

Appendix E

Barren River District Health Department Radiological Response Plan

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I. Introduction

This document is BRDHD's radiation-specific annex to BRDHD's All Hazard Plan.

This document contains general radiation information and outlines the potential roles and responsibilities that we may be called upon to fulfill before, during, and immediately after a radiation incident. The Concept of Operations section is as an example of how a radiation incident response might happen within a community but is not prescriptive. Examples of generic fact sheets and public messages/message maps have been provided as additional resources. Lastly, a reference list of guidance documents, tools, and resources is included.

Hyperlinks are used throughout the document to connect us to additional information, federal guidance documents, and relevant tools/resources. This information is meant to inform and educate us but is not an authoritative or complete listing of available resources.

The focus of this document is on our response actions during a radiological event. Therefore, the triage and clinical management of patients by medical personnel has not been addressed. However, specific references are provided at certain points within the document for medical professionals who wish to learn more about their role in a radiation emergency.

As a threat-specific annex, information that would be included in our all-hazard plan (event notification, BRDHD activation procedures, Incident Command System (ICS) structure, staffing and volunteer management, etc.) has not been addressed in this document.

II. Scope

This plan is relevant to any radiological emergency that may affect our jurisdiction. Incidents may arise from multiple sources and include both the unintentional and intentional release of radioactive materials. Unintentional releases of radioactive materials may occur during the normal transportation, storage, or use of the materials (hospitals, laboratories, industry, etc.). Intentional releases may come from a radiation dispersal device (e.g., dirty bomb) or radiation emission/exposure device.

Accidents at nuclear power plants and the release of materials via a nuclear weapon or an improvised nuclear device do NOT fall within the scope of this plan. While there are some conceptual similarities between nuclear and radiological events, the differences in complexity and the health/environmental impacts of a nuclear event warrants a separate planning annex for nuclear events.

This document focuses on the planning priorities and response actions for the first 72 hours after a radiological event. The integration of federal assets into the local/state response and the long-term monitoring of health and the environment are not the focus of this document, but the roles and

responsibilities of federal agencies and an overview of the radiation-specific capabilities and response teams can be found within the National Response Framework [Nuclear/Radiological Incident Annex](#).

III. **Acronyms**

AMA	American Medical Association
ARS	Acute radiation syndrome
ASPR	Assistant Secretary for Preparedness and Response
CDC	Centers for Disease Control and Prevention
CRC	Community reception center
CRCPD	Conference of Radiation Control Program Directors
CSTE	Council of State and Territorial Epidemiologists
DHS	Department of Homeland Security
DOE	Department of Energy
DTPA	Diethylenetriamine pentaacetate
EMS	Emergency medical services
EOC	Emergency operations center
EPA	Environmental Protection Agency
ESF	Emergency support function
FDA	Food and Drug Administration
FEMA	Federal Emergency Management Agency
FRMAC	Federal Radiological Monitoring and Assessment Center
Hazmat	Hazardous materials
HHS	U.S. Department of Health and Human Services
KI	Potassium iodide
LHD	Local health department
MRC	Medical Reserve Corps
NRC	Nuclear Regulatory Commission
NRF	National Response Framework
PIO	Public information officer
PPE	Personal protective equipment
RDD	Radiation dispersal device
REAC/TS	Radiation emergency assistance center/training site
RED	Radiation emission/exposure device
REMM	Radiation emergency medical management

IV. **Definitions**

Acute radiation syndrome (ARS): ARS is an acute illness caused by irradiation of most/all of the body by a high dose of penetrating radiation in a very short period of time (usually a matter of minutes). Patients in the first stage of ARS exhibit the classic symptoms of nausea, vomiting, and possibly

diarrhea (depending on dose), which can occur from minutes to days following exposure. Symptomatic episodes last for minutes up to several days.

