# The Office of the Second Line of Defense


# SLD Implementation Strategy

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## Acronyms and Abbreviations

| | |
|---|---|
| CAS | Central Alarm Station |
| CM | Country Manager |
| ConOps | Concept of Operations |
| CSDRD | Communications Systems Design Requirements Document |
| CSI | Container Security Initiative |
| DBT | Design Basis Threat |
| DHS | Department of Homeland Security |
| DNDO | Domestic Nuclear Detection Office |
| DOP | Declaration of Principles |
| DOE | Department of Energy |
| DOS | Department of State |
| DRD | Design Requirements Document |
| FCS | Federal Customs Service |
| FSU | Former Soviet Union |
| GA | General Arrangement |
| GAO | Government Accountability Office |
| HAMMER | Hazardous Materials Management and Emergency Response |
| HDI | Human Development Index |
| IA | Implementing Agreement |
| LAS | Local Alarm Station |
| LANL | Los Alamos National Laboratory |
| MOU | Memorandum of Understanding |
| MPC&A | Material Protection Control and Accounting |
| MPM | Maritime Prioritization Model |
| NA-25 | Office of International Material Protection and Cooperation |
| NNSA | National Nuclear Security Administration |
| OT&E | Operational Testing and Evaluation |
| PNNL | Pacific Northwest National Laboratory |
| RDD | Radiological Dispersal Device |
| RPM | Radiation Portal Monitor |
| SLD | Second Line of Defense |
| SNL | Sandia National Laboratories |
| SNM | Special Nuclear Material |
| SPM | Site Prioritization Model |
| SSP | Site Survey Model |
| TMP | Training Management Plan |
| U.S. | United States |
| USG | U.S. Government |
| VA | Vulnerability Assessment |
| WMD | Weapon of Mass Destruction |

# 1.0 Introduction

The Office of the Second Line of Defense (SLD), part of the Office of International Material Protection and Cooperation (NA-25), plays a key role in the nonproliferation mission of the Department of Energy's (DOE) National Nuclear Security Administration (NNSA). SLD's mission is to strengthen the overall capability of foreign countries to deter, detect, and interdict illicit trafficking in nuclear and other radioactive materials across international borders and points of entry/exit as well as through the global maritime shipping network. SLD has two components – the Core Program and the Megaports Initiative. As a result of its activities, SLD furthers international nonproliferation efforts and helps reduce the probability that special nuclear material (SNM) and other radioactive materials could be used in a weapon of mass destruction (WMD) or a radiological dispersal device (RDD) against the United States or its key allies and international partners.

This document outlines the implementation process for SLD and includes technical and programmatic guidance for SLD personnel on the process of effectively selecting and implementing measures to deter, detect, and interdict illicit trafficking in SNM and other radioactive material. It provides guidance on the selection process of sites for installation of radiation monitoring equipment; the process for selecting, designing, and installing such equipment; and measures that assure long-term system sustainability. In addition, this document details the entities responsible for various aspects of program implementation.

The approach described in this document is consistent with DOE/NNSA policy and directives issued by NA-25. The timelines outlined in the document are notional and subject to change. The timelines are meant to provide a general reference for the period of time in which these tasks should be completed. In general, the procedures and processes described in this document may undergo some variations depending on site size and configuration. At smaller border sites in more remote locations for example,

# 2.0 Program Summaries

Provided below are general summaries of the SLD programs. For details about specific activities please refer to the SLD annual Performance Work Plans.

## *2.1 Summary of the SLD Core Program*

The Core Program implements a comprehensive and systematic approach for upgrading detection capabilities for the interdiction of special nuclear and other radiological materials at border crossings, mid-sized seaports, and airports. Working in partnership with foreign country customs, border enforcement, and other relevant agencies, the Core Program originally focused on Russia (i.e., on security for nuclear materials at the core of U.S. efforts). It has since expanded beyond Russia's borders to include other countries of the former Soviet Union as well as other key countries in Eurasia.

In response to a Government Accountability Office recommendation, the Core Program also has assumed responsibility to provide regular repair and maintenance of legacy radiation detection systems installed by various U.S. Government agencies at the end of the Cold War. Since its establishment in 2002, the maintenance component of the Core Program has provided sustainability support for these systems and visited 21 of the 23 countries in which this equipment was installed. Participating countries are located throughout Asia and Europe.

