



Physical Security Technology

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PD Committee Member

NAYGN



The Department of Homeland Security Domestic Nuclear Detection Office

Presentation to NAYGN Annual Meeting

DNDO's Mission and Objectives

DNDO was established on April 15, 2005 with the signing of NSPD 43 / HSPD 14 for the purpose of improving the Nation's capability to detect and report unauthorized attempts to import, possess, store, develop, or transport nuclear or radiological material for use against the Nation, and to further enhance this capability over time.

- Develop the global nuclear detection and reporting architecture (GNDA)
- Develop, acquire, and support the domestic nuclear detection and reporting system
- Characterize detector system performance before deployment
- Facilitate situational awareness through information sharing and analysis
- Establish operational protocols to ensure detection leads to effective response
- Conduct a transformational research and development program
- Provide centralized planning, integration, and advancement of USG nuclear forensics programs

Global Nuclear Detection Architecture

- In order to strengthen the Nation's layered defense, DNDO analyzes the Global Nuclear Detection Architecture, and then formulates recommendations and plans to strengthen the architecture with stakeholder collaboration and cooperation.
- The GNDA is a worldwide network of sensors, telecommunications, and personnel, with the supporting information exchanges, programs, and protocols that serve to detect, analyze, and report on nuclear and radiological materials that are out of regulatory control.
 - The term “out of regulatory control” refers to materials that are being imported, possessed, stored, transported, developed, or used without authorization by the appropriate regulatory authority, either inadvertently or deliberately.

Substantial risk reduction is the aim

Global Nuclear Detection Architecture



Key Mission Areas

- DNDO focuses on increasing detection capabilities in key mission areas as part of a comprehensive strategy to protect the Nation against radiological and nuclear threats.
 - Maritime
 - Aviation
 - Land Border
 - Interior
 - Exterior (International)
- Cross-cutting functions across all mission areas include risk analysis, technical reachback support, domain awareness, nuclear forensics, information integration and performance evaluation

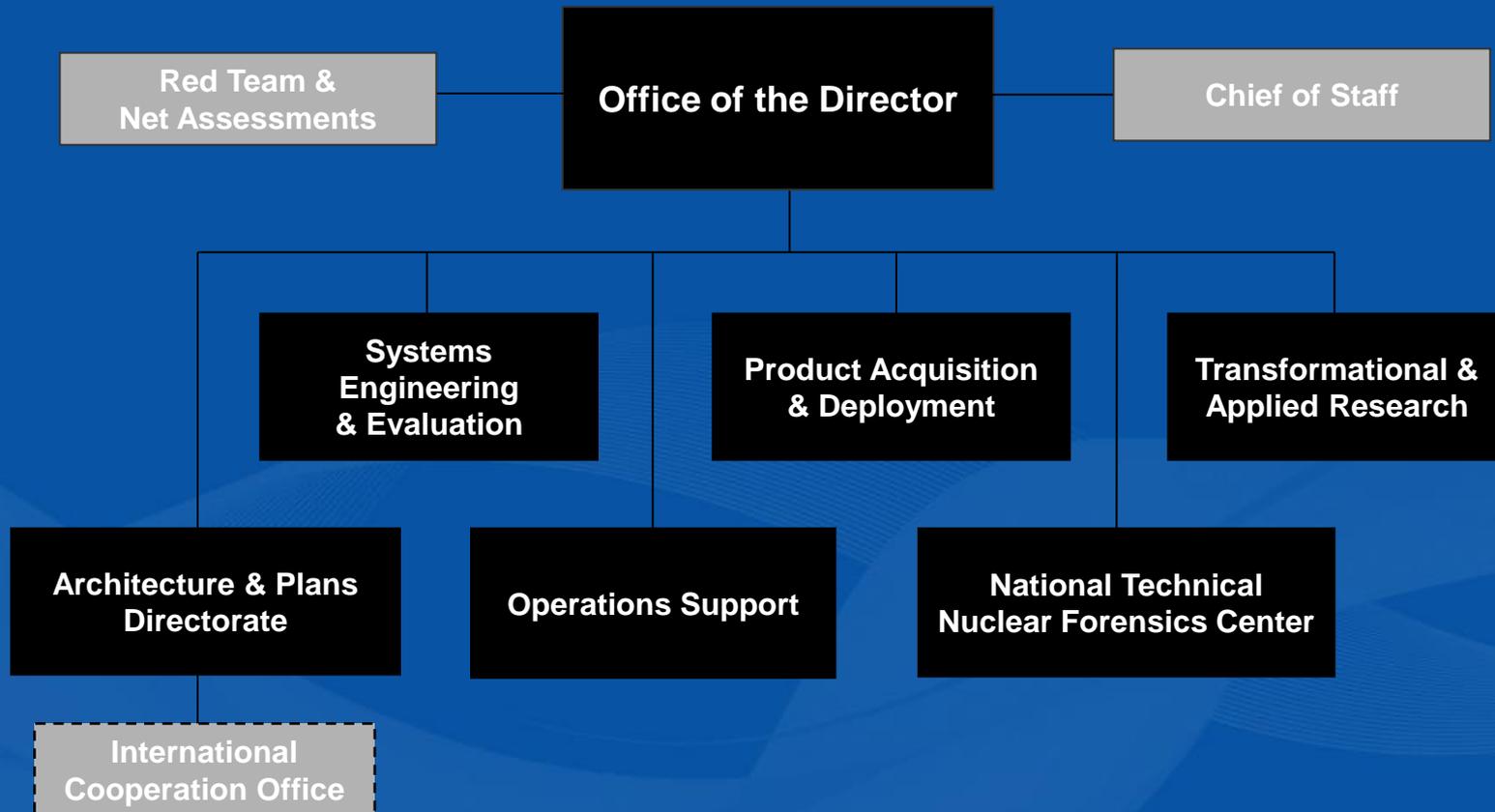


DNDO: An Interagency Office

- DNDO is an interagency office composed of detailees and liaisons from the departments of Energy, Defense, Justice, State, the FBI and NRC.
- Other DHS components such as the U.S. Coast Guard, Customs and Border Protection, and Transportation Security Administration provide detailees to DNDO.
- DNDO relies upon the national laboratories, academia, and private industry to conduct research that directly supports its mission.
- DNDO maintains strong relationships with Federal, State, Tribal and local entities to facilitate capabilities development.