Contamination (radioactive): The deposit of unwanted radioactive material on the surfaces of external or internal structures, areas, objects, or people. External contamination occurs when radioactive material is outside of the body, such as on a person's skin. Internal contamination occurs when radioactive material is taken into the body through breathing, eating, or drinking.

Community reception center (CRC): A dedicated site to assess people for exposure/contamination, conduct external decontamination (if necessary), obtain information for an exposure registry, and refer individuals for medical/mental health follow-up, as appropriate.

Decontamination: The process of removing radioactive contamination. For external contamination, this may involve removing the outer layer of clothing and washing all exposed parts of the body with soap and water. For internal contamination, medical countermeasures are necessary.

Exposure (irradiation): Exposure occurs when radiation energy penetrates the body. Exposure to very large doses of radiation may cause death within a few days or months, and exposure to lower doses of radiation may lead to an increased risk of developing cancer or other adverse health effects later in life.

Population monitoring: The process of immediate monitoring of potentially affected individuals after a radiation incident (which involves screening for exposure) and the use of exposure registries to perform long-term monitoring of health effects from an event.

Radiation dispersal device (RDD): An RDD is a device (or process) that disperses radioactive material, exposing people and the environment to radiation. An RDD may be noticeable—such as an explosion or dirty bomb, or it may be silent and go unnoticed (e.g., case with contamination of the food or water supply). Responders and officials will know an RDD has been used when detection equipment registers an elevated radiation level or through notification by intelligence or law enforcement.

Radiation emission/exposure device (RED): An RED is also called a "hidden sealed source," a 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 discreetly in a public place exposing those who pass close by. Prolonged exposure to a high-intensity source may lead to ARS or to radiation burns. If the seal around the source is broken and the radioactive contents are released from the container, the device could become an RDD, capable of causing radiological contamination.

V. Planning Assumptions

- a) The local response infrastructure is intact.

- b) The incident does not involve biological or chemical agents.
- c) Response officials may have no advance notice of the radiological event.
- d) Radiological incidents may not be immediately recognized as a radiological incident.
- e) Triage and decontamination strategies should be developed separately from those used for chemical and biological agents.
- f) Contamination with radioactive materials is not immediately life-threatening.
- g) Law enforcement agencies will be involved in any act or threat of nuclear or radiological terrorism.
- h) Hazmat or fire/rescue officials will be responsible for on-scene incident management and gross decontamination of victims prior to transport.
- i) Local and state officials should be prepared to initiate the response to a radiological emergency without federal assistance.
- j) An incident involving the potential release of radioactivity may require implementation of protective measures, such as evacuation and shelter-in-place.

VI. Concept of Operations

Immediately after an accident or explosion, the presence of radioactive material may not immediately be known. The use of RDDs (e.g., personal dosimeters) by first responders may serve to alert personnel that radiological material is present. An accident involving a licensed facility or the food and water supply may be identified through routine monitoring or when patients seek medical care for unexplained symptoms. An RED may go unnoticed for some time and only become suspect when patients seek medical care for cutaneous radiation syndrome or other unexplained symptoms or if the device is discovered by an observant individual who notices something out of place.

Once the presence of radiation is discovered or suspected, the responding agency should notify appropriate authorities, secure the scene, and establish incident command. Anyone responding to the scene should wear (if available) personal dosimeters and appropriate PPE and follow the guidance of the designated safety officer to ensure compliance with [Emergency Worker Exposure Guidelines](#). For radiation incidents, protective measures are founded on the following principles: (1) minimize exposure time to radiation sources or contamination; (2) use shielding where possible; and (3) maintain a safe distance from the source of contamination. [Radiation control zones](#) will need to be established near the scene.

For a small dispersal device affecting just a few individuals, the initial response may be handled by on-scene first responders performing any necessary decontamination, or through the coordinated response by hazmat, fire and rescue, EMS, and any receiving hospital (for victims requiring medical care). For events that affect a larger geographic area and/or large population of individuals, or for incidents in which the presence of radioactive material is not quickly recognized, first responders and victims may unknowingly spread contamination to secondary locations before the radiation event has been detected. Additional information for pre-hospital and hospital medical staff can be found at www.remm.nlm.gov/.

