelter locations will be updated as more information is available.

Where is the radioactive material going?

• According to current weather predictions, the areas [DIRECTION] of [CITY] will have the highest, most dangerous radiation levels, but the path can change depending on weather conditions.

• The further you are from the explosion, the less radioactive material will reach your area.
  o Dust- or sand-like particles containing dangerous radiation will fall to the ground in the area closest to the explosion.
  o Weather conditions, like rain, snow or wind, will affect the spread of radioactive material.

• Safety instructions will be provided to those in areas affected by the nuclear explosion.
  o The explosion damage will not extend more than 3 to 5 miles, but radioactive material in the air will travel further. Stay tuned for important safety instructions.
  o Radiation experts and emergency responders are working to confirm the path and location of the radioactive material.
  o Safety instructions will be updated as more information is available.

Is the situation under control?

• Emergency responders, radiation experts, and representatives from all levels of government are working together to protect the public and save lives.

• Law enforcement is working to apprehend those responsible for this horrific act.

• The country is facing unprecedented challenges and a long, difficult response, but together we will recover both physically and emotionally.

Could there be another nuclear explosion?

• At this time, we have no information to indicate that additional attacks are being planned; however, we are taking all possible security precautions to protect the American people.

• As a nation, we must continue to be alert.
  o If you see anything suspicious, contact a local law enforcement official or the FBI.

• Stay tuned to television, radio or and the Internet for important updates.

What are emergency responders doing?

• Radiation experts will determine whether an area is safe to enter and how to best help people
in the affected area.

• After an area is safe for emergency responders to enter, they will provide medical assistance, firefighting, law enforcement and evacuation assistance.
  o Radiation experts and emergency responders continue to gather information on structural damage, radiation levels, location of radioactive material, and how quickly radiation levels are decreasing.
  o Some areas near the explosion may not be safe to enter for days, weeks or years.

What will happen to people in the affected communities?

• While it is too early to know the specific impacts, we know that this has been a catastrophic event where lives have been lost and homes and businesses destroyed.
• All levels of government are coordinating their efforts to do everything possible to help the people affected by this disaster.
• As life-saving activities continue, follow the instruction of emergency responders.
    o These instructions are for your safety.
    o These instructions are based on the best information we have right now.
    o These instructions will be updated as more information is available.

What is the condition of the city that was attacked?

• This explosion caused severe damage to buildings, roads, bridges and communications systems in the areas closest to [LOCATION].
    o [Provide updates on the status of power outages, communications outages, water systems, sewage systems, road and bridge conditions].
• We are taking the following steps to restore damaged systems:
    o [Provide information on steps being taken to bring systems back up online].
• It may take a significant amount of time to get private and public systems working again.

How can the public help?

• Immediately after the explosion, there are three things the public can do to help:
    o Let emergency responders help those in need:
    If you are near the affected area, stay inside unless told otherwise by authorities. This will help protect you from radiation and keep roads clear for emergency vehicles.
    Unless you are critically injured, stay away from hospitals, and fire and police stations. These facilities need to be available for injured victims.
    o Keep phone lines clear
    Use text messaging to communicate with friends and family. This will free up phone lines, allowing people in extreme need to call for help and emergency personnel to communicate with each other.
    o Provide shelter
    If you are able to take someone seeking shelter into your home, there are simple safety steps to keep radioactive material out of your home.
• First, ask your visitor to remove their outer layer of clothing and place it in a plastic bag. Place the bag away from people and pets.
• If possible, have your visitor shower with soap and warm water to remove any remaining radioactive material.
• If they do not have clean clothes, ask your visitor to shake or brush off their outer layer of clothing and redress. Do not breathe in any dust-like particles.

Public Safety and Protective Action Guidance

What should the public do to protect themselves?

- If you are in the affected area of [LOCATION], get inside a building as quickly as possible.
  - o If a multi-story building or a basement can be safely reached within a few minutes of the explosion, go there immediately.
  - o Close all windows and doors and go to a basement or to the middle of the building.
  - o If you are in a car, find a building immediately and get inside. Cars do not protect you from radiation.
- Follow the instructions from State and local officials and emergency responders.
  - o These instructions are for your safety.
  - o These instructions are based on the best information we have right now.
  - o These instructions will be updated as we gather more information.

What is being done to protect those in schools, hospitals and nursing homes?

- Children and adults in schools, hospitals, nursing homes and daycare facilities will be cared for at those facilities and will not be released to go outside until instructed by emergency responders that it is safe to do so.
- Schools, hospitals, and nursing homes have emergency plans in place to protect people at the facility in the event of a nuclear explosion.
  - o These plans include keeping everyone inside, providing assistance for those with functional needs, and, if necessary, ensuring safe evacuation.
  - o Going outside to retrieve your loved ones will expose you and them to dangerous and potentially deadly levels of radiation.

Is the air safe to breathe?

- If you are within 50 miles of [LOCATION], these simple steps can reduce exposure from breathing in radioactive particles:
  - o If outside, cover your mouth and nose with a protective layer—like a mask or a towel—to reduce the amount of potentially harmful particles you breathe.
  - o Close doors and windows if possible.
- The explosion released large amounts of radioactive material and debris into the air.

o Radiation is one of many hazards released as a result of this explosion.

  - o The radioactive material released in the air is dangerous for the immediate area and the areas nearby to the explosion.
  - o Weather conditions, like rain, snow or wind, will affect the spread of radioactive material.
- Radiation experts and Federal, State, local, tribal and territorial emergency responders are monitoring the conditions in the affected area and will let you know when it is safe to leave.
  - o Air monitoring results will be shared with the public as soon as possible.

Are food and medications safe?

• Food in sealed containers and any unspoiled food in your refrigerator or freezer is safe to eat. Medication in sealed containers is safe.

• Use a damp towel or cloth to clean all cans, bottles, packaged foods, counters, plates, pots and utensils before using them.

  o Seal these towels or cleaning cloths in a plastic bag or other container and place them away from people and animals.

• Do not eat food that was outside at the time of the explosion.

• Nursing mothers should take the following additional precautions to reduce radiation exposure to their babies:

  o If you were near the explosion, use baby formula until you are able to contact your doctor for further instructions or advice.

  o You may continue to breastfeed if there is no other source of food available.

  o As soon as possible, tell emergency workers that you are breastfeeding so they can help you and your child get the proper attention.

Is the water safe to drink?

• Until we have drinking water test results, only bottled water is certain to be free of contamination.

• You can safely drink water, juices or other drinks in sealed containers or in your refrigerator or freezer.

  o A sealed package or storage location will protect the liquid inside from radioactive contamination.

  o If a sealed container was exposed to radioactive dust outside, use a clean towel to wipe off the bottle to remove any radioactive material before opening it.

• Tap or well water can be used for cleaning yourself and your food.

  o The risk from having radioactive material on your body or consuming radioactive material on your food is significantly reduced by washing, even if the water itself is contaminated.

  o Boiling tap water does not get rid of radioactive material.

• If needed, water in a toilet tank or from a hot water heater tank will also be free of radioactive contamination.

Will my power, natural gas and water work after a nuclear explosion?

• Buildings may lose power, which will prevent lights and electricity from working.

  o If you move to a basement and plan to light a match or candle for heat, light or cooking, be sure that smoke can escape.

  • Gas lines could break, which will prevent gas-powered cooking and heating.

  o If buildings in your area use natural gas, smell for gas before lighting any fire for heat, light or cooking.

  o If you smell gas, turn off any gas outlets as soon as it is safe to do so.

• Buildings in some areas may lose water pressure, which will prevent the toilet from flushing.

  o If your toilet cannot be flushed, use a container with a cover—like a garbage can or bucket—to dispose of human waste.

o If possible, use a plastic bag as a liner and use disinfectant to protect against the spread of disease and to control the smell.
o Water in a toilet tank will be free of radioactive contamination and can be used for washing.

Will people need to evacuate the affected area?

• You should plan to stay inside a building for the first 12-24 hours or until you are told by emergency responders that it is safe to leave.
• If you are instructed to evacuate, quickly pack important papers, necessary medicines and a change of clothes.
o Follow the evacuation route provided by emergency responders.
o You will be stopped at a "check point" to wash radioactive material from your vehicle.
o Emergency responders must remove radiation from you, your family and your pets before you can enter a shelter.
• If you have been instructed to stay inside, it is because the situation outside is too dangerous to attempt evacuation at this time, or because a safe evacuation route has not yet been established.

Will shelters be available for people instructed to evacuate?

• Yes, shelters will be available for people instructed to evacuate.
• People will be evacuated away from the path of radiation to limit their radiation exposure.
• Emergency responders will guide you to shelters when conditions are safe enough for you to move there.
o Shelters will provide water, food, some medicines, and basic sanitary facilities.
o You should take needed medicines and prescriptions, important papers and a change of clothes with you.

What are the options for evacuation and sheltering with pets?