DNDO Directorate Structure



DNDO Directorates

- Architecture and Plans Directorate—Determines gaps and vulnerabilities in the existing global nuclear detection architecture, then formulates recommendations and plans to develop an enhanced architecture.
- Operations Support Directorate—Develops the information sharing and analytical tools necessary to create a fully integrated operating environment. Residing in the
- Red Team & Net Assessments—Independently assesses the operational performance of planned and deployed capabilities, including technologies, procedures, and protocols.

DNDO Directorates

- Transformational & Applied Research Directorate—Conducts, supports, coordinates, and encourages an aggressive, long-term research and development program to address significant architectural and technical challenges unresolved by R&D efforts on the near horizon.
- Product Acquisition & Deployment Directorate—Carries out the engineering development, production, developmental logistics, procurement and deployment of current and next-generation nuclear detection systems.
- Systems Engineering & Evaluation Directorate—Ensures that DNDO proposes sound technical solutions and thoroughly understands systems performance and potential vulnerabilities prior to deploying those technologies.
- National Technical Nuclear Forensics Center—Provides national-level stewardship, centralized planning and integration for an enduring national technical nuclear forensics capability.

Exterior Mission Area

Program Elements:

- Inter/Intra-agency Coordination
- Bi-lateral engagement
- Multi-lateral engagement

Partners:

- DHS: Policy, OIA, S&T, CBP, TSA, USCG
- USG: DOS, DOE, DoD, DOJ
- INTL: GICNT, IAEA, NATO, ILEA, EC-JRC, UNSCR 1540, INTERPOL



Exterior - Bi-lateral Engagement

- Engagement with counterparts in key partner nations to:
 - Exchange best practices
 - Gain insight into detection strategies
 - Raise awareness and build on existing capabilities



- Ongoing Engagements:
 - Canada, France, Israel, Singapore, UK
- Future potential relationships:
 - Mexico, Middle East, Southeast Asia, Africa, South America

National Technical Nuclear Forensics Center

Operational Readiness:

- Provide centralized planning and integration of USG nuclear forensics programs and activities through interagency working groups, joint exercises, assessments, and foundational document development.

Interagency Stewardship and Coordination

Pre-Det Materials Capability Development

Technology Advancement:

- Advance the Nation's capability to rapidly, accurately, and credibly identify the origin and history of interdicted radioactive/nuclear materials.

Operational Readiness

Technology Advancement

Expertise Development

Restoration and maintenance of scientific expertise



Expertise Development:

- Provide scholarships, fellowships, internships, post-graduate, and university awards for studies and research in specialties relevant to nuclear forensics.



Summary

DNDO is supporting the development and deployment a global nuclear detection and reporting architecture to reduce the risk of nuclear terrorism

- DNDO has coordinated USG identification of critical vulnerabilities in the existing architecture
- DNDO maintains an aggressive system development and acquisition process to rapidly deploy detection systems
- DNDO has conducted several test series as well as red teaming operations to evaluate the effectiveness of technologies and deployed systems.
- Transformational & Applied Research has been identified to reduce risk across other elements of the architecture
- DNDO is providing on-going operational support to the deployed architecture, including support for Federal, State, Tribal, and local mission partners
- Provide centralized planning, stewardship, and integration of USG R/N forensics activities; advance pre-detonation R/N forensics capability; recreate an enduring technical nuclear forensics workforce



National Nuclear Security Administration: Second Line of Defense Program Overview

2013

Briefing Structure

- Program Mission and Strategy
- Program Structure
- Accomplishments
- Program Scope and Activities
- International Coordination and Collaboration
- SLD Assistance Options

Second Line of Defense: Program Mission and Strategy

- SLD mission is to 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 border checkpoints, airports and seaports, internal locations and other controlled land and maritime borders.
- SLD strategy incorporates a threat-based, defense in depth approach to illicit trafficking that recognizes:
 - Smuggling of nuclear and other radioactive materials is an ongoing global enterprise
 - Even a single, viable trafficking network constitutes a serious U.S. national security risk
 - There are currently gaps in the global radiation detection architecture
 - International coordination and collaboration is imperative to meeting global nuclear security needs

Program Mission and Strategy

SLD develops partner countries' capacity to reduce the risk of illicit trafficking through:



- **Deterrence** of trafficking in special nuclear and other radioactive materials by judicious deployment of fixed and mobile radiation detection equipment.

Detection by instrument alarms and information alerts including locating, identifying and securing of source during alarm adjudication.



Operational training, regulatory development, exercises and support for **interdiction** of radioactive materials out of regulatory control

