Department of Homeland Security

Domestic Nuclear Detection Office

Research, Development, and Operations

Fiscal Year 2013

Congressional Justification

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BUDGET REQUEST AND SUPPORTING INFORMATION

Domestic Nuclear Detection Office
Research, Development, and Operations

I. Appropriation Overview

Mission Statement for Research, Development, and Operations:

The mission of the Department of Homeland Security's (DHS) Domestic Nuclear Detection Office (DNDO) is to counter the risk of nuclear terrorism against the United States by continuously improving capabilities to deter, detect, respond to, and attribute attacks, in coordination with domestic and international partners. DNDO's strategic focus includes prevention of acts of nuclear terrorism by developing and implementing a Global Nuclear Detection Architecture (GNDA) and advancing technical nuclear forensics capabilities. The GNDA incorporates detector systems, telecommunications, and personnel, with the supporting information exchanges, programs, and protocols that serve to detect, identify, and report on nuclear and radioactive materials and weapons out of regulatory control. To be effective, the GNDA requires close coordination with partners at the State, local, and tribal levels, within the Federal Government, with the private sector, and internationally. This strategy incorporates the concept of deterrence which serves as a capability multiplier against failure-averse adversaries and their enablers.

Because countering nuclear terrorism is a whole-of-government challenge, the United States Government (USG) has multiple Departments and Agencies with responsibilities within the GNDA, including the Departments of Defense (DoD), Energy (DOE), Justice (DOJ), and State (DOS), the Office of the Director of National Intelligence (DNI), and other Intelligence Community (IC) members, and the Nuclear Regulatory Commission (NRC). Within DHS, the Domestic Nuclear Detection Office (DNDO) has been charged with coordinating the development of the GNDA among the USG partners. In December 2010, DNDO delivered the GNDA Strategic Plan to Congress. This interagency product is designed to guide the nation's nuclear terrorism detection capacity and capability development over the next five years.

DNDO also annually submits the report on the "Global Nuclear Detection Architecture Joint Annual Interagency Review 2011" (2011 GNDA Annual Report) to Congress. The 2011 report includes information about the multiple USG programs that collectively seek to prevent radiological and nuclear (rad/nuc) terrorism against the United States by means of detection, analysis, and reporting on rad/nuc materials out of regulatory control[1]. This report fulfills a requirement of Section 1907 of the Homeland Security Act of 2002 (6 U.S.C. 101 et seq.) as added by Section 1103 of the "Implementing Recommendations of the 9/11 Commission Act of 2007" (P.L. 110-53), which mandates a Joint Annual Interagency Review of the GNDA. The report is jointly prepared by interagency partners including DoD, DOS, DOE, and DOJ, the ODNI, and the NRC.

[1] 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.

This year's budget submission reflects the impacts of the GNDA Strategic Plan and the Annual Report as DNDO continues to develop the GNDA. The Strategic Plan established the USG definition of the GNDA and established a framework for nuclear detection efforts that has been carried through in DNDO's planning and budgeting. In the Annual Report, departments and agencies were asked to specifically report on the performance goals identified in the GNDA Strategic Plan. Building upon these foundational documents and internalizing the recommendations has paved a path forward for DNDO's efforts and continued implementation of the architecture.

DNDO is also continuing to improve its modeling and analysis in support of the annual report and other GNDA analyses by integrating its advanced risk analysis capabilities, developed as part of the radiological and nuclear threat risk assessment (RNTRA) program and other risk analysis efforts, with other analysis capabilities into a GNDA analysis toolkit. This toolkit will apply best-of-breed, verified and validated analytic capabilities to support program assessments and prioritization, risk management, and architecture analyses of all types.

DNDO is focusing efforts to develop surge capabilities to detect threats within the context of limited or imperfect intelligence, warnings, or indicators. Ongoing work on the GNDA emphasizes mobile or agile detection components, which will increase the capability to respond to escalated threat levels by focusing detection assets on effective interdiction. The architecture must account for physical and technical limitation in order to achieve the best strategies, systems, and operations for nuclear detection. DNDO will use existing capabilities and a variety of operations and assets at the Federal, State, local, and tribal levels to surge our radiological and nuclear detection abilities in a coordinated fashion in response to suspected threats. The ability to surge rad/nuc detection capabilities will necessarily rely on the multiple State and local law enforcement agencies that are available to perform rad/nuc detection operations using mobile and human-portable sensors. DNDO is promoting several opportunities to emphasize the rad/nuc detection capabilities and operations at the State, local and tribal levels. Along with the Securing the Cities (STC) Program, DNDO will increase the number of engagements with stakeholders to conduct covert testing.

DNDO was established by National Security Presidential Directive (NSPD)-43 and Homeland Security Presidential Directive (HSPD)-14 to provide a focal point addressing rad/nuc detection. Title V of the Security and Accountability for Every Port Act of 2006 (SAFE Port Act of 2006, P.L. 109-347) directs DNDO to "serve as the primary entity of the United States Government (USG) to further develop, acquire, and support the deployment of an enhanced domestic system to detect and report on attempts to import, possess, store, transport, develop, or use an unauthorized nuclear explosive device, fissile material, or radiological material in the United States, and improve that system over time." DNDO is responsible for the acquisition of current and next generation of nuclear detection systems to maintain and expand the detection capability at all U.S. borders and U.S. interior. DNDO Systems Acquisitions provides for both the initial fielding of new equipment and ongoing recapitalization of existing equipment as it ages, needs upgrade, or replacement. DNDO is also responsible for integrating, advancing, and stewarding national nuclear forensics capabilities amongst the Departments of Defense, Energy, Justice, State, Homeland Security and the Intelligence Community.

DNDO has organized the majority of its detection-related development, test, evaluation, and acquisition programs into four mission areas. At the foundation of this mission space construct is the GNDA delineation of geographic layers (exterior, trans-border, interior, cross-cutting efforts), and

transportation pathways (air, land, and sea). DNDO works closely with Federal, State, and local entities with the primary operational responsibility for each pathway or within each layer to forge a more effective linkage between user requirements and technology and operational capability development efforts. The four mission areas to which DNDO has aligned activities, and the scope of activity addressed by each mission area, are described below:

The *land border* mission area addresses the development and deployment of systems designed to detect illicit rad/nuc materials entering the United States at and between land border ports of entry (POEs). This area includes official U.S. Customs and Border Protection (CBP) Ports of Entry (POE), and areas between the POEs manned by CBP's Office of Border Patrol. The Land Border environment includes all types of commercial conveyances and cargo, all personally-owned vehicles (POV), passenger buses, international freight rail, international passenger rail (including baggage), pedestrians (including baggage), as well as those making illegal entry into the U.S. at areas between the POEs.

The *aviation mission area* addresses all threat pathways involving civil air transport – both commercial operations and general aviation. Radiological and nuclear threats may be transported via air as a prelude to an attack elsewhere, or the actual attack involving a rad/nuc threat device may be executed and delivered directly by air. Rad/nuc detection capabilities address the scanning of air cargo, aviation passengers and their baggage, as well as the aircraft and crew.

The *maritime mission area* addresses the scanning of people, cargo, vessels, and other conveyances at seaports of entry and on seas, oceans, or other navigable waterways within U.S. Federal, State, local and tribal law enforcement jurisdiction. All vessels, including container ships, commercial fishing boats, tug boats, barges, commercial tour boats, cruise ships, tankers, bulk cargo ships, and privately owned/operated pleasure craft and sailboats, within the defined maritime domain may be exploited by terrorists to transport illicit rad/nuc material. The current state of the maritime architecture has primarily addressed portions of the pathway corresponding to containerized cargo and some elements of small vessel security. DNDO is prioritizing efforts towards addressing the gaps in maritime domain awareness, unresolved small vessel security countermeasures, and commercial non-container maritime cargo, in parallel with continued development of existing elements of the maritime architecture.

The *interior mission area* comprises all detection opportunities within U.S. borders across all pathways – land, air, and water. The risk to metropolitan urban areas and critical infrastructure is reduced through facilitated build out of relevant rad/nuc detection programs, which are coordinated with State and local partners

Further, in its *cross mission and infrastructure support* role, DNDO directly interfaces with Federal, State, and local stakeholders to gather rad/nuc technology and operational capability requirements and provide these requirements to the systems development and operations support activities within DNDO. Once these systems are deployed, DNDO provides ongoing, centralized alarm adjudication and information sharing services which allow for situational awareness of the GNDA across all domains and pathways with inputs from partners.

DNDO is committed to ongoing interaction with Federal, State, and local groups across the full range of systems development efforts, which include all necessary systems engineering and test and evaluation needs. In addition, DNDO develops training and exercises specific to user groups, their

operations, and relevant technologies. As a complement to the activities of these mission areas, DNDO will continue a full range of mission support efforts such as systems engineering, test and evaluation infrastructure, red team and net assessments, architecture studies, and operations support activities, including technical and secondary reachback.

Finally, DNDO also plays a key role in a mission that is linked to the GNDA – the identification of smuggling networks and those responsible for illicit trafficking in rad/nuc materials and for planned and actual attacks using rad/nuc weapons or materials. Specifically, DNDO is the USG focal point for the national technical nuclear forensics (NTNF) program, which supports the attribution of rad/nuc events in concert with intelligence and law enforcement information. DNDO has the responsibility for planning, advancing, integrating and stewarding nuclear forensics capabilities amongst DHS, DoD, DOE, DOJ, DOS, and ODNI.

