National Nuclear Security Administration

Office of the Second Line of Defense

MEGAPORTS INITIATIVE

2010

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The Second Line of Defense Megaports Initiative is a key component of a multi-agency, multilayered, defensive network that strengthens the overall capability of partner countries to deter, detect, and interdict illicit trafficking in special nuclear and other radioactive materials at key international seaports. This program is part of the Office of International Material Protection and Cooperation in the U.S. Department of Energy's National Nuclear Security Administration (DOE/NNSA).

Overview

The Megaports Initiative works with foreign customs and other law enforcement agencies, port authorities, terminal operators, and/or other relevant entities in partner countries to systematically enhance detection capabilities for special nuclear and other radioactive materials in containerized cargo transiting the global maritime shipping network. In support of this mission, the Megaports Initiative helps partner countries equip major international seaports with radiation detection equipment and alarm communication systems. In addition, the Megaports Initiative provides comprehensive training for foreign personnel, short-term maintenance coverage, and technical support to ensure the long-term viability and sustainability of installed radiation detection systems.

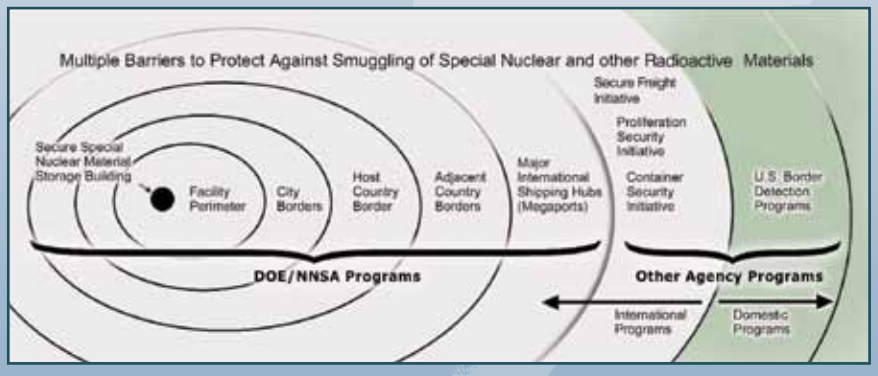
In addition to its international partners, Megaports collaborates with the U.S. Department of Homeland Security, and the U.S. Department of State to counter nuclear and radiological threats to the United States and its international partners by installing radiation portal monitors (RPMs) that can be used by U.S. Customs officers to scan high-risk U.S.-bound containers. The goal of the Megaports Initiative is to scan as much container traffic as possible (including imports, exports, and transshipped containers) regardless of destination and with minimal impact to port operations. The Megaports Initiative seeks to equip 100 seaports with radiation detection systems by 2016, scanning approximately 50% of global maritime containerized cargo and over 80% of U.S.-bound container traffic.

RPM at the Port of Antwerp, Belgium

Addressing the Threat

The vitality of most national economies hinges upon global trade. Over 90% of global commerce is transported through the maritime shipping network via cargo containers. Approximately 500 million twenty-foot-equivalent units—a measure of volume in the transport of containers—transit the globe annually through the maritime domain. The global ambitions of terrorist organizations in today's world has raised concern that terrorists or states of proliferation concern may attempt to exploit containerized cargo to covertly transport nuclear and other radioactive materials or use it to deliver a nuclear weapon or radiological dispersal device. The Megaports strategy is based on the assumption that adversaries have the least control

DOE/NNSA programs combine with Department of Homeland Security and other U.S. and inter-governmental efforts to protect the U.S. homeland against threats from illicit movement of special nuclear and other radioactive materials.



"The second line of defense against nuclear proliferation consists of developing an infrastructure to deter, detect, and respond to illicit trafficking of nuclear materials and related equipment. As the A.Q. Khan network demonstrated, gaps in the nonproliferation regime can be exploited to give proliferators or terrorists an opportunity. As the second pillar of our nonproliferation strategy, several NNSA programs work to strengthen international capabilities to detect, deter, and interdict illicit nuclear materials and nuclear-related smuggling."

– Administrator Thomas D'Agostino, testimony on "Addressing a New Generation of WMD Threats" before the House Armed Services Committee, July 2009

over illicit nuclear and other radioactive materials during the transport stage. The deployment of radiation detection systems also deters nuclear smugglers from using the maritime shipping network, forcing them to turn to other, more easily interdicted means of transportation.

Engaging Foreign Partners

To select key ports for engagement, a Maritime Prioritization Model (MPM) was developed that considers both the volume of container traffic at the port and the threat level and/or strategic location of the port. In prioritizing ports of interest, the MPM factors in the percentage of scannable volume at the port, the origin and destination of container cargo movement through a port, the likelihood that nuclear material might be smuggled through a port, and the country's willingness to participate in the program.