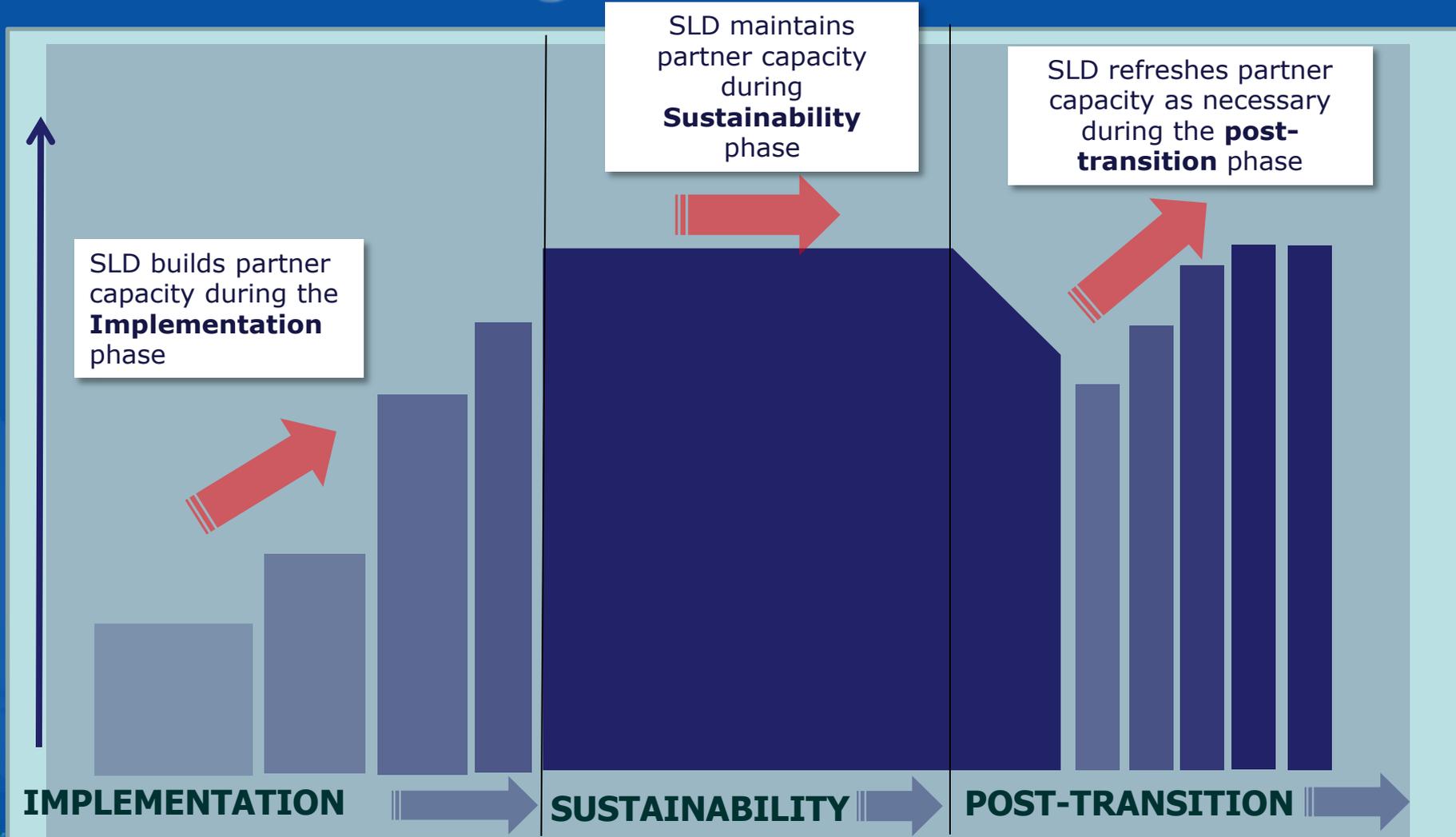
Second Line of Defense

Program Structure

SLD's work consists of two principal components:

- Implementation: Installation and deployment of radiation detection equipment at border checkpoints, airports and seaports, internal locations and other controlled land and maritime borders
 - Recipient organizations typically include Customs, Border Police, and interior law enforcement authorities
- Sustainability: Guidance, methodology and practical transition support for partner country assuming fully operational, maintenance and management responsibilities
 - Assessment tools and metrics to track performance and progress
 - Training, workshops, and exercises
 - Maintenance assistance, including Help Desk support

Program Structure



Second Line of Defense

Accomplishments to Date

Implementation

Installed over 2,500 radiation portal monitors, straddle carriers, spectroscopic portal monitors and/or provided handheld equipment at 454 international crossings and 45 larger container ports (Megaports) in 52 countries.

- Installed at 95 Airports, 235 Border Crossings, 14 Post Offices, 99 Feeder Seaports, 11 Training Academies and 45 Megaports
- Installation activities ongoing in 15 countries
- Provided mobile detection system (MDS) equipment and related training to fourteen countries
- Initiated National Communications Systems in six countries

Sustainability

Transitioned 10 MDS and 320 international points of entry to Partner Country responsibility, including 260 sites in Russia, 49 other border checkpoints, airports and seaports; and an additional 11 large container ports (Megaports)