### *2.2 Summary of the Megaports Initiative*

The Megaports Initiative began in 2003 in an effort to screen containerized cargo as it moves through the global maritime shipping network for special nuclear and other radiological materials before they can be used in an act of terrorism against the United States or our allies. The Megaports Initiative follows a strategy of engagement that considers volume of container cargo movement to the United States and regional terrorist threat. Using this approach, the Initiative is pursuing the most effective strategy for protecting the U.S. homeland and international commerce. As with the Core Program, equipment installed under the Megaports Initiative indicates the presence of special nuclear or other radiological materials, alerting foreign port officials, and U.S. representatives of the need to examine the cargo and take appropriate action.

## 3.0 Core and Megaports Threat Overview

As a first line of defense, NA-25 endeavors to protect, control, and account for SNM at nuclear production and storage facilities in countries of concern. The SLD program adds defense-in-depth to deter, detect, and interdict illicit trafficking of SNM and other radioactive materials through international points of entry/exit or through global maritime shipping channels.

Initially the SLD Core program focused on establishing a second opportunity to prevent the movement of SNM (Special Nuclear Material) out of Russia by working with the Government of Russia and other Former Soviet Union countries to equip entry and exit points with radiation monitoring equipment. In recent years, however, concern has grown that material may have moved beyond the FSU borders as well as a recognition that significant quantities of SNM are also generated and stored in countries outside of the FSU.

The results of several SLD-directed threat modeling studies indicate that it is likely that nuclear or other radiological materials could be taken from a source country to another country where it would be fashioned into a device. Like the Core Program, the Megaports strategy is based on the assumption that it is during this initial transport stage that the adversary might have the least control over the material and take the least care in protecting it from discovery. This assumption is based upon the premise that as materials are weaponized they will represent greater investments of time and resources and consequently will be more carefully protected from detection during shipments or will be transferred by private forms of transportation. Both the Megaports and Core strategies

therefore reflect the assumption that the detection probability is higher upstream in the weapon development process.

# 4.0 Roles and Responsibilities of SLD Project Teams

DOE/NNSA management assembles highly specialized, multi-disciplinary teams of technical experts from DOE's national laboratories and private industry to execute its international border and port security mission. The specific roles and responsibilities of the project team members are documented and assigned to avoid unnecessary duplication of efforts and to clearly define performance expectations. The general roles and responsibilities of each of the principle contributors to SLD project teams are detailed below.

These roles and responsibilities are subject to change. Over time, adjustments may be made to meet the evolving needs of the program. In addition, individual ports and countries sometimes require specific approaches (adapting to equipment already in place, specialized partnering agreements, etc.) that may require modification in the roles and responsibilities as described below.

Leadership for SLD is at the DOE/NNSA Federal level. DOE/NNSA Federal personnel are responsible for developing the overall strategic direction and identifying the priority goals and objectives for SLD. They provide project performance and financial oversight for all SLD-funded activities and issue programmatic guidance to ensure consistent technical execution of program. DOE/NNSA Federal personnel perform all official negotiations with foreign countries and interface with U.S. Embassy staff overseas.

## *4.1 Sandia National Laboratories (SNL)*

SNL provides program management assistance to DOE-HQ and may be designated as the lead organization for developing the DBT, developing the Maritime Prioritization Model, conducting assessments of points of entry and ports, and developing design requirements documentation (DRD) (conceptual designs). SNL may also provide personnel with communications expertise to define the alarm communication and assessment needs.

## *4.2 Pacific Northwest National Laboratory (PNNL)*

PNNL provides program management and strategic planning support to DOE/NNSA and has been designated as the lead organization for providing U.S. and foreign-based training to countries participating in SLD. PNNL may provide certified project managers to assist DOE/NNSA in managing the scope, schedule, and budget for individual SLD project teams.

## *4.3 Los Alamos National Laboratory (LANL)*

LANL provides expertise in radiation detection technologies and has been designated as the lead laboratory for testing and evaluating the performance of prospective radiation detection equipment prior to deployment and for acceptance testing the deployed

radiation detection equipment. LANL provides expertise for prioritization modeling for the SLD Core Program. LANL staff may support DOE/NNSA Federal Country managers and/or SNL in performing site surveys and preparing the design requirements documentation. LANL staff will perform Background Radiation Surveys, as required.

