



## **Radiation Detection, Response & Recovery**

### Office of the Second Line of Defense

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## Second Line of Defense (SLD)

**MISSION:** Strengthen the capabilities of partner countries to **deter**, **detect**, and **interdict** illicit trafficking of special nuclear and other radioactive materials at international border crossings including airports, seaports, and other points of entry/exit

**STRATEGY:** Develop cooperative efforts to mitigate the risk of illicit trafficking through:

- Search, detection, and identification of nuclear and other radioactive materials
- Development of response procedures and capabilities
- Deterrence of future trafficking in illicit nuclear and nuclear-related materials



**GOAL:** Deliver an effective and sustainable global capability to **deter**, **detect**, and **interdict** illicit trafficking in special nuclear and other radioactive materials.



# SLD: Two Primary Programs

## Second Line of Defense

### Core Program

- Equip more than 450 points of entry: airports, border crossings, and small feeder seaports
- Bolster detection capabilities of foreign border officials or affiliated agencies
- Partner with international or multilateral organizations
  - International Atomic Energy Agency (IAEA)
  - European Union

### Megaports Initiative

- Equip 100 international seaports
- Bolster detection capabilities of foreign customs officials and port authorities
- Partner with other U.S. federal agencies
  - CBP/ICE: Container Security Initiative (CSI)
  - CBP: Secure Freight Initiative (SFI)
  - DHS: ASP deployment



## SLD Accomplishments through FY08

**SLD Core Program:** Installed over 950 radiation portal monitors and/or provided handheld equipment at 213 sites in 13 countries.

- Installed at 38 Airports, 97 Border Crossings, 11 Post Offices, 60 Seaports, 6 Training Academies, and 1 Pedestrian Crossing
- Installations ongoing in 16 countries

**SLD Megaports Initiative:** Installed over 150 radiation portal monitors, straddle carriers, spectroscopic portal monitors, and handheld equipment in 18 countries.

- Installed at 19 Megaports
- Installations ongoing at 25 additional Megaports



# SLD Core Program Progress

## Program Goal:

- Equip approximately 450 sites at borders, airports, and strategic feeder ports in approximately 30 countries

## Agreements signed:

- Russia, Armenia, Azerbaijan, Bulgaria, Estonia, Georgia, Greece, Israel, Kazakhstan, Kyrgyzstan, Latvia, Mexico, Mongolia, Poland, Romania, Slovenia, Slovakia, Ukraine

## Finalizing agreements and various stages of engagement :

- Turkey, Lithuania, Pakistan, Hungary, Malta, Cyprus, Turkmenistan

## Engaged with countries to upgrade older USG installed equipment:

- Lithuania, Cyprus, Malta, Bulgaria, Turkmenistan, and Turkey

**SLD also maintains USG installed equipment in Uzbekistan**



*Airport in Greece*



*Vehicle Crossing in Slovenia*



# Megaports Progress to Date

- ◆ *Equipment installed and tested*
- ◆ *Host nation operating equipment and responding to alarms*

## Operational Megaports (19)

- |                                       |   |
|---------------------------------------|---|
| <b>Bahamas</b> (Freeport)             | <b>*Pakistan</b> (Qasim) – SFI Pilot    |
| <b>Belgium</b> (Antwerp)              | <b>Panama</b> (Balboa, MIT)             |
| <b>Colombia</b> (Cartagena)           | <b>Philippines</b> (Manila)             |
| <b>Dominican Republic</b> (Caucedo)   | <b>Spain</b> (Algeciras)                |
| <b>Greece</b> (Piraeus)               | <b>Singapore</b> (Singapore) – Pilot    |
| <b>*Honduras</b> (Cortes) – SFI Pilot | <b>*South Korea</b> (Pusan) – SFI Pilot |
| <b>Israel</b> (Haifa) – Pilot         | <b>Sri Lanka</b> (Colombo)              |
| <b>Netherlands</b> (Rotterdam)        | <b>Thailand</b> (Laem Chabang)          |
| <b>*Oman</b> (Salalah) – SFI Pilot    | <b>*U.K.</b> (Southampton) – SFI Pilot  |