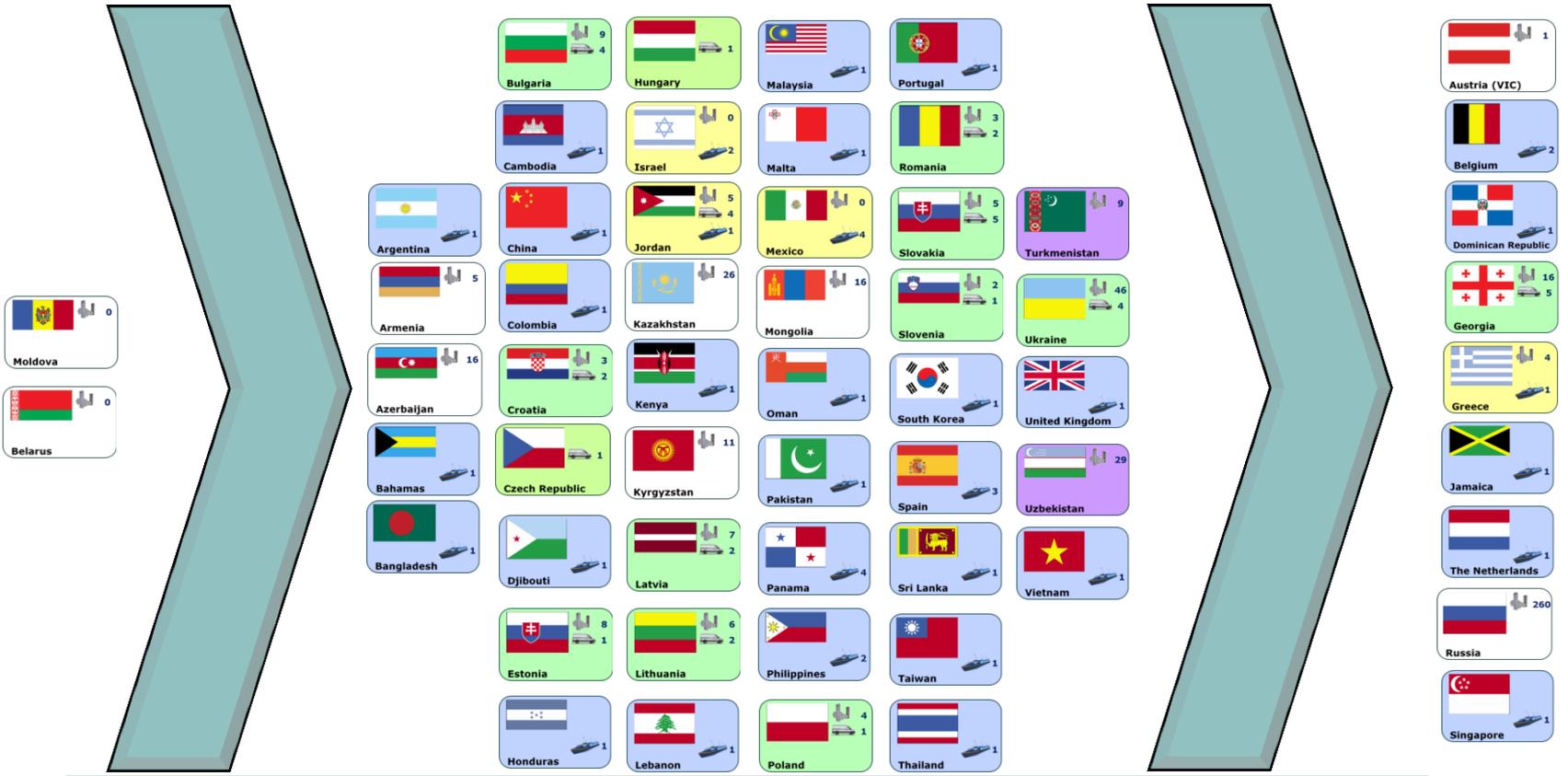
- Currently in process of transitioning 31 MDS and 194 international points of entry, including 160 border checkpoints, airports and seaports and 34 Megaports
- Provided over 320 initial and recurring training courses in over 40 partner countries to over 5,300 personnel
- Conducted 194 assurance visits (107 border checkpoints, airports and seaports; 87 large container ports (Megaports))
- SLD-trained indigenous maintenance providers resolved 70% of all repair issues without SLD technical assistance
- SLD Help Desk resolved over 2,000 service requests from maintenance providers
- Analyzed technical data from more than 185 million lane occupancies in over thirty countries

Second Line of Defense

Accomplishments to Date

Implementation - Operations - Transition

Post-Transition



**K
E
Y
S**



Large container ports only



Borders and ports



Interior (MDS) only



Borders, ports, interior (MDS)



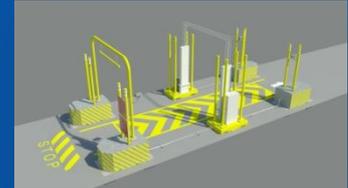
Borders, ports, interior (MDS) and large container ports



Special cases

SLD Scope and Activities: Implementation

- Installation of fixed radiation detection equipment at border checkpoints, airports, feeder and large container seaports
 - Site Survey
 - Equipment Selection
 - Design
 - Final Design and Permitting
 - Procurement
 - Construction / Installation of Equipment
 - Testing
- Mobile radiation detection system (MDS) vans are custom designed and assembled in Slovakia under SLD direction
- Most installations and MDS vans include computer equipment and associated communications systems for a site-level central alarm station (CAS)
 - In select cases, all equipment is networked to national centralized location



Implementation: Fixed Equipment

SLD Country Concept:
Distributed border crossings and port deployments are coordinated through a central National Command Center (NCS)



Implementation:
Secondary Inspection Equipment



Implementation: SLD Mobile Detection Systems (MDS)

- MDS complements fixed detection equipment and are a critical component of SLD's layered, defense-in-depth architecture
- Powerful nuclear security tool for border controls and law enforcement operations
 - Along "green" borders
 - Response to intelligence or information alert related to smuggling activity
 - Law enforcement sting operations
 - Political boundaries where fixed equipment installations are impractical, unauthorized or unwanted.
 - Temporary replacement for fixed RPM installation
 - Major public events



Roadside operations in Slovakia
(white van in foreground)



Backpack used in field training exercise

Radiation Detection and Investigative Techniques

- Frequently provided as part of MDS Deployments
- 3-5 day training course jointly taught by experts from SLD and FBI
- Curriculum examples include:
 - Mobile Detection System Operations
 - Operations and Evidence Collection in a Hazardous Environment
 - WMD Operational Threat Credibility Evaluation
 - Investigative Operations Planning
- Emphasis on practical scenario-based field training exercises
 - Scenarios can be customized to meet country needs
 - Incorporate all radiation detection assets to exercise officers' skills



Implementation:

Specialized Radiation Detection Equipment

Transshipped containers at large container ports:

- To address the challenge of scanning transshipped containers, SLD developed two new technologies that are now commercially available
 - Radiation Detection Straddle Carrier (RDSC): RDSC drives over containers as they are stacked in a port's yard and scans them for the presence of radiation
 - Mobile Radiation Detection and Identification System (MRDIS): can be driven throughout a port and strategically positioned to maximize scanning
 - Allows for scanning as containers are discharged from vessel
 - System can be relocated as needed (e.g., repositioned when the crane moves)



RDSC



MRDIS

Discreet RPM installations:

- While clearly visible radiation portal monitors (RPMs) provide a measure of deterrence, there are applications where less-visible RPM installations are desirable
 - RPM can be architecturally blended into surrounding infrastructure without sacrificing performance
 - RPM can be integrated into functional items commonly found in public areas and at major public events (e.g., stanchions)



Discreet RPM Installation

Implementation: National Communications System (NCS)

Completed NCS Deployments:

- 1) Russia:**
Pilot complete;
main installation underway
- 2) Armenia:**
Pilot complete;
main installation underway
- 3) Georgia:**
Integrated all sites in 2010
- 4) Kyrgyzstan:**
Pilot underway