## *4.4 Oak Ridge National Laboratory (ORNL)*

ORNL plays the lead role in conducting SLD training activities in Russia and provides data analysis expertise. ORNL also provides additional expertise in radiation detection technologies.

## *4.5 Bechtel Nevada*

Bechtel Nevada (BN) performs routine and preventative maintenance for x-ray and portal monitor equipment deployed in over 20 countries. BN also supports the transition of maintenance responsibility to the host governments and provides limited training to local operators. In addition, BN supports SLD testing activities at the DNDO facilities at the Nevada Test Site.

## *4.6 Other National Laboratories*

Other national laboratories may be called upon to provide additional support.

## *4.7 Private Industry*

SLD uses private industry firms, with a focus on the utilization of small businesses, to help implement its activities. Those currently employed by SLD are outlined below. Other firms may be called upon by SLD to support its activities.

### 4.7.1 International Service Advisors, Inc.

International Services Advisors, Inc. (ISA) is a small business providing technical support to the SLD Program in three specific areas: highly skilled technical support in nuclear and nuclear related technologies and sciences including radiation physics; technical and interface support for program implementation domestically and internationally; and project management support activities. ISA personnel have native or near-native foreign language skills and advanced degrees with substantial experience working in U.S. inter-and intra-governmental programs and provide “Trusted Agents” to support SLD implementation in specific countries or regions where needed.

### 4.7.2 Miratek Corporation

Miratek Corporation is a small business specializing in audit and program controls services. Miratek provides support in program budget planning, budget execution tracking, performance tracking, and costing and program controls management. Miratek provides support in the management and maintenance of the SLD budget and performance reporting tools, provides reports, and recommends value added enhancements to the reporting tools.

### 4.7.3 SI International, Inc.

SI International, Inc. (SI) provides communications systems services for the development of system requirements and the implementation of these requirements at border crossings, airports, seaports and at Megaports.

### 4.7.4 Technology Ventures, Inc.

Technology Ventures, Inc. (TVI) is a small business providing equipment management services for the SLD program. TVI provides warehouse services for portal monitors and associated equipment at its warehouse in the Detroit area. TVI also maintains an up-to-date inventory of all program equipment regardless of location and provides equipment maintenance and training services through the use of in-country vendors.

### 4.7.5 Ahtna Government Services

Ahtna Government Services is an Alaska Native Corporation (small business) providing design and construction services for the installation of SLD systems. It provides architectural and engineering designs, construction, training, and logistics services for the installation of program equipment in foreign countries and at testing and training locations within the United States. Ahtna coordinates with other SLD program contractors to deliver equipment and ensures other requirements are in place as needed to meet the construction and installation schedules. Currently, TetraTech FW, Inc. serves as a mentor and sub-contractor to Ahtna, supporting these activities.

### 4.7.6 TSA Systems, Ltd.

TSA Systems, Ltd. (TSA) is a small business radiation detection equipment manufacturer. TSA provides the pedestrian, vehicle, and rail portal monitors for the SLD program. TSA also provides training on the maintenance and operation of its equipment to other program contractors. TSA provides other technical support, such as upgrades to SLD program equipment procured under previous contracts and development of specifically configured monitors to support specific deployments.

# 5.0 Program Implementation Process

The following sections outline the key components of the implementation process for the Core Program and the Megaports Initiative. It should be noted that the implementation process as presented provides a framework for execution of the SLD program and will be adapted to suit the specific conditions in any given country or port. The SLD team is constantly seeking ways to streamline the process in order to implement the program more efficiently. Depending on the size and complexity of the site, port, and/or country, some components may not be utilized. The Federal Country Manager, with approval from SLD Program Management, will decide what components will be part of the implementation process.

In Appendix A, the generic project lifecycle is outlined with activities, responsibilities, and deliverables identified. The implementation process flow chart for the SLD project is shown in Appendix B.

## *5.1 Site/Port Selection Process*

Along with other tools and expert judgment, the SLD Program uses analytical models to support the selection of countries, sites, and/or ports for possible installation of SLD equipment. The models for the Core Program and the Megaports Initiative are outlined below.