• You can clean radioactive material from pets just as you would remove radioactive material from people.
o Use a brush to gently remove any dust-like particles from your pet's coat. Do not breathe any particles that come from your pet's coat.
o If possible, shampoo your pet using lukewarm water. Do not use conditioner.
• While pets are accepted at some evacuation facilities, many emergency shelters cannot accept pets for public health reasons.
o Service animals are not considered pets and will be accepted in evacuation shelters.
• If you are evacuating with a pet:
o Listen to local radio news broadcasts for information on pet evacuation and the locations of available pet shelters.
o Pets will not be allowed into any shelter until they are thoroughly washed to remove any radioactive material.
o Preserving and protecting human life takes priority over pets.
o If possible, bring a cage, leash, food, medication and veterinary records, including immunization records.

What plans are in place for people who don't have transportation?

• Emergency responders are trained on how to help those who do not have access to transportation and those who cannot care for themselves following an IND incident.
• Transportation will be provided to evacuate people from dangerous areas.

Can I let someone into my home after a nuclear explosion?

• Providing shelter to someone who was outside during the nuclear explosion can save their life without endangering your own.
• If you are able to take someone seeking shelter into your home, follow these safety steps to keep radioactive material out of your home.
    o First, ask your visitor to remove their outer layer of clothing and place it in a plastic bag or another container. Place the container away from people and pets.
    o Second, have your visitor shower with soap and warm water to remove any remaining radioactive material. They should not use conditioner in their hair.
    o If no shower or clean clothes are available, ask your visitor to brush off any loose material that may have settled on their clothing. They should use a wipe or clean wet cloth to wipe any skin that was not covered by clothing, like their hands and face.

What should people do if they do not have food, water or medications?

• If you are in the impacted area and your life is threatened by no access to, or running out of, life-sustaining medication like insulin or heart medication, take the following steps to get medication and avoid radioactive material outside:
    o Call 911 if possible.
    o Seek help from a neighbor.
    o As a last resort, you can go to the closest medical facility.
• If your condition is not life-threatening, stay inside for 12-24 hours until instructed otherwise.
    o Treat burn, cut and shock injuries with first aid – there is no need to delay treatment because of radiation.
    o Going outside to look for food, water or medicine soon after an explosion can put you in immediate danger.
• If you have to go outside for any reason, cover your nose and mouth to avoid breathing any radiation particles. Clean yourself thoroughly, put on clean clothing and wash exposed areas with soap and water when you come back inside.

Is pet food safe?

• As with human food, sealed pet food is safe for animals to consume.
• As with human food, rinse or wipe off any debris from a closed can or package with tap water and dispose of the washcloth in a plastic bag away from people and animals.

What should people do if they are on a boat near the impacted area?

• If you are on a boat, get to water that is at least 5 feet deep and 200 feet or more from shore, stay inside the boat and navigate away from the affected area.
    o While boats do not protect you from radiation, distance from the explosion will.

• The largest, most dangerous radioactive particles will sink in the water. Quickly and carefully wash or sweep away any dust- or sand-like particles that land on the boat. Cover your mouth and nose to prevent breathing in radiation particles and avoid direct contact with these particles.

Radiation Basics

What is radiation?

- Radiation is the release of energy from unstable atoms in the form of particles or waves.
  - Everything is made of atoms.
  - Some atoms are unstable and release energy to become stable. These atoms are radioactive.
- Radiation can be detected using special equipment.
- People cannot see, smell, hear, feel or taste radiation.
- Radiation affects people by depositing energy in the body, which damages body tissue.
  - Radioactive material can be harmful when it contacts your skin, inhaled from the air, ingested, or enters your body through an open wound.
  - Unnecessary radiation exposure should be avoided.

What are the types of radiation?

- Ionizing radiation is the type of dangerous radiation that is released after a nuclear explosion.
  - Ionizing radiation can alter a person's DNA or cells.
- Non-ionizing radiation is not strong enough to cause internal damage.
  - Examples of non-ionizing radiation are radio waves, cell phone signals and microwaves.

What are the different types of ionizing radiation?

- Radioactive material from a nuclear explosion may emit any of four types of ionizing radiation: alpha particles, beta particles, gamma rays and neutrons.
  - Alpha particles: A piece of paper or the outer layers of skin will stop alpha particles. Radioactive material that emits alpha particles (alpha emitters) is most harmful when inhaled, swallowed or enters into the blood stream through wounds.
  - Beta particles: Beta particles can be stopped by a single layer of clothing or by a thin layer of protective material. Beta particles are capable of penetrating exposed skin and causing radiation damage such as skin burns. Beta particles are most hazardous when they are inhaled, swallowed or enter into the blood stream through wounds.
  - Gamma rays: Gamma rays are similar to x-rays taken in a doctor's office. Several feet of concrete or another dense material, like the lead aprons worn during medical x-rays, are required to stop gamma rays. Gamma rays can penetrate a person's entire body and are the primary concern following a nuclear explosion. Gamma rays and x-rays typically pass completely through the human body. However, they deposit a fraction of energy in a person's body tissue that can cause harmful health effects.

- Neutrons: Neutrons are released immediately after a nuclear explosion and last only a few seconds in the impacted area. Neutrons are very penetrating. Several feet of concrete or another dense material are required to stop them. Neutrons interact with tissues in the body and have the potential to cause damage.

What is background radiation?

- Background radiation is radiation that is always around us. Everyone is exposed to some amount of background radiation.
- Background radiation comes from natural sources such as rocks, soil and outer space.
- Background radiation levels vary across the country, states and even within individual cities.
  - This can be due to elevation; higher elevations have more exposure to cosmic radiation.
  - It can be due to rock composition; some kinds of rocks contain more radioactive materials than others.

How is radiation exposure measured?

- Radiation specialists use complex tools to measure, analyze and calculate how much radiation a person receives following a nuclear explosion.
- In the United States, the radiation dose a person receives is measured in a unit called a rem.
  - Small doses of radiation are measured in millirems, which are one-thousandth of a rem.
  - Other countries use different units.
- The average person in the United States receives a dose of about 620 millirem of radiation per year due to natural radiation and medical procedures.
  - Aggressive cancer treatments can expose a person to higher amounts of radiation, ranging from 40 to 4,000 rem over a series of treatments.

How much radiation is considered low risk?

- According to radiation safety experts, radiation exposure between 5–10 rem usually results in little to no harmful health effects.
  - Infants, the elderly and pregnant women are more sensitive to radiation exposure than healthy adults.
- It takes a large dose of radiation—more than 75 rem—in a short amount of time (usually minutes) to cause immediate health effects like acute radiation sickness.
  - Differences like age, gender and even previous exposure are factors that might influence a body's reaction to radiation exposure.
- You can lower your risk of developing health effects by limiting your exposure to radiation.
  - Get inside a building or to a basement to protect yourself.
  - Get clean.
  - Listen to officials and emergency responders for further safety instructions.

Who sets radiation exposure limits?

- Federal agencies provide guidance on levels of radiation that may warrant safety actions.
  - For example, the U.S. Environmental Protection Agency provides guidance on evacuation and sheltering and the Food and Drug Administration provides guidance on radiation contamination and food safety.

o Specialists from these and other agencies are advising State and local officials and emergency responders.
• Some states also have established radiation exposure limits.

Radiation and Improvised Nuclear Device (IND) Overview

What is an Improvised Nuclear Device (IND)?
• An IND is an explosive nuclear device with energy measured in kilotons (a small fraction of Cold War-era nuclear weapons) that can be detonated with no warning.
o This weapon can cause significant destruction and severely damage areas within 3-5 miles of the explosion.
• An IND explosion releases radioactive material, which makes it much more dangerous than other types of explosions.
o An IND should not be confused with a radiological dispersal device (RDD), which is commonly called a “dirty bomb”. A dirty bomb uses an explosive device to spread radioactive material without a nuclear explosion.
• An IND may be constructed from stolen nuclear weapon components or made from scratch using nuclear material to produce a nuclear explosion.

What is a nuclear explosion?
• A nuclear explosion involves a large blast that produces an intense wave of heat, light, air, and radiation.
• Anything immediately near the explosion, including buildings, roads and cars, will be destroyed. The resulting dust and debris will be pulled upward and form a cloud above the explosion.

What is nuclear fallout?
• After a nuclear detonation, material in the explosive cloud will cool and fall to the ground; this is known as fallout.
o Fallout is dangerous because it contains radioactive material.
o The radioactive material in fallout can be carried long distances by wind before it falls back to the earth.
o Fallout particles look like dust, sand, or ash, and can be seen as they fall from the sky after an IND detonation.

Why is a nuclear explosion so dangerous?
• The blast, heat, and radiation from a nuclear explosion can cause massive casualties and significant damage to buildings and property.
• A nuclear explosion releases extremely dangerous levels of radiation, which is harmful to humans and animals.
o People hundreds of miles away from the explosion could be exposed to lower levels of radioactive fallout carried by winds.
o The most dangerous radiation levels from fallout will decrease significantly after a nuclear explosion in the first 24 hours.

How far will the radioactive material travel?

