OPERATIONS AT THE INCIDENT SITE

WORKER HEALTH & SAFETY

for

Radiological Emergencies

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ACTIONS AT THE SCENE

1. Establish incident command
   - If radiation detected or suspected:
     - Follow established protocols
   - If radiation not detected:
     - Establish incident command

2. Radiation detected or suspected
   - Control scene
     - Establish “safe area”
   - Rescue injured
   - Contact Local/State Radiation Control Program

3. If feasible, record contact information of uninjured victims at the scene
   - Start triage and rapid treatment

4. Offer on-site monitoring and decontamination or release and issue procedure for home decontamination
   - Life threatening
     - Treat without regard for contamination
   - Contaminated
     - Decontaminate
   - Register and release for medical treatment

   - Local/State Radiation Control Program should act as Radiation Safety Officer, as adjunct to the IC as defined by NIMS
   - Measure radiation levels (alpha, beta, gamma, neutrons)
   - Set up and verify radiation boundaries
   - Verify/redefine contaminated area
   - Establish administrative dose guidance and dosimetry
   - Identify radioisotopes
   - Assist in monitoring and decontamination of noninjured victims (including first responders)
   - Provide support to medical personnel
   - Provide support to Public Information Officer
SETTING RADIATION ZONES

• Use a survey meter to determine boundaries of radiation zones.

• Contamination may not be uniformly distributed
  – zones may have irregular shapes
  – there may be hot spots (areas of elevated radioactivity) within the zones
RADIATION ZONES

• You may have more or fewer “zones” depending on the size of the incident.

• You may use different values for zone boundaries depending on the size of the incident.

• For transportation accidents, there are usually just 2 zones...hot and cold...and the boundary is set at 2 mR/hr.
RADIATION ZONES

• If radiation detection instrumentation is not available:
  – Establish an initial evacuation zone with a 500m radius (1650 feet, 2.5 city blocks)
  – Limit activities within this area to lifesaving and critical property mitigation activities
  – Contact state/local radiation control program to assess radiation levels and establish zone boundaries
RADIATION ZONES

• Decision points
  – define activities
  – define stay times
  – prioritize activities
## ZONE ACTIVITIES

### INCIDENT ZONES AND SUGGESTED ACTIVITIES FOR EACH ZONE DURING THE FIRST 12 HOURS

<table>
<thead>
<tr>
<th>Boundary mR/hr</th>
<th>Incident Zones mR/hr</th>
<th>Activities</th>
<th>Total Stay Time*</th>
</tr>
</thead>
<tbody>
<tr>
<td>Background</td>
<td>Uncontrolled</td>
<td>No restrictions. Best location for Incident Command and decontamination activities.</td>
<td>Unlimited</td>
</tr>
<tr>
<td>&lt;10</td>
<td>Low-Radiation Zone &lt;10-100</td>
<td>If feasible, restrict access to essential personnel. Initial decontamination of responders should occur near outer boundary. Uninjured personnel can be directed home to shower if contamination surveying at the scene is not feasible.</td>
<td>Full 12 hours</td>
</tr>
<tr>
<td>100</td>
<td>Medium-Radiation Zone 100-1000</td>
<td>Only authorized personnel. Personal dosimetry should be worn. Buffer zone/transition area between the High and Low radiation zones. Survey people for contamination before releasing.</td>
<td>5 - 12 hours (12 hours for critical property and life saving)</td>
</tr>
<tr>
<td>1000</td>
<td>High-Radiation Zone 1000-&lt;10,000</td>
<td>Only authorized personnel with specific critical tasks such as fire fighting, medical assistance, rescue, extrication, and other time sensitive activities. Personal dosimetry should be worn. Survey people for contamination before releasing.</td>
<td>30 minutes - 5 hours</td>
</tr>
<tr>
<td>10,000</td>
<td>Extreme Caution Zone &gt;10,000</td>
<td>Located within the High radiation zone. Restricted to the most critical activities, such as lifesaving. Personal dosimetry required (one monitor for several responders is acceptable). Limit time spent in this area to avoid Acute Radiation Sickness. Survey people for contamination before releasing.</td>
<td>Minutes to a few hours</td>
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</tbody>
</table>

*Total Stay Time is calculated by dividing total allowed dose by exposure rate. For example, if total allowed dose for lifesaving is 50,000 mRem, Total Stay Time in a 200,000 mRem/hr field is 15 minutes.*
RADIATION EXPOSURE

- External
- Internal
  - inhaled (breathing)
  - ingested (eating)
  - absorbed through skin
PERSONAL PROTECTIVE EQUIPMENT (PPE)

- Turn-out gear or other heavy clothing protects from ☢️ and ☢️ radiation
- Use time, distance, shielding to reduce ☢️ dose.
- If airborne radioactive material is suspected a respirator should be worn.
PERSONAL PROTECTIVE EQUIPMENT (PPE)

- Minimum PPE for contamination control is gloves and booties

- Universal precautions should be used in any situation where the presence of radioactive materials is suspected to help prevent the spread of contamination from injured victims to emergency personnel
EXPOSURE CONTROL, SURVEILLANCE & TRACKING

- Dosimetry
- Dose Limits
- Alarm Set Points
- Turn Back Values
- Stay Times
- Contamination Control
EXPOSURE TRACKING

• The best way to track radiation doses is to use dosimetry.

• If dosimetry is not available, doses can be reconstructed based on time spent in the various radiation zones.
PERSONAL DOSIMETERS

• Designed to measure the radiation dose an individual receives

• These are all examples of “direct-read” instruments that let you know your radiation dose right away.

• Electronic (pager) dosimeters are often used by law enforcement and other emergency responders as radiation detectors for interdiction programs.
PERSONAL DOSIMETERS (RADIATION BADGES)

All of these types of personal dosimeters must be returned to the vendor to be “read” in order to find out an individual's radiation dose.
GROUP RADIATION EXPOSURE RECORD

LOCATION: ______________________________________________________ DATE: _________

REMARKS: __________________________________________

<table>
<thead>
<tr>
<th>Name</th>
<th>Agency</th>
<th>Dosimeter Serial Number</th>
<th>Radiation Badge Serial Number</th>
<th>Initial Reading</th>
<th>Final Reading</th>
<th>Exposure (R or mR)</th>
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