Together, the GNDA and NTNF work to strengthen prevention and deterrence by detecting rad/nuc materials out of regulatory control, enabling the identification and closure of illicit rad/nuc trafficking networks, promoting nuclear security, disrupting planned attacks in the initial stages and potential follow-on attacks, and influencing potential adversaries by increasing their perceived risk of failure and the prospect of being held accountable for planned and executed attacks. The National Technical Nuclear Forensics Center (NTNFC) provides the technical capability to determine the origin and nature of nuclear or radiological attacks, interdicted source materials and devices to support national priorities for deterrence, attribution and prosecution. The Nuclear Forensics and Attribution Act (NFAA), signed into law on February 16, 2010, codified this mission within DNDO and included specific requirements to lead the development and implementation of the National Strategic Five-Year Plan for improving U.S. nuclear forensic and attribution capabilities, and to establish a National Nuclear Forensics Expertise Development Program to address the workforce pipeline needs in nuclear forensics.

The Research, Development, and Operations (RD&O) request identifies resources required for GNDA Development and the implementation of solutions to address vulnerabilities in the GNDA and all required mission and operations support activities.

B. Budget Activities:

In the present budget environment, DNDO has prioritized its request from RD&O to Systems Acquisition to continue the recapitalization of Customs and Border Protection Radio-Isotope Identification Devices (RIID) to Next Generation devices to support the fielding of enhanced detection capability to U.S. borders. The presently-deployed RIIDs have known technical limitations and are approaching or past their anticipated service lives. Funding decreases, primarily from the Systems Development PPA, also provide support to acquire new capability for stand-off detection in the maritime domain.

Systems Engineering and Architecture

All DNDO programs and mission areas require the implementation of a strong and disciplined systems engineering approach. Systems engineering is integral to program support, and includes areas such as risk management, configuration control, requirements development, and technical evaluation and

analysis. Systems engineering is also a key component of test and evaluation efforts, providing the bases for the development of test strategies and plans, generation of test requirements, selection of appropriate test venues and equipment, support of test implementation, and reporting of test results. Additionally the development of detection technology standards to set the goals of the technology performance is included in this program.

At the core of all DNDO activities is the systems architecture function: determining gaps and vulnerabilities and then formulating recommendations and plans to mitigate the same.

The Joint Annual Interagency Review of the GNDA provides a means to evaluate and document the GNDA. DNDO Systems Architecture efforts are focused on developing an enhanced GNDA, including both domestic and international components. The global architecture 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 rad/nuc materials that are out of regulatory control.

The GNDA Strategic Plan completed and approved in FY 2011, will be used as a framework for implementation planning and for smaller, more focused implementation plans such as the domestic GNDA implementation plan. The completion of the strategic plan also supports additional strategic analyses such as the GNDA Capabilities Based Assessment (CBA) which will complete its first spiral development in FY 2012. This CBA will be a structured accounting of current rad/nuc detection capabilities compared to envisioned capabilities and an assessment of how to bridge the difference.

Both the GNDA Strategic Plan and the Joint Annual Interagency Review serve to inform DNDO's budget process by providing, respectively, an overall strategic direction to USG (and DNDO) efforts on behalf of developing and implementing the GNDA and a examination of the progress of the GNDA. The Joint Annual Interagency Review for 2011 provided particular recommendations to aid in improving the GNDA by listing specific objectives and performance goals that describe what the USG, and in particular DNDO, must do to develop and implement the GNDA. This document also identifies metrics for a number of programs supporting the GNDA. In the future, these metrics will be evaluated in the context of the Strategic Plan's objectives and performance goals, thereby defining a more robust set of performance measures that collectively will gauge the effectiveness of GNDA implementation. This information will then be used in developing DNDO's budget.

Near-term priorities for Systems Engineering and Architecture are:

- Initiate a spiral development process to coordinate and synchronize the collaborative development of the GNDA products by the stakeholders such as the annual review, capabilities based assessment, and the radiological and nuclear threat risk assessment (RNTRA). This spiral process will build upon and formalize the collaborative process that was followed by the interagency stakeholders to successfully develop the GNDA Strategic Plan 2010, the GNDA Joint Interagency Annual Review 2011, and the Interagency Domestic Radiological/Nuclear Search Plan.
- Complete the first spiral of a Capabilities-Based Assessment (CBA) for the GNDA.
- Continually update the architecture gap and risk analyses models.
- Complete the 2012 Joint Annual Interagency Review.

- Complete the 2012 RNTRA update.
- Expand structured architecture studies to a broader range of potential pathways and identify solution options for enduring vulnerabilities in the GNDA.
- Incorporate Domain Awareness requirements into appropriate architecture analyses. Domain awareness remains an important GNDA priority. The ability to encounter, detect, and identify conveyances and people in land, air, and sea pathways in the trans-border layer is the foundation for nuclear detection. Incorporate information connectivity requirements into architecture analyses. Identify connectivity of nuclear detection capabilities, communications, and information/intelligence sharing among GNDA partners to enhance real-time tracking, trend analysis and threat evaluation, both domestically and worldwide.
- Publish Technical Capability Standards for backpack and vehicle mobile rad/nuc detection equipment.
- Develop a draft, threat-based technical Capability Standard for maritime rad/nuc detection systems.
- Continue to participate in the development of national and international standards for rad/nuc detection equipment.
- Develop and implement an Operating Instruction for the planning and execution of Systems Engineering Technical Reviews to assess program maturity and to assist the Program Manager in determining if the program is ready to proceed to the next stage of the DNDO Solutions Development Process.
- Establish a Risk Management Program to promulgate consistent, disciplined risk management principles across DNDO.
- Establish and execute a Configuration Management Program for DNDO to prescribe and carry out disciplined configuration management principles and procedures.

Systems Development

DNDO Systems Development programs serve as the rad/nuc detection improvement component within DNDO, taking concepts for new detection systems from exploratory (or long-range) research to a level of maturity sufficient for production and deployment. DNDO meets its Systems Development responsibilities by applying two different yet complimentary approaches. In the more direct approach, DNDO identifies proven technology found suitable to meet various mission requirements applicable to current vulnerabilities identified in the GNDA, including identifying potential end uses. In these cases, Systems Development activities include engineering development and all developmental logistics elements associated with current as well as next-generation nuclear detection systems. The second approach is less direct. It is designed to foster initiatives within industry, academia, and the broader community of stakeholders to leverage their own programs and creativity toward advancements that will benefit the GNDA. By increasing communications, promoting competition, and enhancing the sharing of ideas among stakeholders DNDO is able to leverage normal market incentives in the development of next-generation products. The result is that commercial off the shelf (COTS) products are available for GNDA applications, at lower risk and cost to the Federal Government. The long-range research will be done through DNDO's transformational research activities. This research directly feeds the development activities detailed here. Current programs include advanced radiation portal monitors, human portable systems, and imaging techniques, as well as neutron detection technology replacement, among others.

In order to implement the requirements of the DHS Acquisition Directive 102-01 (AD 102-01) and improve overall program oversight, DNDO has implemented and continues to improve the Solution Development Process. The process includes foundational guidelines for long term plans, stage requirements and stage gates for program decision phases. This process provides a structured mechanism for leadership to initiate programs and objectives; to conduct periodic reviews and evaluate programs against approved objectives and milestones. As this process matures it will continue to provide insights to health of DNDO programs toward meeting their cost, schedule, and performance objectives. Improvements will increase effectiveness in linking program contributions to filling gaps in the GNDA and, ultimately, reduction of risk to nuclear terrorism.

DNDO is promoting several opportunities to further develop rad/nuc detection capabilities and operations at the State and local level. DNDO's first Rad/Nuc Challenge, planned for FY 2012 will provide a competition within the rad/nuc detection community, and will include industry demonstrations and information exchange forums. Expos, trade shows, and competitions (as in this context) have been shown to provide a cost effective way to foster and sustain communication with many members of a community and advance development in the field in a relatively short amount of time. Hosting the Rad/Nuc Challenge will move DNDO toward a position of prominence, recognized leadership, and excellence necessary for the effective and efficient accomplishment of its mission.

Near-term priorities for Systems Development are:

- Advance the technical maturity of emerging technologies to passively detect rad/nuc threats from a stand-off distance.
- Development and evaluation of boat-mounted rad/nuc detection technologies to address the "detection at sea" mission.
- Development of non-Helium-3 (^{3}He) based neutron detectors.
- Analysis of operational needs of domestic Airports of Entry (APOEs) sites, with a focus on inbound international air cargo, and identify potential solution options.
- Improve rad/nuc systems' algorithm performance for detection and identification of radiation.
- Drive improvements to human portable nuclear detection equipment through a commercial first approach.
- Complete Field Validation Testing of selected improvements to deployed PVT solutions.

Transformational Research and Development

DNDO established a transformational research and development (R&D) program to identify, explore, develop, and demonstrate scientific and technological approaches that meet one or more of the following criteria: address gaps in the GNDA, dramatically improve the performance of nuclear detection components and systems, or significantly reduce the operational burden of rad/nuc detection. Dramatic technological improvements may include improvements in system or component effectiveness and performance characteristics; reduction in cost of acquisition or maintenance; or reduction of operational burden by users in the field. R&D investments are made based on competitive awards, with investigators in all sectors – government laboratories, academia, and private industry – encouraged to participate. This program takes advantage of the qualities and respective advantages of all three sectors to develop products, and teaming among them is encouraged. Transformational R&D is carried out within three major programs: Advanced Technology Demonstrations (ATD), Exploratory

Research Program (ER) Program, and the Academic Research Initiative (ARI). Maintaining a robust research and development program is key to developing and delivering new technologies that are crucial to countering the threat of nuclear terrorism.