• Radioactive material can be carried hundreds of miles by wind.
• As radioactive material moves through the air, radioactive fallout will drop on the surfaces below.
    o Larger particles, containing greater amounts of radioactive material, fall closest to the explosion.
• The further you are from the explosion, the less radioactive material will reach your area.
• People in the path of radioactive material should follow important safety instructions from officials and emergency responders and avoid coming in contact with radioactive material.

How will precipitation affect the fallout?

• Any type of precipitation, such as rain or snow, will push radioactive material toward the ground.
    o The precipitation gathers and concentrates the radioactive particles in the air and brings them to the ground, similar to the way rain collects pollen from the air and brings it to the ground.
    o Radiation levels will likely be higher in areas that experience precipitation after a nuclear explosion.

Exposure, Contamination and Decontamination

What is the difference between radiation exposure and contamination?

• Radiation exposure occurs when radiation interacts with the body. Radiation contamination occurs when radioactive materials settles on a surface or enters a person's body.
    o Radioactive contamination can be spread in the same way that dust or mud can be tracked into the home or spread to another person or object.
    o Radioactive contamination on your skin, hair, clothes or objects like a purse or a car can typically be easily removed by brushing off the radioactive particles.
• You can be exposed to radiation without being contaminated.
    o Having a medical x-ray is an example of being exposed but not contaminated.
    o After a nuclear explosion, a person or object can leave the area following the release of radioactive material and still be contaminated.
    o If you are or were in the [AREA], listen for instructions on how to remove the contamination.

What is internal and external radiation contamination?

• Internal contamination occurs when radioactive material enters the body.
    o Radiation can be swallowed, inhaled or enter the body through skin wounds.
    o Different kinds of radioactive materials may affect different parts of your body.
• External contamination occurs when radioactive material settles on a surface like your body or clothing, a structure, or an object.

What is decontamination?

• The process of removing radioactive material from people, pets or objects—usually by simple washing—is called decontamination.
    o Radioactive particles fall from the air like dust or sand and settle on objects below, including people, buildings, cars and roads.
    o If radioactive material falls on you, you should remove these particles as quickly as possible. Do not breathe any dust-like particles.
• Decontaminating yourself will reduce your exposure to harmful radiation.
    o The longer the particles stay on your skin, the more harm the radiation can do.
    o Reducing your radiation exposure is critical to protecting you and your family after a nuclear explosion.

How do I decontaminate myself?

• To reduce the chance of harm from radiation, remove radioactive particles from your body and clothing as quickly as possible.
• Quickly take the following three steps to reduce your radiation exposure and to keep radioactive material from spreading:
    o Remove your outer layer of clothing. Removing your outer layer of clothing can remove up to 90% of radioactive material. Be careful not to breathe radioactive dust that could shake loose when removing your clothes. Seal the clothing you were wearing in a plastic bag and place the bag away from people and pets.
    o Wash yourself off. Take a warm shower with lots of soap to help remove radioactive material.
    Do not scald, scrub or scratch your skin. Wash your hair with shampoo or soap and water. Do not use conditioner because it will cause radioactive material to stick to your hair. If you cannot shower, use a wipe or clean wet cloth to wipe skin that was not covered by clothing, like your hands and face. Gently blow your nose, wipe your eyelids, eyelashes and ears with a clean wet cloth. Put on clean clothing. Clothing stored in a closet or away from radioactive material is clean.
• If it is not practical to discard your clothes, remove the outer layer, shake or brush off your clothes and redress. Do not breathe any dust-like particles.

How should people decontaminate their pets?

• Radiation affects pets and livestock the same way that it affects people.
• Contaminated animals can expose people and property to radiation.
• If your pet was outside in the affected area, take the following steps to remove any radioactive material that may have settled on your pet:
    o Wash your pet thoroughly with shampoo and water and rinse completely.
    o Wear waterproof gloves and, if possible, a dust mask to protect yourself from radiation particles.
    o Keep cuts and abrasions on you or your pet covered when washing your pet to avoid getting radioactive material in the wound.

How should people decontaminate their homes?

• Emergency responders or local officials will let you know if you need to decontaminate your home.

• If you need to decontaminate your home, emergency responders or local officials will provide specific guidance on protective clothing and safety instructions for cleaning inside and outside your home.

Environmental Monitoring

How is radiation monitored or detected?

• Specialized monitoring instruments can accurately detect radiation, even at very low levels.

• Different types of detectors are used for different types of radiation.

• Radiation experts use these instruments to measure and analyze the radiation levels in areas after a nuclear explosion.

How do you know if radiation is background or from the incident?

• Distinguishing between background radiation and radiation from a specific event is not easy.

• However, after a nuclear explosion, there will be areas where radiation levels are clearly above normal.

  o Some areas have historical data on background radiation levels.

• Radiation experts use models, monitoring and sample analysis to identify areas with elevated radiation levels from the nuclear explosion.

How will authorities let people know what areas are dangerous?

• Federal, State, local, tribal and territorial emergency responders are monitoring air and ground conditions to locate areas with dangerous levels of radiation.

• Stay tuned to television, radio or Internet sources to receive information about what areas are
dangerous and where evacuation is recommended.

  o Plan to stay inside for 12-24 hours or until emergency response officials say it is safe to evacuate.

  o Safety information will be updated as further information is available.

• Up-to-date and verified information will be posted at [WEBSITE].

How will the government test for radiation?

• Emergency responders and experts are taking air, soil, water and food samples and looking for radioactive material to get a better picture of the environmental impacts.

• Federal, State, local, tribal and territorial partners are working together to implement plans for detailed environmental sampling and analysis.

  o The priority is gathering information that has a direct impact on public safety, such as levels of radioactive contamination and water safety.

  o In the days, weeks and months ahead, these samples will be analyzed to help us understand the environmental impacts on precipitation, bodies of water, soil, vegetation, crops, livestock, and milk.

• Until we determine the extent of the contamination we cannot truly understand the environmental impacts from this attack.

Population Monitoring

How do people know if they have been exposed to radiation?

• If you were near the location of a nuclear explosion, you may have been exposed to radiation and may be contaminated by radioactive material.
• If you came in contact with any dust-like particles falling from the sky following a nuclear explosion, you may have been exposed to radiation and may be contaminated by radioactive material.
• Federal, state and local authorities are monitoring radiation levels after the explosion and can help determine whether or not you have been exposed to dangerous levels of radiation.
    o If you were exposed to a small dose of radiation, you will not see any immediate health effects.
    o If you were exposed to a large dose of radiation, you may experience nausea, skin reddening, or skin burns.
• Tune in to your television news, radio, or connect to the Internet for more information about the areas where dangerous radiation may have fallen and specific instructions on what to do if you were in these areas.

Where can people go to be checked for radiation exposure?

• Local officials in the affected area will set up radiation testing centers within days after the explosion.
    o These testing centers, known as community reception centers, will assess people for radiation exposure and contamination and assist them with needed services.
• Tune in to television news, radio, or connect to the Internet to learn about the location of these testing centers and receive safety instructions.
• Unless you have a life-threatening condition, you should not leave your building until you have been instructed by officials or emergency responders that it is safe to leave.

Why are you tracking people who have been exposed to radiation?

• Federal, State, local, tribal and territorial officials will set up reception centers within days after the explosion to check people for radiation exposure, assist them with needed services and enter them into a registry.
• The registry will allow emergency responders and medical staff to follow up with people who need immediate health care and monitor those who have been exposed to radiation from the explosion.
• The registry may also provide information to help reunite family members who were separated at the time of the explosion.

Health Effects of Radiation Exposure

Will a distant nuclear explosion affect my health?

• A distant nuclear explosion may produce radiation that could affect your health.
• Radiation experts are monitoring air, ground and water samples to locate areas with dangerously high levels of radiation.
• If radiation levels near your location are found to be dangerous, authorities will provide instructions to protect you from any health hazards.
    o Minimizing unnecessary radiation exposure is best.
    o Radiation from natural and man-made sources, called background radiation, is always around us. Low levels of radiation do not present significant health risks.
    o It takes a very large dose of radiation in a very short amount of time to cause immediate health effects.
• If you are near the affected area after a nuclear explosion, follow the instructions of Federal, State and local authorities to protect yourself from radiation danger.

Does exposure to radiation present some risk?

• Risk from radiation depends on the amount, the type and the duration of radiation exposure.
• Although low levels of radiation do not present significant health risks, minimizing your exposure to radiation is the best way to avoid harm.
• Take the following steps to limit exposure to radiation following a nuclear explosion:
    o Decrease your exposure to radiation by staying inside until you are told by officials or emergency responders that it is safe to leave.
    o Protect yourself from radiation by putting thick, dense materials, like soil or concrete, between you and the radioactive material outside.

What are the health effects of radiation exposure?

• Radiation can affect the body in a number of ways and the health effects may take years to develop.
• It takes a large dose of radiation—more than 75 rem—in a short amount of time (usually minutes) to cause immediate effects, such as acute radiation sickness.
    o According to radiation safety experts, radiation exposure between 5–10 rem usually results in little to no harmful health effects.
• If you have developed skin burns, develop nausea or begin vomiting shortly after radiation exposure, seek medical attention as soon as it is safe to leave your shelter.
    o These may be symptoms of radiation sickness.
    o These symptoms can develop several days after you were exposed to radiation.
    o Nausea from pre-existing conditions should not be confused with radiation sickness.
• There are some treatments available for people exposed to certain types of radioactive material. Medical professionals will determine if medical treatments are appropriate.
• You should treat cuts, bruises or injuries with first aid.