Radiation exposure incidents and events involving the food and water supply pose a unique challenge because the identification of potentially exposed persons may be difficult and require the collection of a large number of human/environmental samples for testing to determine the size and scope of the incident.

For most radiological incidents, law enforcement officials will be involved as they investigate the cause of the emergency. The local (and perhaps state, depending on the size of the incident) EOC may be activated or the response operation may be managed by incident command/unified command. We may serve as part of a unified command and/or the lead for ESF 8. Our Health Department Director should consider requesting any emergency health powers declarations as needed under local/state law.

In some radiological dispersal (contamination) events, there is the chance that individuals might not receive screening/decontamination at the scene of the incident. In this scenario, messages should be crafted to notify citizens of the event, provide instructions for self-care (e.g., at-home decontamination), and direct citizens to the most appropriate source/location for additional information, care, or follow-up. In general, citizens should be directed NOT to go to a medical facility so medical resources are available for those who are seriously injured. Careful messaging is also necessary for events involving radiation exposure devices— to alert people who may have unknowingly come into contact with the device. The LHD may take a lead role in developing these messages.

If a [CRC](#) is necessary, we will play a key role in coordinating the activities of the CRC and providing staff for the CRC. Individuals potentially affected by the radiation event should be instructed to report to the CRC in a prioritized fashion (based on proximity to the scene of the incident) to avoid overcrowding of the facility. CRCs allow for the screening of individuals for radioactive contamination and onsite decontamination and provide public health the opportunity to obtain demographic information for an exposure registry and to provide mental health services to those who may need them. With support and guidance from Kentucky Department for Public Health's Radiation Health Branch (<http://chfs.ky.gov/dph/radiation.htm>) we may have capabilities to perform internal contamination monitoring and to obtain samples (likely urine) for isotope identification and dose determination. As people exit the CRC, they will either be referred for additional care or discharged to their home, the home of a family member or friend, or to an emergency shelter.

While the long-term monitoring of health and the environment are not the focus of this document, pre-event recovery planning is necessary for an effective response. Recovery planning is primarily the responsibility of the state/local government, with federal assistance available upon request. For example, the CDC may be able to assist with long-term health monitoring of affected individuals. The EPA or NRC may assist with removal of radioactive debris and environmental clean-up. Refer to the [Nuclear/Radiological Incident Annex](#) of the NRF for additional information on recovery assistance.

VII. **Public Health Roles and Responsibilities**

The following section provides an overview of potential roles that we may be responsible for during a radiological emergency. Work with local office of emergency management and other response partners to clearly establish specific roles and responsibilities for radiation emergencies.

In general, public health can anticipate playing either the **primary** or **supporting** role in the following:

a. **Serve as Liaison/ESF 8 Lead to Local EOC**

- i. Ensure provision of health and medical services—Work with local area hospitals to establish “first receiver” facilities for radiation patients. Provide medical professionals with guidance on the [medical management](#) of patients affected by radiation as needed. Determine resource needs (e.g., staffing, [medical countermeasures](#)) and work through pre-established procedures to request additional resources from neighboring jurisdictions, the state, and/or the federal government (for Strategic National Stockpile, deployable medical teams, etc.). Mental health needs will be significant during and after a radiological event and we should work with existing partners (private providers, community services board, voluntary organizations active in disaster, etc.) to ensure access to [disaster mental health services](#) for the general public and the responder community.
- ii. Contribute to worker health and safety—Provide the safety officer with recommendations for protecting responder health and safety. This may include [establishing radiation control zones](#) around the scene of an incident, providing [PPE recommendations](#), and/or issuing guidance on the safe [handling of remains](#).
- iii. Ensure emergency shelters are safe—Generally, we are not the lead for shelter operations in our communities (which fall within the realm of ESF 6). However, public health may need to take actions to ensure the safety/health of individuals who are referred to an emergency shelter after a radiation incident. Potential actions may include performing [environmental health assessments at shelter sites](#), providing onsite health department staff to [monitor shelter residents for health issues](#) (including ARS), ensuring shelters are [accessible to persons with disabilities](#), and potentially monitoring for the presence of radioactive contamination.
- iv. Coordinate biological/environmental sampling—For the most effective medical management of patients, it is helpful to know what amount and type of radioactive material has affected the body (internally and externally). Monitoring for internal contamination or significant exposure to external radiation will require biological samples (likely urine) and specific [laboratory capabilities](#). Local/state laboratory capabilities for radiation emergencies are generally limited. Federal laboratories will be called upon to contribute their expertise and expand available lab capacity. We may be able to assist by [prioritizing specimens](#) (from those individuals thought to be at higher risk of exposure) and by assisting with specimen collection.