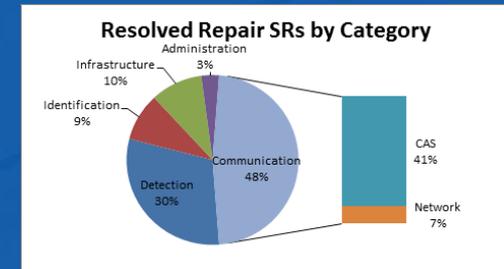


Program Scope and Activities:

Sustainability

SLD works with partner countries to develop a sustainable system, supporting their transition (3 to 5 years) to assuming full operational and management responsibilities by providing assistance in the following areas:

- Overall Guidance and Planning
 - Estimating tools for costs and staffing
 - Support for alarm response procedures
- Assuming Maintenance Responsibilities
 - Identify and train local maintenance provider
 - Provide for maintenance for ~ 3 years
 - Access to SLD Help Desk
- Developing Indigenous Training Capacity
 - Training support and materials
 - Train the Trainer Programs
- Track System Performance
 - Assurance visits, exercises and data analysis
- Encouraging Regional Cooperation
 - Resources for cross-border exercises and collaboration,
 - Regional conferences and seminars



Help Desk trend analysis

Promotes long-term, proficient radiation detection system operations by partner countries

Comprehensive Operational and Sustainability Support

- Regulatory Framework
 - Assistance in establishing standard operating procedures (Concept of operations)
 - Alarm adjudication and secondary inspections
- Training in all aspects of system use and maintenance for the multiple stakeholders with roles and responsibilities
- Maintenance support
- Technical support assistance
- Networking to regional and/or centralized national location (for select deployments)
 - SLD-developed National Communications System (NCS) provides several benefits:
 - Administrative oversight (counter corruption)
 - Technical support for alarm adjudications
 - Equipment status of health



Airport Workshop, Athens 20120



RPM Maintenance Training



National Communications System Concept



Sustainability

Training, Workshops and Field Exercises

- Multi-Phase training takes place both during and after equipment installation
 - Radiation Detection/Alarm Adjudication Training
 - CONOPs Training
 - Maintenance/Repair Training
 - Specialized Topics: Source Recovery (with other NNSA support)
- SLD collaborates with European Commission Joint Research Centre and IAEA on development and delivery of training.
 - Harmonized Curricula
 - Training materials and job aids
 - E-Learning tools
 - Front Line Officer training at EUSECTRA
- Training available for Front Line Officers (CAS operators, secondary inspection teams), Maintenance Personnel and Instructors
 - In-Country training: On-site on-the-job training
- Bilateral and Regional Workshops: Sustainability
 - Development of regulations and management practices
 - Best practices; e.g. airport operations
- Field training exercises
 - Collaboration with US interagency (FBI, DHS, DoD and DOS) and international organizations



International Coordination and Collaboration

Partnering with international terminal operators and other industry leaders

Industry

Partner Countries

Build nuclear detection capability, workshops, exercises, technical exchanges, regulatory development

**Partnering,
Cost-sharing,
and Technical
Exchanges**

GNDA, GICNT, workshops exercises, donor countries

US Interagency

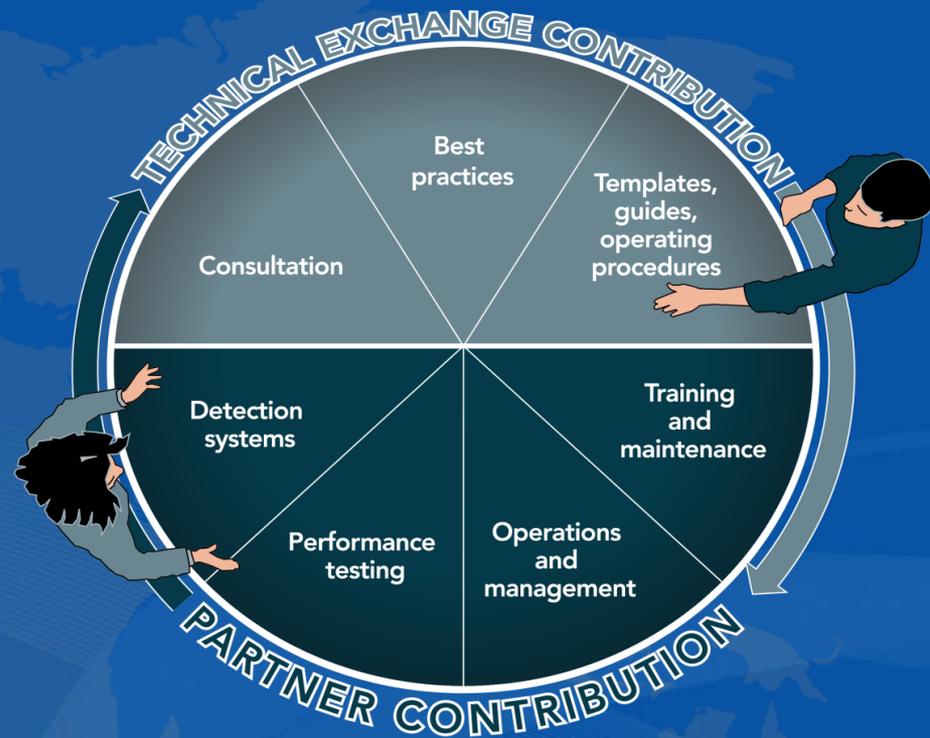
International Organizations

Technical exchanges, best practices, CoE support, joint training and consulting, joint exercises, sustainability partnerships



Technical Exchange

- **Leverage** 15 years international experience deploying radiation detection systems to bolster global capability to deter, detect, and interdict illicit nuclear trafficking
- **Build** capacity through collaborative approach to assist international partners to plan, implement, and sustain radiation detection programs
- **Deliver** access to subject matter expert consultation and collection of program tools (templates, best practices, document samples) designed to aid deployment process



Summary

SLD and the global community will optimize progress in combating nuclear smuggling only if:

- Detection systems are effectively sustained through strong joint maintenance and training efforts
- Information and experiences related to detection systems are appropriately shared to facilitate improved monitoring and deployment approaches
- Detection systems are effectively integrated into a partner country, regional and global strategy for detecting illicit trafficking

Contacts

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The Department of Homeland Security Domestic Nuclear Detection Office

Adam Graf

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The Department of Homeland Security

- In response to the attacks of September 11, the Department of Homeland security was created by the Homeland Security Act of 2002.
- DHS was established to coordinate the implementation of a national strategy to protect the U.S homeland from terrorist attacks, and to consolidate all the executive branch elements related to homeland security under one agency.
- DHS is responsible for:
 - Guarding Against Terrorism
 - Security of US Borders
 - Enforcing US Immigration Laws
 - Improving America’s Readiness for, Response to and Recovery from Disasters



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The goal is to substantially reduce the risk of nuclear and radiological terrorism.