- ◆ *Agreement signed*
- ◆ *Design and construction underway*

## Implementation Phase (24)

- |                                 |   |
|---------------------------------|---|
| <b>Bangladesh</b> (Chittagong)  | <b>Jordan</b> (Aqaba)   |
| <b>Belgium</b> (Zeebrugge)      | <b>Lebanon</b> (Beirut)   |
| <b>China</b> (Shanghai)         | <b>Malaysia</b> (Klang & TJP)                                   |
| <b>*China</b> (Hong Kong) – SFI | <b>Mexico</b> (Veracruz, Manzanillo, Altamira, Lazaro Cardenas) |
| <b>Djibouti</b> (Djibouti)      | <b>Panama</b> (Colon & Cristobal)                               |
| <b>Dubai, UAE</b> (Jebel Ali)   | <b>Portugal</b> (Lisbon)  |
| <b>Egypt</b> (Alexandria)       | <b>Spain</b> (Valencia & Barcelona)                             |
| <b>Israel</b> (Ashdod)          | <b>Taiwan</b> (Kaohsiung & Keelung)                             |
| <b>Jamaica</b> (Kingston)       |   |

## MOU Signature Pending (1)

**Kenya** (Mombasa)

## Special Projects & Collaboration (2)

**Japan** (Yokohama)    **Qatar** (Training Center)

**Over 25 other major international seaports in several locations under negotiation**

**Goal:** Over 100 Megaports, scanning over 50% of global shipping traffic by 2013



# Reach and Impact of SLD Installations



SLD scans a variety of types of traffic at borders and seaports around the world





# Types of SLD Installations



← Pedestrian Monitor



Rail Monitor →



→ Vehicle Monitors ←







# SLD Monitoring in Action



**Vehicle Monitors**



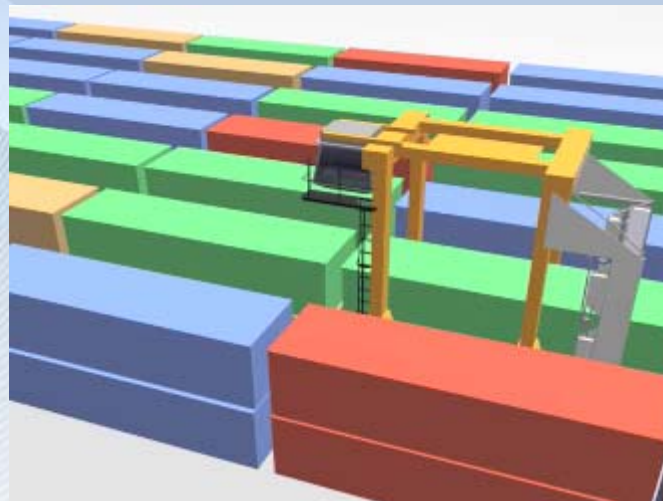
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**Rail Monitors**



**Secondary Inspection**



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**Border Crossings,  
Seaports, and  
Airports**





# SLD Provided Equipment

## Fixed Locations

- Vehicle monitors
- Pedestrian monitors
- Rail monitors
- Spectral monitors
- OCR/LPR
- Fixed Focus Cameras



## Non-Fixed Locations

- Straddle carriers (Megaports)
- Mobile Detection Systems (Megaports)
- Van-mounted monitors (Core Program)



## Handheld Equipment

- Personal Radiation Pagers (PRDs)
- Radioisotopic Identifiers (RIIDs)
- Radiation Survey Meters
- Highly Sensitive Germanium Identifiers



TSA Survey Meter



Thermo  
IdentifINDER



Germanium  
Based  
ORTEC  
Detective



# Types of Detections

- ◆ Naturally Occurring Radioactive Materials (NORM) or Legitimate Radioactive Sources
- ◆ Orphan radioactive sources in scrap metal
- ◆ Contaminated materials



Banana Crates



Cs-137 Source in  
Shielding



Co-60 Contaminated Stainless  
Steel



# SLD Detections: Orphan Sources



**AmBe Source**



**Co-60 Source**



**Cs-137 Source  
in Shielding**



**Cs-137 Source**



# SLD Detections: Contaminated Scrap



**Co-60 Contaminated  
Stainless Steel**



**Ra-226 Contaminated  
Scrap Metal**



# What is response?

- ◆ **Real detections of illicit nuclear or other radioactive materials require a response**
  - **Avoid reintroduction into global maritime system**
  - **Recover the material (if it is not contaminated bulk)**
  - **Confiscate and isolate the container (if it is contaminated bulk)**
- ◆ **Not all detections warrant an “emergency response”**
  - **Depends on a number of factors, including:**
    - **Type of material**
    - **Strength of source**
    - **Whether contamination is present**
    - **Whether it is a threat material**
    - **Whether it is a security risk and/or a health & safety issue**