### 5.1.1 Core Program

The Core Program utilizes a variety of means to prioritize countries and sites, including open source and classified information about countries (border points, SNM facilities, etc.) and smuggling routes, databases on radioactive smuggling events, recommendations from host country counterparts, other USG agency recommendations, traffic volumes, other non-DOE country studies, expert judgment and modeling. The Flow and Stochastic Network Interdiction Models provide an objective means to prioritize sites within countries by ranking these sites using a cost benefit analysis that takes into account risk reduction and costs. When planning, SLD management combines the model result with the tools and information referenced above, as well as political realities related to working in particular countries or at specific sites. For each country, information is combined in a "Country Plan" that outlines and explains the Core Program's recommended work in that country.

### 5.1.2 Megaports Initiative—Maritime Prioritization Model

The primary objective of the Maritime Prioritization Model (MPM) is to rank global seaports by attractiveness to SNM or other radioactive material smuggler attempting to use maritime commerce for illicit movements of these materials. The model assesses maritime transportation systems and evaluates accessibility from a nuclear material smuggler's point of view. The results of the MPM are used as a tool to assist the Megaports Initiative in prioritizing seaports for engagement and installation of radiation detection equipment.

#### 5.1.2.1 Model Overview

Working closely with experts at the national laboratories, DOE/NNSA developed the Maritime Prioritization Model (MPM) to assist in the evaluation of candidate ports considering both the volume of containers handled and the potential threat. The MPM is a tool used to produce prioritization lists based on: 1) the percentage of scannable throughput volume; and, 2) the global nuclear material smuggling threat.

To determine relative rankings of ports from a nuclear material smuggler's perspective, and thus from an interdiction standpoint, the model calculates a Port Score for each port evaluated in the model. Over 1200 ports are evaluated in the model. These were selected from the approximately 6000 ports in the global shipping network based on the availability of published container movement statistics, and include all the major seaports.

The Port Score is therefore the summation of two scores: Country Score and Scannable Volume. The two scores are then combined to produce an overall port score. Each score is described below.

#### 5.1.2.2 Country Score

The country score consists of seven parts: level of capability of terrorist groups operating in the country, level of animosity of terrorist groups towards the U.S. and its allies, Human Development Index (HDI) for the country, amount and accessibility of SNM within the country, freedom of criminal groups to operate within a country, country-based piracy, and war risk. The weighting for each part was determined by expert opinion.

#### 5.1.2.3 Scannable Volume

Scannable volume refers to the amount of inbound, outbound and transshipped cargo that the program estimates can be screened. To determine the scannable volume score for each of the ports in the model, the model evaluates calendar year 2004 global throughput statistics representing the total number of TEUs that pass through a port on an annual basis. It should be noted that global throughput statistics are not available for many of the smaller ports in the model. For these ports, Last Port of Loading (LPOL) statistics were used. In the few instances where neither of these statistics was available, an industry expert estimate was applied to reflect the estimated throughput volume of the specific port.

#### 5.1.2.4 Other Constraints

There are other factors outside of the MPM that influence the overall priority of a port. These factors may include political realities, the local economy, relations with the United States, additional intelligence information, personnel safety, and others.

## *5.2 Host Government Engagement*

### 5.2.1 Exploratory discussions

Once SLD selects a country for engagement, SLD Federal staff (national laboratory and/or private contractor project team members may be included as needed) and host government representatives will hold introductory meetings to review the Core Program, the Megaports Initiative, or both. The objective of these discussions is to provide a forum for the representatives from the host government to ask questions, express concerns, communicate expectations, and gain an overall understanding of the SLD program. These discussions will also allow SLD to provide as much information as possible and to discuss the roles and responsibilities in carrying out the project.

While conducting exploratory discussions, the implementing host government agency should be identified. The SLD team may gain information regarding: laws and regulations pertaining to nuclear and radioactive material trafficking; traffic and cargo statistics; administration and regulatory controls; concept of operations; and the potential challenges and issues that may impact the implementation of the SLD Program.

### 5.2.2 Agreements

After exploratory discussions have taken place, the next step is for DOE/NNSA and the appropriate host government authorities to enter into an agreement or understanding that outlines the expectations, roles, and responsibilities of each side for implementing SLD.

The specific form of the agreement or understanding varies, and depends upon a number of factors, including whether there exists any legally binding government-to-government umbrella agreements between the United States and the host government under which an implementing arrangement could be negotiated. Even if a legally binding government-to-government umbrella agreement exists, DOE/NNSA, with DOE's General Counsel's approval, may decide to work under a non-legally binding understanding. This may be the case if amending the umbrella agreement proves to potentially delay the implementation of the SLD Program for an extended period of time.