b. **Assist with Environmental Health Tasks**

i. Ensure the safety of food, water, and air—We may be asked to assist with the collection of environmental samples (water, soil and air) in the cold zone. Work with state/federal emergency response teams (such as our Environmental Strike Team, the [Advisory Team for Environment, Food, and Health](#)) to perform environmental radiological monitoring, sampling, and assessment activities for the response. Any monitoring and assessment activities should be integrated with the [Federal Radiological Monitoring and Assessment Center \(FRMAC\)](#).

c. **Conduct Population Monitoring**

i. Following a radiation emergency, we will play a crucial role in assessing and monitoring people potentially exposed to radiation or contaminated with radioactive material. This process is called population monitoring, and may be conducted in [CRCs](#). If our community plans to open CRCs, we may be able to provide staffing for these sites (LHD staff and/or [MRC volunteers](#)).

ii. Screening—The CDC does not recommend setting, in advance, a fixed screening criterion to be applied to all people for all incidents. At the time of an incident, work with the Kentucky Department for Public Health’s Radiation Health Branch (<http://chfs.ky.gov/dph/radiation.htm>) and the Federal Advisory Team for Environment, Food, and Health to assist with setting the screening criteria based on local circumstances. Refer to Appendix C and D of the [Population Monitoring Guide](#) for benchmark screening criteria for internal/external contamination. Once a screening criterion has been set, [handheld survey meters](#) or [portal monitors](#) will be used to survey potentially exposed individuals.

iii. Decontamination—Individuals who exceed the radiation level set by the screening criterion will be instructed to remove and bag clothing and other personal items, and either wash their upper body (hands/head for limited contamination) or shower with soap and water. While we are generally not the lead agency for decontamination, public health may provide staffing for these sites (BRDHD staff and/or [MRC volunteers](#)).

iv. Establish a registry—We should be prepared to establish a [registry](#) (list) of people who might have been exposed to radiation from the incident. The Kentucky Department for Public Health’s Radiation Health Branch, the CDC, and Agency for Toxic Substances and Disease Registry can assist with determining how much radiation people were exposed to and follow people for as long as necessary to see whether they develop health effects from their radiation exposure or from the stress of being involved in an incident.

v. Collection of samples—Federal resources may be able to assist in the collection and analysis of bioassays, but these resources will not be available in the early phase of a response. Local hospital/public health staff should be prepared to [collect samples](#) and [ensure delivery to a laboratory that can analyze the specimens](#).

vi. Counseling—Ensure that our health department has a mental health professional (or staff member/volunteer trained in [psychological first aid](#)) at each CRC. During the planning process, establish a contact list of credentialed individuals who can provide mental health assistance.

d. **Develop Health Messages**

i. Our PIO should work closely with other PIOs to develop appropriate health and safety messages for various populations (general public, first responders, clinicians, etc.). These messages can be prepared in advance of an emergency to allow for rapid insertion of event-specific information and distribution during an emergency. A variety of sample public messages and message maps are available and can be modified to suit our situation and community.