# Source Recovery

- ◆ **For low-level radiological source detections (i.e., industrial sources in scrap metal containers), preferred method of disposition is recovery**
  - **Requires some technical expertise**
  - **Requires temporary storage at installation location and long-term disposition plan**
    - **Close intersection with other DOE/NNSA programs**
- ◆ **High activity radioactive sources may require health physics coverage and technical experts to recover**
  - **IAEA technical assistance**



# Source Recovery Equipment

- ◆ **SLD may donate specialized source recovery equipment to host nations, as requested**
  - **Calibrated dose rate meter**
    - To accurately measure exposure rates
  - **Contamination survey instruments**
    - To detect presence of fixed or loose surface contamination
    - (i.e., breached source)



E 600 Multipurpose  
Survey Meter



HP-270 Beta/Gamma  
Survey Meter



HP-380 AB270 Alpha/Beta  
Gamma Survey Meter



43-10-1 Alpha/Beta  
Sample Counter Kit





# Source Recovery Training

- ◆ **Based on idea that low-level radiological sources can be recovered by host nation with proper training and equipment**
- ◆ **Geared toward orphan sources in scrap metal**
- ◆ **Builds off of existing IAEA guidelines on source recovery**
  - **Focused on health and safety of the recovery team and security of source once recovered**

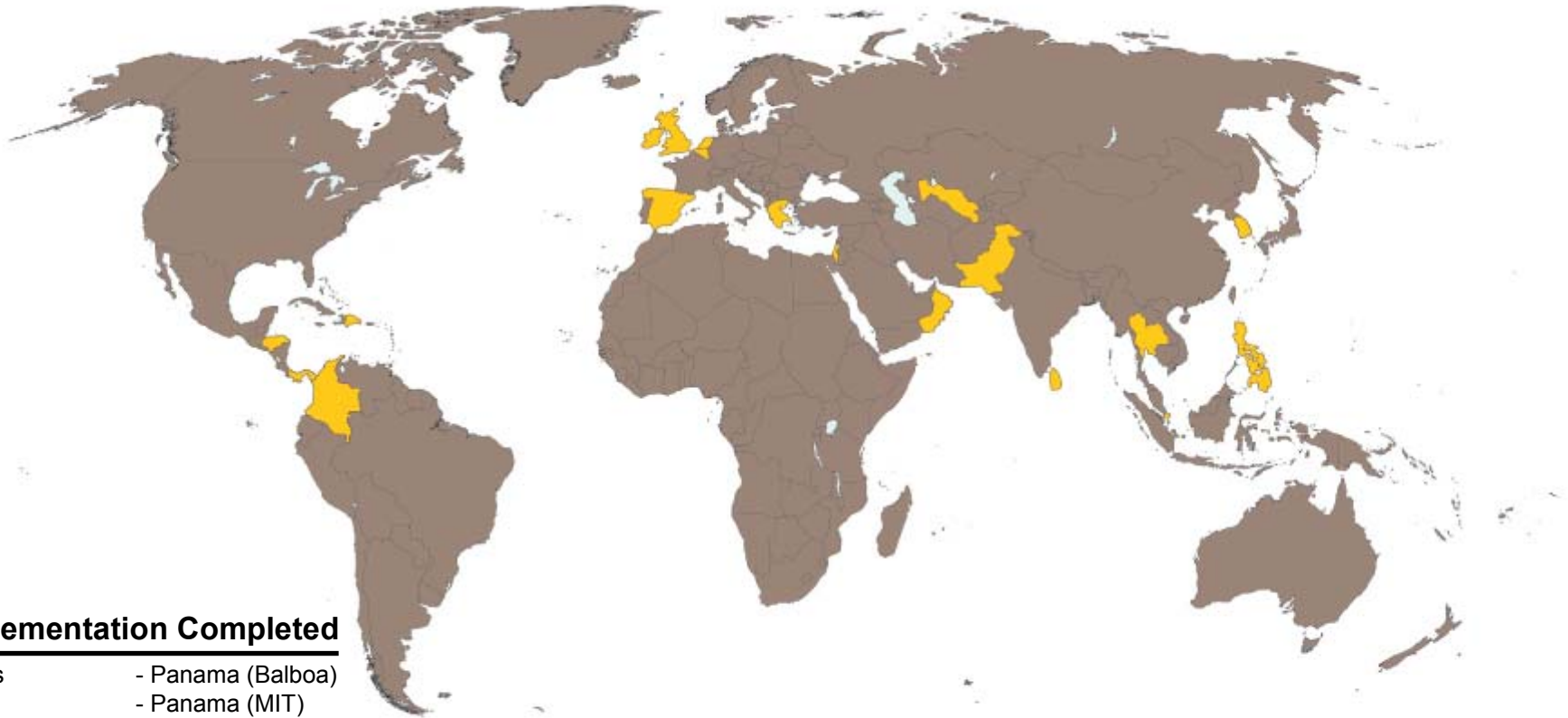


# Emergency Response

- ◆ **Emergency response – typically responsibility of host nation**
  - **Use of in-country technical expertise to assist SLD CAS operators with alarm disposition and appropriate response to real detections**
- ◆ **Where host nation expertise does not exist, SLD may put response protocol in place**
- ◆ **IAEA assistance may also be requested in emergency response incidents**