In some cases, particularly in non-FSU countries, a stand-alone agreement that is not legally binding, such as a Memorandum of Understanding (MOU) or Declaration of Principles (DOP), is proposed for negotiation.

The agreement, in whatever format, is the mechanism by which DOE/NNSA and the host government lead agency document their mutual interest in cooperating on the implementation of the appropriate SLD Program and describe respective roles and responsibilities.

The timeframe for successfully negotiating, finalizing, and signing an agreement varies from country to country. The process depends largely on the host government's willingness to participate, bureaucratic obstacles within both the U.S. and host country government, and the legal implications of the agreement. It usually takes longer to negotiate and finalize legally-binding agreements.

### 5.2.3 Work Scope Prior to Agreement

With the consent of the host government, SLD may conduct certain activities in the host country before any agreement has been signed. Such activities may include site/port surveys, sustainability discussions, and engineering and communications surveys. These activities may take place in conjunction with the government-to-government discussions and involve technical experts from U.S. national laboratories, SLD contractors, and/or host country personnel. In most cases, these are the only activities that will be conducted before the agreement is signed. Once DOE/NNSA and the host government have signed an agreement, SLD may fully implement all activities.

### 5.2.4 Host Country's Role and Participants

Successfully implementing SLD programs depends on effective cooperation between SLD and its foreign partners. SLD views representatives from the host country as equal partners in the implementation process and strives to build a productive working relationship with them. The host country cooperates on SLD program implementation according to the terms laid-out in its respective agreement. In general, the host government agrees to: implement the Core Program, the Megaports Initiative, or both;

aid in the design of the system and concur on the final design; identify the lead implementing government agency and relevant support agencies; identify lead personnel for SLD implementation; identify personnel to be trained and participate in training activities; develop and implement domestic response procedures and protocols; provide sufficient staff to effectively deploy the SLD provided system; agree upon and implement a data sharing arrangement through which the host country will provide the United States data from the monitors and other information on instances of illicit trafficking identified through the SLD supplied system; share technical information and monitor data on an informal basis; provide long-term system sustainability; and provide Value Added Tax exemption on any equipment, materials, training, or services provided by SLD.

The host government determines its participants. Typical host country participants in the SLD implementation process include representatives from government agencies that oversee programs related to national security as well as officials from customs, law enforcement, maritime trade; and/or airport security. Additional key participants may include site management personnel, host country construction firms, and host country embassy personnel stationed in Washington, D.C.

## *5.3 Site Survey and Conceptual Design*

The purpose of the detailed technical site survey is to gather information about the site that will be used to understand the operations of the site and that will eventually be incorporated into a conceptual design. Detailed information is gathered on the site's physical layout, infrastructure, operation and access, site usage, and security.

The survey team will include the CM and representatives from DOE's national laboratories and/or private contractors as needed. Depending on the complexity of the environment the survey team will be working in multiple sites may be surveyed in a single trip.

### 5.3.1 Design Requirements Document (DRD)

The DRD is based on information gathered on the site survey. The DRD describes the upgrades that are to be installed at each site and is used by the design and communications contractors as the basis of design. The DRD generally needs to be approved by the host country before it is submitted to the engineering and design firms. As this document is determined by project/country-specific factors, the CM will determine when the DRD will be submitted.

### 5.3.2 Concept of Operations Document (ConOps)

Upon completion of the site survey, the project team will develop a preliminary ConOps document that identifies the participating stakeholders and the activities that will take place in responding to radiation alarms. This document serves as a starting point for developing the operational process that supports the operational architecture of the site. In addition, this document will highlight any new requirements for the system such as those that need to be included in the Communication System Design Requirements Document (CSDRD) or those addressed in the training phase. As this document is determined by the complexity of the project/country, the CM will determine when the

ConOps will be submitted to DOE/NNSA and whether the standard ConOps or communications design documents should be implemented.

### 5.3.3 Communication System Design Requirements Document (CSDRD)

Upon completion of the site survey, a site-specific CSDRD is developed that identifies the communication system requirements for a specific site or number of sites. The CSDRD identifies the hardware and software requirements and highlights any additional or reduced requirements of the system based on the particular logistic, operational, and jurisdictional conditions of the site. This document serves as the basis of design and is used by the communications contractor to develop a detailed design. . Depending on the complexity of the site, a standard communications design document, instead of a CSDRD, may be utilized and used as the basis for the communications contractor.

