

# Radiological Material Security in Large Panoramic Irradiators

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Global  
Material  
Security



**ORS**  
Office of Radiological Security  
*Protect · Remove · Reduce*

- Large panoramic irradiators (LPI) are widely used to sterilize medical supplies, food products, spices, cosmetics, and other consumable goods
- Approximately 50 commercial irradiators are in operation in the United States and over 200 are in operation worldwide
- Review security concepts implemented by US DOE/ORS at LPI facilities

# Radioactive Sources of Concern

- Each irradiator has millions of curies of Co-60
- Source material is an interest to terrorist and criminal organizations
- Radiological Dispersal Device (RDD) or Radiological Exposure Device (RED)
- The dispersal could be confined to a small area intended to expose a specific population or could be widespread intended to contaminate a large area

# Security Overview

- The LPI security system should have a high probability of detecting an attempted attack and delay the removal of the source material
- Minimize disruption to operations at the facility
- Detection, Delay, and Response
- Continuous and Balanced Protection
- Layers of Protection

- Discovery of an adversary's action
- Typically accomplished by stimulating a sensor
- Effective detection also includes alarm assessment
  - Video assessment vs
  - Human detection and assessment
- True alarm, False alarm, Nuisance alarm

# Delay

- Delay is intended to slow the adversary along the path to the intended target or at the target
- Delay elements must be placed after detection
- Access Control
  - Security element that controls which persons have access to a room or space
  - Access control systems can also be used to deactivate, or shunt, a detection element

# Response

- Response is the human element that is used to interrupt and stop an adversary's actions
- A good response requires an appropriate number of responders with appropriate weapons to stop an adversary
- Not covered because of the special intricacies associated with jurisdictional authority and localized tactical procedures

# Continuous and Balanced Protection

- All elements of the security system being equally difficult to defeat with no gaps in coverage
- Detection is consistent with no gaps in detection, and delay is the same no matter how an adversary enters an area
- No alternative means of entry that provide an adversary any advantage



# Layers of Protection

- Also referred to as protection-in-depth
  - Multiple levels of continuous and balanced security elements in an adversary's path to a target or attack goal
- Each layer may not be equal, and the effectiveness may be quite different, but in general the layers should be more difficult to defeat or avoid closer to the target
- Access through each layer should be granted only to individuals who have legitimate work-related activities in that specific area
- The security system should isolate the source from the other areas of the facility, and the security system of the facility should isolate it from the general public

# LPI Security Concepts and Lessons Learned

- Intrusion Detection and Assessment
  - Balanced Magnetic Switches (BMS) on doors
  - Motion sensor to cover surfaces, including door
  - Duress buttons/switches located where facility personnel are located
  - Focus should be on detection at the outer layers and delay closer to the target area
  - Detection sensors within the source containment should only be activated when the source rack is in the down position or when no personnel are present on site

# LPI Security Concepts and Lessons Learned (con't)

- Pressure pads, independent of the safety system, should be positioned inside the source containment boundary entrances
- Fixed assessment cameras should be located to assess the situation of an alarm generated by any sensor (duress PIN, BMS, motion sensor, duress button, or pressure pad)
- Assessment cameras should be located outside the high radiation areas in the source containment boundary
- Radiation sensors, for detecting the removal of source material from the source containment, should be installed near the exit points of the source containment boundary

# LPI Security Concepts and Lessons Learned (con't)

- Delay, Structural Elements, and Access Control
  - Two-factor access control should be implemented on the control room door
  - Two-person / two-factor access control should be implemented on the source containment boundary door(s)
  - Openings greater than 96 in<sup>2</sup> in the control room and source containment boundary should be covered with grates or expanded metal mesh.

# LPI Security Concepts and Lessons Learned (con't)

- A cage to house the source removal tools should be constructed
- A cost effective option to designing and manufacturing a cage is to use a commercial vault/safe
- If practical, all IT infrastructure should be collocated and positioned in a space that is already protected.
- Alarms should be monitored and assessed on-site or off-site 24-hours/day, 7-days a week

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