- Non-POE (Illegal Crossing)
- Land POE
- Air POE
- Sea POE
- Potential source of nuclear and radiological materials
- POD
- Pre-clearance location
- Potential Target
- Target Vicinity
- Instrument Detectors
- Non-instrument Detection

Key Mission Areas

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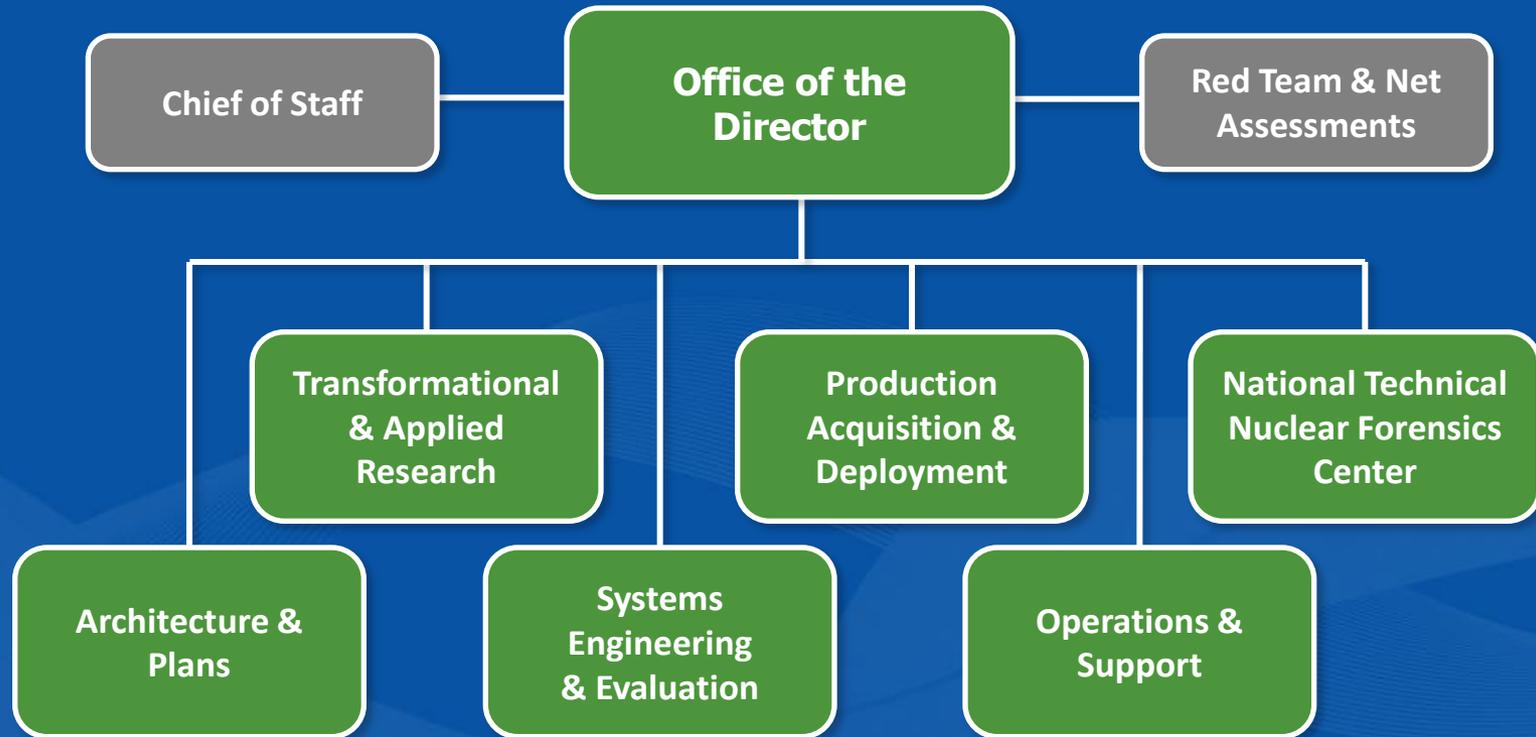


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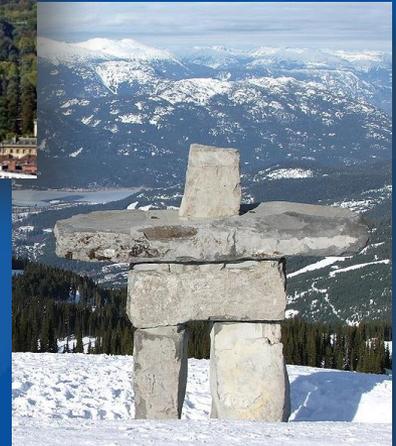
Exterior Mission Area

Program Elements

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- Bi-lateral Engagement
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Partners

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National Technical Nuclear Forensics Center

Operational Readiness:

- Provide centralized planning and integration of USG nuclear forensics programs and activities through interagency working groups, joint exercises, assessments, and foundational document development.

