Standardized Awareness Authorized Training, Train-the-Trainer

Radiological Material and Nuclear Weapons

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Objectives

- **Describe radioactive materials, exposure, contamination, and the physiological signs and symptoms of radiation exposure.**
- **Discuss radiation exposure devices, Radiological Dispersal Devices (RDD), and radiopharmaceuticals.**
- **Differentiate between a nuclear weapons detonation and a conventional explosion.**
- **Discuss the advantages and disadvantages of using radiological materials and nuclear weapons in terrorist activity.**

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Objectives (continued)

- Describe potential sources in the community where radiological materials are manufactured, transported, stored, used, or disposed.
- Discuss the principles of recognition, identification, and classification as they apply to radiological incidents.
- List the indicators of a possible criminal/terrorist act involving radiological materials.
- Discuss instructional strategies for facilitating the "Radiological Materials and Nuclear Weapons" module.

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Definitions

- Atom
- Radioactive
  - Alpha particles; limited penetrating power, can be stopped by clothing.
  - Beta particles
  - Gamma rays; can travel hundreds of meters & penetrate clothing.
  - Neutrons

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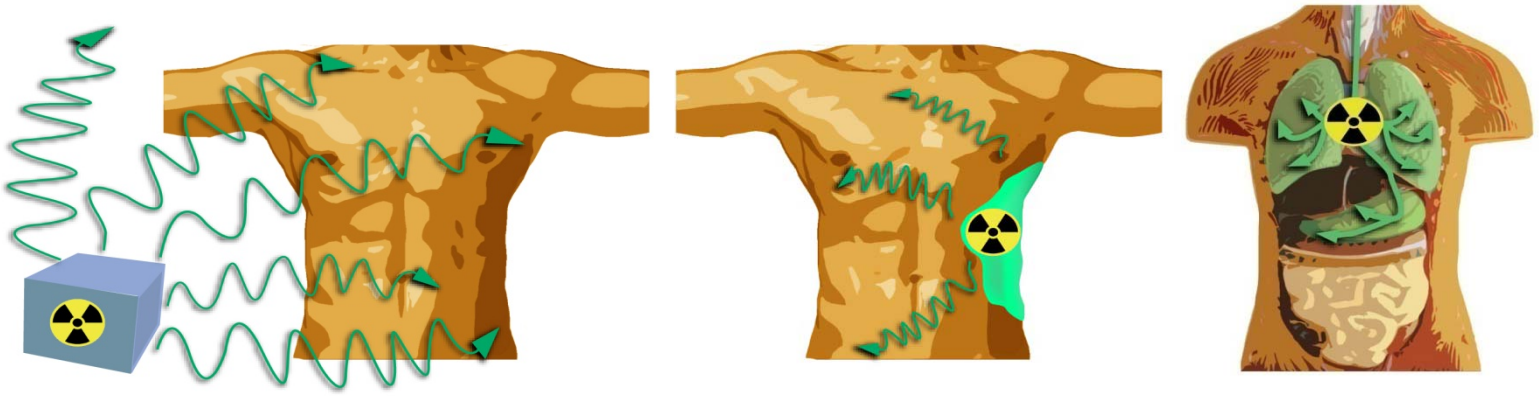
Exposure Versus Contamination



External Exposure | **External Contamination** | **Internal Contamination**

External Exposure occurs when radiological material is physically attached to a person's skin and or hair

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Physiological Signs and Symptoms of Exposure

Courtesy of EPA Region 9 Emergency Response Section Introduction to Ionizing Radiation for First Responders 10/01/07

- **Acute Radiation Syndrome (ARS)**
  - **Nausea**
  - **Vomiting**
  - **Diarrhea**
- **Radiation burns**

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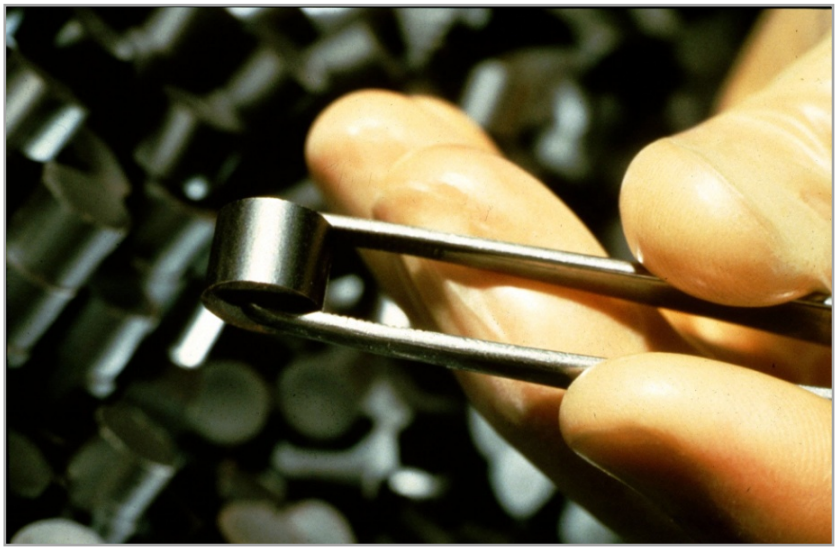
Radiation Exposure Device



Courtesy of NRC

- **Radioactive source placed in public place**
- **Use large doses of radiation to injure or kill**

