Radiation Portal Monitor Program

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U.S. Customs and Border Protection
Background

- Customs and Border Protection (CBP), with the US Coast Guard, are the primary agencies responsible for protecting the Nation’s borders.
- CBP is enhancing its capabilities to interdict the illicit import of radiological materials and devices.
- CBP will screen ALL arriving cars, containers, trucks, mail bags, and express consignment packages with handheld radiation isotope identifiers, personal radiation detectors, portable radiation detectors, and radiation portal monitors.
Background Continued

- Customs and Border Protection (CBP), Department of Energy, and the Pacific Northwest National Laboratory (PNNL), have teamed to design, procure and install detection systems to enhance CBP’s existing detection capabilities.

- PNNL is providing scientific and technical support to enable rapid deployment of radiation detection technology at U. S. ports of entry.
Requirement is 100% Screening

317 Ports of Entry representing
621 border sites to protect

333,000 vehicles/day
57,000 trucks/containers/day
2,500 aircraft/day
600 vessels/day
CBP Program for Monitoring Radioactive Materials

- **Objective:** Prevent the illicit import of nuclear and radiological materials into the Port
- **Need:** Protect high-risk locations and large economically important operations
- **Strategy:** Screen all imported containerized cargo with highly sensitive gamma and neutron detectors called Radiation Portal Monitors (RPMs)
RPM Deployment Priorities

Phase I – Mail Facilities & Express Consignment Facilities
Phase II – Major Northern Border Metro Areas & Crossings
Phase III – Major Seaports on East, West, and Gulf Coasts
Phase IV – All Southwest Border Crossings
Phase V – Air Cargo Environment
Phase VI – All Other Crossings & Rail Crossings
Phase VII – Reconfigured ports of entry/terminals

*Italics: Complete*
The Approach

- Deploy RPM systems based on CBP priorities
- Provide fully operational interdiction systems and site-specific standard operating procedures (SOPs)

Deployment steps include:
- Site survey
- Design
- Construction of infrastructure
- Installation of RPM systems
- Commissioning/Training
- Turnover for operation
- Data monitoring and reporting
Many Legitimate Transports

- Radioactive material is transported every day by highway, rail, air, and water
- Radiation alarms do not automatically imply either a hazard or a violation
Innocent Materials Causing Alarms (NORM)

- Abrasives
- Building materials
- Fertilizer
- Granite slabs
- Kitty litter
- Medical
- Mineral fiber
- Nuclear fuel
- Pottery
- Scouring pads
- Toilet bowls
- Aircraft parts

Alarm rates depend on commodities and vary terminal by terminal.

Naturally Occurring Radioactive Materials (NORM)
The Challenge

- Deploy detection systems as rapidly as possible
- Develop conceptual designs acceptable to all stakeholders with respect to screening requirements, flow of commerce, safety, and staffing
  - Terminal operators (including parent company)
  - Port authorities
  - Local CBP field office/CBP-HQ
  - PNNL
- Minimize number of conceptual design iterations, scope changes due to terminal reconfigurations, and/or screening requirements
- Continue to provide screening as terminals reconfigure
- Deploy validated new technologies to improve detection levels, reduce NORM alarms, minimize staffing requirements, and enhance resolution of alarms
RPM System Description

- **Performance Objectives**
  - Deploy harmless, passive systems to detect radiation
  - Detect small quantities of fissile or radioactive materials
  - Perform scan on moving vehicles (~5 mph)
  - Employ visual identification systems as required

- **Monitoring Principles**
  - Detect, confirm, isolate, resolve

- **Configuration**
  - Primary and secondary RPMs to reduce impact on commerce
  - Other portable isotope identification devices

- **Components**
  - Detectors, remote alarm boxes, servers/computers, networked communication system, video systems, etc.
Seaport RPM Operations Overview

CBP Booth - Houses CBP Officers, RPM equipment

Secondary RPM
- Confirmation of alarm
- Alarm resolution

Primary RPMs
- “Pass/Fail”
Interdiction Strategy and Challenges

- Primary responders: CBP or authorized law enforcement
- Provide local infrastructure for
  - RPM monitoring
  - Response to alarms
  - Conducting CBP activities
- Traffic lights and/or intercoms used to
  - Clear or retain vehicles
  - Provide safe interdiction environment
  - Rapidly clear lanes
- New approaches being deployed to reduce impact of NORM
Deployment Strategy

- Safety/productivity concerns eliminate dockside deployments
  - Limits real-time screening
- Spreader-bar technology not ready for deployment
- Relocatable or fixed RPMs deployed
  - Prior to exit gates
  - Rail access points
  - Monitoring points between TIR and exit gates
- Mobile RPMs for low volume terminals, targeted cargo
- Under development
  - Rail portal for straddle carrier terminal-based operations
Deployment Strategy Continued

- Stakeholder input critical to viable and robust design
- Conceptual design key activity for stakeholder input
  - Traffic studies, traffic modeling, and turning radius evaluations can be used to support conceptual designs
- Integrate with terminal/port configurations where possible to reduce costs and disruption
- Use operational experience to refine designs (e.g., interdiction strategy)
Deployment Models

- CBP funds PNNL for deployment
- PNNL contracts with port authority, terminal operator, or construction management firm for
  - Final design
  - Infrastructure installation
  - Construction management oversight
- Port authority assures compliance with port requirements (e.g., reviews, permits, etc.)
- Terminal operator determines laydown areas, site access, work hours

Example Contracting Flow
Deployment Options - Fixed RPM

- Concrete foundation and bullnose
- Limited to “permanent” gates (e.g., port exit, OCR lanes)
Deployment Options - Relocatable RPM

- Addresses dynamic nature of terminal operations
- K-rails and bollards for protection
- No concrete work required
Deployment Options - Mobile RPM

- Operates in stationary (portal) or mobile (scanning) modes
- Provides early screening of targeted containers
  - Increased efficiency
  - Increased sensitivity
- Ideal for low volume terminals; temporary screening requirements
Mobile RPM for Rail Screening

- Containers loaded by RTGs
- Containers may approach RTG from both directions
- Trains are configured by RTGs traversing the length of the train
- mRPMs repositioned as necessary

Example of mRPM Staging Area
Deployment Options - Remotely Operated RPM

Exit Gate or Rail Access

Wired or Encrypted Wireless Transmission
Remotely Operated RPM Continued

“Proceed to Secondary Area”
Remotely Operated RPM Continued

- VIS Image
- OCR Processing
- Validation
- Release
- Container Loading
- Train Consist
Deployment Options
Under Development – Rail Portal
Deployment Summary

- RPM systems have been deployed at 14 terminals
- 18 terminals in construction phase
- 27 terminals in final design
- Alarm rates vary by order of magnitude based on commodities
  - ~1 in 100 to 1 in several thousand
- No impact on flow of commerce observed
Summary

- Commissioner Bonner has committed CBP to rapidly deploy radiation portal monitors as part of a layered defense
  - Operating RPMs at all port terminals
  - Networked, integrated RPM monitoring capability
  - Site-specific SOPs
  - Operators and response personnel training
  - Post-turnover support

- Operator and port authority input and participation is critical to successful deployments on time and within budget

- Current experience to date demonstrates installation and operation can occur without impact to commerce