This incident annex 09 should be used in conjunction with other Oregon's Emergency Operations Plan, Emergency Support Functions 1 through 18.

OREGON HEALTH AUTHORITY

Public Health Division

Radiological Response Plan

To Support

State of Oregon Comprehensive Emergency Plan

Volume 3 Emergency Operations Plan, Emergency Support Function 08

Incident Annex 09 Dated August 15, 2024

Revision Summary

Date	Revision Number	Author	Comments
11/01/2024	New 0.1	Carpenter	Newly released.
	1.0		
	2.0		
	3.0		
	4.0		
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1 CONTENTS

2 INTRODUCTION

This plan describes the Oregon Health Authority, Public Health Division (PHD) response to a radiological incident. It outlines:

1. Key assumptions.

2. Explains the PHD emergency management organization.

3. Radiation Response Teams (RRT) response guidelines.

4. Incident Command System structure and function of each Section.

5. Strike Team or Task Force deployment and operations.

6. Other local jurisdictions emergency plans that would be implemented during an incident.

7. The use of the Radiation Protection Services (RPS) Field Operating Guide (FOG) for field response guidance.

The responsibility for radiation incidents is a shared one:

- The Oregon Department of Energy (ODOE) is the lead state agency for incidents that occur during the transport of radioactive materials and for incidents at nuclear reactors or nuclear fuel storage facilities. PHD provides technical assistance, environmental monitoring, and determining both the public and the emergency worker health effects by responding to the scene when requested by ODOE.

- PHD provides ODOE with Radiation Response Teams (RRT) to respond for emergencies declared at the Columbia Generating Station (CGS) and the Hanford nuclear waste site.

- PHD establishes and maintains the emergency response procedures for the Columbia Generating Station and the Hanford Site.

- PHD is the lead state agency for all other radiological incidents, excluding a terrorist incident.

- When resources allow, PHD can provide RRTs for incidents when requested through the Oregon Emergency Response System by a local, state, or federal jurisdictions.

This plan is organized to addresses command and control, and response to radiological incidents. In addition, the plan focuses on the following:

- Radiological dispersal device (RDD).

- Radiological exposure device (RED) or also known as a “hidden sealed source”.
- Radioactive materials transportation accident.
- Radioactive materials industrial or medical accident.
- Environmental monitoring for radioactive materials.

This plan is to complement the Oregon Emergency Management’s Comprehensive Emergency Management Plan (CEMP), volume III, emergency operations and volume IV, disaster recovery plans and the following supportive documents.

- Emergency Support Function 08, Health and Medical;
- Emergency Support Function 10, Environmental Protections and Hazardous Materials;
- Incident Annex 09, Nuclear Radiological; and
- State Recovery Function 3, Oregon Health Authority

The Environmental Protection Agency’s (EPA) Protective Action Guides and Planning Guidance for Radiological Incidents (EPA-400R-17/001/January 2017) will be used as a planning guide to assist with the guidance during the early, intermediate, and late phases of a radiological response.

3 PURPOSE AND AUTHORITIES

The purpose of the Radiological Emergency Response Plan is to lessen the health impact after a release of radioactive material and provide appropriate protective action guidance to the members of the public and first responders and receivers. This plan focuses on elements unique to radiological emergencies.

3.1 AUTHORITIES

Oregon Rule or Statute	Title
ORS 453.635	Designates PHD as the state radiation control agency to protect occupational and public health safety against radiation hazards.
ORS 469.533	Requires PHD, in cooperation with the Oregon Department of Energy and the Oregon Department Emergency Management to develop radiological emergency procedures.

ORS 469.611(3)	Directs PHD to maintain a trained and equipped radiation emergency response team available 24 hours a day.
OAR 333-100 through 125	Oregon Rules for the Control of Radiation
ORS 401.035	The Oregon Disaster Recovery Plan is developed for the emergency services system within the state of Oregon. The Governor has delegated the responsibility for coordination of the State's emergency program, including coordination of recovery planning activities to the Oregon Department of Emergency Management (ORS 401.052).

4 SITUATIONS AND ASSUMPTIONS

4.1 SITUATIONS

Radioactive materials are widely used in commercial applications, research laboratories, medical care facilities, experimental reactors, and an independent spent fuel storage installation in Oregon. Radiation exposure could occur as the result of an accident, spill, lost radioactive source, or as a deliberate act.

If reasonable resources are available, PHD will provide RRTs to assist in mitigating an industrial, medical, transportation, or terrorist incident when involvement of radioactive material is suspected by the on-scene Incident Commander or by another appropriate authority. For incidents managed by the ODOE or a federal agency, PHD can provide RRTs as subject matter experts to provide technical assistance in establishing protective action plans and evaluate the health impact from the exposures or contamination generated by the radioactive materials.

The public health response to the accidental or deliberate release of radiological materials will focus on protecting human health. A timely response is critical in limiting the health impact of public exposure to ionizing radiation, and it is essential in controlling the spread of radiological contaminants. A radiological incident may result in environmental contamination and thus the risk of ongoing human exposure and long-term health consequences may exist. The incident may have psychological impacts among people who were not actually exposed, but who are still concerned about their health.

Recovery operations involve the cooperative efforts of a number of state, local, federal and private agencies and organizations and are likely to be a long-term, time-consuming task.

In large events, Oregon Health Authority will utilize the CEMP, Volume III – State Emergency Operations Plan and manage efforts with the State Disaster Recovery Coordinating Officer and Local Disaster Recovery Managers.

Recovery begins when the incident is stabilized, and the response phase is complete. It is a time of planning, assessment, restoration and return to non-emergency operations.

This plan discusses the following types of radiological incidents:

- Radioactive materials could be released as the result of an accident during the transportation of materials or at an industrial site that uses radioactive materials.

- Radioactive materials introduced into food or water as a contaminant through the means of radioactive gases or particles.

- A radiological dispersal device (RDD), or “dirty bomb,” is a bomb that combines conventional explosives (such as dynamite or TNT) with radioactive materials. An RDD injures nearby people, damages buildings, and blasts radioactive materials into the area. An RDD attack is more likely to occur than other types of attacks because of the prevalence of commercial radioactive material and the relative ease of constructing an explosive device. Radioactive materials dispersed into the air by other means are also considered a RDD.

- An improvised nuclear device (IND) is a high-yield nuclear bomb that produces a nuclear explosion. An IND creates a fireball that emits intense heat and light along with ionizing radiation. An IND could be fabricated from diverted nuclear weapon components or built from scratch using nuclear materials (hence the term “improvised”). Because an IND requires enriched uranium or plutonium and a more sophisticated knowledge of bomb-building, it is less likely to be used in a terrorist attack.

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

- Lost or orphan sealed sources that are no longer under proper regulatory control due to being stolen, illegally discarded, or accidently misplaced can be a threat to public health by being exposed to radiation. If the source capsule is damaged, the radioactive material can be released resulting in contamination. The Authority may have to manage the search, characterization, recovery, and secure storage of located sources.

4.2 ASSUMPTIONS

- PHD is the lead state agency for all radiological incidents except transportation accidents, incidents at nuclear reactors, and nuclear fuel storage facilities,
- PHD provides technical assistance for radiological incidents within the state of Oregon.
- The Federal Bureau of Investigation (FBI) leads the criminal investigation if the radiological release was intentional.
- Federal agencies, including the U.S. Department of Energy (DOE), the Environmental Protection Agency (EPA), and the Nuclear Regulatory Commission (NRC), will provide resources when Oregon's resources exceed the availability or when a radiological incident extends beyond state boundaries.
- The U.S. Centers for Disease Control and Prevention (CDC) is the lead federal agency to support public health actions when state capacity and expertise are exceeded.
- The State Emergency Coordination Center (ECC) may be activated to coordinate state interagency efforts to respond to a radiological emergency.
- Local health departments have jurisdiction in their communities for public health.
- Local government authorities may have response plans in place to deal with a radiological emergency.
- The initial response phase may be complicated by the fact that the incident site could be a mass casualty scene, possibly a life-threatening hazard area, and a crime scene.
- For a crime scene, it will be necessary to preserve the scene so that law enforcement can gather evidence.
- It may be necessary to provide medical treatment to on-scene victims prior to decontamination.
- The incident must be stabilized, and the radioactive release stopped prior to initiation of recovery operations.
- If a radiation plume exists, recovery operations may not begin until it has dissipated, and all significant deposition has occurred.

- Radiation Protection Services (RPS), State Fire Marshal's Office regional hazardous materials (Hazmat) teams and Oregon National Guard, 102nd Civil Support Team (CST) are the lead state groups for technical radiological and decontamination expertise during the recovery phase.

- Recovery personnel will be subject to the exposure limits for occupational workers in the Oregon Rules for the Control of Radiation (OAR, Chapter 333, divisions 100 - 124).

- Exposures will be maintained as low as reasonably achievable (ALARA) during recovery.

- Non-governmental organizations may be required to be issued a radioactive material license to perform recovery services.

5 CONCEPT OF OPERATIONS

Oregon Emergency Operations Plan – ESF 08, Health and Medical, and Oregon Health Authority, Radiological Emergency Response plans contain detailed information on incident management and the federal, state, and local response systems. For a radiological incident, PHD would lead the public health response and public messaging using the National Incident Management Systems concept of operations. The Health Security Preparedness Response (HSPR) program will support all other public health programs during the response.

NIMS	2017
Component	**Contents**
1	Fundamentals and Concepts of NIMS
2	Resource Management
3	Command and Coordination
•Incident Command System (ICS)	
•Emergency Operations Centers (EOC)	
•Multiagency Coordination Group (MAC Group)	
•Joint Information System (JIS)	
4	Communications and Information Management

RPS may encounter an incident as the initial arriving agency and must implement the initial steps to begin Incident Command until a Unified Incident Command System with other responding partners can be established.

***NATIONAL INCIDENT MANAGEMENT SYSTEM (NIMS)**

Oregon Health Authority, Radiation Protection Services utilizes the National Incident Management System to either provide command and control with RPS's response teams or working with other public safety and governmental agencies to coordinate state, regional or local incidents that require radiation subject experts.