The ATD program builds on technology concepts previously demonstrated under the ER Program, or equivalent. Through the ATD, technology concepts are developed into Performance Test Units (PTU) that are capable of providing reliable and scalable performance measurements in a challenging and realistic simulated operational environment. Through this technology characterization, sufficient understanding of the technology potential is obtained to inform a Cost-Benefit Analysis (CBA) for the transition of the PTU technology to a Government acquisition program or to commercial system development.

The ER Program consists of innovative, high-risk, early-stage, new ideas that can make a transformational contribution to the DNDO mission of reducing the risk of nuclear terrorism. Specifically, the ER Program focuses on potential techniques for closing gaps in the GNDA and substantially improving the performance or reducing the cost of radiological/nuclear detection capabilities. Projects cover all major technical areas including materials development, passive detection techniques, neutron detection / ^{3}He replacements, shielded Special Nuclear Material (SNM) detection, modeling and algorithms, and nuclear forensics.

The ARI is a joint National Science Foundation (NSF) and DNDO program established through a formal Memorandum of Understanding (MOU) in January 2007 to conduct basic and long-term research to stimulate innovation across many radiation detection sectors while augmenting the ER Program and supporting the DNDO research goals. The ARI has the additional goal to develop and train the next generation of researchers in nuclear detection technology.

Near-term priorities for Transformational Research and Development are:

- Initiate at least one new Advanced Technology Demonstration (ATD) every year as programs build on past success. Continue to initiate one ATD per year with a performance period of two to three years per ATD with transitions throughout FY 2012 and FY 2013.
- Maintaining a robust rad/nuc ER program by reviewing projects each year, with an emphasis on culling the less-promising efforts while initiating new ones. A strong ER program which explores innovative, high-risk, early-stage, new ideas can make a transformational contribution to the DNDO mission of reducing the risk of nuclear terrorism.
- The ARI is most effective when supported through continuous and constant funding. Continue the ARI to engage the academic community in DNDO research goals, building a community dedicated to solving long-term, high-risk research issues and to develop the next generation of researchers in nuclear detection technology.

Assessments

The DNDO capability development process is anchored by a critical assessment of technologies as they are developed, deployed and operated, as well as a continual assessment of the GNDA itself. Development and acquisition programs are supported by a rigorous and objective test and evaluation (T&E) program to characterize technologies and systems to understand technical performance, operational effectiveness, and system limitations. Red teaming deepens our understanding of

adversary capabilities and presents those adversarial-based capabilities to Federal, State, local, and tribal operations in overt and covert tests. Overt and covert tests use inside information to intentionally introduce radioactive sources against operationally deployed defenses to assess the performance of fielded technology, training, and protocols. Adversarial-based assessments are from an outsiders' perspective without using any "inside" information of current or planned capabilities. Net assessments provide independent reviews to identify the effectiveness of planned and deployed programs and operations, which support the GNDA. Net assessments examines the various DNDO programs; reviews procedures and policies; identifies lessons learned; and conducts continuous independent assessments to determine value added against the global threat. Net assessments, with cooperation from Federal, State, local and tribal operational partners, are part of an on-going strategy to improve the overall probability of success in the rad/nuc mission.

In addition to the above activities, DNDO executes pilots – activities planned as operational tests or trials that serve as a tentative model for future development or deployment decisions. While DNDO's aforementioned test campaigns are intended to evaluate the technical performance of detection technologies in controlled environments, pilot programs allow DNDO to conduct limited deployments of new CONOPS or emerging rad/nuc detection technologies in existing operational environments, or alternately, existing CONOPS or technologies in new operational environments. These pilots provide an assessment of the processes, equipment, and/or systems to support nuclear detection mission objectives and customer/stakeholder requirements. Pilots offer the opportunity for DNDO to identify and leverage lessons learned that will reduce the risk of full scale deployments, enhance the impact of limited and competing resources, and expedite deployment of the GNDA, thereby increasing the Nation's ability to respond to the rad/nuc threat. In addition, DNDO has established Graduated Rad/Nuc Detector Evaluation and Reporting (GRaDER^{SM}), a program to ensure independent and consistent testing of radiation detectors is performed by accredited laboratories against ANSI standards.

Near-term priorities for Assessments are:

- Maintain the expertise and resources to conduct up to 10 individual test campaigns.
- Design an Archival and Retrieval Management System (ARMS)/Report Analysis and Archive System (RAAS) interface with test and evaluation modeling methodologies, so that experimental data can support emerging modeling capabilities.
- Initiate GRaDER testing of the Technical Capability Standard for Handheld Instruments Used for the Detection and Identification of Radionuclides.
- Conduct overt and/or covert red team operations that test, at a minimum, the following GNDA nodes each year: official Ports of Entry (POE); commercial vehicle screening; transportation venue screening; federal, state, or local maritime operations; and special event screening. Number of test is highly dependent on the complexity of the venues chosen.
- At least once per fiscal year, red team operations should conduct covert tests designed to assess the entire adjudication process from the point of detection, through reachback, and hand off to appropriate federal response elements.
- Net Assessments' primary focus will be performing an assessment of the GNDA, including both intra and inter-agency partners.

- Provide assessment and Red Team findings and lessons learned for appropriate integration into the next Securing the Cities (STC) region. Continue to assess STC program in the New York City region and a second STC region.

Operations Support

DNDO Operations Support Directorate (OSD) provides resources, strategies, and standards to Federal, State, and local stakeholders who are developing or enhancing their nuclear detection capabilities, especially as they relate to the GNDA. This support includes keeping stakeholders aware of relevant nuclear detection information or incidents, assisting in developing local or regional programs and integrating those programs' interactions with the GNDA, guiding the development of CONOPS and standard operating procedures (SOPs), and developing training and exercise products to ingrain those procedures into day-to-day activities.

To accomplish this, operational support activities at DNDO are grouped into three basic functions:

Securing the Cities (STC): This activity seeks to assist stakeholders to prevent the successful deployment of a radiological/nuclear terrorist weapon against the major metropolitan areas in the United States by establishing sustainable capability among State, local and tribal agencies to detect and report unauthorized radiological/nuclear materials within their jurisdictions in support of the GNDA. STC utilizes Systems Acquisition funding for the program.

Training, Exercising, and Assistance (to non-Tier 1 cities): Training, exercising, and assistance (TE&A) for nuclear detection is provided to Federal, State, local and tribal agencies. The assistance can be part of establishing a startup nuclear detection program, working to enhance an existing program, or providing standards and materials for training and exercises. The efforts of the TE&A section are tied to the performance and organization of the existing rad/nuc detection programs within the Federal, State, or local jurisdiction or agency. Support activities are jointly planned with the agency or region requesting the assistance. The plan establishes the level of support appropriate to the program. TE&A materials and standards are provided to these agencies and regions to ensure consistent application of the processes, functional compatibility between agencies and regions, and integration at the Federal level. These services, combined with others, assist in building the domestic portion of the GNDA and assist in DNDO's mission of assuring an effective response to a rad/nuc event.

Joint Analysis Center (JAC) (for analysis and sharing of information related to the GNDA): The JAC works directly with State and local law enforcement, the Intelligence Community and other Federal partners to determine indicators of nuclear terrorism to disseminate this information to relevant decision makers. Additionally, OSD develops and maintains information sharing capabilities and analytical tools necessary to support the GNDA during all modes of operation across Federal, State, local, and tribal law enforcement.

DNDO works directly with law enforcement and other Federal partners to determine indicators of nuclear terrorism to recommend appropriate response, including interdiction. Additionally, DNDO develops and maintains information sharing capabilities and analytical tools necessary to support an integrated operating system to be used by Federal, State, local, and tribal law enforcement agencies, as

well as the larger intelligence and counterterrorism communities. DNDO rounds out its support to State and local entities through a training and exercise program tailored to the needs of the community.

More specifically, a centralized support capability is provided through the DNDO JAC, a 24/7 information and analysis function that provides for situational awareness of the deployed nuclear detection architecture, timely information reporting, and facilitation of technical support for alarm adjudication and resolution. The JAC relies on the national laboratory-based Secondary Reachback Program (SRB) to provide expert advice and analysis in support of detection operations, and on the Nuclear Assessment Program (NAP) to provide technical analysis related to nuclear incidents as well as foreign and domestic detection capabilities. With the release of the GNDA Strategic Plan, DNDO has refocused the technical expertise resident within NAP towards specific requirements of DNDO to include the development of classified annexes for architectural studies; creation of GNDA visualization tools; operations support activities and the ongoing development and execution of red team and assessment activities. Specifically, NAP provides technical advice and assistance to DNDO operations and the supporting elements of the GNDA. NAP assists DNDO in defining, monitoring, and updating the evolution of the GNDA.

The Information Sharing Program provides the necessary Enterprise and Data Architecture to enable our Federal, State, local and commercial partners to effectively share rad/nuc information. The Mission Critical Messaging (MCM) program provides the capability to implement automated sharing of situational awareness with our partners. As the programs mature, DNDO is consolidating them under the Operation Support PPA to enable and better align with the common objectives of other programs in the account.