## *5.4 Stakeholders' Review*

The purpose of the Stakeholders' Review is to gain host government approval and buy-in on the conceptual design. This may require further refinement and/or modifications to the conceptual design. Additionally, planning and development of the sustainability and training activities are discussed. The project team may submit final conceptual design documents to DOE/NNSA and host country upon completion of the Stakeholders' Review. In some cases, multiple Stakeholders' Review meetings may take place with the host-government depending on the size and complexity of the project.

## *5.5 Engineering and Communication Surveys and Design (ECSD)*

If the complexity of the site requires more in-depth engineering and/or communications surveys than performed during the Site Survey, the project team including the design-build and/or communications contractors will conduct an engineering and/or communications survey of the site. The CSDRD and the DRD drive the basic infrastructure requirements for the site to be equipped. The survey, which may require multiple visits to the host country, will gather relevant civil, electrical, and communication infrastructure information related to the proposed radiation monitor and communication system. Information obtained on these surveys will be used to develop a final design that minimizes the impact of construction and installation on normal site operations. The ECSD team cannot make any changes to the operational characteristics of the site design without formal approval from the CM.

Elements that may be reviewed during the engineering and communication survey include portal lanes location and spacing, interferences, existing utilities, existing documentation, power availability and locations, lighting, communication needs and restraints, and floor space for equipment racks and suitability of existing environmental controls for electronic equipment. The project team requires access to supporting documentation, such as drawings, aerial photographs, diagrams, and sketches. Infrastructure, such as copper and fiber optic backbones, should be made available for inspection. Information regarding reliability of infrastructure (particularly electrical power) will also be reviewed. The goals of survey and design process include:

development of detailed design specifications; a final design package; a management plan to include a resource-loaded schedule; and a detailed cost estimate for the site.

## *5.6 Approval of Final Design*

Once DOE/NNSA approves the final design, the final design package is sent to the host country for concurrence prior to initiating site preparation and installation activities.

## *5.7 Construction and Installation*

Once the final designs are approved, site preparation, construction, and installation of equipment may begin. These activities may involve the project team including the CM and and/or host country organizations. In most cases, the design-build contractors will sub-contract to in-country contractors. These in-country sub-contractors should be used to the maximum extent possible where appropriate. The construction and installation activities include:

- Completing contractual arrangements and work plans with U.S. and host country contractors and submitting finalized work plans to DOE/NNSA within a timeframe determined by the CM;
- Completing construction and installation as specified by the final design in accordance with the DOE/NNSA and host country approved implementation schedule;
- Ensuring that the as-builts fully reflect the final installation and that any modifications are captured and reported per the SLD Configuration Management Strategy; and
- Ensuring that all construction meets, at a minimum, host country site specifications for expected environmental conditions.

## *5.8 Training*

Training is an integral part of the SLD implementation process. Assistance in developing a comprehensive training program will be provided to all foreign countries participating in the program. Training will be provided to foreign personnel on the use of the radiation detection equipment, recognition of common smuggling tactics and techniques, operational procedures, maintenance practices, and appropriate response protocols. In order to determine the exact training requirements for a particular site or country, a Training Needs Assessment will be conducted during a visit early in the engagement. This visit will provide the project team with an opportunity to gather information on the training capabilities that currently exist and to lay the groundwork to establish a training infrastructure to ensure the long-term efficacy and sustainability of the installed systems. Proposed training activities should be documented in a Training Management Plan (TMP), which will be submitted to DOE/NNSA for review.

The project specific training strategy outlined in the TMP will be tailored to address the unique requirements of each site or country. However, there will be several common training elements found in each TMP. Below are several training activities that may be offered to cooperating foreign countries under the SLD program.

### 5.8.1 Interdict/RADACAD Foundations Training

One training product offered by SLD is the Interdict/RADACAD course conducted at the DOE Hazardous Materials Management and Emergency Response (HAMMER) Center located in Richland, Washington. The training may be conducted by PNNL and given to frontline officers who will be responsible for operating the radiation detection equipment installed by the program. Subject matter experts from across the DOE complex conduct presentations on technical topics such as the threat from weapons of mass destruction, radiation safety, radiation detection technologies, and response procedures. A key aspect that makes this training beneficial is the strong emphasis on field exercises that include actual SNM, naturally occurring radioactive materials (NORM), and replicate sets of hand-held and fixed portal monitor radiation detection equipment. Through this comprehensive training, it is the goal to have the participants able to both operate the radiation detection equipment and synthesize operational requirements and response procedures for the specific circumstances they will face in their country. The training course is typically five days in duration.