***Source: National Incident Management System (NIMS), Third Edition, October 2017**

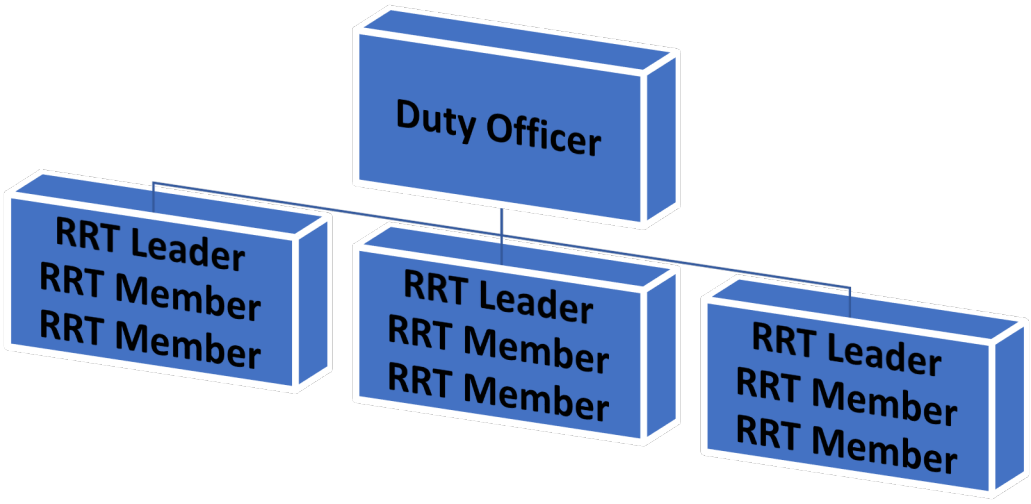
5.1 NIMS GUIDING PRINCIPLES

Incident management priorities include saving lives, stabilizing the incident, and protecting property and the environment. To achieve these priorities, incident personnel apply and implement NIMS components in accordance with the principles of flexibility, standardization, and unity of effort.

This system provides a consistent, nationwide approach for federal, state, local, and tribal governments; the private sector; and Non-Governmental Organizations to work effectively and efficiently together to prepare for, respond to, and recover from domestic incidents regardless of cause, size, or complexity. To provide for interoperability and compatibility among federal, state, local, and tribal capabilities, the NIMS includes a core set of concepts, principles, and terminology. Homeland Security Presidential Directive-5 identifies these as the Incident Command System (ICS); multi-agency coordination systems; training; identification and management of resources (including

systems for classifying types of resources); qualification and certification; and the collection, tracking, and reporting of incident information and incident resources.

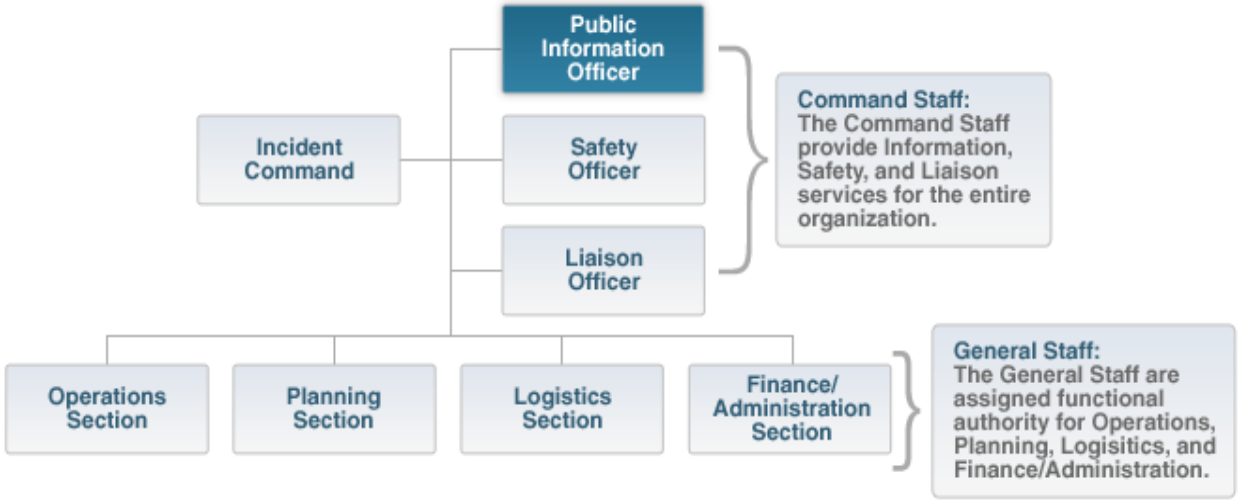
Simple Command Structure
RPS Resources for Staging and Strike Team Response



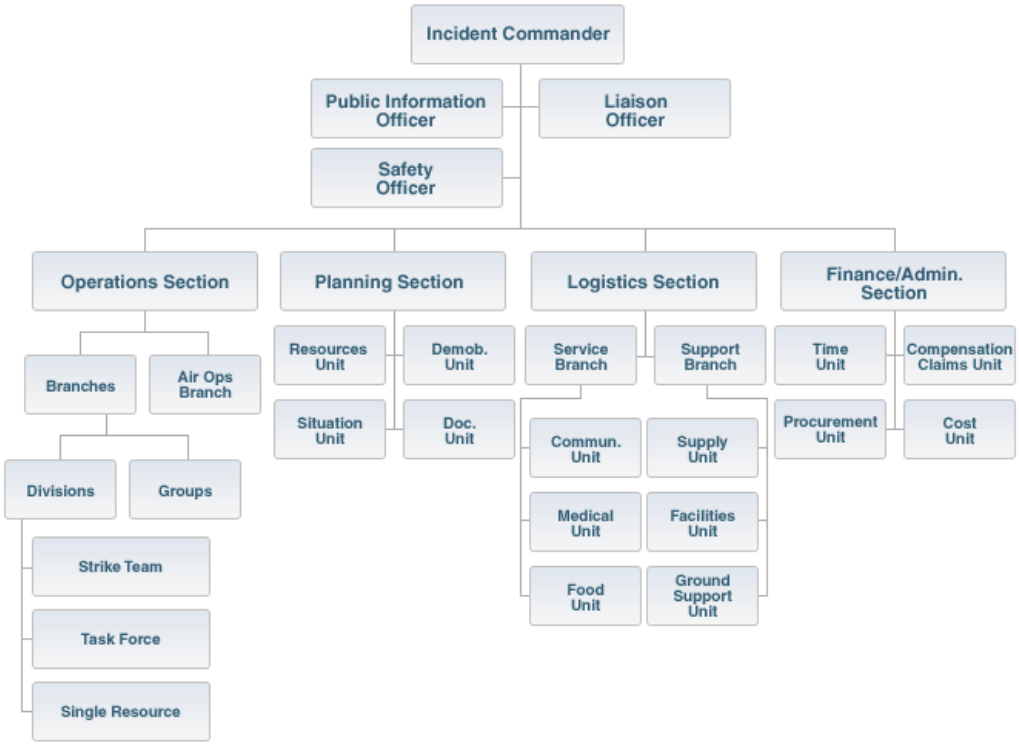
Incident Command Structure Examples

Simple Command Structure

NOTE: Safety Officer Staff must include a Radiation Safety Officer (RSO)



Complex Command Structure



5.2 ICS Organization Descriptions

- **Command Staff:** The Command Staff consists of the Public Information Officer, Safety Officer, Radiation Safety Officer, and Liaison Officer. They report directly to the Incident Commander.

- **General Staff:** The organization level having functional responsibility for primary segments of incident management (Operations, Planning, Logistics, Finance/Administration). The Section level is organizationally between Branch and Incident Commander.

- **Branch:** That organizational level having functional, geographical, or jurisdictional responsibility for major parts of the incident operations. The Branch level is organizationally between Section and Division/Group in the Operations Section, and between Section and Units in the Logistics Section. Branches are identified by the use of Roman numerals, by function, or by jurisdictional name.

- **Division:** That organizational level having responsibility for operations within a defined geographic area. The Division level is organizationally between the Strike Team and the Branch.

- **Group:** Groups are established to divide the incident into functional areas of operation. Groups are located between Branches (when activated) and Resources in the Operations Section.

- **Unit:** That organization element having functional responsibility for a specific incident planning, logistics, or finance/administration activity.

- **Task Force:** A group of resources with common communications and a leader that may be pre-established and sent to an incident or formed at an incident.

- **Strike Team:** Specified combinations of the same kind and type of resources, with common communications and a leader.

- **Single Resource:** An individual piece of equipment and its personnel complement, or an established crew or team of individuals with an identified work supervisor that can be used on an incident.

5.3 OVERALL ORGANIZATIONAL FUNCTIONS

Incident Commander: As incidents became more complex, difficult, and expensive, the need for an organizational manager became more evident. The Incident Commander manages the organization and not the incident.

The Incident Commander is technically not a part of either the General or Command staff. The Incident Commander is responsible for overall incident management, including:

- Having clear authority and knowing agency policy.
- Ensuring incident safety.
- Establishing an Incident Command Post.
- Setting priorities and determining incident objectives and strategies to be followed.
- Establishing ICS organization needed to manage the incident.
- Approving the Incident Action Plan.
- Coordinating Command and General Staff activities.
- Authorizing information release to the media.
- Approving resource requests and use of volunteers and auxiliary personnel.
- Ordering demobilization as needed.
- Ensuring after-action reports are completed.

Command Staff: The Command Staff is assigned to carry out staff functions needed to support the Incident Commander. These functions include interagency liaison, incident safety, and public information.

Command Staff positions are established to assign responsibility for key activities not specifically identified in the General Staff functional elements. These positions may include the Public Information Officer (PIO), Safety Officer (SO), Radiation Safety Officer (RSO) and Liaison Officer (LNO), in addition to various others, as required and assigned by the Incident Commander.

General Staff: The General Staff represents and is responsible for the functional aspects of the Incident Command structure. The General Staff typically consists of the Operations, Planning, Logistics, and Finance/Administration Sections.

General guidelines related to General Staff positions include the following:

- Only one person will be assigned to each General Staff position.
- General Staff positions may be filled by qualified persons from any agency or jurisdiction.
- Members of the General Staff report directly to the Incident Commander. If a General Staff position is not activated, the Incident Commander will have responsibility for that functional activity.
- Deputy positions may be established for each of the General Staff positions. Deputies are individuals fully qualified to fill the primary position. Deputies can be designated

from other jurisdictions or agencies, as appropriate. This is a good way to bring about greater interagency coordination.

- General Staff members may exchange information with any person within the organization. Direction takes place through the chain of command. This is an important concept in ICS.
- General Staff positions should not be combined. For example, to establish a "Planning and Logistics Section," it is better to initially create the two separate functions, and if necessary, for a short time, place one person in charge of both. That way, the transfer of responsibility can be made easier.

6 NOTIFICATION

Notification of a radiation emergency will likely come from the Oregon Emergency Response System (OERS), which is managed by the Oregon Department of Emergency Management (ODEM). Alternatively, PHD staff may receive notification of an emergency from local health departments, other governmental agencies, businesses, licensees, registrants or members of the public.