Near term priorities for Operations Support are:

- Systematically build integrated radiation detection capabilities in the Interior layer of the GNDA, including information sharing mechanisms.
- Routinely gather, analyze and share rad/nuc informational products to ensure the Department and all its partners can conduct collaborative rad/nuc operations based on a common frame of reference.
- Ensure that detection events lead to an appropriate response by local or Federal law enforcement, fire and other public safety operations.
- Conduct engagements with State and local communities to increase awareness, partnerships, and capabilities.
- Expand existing foundational programs, such as training, exercises, and onsite program assistance to include a broader range of customers, evolving risks and vulnerabilities, technologies, and proven operational concepts.
- Operate, maintain, and enhance the JAC Collaborative Information System, as the government's capability to receive, analyze, store, and report on rad/nuc-related information.
- Creating the GNDA Information Exchange Architecture and begin implementation of key data exchange connections with selected Federal, State, and local partners to enable situational awareness and coordinated response to the rad/nuc threat.

National Technical Nuclear Forensics

Technical nuclear forensics supports nuclear attribution – the identification of those responsible for planned or executed attacks using rad/nuc weapons or materials – when combined with intelligence and law enforcement information. Through its contribution to attribution, technical nuclear forensics strengthens U.S. defenses against nuclear threats by:

- Encouraging nations to ensure the security of their rad/nuc materials or weapons to help prevent their unwitting transfer to third parties through loss of control;
- Tracing the source of materials to help identify and close smuggling networks;
- Deterring nations from providing nuclear weapons or materials to terrorists;
- Disrupting terrorist plans in the initial stages;
- Informing national and international decisions should a plot be uncovered or an attack occur;
- Assisting efforts to prevent follow-on attacks; and,
- Helping to bring terrorists and their facilitators to justice.

The National Technical Nuclear Forensics Center (NTNFC), which serves as the USG focal point for the National Technical Nuclear Forensics (NTNF) program, was established within DNDO on October 1, 2006 and codified by NSPD-17/HSPD-4 (Annex IV) in July 2007. This Presidential Directive assigned roles and responsibilities to six Federal departments and agencies for developing and maintaining a comprehensive NTNF capability. DNDO was given two core missions. The first is to provide national-level integration, centralized planning, assessment and stewardship as the USG integrator for a nuclear forensics capability that must be ready, robust, and enduring. The second mission is to advance the capability to conduct forensics on rad/nuc materials prior to detonation materials which may have been illicitly trafficked and/or extracted from an interdicted weapon. The *Nuclear Forensics and Attribution Act* (NFAA) (P.L. 111-140), signed into law on February 16, 2010, further codified this two-tiered mission and mandated DNDO to lead the development and implementation of the National Nuclear Forensics Expertise Development Program (NNFEDP) and the National Strategic Five-Year Plan for Improving the Nuclear Forensics and Attribution Capabilities of the United States. DNDO is striving to appropriately resource and advance NTNF capabilities in order to support the U.S. declared commitment to hold fully accountable any State, terrorist group, or other non-State actor that enables terrorist efforts to obtain or use weapons of mass destruction.

DNDO staffs the NTNFC with DHS experts and detailees from partner departments, including DoD, DOE and DOJ/FBI, which provides a Supervisory Special Agent from the FBI Laboratory as the NTNFC Deputy Assistant Director. This team addresses the program integration and pre-detonation materials missions comprehensively, by organizing NTNFC's activities into three key work areas: 1) Operational Readiness, 2) Technology Advancement, and 3) Expertise Development.

The nuclear forensics Operational Readiness work area comprises activities that ensure the USG has robust jointly-developed plans that are regularly exercised and assessed, to assure preparedness for a nuclear attack or interdiction, immediately and without warning. NTNFC leads the nuclear forensics community in the implementation of the National Strategic Five-Year Plan and activities outlined therein, through the use of its well-established interagency forums. In addition, NTNFC leads the development and revision of foundational documentation, the organization and evaluation of interagency exercises, and the conduct of periodic capability assessments.

Due to the complexity of pre-detonation materials characteristics, NTNFC addresses Technology Advancement systematically, across the nuclear fuel cycle and the pre-detonation forensics phases of materials collection, analysis, and evaluation. NTNFC works with domestic and international partners to design and build programs that define the use of standardized methods for lab analyses, articulation of confidence in results, and practice of demonstrated competencies in measurements and evaluations. This strategy increases knowledge of the characteristics of domestic and foreign materials, signatures, and manufacturing processes – utilizing current and emerging techniques and tools tied to rigorous standards for forensics investigations.

Finally, the Expertise Development work area ensures that a sufficient population of highly qualified scientists is cultivated and sustained to provide the critical technical expertise that underpins the entire NTNF enterprise. DNDO plans to continue to expand the NNFEDP gradually, in step with the mission requirements and assessments of the supply and demand. The NTNFC will introduce three to four new Ph.D. scientists into the NF workforce annually as it advances toward the goal of adding at least 35 new scientists by 2018. These metrics are based on the recommendations of the expert Nuclear Forensics Science Panel and the American Association for the Advancement of Science (AAAS)/American Physical Society (APS) to stem the loss of qualified personnel and maintain baseline staffing levels. NTNFC reports on these metrics in the DHS GPRA, in which NNFEDP reporting is combined with TAR Academic Research Initiative (ARI) reporting to reflect comprehensive DNDO progress toward meeting its academic/expertise development-related goals.

The following near-term priorities for NTNFC are underpinned by Public Law 111-140, Presidential Directive, National Strategic Five-Year Plan, and National Academy recommendations:

- Address each of the strategic objectives for improvement of technical nuclear forensics, as described in the National Strategic Five-Year Plan.
- Advance the rigor and effectiveness of the interagency exercise program, as recommended by the National Academy of Sciences.
- Advance international cooperation in nuclear forensics best practices, exercising, and development of national libraries through collaboration with the IAEA, Global Initiative, Nuclear Security Summit, and other venues.
- By the end of FY 2017, develop analytical measurement methods for rad/nuc materials in the following categories: chemical form of the material; physical form of the material; concentration of major, minor, and trace elements; and age-dating.
- Develop a capability to process uranium and plutonium on a laboratory scale for the purposes of producing material of known provenance, which can be used to develop a predictive model for signature development.
- Produce nuclear forensic-specific Certified Reference Materials to validate methods used for characterizing materials.
- Continue to expand the NNFEDP gradually to meet the goal of adding at least 35 new Ph.D. scientists into the workforce by 2018.

C. Budget Request Summary:

The Domestic Nuclear Detection Office requests $236.830 million in FY 2013 funding for Research, Development, and Operations.

II. Summary of FY 2013 Budget Estimates by Program/Project Activity (PPA)

Department of Homeland Security
Domestic Nuclear Detection Office
Research, Development, and Operations:
Summary of FY 2013 Budget Estimates by Program Project Activity

FY 2013 Request
(Dollars in Thousands)

Program Project Activity	FY 2011		FY 2012		FY 2013		Increase(+) or Decrease(-) for FY 2013					
	Actual Obligations		Enacted Budget Authority		Requested Budget Authority		Total Changes		Program Changes		Adjustments-to-Base	
	FTE	Amount	FTE	Amount	FTE	Amount	FTE	Amount	FTE	Amount	FTE	Amount
Systems Engineering and Architecture	-	34,607	-	30,000	-	30,091	-	91	-	1,295	-	(1,204)
Systems Development	-	68,420	-	51,000	-	28,401	-	(22,599)	-	(21,496)	-	(1,103)
Transformational Research and Development	-	98,478	-	40,000	-	83,897	-	43,897	-	43,897	-	-
Assessments	-	40,799	-	38,000	-	33,198	-	(4,802)	-	(4,194)	-	(608)
Operations Support	-	32,656	-	33,000	-	35,679	-	2,679	-	3,290	-	(611)
National Technical Nuclear Forensics Center	-	23,032	-	23,000	-	25,564	-	2,564	-	4,463	-	(1,899)
Total, Research, Development, and Operations:	**-**	**297,992**	**-**	**215,000**	**-**	**236,830**	**-**	**21,830**	**-**	**27,255**	**-**	**(5,425)**
Subtotal, Enacted Appropriations and Budget Estimates	**-**	**297,992**	**-**	**215,000**	**-**	**236,830**	**-**	**21,830**	**-**	**27,255**	**-**	**(5,425)**
Less: Adjustments for Other Funding Sources	**-**	-	**-**	-	**-**	-	**-**	-	**-**	-	**-**	-
Net, Enacted Appropriations and Budget Estimates:	**-**	**297,992**	**-**	**215,000**	**-**	**236,830**	**-**	**21,830**	**-**	**27,255**	**-**	**(5,425)**

III. Current Services Program Description by PPA

Department of Homeland Security
Domestic Nuclear Detection Office
Research, Development, and Operations:
Systems Engineering and Architecture
Program Performance Justification
(Dollars in Thousands)

PPA: Systems Engineering and Architecture

	Perm. Pos	FTE	Amount
2011 Actual Obligations	**-**	**-**	**34,607**
2012 Enacted Budget Authority	**-**	**-**	**30,000**
2013 Adjustments-to-Base	-	-	(1,204)
2013 Current Services	**-**	**-**	**28,796**
2013 Program Change	-	-	1,295
2013 Total Requested Budget Authority	**-**	**-**	**30,091**
Total Change 2012 to 2013	-	-	91

DNDO requests $30.091 million for this activity in FY 2013. DNDO has identified efficiency savings of $1.204 million in FY 2013 by refining our approach to completing Capabilities Based Assessments, and modeling in support of the radiological and nuclear threat risk assessment (RNTRA).

CURRENT SERVICES PROGRAM DESCRIPTION:

DNDO Systems Engineering and Architecture Program develops, implements, and supports a disciplined systems engineering (SE) approach throughout DNDO and enhances the Global Nuclear Detection Architecture (GNDA), including both domestic and international components.