Once a country has been identified for engagement, DOE/NNSA personnel participate in bilateral discussions with the foreign government and key stakeholders on the Megaports Initiative conduct a familiarization tour of the port(s) of interest. Joint cooperation on the Megaports Initiative is typically formalized by signing a bilateral agreement.

Implementing the Program

The Megaports Initiative is implemented by DOE/NNSA with support from DOE national laboratories and qualified design, engineering, and construction contractors. The Megaports Initiative pursues cost-sharing with partner countries, where possible, for the design and installation of the radiation detection systems.

Integrated scanning lane – Puerto Cortes, Honduras

The Megaports Initiative makes a concerted effort to implement the program in a manner that reduces proliferation threats without disrupting the flow of commerce. Throughout the design phase, Megaports personnel coordinate closely with terminal operators and port authorities, foreign customs officials, and other stakeholders to ensure that the placement of radiation detection equipment and the operational procedures developed to respond to radiation alarms minimize impact to port operations. The goal of the Megaports Initiative is to scan as many containers as possible (including imports, exports, and transshipped containers) regardless of destination and with minimal impact on port operations. Imports and exports are

Partnering with Homeland Security

DOE/NNSA has established strong, synergistic ties with CBP, which implements several programs directly related to radiation detection and maritime security.

- CBP's Container Security Initiative (CSI), which handles over 85% of container cargo coming into the United States, is active at 58 ports, many of which are operational Megaports or ports of interest. The Megaports Initiative collaborates with CBP where Megaports and CSI overlap to improve CSI inspection teams' ability to identify high-risk U.S.-bound containers. The Megaports Initiative has committed to providing a radiation detection capability to all CSI ports to serve as an additional screening tool in assessing high-risk containers.
- DOE/NNSA and CBP are jointly implementing the Secure Freight Initiative (SFI), the goal of which is to scan 100% of U.S.-bound containers with radiation detection and imaging systems at select foreign ports. The Megaports Initiative provides RPMs with optical character recognition technology, communications systems, and integrated RPM/imaging data for CBP and host nation personnel at SFI ports. Currently SFI is operational at the ports of Salalah, Oman, and Port Qasim, Pakistan.

Status of Megaports Cooperation with CSI and SFI

Operational Megaports		Implementation Underway		Future Megaports	
Freeport	Bahamas	Buenos Aires	Argentina	Santos	Brazil
Zeebrugge	Belgium	Shanghai	China	Halifax	Canada
Antwerp	Belgium	Genoa	Italy	Montreal	Canada
Cartagena	Colombia	Gioia Tauro	Italy	Vancouver	Canada
Caucedo	Dominican Republic	Yokohama	Japan	Hong Kong	China
Piraeus	Greece	Tanjung Pelepas	Malaysia	Shenzhen	China
Puerto Cortes	Honduras	Barcelona	Spain	Alexandria	Egypt
Ashdod	Israel	Valencia	Spain	Le Havre	France
Haifa	Israel			Marseilles	France
Kingston	Jamaica			Bremerhaven/Bremen	Germany
Port Klang	Malaysia			Hamburg	Germany
Rotterdam	Netherlands			La Spezia	Italy
Salalah	Oman			Leghorn/Livorno	Italy
Port Qasim	Pakistan			Naples	Italy
Colon	Panama			Kobe	Japan
Balboa	Panama			Nagoya	Japan
Manzanillo	Panama			Tokyo	Japan
Lisbon	Portugal			Durban	South Africa
Singapore	Singapore			Gotenborg	Sweden
Busan	South Korea			Chi-Lung	Taiwan
Algeciras	Spain			Jebel Ali/Dubai	UAE
Colombo	Sri Lanka			Felixstowe	United Kingdom
Kaohsiung	Taiwan			Liverpool	United Kingdom
Laem Chabang	Thailand			Thamesport	United Kingdom
Southampton	United Kingdom			Tilbury	United Kingdom

*SFI Ports

typically captured by installing radiation detection equipment at the entrance and exit gates of port facilities. Scanning transshipped containers can be challenging and often requires innovative solutions. U.S. contractors selected by DOE/NNSA oversee construction and installation of the Megaports systems after the detailed design has been accepted by all stakeholders. When cost-sharing, the partner nation typically funds the design, construction, and installation of the Megaports systems with assistance from U.S. engineers and construction experts.