When informed of a radiological emergency:

- OERS staff notify the RPS Duty Officer.
- The RPS Duty Officer will make an initial assessment of severity and scope and will notify the HSPR Duty Officer and request that appropriate PHD staff to be advised of the incident.
- The RPS Duty Officer may request the HSPR Duty Officer to activate the state public health AOC. PHD will notify ODEM if the AOC is activated.
- When notified of a radiological emergency, the RPS Duty Officer primary responsibilities are to provide briefings to appropriate PHD personnel and first response agencies, organize RRTs, notify HSPR Duty Officer and Oregon State University's Radiation Center personnel.
- The RPS Duty Officer may notify the National Response Center of the incident if the National Contingency Plan may need to be activated.

7 OPERATIONAL PRIORITIES

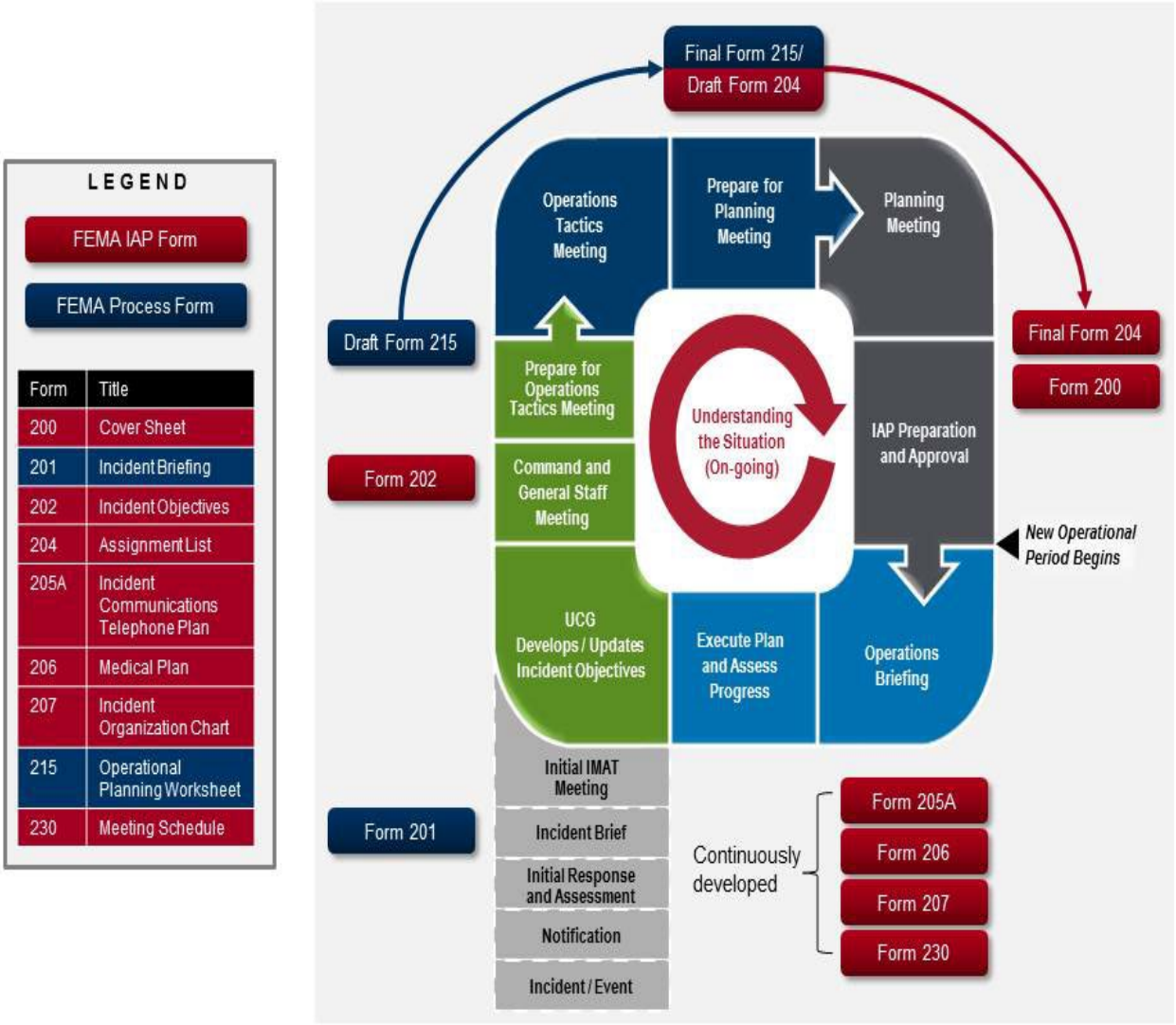
To minimize the health effects of a radiation incident, PHD will:

- Ensure that local authorities have established Incident Command and can expand to a Unified Command as resources arrive at the incident staging area.
- Assess the need to activate PHD's Agency Operations Center (AOC).
- Develop a communications plan with responding agencies.
- Commence to develop an initial Incident Action Plan using the NIMS ICS forms listed below.

ICS Form	Title	IAP Component	Section Responsibility	Originator	Approvals Required	Distribution
201	Incident Briefing	No	Command	Initial IC	No	All applicable resources enroute and on-scene
202	Incident Objectives	Yes	Planning	Planning Section Chief	Incident Commander	Section Chiefs, Branch Directors, Division and Group Supervisors, and Unit Leaders (Task Force/Strike Teams)
203	Organizational Assignment List	Yes	Planning	Resource Unit	None	Section Chiefs, Branch Directors, Division and Group Supervisors, and Unit Leaders (Task Force/Strike Teams)
204	Assignment List	Yes	Planning	Resource Unit	Planning Section Chief	Section Chiefs, Branch Directors, Division and Group Supervisors, and Unit Leaders (Task Force/Strike Teams)
205	Incident Radio List	Yes	Logistics	Communi-cations Leader	None	Section Chiefs, Branch Directors, Division and Group Supervisors, and Unit Leaders (Task Force/Strike Teams)
206	Medical Plan	Yes	Logistics	Medical Unit Leader	Safety Officer	Section Chiefs, Branch Directors, Division and Group Supervisors, and Unit Leaders (Task Force/Strike Teams)
215	Operational Planning Worksheet	Yes	Resources	Resource Unit Leader	Operations Section Chief	Section Chiefs, Branch Directors, Division and Group Supervisors, and Unit Leaders (Task Force/Strike Teams)
215A	Safety Analysis	Yes	Safety	Safety Officer	Operations Section Chief	Section Chiefs, Branch Directors, Division and Group Supervisors, and Unit Leaders (Task Force/Strike Teams)

- Assess the risk to people and recommend direct interventions.
- Provide information and Protective Action Guidance (PAG) to the Joint Information Center (JIC) for release to the public.
- Provide technical information about the radiological material being exposed or released within the operational area.
- Identify activities or worker duties that have the potential for a high level of radiation dose exposure.
- Recommend safety procedures for first responders, including advice on protective equipment to use and allowable radiation dose limits during exposures.
- Assist the on-scene Incident Commander by providing field personnel to monitor the site for radiation levels and monitor first responders for radiation dose levels.
- Evaluate the long-term health consequences and recommend follow-up actions for environmental decontamination and medical evaluation.

- Develop environmental monitoring and food control plans.
- Establish and assign strike teams to defined areas for lost or hidden radiological source(s).
- Activate and commence recovery activities. Assign personnel and agencies for demobilization operations.



8 ACTIVATION OF THE HEALTH SECURITY, PREPAREDNESS AND RESPONSE, AGENCY OPERATIONS CENTER

This section describes the emergency management structure that PHD will use during a radiological incident to manage resources under state control. The PHD response to a radiological incident will comply with the National Incident Management System (NIMS) and Federal Emergency Management Agency's (FEMA) guidance and policies.

The HSPR Duty Officer who receives a call from the RPS Duty Officer will determine the initial activation of the PHD emergency management organization in consultation with PHD management and technical staff. RPS personnel reporting to the scene of an incident will report to the on-scene Incident Commander for instructions and will typically act as an on-scene advisor throughout the incident. The RPS Section Manager or designee acts as the state Public Health representative when activation of HSPR's AOC is not necessary.

8.1 AGENCY OPERATIONS CENTER (AOC)

The AOC is the physical location for PHD staff to coordinate activities. The AOC is activated for large scale radiation emergencies or when mutual aid is requested due to the lack of local jurisdictional resources.

At the AOC, the Public Health Incident Command Team will:

- Notify, assemble and dispatch radiation response teams as strike teams.
- Coordinate strike teams activities.
- Provide logistical support for radiation strike response teams.
- Coordinate laboratory testing of environmental and human samples.
- Acquire resources to support local health department field emergency responses through the state Emergency Coordination Center (ECC). All resource requests are forwarded to and filled by the Logistics Section. These include, but not limited to:
  - RPS personnel and equipment.
  - Oregon Office of State Fire Marshal's (OSFM) regional Hazmat teams
  - Selected personnel from state universities, medical facilities, SERV-OR or FEMA's Radiation Operations Support Specialist for radiological field team resources.
  - OSU Radiation Center's Laboratory.
  - Coordinate through OERS for the joint operations center to mobilize the Oregon's 102nd National Guard Civil Support Team.
- Coordinate health information flow to and from:
  - Federal agencies.
  - PHD programs and other state agencies.
  - Local health departments.
  - Tribal governments.
  - Health care organizations.

- Medical suppliers.
- The Joint Information System/Joint Information Center (JIS/JIC).