QHSR Strategic Alignment - Systems Engineering and Architecture

- Department of Homeland Security (DHS) Quadrennial Homeland Security Review (QHSR) Mission 1, Preventing Terrorism and Enhancing Security
  - Goal 1.2: Prevent the Unauthorized Acquisition or Use of Chemical, Biological, Radiological, and Nuclear (CBRN) Materials and Capabilities
    - Objective 1.2.3: Control Movement of CBRN
    - Objective 1.2.4: Protection Against Hostile Use of CBRN

SYSTEMS ENGINEERING

Description

Application of sound systems engineering principals is the foundation for successful system development and acquisition programs. The Systems Engineering Process Integration (SEPI) program provides the independent review and assessment that is required to ensure that systems engineering principles are consistently applied across the multiple Systems Engineering efforts supporting various DNDO Directorates and Programs. SEPI will also provide for consistent policies, procedures, and execution of a disciplined configuration management program for all systems engineering products, common implementation of programmatic risk management principals, and development of multiple life-cycle cost estimates throughout the year. This project will also provide for the capability to conduct several Analysis of Alternatives (AoAs) or Alternative Analysis (AAs)[2] concurrently and in a uniform and defendable manner consistent with the Department's Acquisition Directive (AD) 102-01 and the Solutions Development Process. SEPI will also provide required independent technical reviews in support of the DNDO Lead Technical Authority as required by the DHS AD 102-01.

Rad/Nuc Detection Standards

Description

The SAFE Port Act of 2006 (PUBLIC LAW 109–347) requires that "*the Secretary, acting through the Director for Domestic Nuclear Detection and in collaboration with the National Institute of Standards and Technology, shall publish technical capability standards and recommended standard operating procedures for the use of nonintrusive imaging and radiation detection equipment in the United States.*" The Rad/Nuc Detection Standards program fulfills the U.S. Government responsibility for providing necessary support for the development and maintenance of standards for rad/nuc detection. This includes participating on the national and international standards committees developing consensus standards (ANSI and IEC) as well as leading the inter-agency teams developing threat-informed government unique technical capability standards. It should be noted that the process for developing consensus standards and technical capability standards is an iterative process that re-evaluates the requirements over time as the standards committee considers new information developed during standards validation, testing, and use by industry and end-users. It is anticipated that two – three standards will be under review revision or update in any given fiscal year. The specific goal for the planning year is to finalize and publish inter-agency approved Technical Capability Standards for backpack radiation detection systems and for vehicle mobile radiation detection stems, and a draft, threat-based Technical Capability Standard for aerial rad/nuc detection systems.

[2] In accordance with "DHS Acquisition Instruction/Guidebook 102-01-001", the AoA is an analytical comparison of alternatives for fulfilling the specific capability gaps/needs. The AoA explores these alternatives within practical performance, cost, schedule, and risk boundaries, covering DOTMLPF + R/G/S spectrum. An AA differs from an AoA since the former can be used when the preferred solution is already narrowed down to a specific materiel solution. An AA examines more detailed performance characteristics of various alternative ways to implement the materiel solution, and may be affected by cost and schedule constraints and trade-offs.

SYSTEMS ARCHITECTURE

GNDA Development Program

Description
The overarching goal of GNDA Development is to develop strategies for building out the GNDA. 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 radioactive materials that are out of regulatory control. The work of developing the GNDA is an intimate part of the Solution Development Process (SDP), initially feeding into Stage Zero, which is a quantitative analysis of the entire GNDA at the strategic and operational level, including a deliberate incorporation of validated end user and stakeholder needs, resulting in an initial prioritization of new preliminary mission needs statements among the existing portfolio of needs. This work then leads to a Capabilities-Based Assessment (CBA) to identify and prioritize risk-informed recommendations, over all mission areas, which include both solutions that feed into later stages of the SDP as well as identification of areas which require further study.

GNDA Development - GNDA-Wide Planning, Modeling, and Analysis Project

Description
A nuclear detection architecture can help reduce the threat of nuclear terrorism and its consequences. Such an architecture provides the framework to integrate a comprehensive set of detection systems and the associated technical and non-technical resources and infrastructure to improve a nation's ability to detect and interdict rad/nuc threats. An effective Planning, Modeling and Analysis function is an important part of the strategic basis that drives effective implementation of enhanced detection.

At the core of all DNDO activities is the GNDA delineation of geographic layers (exterior, trans-border, interior, and crosscutting efforts) and transportation pathways (air, land, and sea). Strategic planning and evolving risk evaluations will culminate in an annual report that will provide both the status of current detection architecture capabilities as well as provide direction for further enhancements to detection capabilities across the architecture. Other annual activities include updating the GNDA Strategic Plan, and completing the GNDA Joint Annual Interagency Review, the next spiral of the Radiological/Nuclear Terrorism Risk Assessment (RNTRA), the annual DNDO Solution Development Process Stage Gate 0 Review, the next spiral of the Capabilities Based Assessment and the second spiral of the GNDA Architecture Spiral Development.

These activities are intended to reduce both the technical and programmatic risk of new efforts and enhance their integration and interoperability with the overall GNDA.

GNDA Development - International GNDA Studies and Engagement Project

Description
International studies and analyses are performed to characterize the gaps, identify options, evaluate the advantages and disadvantages of alternative solutions, and formulate time-phased plans to reduce risks to the exterior layers of the GNDA. As a crosscutting function, ongoing development of the GNDA must involve analyses of all potential pathways, suggest technologies or programs to address any

identified vulnerabilities, and strive for stronger linkages at every point in the architecture. This includes performance of international geographical architectural analyses and investigation of key relationships with international partners to enhance national level detection capacity in their respective countries.

A significant portion of the development of a GNDA is incumbent on the sovereign decisions of foreign partners to enhance their own national and regional-level detection architectures and capacities. As such, country and regional architecture analyses must be done to characterize existing detection capabilities in order to identify potential areas for engagement/enhancements. Prioritization methodologies and engagement will be conducted under both bilateral discussions and arrangements as well as under the framework of existing international agreements (e.g., UNSCR 1540, Global Initiative to Combat Nuclear Terrorism) as well as existing institutions (e.g., International Atomic Energy Agency, World Customs Organization, Interpol, International Civil Aviation Organization, International Maritime Organization, etc.) as a means to bolster the GNDA.

Annual activities include conducting multiple "Global Initiative to Combat Nuclear Terrorism" workshops to facilitate the continued development of the best practices guides for "Planning and Organization" and "Planning and Organization" related to nuclear detection architecture development, conducting multiple GNDA Workshops for expanding GNDA capabilities within bi-lateral or multi-lateral constructs and ongoing bilateral and multilateral engagements with key foreign partners on nuclear detection architectures, to include the International Atomic Energy Agency, the Global Initiative to Combat Nuclear Terrorism and other partners. Additionally the program continues to support the Secretary of Homeland Security's "Secure Supply Chain Initiative" and engage with organizations such as the World Customs Organization, International Civil Aviation Organization and International Maritime Organization to facilitate the integration of best practices for nuclear detection.

GNDA Development – Land Border GNDA Requirements Development Studies Project

Description
The GNDA Development Program consists of three continuing Projects: Development Studies, Non-POE Capabilities Based Assessments (CBA), and POE CBA. Through these projects, vulnerabilities in the existing GNDA will be determined and recommendations and plans formulated to develop an enhanced architecture that includes appropriate linkages with international partners, and across Federal, State, territorial, tribal and local agencies. These projects will focus on studies and architecture requirements, examining issues for official road POEs, rail POEs, land border checkpoints, and illicit traffic along the border in areas between all official land border POEs and land border checkpoints. These efforts support the work described in the Land Border Capabilities section.

Development Studies - Description
DNDO develops time-phased strategies and plans for improving the probability of detecting and interdicting rad/nuc attacks. Plans are developed jointly with DNDO's interagency partners and in close coordination with relevant DNDO offices. These plans are focused on analyzing and improving the GNDA through the development of specific architecture studies, Concept of Operations (CONOPS) analyses, detector modeling studies, and enterprise architecture support specific to land border issues. These studies typically will focus on specific programs, operating environments, modes

of transportation, and/or specific threats and will directly feed into and support the efforts of the Land Border CBAs identified below.

The global architecture comprises several key elements: a multi-layered structure of rad/nuc detection systems (deployed both domestically and overseas), a well-defined and carefully coordinated network of interrelationships among them, and a set of systems engineering based principles and guidelines governing the architecture's design and evolution over time.

Guided by the GNDA, DNDO provides support relative to the assessment and mitigation of threats in the land border, such as the development of specific architecture studies, CONOPS analyses, detector modeling studies, and enterprise architecture support that are specific to land border issues. As an example, an Alaska Regional Architectural Study will be performed during FY 2011 and FY 2012 to baseline the rad/nuc capabilities available in Alaska as input to a "quick look" CBA. In general, studies will be commissioned to identify and characterize trade-offs, risks, and costs before deciding on specific implementation paths. These preliminary studies are intended to reduce the technical and programmatic risk of new efforts and enhance their integration and interoperability with the overall GNDA.

CBAs - Description
The Non-POE CBA project will address the areas within the GNDA that are between official Land Border POEs. A CBA consists of two primary components:

- The functional area analysis where capabilities, tasks, resources and metrics are identified within the defined architecture; and,
- The functional needs analysis where gaps are identified through an analysis of capabilities which are modeled against particular threats and defined measures of effectiveness.

In addressing these Non-POEs, the project will provide gap summaries and recommendations that will be used by the Land Border Capabilities Program Non-POE Project to develop Mission Need Statements, Capability Development Plans, and other required documents in accordance with DHS Acquisition Management Directive 102-01.