Interagency Stewardship and Coordination

Pre-Det Materials Capability Development

Technology Advancement:

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PHYSICAL NUCLEAR SECURITY TECHNOLOGY

Ron Teed

Director, Fleet Nuclear Security

Constellation Energy Nuclear Group, LLC

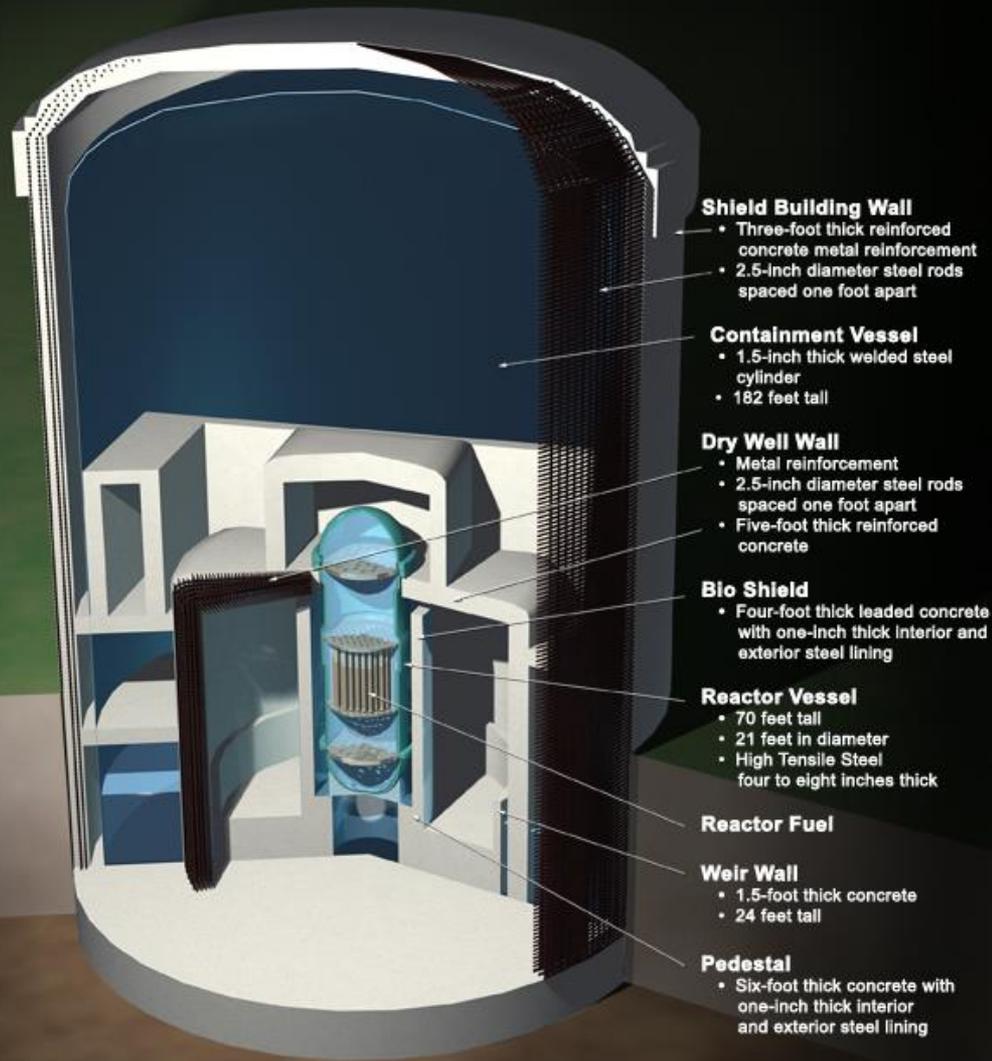
Discussion Topics

- General Information
- Physical Security Regulatory Requirements
- Design Basis Threat Overview
- Physical Security Measures
- Contingency Response
- Cyber Security
- Summary

General Information

- Safeguards information or security sensitive information will not be discussed
- Nuclear power plants in the United States are some of the most secure industrial facilities in the world
- Plants in the United States have robust structural designs, layered safety structures and comprehensive processes and procedures to assure nuclear safety

Multiple Layers of Safety at Nuclear Power Plants



Boiling Water Reactor

Physical Security Requirements

- Requirements for physical security measures at U.S. reactors are located in several federal regulations
- The primary regulation governing physical security is 10 CFR 73.55
- Oversight of compliance is provided by the Nuclear Regulatory Commission (NRC)

Physical Security Requirements

- All nuclear power plant security programs must be able to defend the facility against a Design Basis Threat (DBT) to prevent radiological sabotage and to prevent the theft or diversion of special nuclear material

Some DBT Attributes

- A determined violent external assault, attack by stealth, or deceptive actions
- Well-trained (including military training and skills) and dedicated individuals, willing to kill or be killed, with sufficient knowledge to identify specific equipment or locations necessary for a successful attack

Some DBT Attributes (cont.)

- Active or passive inside assistance
- Suitable weapons and hand-carried equipment
- Land and water vehicles
- Internal threats
- Land or waterborne vehicle bomb assaults
- Cyber attacks

Physical Security Measures

- Already robust plant structures are protected against the DBT with an integration of physical barriers, security technology, highly trained and well equipped security forces, site contingency plans and procedures, and integrated response with off-site law enforcement agencies

Physical Security Measures

- Sites are divided into three areas with layers of increasing security measures
 - Owner Controlled Area
 - Protected Area
 - Vital Areas