9 RADIOLOGICAL INCIDENT PHASES AND APPLICABILITY OF PROTECTIVE ACTIONS

Source: Environmental Protection Agency's Protective Action Guides and Planning Guidance for Radiological Incidents - Section 1.4, version EPA-400/R-17/January 2017

Emergency planners need to divide responses to radiological incidents into three phases of activity

Phase	Protective Action Recommendation	PAG, Guideline, or Planning Guidance
Early Phase	Sheltering-in-place or evacuation of the public	**PAG**: 1 to 5 rem (10 to 50 mSv) projected dose over four days
	Supplementary administration of prophylactic drugs – KI	**PAG**: 5 rem (50 mSv) projected child thyroid dose from exposure to radioactive iodine
	Limit emergency worker exposure (total dose incurred over entire response)	**Guideline**: 5 rem (50 mSv)/year (or greater under exceptional circumstances)
Intermediate Phase	Relocation of the public	**PAG**: > 2 rem (20 mSv) projected dose in the first year 0.5 rem (5 mSv)/year projected dose in the second and subsequent years
	Apply simple dose reduction techniques	**Guideline**: < 2 rem (20 mSv) projected dose in the first year
	Food interdiction	**PAG**: 0.5 rem (5 mSv)/year projected whole body dose, or 5 rem (50 mSv)/year to any individual organ or tissue, whichever is limiting
	Drinking water	**PAG:** 100 mrem (1 mSv or 0.1 rem) projected dose, for one year, to the most sensitive populations (e.g., infants, children, pregnant women and nursing women); 500 mrem (5 mSv or 0.5 rem) projected dose, for one year, to the general population
Intermediate Phase	Limit emergency worker exposure (total dose incurred over the entire response)	**Guideline**: 5 rem (50 mSv)/year
	Reentry	**Guideline**: Operational Guidelines (stay times and concentrations) for specific reentry activities (see Section 4.5, *EPA-400/R17/001*)
Late Phase	Cleanup	**Guideline**: Operational Guidelines (stay times and concentrations) for specific reentry activities (see Section 4.5, *EPA-400/R17/001*)
	Waste Disposal	**Planning Guidance**: Brief description of planning process (see Section 5.2, *EPA-400/R17/001*)

9.1 Early Phase

The beginning of a radiological incident for which immediate decisions for effective use of protective actions are required and must therefore be based primarily on the status of

the radiological incident and the prognosis for worsening conditions. When available, predictions of radiological conditions in the environment based on the condition of the source or actual environmental measurements may be used. Protective actions based on the PAGs may be preceded by precautionary actions during the period. This phase may last from hours to days.

9.2 Intermediate Phase

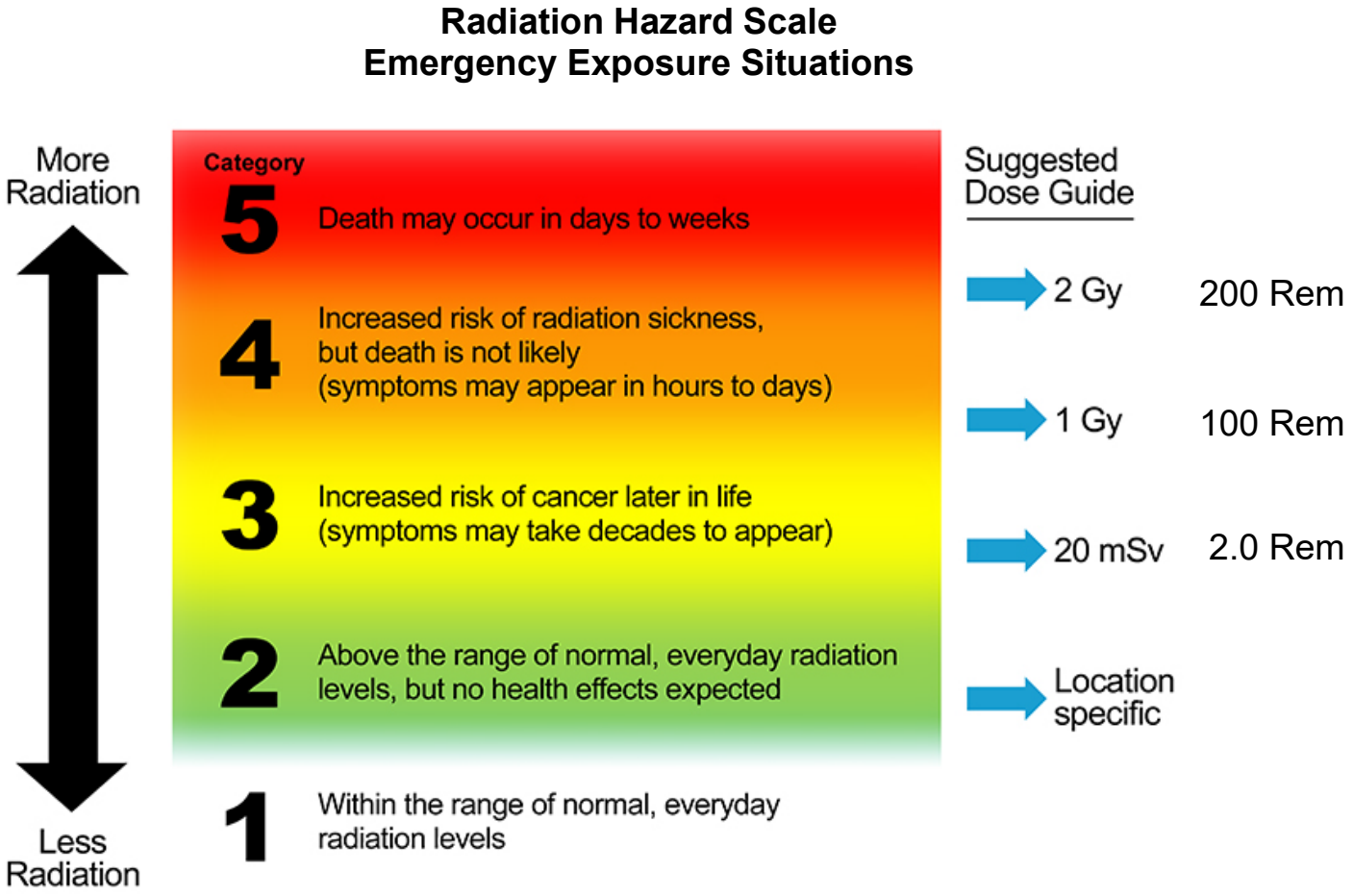
The period beginning after the source and releases have been brought under control (has not necessarily stopped but is no longer growing) and reliable environmental measurements are available for use as a basis for decisions on protective actions and extending until these additional protective actions are no longer needed. This phase may overlap the early phase and late phase and may last from weeks to months.

9.3 Late Phase

The period beginning when recovery actions designed to reduce radiation levels in the environment to acceptable levels are commenced and ending when all recovery actions have been completed. This phase may extend from months to years. A PAG level, or dose to avoid, is not appropriate for long-term cleanup.

9.4 Applicability of Protective Actions

Use of Radiation Hazard Scale Categories. A Tool for Communication in Nuclear and Radiological Emergencies (source Centers for Disease Control and Prevention)



9.5 Advisories

For cases in which incident command (IC) has determined that there has been a release of significant amounts of radioactive materials, the following advisories should be released to persons in affected geographic areas as soon as possible after the release of radioactive materials. Until the amount of radiological contamination is determined, the following precautionary advisories are recommended to minimize risk to the public.

- Remain inside and minimize opening doors and windows.
- Children should not play outdoors.
- Locally grown fruits and vegetables should not be eaten; food stored indoors is safe to eat.
- Tap water is safe for drinking and bathing until further notice.

 Turn off fans, air conditioners, and forced air heating units that bring in fresh air from the outside. Use them only to recirculate air already in the building. NOTE: Inform the public to restore their air circulation units as soon as it is deemed safe.

 Trained monitoring teams will be moving through the area to determine the extent of possible radiological contamination.

 If you are outside, proceed to the nearest permanent structure. If you must go outside for critical or lifesaving activities, cover your nose and mouth and avoid stirring up and breathing any dust. It is important to remember that your movement outside could increase your exposure.

 Local, State, and federal personnel are responding to the incident. In the interest of public safety and to assist emergency response teams, authorities request that individuals within the vicinity (*define*) stay inside, with doors and windows closed, unless advised to do otherwise by the police.

 Do not go to the hospital unless you have a medical condition that requires treatment.

 Advise the public on the location of reception center(s) and who should or should not go there.

 Further statements will be made when there is more information. Please listen for announcements on local radio/television (*name stations and frequencies*). Check the Internet at (*name web site*).

Key messages that public officials need to communicate to the public are listed below:

 Radiation exposure can have short- and long-term consequences to human health.

 Health effects depend on the radiation dose received and many other factors including length of time exposed, distance from the radiation source, and protection such as shelter or clothing worn at the time of exposure.

 Children exposed to radiation can be more at risk than adults.

 Radiation exposure, like exposure to the sun, is cumulative.

 If you want to be entered into a dose-reconstruction program to estimate the effect on your health effects, you need to contact your local public health jurisdiction.

Washington State Department of Health Washington State Radiological Response Plan 5-2 December 2010

9.6 RE-ENTRY, RESTORATION, RETURN, AND RELOCATION

During the recovery phase, RPS's operations must work in coordination with Oregon Emergency Management's CEMP Volume IV, Disaster Recovery Plans and State Recovery Function 3 to:

- Coordinate actions of the RPS RRTs.
- Provide guidance to the Recovery Organization and State Recovery Function (SRF) 3 regarding health physics, radiation safety, decontamination methods and materials, exposure limits, regulatory requirements, and disposal of radioactive materials.
- Control contamination and manage exposure to radiation.

- Provide technical support to utilities.
- Provide technical background for public information.
- Ensure that supervisors and emergency workers know that exposures are subject to the occupational worker limits expressed in the Oregon Rules for Control of Radiation (OAR, chapter 333, divisions 100-123).

Re-entry Phase

- Provide technical assistance to the Recovery Group overseeing reentry to determine the extent of damage and contamination levels.
- Determine access routes to and from the affected area.
- Assessing all data gathered from re-entry operations and additional information developed by the various technical support groups.
- Determine resources required to commence and sustain the restoration phase.

Restoration Phase

- Review the CEMP, Volume IV Disaster Recovery Plan and issue a license for its performance (see OAR-chapter 333 division 102) to:

  1. Evaluate the professional and technical qualifications of people and/or firms providing services prior to issuance of a license.

  2. Approve or disapprove (for cause) the radiological portions of contracts to perform work under the license.

  3. Perform periodic inspections to ensure compliance.

  4. Ensure that all decontamination license conditions are met.

- Determine areas, structures and equipment that need to be decontaminated.

- Follow progress of restoration by sample collection and analysis.

- Assure monitoring and decontamination, as necessary, of people, vehicles and equipment leaving the relocation zone.

- Assure decontamination of essential facilities and their access routes. Perform periodic contamination checks and assure decontamination as needed.

- Require that radioactive waste be packaged, stored, shipped, and disposed of in accordance with applicable regulations. Inspect as necessary to ensure compliance.

- Perform post-decontamination surveys as appropriate. Use the results to determine whether Return Phase exposure guidelines and decontamination plan requirements have been met.

- Release areas, buildings, equipment, etc. to unrestricted use when Oregon Rules for the Control of Radiation and decontamination plan license requirements are met.

- Recommend release of portions of the relocation zone to unrestricted use when Return Phase exposure guidelines and decontamination plan license requirements are met.

- Advise city and county officials regarding the temporary return of area residents and local workers to relocation zone.

- Monitor worker performance to assure compliance with radiation work permit requirements, exposure limits and radiation safety.