In order to complete the two components of the CBA, a combination of approaches will be used including Subject Matter Expert (SME) elicitation, site visits, data collection, interviews, and modeling/simulation. Using these approaches, CBAs and studies will be conducted to:

- Develop and improve overall effectiveness of the Non-POE Land Border architecture;
- Analyze and identify gaps, vulnerabilities, and options; and,
- Formulate recommendations to mitigate shortcomings and strengthen capabilities development efforts and deployments.

POE CBAs - Description
The POE CBA project will address the areas within the GNDA at official Land Border POEs. In addressing these Land Border POEs, the project will provide gap summaries and recommendations that will be used by the Land Border Capabilities Program POE Project to develop documentation such as Mission Need Statements in accordance with DHS Acquisition Management Directive 102-01.

As with the Non-POE CBA Project, CBAs will be provided using a combination of approaches. These include SME elicitation, site visits, data collection, interviews, and modeling/simulation. Using these approaches, CBAs and studies will be conducted to:

- Develop and improve overall effectiveness of the POE Land Border architecture;
- Analyze and identify gaps, vulnerabilities, and options; and,
- Formulate recommendations to mitigate shortcomings and strengthen capabilities development efforts and deployments.

Land Border Capabilities

Description
The Land Border Capabilities Program is composed of three projects. Whereas GNDA Development – Land Border is focused on studies and requirements, this section is focused on conceptualizing and developing solutions and projects to fill those gaps and meet the identified requirements. It is the next step in developing capabilities. In performing these projects, DNDO will continue to strengthen its partnerships with representatives from Customs and Border Protection (CBP) Office of Field Operations (OFO), Office of Border Patrol (OBP), Office of Intelligence and Operations Coordination (OIOC), and Laboratories and Scientific Services (LSS) to further define requirements and identify and evaluate technology solutions. The POE Project addresses rad/nuc detection capabilities at official land ports of entry other than rail ports of entry. The OBP Checkpoint Fixed Detection Project and Non-POE Project address rad/nuc detection capabilities in areas between the official land ports of entry. The OBP Checkpoint Fixed Detection Project is focused on the 35 permanent checkpoint areas through which vehicular traffic travels. These checkpoints are not considered as part of the official land ports of entry. The Non-POE Project covers the vast area between the official land POEs not addressed by the OBP Checkpoint Fixed Detection Project.

OBP Checkpoint Fixed Detection - Description
Within the GNDA there is a lack of deployed capabilities to address radiation and nuclear detection between official POEs. The *OBP Checkpoint Fixed Detection Project* will address rad/nuc detection for vehicles at 110 checkpoint lanes located at 35 permanent checkpoint areas.

Some initial capabilities have been deployed to OBP checkpoints through Phased Deployment Implementation Plan (PDIP), which formally ended in FY 2010. PDIP involved the evaluation of COTS detectors in both laboratory and operational environments, integration of these COTS detectors with existing CONOPS, and the purchase and deployment of those detectors found technically and operationally acceptable. The outcome of this phase was the fielding of Personal Radiation Detectors (PRDs) and Radioisotope Identification Devices (RIIDs) to Border Patrol Agents at checkpoints along the northern and southern borders of the United States. Procurement of this equipment is anticipated to be completed in FY 2012.

Activities are being performed within the Land Border Capabilities Program to address gaps not addressed by the aforementioned PRD and RIID deployment at OBP checkpoints. The deployment of rad/nuc detection capabilities at these locations must address potential impacts on traffic flow, fourth amendment issues and operational demands on OBP agents. An AoA is targeted for FY 2013 to

recommend proposed solutions to be implemented. Current assumptions are that the solutions selected will be commercially available and will not require Government Research & Development (R&D) funding. DNDO will seek to deploy solutions covering 50% of OBP Checkpoint lanes in the out-years.

Non-POE - Description
The Non-POE Project will address the lack of deployed capabilities to meet the GNDA goals to provide rad/nuc detection between official POEs and supplement the coverage provided by the OBP Check Point Fixed Detection capability.

Within the Land Border Capabilities Program, activities are being performed to address gaps associated with Non-POE locations. Addressing rad/nuc detection in these vast non-POE geographic areas has many major challenges. In these areas the probability of encounter is the major issue and the deployment of rad/nuc detection capabilities must be able to operate in extremely varied environments. An AoA for the Non-POE Project is planned for the future to recommend proposed solutions for implementation. Current assumptions are that the solution(s) identified will be commercially available and will not require Government R&D funding.

POE - Description
The POE project continues to develop time-phased strategies and plans for improving the probability of preventing and deterring rad/nuc attacks. Plans are developed jointly with DNDO's intra-agency and interagency partners and in close coordination among relevant DNDO offices. The time-phased aspect of the plans is important because it allows for the integration of current and near-term technologies and approaches, as well as longer-term options that may draw upon technologies that are currently in the R&D phase and not available for implementation for several years.

Efforts during FY 2013 and in the years following will continue to support analyses of detection strategies for the remaining vulnerabilities at Land Border POEs, as well as modeling and risk assessments focused on characterizing the threat and identifying opportunities for detection and interdiction at the border. A specific area of study moving forward will be an evaluation of the Land Border POE architecture and technology base. A study will assess the effectiveness of the existing rad/nuc prevention and deterrence capabilities currently at the Land Border POEs in light of new prevention and deterrence technologies on the horizon, updated operational approaches to prevent the smuggling of illicit rad/nuc materials, and the introduction of prevention/deterrence processes. Then, if warranted, technological, operational, and policy changes will be recommended to make rad/nuc prevention and deterrence efforts more effective and in-line with current approaches to the rad/nuc smuggling challenge. Beginning in FY 2013, an AA will be performed that evaluates options for replacing radiation portal monitors. As these units, which are deployed most heavily at Land POEs, approach the time period when equipment repair costs requirements due to aging could spike, a study to explore alternatives is prudent.

The Land Border POEs is addressing several major challenges to include the potential impacts on traffic flow and the operational and staffing demands on port personnel. Many capabilities have been deployed to these POE's (e.g., RPM's, RIID's, and PRD's); however, architecture and other studies will continue with a goal of identifying improved strategies and/or advanced technologies that would provide optimum POE detection capabilities.

GNDA Development – Interior GNDA Requirements Development Studies Project

Description
DNDO develops time-phased strategies and plans for improving the probability of detecting rad/nuc materials that are out of regulatory control. Plans are developed jointly with DNDO's interagency partners and in close coordination with relevant DNDO offices. These plans are focused on analyzing and improving the GNDA through the development of specific architecture studies, CONOPS analyses, detector modeling studies, and enterprise architecture support that are specific to interior issues. These studies will typically be focused on specific programs, operating environments, modes of transportation, and/or specific threats and will directly feed into and support the efforts of the Capabilities Based Assessments identified below.

Capabilities Based Assessments (CBA) will be conducted to develop and improve overall effectiveness of the interior architecture; analyze and identify gaps, vulnerabilities, and options; and formulate recommendations to mitigate shortcomings and strengthen capabilities development efforts and deployments. The CBA consists of two primary components: the functional area analysis where capabilities, tasks, resources and metrics are identified within the defined architecture; and the functional needs analysis where gaps are identified through an analysis of capabilities which are modeled against particular threats and defined measures of effectiveness. The Interior Regional CBA will provide gap summaries and recommendations regarding the regional layers of the interior architecture and will be used by interior programs to document Missions Needs Statements, Capability Development Plans, and other required documents in accordance with Acquisition Management Directive 102-01. The Interior Target / Target Vicinity CBA will perform similar tasks for the target/target vicinity portions of the interior architecture.

The annual planned study cycle includes:

- Interior Requirements Development Studies
- Interior Regional Capability Based Assessment
- Interior Target / Target Vicinity Capability Based Assessment

GNDA Development – Maritime GNDA Requirements Development Studies Project

Description
The Maritime GNDA Requirements Development Studies Program consists of conducting a series of studies of the baseline maritime pathways architecture. The objective is to assess nuclear detection capabilities, rad/nuc threats (materials, weapons, and conveyances), waterway/seaport vulnerabilities, options to mitigate these vulnerabilities, and recommendations for achieving the maximum risk reduction within the constraints of the available budget.

A CBA will be conducted to develop and improve overall effectiveness of the maritime architecture; analyze and identify gaps, vulnerabilities, and options; and formulate recommendations to mitigate shortcomings and strengthen capabilities development efforts and deployments. The CBA consists of two primary components; the functional area analysis where capabilities, tasks, resources and metrics are identified within the defined architecture, and the functional needs analysis where gaps are

identified through an analysis of capabilities which are modeled against particular threats and defined measures of effectiveness. The Maritime Capability Based Assessment CBA will provide gap summaries and recommendations regarding the layers of the maritime architecture and will be used to document mission needs statements, capability development plans, and other required documents in accordance with Acquisition Management Directive 102-01.

GNDA Development – Aviation GNDA Requirements Development Studies Project

Description
This program details the identification of aviation environments to inform architecture development planning. It provides input into the GNDA Gap(s) / Problem(s), including IGA Non-Compliant Aircraft Vulnerability Analysis, Mobility/Agility and Deterrence, and Characterization of Specific International Regions of Interest. The studies produced will be of sufficient quality to identify gaps and produce mission needs statements.

General Aviation and Commercial Aviation Capabilities Based Assessment (CBA) – Description
A CBA process will be executed to define gaps and inform prioritized solutions for the GNDA with respect to the commercial aviation pathway. A set of scenarios currently under development will be used as the basis for validating capability needs. The CBA will provide recommendations for addressing the gaps with non-materiel and/or materiel approaches.