Does radiation cause cancer?

- There is clear evidence that high doses of radiation can raise your risk of cancer.
    - While cancer has been associated with high doses of radiation received over short periods of time, the cancers usually do not appear for many years, even decades.
- However, at low doses, your risk of cancer from radiation becomes so small that it cannot be separated from exposure to chemicals, genetic pre-disposition, smoking, or diet.
    - Radiation from natural background and other routine sources is a minor contributor to our overall cancer risk.
- The risk of radiation-related cancers increases with the level of radiation exposure.
- Health officials will monitor people affected by a nuclear explosion for long-term health effects, including cancer.

What populations are most at risk to radiation exposure?

- Infants, children, the elderly, pregnant women and people with compromised immune systems are more susceptible to health effects from radiation exposure than healthy adults.
    - A developing fetus is most susceptible to health effects from radiation exposure because the cells are developing so rapidly.
- The steps for reducing radiation exposure are the same for all populations.

What is radiation sickness?

- Radiation sickness and acute radiation syndrome/sickness (ARS) occur when a person is exposed to very high levels of radiation during a very short amount of time.
- Symptoms of radiation sickness include skin burns, nausea and vomiting very shortly after a significant exposure to radiation.
    - These symptoms may appear within minutes or days.
    - If you experience these symptoms, seek medical attention as soon as you can safely leave your building.
- You cannot get ARS from long-term exposure to small amounts of radiation.

Are there any treatments for radiation sickness?

- There are limited treatments available for people with radiation sickness. These treatments only work for certain types of radioactive materials and need to be prescribed by a doctor.
    - Medical professionals will determine if treatments are appropriate.
    - Treatments for radiation sickness focus on reducing infections, maintaining hydration and treating major injuries and burns.
    - Some medical treatments are available for limiting or removing internal contamination.
- Local emergency workers and medical professionals will monitor the situation to determine what medical treatments are needed and what kind of treatment to provide for each patient.
- If you experience skin burns, nausea and vomiting shortly after exposure to radiation, seek medical attention as soon as you can safely leave your building.

Are there specific protective actions for pregnant women?

- Pregnant women should follow the same protective action steps as the rest of the population.
- In addition, pregnant women should:

o Inform emergency workers and safety officials in a reception center or emergency shelter that they are pregnant so that they can receive proper attention.
o Call or visit their doctor or OB/GYN as soon as possible after they can safely leave their building.

Should nursing mothers continue to breastfeed?
• If you were near the nuclear explosion, you may have been exposed to radiation.
• Radiation and other harmful substances can be passed through breast milk.
• If possible, switch to baby formula until you are able to contact your doctor for further instructions or advice.
• You may continue to breastfeed if there is no other source of food available.
• If you are in a community reception center or emergency shelter, tell emergency workers that you are breastfeeding so they can help you get the proper attention.

Emergency Response Capabilities

What is being done in response to the detonation?
• Federal, State, local, tribal, territorial and private-sector emergency responders are working to save lives as close to the impacted area and as quickly as possible.
• Health and safety officials are working closely to effectively respond to this explosion and to provide medical and safety assistance to those in need.
• Specialized teams are assessing the damage and determining the extent of radioactive contamination. Safety instructions will be updated based on their findings.

Who is managing the response?
• State and local governments in the impacted areas are at the forefront of the response.
• Police and firefighters are on the scene, working to save as many people as possible.
o Emergency responders across the nation have been trained to respond to this type of disaster.
• Emergency responders are following existing safety plans to use all available resources and respond as quickly and safely as possible. Federal responders and resources are already supporting the response with experts, equipment and additional resources.

How is the government responding?
• Emergency responders at all levels of government are working together, using all available resources and doing everything possible to help those affected by this incident.
o Emergency responders will provide health and safety assistance, including firefighting, law enforcement, and evacuation help for people in the affected area.
o Emergency responders have prepared and practiced their existing plans to respond to this incident.

What is the role of radiation experts after a nuclear explosion?
• Federal and State governments have experts who specialize in the effects of radiation on the human body and the environment, such as trained physicians, radiation specialists and

emergency response teams.
• These radiation experts are analyzing the impacts of this nuclear explosion and are health and safety recommendations.

Which areas are safe for emergency responders to enter?
• Areas close to the explosion are dangerous for the public and emergency responders following a nuclear incident.
    o Emergency responders will only enter an area after radiation experts determine that it is safe for them to do so.
• As soon as radiation levels decrease enough for emergency responders to safely enter, the responders will work to save lives in the affected areas.

What are the effects on national infrastructure from this explosion?
• At this time, we don't know if there will be any lasting effects on national infrastructure.
    o [Provide updates on the status of power outages, communications outages, water systems, sewage systems, road and bridge conditions].
    o [Provide information on steps to restore damaged systems].

Can people return to the area near the explosion?
• At this time people in [AREA] should stay inside a building, unless instructed to do otherwise.
• If you have been evacuated, do not return until you are told it is safe to do so by authorities.
• Attempting to return before it is safe will put you and your loved ones in danger and will keep emergency responders from helping people who need immediate assistance.

Can the affected area be returned to its former use?
• A long, difficult cleanup awaits and the most important goal of the cleanup is to keep people safe.
    o This nuclear detonation has created areas with dangerously high levels of radiation.
    o Some heavily contaminated areas may never be reoccupied. Other areas may take years before they can be returned to their former use.
• The affected area will be closed to non-emergency responders until radiation experts determine the location and amount of radioactive contamination.
    o Once an analysis of the affected area is made, a cleanup plan will be developed with input from the community and emergency response and safety officials.

How soon will a map displaying the areas affected be available?
• Initial maps showing the affected areas—where the radioactive material is going and locations where actions need to be taken—are being developed.
    o These maps will be made available to the public as soon as possible and will be updated as new information is available.
    o The initial maps are based on very limited information and on the best estimates and predictions of radiation, weather and scientific experts.
• You will be able to view maps of the affected areas at [WEBSITE].

How are evacuation decisions being made?

• Evacuation decisions are based on factors such as weather conditions, size of the detonation, radiation levels, and damage to roads and structures along evacuation routes.
    o Radiation levels are extremely dangerous after a nuclear detonation, but the most dangerous radiation levels will decrease significantly in the first 24 hours.
    o During the time with the highest radiation levels it is safest to stay inside a building, away from the radioactive material outside.
• As radioactive material moves through the air, people in the path will be asked to take safety measures.
• All safety instructions are made by State and local officials with the support of radiation and weather experts. Their goal is to save lives and reduce radiation exposure to the public.
    o Pay close attention to emergency broadcasts and information from officials or emergency responders for important safety instructions.

Should people eat food from their gardens or locally caught fish and game?

• If you are close to the affected area, it is likely that the radioactive material has settled on the ground and outdoor crops or gardens.
• Do not pick or eat food from your garden or food grown in the affected area until further notice.
• Do not eat fish or game caught in the affected area until further notice.
• Authorities will be testing agricultural products in the affected area and will let you know if they are safe to eat.
    o Follow food safety instructions from public safety officials.

What should farmers do with their crops and livestock?

• We are asking farmers in [AREA] to not harvest, eat or distribute their crops until radiation test results are analyzed.
• If you are outside the shelter and evacuation areas, take these steps to protect your livestock:
    o Move your livestock indoors.
        o Use only stored feed and covered water. If possible, avoid using feed that was kept outside.
        o Wear gloves, boots, an apron and a dust mask to protect yourself while caring for your livestock.
    • We recognize that crops and livestock are critical to livelihoods. State and local officials will provide information as soon as radiation test results are available.
        o Designated Federal agencies will declare affected agricultural areas as disaster areas and will work with farmers and ranchers to obtain disaster assistance.
        o Because an IND explosion is a manmade event and is not covered under crop insurance, Federal agencies will help farmers and ranchers obtain assistance.

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Appendix D - Radiation Units and Short-term Dose Effects

Radioactivity would manifest in two important ways following a nuclear detonation. First would be the initial pulse of radiation, known as prompt radiation, and defined as the radiation emitted within one minute of the blast. This radiation exposure can be fatal within approximately one mile of the detonation of a 10-kt nuclear device. Prompt radiation consists of alpha and beta particles, gamma rays and neutrons.

The second form of radiation exposure is fallout. Fallout is created when the blast sends pulverized dirt, concrete, metal and other materials combined with radioactive fission products upward often forming the hallmark "mushroom cloud" from which highly radioactive particles then fall back down to earth as they cool. Fallout particles may be visible as they fall, the size of table salt or ash. Radiation levels from fallout particles would diminish quickly, with much of the potential radiation exposure occurring in the first hour after the detonation and most of it occurring within the first day. The fallout deposition pattern is highly dependent on weather conditions and topography; for a 10-kt nuclear device it can be expected that the most dangerous concentrations of fallout particles will occur within 20 miles downwind of the detonation site.