Nuclear Plant Security Zones

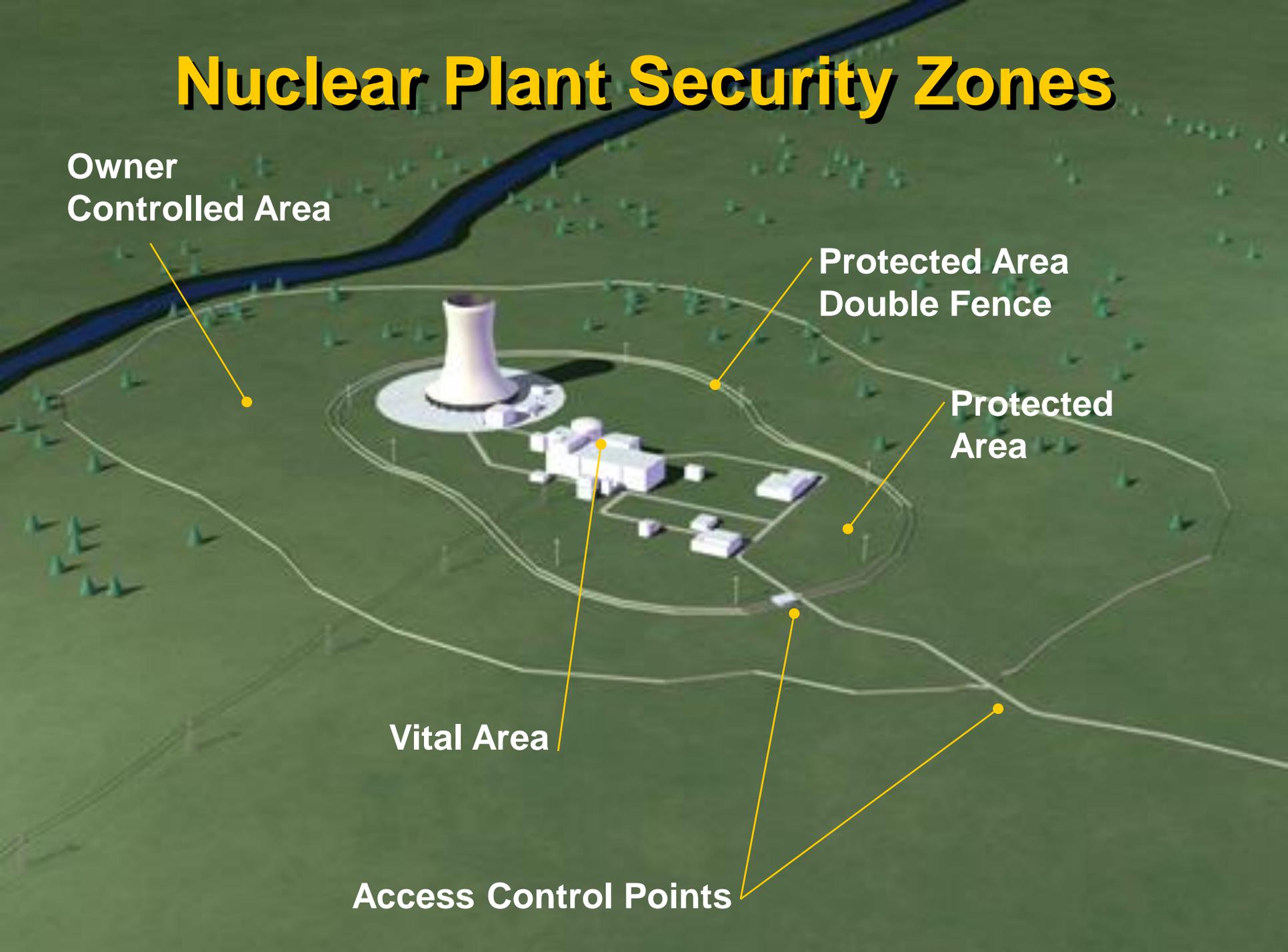
Owner
Controlled Area

Protected Area
Double Fence

Protected
Area

Vital Area

Access Control Points



OCA Physical Security Measures

- Measures vary based on site design and topography
- Vehicle Barriers
- Security restricted areas
- Security checkpoints and access control

OCA Physical Security Measures (cont.)

- Surveillance measures
 - Mobile random patrols
 - Surveillance cameras
 - Low/No light capability
- Site security detection and response capabilities
- Law enforcement response agreements

PA Physical Security Measures

- Vehicle Barrier Systems
- Multiple physical barriers
- Multiple intrusion detection systems
 - Central and Secondary Alarm Stations
- Uninterruptible power supplies
- Isolation zones
- Surveillance and assessment systems
- Delay barriers





PA Physical Security Measures (cont.)

- Access Control for personnel, vehicles, material
 - Authorization
 - Search for firearms, explosives, incendiary devices or other contraband
 - Metal detectors
 - Explosive detectors
 - X-ray machines
 - Biometric Access Control Systems





PA Physical Security Measures (cont.)

- Access Authorization
- Unescorted access to a nuclear power plant requires:
 - Work related need for access
 - Full background check (identify verification, employment, military, criminal history, education, credit, references)
 - Psychological evaluation
 - Initial and random drug and alcohol testing
 - Continuous observation program
 - Periodic reinvestigation

PA Physical Security Measures (cont.)

- Visitors require continuous escort
- Protected area surveillance
- Patrols
- Security response protocols

VA Physical Security Measures (cont.)

- Additional barriers separate from PA barriers
- Locks and alarms
- Access control through card readers or key control
- Key control and accountability
- Access authorization (work need) and access records
- Patrols

Contingency Response

- Well armed and trained response officers
- Fortified fighting positions
- Defense-in-depth protective strategies
- Equipped and trained to defend against a wide range of adversary tactics
- Command and control protocols
- Significant communications capabilities



Contingency Response (cont.)

- Integrated with law enforcement response plans
- Integrated with site emergency response plans
- Full scale exercises, limited scope drills, and tabletop exercises are conducted routinely
- NRC evaluated force-on-force exercises conducted at least every three years

Cyber Security

- Each site has a cyber security plan reviewed and approved by NRC
 - Dedicated personnel resources
 - Cyber barriers (e.g., air gaps, data diodes, etc.)
 - Detection and assessment protocols
 - Response protocols
 - Notification procedures
 - Integration with physical security

Summary

- Nuclear power plants are a critical component of the U.S. infrastructure
- Nuclear safety and security is the highest priority at U.S. plants
- The nuclear power industry has invested over \$1B capital dollars for security enhancements since 9/11
- Security forces have increased approximately 60%

Summary

- Modern technology,
- Well trained and dedicated security forces,
- Comprehensive plans and procedures, and
- Integrated contingency response capabilities,
- Result in protection against radiological sabotage and thereby protection of public health and safety.

PHYSICAL NUCLEAR SECURITY TECHNOLOGY

QUESTIONS?