General aviation has a significant threat associated with a direct-to-target attack. The CBA targeted in this aviation pathway will consider both the domestic and international general aviation.

Commercial aviation has distinct scope and challenges differing from general aviation. The CBA will include consideration of deterrence factors due to the significant security apparatus already in place for commercial aviation. The defense in depth desired of the GNDA requires that this assessment span the full expanse of commercial aviation, including that outside the United States. Anticipated solutions informed by this CBA will require coordination among USG agencies and have the potential to drive international outreach efforts.

Prioritized Targeted Regional Studies – Description
A series of studies is planned which will concentrate analysis of the aviation environment within a regional level of interest.

Current studies of the aviation portion of the GNDA span the entire international aviation environment. This scale is sufficient to highlight regions of interest or opportunity in development of the GNDA, and target possibilities for policy development. However, a regional scale will be better suited to reveal details of effectiveness of security implementation at the scale of individual nations or even airports. This information is needed to effectively tailor individual outreach efforts and inform prioritization efforts.

SUMMARY: The table below assists in illustrating the crosswalk between specific projects and activities and the DNDO mission areas.

PPA: SYSTEMS ENGINEERING AND ARCHITECTURE						
MISSION ALIGNMENT						
	Cross Mission Capability Development	**Infrastructure and Support**	**Land Border**	**Interior**	**Maritime**	**Aviation**
Systems Engineering		X				
Rad/Nuc Detection Standards		X				
SE Program Integration		X				
Systems Architecture	X					
GNDA Development	X					
Land Border Mission			X			
Land Border Capabilities			X			
Interior Mission				X		
Maritime Mission					X	
Aviation Mission						X
Multi-Pathway Scanning Integration						X

QHSR ALIGNMENT			
	Goal	**Obj.**	**Description**
Systems Engineering	1.2	1.2.3 1.2.4	Control Movement of CBRN Protect Against Hostile Use of CBRN
Systems Architecture	1.2	1.2.3 1.2.4	Control Movement of CBRN Protect Against Hostile Use of CBRN
Maritime PA	1.2	1.2.3 1.2.4	Control Movement of CBRN Protect Against Hostile Use of CBRN

DHS QHSR Mission 1- *Preventing Terrorism and Enhancing Security*
Goal 1.2 *- Prevent Unauthorized Acquisition or Use of CBRN Materials and Capabilities*

Department of Homeland Security
Domestic Nuclear Detection Office
Research, Development, and Operations:
Systems Development
Program Performance Justification
(Dollars in Thousands)

PPA: Systems Development

	Perm. Pos	FTE	Amount
2011 Actual Obligations	**-**	**-**	**68,420**
2012 Enacted Budget Authority	**-**	**-**	**51,000**
2013 Adjustments-to-Base	-	-	(1,103)
2013 Current Services	**-**	**-**	**49,897**
2013 Program Change	-	-	(21,496)
2013 Total Requested Budget Authority	**-**	**-**	**28,401**
Total Change 2012 to 2013	-	-	(22,599)

The Domestic Nuclear Detection Office (DNDO) requests $28.401 million for this activity in FY 2013. DNDO has identified efficiency savings of $1.103 million in FY 2013 through the implementation of the Commercial First approach for the development of classes of nuclear detection equipment. The strategy of the Commercial First approach is to promote industry development of nuclear detection equipment where there are sufficient market drivers to make the investment of development more feasible. These savings allowed DNDO to shift funding to improve and extend the life the current deployed fixed detectors and the acquisition of nuclear detection equipment to enhance front line capabilities.

CURRENT SERVICES PROGRAM DESCRIPTION:

The Department of Homeland Security (DHS) is responsible for ensuring that the Nation maintains a preeminent research and development (R&D) program to address user requirements in radiation detection science and technology. Long range radiological and nuclear (rad/nuc) basic research activities are conducted through the Transformational and Applied Research (TAR) activities. Consequently, DNDO has implemented a standard solutions development process (SDP) to build on these activities and to address technical requirements arising from gaps in operational capabilities and to meet mission requirements.

QHSR Strategic Alignment - Systems Development

- Department of Homeland Security (DHS) Quadrennial Homeland Security Review (QHSR) Mission 1, Preventing Terrorism and Enhancing Security.

- Goal 1.2: Prevent the Unauthorized Acquisition or Use of Chemical, Biological, Radiological, and Nuclear (CBRN) Materials and Capabilities.
  - Objective 1.2.3: Control Movement of CBRN.
  - Objective 1.2.4: Protection Against Hostile Use of CBRN.

Mission 2, Securing and Managing Our Borders.

- Goal 2.1: Effectively Control U.S. Air, Land, and Sea Borders.
  - Objective 2.1.1: Prevent illegal entry; protect against cross-border threats.

State & Local Initiatives – Rad/Nuc Challenge

Description
Background. The Domestic Nuclear Detection Office's (DNDO) mission, as codified in the SAFE Port Act of 2006, National Security Presidential Directive-43, and Homeland Security Presidential Directive-14, points to numerous requirements that can best be met by positioning DNDO as an international center of excellence in the Rad/Nuc Detection community. Sponsorship of a Rad/Nuc Challenge is an effective and powerful method of moving DNDO toward a position of prominence, recognized leadership, and excellence necessary for the effective and efficient accomplishment of its mission.

Competitions in the form of challenges have proven to be a cost effective way to foster and sustain communication with many members of a community and advance technical developments in the field in a relatively short amount of time. In support of this, the GSA has recently created a new schedule specifically for challenges to make it easier to contract for services from approved challenge integrators. The GSA has also recently created a new website, challenge.gov, which provides a range of information about government challenges. Among other things the website lists current government challenges, many of which carry cash prizes through the America Completes Act.

DNDO plans to host the first Rad/Nuc Challenge in calendar 2012 in an effort to: improve and advance the rad/nuc detection capabilities of our Federal, State, local, industry and academia partners through increased awareness, cooperation and competition; expose industry and academia to Federal, State and local radiation detection requirements, helping to shape independent research and development programs and alert mission stakeholders to upcoming opportunities; provide an environment for networking within the rad/nuc community; and foster community-wide awareness of the current state-of-the-art of technology and best practices in the field.

Hosting the Rad/Nuc Challenge will be an effective and powerful method of advancing nuclear detection capabilities and maturing the Global Nuclear Detection Architecture (GNDA). It will also provide DNDO the opportunity showcase and promote the unique RND mission, and improve and expand DNDO's standing among our RND partners and other stakeholders.

Human Portable Wide Area Search (HPWAS)

Description
The HPWAS program will address the mission need for more effective, efficient, and suitable purposeful searches performed to find rad/nuc material in large areas, such as large aircraft, medium to large-sized maritime vessels, open-air events, parking lots, and stadiums. A HPWAS capability is

appropriate for all environments in which rad/nuc detection is conducted, including air, land, and sea Ports of Entry (POEs), between POEs, the interior of the United States, and coastal waters. HPWAS systems will be used by Federal, State, local, and tribal authorities.

The program is subordinate to the Human Portable Radiological/Nuclear Detection System (HPRDS) program and addresses the need for improved Wide Area Search capability as detailed in the HPRDS Mission Needs Statement (MNS). HPWAS will replace existing backpack-sized and other similar rad/nuc detectors with more capable systems. Funding will be used to integrate and evaluate in an operational environment promising new technologies that are ready for transition to systems development, such as Non-^{3}He Neutron Detection Alternatives for Backpacks and Intelligent Radiation Sensing System. The program will use a "commercial first" approach of defining and publishing requirements and relying upon industry to develop a solution based upon expected demand. Candidate HPWAS systems will be thoroughly tested in a range of operational environments and scenarios.

Human Portable Tripwire Program

Description
The Human Portable Tripwire (HPT) program will increase the opportunity and likelihood of detecting rad/nuc material through constant, non-deliberate rad/nuc scans. HPT detection systems will be small and light enough to be worn by operators at all times and both easy to use and cost effective so they can be easily deployed to a large number of operators, increasing the opportunity for detection.

This HPT program focuses on tripwire detection capability, comprised of passive monitoring operations, not deliberate screening, intended to increase the opportunity and likelihood of detecting illicit material. Human portable tripwire detection systems used to perform passive monitoring should be considered standard equipment and worn by operators at all times. These systems should be wearable, easy to use, and cost effective so they can be easily deployed to a large number of operators to increase the opportunity for detection. Because the systems used in this role should be worn at all times, they may also function as Personal Protective Equipment (PPE), which provide personnel with warnings when exposed to potentially harmful levels of radiation.

The HPT was deferred because of ongoing technical challenges and perceived anticipated higher procurement costs. However, results of an HPT Industry Day indicated interest by industry to invest R&D funding into an HPT solution. Based on industry feedback the HPT program was initialized to move forward as a Commercial Fires initiative.

Due to current budget constraints, the CISNT program will be unfunded in FY 2013. The system development of this capability will be postponed and re-evaluated once funding becomes available.

Long Range Radiation Detection (LRRD)

Description
The overarching goal of the Long Range Radiation Detection (LRRD) program is to determine if a passive long range rad/nuc detection system should be developed and fielded. To transition the technology to a systems development phase, it will be necessary to collect and validate user needs to address two of the most problematic constraints for passive detection and classification of radioactive

materials in the Interior (as well as in other mission areas): the need to detect rad/nuc materials at a large distance from the source and to quickly localize the source of the radiation

LRRD builds upon the capabilities demonstrated by the Stand-Off Detection Systems (SORDS) and Roadside Tracker technology demonstration projects conducted by TAR. The technology demonstrations produced an increase in passive stand-off detection capability for stationary source /moving detector and moving source/stationary detector scenarios.