The energy imparted by radiation to an absorbing material is known as "absorbed dose." The legacy unit used in the U.S. is the radiation absorbed dose (rad) while the international unit is the gray (Gy). When considering the risk of injury and illness from radiation exposure, different units are used. The U.S. unit is the roentgen equivalent man (rem) and the international unit is the sievert (Sv). A rem is a large dose of radiation, so the millirem (mrem), one thousandth of a rem, is often used for dosages commonly encountered. For example, the average annual radiation dose per person in the U.S. is estimated to be 620 mrem from both natural sources, such as minerals in the ground or radiation from the sun, and from man-made sources such as medical x-rays.

Table D-1. Radiation Units of Measurement

Unit	Equivalency	Relevance
Becquerel	n/a	Disintegrations per second
Curie (Ci)	1 Ci = 3.7 x 10^{10} disintegrations/second	Amount of radioactivity of a material
Roentgen (R)	I R = I rem (approximate)	Amount of ionization of air
rad	1 rad = 0.01 gray (Gy); 1 centigray (cGy); 100 rad = 1 Gy	Amount of absorbed dose to any object
rem	1 rem = 0.01 sievert (Sv); 10 millisievert (mSv); 100 rem = 1 Sv	Amount of damage to human tissue or dose equivalent

Different types of radiation have different intensities. For the purposes of this planning guidance the gamma equivalency is used as a simple way to estimate radiation dose. Therefore, one rad of absorbed dose is considered equal to one rem of whole-body dose for all types of

radiation allowing the units to be used interchangeably. Radiation dose is estimated by the dose rate (dose per unit of time) multiplied by the duration of exposure. For example, if the dose rate is 10 rad/hour, then four hours of exposure would equal of dose of 40 rads. Although this method provides only a rough approximation of an individual's dose, it is usually adequate given the usual uncertainty associated with exact distance from the source and the time spent near it.

When measuring the amount of radiation in air, the unit roentgen (R), the amount of gamma or x-rays needed to produce ions carrying one electrostatic unit of electrical charge in one cubic centimeter of air, is commonly used. Many radiation detection instruments report radioactivity in R or milliroentgens (mR). For purposes of this guidance, one R of exposure is assumed to equal one rem of absorbed dose. Acute Radiation Syndrome (ARS) results from exposure to radiation doses in excess of 50-100 rad delivered to the whole body or a major portion of the body in a short period of time. ARS is an illness that varies in onset from a few hours to weeks depending on the radiation dose received. Doses of 100 to 200 rad may cause illness but would rarely be fatal. Doses of 200 to 1,000 rad would likely cause serious illness with poor outlook at the upper end of the range without aggressive treatment. Doses of more than 1,000 rad are almost always fatal.

Table D-2. Dose and Acute Radiation Syndrome

Effects[1]	**Whole Body Absorbed Dose (rem [cGy])**				
	0-100	**100-200**	**200-600**	**600-800**	**>800**
Gastrointestinal (Nausea, Vomiting)	None	5-50%	50-100%	75-100% severe	90-100% severe
Time of Onset	n/a	3-6 hours	2-4 hours	1-2 hours	<1 hour
Duration	n/a	<24 hours	<24 hours	<48 hours	<48hours
Blood Lymphocyte Count	Slight decrease	Minimal 10-20% Decrease	20-50% decrease @ 24 hours	>50% decrease @ 24 hours	Rapid decrease <24 hours
Nervous System CNS Function	No impairment	No impairment	Cognitive impairment 6-20 hours	Cognitive impairment >20 hours	Rapid incapacitation
Lethality	None	Low	Low with aggressive therapy	High	Very high

[1]Short-term whole-body absorbed dose effects only. From REACTS publication, *The Medical Aspects of Radiation Incidents*

Appendix E - Protective Actions

The 1992 *Manual of Protective Action Guides and Protective Actions for Nuclear Incidents (EPA 400-R-92-001)* developed by the U.S. EPA contains guidance intended to protect emergency workers and the public from radiation exposure. EPA Protective Action Guides (PAGs) are non-regulatory and are designed to provide a flexible basis for decision making under varying emergency circumstances. A Protective Action Recommendation (PAR) is made based on actual conditions and the PAG applicable to the situation. In 2008, additional guidance was released by the Department of Homeland Security in the *Planning Guidance for Protection and Recovery following RDD and IND Incidents.*

Immediately following a detonation, radiation level information will likely be limited. In lieu of actual field monitoring data, the visible nature and extent of physical damage can assist in estimating radiation levels. While there are no clear boundaries between damage zones resulting from a nuclear detonation, generally, the light damage zone is characterized by broken windows and easily managed injuries; the moderate zone by significant building damage, rubble, downed utility poles, overturned automobiles, fires, and serious injuries; and the severe damage or "no-go zone" by completely destroyed infrastructure and radiation levels resulting in unlikely survival of victims. The severe damage zone presents an acute radiation hazard that would prevent safe entry into the area for at least several hours. The moderate and light damage areas in the downwind direction of the detonation also pose serious hazards for the public and responders following the detonation.

Protection of Emergency Responders

During the response phase of a nuclear detonation incident, occupational radiation limits intended for routine work scenarios would not be applicable to emergency response workers. These limits may apply, however, during recovery operations. The fundamental concept of keeping radiation exposures as low as reasonably achievable (ALARA) applies to both routine occupational and emergency response situations. For example, it is recommended that a command post or other emergency response facility be located in the "cold zone," an area with a dose rate of less than 10 mR per hour, for the protection of emergency responders.

The dose an emergency responder is exposed to or potentially exposed to governs decisions regarding the nature and duration of response activities. The approach to worker protection from radiation in a nuclear terrorism incident is based on these considerations: 1) the establishment of radiation hazard (control) zones, 2) control of the absorbed dose through time, distance and shielding, and 3) exposure monitoring via dosimetry. Radiation monitoring and application of protective measures (time, distance, shielding) must be employed to ensure responder safety. Radiation control zones segment the site into areas of differing levels of radiation risk using observed exposure rates. Rescue teams and other emergency responders would be in peril of receiving life-threatening doses unless careful dose management is

practiced. Dose management controls, including the initial sheltering-in-place for responders located near the detonation site until safe, would be required to prevent injury. Responder absorbed dose can be monitored by comparing exposure to USEPA's mission-specific, risk-based dose recommendations for emergency responders.

Table E-1. Emergency Response Radiation Control Zones

Radiation Level[1]	Control Zones
≤10 mR/hr	Emergency response 'Cold Zone' boundary where decontamination, staging, incident command, etc. activities may take place.
≥10 mR/hr to <10 R/hour	Emergency response 'Hot Zone' boundaries where assessment, mitigation and rescue operations may take place.
≥10 R/hr	Emergency response 'Dangerous Radiation Zone' boundary where pre-planned lifesaving and critical operations may take place under caution.

[1]NCRP No. 165 for gamma radiation measured one meter above the ground

Many common radiation detection instruments report radioactivity in roentgens (R) or milliroentgens (mR). For purposes of this guidance it can be assumed that one R of radioactivity is roughly equal to one rad or one rem of exposure.

Table E-2. Guidelines for Emergency Responders

Activity		Limits	Notes
Emergency Response		>5 rem (50 mSv)	Doses >5 rem must be unavoidable with actions taken to monitor and reduce dose. Response is on a voluntary basis by an informed responder who is not pregnant.[1]
		10 rem (100 mSv)	Cumulative dose: protection of critical infrastructure[1]
		25 rem (250 mSv)	Cumulative dose: lifesaving/protection of large population [1]
		10 R/hour	Turn back level: protection of critical infrastructure[1]
		100 R/hour	Turn back level: lifesaving/protection of large population[1]
Excess Exposure Requires Careful Consideration	Decision Dose	50 rad (0.5 Gy)	NCRP recommends that this cumulative dose trigger a decision on whether to withdraw an emergency responder.[2]
	IAEA	100 rem (1 Sv)	International Atomic Emergency Agency (IAEA) recommended dose limit for lifesaving efforts
	U.S. Military	125 rad (1.25 Gy)	Dose limit for high-priority missions including lifesaving activities. Once this cumulative dose is reached personnel are prohibited from future radiological missions.
	ARS Symptoms	>100 rad (1 Gy)	ARS symptoms can occur at this whole body absorbed dose. Responders should be removed and provided medical care.

[1]EPA *400-R-92-001 Manual of Protective Action Guides and Protective Actions for Nuclear Incidents*
[2]NCRP Commentary No. 19
Notes: Incident commanders may need to consider raising the property and lifesaving response worker dose limits in order to prevent further loss of life and massive spread of destruction.[1]
The limits above address short-term effects only. Exposure at these levels can also result in long-term (lifetime or stochastic) health effects.

