Radiation Safety in an Emergency Response

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Exposure and Contamination

- Exposure
- Contamination
  - Internal
  - External

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Exposure Units

For emergency responders
– 1 Roentgen = 1 rem = 1 rad
  (for Gamma and X-rays)
– 1 milliRoentgen = 1 millirad = 1mR

• rem (roentgen equivalent man)
• Roentgen
• Rad (radiation absorbed dose)
Contamination

- Radioactive dirt
- External contamination
- Internal contamination
Whole Body Contamination
Inhalation and Ingestion
Shrapnel Contamination

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Scenarios

• Radiological Dispersion Device
• Radiological Exposure Device
• Improvised Nuclear Weapon
Radiological Dispersion Device
aka Dirty Bomb

- Explosion/Blast
  - Leading cause of casualties
- Airborne radiological contamination
- Radioactive shrapnel
  - Rare
  - Easily detectible
Possible Fragments

Radiological Exposure Device

- Easy to visually conceal
- Detection
  - Device
  - Source
- Exposure rate and dose
- No contamination

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Improvised Nuclear Weapon

- Very difficult to produce
- Highly destructive
- Likely to be used against a high value target
Protection

• As Low As Reasonably Achievable
• Personal Protective Equipment
• Facility Contamination Control
• Administrative Dose Limits
• Dosimetry
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ALARA

• Time
• Distance
• Shielding
PPE

- Treat public as contaminated
- Swap PPE regularly
- Gloves and booties are a minimum
  - Other barriers may be implemented as needed
Facility Contamination Control

• Conducting area surveys of facility to identify and remove contamination

• Control foot traffic and use floor plan efficiently
  – Trash removal
  – Signs
  – Runners
Administrative Limits

• Dose
  – Call in: 500mR (0.5R)
  – Turn back: 1000mR (1R)

• Exposure Rate
  – Call in: 1R/hr
  – Turn back: 5R/hr
Dosimetry

- Types of dosimetry
- How dosimetry will be used in response operations
- Tracking dose of responders

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How to Use a Direct Read

- Inspect
- Charge
- Read
- Record
- Recharge

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Charge the dosimeter

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Read the dosimeter

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Dose Card

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### Dose card

**DOSIMETRY**

All dosimetry should be worn on the outside of clothing between the waist and shoulders.

**TO READ:**
Hold up to light (clip end towards eye), look through lens.

Read dosimeter and record position of hairline every hour, unless otherwise directed by the Radiological Officer.

**PERMANENT RECORD DOSIMETER**
This badge will provide an accurate and permanent record of any exposure. Wear it at all times, between your waist and shoulders, during your assignment.

Turn in your dosimeters and individual dose record card to your supervisor at the end of your assignment.

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**TIME / DISTANCE / SHIELDING**

- Alpha
- Beta
- Gamma

The dosimeter(s) you have been issued will enable you to record your exposure to radiation. It is important that you wear your dosimetry at all times during the radiological incident and read and record measurements at least once an hour or as instructed.

Be careful not to bump or drop any direct reading dosimeter as this may cause a false reading. If such an accident occurs, read your dosimeter immediately and report any change to your supervisor.

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What is RAM

• RadioActive Material

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Well Logging

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Radiography Camera and Source

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Soil Density Gauge

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Medical Sources

- Therapy Sources
- Gamma Knife
- Blood Irradiators
- Moly Generators
- Xray Devices
House Hold Sources

- Lantern
- Fiesta
- Glass
- Tile
- Smoke detector

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