Additionally, the Megaports Initiative trains partner nation officials to operate and maintain the systems, and helps partner countries establish an indigenous training capability to ensure system operators and maintenance personnel have the requisite knowledge and technical proficiency to support the long-term operation of the installed systems. The training plan often includes technical classes held at DOE/NNSA's HAMMER Training Center in Richland, Washington, as well as extensive on-the-job training at the port.

Secondary Inspection and Identification Equipment

Spectroscopic portals

Handheld Equipment

- Personal Radiation Detectors
- Radioisotope Identification Devices (RIIDs)
- Radiation Survey Meters
- High Purity Germanium Detectors

Personal Radiation Detector

TSA Survey Meter

Thermo IdentiFINDER

Germanium-based ORTEC Detective

Transshipment

Whereas gate traffic can be easily captured by taking advantage of existing chokepoints into and out of a port, transshipped cargo continues to present a significant challenge for Megaports implementation. Because of shorter dwell times for containers, space constraints, lack of shipping data, and the difficulty of identifying non-disruptive permanent RPM sites within terminals, capturing transshipments without seriously impacting port operations often requires new and creative solutions. DOE/NNSA has been innovative in its technological approach to scanning transshipped containers where permanent RPM installations are not possible due to terminal configurations:

- A prototype Radiation Detection Straddle Carrier (RDSC) was developed to scan rows of containers stacked up to three high. The prototype consists of an off-the-shelf straddle carrier that has been stripped of its lifting mechanisms and reconfigured with radiation and spectroscopic portal monitors. The RDSC was successfully piloted in Freeport, Bahamas, where it was proven capable of scanning 85% of transshipment containers. Subsequently, DOE/NNSA awarded a contract to build additional systems to be deployed to ports that primarily rely on straddle carriers for container movement.

RDSC – Freeport, Bahamas

- The Mobile Radiation Detection and Identification System (MRDIS) consists of radiation and spectroscopic portal monitors mounted on a mobile, self-propelled frame. The MRDIS can relocate to scan containers as they are transferred between ships or to the container stacks. Once parked, the MRDIS is used in the same manner as fixed RPMs. The MRDIS is being piloted at the Port of Salalah, Oman. Additional systems will be built in the future and deployed to heavy transshipment ports.

MRDIS – Salalah, Oman

- DOE/NNSA, in close partnership with CBP and DNDO, is analyzing the integration of radiation detection technology into spreader-bar equipment used to lift containers. DOE/NNSA and CBP conducted tests at the Ports of Tacoma and Oakland, and Los Alamos National Laboratory. DOE/NNSA, CBP, and DNDO continue to evaluate the effectiveness of spreader-bar-based detection technologies in scanning transshipped containers.

Spreader Bar Detection Prototype

Ensuring Long-Term Sustainability

In addition to establishing an indigenous training program, the supply of preventative maintenance and emergency repair support, critical spare parts, data analysis support, and system performance testing are other important elements of the sustainability approach employed by the Megaports Initiative. Under most Megaports agreements, DOE/NNSA commits to providing maintenance and training support for three years, after which time the partner country takes full responsibility for operating and maintaining the systems. Moreover, the Megaports Initiative hosts regional Megaports workshops with partner nations annually or as needed to encourage information sharing between regional partners and to exchange lessons learned. For our prospective Megaports participants, the regional workshops also include a tour of an operational Megaport.

Cost-Sharing

Where possible, the Megaports Initiative employs cost sharing in the Megaports implementation process. The primary dividend of cost sharing is buy-in from the host government and terminal operator. Although no set formula for cost-sharing is available, the terminal operator or port authority often pays for design, construction, engineering, installation, or a combination of those costs. Cost-sharing arrangements are site-specific and negotiated differently for each port.

Layout and traffic control

Excavation

Foundation placement

Conduit installation

Monitor ins

Looking Ahead: 2010 and Beyond

Looking ahead, the Megaports Initiative will:

- Install radiation detection equipment at 100 ports, scanning approximately 50% of global container traffic by 2016.
  - Complete 14 ports in FY 2010, bringing the cumulative number of operational Megaports to 41
- Initiate new partnerships and establish formal agreements for Megaports cooperation
- Provide mobile detection systems to select transshipment ports
- Develop response protocols with select nations to address nuclear and radiological threats
- Provide training to partner nation officials, helping to ensure appropriate use and long-term sustainability of the systems
- Provide specialized equipment and/or training to select ports to enhance partner nation capability for detection, response, and recovery efforts
- Transition operational Megaports to partner nation officials after the sustainability transition period.