Protection of the Public

Although radiation levels that cause immediate health effects (cutaneous burns, Acute Radiation Syndrome) are not expected beyond 20 miles downwind of a 10-kt nuclear detonation, protective actions should be considered to reduce the potential dose any time it exceeds 1 rem (0.01 Sv). Until the level and extent of radiological contamination can be determined, sheltering-in-place instructions would be disseminated to populations located within 50 miles in all directions from the detonation site. In areas where radiation is expected to reach life and health-threatening levels, the public could be protected through early, adequate sheltering for at least 24 and up to 72 hours followed by informed evacuation. Once radiation monitoring and/or modeling has been conducted, protective action instructions based on actual conditions would be developed that could include communities hundreds of miles downwind from the detonation. Radiation exposure at levels too low to cause immediate health effects may still result in long-term (lifetime or stochastic) health effects.

Inverse square law principles applied to radiation exposure indicates that doubling the distance from a radiation source decreases the radiation level by 75%. Conversely, halving the distance increases the radiation level 300%. The "rule of sevens" that indicates for every seven-fold increase in time following a nuclear detonation, the radiation intensity decreases by a factor of 10. After seven hours, radioactivity can be expected to have declined by roughly ninety percent, to one-tenth its level at one hour.

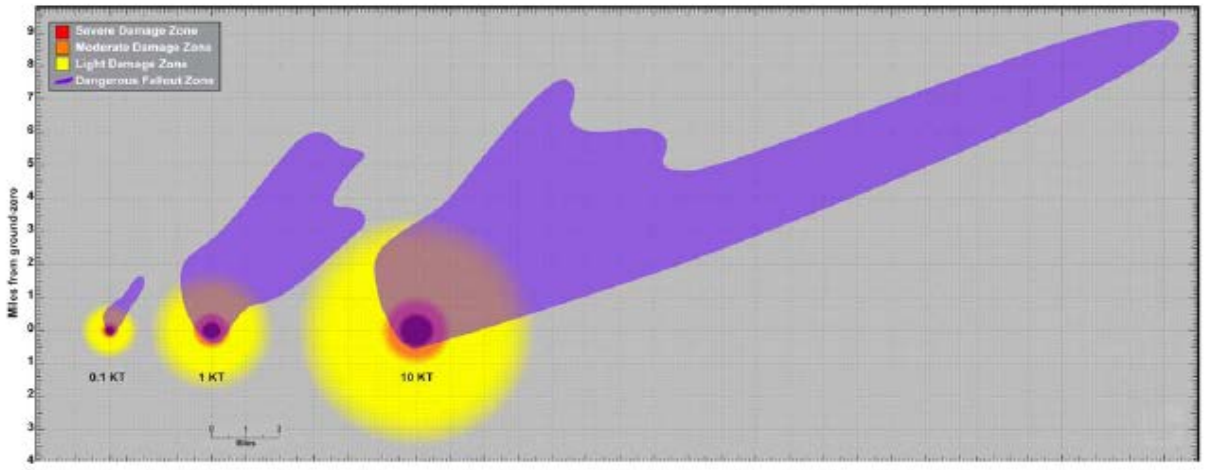

Figure E.1. Size and shape of dangerous fallout zones estimated for 0.1-kt, 1-kt, and 10-kt devices. The dangerous fallout zone is where life and health-threatening levels of radiation can be expected in the initial hours after a detonation. Source: US Department of Homeland Security, Federal Emergency Management Agency, *Planning Guidance for Response to a Nuclear Detonation*, 2010

Table E-3. Summary of Protective Actions and Dose Limits for the Public

Protective Action[1]	Projected Dose	Notes
Sheltering-in-place or Evacuation (whichever is more protective)	1-5 rem (10-50 mSv)	Initially, shelter in all directions 50 miles. When data available, protect population in areas where dose is expected to meet or exceed 1 rem (10 mSv) in first four days.
Relocation of General Public	2 rem (20 mSv)	First year. Subsequent years 0.5 rem/year (5 mSv/yr)
Relocation of Special Populations	10 rem (100 mSv)	If evacuation puts special population (e.g. prison inmates, patients on life support) or public at risk
Potassium Iodide (KI) Prophylaxis	5 rem (50 mSv)	Child thyroid. Provides protection from radioactive iodine only.
Food Interdiction	0.5 rem (5 mSv)	Or 50 mSv to any individual organ or tissue in the first year whichever is more limiting
Drinking Water Interdiction	0.5 rem (5 mSv)	During the first year after the incident

[1] *Planning Guidance for Protection and Recovery Following Radiological dispersal Device (RDD) and Improvised Nuclear Device (IND) Incidents,* Federal Register Volume 73 Issue 149, August 2008

Shelter-in-place and evacuation are protective actions taken in the immediate response and intermediate response I phases of the incident. Relocation is the removal or continued exclusion of people from the contaminated areas that may continue for a prolonged period of time. Not all evacuated residents will be subject to relocation. Many areas will be safe to reenter once monitoring data shows radiation to be below levels of concern. Decisions on reentry and reoccupation of evacuated areas will be made generally in the intermediate response II and recovery phases of the incident.

Appendix F - List of Acronyms and Abbreviations

ACS	Alternate Care Site
AFRAT	Air Force Radiation Assessment Team
ALARA	As Low as Reasonably Achievable
AMS	Aerial Measuring System
ARS	Acute Radiation Syndrome (Sickness)
AST	Ambulance Strike Team
CA	California
CAHAN	California Health Alert Network
CalEPA	California Environmental Protection Agency
Cal-MAT	California Medical Assistance Team
Cal OES	California Office of Emergency Services
CalOSHA	California Occupational Safety and Health Administration
CalREP	California Radiological Emergency Preparedness
Caltrans	California Department of Transportation
CDC	Centers for Disease Control and Prevention
CDFA	California Department of Food and Agriculture
CDFG	California Department of Fish and Game
CDSS	California Department of Social Services
CDPH	California Department of Public Health
CERC	Crisis and Emergency Risk Communications
cGy	centiGray
CHHS	California Health and Human Services Agency
CHP	California Highway Patrol
CMHT	Consequence Management Home Teams
CMRT	Consequence Management Response Teams
CNG	California National Guard
COA	Course of Action
CRCPD	Conference of Radiation Control Program Directors
DCDC	Division of Communicable Disease Control
DEST	Domestic Emergency Support Team
DEODC	Division of Environmental and Occupational Disease Control
DHS	Department of Homeland Security
DHV	Disaster Healthcare Volunteer
DMAT	Disaster Medical Advisory Team
DMORT	Disaster Mortuary Team
DOC	Department Operations Center
DoD	Department of Defense
DOE	Department of Energy
DWRLB	Drinking Water and Radiation Laboratory Branch

EF	Emergency Function
EHD	Environmental Health Department
EMAC	Emergency Management Assistance Compact
EMP	Electromagnetic pulse
EMS	Emergency Medical Services
EMSA	Emergency Medical Services Authority
EOC	Emergency Operations Center
EOM	Emergency Operations Manual
EORP	Emergency Operations Response Plan
EPA	Environmental Protection Agency
EPO	Emergency Preparedness Office
ESF	Emergency Support Function
FAQ	Frequently Asked Question
FBI	Federal Bureau of Investigation
FDA	Food and Drug Administration
FEMA	Federal Emergency Management Agency
FMS	Field Medical Station
FOSC	Federal On Scene Coordinator
FRMAC	Federal Radiological Monitoring and Assessment Center
FTS	Field Treatment Site
Gy	Gray
HAvBED	Hospital Available Beds for Emergencies and Disasters
HHS	U.S. Health and Human Services
hr	hour
IAEA	International Atomic Energy Agency
IMAAC	Interagency Modeling and Atmospheric Assessment Center
IND	Improvised Nuclear Device
JFO	Joint Field Office
JIC	Joint Information Center
JIS	Joint information System
KI	potassium iodide
kt	kiloton
L&C	Licensing and Certification
LEMSA	Local Emergency Medical Services Agency
LHD	Local Health Department
LHO	Local Health Officer
LRN	Laboratory Response Network
MAC	Multi-agency Coordination
min	minute
MHCC	Medical Health Coordination Center
MMRS	Metropolitan Medical Response System

MRAT	Medical Radiobiology Advisory Team
MRC	Medical Reserve Corp
mGy	milliGray
mR	milliRoentgen
mrem	millirem
mSv	millisievert
NARAC	National Atmospheric Release Advisory Center
NCRP	National Council on Radiation Protection and Measurements
NDA	National Defense Areas
NDMS	National Disaster Medical System
NDOP	Nuclear Detonation Operational Plan
NERP	Nuclear Emergency Response Program
NEST	Nuclear Emergency Support Team
NIMS	National Incident Management System
NIRT	Nuclear Incident Response Team
NMRT	National Medical Response Team
NNSA	National Nuclear Security Administration
NPP	Nuclear Power Plant
NRC	Nuclear Regulatory Commission
NRF	National Response Framework
NRT	National Response Team
NSA	National Security Areas
NV	Nevada
OA	Operational Area
OEHHA	Office of Environmental Health Hazard Assessment
OPA	Office of Public Affairs
ORISE	Oak Ridge Institute for Science and Education
OSHA	Occupational Safety and Health Administration
PAD	Protective Action Decision
PAG	Protective Action Guide
PAR	Protective Action Recommendation
PIO	Public Information Officer
PPE	Personal Protective Equipment
R	Roentgen
rad	radiation absorbed dose
RAMT	Radiological Advisory Medical Team
RAP	Radiological Assistance Program
RAT	Radiological Assistance Team
RCCC	Richmond Campus Coordinating Center
RDD	Radiological Dispersal Device
RDMHC	Regional Disaster Medical Health Coordinator