- Periodically monitor areas adjacent to restricted zones to determine the effectiveness of contamination control measures in the environment.

- Coordinate actions with the Recovery Committee.

- Recommend medical screening, examination and diagnosis of exposed personnel, and medical reassurance to people not exposed.

- Monitor relocation zone boundaries to detect the spread of contamination.

- Take required actions to prevent the spread of contamination.

Return Phase

- If directed by the Recovery Organization, survey each dwelling, workspace, or accessible area prior to the return of evacuees.

- Use results of the survey will be used to project first, second, and fifty-year dose commitments.

- Provide guidance to the Recovery Organization regarding the return of people to former relocation zone areas. Recommend limitations as appropriate to meet return phase exposure guidelines.

- Ensure that use restrictions are posted in the relocation zone and other affected areas. Update restrictions when conditions change.

- Monitor areas adjacent to remaining relocation zone areas to determine if contamination is being spread beyond zone boundaries. Require

decontamination as necessary to maintain exposures within return exposure guidelines and ALARA.

- Monitor occupied areas and buildings to verify dose projections and determine the need for additional protective action recommendations.

Relocation Phase

- Ensure that use restrictions are posted in affected areas. Update restrictions when conditions change.

- Ensure that residents and local workers are provided dosimetry and appropriate protective clothing (if necessary) when entering the relocation zone, and that all people entering the zone receive a briefing on radiological conditions prior to entry. Escorts will be provided by the local government.

- Assure that contaminated materials are not removed from the relocation zone except for the purpose of decontamination or proper disposal.

- Monitor people, vehicles and other items leaving the relocation zone. Ensure that appropriate decontamination is performed prior to release.

- Monitor relocation zone areas and buildings periodically to determine when access control is no longer warranted.

- Monitor areas adjacent to the relocation zone to determine whether contamination has spread beyond zone boundaries. Require decontamination, as necessary, to maintain exposures in those areas within return exposure guidelines and ALARA.

- Coordinate actions with the Recovery Organization.

10 EARLY PHASE OBJECTIVES BY PROGRAM

10.1 RADIATION PROTECTION SERVICES

- Staff the RPS Duty Officer position and, with the HSPR Duty Officer, form an initial assessment of the incident.

- Lead public health activities during a radiological incident.

- Act as the PHD Director's designee on smaller events not requiring the activation of the AOC or the state ECC.

- Lead the risk assessment process.

- Send RPS radiation response teams to the incident location as appropriate to become part of the operations and provide technical assistance to the Incident Commander.

- If the AOC is activated, designate a Radiological Branch Director and a Dose Analyst to report to the ESF-8 Incident Manager.

- Request to activate the Oregon State University's Radiation Center, Radiation Laboratory to support analytical services.

- Advise radiation responders and workers of appropriate personal protective equipment for the type and intensity of the radioactivity exposure.

10.2 • ADVISE ON THE APPROPRIATE PROTECTIVE ACTION GUIDES (PAGS) TO UTILIZE. HEALTH SECURITY, PREPAREDNESS AND RESPONSE

- Serve as PHD Duty Officer.

- If the AOC is activated, staff the AOC and direct its operations.

- Provide liaisons to the state ECC and to hospitals and health care systems.

- Issue appropriate Oregon HAN alerts.

- Support state and local health department activities.

- Develop and coordinate preparedness related educational material.

- Provide NIMS organizational command and control to include planning and logistics for PHD activities.

10.3 ENVIRONMENTAL PUBLIC HEALTH

Provide input on personal protective equipment and safety procedures for both first responders and first receivers.

- In collaboration with Environmental and Occupational Epidemiology, provide toxicological prognosis to the public for the short-term, mid-term and long-term health effects of exposure.

- Assist with sampling plans.

- Coordinate the issuance of appropriate advisories for food, air and water.

- Direct the issuance of advisories for food safety.

- Initiate recall procedures as necessary.

- Provide input on food safety procedures for first responders and first receivers.

- Review recommended derived intervention levels.

- Coordinate with the Oregon Department of Agriculture.

- Provide toxicological prognosis to the public for the short-term, mid-term and long-term health effects of exposure.

10.4 Acute and Communicable Disease Prevention Section

- Identify cohorts (groups of people) at risk of subsequent health effects and find out how to reach them for follow-up.

- Document the mortality and disposition of people acutely affected by radiation.

- Conduct ongoing community surveillance to document short-term, mid-term and long- term health effects using standard epidemiological methods.

- Document the identity and exposure factors of acutely affected subjects who were exposed but are not yet acutely symptomatic.

- Send information using a variety of media (print, television, radio) to inform the public about their risk of exposure and to provide guidance on when to contact their medical providers.

- Work with partner agencies and the state Public Information Officer (PIO) to develop risk communication strategies and disseminate to community stakeholders.

10.5 OREGON STATE PUBLIC HEALTH LABORATORY

- Work in consultation with the CDC to determine whether clinical samples will be collected for the Rapid Toxic Screen laboratory test.

- Provide technical assistance to various public and private medical facilities throughout the state to collect, package and ship human clinical samples from potentially exposed and legitimately concerned victims who report for evaluation and treatment.

- At CDC's direction, receive and process nonradioactive human clinical samples from various public or private medical facilities throughout the state.

- At CDC's direction, retrieve non-radioactive human clinical samples from various public or private medical facilities throughout the state.

- Coordinate all human clinical sample data processing functions between CDC, Level 1 and Level 2 state surge laboratories, local health departments, medical facilities, and other governmental agencies.

10.6 DRINKING WATER SERVICES

- Provide locations of public water systems that use surface water or have uncovered reservoirs that might be subject to fallout contamination to the AOC or RPS as needed.

- Assist public water systems with public notification, water sampling, emergency interim measures, and treatment/operational considerations appropriate to the radioactive element in question.

10.7 PUBLIC INFORMATION/RISK COMMUNICATION

- Activate the public health JIS/JIC to ensure information flow to local health departments, medical providers, tribes and other health care partners.

* Coordinate with the State JIC/JIS when established by the State Emergency Coordination Center.

- Send technical information about the radiological materials and decontamination procedures to local health departments, hospitals and clinicians.

- Distribute fact sheets, FAQs and other informational materials via the news media,

e-mail lists, PHD's Health Alert Network, the JIS/JIC.

- Focus messages on who is likely to be affected (based on geographical proximity to the radiological incident, wind speed and direction, health and age vulnerability and other factors), actions necessary to prevent or mitigate the effects of exposure, availability and location of treatment, and the numbers of confirmed illnesses or deaths.

11 Intermediate and Late Phase, Reentry and Recovery Objectives by Program

During the recovery phase, RPS's operations must work in coordination with Oregon Department of Emergency Management's CEMP volume IV, Disaster Recovery Plans and State Recovery Function 3, Oregon Health Authority.

11.1 Radiation Protection Services

- Staff the RPS Duty Officer position and with the HSPR Duty Officer, form an initial assessment of the recover site to be addressed.
- Lead public health activities during a radiological incident.
- Act as the PHD Director's designee on smaller events not requiring the activation of the AOC or the state ECC.
- Lead the risk assessment process.
- Send RPS emergency response teams to the incident location as appropriate to become part of the operations and provide technical assistance to the Incident Commander.
- If PHD's AOC is activated, designate a Radiological Branch Director and a Dose Analyst to report to the Incident Manager or designee.
- Request to activate radiation laboratories to support any needed laboratory work. Oregon Laboratories are located at Oregon State University's Radiation Center.
- Advise on appropriate personal protective equipment for the type and intensity of the radioactivity.
- Advise on appropriate Protective Action Guides Recommendations (PAGs).

11.2 Health Security, Preparedness and Response

- Serve as PHD Duty Officer.
- If the AOC is activated, staff the AOC and direct its operation.
- Provide liaisons to the state ECC and to hospitals and health care systems.
- Issue appropriate Oregon HAN alerts.
- Support state and local health department activities.
- Develop and coordinate preparedness related educational material.

11.3 Environmental Public Health

Provide input on personal protective equipment and safety procedures for both first responders and first receivers.

- In collaboration with Environmental and Occupational Epidemiology, provide toxicological prognosis to the public for the short-term, mid-term and long-term health effects of exposure.
- Assist with sampling plans.
- Coordinate the issuance of appropriate advisories for food, air and water.
- Direct the issuance of advisories for food safety.
- Initiate recall procedures as necessary.
- Provide input on food safety procedures for first responders and first receivers.
- Review recommended derived intervention levels.
- Coordinate with the Oregon Department of Agriculture.
- Provide toxicological prognosis to the public for the short-term, mid-term and long-term health effects of exposure.

11.4 Acute and Communicable Disease Prevention Section

- Identify cohorts (groups of people) at risk of subsequent health effects and find out how to reach them for follow-up.

- Document the mortality and disposition of people acutely affected by radiation.

- Conduct ongoing community surveillance to document short-term, mid-term and long- term health effects using standard epidemiological methods.

- Document the identity and exposure factors of acutely affected subjects who were exposed but are not yet acutely symptomatic.

- Send information using a variety of media (print, television, radio) to inform the public about their risk of exposure and to provide guidance on when to contact their medical providers.

- Work with partner agencies and the state Public Information Officer (PIO) to develop risk communication strategies and disseminate to community stakeholders.

11.5 Oregon State Public Health Laboratory

- Work in consultation with the CDC to determine whether clinical samples will be collected for the Rapid Toxic Screen laboratory test.

- Provide technical assistance to various public and private medical facilities throughout the state to collect, package and ship human clinical samples from potentially exposed and legitimately concerned victims who report for evaluation and treatment.

- At CDC's direction, receive and process nonradioactive human clinical samples from various public or private medical facilities throughout the state.

- At CDC's direction, retrieve non-radioactive human clinical samples from various public or private medical facilities throughout the state.

- Coordinate all human clinical sample data processing functions between CDC, Level 1 and Level 2 state surge laboratories, local health departments, medical facilities, and other governmental agencies.

11.6 Drinking Water Services

- Provide locations of public water systems that use surface water or have uncovered reservoirs that might be subject to fallout contamination to the AOC or to RPS as needed.

- Assist public water systems with public notification, water sampling, emergency interim measures, and treatment/operational considerations appropriate to the radioactive element in question.

11.7 Public Information/Risk Communication

- Activate the public health JIS/JIC to ensure information flow to local health departments, medical providers and other health care partners.

- Coordinate with the State JIC/JIS when established by the State Emergency Coordination Center.

- Send technical information about the radiological materials and decontamination procedures to local health departments, hospitals and clinicians.

- Distribute fact sheets, FAQs and other informational materials via the news media, e-mail lists, Health Alert Network, and the JIS/JIC.