ii. Public Messaging

- a. [Instructions for Self-Decontamination](#)
- b. [Instructions for Pet Decontamination \(pg 112\)](#)
- c. [Message Template for the First Minutes for all Emergencies](#)
- b. [Extended and Short Messages](#)
- c. [Long and Short Radio Scripts](#)
- d. [Slates, B-roll, and Sound bites](#)

iii. CDC Radiation Fact Sheets

- a. [Sheltering in Place for Radiological Emergencies](#)
- b. [Evacuation in a Radiation Emergency](#)
- c. [Contamination versus Exposure](#)
- d. Countermeasure Fact Sheets
 - 1. [Potassium Iodide](#)
 - 2. [Prussian Blue](#)
 - 3. [DTPA](#)
 - 4. [Neupogen](#)

VIII. **Additional Resources**

- a. References and Resources
 - i. [NRC RDD/Dirty Bomb Backgrounder and FAQ document](#)
 - ii. [NRF Nuclear/Radiological Incident Annex](#)
 - iii. [HHS/ASPR Radiological Dispersal Device Playbook](#)
 - iv. [Community Reception Centers](#) – with posters, video, job action sheets, and customizable job aids for CRCs.
 - v. [Handbook for Responding To A Radiological Dispersal Device \(Dirty Bomb\) First Responder’s Guide](#)
 - vi. [Population Monitoring in Radiation Emergencies](#)
 - vii. [Planning Guidance for Response to a Nuclear Detonation](#)

- viii. [Disaster Mental Health: Assisting People Exposed to Radiation from New York State Department of Health](#)
- ix. [Accidental Radioactive Contamination of Human Food and Animal Feeds: Recommendations for State and Local Agencies](#)
- x. Clive M. Tan, Daniel J. Barnett, Adam J. Stolz, and Jonathan M. Links
[Radiological Incident Preparedness: Planning at the Local Level](#)
Disaster Medicine and Public Health Preparedness 2011 v. 5, p. S151-S158.
- b. NACCHO Advanced Practice Center (APC) Tools (<http://apc.naccho.org>)
 - i. [PPE, Decontamination, and Mass Triage: A Short Course](#)
 - ii. [PsychoSocial/Behavioral Response to Radiological and Nuclear Disasters](#)
 - iii. [Responding to Chemical and Radiological Disasters: A Self-Paced Training Course](#) and [Training Manual](#)
 - iv. [Crisis, Emergency, and Risk Communication \(CERC\) Toolkit](#)— radiation specific message maps and fact sheets
 - v. [Urban to Rural Evacuation Tool](#)
 - vi. [Designing, Implementing, and Evaluating a Public Health Exercise: A Dirty Bomb Disaster](#)
 - vii. [Master the Disaster!](#)
 - viii. [Planning and Implementing a Public Health Exercise for Radiological Events: An Exercise Guide](#)
- c. Radiation/Nuclear Response and Regulatory Contacts
 - i. Radiation Emergency Medical Management: www.remm.nlm.gov
 - ii. Department of Homeland Security: www.dhs.gov
 - iii. Department of Energy: www.energy.gov/
 - iv. Environmental Protection Agency: www.epa.gov
 - v. Nuclear Regulatory Commission: www.nrc.gov
 - vi. Federal Emergency Management Agency: www.fema.gov
 - vii. Conference of Radiation Control Program Directors: <http://www.crcpd.org/>
 - viii. Radiation Emergency Assistance Center/Training Site: <http://orise.orau.gov/reacts/>
 - ix. Federal Bureau of Investigation: www.fbi.gov
 - x. Centers for Disease Control and Prevention: <http://emergency.cdc.gov/radiation/>
 - xi. Transportation Security Administration: www.tsa.gov/public/
 - xii. National Nuclear Security Administration: www.nnsa.doe.gov/

IX. **Acknowledgments**

We utilized NACCHO’s Public Health Radiological Response Annex (Draft Planning Template) to prepare this plan.