REAC/TS	Radiation Emergency Assistance Center/Training Site
RED	Radiation Emission Device
rem	roentgen equivalent man
REM-TAG	Radiological Emergency Monitoring Technical Advisory Group
REOC	Regional Emergency Operations Center
RERT	Radiological Emergency Response Team
RHB	Radiologic Health Branch
RIMS	Response Information Management System
RSO	Radiation Safety Officer
RSS	Receipt, Staging and Storing
SDAC	State Dose Assessment Center
SEMS	Standardized Emergency Management System
SEP	State Emergency Plan
SNS	Strategic National Stockpile
SOC	State Operations Center
Sv	Sievert
UCG	Unified Coordination Group
USDA	U.S. Department of Agriculture
USEPA	U.S. Environmental Protection Agency
WMD-CST	Weapons of Mass Destruction Civil Support Team
yr	year

Appendix G - Glossary

This Glossary contains radiological and emergency management terms used in the NDOP.

A

Activity: The rate of disintegration (transformation) or decay of radioactive material per unit of time. The units of activity are the curie (Ci) and the bequerel (Bq).

Acute Radiation Syndrome [Sickness] (ARS): A serious illness caused by receiving a whole body (or large part of the body) dose of 50-200 rads of ionizing radiation in a short period of time. The earliest symptoms are nausea, fatigue, vomiting, and diarrhea. Hair loss, bleeding, swelling 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 two to four weeks. Those who survive six weeks after the receipt of a single large dose of radiation may generally be expected to recover. Also known as “radiation sickness” or “radiation syndrome.”

Alternate Care Site: A location that is not currently providing healthcare services and would be converted to enable the provision of healthcare services to support, at a minimum, inpatient and/or outpatient care required after a declared catastrophic emergency. These specific sites are not part of the expansion of an existing healthcare facility (i.e., extensions of general acute care hospitals, clinics, or long term care facilities), but rather are designated under the authority of the local government.

Alpha, beta, gamma: types of ionizing radiation. Alpha and beta are particles. Gamma is an electromagnetic wave.

As Low As Reasonably Achievable (ALARA):A process to manage radiation doses so that doses are as low as reasonably achievable. No one should receive a radiation exposure, if it can be prevented, unless there is some benefit.

B

Background radiation: The natural radiation that is always present in the environment. The typical average individual exposure in the united States from natural background sources is about 300 millirems per year.

Bequerel (Bq): A unit used to measure radioactivity. One Bq represents a rate of radioactive decay equal to one disintegration per second; 37 billion Bq equals one curie.

C

Cache: A pre-determined complement of tools, equipment and/or supplies stored in a designated location, available for incident use.

Centigray: International unit used to measure the amount of radiation absorbed by an object or person. One Centigray equals 10 rads.

Community Reception Center (CRC): A location outside the plume exposure pathway through which evacuees would pass to receive initial assistance, radiological monitoring (if required), first aid, or direction to a congregate care center or medical facility. A location designated to assess people for exposure, contamination, and the need for decontamination or medical follow-up.

Contamination (radioactive): The presence of unwanted radioactive material internally or externally on structures, areas, objects, and people.

D

Decay (radioactive): The spontaneous transformation of one radioisotope into one or more different isotopes accompanied by a decrease in radioactivity.

Decision dose: A cumulative absorbed dose to the whole body to an emergency responder at which a decision should be made whether or not to withdraw from life saving activities to limit further exposure. NCRP recommends that 50 rad (0.5 Gy) be considered a decision dose, not a dose limit.

Decontamination: A process used to reduce or remove radioactive contamination from a person, structure, or object to the extent necessary to preclude the occurrence of foreseeable adverse effects. Also known as “decon.”

Disaster Healthcare Volunteers: An emergency personnel management system developed to enroll California health care personnel with active unrestricted licenses as volunteers (paid or unpaid) for disaster service. The system validates enrollee licenses and credentials prior to an emergency and provides a mechanism for contacting and mobilizing needed personnel.

Dose (radiation): The amount of energy absorbed by an object, person, or body tissue due to radiation exposure. The international system unit is the gray (Gy) where 1 Gy is equal to 100 rad. The unit for biological dose is rem or Sievert, which measure the biological damage to living tissue as a result of radiation exposure.

Dose assessment: Process of estimating radiological dose through the use of exposure scenarios, bioassay results, monitoring data, source term information and pathway analysis.

Dose rate: The dose of ionizing radiation delivered per unit of time. For example, rems or sieverts per hour.

Dosimetry: The theory and application of the principles and techniques involved in measuring and recording doses or ionizing radiation.

E

Electromagnetic pulse (EMP): A transient electromagnetic field generated by a nuclear explosion that produces a high voltage surge in conductors. This surge can damage unprotected electronic components out to a distance of about 2 miles from the detonation site though the degree to which it would affect electronic equipment is not well understood. Stalling of vehicles, disruptions in communications and computer equipment, utility control systems and other electronic devices could result.

Emergency Operations Center (EOC): The physical location at which the coordination of information and resources to support incident management (on-scene operations) activities normally takes place. An EOC may be a temporary facility or may be located in a more central or permanently established facility, perhaps at a higher level of organization within a jurisdiction. EOCs may be organized by major functional disciplines (e.g., fire, law enforcement, and medical services), by jurisdiction (e.g., Federal, State, regional, tribal, city, county), or some combination thereof.

Emergency Function (EF): A functional area of response activity established to facilitate the delivery of state assistance required during the response phase of an emergency.

Emergency Support Function (ESF): A functional area of response activity established to facilitate the delivery of federal assistance required during the response phase of an emergency.

Evacuation: The orderly withdrawal of individuals from a hazardous or threatened area until such time as the area is again deemed safe for use.

Exposure (radiation): Absorption of ionizing radiation or ingestion of a radioisotope.

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 i.e., inhalation of airborne radioactive material; ingestion of

contaminated food or drink; and whole body exposure to a passing plume or ground contamination.

F

Fallout (nuclear): Minute particles of radioactive debris that descend slowly from the atmosphere after a nuclear explosion.

Federal Radiological Monitoring and Assessment Center (FRMAC): A facility established by Department of Energy usually at an airport near the scene of a radiological emergency, from which the off-site Technical Director conducts the Federal Radiological Monitoring and Assessment; see State Dose Assessment Center (SDAC).

Field monitoring: The use of sensitive detection equipment by trained personnel to perform measurements to determine the presence and levels of radioactive or other hazardous substance contamination at selected geographic locations in the off-site environment.

Field Treatment Site (FTS): Temporary sites utilized for emergencies when permanent medical facilities are not available or adequate to meet emergency medical care needs. The FTS is designed to provide triage and medical care for up to 48 hours or until new patients are no longer arriving at the site.

G

Gamma radiation: High-energy, short-wavelength electromagnetic radiation emitted from the nucleus of an atom. Gamma rays are similar to x-rays but are very penetrating.

Government-authorized Alternate Care Site: A location that is not currently providing healthcare services and would be converted to enable the provision of healthcare services to support, at a minimum, inpatient and/or outpatient care required after a declared catastrophic emergency. These specific sites are not part of the expansion of an existing healthcare facility (i.e., extensions of general acute care hospitals, clinics, or long term care facilities), but rather are designated under the authority of the local government**.** Government-authorized Alternate Care Sites include mobile field hospitals, schools, shuttered hospitals, stadiums, arenas, churches, and other facilities not currently licensed to provide healthcare services that that help absorb the patient load after all other healthcare resources are exhausted.

Gray (Gy): International unit used to measure the amount of radiation absorbed by an object or person. One Gy equals 100 rads.

H

Half-life: The time in which one half of the atoms of a particular radioactive substance disintegrate into another nuclear form.

HAvBED: The purpose of the HAvBED information system is to access "real-time" hospital bed and resource availability that can be used by decision makers, planners and emergency personnel at the local, State, regional and federal levels.

Hazard: A process, condition, or asset which has the potential to adversely impact the health and safety of personnel, the public, the environment, or national security.

Health physics: The science concerned with recognition, evaluation and control of health hazards from ionizing and non-ionizing radiation.

Health physicist: A specialist in radiation safety.

I

Ingestion exposure pathway: A geographic zone with approximately 50 miles radius centered at a nuclear power plant for which plans are developed to protect the public from exposure to radiation principally from the ingestion of water or foods such as milk or fresh vegetables that are contaminated as a result of a nuclear power plant accident.

Ionizing radiation: A form of radiation that includes alpha particles, beta particles, gamma rays, x-rays, neutrons, high-speed electrons, high-speed protons, and other particles capable of producing ions.