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Radiological Dispersal Device

- **“Dirty bomb”**
- **Conventional explosive or bomb containing radioactive material**
- **Spreads radioactive contamination**
- **Any type of radioactive material is used**
- **Dispersed by explosives or other means**
- **Higher probability of use than nuclear weapon**

Most likely to be used by a terrorist in a WMD incident

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Radiopharmaceuticals

Courtesy of EPA Region 9 Emergency Response Section Introduction to Ionizing Radiation for First Responders 10/01/07

- **Administered to patients for medical testing and treatment**
- **Kept in small vials**
- **Transported, stored, and administered in liquid form**

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Nuclear Weapons

- Low probability of use
- Size may be larger than conventional explosions
- Produce devastating effects
- Can be carried by one person
- May not have mushroom-shaped cloud

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Advantages of Using Radiological Materials for Terrorist Activity

- Prevalent commercial use of radiological material
- Psychological and economic impact
- Contamination area control
- Lethal effects
- Unpreparedness of most jurisdictions

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Disadvantages of Using Radiological Materials for Terrorist Activity

- Heavy containers
- Delayed effects
- Hazardous to terrorist
- Requires numerous difficult steps
- Possibly expensive

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Potential Sources of Radioactive Material

Courtesy of EPA Region 9 Emergency Response Section Introduction to Ionizing Radiation for First Responders 10/01/07

- **Hospitals and cancer treatment facilities**
- **Government agencies**
- **Industrial and construction sites**
- **Nuclear power plants**
- **In transit**

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Radioactive Materials Labels

- White-I
- Yellow-II
- Yellow-III; highest level of radiation

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Radioactive Materials Containers

- **Excepted Package**
- **Industrial Package**
- **Type A Package; transports small quantities of radioactive material & not designed to withstand forces of accidents.**
- **Type B Package**
- **Fixed-facility signage**

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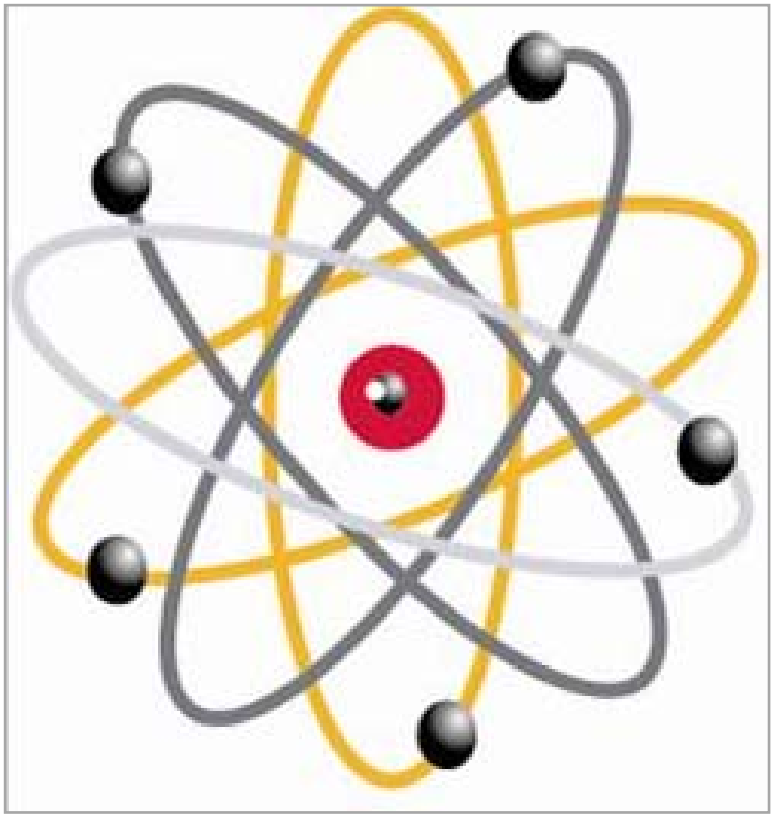
Protection from Radiation



Courtesy of CDP

- **Time**
- **Distance**
- **Shielding**

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Indicators of a Possible Radiological Incident

- Containers may display a radiation symbol
- Unusual metal debris
- Material that is hot or seems to emit heat
- Glowing materials
- Unusual numbers of sick or dying people or animals

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Questions for Presentation Preparation

- How will you explain the importance of learning this module to your participants?
- What do participants need to learn from this module content?
- What additional resources can be used to reinforce learning the content in this module?
- How will you involve the audience in learning this material?
- What safety concerns need to be reinforced in this module?

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Conclusion

- What do the terms radiation, radioactive materials, exposure, contamination, and the physiological signs and symptoms of radiation exposure mean?
- What are radiation exposure devices, RDD, and radiopharmaceuticals?
- What is the difference between a nuclear weapons detonation and a conventional explosion?
- What are the advantages and disadvantages of using radiological materials and nuclear weapons in terrorist activity?

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Conclusion (continued)

- **How do you identify potential sources in the community where radiological materials are manufactured, transported, stored, used, or disposed?**
- **How do the principles of recognition, identification, and classification apply to radiological incidents?**
- **What are some indicators of a possible criminal/terrorist act involving radiological materials?**
- **What are some potential instructional strategies you could use for facilitating the "Radiological Material and Nuclear Weapons " module?**

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Radiological Material and Nuclear Weapons—End of Module

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