- Focus messages on who is likely to be affected (based on geographical proximity to the radiological incident, wind speed and direction, health and age vulnerability and other factors), actions necessary to prevent or mitigate the effects of exposure, availability and location of treatment, and the numbers of confirmed illnesses or deaths.

12 Government Agencies Roles and Responsibilities

This section outlines the roles and responsibilities of the federal, state and local agencies involved in the preparation for and response to a radiological incident. For other incident response activities, coordination of state resources will occur through the State Emergency Coordination Center.

Response Activity	Local and State Organization		Federal Responsibility
	Primary Responsibility	Support Responsibility	
Emergency Worker Monitoring	*Response agency has responsibility to monitor its workers prior to assignment. *On-scene	OR-OSHA	U.S. Department of Labor/OSHA

	Safety Officer		
Incident Security	* Incident Command * Local Law enforcement * County or State Police	*Mutual Aid from other law enforcement agencies *Oregon National Guard *Oregon Dept. of Transportation * Coordinate with the State Emergency Coordination Center	*U.S. Department of Justice/FBI *U.S. Department of Homeland Security *U.S. Department of Defense
Unknown Material Identification	*OSFM Regional Hazmat teams	*Oregon National Guard, 102nd. CST *Oregon State Public Health Division.	*U.S. Dept of Energy RAP 8 *U.S. EPA *U.S. Department of Homeland Security, Domestic Nuclear Detection Office *U.S. Department of Defense/USNORTHCOM *U.S. Department of Justice/FBI
Atmospheric Plume Modeling	Ask Dr. Reese	*National Guard 102nd. CST	*National Atmospheric Release Advisory Center (NARAC)
Environmental Monitoring and Sampling for Characterization and Re-Entry	*PHD-RPS *Oregon State University Radiation Center *OSFM Regional Hazmat teams	*State of Oregon Dept. of Environmental Quality *State of Oregon Department of Agriculture *Oregon National Guard 102nd. CST	*U.S. Department of Energy RAP 8 *U.S. Department of Environmental Protection U.S. Department of Defense/USORTHCOM
Protective Action Recommendations (PAR)	*Incident Command * PHD-RPS *Oregon Dept. of Agriculture *Oregon Department of Environmental Quality	*Oregon State Police *Oregon Department of Transportation	*U.S. Department of Energy RAP 8 *U.S. Department of Environmental Protection *U.S. Department of Agriculture *U.S. Department of Health and Human Services/FDA/CDC
Population Monitoring	*PHD-RPS *Local Emergency Management Agencies *Local Public Health Agencies *Local Hospitals and Medical Clinics *Trained Volunteer Groups/RVCC	*Oregon National Guard 102nd. CST *OSFM Regional Hazmat Teams	*U.S. Department of Energy RAP 8 *U.S. Department of Health and Human Services/FDA/CDC *U.S. EPA, Radiological Emergency Response Team

Laboratory Analysis	*PHD-RPS *Oregon State University Radiation Center	*Oregon Department of Agriculture *Washington Department of Health	*U.S. Department of Energy RAP 8 *U.S. Department of Health and Human Services/FDA/CDC *U.S. EPA, Radiological Emergency Response Team *U.S. Department of Justice/FBI
Environmental Monitoring and Sampling for Cleanup Verification and Remediation	*PHD-RPS *Oregon Department of Environmental Quality	*Oregon State University Radiation Center	*U.S. Department of Environmental Protection Agency *U.S. Department of Defense * U.S. Department of Food, Drug Administration

12.1 FEDERAL AGENCIES

12.1.1 FBI

(503) 224-4181 **portland.fbi.gov**

Is the lead federal agency for a radiological terrorist or criminal incident.

12.1.2 U.S. Department of Energy (DOE)

(202) 586-8100

Provides federal radiological support with both equipment and personnel when called by the FBI for a terrorist incident or upon request from the state for a radiological accident. The DOE has the responsibility to maintain the operational readiness of the Federal Radiological Monitoring and Assessment Center (FRMAC) and the Radiological Assistance Program (RAP) which assists with detection, identification, analysis and can provide response teams to assist in mitigating an incident.

12.1.3 Nuclear Regulatory Commission (NRC

(301) 415-5100 **https://www.nrc.gov/about-nrc/contactus.html**

Provides technical assistance and ensures compliance with the legal use of radiological material for any incident involving a radiological licensee or a nuclear power plant. Has the capability to provide assistance to States in responding to radiological emergencies. Under the National Response Framework, NRC is the coordinating agency for domestic incident management for incidents involving nuclear materials or facilities licensed by the NRC or Agreement States. As the coordinating agency, NRC may request assistance from other agencies which could include Agreement States. Federal assistance could include ground and aerial radiological monitoring, medical advice on radiation effects and treatment, consequence projection, and protective action assessment. Request can be made by contacting the NRC Operations Center at (301) 816-5151.

12.2 Environmental Protection Agency (EPA) (206) 553-1263

https://www.epa.gov/radiation/regional-radiation-contacts#region-10

Can provide radiological emergency response teams trained to work with federal, state, and local agencies during a radiological emergency. Also provides technical assistance during the recovery phase of a radiological disaster. The EPA responds when called by the FBI for a terrorist incident or upon request from the state for a radiological accident that affects a large area, waterways or federal land. In addition, the EPA publishes the Protective Action Guides (PAG) for Radiological Incidents. *EPA-400/R-17/001 can be downloaded at: www.epa.gov/radation/protective-action-guides-pags.*

12.2.1 Center for Disease Control (CDC)

CDC Emergency Operations Center: 770-488-7100

Is the lead consulting agency in the collection of human clinical samples to test for heavy metal or chemical exposure. This agency also provides various operational guidance to include the Community Reception Center Tool Kit. Guidance documents can be downloaded at: ***https://emergency.cdc.gov/radiation/toolkits.asp.***

NOTES:

- A federal representative, from FEMA, the EPA, or the U.S. DOE, should be on the Recovery Committee.
- In large scale incidents, a Federal Radiological Monitoring Assessment Center (FRMAC) will be established.
- U.S. Department of Health and Human Services, Office of the Assistant Secretary for Preparedness and Response manages the Strategic National Stockpile (SNS). If necessary, request can be made to obtain drugs and supplies to treat radiation exposures.

Other federal agencies that have a support role in the response to or recovery from a radiological incident are outlined in the U.S. Department of Homeland Security National Response Framework (See **https://www.fema.gov/media-library/assets/documents/117791).**

12.2.2 Radiation Emergency Assistance Center/Training Site (REAC/TS)

(865) 576-1005 (ask for REAC/TS) https://orise.orau.gov/reacts/

REAC/TS is a U.S. Department of Energy asset by providing subject matter expertise on the medical management stemming from radiation incidents. REAC/TS maintains a 24/7 national and international radiation emergency response capability.

12.1.7 National Response Center - US Coast Guard National Response Center

1-800-424-8802

The National Response Center (NRC) is not a response agency. It serves as an emergency call center that fields INITIAL reports for pollution and railroad incidents and forwards that information to appropriate federal/state agencies for response.

12.1.8 The Advisory Team for the Environment, Food, and Health

1-866-300-4374

The Advisory Team for the environment, food, and health (or “advisory team”) is a federal interagency group of subject matter experts in radiological health and related matters. The mission of the Advisory Team is to provide protective action recommendations to decision makers at all levels following accidents or incidents that result in the release of radioactive material. The Advisory Team is comprised of representatives from four agencies: EPA, USDA, CDC and FDA.
According to current procedures, the Advisory Team may be activated by DHS, coordinating agencies, and state/local tribal governments by contacting the FDA emergency operations center at 1-866-300-4374. The Advisory Team will likely also be activated by DOE upon activation of the FRMAC.

12.1.9 U.S. Department of Health and Human Services, Radiation Emergency Medical Management (REMM)

https://remm.hhs.gov The mission of REMM is to provide medical guidance health care workers about clinical diagnosis and treatment. In addition, the agency provides just in time training and provide web-based information which is also downloadable.

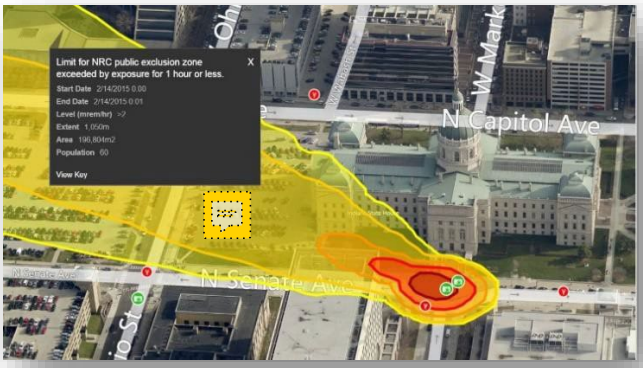
12.1.10 Administration for Strategic Preparedness and Response - National Stockpile (SNS) – CDC Emergency Operations Center

770-488-7100 or HHS Secretary’s Operations Center: 202-619-7800

The SNS is part of the federal medical response infrastructure and can supplement medical countermeasures needed by states, tribal nations, territories and the largest metropolitan areas during public health emergencies. The supplies, medicines, and devices for lifesaving care contained in the stockpile can be used as a short-term, stopgap buffer when the immediate supply of these materials may not be available or sufficient. The SNS is a resource for the location of medical counter measures for radiation exposure and contamination events.

12.1.11 CBRN Responder (RadResponder)

As part of the revised Nuclear/Radiological Incident Annex to the National Response Framework is the CBRN Responder, which provides a component we call the RadResponderNetwork providing the National Standard and Whole Community solution for the management of radiological data.



The Network is the product of collaboration among FEMA, DOE/NNSA, and EPA, and was developed as a solution to lessons learned about data management and data sharing following the Fukushima disaster in 2011.

RadResponder provides various methods for data collection, as well as tools to manage personnel, equipment, and field teams which help to maintain data quality standards. The RadResponder mapping utility allows for the geospatial display of real-time data, responder locations and tracking paths, modeling, RDD guidance and NPP guidance, user GIS files, fixed sensors, facilities, and sampling locations. GIS file exports ensure RadResponder is interoperable with other situational awareness tools

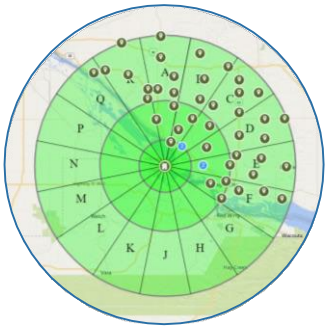
PARTNERSHIPS AND DATA MANAGEMENT

Partnership functions within the Network provide flexibility for organizations to manage with whom and under what circumstances radiological data is shared – events can be managed to allow multiple jurisdictions to collect and share radiological data and associated event information. RadResponder also incorporates atmospheric dispersion modeling into events, allowing for rapid display of plume models to support operational planning and decision making.