### 5.8.2 In-Country Training

In-country training is provided once acceptance testing of the installed equipment has been completed. Training teams will conduct in-country training courses at either individual sites or at a national training center. Training teams will provide in-depth training geared towards situational operation of the radiation portal monitors, handheld equipment, and related communications system. During the in-country training, alarm response and interdiction procedures are typically finalized and put into formal operation. Other specialized training, as directed by the CM, may be delivered in-country, such as portal configurations and calibration, central alarm station (CAS) operations, and advanced secondary inspection techniques.

In addition to training the operators of the radiation detection system, the SLD training strategy may employ a “train-the-trainer” approach. Pursuing a “train-the-trainer” strategy will ultimately allow the SLD program to transfer ownership of the jointly developed training program to the partner country enabling long-term program sustainability.

### 5.8.3 Preventative Maintenance and Emergency Repair Training

Equipment maintenance training may involve the participation of the specific vendors who provide the radiation detection and alarm communication systems to the SLD program. Depending on the resources of the host government implementing agency, an indigenous commercial company may be contracted to provide emergency repair, preventative maintenance, and calibration support. Vendor training will be provided directly to staff from these maintenance companies or to host government officials.

## *5.9 Acceptance Testing*

The purpose of acceptance testing is to ensure fully functional and operational systems are installed and delivered to the host country. Systems include radiation monitors, communication and alarm assessment equipment, hand-held detectors, and ancillary support equipment. The acceptance testing process includes functional testing of installed

equipment, acceptance testing of radiation detection and communications equipment, system level testing, and commissioning.

The Acceptance Test Plan (ATP) may vary greatly depending on the complexity of the site and the type of equipment and communications being installed. A standard ATP will be used with site-specific modifications made, as needed. The purpose of the ATP is to verify installation and operability compliance to the specified design requirements of the system.

The Acceptance Test Plan may include the following:

- Infrastructure Installation Validation
    - Purpose to verify that construction/installation is complete and to document any remaining construction/installation items
- Detailed Design Validation
    - Purpose to verify that the general installation meets the Detailed Design Drawings
- Monitor Installation and Calibration Validation
    - Purpose to verify that the radiation monitors have been installed and calibrated correctly
- System Integration Testing
    - Purpose to assess whether all components have been successfully integrated and are working together as a system

An Acceptance Test Report will be submitted to DOE HQ once the testing is complete. This report may be completed by the CM or laboratory personnel depending on the site.

## *5.10 Official System Transfer*

Once the system has been tested and compliance to the design requirements has been verified, the responsibility and ownership of the system is officially transferred to the host government.

## *5.11 Sustainability*

The goal of the *SLD Sustainability Guidelines* is to provide a strategy for meeting the minimum requirements needed for long-term viability of SLD equipped sites around the world. This document should be referenced for detailed guidance on sustainability. At the onset of project implementation, the project team and the host government should discuss the sustainability approach that will be used by the project team to create the final *Sustainability Plan (SP)* document. The project team shall write and submit the *SP* for DOE/NNSA approval. The timeframe for completion of the *SP* will vary for each country. As this document is determined by project/country-specific factors, the CM will determine when the document will be submitted to DOE/NNSA. The team should be prepared for rigorous review and consideration of the sustainability approach in the earliest part of government-to-government discussions. The project team collaborates with the host government to jointly develop a sustainability strategy that incorporates SLD minimum requirements while realistically considering the host government's

present and likely future capabilities. Minimum requirements are the essential elements needed to have the basic functioning suite of SLD capability following acceptance testing.

### 5.11.1 Operational Testing and Evaluation (OT&E)

The purpose of the OT&E phase is an important step part of sustainability and is to develop a pool of data from the actual screening of traffic so that the monitors can be tuned to optimally screen for the target material and minimize innocent and false alarms. OT&E may begin before the equipment is handed over and continue afterward. There may have to be more than normal secondary inspections during this phase in order to gather needed OT&E data. The project team, host government representatives, or other entities will conduct this phase of testing. The project team, host government representatives, or other entities will develop test objectives, test protocols, and analysis of the data when taken. The output of this activity will be a site monitoring system fully exercised and tuned for the long term monitoring mission.