Many of our host nation partners have paid for some or all of the construction and installation process. The typical construction process is illustrated here.


tallation


Bollard placement


Camera installation

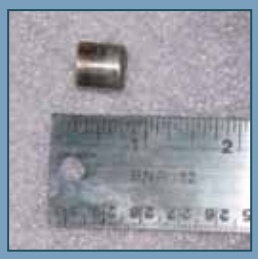

Restoration


Completed gate

Detection, Response, and Recovery

The radiation detection systems deployed under the Megaports Initiative better equip partner countries to detect radiation, respond to alarms, and safely recover improperly-disposed radioactive sealed sources and/or disposition contaminated scrap metal. The following photos are examples of real detections using Megaports equipment that required response from partner countries.

Orphan Sources in Scrap Metal



AmBe source

Cs-137 source

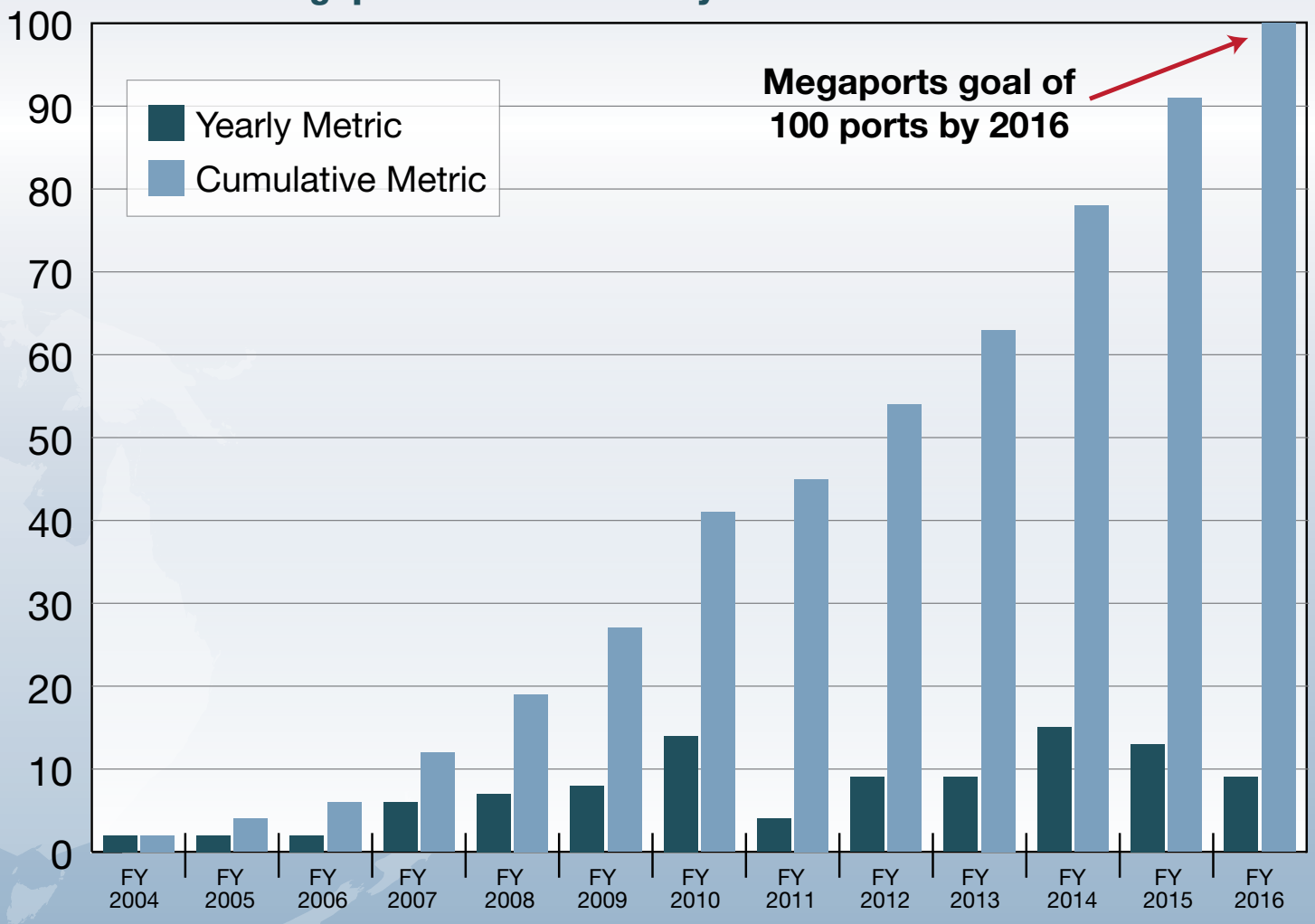
Contamination

Testing for radiation

Testing for contamination

Frisking individuals for contamination

Megaports Initiative Yearly and Cumulative Metrics



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