Via the RadResponder Application Program Interface, organizations and equipment manufacturers can securely integrate live data feeds into the system to provide real-time monitoring and situational awareness. These data feeds can take the form of fixed monitoring stations or user-authenticated, Bluetooth-enabled detection equipment which reduces errors and improves the quality and efficiency of data collection.

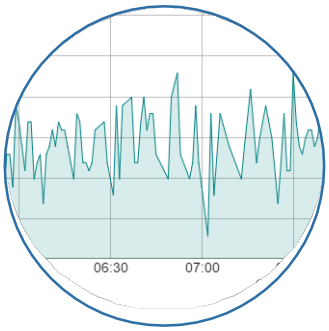
RadResponder is now provided free to all federal, state, local, tribal, and territorial response organizations, allowing users to uniformly establish a secure, flexible, and networked approach to the management of radiological data. RadResponder can be accessed on smartphones and tablets (iOS, Android, Windows), and via the web (www.radresponder.net), allowing it to be seamlessly and rapidly employed at all levels of government during a radiological or nuclear emergency response. See next page for RadResponder capabilities.

CAPABILITIES



NPP & RDD Guidance
NPP EPZs, RDD hot zones, shelter-in-place zones, and 10 point monitoring plans.

Responder Tracking
Track responders in the field that are using the mobile applications



Fixed Sensor Integration
Fixed monitoring sensors located nationwide stream data to provide real-time situational awareness

Plume Modeling and GIS Files
Use NARAC's plume models or upload your own KML or Shape files to an event

FUNCTIONALITY

COLLECT

- Field surveys
- Field samples & analysis
- Spectra
- Observations

MANAGE

- Responders
- Equipment
- Field teams
- Partnerships
- Multijurisdictional event space

SHARE

- Radiological data
- Situational awareness
- Event management responsibilities

…with any organization in the RadResponder Network

12.1.12 CONTACT RADRESPONDER 1-202-646-8269
RadResponder Team at support@radresponder.net; http://www.radresponder.net

12.3 STATE AGENCIES

This section outlines the roles and responsibilities of the state agencies involved in a radiological emergency.

12.3.1 Oregon Health Authority Public Health Division (PHD)

PHD will staff the ESF #8 incident command positions (see OEM Volume III, Emergency Operations Plan, ESF #8 for Health and Medical). Within PHD, Radiation Protection Services is the lead program for the state public health response to a radiological emergency. This section describes the roles and responsibilities of the PHD programs involved in a radiological emergency.

12.3.2 OHA Center for Health Protection (CHP), Radiation Protection Services

- Participate in preparing plans.
- Participate in exercises.
- Participate in appropriate training.
- Maintain radiological equipment:
  - Inventory equipment on a quarterly basis
  - Replace or maintain equipment as needed.
- Form radiological response teams (RRTs) and conduct training at least twice a year.
- Conduct refresher training for the state Hazmat teams at least once every 18 months.
- Update state radiological plans and standard operating procedures (SOPs) every other year.
- Review and distribute exposure guidelines for first responders.
- Offer planning assistance to first response agencies (e.g., police, fire, and ambulance personnel).
- Coordinate planning and training with other agencies and assets.
- Provide command staff, administrative support and subject matter experts for the Health Security, Preparedness and Response, Agency Operations Center (AOC).

12.3.3 OHA Health Security, Preparedness and Response (HSPR)

- Coordinate public health planning, response, and recovery through its AOC.
- Encourage local health department planning.
- Coordinate the design and evaluation of exercises.
- Standardize statewide response protocols.
- Act as point of contact with Oregon Emergency Management's Emergency Coordination Center (ECC).
- Coordinate and provide logistical planning and resources for PHD's field teams.

12.3.4 OHA, Environmental Public Health

- In coordination with RPS, provide chemical and radiological training to first responders.
- Coordinate with public health programs and other agencies on the radiological emergency response plan and threat assessments.
- Provide Command staff, administrative support, and subject matter experts to HSPR's AOC

12.3.5 OHA, Acute and Communicable Disease Prevention Section

- Create or expand role of pre-established networks of physicians and systems to detect unusual census or unexpected radiological syndromes.
- Increase the number of physicians and other providers with experience and skills in the diagnosis and treatment of diseases or conditions possibly resulting from a radiological terrorist incident.
- Provide Command staff, administrative support and subject matter experts to HSPR's AOC.

12.3.6 OHA, Oregon State Public Health Laboratory (OSPHL)

- Ensure appropriate facilities receive key documents and just in time training on how to respond to a radiological emergency when the public seeks medical care, including:
  - CDC's protocols for phlebotomy, urine collection, and packaging of human clinical samples for shipping.
  - OSPHL's protocols for receiving human clinical samples.
- Provide Command staff, administrative support and subject matter experts to HSPR's AOC.

12.3.7 OHA Drinking Water Services

- Maintain an updated inventory of public water systems that use surface water sources or have uncovered reservoirs, along with contact information.
- Investigate the possibility of coordinating with Oregon's Department of Environmental Quality and Water Resources Department on developing water-related geographic information system (GIS) databases.
- Provide Command staff, administrative support and subject matter experts to HSPR's AOC.

12.3.8 OHA, Environmental Public Health – Foodborne Illness Prevention Program

- Review and distribute protective action guides.
- Review and distribute derived intervention levels.
- Coordinate with RPS on the development of protective action guides and derived intervention levels utilizing EPA's 400/R-17/001 /January 2017 PAG Manual.
- Provide Command staff, administrative support and subject matter experts to HSPR's AOC.

12.3.9 OHA, Public Information/Risk Communication

The Risk Communication Team shall be coordinated by the Public Health Director's Communication program with assistance from the HSPR's AOC Incident Management Team (IMT).

- Prepare messages that focus on radiation response activities for state and local public health, hospitals, businesses, individuals and families, community organizations, and schools.
- Prepare communication materials on a variety of radiological agents for distribution to health care providers, emergency responders, the media, and the public during a radiation emergency.
- Participate in communication planning and exercises with radiation emergency response partners.
- Incorporate radiation events into JIS/JIC exercises.
- Provide Command staff, administrative support and subject matter experts to HSPR's AOC.

12.3.10 Oregon Department of Energy

- Is the lead state agency for transportation-related radiological incidents in Oregon. It is also the lead state agency in the case of an incident at the two nuclear research reactors in Oregon (at Reed College and Oregon State University).
- Supports PHD in all other radiological events occurring in Oregon.

12.3.11 Oregon State Fire Marshal

- Establish and maintain the statewide Hazardous Materials Emergency Response system, which includes regionally located response teams with specialized training and equipment.
- When requested through OERS, dispatch Hazmat response teams to serious incidents involving radiological materials when the incident exceeds first responder training and equipment.
- Provide overhead teams to direct or support incident management.

12.3.12 Oregon State University, OSU Radiation Center and Radiation Safety Office

- Provide additional survey instruments.
- Provide subject matter experts.
- Provide radiation laboratory and counting facilities for analysis of field and biologic samples.

12.3.13 Oregon Health Sciences University

- One to three trained radiological monitors, survey instruments or subject matter experts.

12.3.14 Oregon Department of Emergency Management

- Coordinate notifications of radiological incidents to state agencies through OERS.
- Coordinates interagency response and recovery efforts through the state emergency coordination center and recovery coordination center.

- Coordinates requests for an ORS 401 Emergency Declaration from the Governor's Office.
- Establish and coordinate an interagency joint information center/joint information system to provide coordinated unified messaging.
- Provide access to the Oregon Civil Support Team if needed.

12.3.15 Oregon Poison Center

- Provide technical and clinical expertise to assist in hazard assessment and patient management, including real-time assistance with patient diagnosis, treatment and antidotal therapy.
- Provide medical consultation to health care workers in local and regional hospitals, clinics and offices.
- Provide immediate toxicological information to PHD to help with scientific and risk communication for the public.
- Provide medical consultation to organizations concerning occupational exposures to radiological material during recovery.

12.3.16 Oregon Department of Agriculture

- Responsible for regulating the pickup, delivery, sampling, handling and processing of milk, food, and animal feed in the state of Oregon.
- Implementation of milk, food, and animal feed control measures.
- Supervising food control check points.

12.3.17 Oregon National Guard, 102nd Civil Support Team.

- Provide rapid response to any radiological and CBRNE hazards.
- Provide personnel for detailed radiological survey operations and nuclide identification.
- Conduct decontamination operations to radiation workers.
- Provide enhanced communication systems from field sites to AOCs.

13 VULNERABLE POPULATIONS

Radioactive materials that pose health risks to adults in the general population pose a significantly higher risk to some vulnerable populations because of the potential for longer exposures, pre-existing medical conditions, and the likelihood of not understanding disaster preparedness. Vulnerable populations should be given the highest priority for evaluation, shelter-in-place removal, and medical attention due to the high probability that these individuals would perish without immediate attention in a radiological emergency.

For radiation emergencies, children and pregnant women are at particular risk because children and fetuses are more sensitive to radiation than adults. Children are growing more rapidly, so there are more cells dividing and a greater opportunity for radiation to disrupt the process. The effects of radiation to the fetus depends on the developmental stage:

13.1 CENTER FOR DISEASE CONTROL TABLE 1. POTENTIAL HEALTH EFFECTS OF PRENATAL RADIATION EXPOSURE

Acute Radiation Dose to the Embryo or Fetus	Time Post Conception				
	Blastogenesis (up to 2 wks)	Organogenesis (2-7 wks)	Fetogenesis (8-15 wks)	Fetogenesis (16-25 wks)	Fetogenesis (26-38 wks)
<0.05 Gy (5-50 rads)	Noncancer health effects NOT detectable				
0.05-0.50 Gy (5-50 rads)	Incidence of failure to implant may increase slightly, but surviving embryos will probably have no significant (noncancer) health effects	• Incidence of major malformations may increase slightly • Growth retardation possible	• Growth retardation possible • Reduction in IQ possible (up to 15 points, depending on dose) • Incidence of severe mental retardation up to 20%, depending on dose	Noncancer health unlikely	
>0.50 Gy (50 rads)	Incidence of failure to implant will likely be large,‡ depending on dose, but surviving embryos will probably have no significant (noncancer) health effects	• Incidence of miscarriage may increase, depending on dose • Substantial risk of major malformations such as neurological and motor deficiencies • Growth retardation likely	• Incidence of miscarriage probably will increase, depending on dose • Growth retardation likely • Reduction in IQ possible (> 15 points, depending on dose) • Incidence of severe mental retardation > 20%, depending on dose •Incidence of major malformations will probably increase	• Incidence of miscarriage may increase, depending on dose • Growth retardation possible, depending on dose • Reduction in IQ possible, depending on dose • Severe mental retardation possible, depending on dose • Incidence of major malformations may increase	Incidence of miscarriage and neonatal death will probably increase depending on dose

Gestational age and radiation dose are important determinants of potential noncancer health effects. The following points are of particular note:
Source: Centers for Disease Control and Prevention

- **Before about 2 weeks gestation (i.e., the time after conception), the health effect of concern from an exposure of > 0.1 gray (Gy) or 10 rads1 is the death of the embryo. If the embryo survives, however, radiation-induced noncancer health effects are unlikely, no matter what the radiation dose.** Because the embryo is made up of only a few cells, damage to one cell, the progenitor of many other cells, can cause the death of the embryo, and the blastocyst will fail to implant in the uterus. Embryos that survive, however, will exhibit few congenital abnormalities.