## *5.12 Lessons Learned*

Lessons learned encompass a series of discussions both within the project team and with the host government team to identify ways for SLD to improve overall program effectiveness and incorporate best practices into program level documents.

# 6.0 Relevant Standards

U.S. standards and practices are employed and adhered to wherever possible. In foreign locations, local standards and customs are applied as appropriate. SLD adheres to the appropriate relative standards for each implementation activity.

## Appendix A: Project Lifecycle: Activities, Responsibilities, and Deliverables*

**The following are notional and subject to change depending on the size of the project and the complexity of the site. DOE/NNSA and the CM will determine which timelines, deliverables, and responsible groups will be utilized. The timelines indicated are meant to provide a general reference for the period of time in which these tasks should be completed.*

| **Implementation Phase: Host Government Engagement** |
|---|
| **Possible Deliverables to DOE/NNSA:** Signed agreement with the Foreign Government |
| **Possible Group/s Responsible:** DOE/NNSA Federal staff |
| **Typical Timeframe of Due Date to DOE/NNSA:** Country specific |

| **Implementation Phase: Site Survey** |
|---|
| **Possible Deliverables to DOE/NNSA:** DRD, CSDRD, ConOps |
| **Possible Group/s Responsible:** CM**,** SNL, LANL, PNNL, contractors |
| **Typical Timeframe of Due Date to DOE/NNSA:** 15 - 45 days after last day of site survey trip |

| **Implementation Phase: Stakeholders' Review or Country Working Group** |
|---|
| **Possible Deliverables to DOE/NNSA:** Host government-endorsed conceptual design |
| **Possible Group/s Responsible:** CM, SNL, LANL, PNNL, contractors, Host Government |
| **Typical Timeframe of Due Date to DOE/NNSA:** Country/project specific – CM will determine |

| **Implementation Phase: Engineering & Communications Surveys and Design** |
|---|
| **Possible Deliverables to DOE/NNSA:** Detail designs for civil, electrical, and communications scopes that may include General Arrangement Drawings, Final Detail Design Drawings, Software Requirements Specifications |
| **Possible Group/s Responsible:** CM, contractors, national laboratories |
| **Typical Timeframe of Due Date to DOE/NNSA:** 30 – 45 days after last day of engineering/communications survey trip |

| **Implementation Phase: Construction and Installation** |
|---|
| **Possible Deliverables to DOE/NNSA:** Work Plans, Project Schedules, Change Requests, Final Installation report including as-built drawings, equipment inventories, etc. |
| **Possible Group/s Responsible:** CM, contractors, national laboratories |
| **Typical Timeframe of Due Date to DOE/NNSA:** Country/project specific – CM will determine |

| **Implementation Phase: Training** |
|---|
| **Possible Deliverables to DOE/NNSA:** Training Management Plan |
| **Possible Group/s Responsible: CM,** PNNL, other national laboratories, contractors |
| **Typical Timeframe of Due Date to DOE/NNSA:** 15-45 days after last day of training needs assessment visit, Stakeholders' Review or Country Working Group meeting |

| **Implementation Phase: Acceptance Testing and Equipment hand-over** |
|---|
| **Possible Deliverables to DOE/NNSA:** Acceptance Test Report |
| **Possible Group/s Responsible:** CM, SNL, LANL, PNNL |
| **Typical Timeframe of Due Date to DOE/NNSA:** 10-15 days after last test completed |

| **Implementation Phase: Sustainability** |
|---|
| **Possible Deliverables to DOE/NNSA:** Sustainability Plan |

| |
|---|
| **Possible Group/s Responsible:** CM, PNNL, other national laboratories, contractors |
| **Typical Timeframe of Due Date to DOE/NNSA:** Country/project specific – CM will determine |

| **Implementation Phase: Lessons Learned** |
|---|
| **Possible Deliverables to DOE/NNSA:** Lessons Learned Program Level Document |
| **Possible Group/s Responsible:** CM, PNNL, other national laboratories, contractors, host government |
| **Typical Timeframe of Due Date to DOE/NNSA:** Country/project specific – CM will determine |

## Appendix B: SLD Implementation Process Flow Chart