# SLD Around the Globe

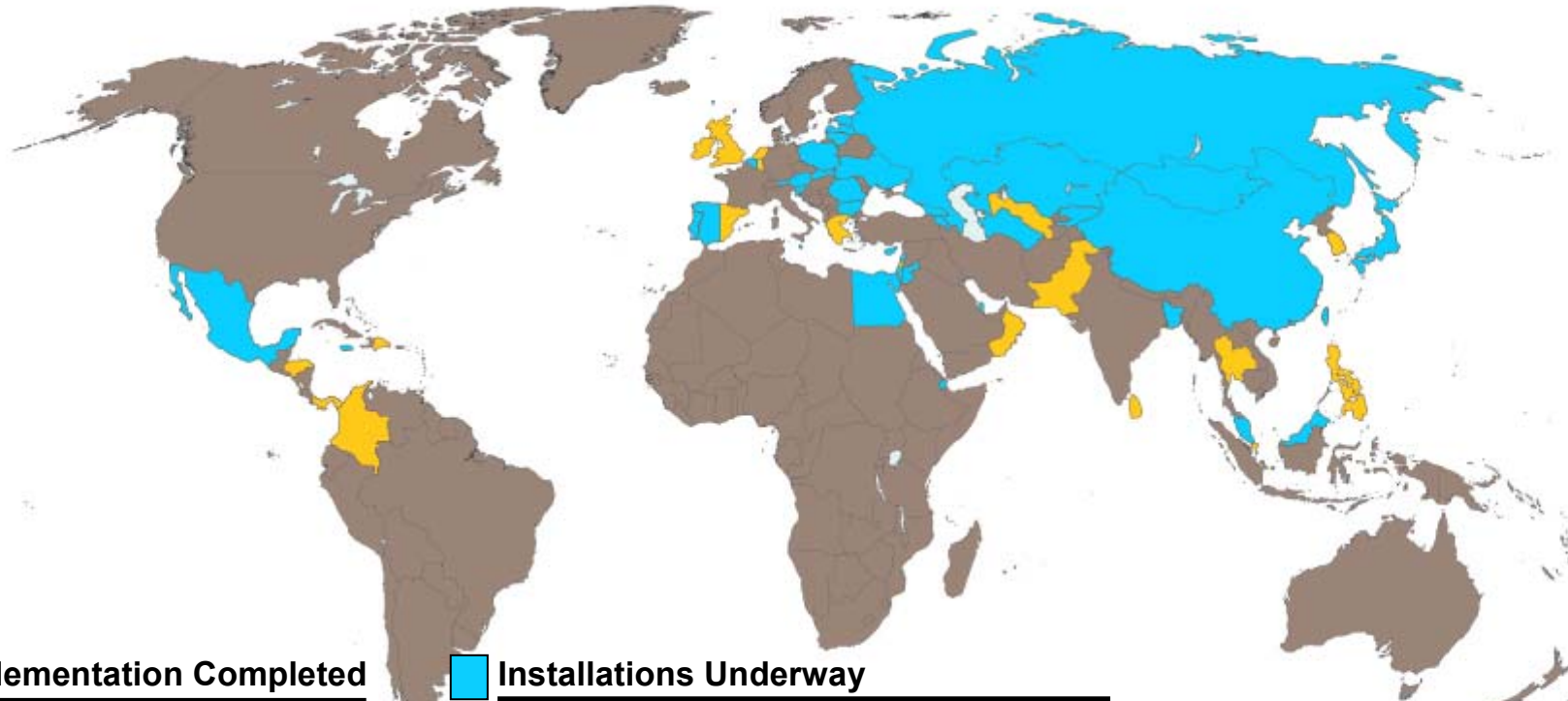


## Implementation Completed

- Bahamas
- Belgium (Antwerp)
- Colombia
- Dominican Republic
- Greece
- Honduras
- Israel-(Haifa)
- Netherlands
- Oman (Salalah)
- Pakistan (M. Qasim)
- Panama (Balboa)
- Panama (MIT)
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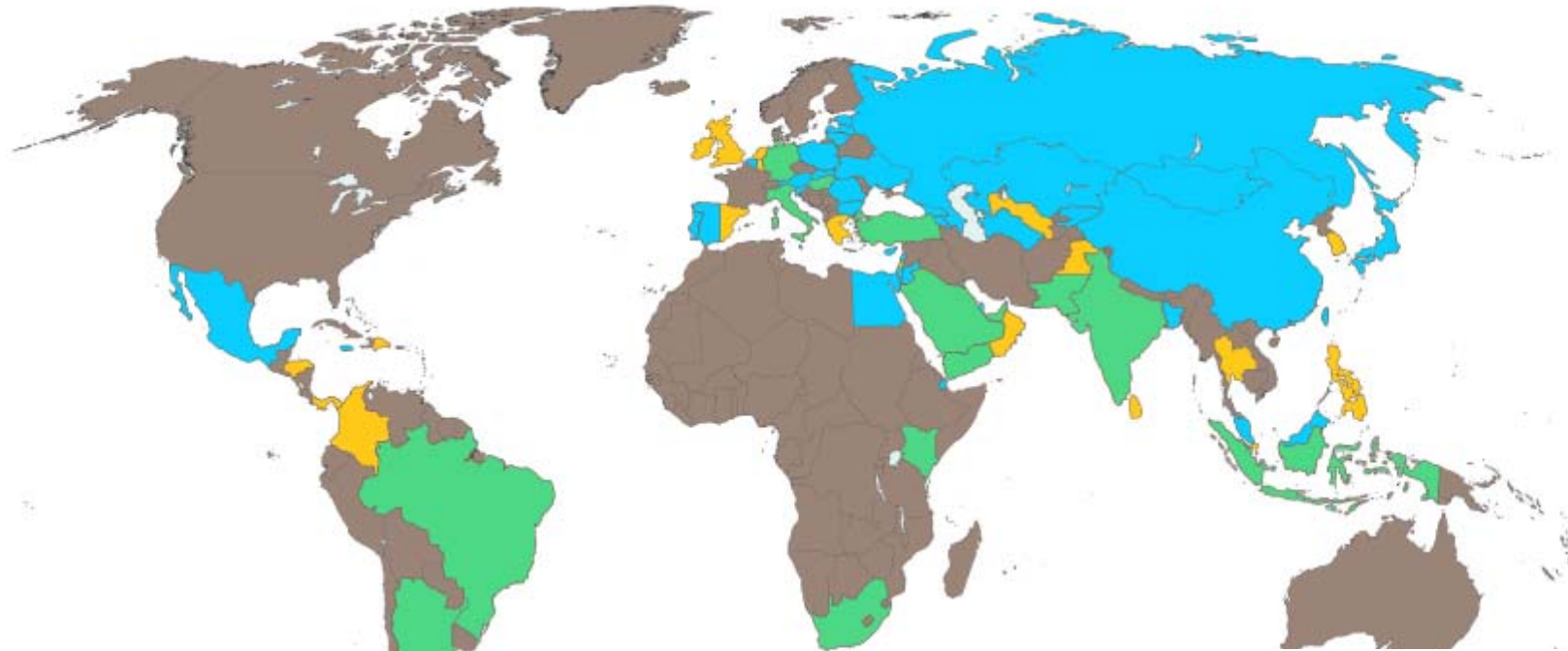
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- Uzbekistan

## Installations Underway

- Armenia
- Azerbaijan
- Bangladesh
- Belgium (Zeebrugge)
- Bulgaria
- China
- China (Hong Kong)
- Cyprus
- Djibouti
- Dubai
- Egypt
- Estonia
- Georgia
- IAEA
- Israel (Ashdod)
- Israel (Core)
- Jamaica
- Japan
- Jordan
- Kazakhstan
- Kyrgyzstan
- Latvia
- Lebanon
- Lithuania
- Malaysia
- Malta
- Mexico
- Mongolia
- Panama (Colon, Cristobal)
- Poland
- Portugal
- Qatar
- Romania
- Russia
- Slovakia
- Slovenia
- Spain
- Taiwan
- Turkmenistan
- Ukraine



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- Qatar
- Romania
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- Slovakia
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- Turkmenistan
- Ukraine

## Various Stages of Discussion

- Argentina
- Brazil
- Germany
- Hungary
- India
- Indonesia
- Italy
- Kenya
- Pakistan
- Saudi Arabia
- South Africa
- Turkey
- Turkmenistan
- Yemen
- UAE



# Points of Contact

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