- **In all stages of gestation, radiation-induced noncancer health effects are not detectable for fetal doses below about 0.05 Gy (5 rads).** Most researchers agree that a dose of < 0.05 Gy (5 rads) represents no measurable noncancer risk to the embryo or fetus at any stage of gestation. Research on rodents suggests a small risk may exist for malformations, as well as effects on the central nervous system in the 0.05–0.10 Gy (5–10 rads) range for some stages of gestation. However, a practical threshold for congenital effects in the human embryo or fetus is most likely between 0.10–0.20 Gy (10–20 rads).

- **From about 16 weeks' gestation to birth, radiation-induced noncancer health effects are unlikely below about 0.50 Gy (50 rads).** Although some researchers suggest that a small possibility exists for impaired brain function above 0.10 Gy (10 rads) in the 16- to 25-week stage of gestation, most researchers agree that after about 16 weeks' gestation, the threshold for congenital effects in the human embryo or fetus is approximately 0.50–0.70 Gy (50–70 rads).

13.2 Critical Considerations for Evacuation vs. Shelter-In-Place

Protective actions such as evacuation and shelter-in-place can become complex due to the considerations that must be evaluated when the Jurisdictional Government determines what actions to take to protect vulnerable populations within an affected zone.

Examples of populations are:

- Children and Unaccompanied Minor
- Correctional Facilities
- Homeless Population
- Hospitals and Residential Medical Facilities
- Household Pets and Animals
- Individuals with Access and Functional Needs
- Tourist

Evacuation: Organized, phased, and supervised withdrawal, dispersal, or removal of civilians from dangerous or potentially dangerous areas, and their reception and care in safe areas.

Shelter-in-Place: The use of a structure to temporarily separate individuals from a hazard or threat.

14 ISOTOPES OF INTEREST

14.1 ISOTOPES OF INTEREST: PROPERTIES, TREATMENT, AND FACT SHEETS

Information in this table adapted from: Management of Persons Contaminated with Radionuclides: Handbook (NCRP Report No. 161, Vol. I), National Council on Radiation Protection and Measurements, Bethesda, MD, 2008.

Isotope	Ionizing radiation decay mode	Radioactive half-life	Major exposure pathways	Focal accumulation	Treatment: References for use	Fact sheets (CDC, ATSDR, EPA, Argonne Natl. Lab, Wikipedia)
Americium (Am-241)	α	458 years	Inhalation Skin	Lungs Liver Bone marrow	DTPA† *	CDC ATSDR EPA Argonne (PDF - 2.34 MB) Wikipedia
Californium (Cf-252)	α, γ	2.6 years	Inhalation Ingestion	Bone Liver	DTPA*	Argonne (PDF - 2.34 MB) Wikipedia
Cesium (Cs-137)	β, γ	30 years	Inhalation Ingestion	Follows potassium; renal excretion	Prussian blue, insoluble† *	CDC ATSDR EPA Argonne (PDF - 2.34 MB) Wikipedia
Cobalt (Co-60)	β, γ	5.26 years	Inhalation	Liver	Succimer (DMSA)§ (DailyMed) DTPA* EDTA§ N-Acetyl-L-cysteine§	CDC ATSDR EPA Argonne (PDF - 2.34 MB) Wikipedia
Curium (Cm-244)	α, γ, neutron	18 years	Inhalation Ingestion	Liver Bone	DTPA† *	Argonne (PDF - 2.34 MB) Wikipedia

Iodine (I-131)	β, γ	8.1 days	Inhalation Ingestion Skin	Thyroid	Potassium iodide† * Saturated solution of potassium iodide§ Propylthiouracil§ Methimazole§ Potassium iodate§	CDC ATSDR EPA Argonne (PDF - 2.34 MB) Wikipedia
Iridium (Ir-192)	β, γ	74 days	N/A	Spleen	Consider DTPA* Consider EDTA§	CDC Argonne (PDF - 2.34 MB) Wikipedia
Isotope	**Ionizing radiation decay mode**	**Radioactive half-life**	**Major exposure pathways**	**Focal accumulation**	**Treatment: References for use**	**Fact sheets (CDC, ATSDR, EPA, Argonne Natl. Lab, Wikipedia)**
Phosphorus (P-32)	β	14.3 days	Inhalation Ingestion Skin	Bone marrow Rapidly replicating cells	Hydration + Phosphate drugs • Sodium glycerophosphate§ • Sodium phosphate§ • Potassium phosphate§ • Calcium carbonate§ • Aluminum hydroxide§ • Aluminum carbonate§ • Sevelamer§ (DailyMed)	Wikipedia
Plutonium (Pu-239)	α	24,100 years	Inhalation (limited absorption)	Lung Bone marrow Liver Gonads	DTPA§ DFOA§ EDTA§ DTPA + DFOA§	CDC ATSDR EPA Argonne (PDF - 2.34 MB) Wikipedia IEER

Polonium (Po-210)	α	138.4 days	Inhalation Ingestion Skin	Spleen Kidneys Lymph nodes Bone marrow Liver Lung mucosa	Gastric Lavage Dimercaprol (BAL)* Succimer (DMSA)§ (DailyMed) D-Penicillamine§ (DailyMed)	CDC Argonne (PDF - 2.34 MB) HPS (PDF - 492 KB) NRC Wikipedia More references
Radium (Ra-226)	α, β, γ	1,602 years	Ingestion	Bone	Aluminum hydroxide* Barium sulfate* Sodium alginate§ Calcium phosphate§	ATSDR EPA Argonne (PDF - 2.43 MB) Wikipedia
Strontium (Sr-90)	β	28 years	Inhalation Ingestion	Bone	**Inhalation:** Calcium gluconate§ Barium sulfate§ **Ingestion:** Rx is the same as for radium (see above). Additional Rx may include stable strontium compounds: Strontium lactate§ Strontium gluconate§	CDC ATSDR EPA Argonne (PDF - 2.34 MB) Wikipedia
Isotope	**Ionizing radiation decay mode**	**Radioactive half-life**	**Major exposure pathways**	**Focal accumulation**	**Treatment: References for use**	**Fact sheets (CDC, ATSDR, EPA, Argonne Natl. Lab, Wikipedia)**
Thorium (Th-232)	α	1.41 x 10^{10} years	Inhalation Ingestion	Bone	Consider DTPA*	ATSDR EPA Argonne (PDF - 2.34 MB) Wikipedia
Tritium (H-3)	β	12.5 years	Inhalation Ingestion Skin	Whole body	Water diuresis*	EPA Public Health England (PHE), formerly Health Protection Agency (HPA),

						(UK) Wikipedia
Uranium (U-235)	α	7.1 x 10^8 years	Inhalation Ingestion	Kidneys Bone	Sodium bicarbonate* For high level intake consider off-label diuretics and/or dialysis§	CDC ATSDR EPA Argonne (PDF - 2.34 MB) Wikipedia
Yttrium (Y-90)¶	β	64 hours	Inhalation Ingestion	Bone	DTPA* EDTA§	Argonne ¶ (PDF - 2.34 MB) Wikipedia

References for use

† **FDA approved:** Countermeasures so marked have been approved as treatment for internal contamination with the listed radioisotope by the US Food and Drug Administration (FDA).

* **NCRP preferred:** Countermeasures so marked have been listed as preferred treatments for internal contamination with the listed radioisotope by the National Council on Radiation Protection and Measurements [Management of Persons Contaminated with Radionuclides: Handbook (NCRP Report No. 161, Vol. I)]. Except where noted, use of these countermeasures has not been approved by the US Food and Drug Administration (FDA).

§ **NCRP suggested:** Countermeasures so marked have been listed as suggested treatments for internal contamination with the listed radioisotope by the National Council on Radiation Protection and Measurements [Management of Persons Contaminated with Radionuclides: Handbook (NCRP Report No. 161, Vol. I)]. Use of these countermeasures has not been approved by the US Food and Drug Administration (FDA).

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14.2 TABLE 1: RADIONUCLIDES OF CONCERN

Radionuclide	Quantity of Concern[1] (TBq)	Quantity of Concern[2] (Ci)
Am-241	0.6	16
Am-241/Be	0.6	16
Cf-252	0.2	5.4
Cm-244	0.5	14
Co-60	0.3	8.1
Cs-137	1	27
Gd-153	10	270
Ir-192	0.8	22
Pm-147	400	11,000
Pu-238	0.6	16
Pu-239/Be	0.6	16
Ra-226	0.4	11
Se-75	2	54
Sr-90 (Y-90)	10	270
Tm-170	200	5,400
Yb-169	3	81
Combinations of radioactive materials listed above[3]	See Footnote Below[4]	

1. The aggregate activity of multiple, collocated sources of the same radionuclide should be included when the total activity equals or exceeds the quantity of concern.

2. The primary values used for compliance with this Order are TBq. The curie (Ci) values are rounded to two significant figures for informational purposes only.

3. Radioactive materials are to be considered aggregated or collocated if breaching a common physical security barrier (e.g., a locked door at the entrance to a storage room) would allow access to the radioactive material or devices containing the radioactive material.

4. If several radionuclides are aggregated, the sum of the ratios of the activity of each source, *i* of radionuclide, *n*, $\mathbf{A}_{(i,n)}$, to the quantity of concern for radionuclide *n*, $\mathbf{Q}_{(n)}$, listed for that radionuclide equals or exceeds one. [(aggregated source activity for radionuclide A) ÷ (quantity of concern for radionuclide A)] + [(aggregated source activity for radionuclide B) ÷ (quantity of concern for radionuclide B)] + etc..... ≥ 1