K

Kiloton (Kt): The energy of an explosion that is equivalent to an explosion of 1,000 tons of TNT.

L

Latent period: The time between exposure to a radioactive material and the appearance of a resultant health effect. Acute Radiation Syndrome is characterized by four distinct phases: a prodromal period, a latent period, a period of illness, and one of recovery or death.

Local Health Officer: City and county health officers are authorized by the Health and Safety (H&S) Code to take any preventive measure necessary to protect and preserve the public health from any public health hazard during a local emergency or state of emergency within their jurisdiction.

M

Medical Health Coordination Center (MHCC): The MHCC is the co-located Emergency Operations Center (EOC) for CDPH, EMSA and DHCS. The role of the MHCC includes the following EF 8 core functions: coordination; communications; resource allocation and tracking; and information collection, analysis, and dissemination.

Medical Reserve Corps: Community-based networks of volunteers who assist medical and public health response efforts.

Medical Shelter: A temporary facility equipped to treat patients with palliative care requirements or existing chronic medical conditions with maintenance care requirements (e.g., renal failure, diabetes, etc.).

Metropolitan Medical Response System (MMRS): The largest metropolitan areas in California maintain this system to provide an enhanced local capability to respond to attacks utilizing Weapons of Mass Destruction.

Millirem (mrem): A unit of radiation dosage equal to one-thousandth of a rem.

Milliroentgen (mR): One thousandth of a roentgen (R).

Monitoring: Periodic or continuous determination of the amount of ionizing radiation or radioactive contamination in a region. Radiation monitoring is a safety measure to protect the health and safety of the public and the environment through the use of bioassay, alpha scans, and other radiological survey methods to monitor air, surface water and ground water, soil and sediment, equipment surfaces, and personnel.

N

National Defense Area: An area established by the Federal government in an emergency to safeguard classified information, and/or restricted data, or equipment and material. Establishment of these areas places non-Federal lands under Federal control and results only from an emergency event. It is possible that radioactive contamination would extend beyond the boundaries of these areas.

Nuclear Emergency Search Team (NEST): A group of experts, assisted by radiation detection

systems and associated personnel, assigned responsibility to provide technical assistance to law enforcement agencies in nuclear threat emergencies for the search and identification of any ionizing radiation-producing materials that may have been lost or stolen or may be associated with bomb threats or radiation dispersal threats.

Nuclear Regulatory Commission (NRC): The federal agency responsible for regulating commercial nuclear power plants and other commercial nuclear operations to include by-product materials, and desecrate radioactive sources made from either naturally occurring radioactive materials or accelerator produced radioactive materials.

National Response Team (NRT): The federal agency team at the headquarters level that serves as a standing committee to evaluate methods of responding to discharges or releases and to recommend needed changes in the response organization and revisions to the National Contingency Plan. The NRT is chaired by the Environmental Protection Agency (EPA) or U.S. Coast Guard representative.

National Security Area (NSA): An area established by the Federal government in an emergency to safeguard classified information, and/or restricted data, or equipment and material. Establishment of these areas places non-Federal lands under Federal control and results only from an emergency event. It is possible that radioactive contamination would extend beyond the boundaries of these areas.

P

Plume (radiation): Airborne material spreading from a particular source. Used to denote dispersal of particles, gases, vapors, and aerosols in the atmosphere. Occasionally referred to as a cloud (for example, a "radioactive cloud").

Plume exposure pathway: The area surrounding a nuclear facility site (usually a radius of approximately 10 miles) where the principal exposure would be from: (a) whole body exposure to gamma radiation from the plume and from deposited material, and (b) inhalation exposure from the passing plume.

Population monitoring: The process of identifying, screening, and monitoring people for exposure to radiation or contamination by radioactive materials.

Potassium iodide (KI): Medical countermeasure, thyroid-blocking agent that may be used in radiological events involving releases of radioiodine.

Protective action: Physical measures, such as evacuation or sheltering, taken to prevent potential health hazards resulting from a release of hazardous materials to the environment

from adversely affecting employees or the off-site population.

Protective Action Decision (PAD): A decision by local government on measures that to be taken to avoid or reduce exposure of the public to radiation.

Protective Action Guide (PAG): Projected dose at which a specific protective action to reduce or avoid that dose is recommended. Protective actions are designed to be taken before the anticipated dose is realized.

Protective Action Recommendation (PAR): A recommendation that provides advice to local government on measures that could be taken to avoid or reduce exposure of the public to radiation. This includes advice on actions such as sheltering, evacuation, and prophylactic use of stable iodine. It also includes longer-term measures to avoid or minimize exposure to residual radiation or exposure through the ingestion pathway such as restriction of food, temporary relocation, and permanent resettlement.

R

rad: A traditional unit used to measure the absorbed dose of ionizing radiation. One hundred rads equals one Gray (Gy).

Radiation: The emission of energy moving in the form of particles or waves from a substance. Radiation may take many forms such as sound, visible light, and radiowaves. Ionizing radiation is a very high energy form of electromagnetic radiation.

Radiation Emergency Assistance Center/Training Site (REACTS): A multi-purpose medical facility located in Oak Ridge, TN, prepared to deal with all types of radiation exposure emergencies and provide medical and health physics advice and assistance in radiological emergencies.

Radiation Safety Officer (RSO): An individual qualified by training and experience in radiation protection, who is available for advice and assistance on radiological safety matters.

Radioactive material: Material that contains unstable (radioactive) atoms that give off radiation as they decay.

Radioactivity: The process of spontaneous transformation of the nucleus, generally with the emission of alpha or beta particles often accompanied by gamma rays. This process is referred to as decay or disintegration of an atom and is measured in curies (Ci), bequerels (Bq) or disintegrations per second.

Radioisotope: Isotopes of an element that have an unstable nucleus. Radioactive isotopes are commonly used in science, industry, and medicine. The nucleus eventually reaches a stable number of protons and neutrons through one or more radioactive decays. Approximately 5,000 natural and artificial radioisotopes have been identified.

Radionuclide: An unstable isotope of an element that decays or disintegrates spontaneously, thereby emitting radiation.

Radiological Assistance Program (RAP): A Department of Energy program, which provides for radiological assistance to federal, state and major Nuclear Regulatory Commission licensees in the event of an incident involving radioactive materials.

Regional Emergency Operations Center (REOC): Facilities found at State Cal OES Administrative Regions. REOCs provide centralized coordination of resources among operational areas within their respective regions, and between the operational areas and the State level.

rem (roentgen equivalent man):A unit used to measure the amount of energy from ionizing radiation that is deposited in human tissue and the biological damage. It is determined by multiplying the number of rads by the quality factor, a number reflecting the potential damage caused by the particular type of radiation (alpha, beta, gamma, neutron). The rem is the traditional unit; the international unit is the sievert (Sv) and is equal to 100 rem.

Risk assessment: An evaluation of the risk to human health or the environment by hazards. Risk assessments can look at either existing hazards or potential hazards.

Roentgen (R):A unit of gamma or x-ray exposure in air. One roentgen is the amount of gamma or x-rays needed to produce ions carrying one electrostatic unit of electrical charge in one cubic centimeter of dry air under standard conditions. For purposes of this guidance, one R of exposure equals one rem of absorbed dose.

S

Sheltering: An immediate protective action which calls for people to go indoors, close all doors and windows, turn off all sources of outside air, listen to radio or television for emergency information, and remain indoors until official notification that it is safe to go out.

Shelter-in-place: Means to stay inside a building, close the windows, turn off ventilation or turn it on re-circulation, if possible. Duct tape and plastic are not necessary unless windows are broken. Sheltering-in-place is a temporary measure that would last until safe paths of egress are determined so people can then leave the area in as safe a manner as possible.

Sievert (Sv): The international unit for a derived quantity called radiation dose equivalent. This relates the absorbed dose in human tissue to the effective biological damage of the radiation. Not all radiation has the same biological effect, even for the same amount of absorbed dose. One sievert is equivalent to 100 rem.

State Dose Assessment Center (SDAC): A facility established near a radiological emergency where local, state and federal authorities with concurrent authorities and responsibilities can monitor, assess and analyze the extent and intensity of the radiological release, in order to determine the heath and safety potential, and coordinate the technical interagency activities; The purpose of the SDAC is to determine the radiation dose to the general public and provide recommendations to decision makers to protect public health and safety.

Surge (healthcare): A healthcare surge is proclaimed in a local jurisdiction when an authorized local official, such as a local health officer or other appropriate designee, using professional judgment subsequent to a significant emergency or circumstances, that the healthcare delivery system has been impacted.

T

Technical Specialists: Personnel with special skills that can be used anywhere within the SEMS organization. No minimum qualifications are prescribed, as technical specialists normally perform the same duties during an incident that they perform in their everyday jobs, and they are typically certified in their fields or professions.

U

Unified Coordination Group (UCG): Responsible for operational direction of coordinated State and Federal response and recovery activities. Federal agencies provide resources under DHS/FEMA mission assignments or their own authorities.

Appendix H - References

This appendix lists references used in the development of this annex or useful for its implementation.

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