Analysis of the underlying technology concluded that the LRRD program holds promise but that it is not mature enough to proceed to an acquisition without further development. Therefore, the program has been delayed for two years while a spiral development is conducted. The effort will be guided by operational requirements and concepts of operation based on State, local, and Federal stakeholder interactions and evaluation activities. Stakeholders will continue their involvement in the program and help inform the development efforts throughout the spiral.

Small Vessel Standoff Detection Program (SVSD)

Description
The Small Vessel Standoff Detection (SVSD) program will develop and field a capability to provide standoff rad/nuc detection systems for scanning small vessels (less than 300 gross-tons). Currently, rad/nuc scanning of small vessels is accomplished by boarding the vessel and conducting an inspection with human portable systems. However, current and future force levels for USCG, CBP, and other Federal, State, and local partners are only capable of boarding a small fraction of the daily U.S. small vessel traffic. This program will allow maritime enforcement officers to increase rad/nuc scanning of small vessels by reducing the need to board each encountered vessel.

The program will initially develop a capability for scanning small vessels from maritime law enforcement vessels on the water ("boat-to-boat" scanning). Using information from previous operational testing of current COTS and government off-the-shelf (GOTS) standoff detection equipment in a maritime environment, the SVSD Program will inform the future development of CONOPS, tactics, techniques, and procedures as well as the development of a materiel capability to reduce the risk of a rad/nuc threat being transported or deployed by a small vessel.

Boat-to-Boat Scanning – Description
Analysis, selection, design, development, and testing of boat-to-boat systems are being conducted from FY 2010 - 2013, with acquisition and deployment of the systems from FY 2013 - 2015. Initial fielding plans include outfitting USCG and CBP Office of Air and Marine (OAM) patrol vessels for employment during routine maritime operations and periods of heightened maritime security.

Phase II and III - Description
Follow-on phases will address additional modes of encountering small vessels identified in the Mission Needs Statement, including: aircraft-to-boat ("aerial") as well as maritime geographic chokepoints and maritime/port infrastructure (collectively referred to as "fixed"). Previous program planning included the development of aerial systems upon completion of boat-to-boat systems development and subsequently development of fixed detection systems. However, as to not pre-suppose technological maturity or a certain materiel solution, an Analysis of Alternatives (AoA) is planned for FY 2013 to

systematically determine the best alternative to develop in subsequent phases of the program and re-titled Phase II and Phase III. As a result, systems development of Phase II will be delayed one year

^{3}He Shortage Mitigation Program

Description
The initial focus of the ^{3}He Shortage Mitigation Program was on finding an alternative technology to replace the ^{3}He-based neutron detectors within radiation portal monitors (RPMs). The initial effort concentrated on RPMs because these are high priority systems, and RPMs used the largest amount of ^{3}He gas in all of DHS. Over the past few years, alternative technologies for RPMs have advanced sufficiently enough to change the focus to investigate alternative technologies for neutron detection for backpack radiation detection systems, which are used when performing wide area searches. This program has two projects: (1) The Government Sponsored Backpack and Handheld Test Campaign and (2) the ^{3}He Acquisition project. The first is directed at engaging with the commercial sector and Government-sponsored projects to assess alternative neutron detection technologies proposed for current backpack systems to fill the void until a more permanent solution is found. The focus of ^{3}He Acquisition to procure 1,200 liters of ^{3}He each year to ensure DHS has the ^{3}He gas it needs to execute its mission during this transition period where alternative technologies are being investigated as well as to manage and distribute the ^{3}He gas supply.

A major element of this program is directed at engaging with the commercial sector and Government-sponsored projects to encourage development of and to assess alternative neutron detection technologies being proposed for current backpack systems to fill the void until a more permanent solution can be achieved through the Wide Area Search effort within DNDO. To compliment the FY 2012 test campaign of near term commercial backpacks with alternative technologies, the FY 2013 effort will evaluate Government-sponsored alternative neutron detectors under development (e.g., DNDO/TAR, DOE/National Nuclear Security Administration [NNSA] NA-22]) and DOD/Defense Threat Reduction Agency [DTRA]) to encourage and accelerate the commercialization of these detectors.

Multi-Pathway Scanning Integration

Description
Aviation environments present unique and complex challenges for nuclear detection operations. While efforts have been made to characterize individual components of aviation pathways for nuclear detection purposes, greater understanding and consideration of broad aviation environments is required in order to maximize system effectiveness and efficiency. DNDO has initiated the Multi-Pathway Scanning Integration Program to support this approach. This program consists of four projects: (1) Domestic Airport Deployments; (2) Multi-Pathway Systems Evaluation; (3) Domestic General Aviation Systems Evaluation; and (4) Pre-arrival Systems Evaluation.

This approach aligns with the latest DNDO planning principles and strategies, considers the perspective of end user (airport/location and stakeholder, versus pathway), leverages current rad/nuc systems, and accounts for the deterrence provided by non rad/nuc security measures already in place. The approach examines the intersection of International Commercial Aviation (ICA) Pax/Bag, ICA Air Cargo, and International and Domestic General Aviation (GA) pathways including the commonality of

systems and processes that can be leveraged and shared. In addition to potentially increasing effectiveness against rad/nuc threats, the cumulative benefits gained from enhanced efficiencies across national and global operations has the potential to significantly reduce long-term burdens of system acquisition, maintenance, and operation. This effort includes analysis of operational needs and selection of potential solution options for these pathways; future efforts may initiate support for systems development and/or acquisition as appropriate.

Pre-Arrival Systems Evaluation Strategic Alignment
The Pre-Arrival Systems Evaluation (IGA) project strategically links to the following:

- National Security Presidential Directive 47/ Homeland Security Policy Directive 16 (NSPD-47/ HSPD-16) provide overarching guidance and authority for interagency cooperation for the protection of the homeland against future terrorist attacks involving the Air Domain, including IGA.
- The National Strategy for Aviation Security (NSAS) dated March 26, 2007, directs a comprehensive national effort to prevent hostile or illegal acts within the Air Domain, promote global economic stability, and protect legitimate aviation activities.
    - The NSAS has seven supporting plans including the Air Domain Surveillance and Intelligence Integration (ADSII) Plan dated March 26, 2007. The ADSII states, *"The Secretary of Homeland Security is responsible for closely coordinating the U.S. department and agency activities under the national aviation security program."* ADSII resulted in a significant interagency effort recommending a detailed list of critical actions and implementation tasks to achieve a whole government solution.
- Direct-to-target threats present a particular vulnerability related to IGA. With regard to radiological and nuclear threats specifically, international air cargo (IGA) represents a vital part of the aviation pathway in the Global Nuclear Detection Architecture (GNDA).

Domestic Airport Deployments - Description
The Domestic Airport Deployment project will develop and field capabilities by optimizing combinations of mobile, fixed, and human portable rad/nuc detection systems for scanning international air cargo. These systems may also provide opportunities to enhance IGA rad/nuc detection operations. Currently, rad/nuc scanning of cargo and IGA is by conducting an inspection with human portable systems. With current and anticipated staffing, CBP will only be capable of scanning a small fraction of the daily inbound international air cargo using human portable systems alone. This program will provide systems that allow more rapid scanning of a much greater volume of air cargo, with potential dual use for enhancing IGA operations, reducing the burden of using hand-held equipment as primary scanning equipment in those environments.

To date, initial capabilities to scan air cargo for rad/nuc have been established at several air ports of entry (APOEs) to validate operational feasibility. Lessons will be drawn from those deployments and applied as appropriate to the future deployments of fixed or mobile systems.

Based on an alternatives analysis for deployment of fixed systems to be conducted in FY 2012, the program will initially deploy a limited number of fixed systems to APOEs with heavy volumes of international air cargo where chokepoints of cargo flows exist and fixed systems are operationally feasible.

Concurrently, analysis, selection, design, development, and testing of mobile/re-locatable systems will be conducted in FY 2012 and FY 2013, with possible continuation of development and potential acquisition and deployment of the systems following the FY 2013 work. Initial fielding plans include outfitting APOEs that receive large volumes of international air cargo where fixed portals are not a viable solution.

As a planning process, many of the measures for this project will be output-based (i.e. measurements of activities done by DNDO), but will ultimately improve the outcomes of programs operated by other entities (other Federal agencies, State and local) by providing these entities with the means to make better decisions about how to reduce the risk of a terrorist attack involving radiological material. One set of metrics will be the number of fixed and mobile/re-locatable rad/nuc detection systems acquired and deployed. Another key set of metrics will be the percent of total arriving international air cargo scanned with deployed systems. After fixed systems are deployed, approximately 40% of inbound international air cargo will be scanned upon arrival.

Multi-Pathway Systems Evaluation - Description
The Multi-Pathway Systems Evaluation project will involve interagency partners in analyzing currently deployed systems (technical, operational, and other) in commercial aviation pathways and determine where limited investments in technology, training, and/or CONOPS could yield meaningful enhancements to the GNDA. For example, computed tomography (CT) and other x-ray systems are currently deployed across aviation pathways, but are not typically used to search for rad/nuc materials. Coupling those systems with increased knowledge of rad/nuc threats, appropriate handheld detection equipment, and associated training and CONOPs could significantly increase the number of personnel involved in layered rad/nuc detection across aviation pathways. DNDO will work with TSA and other relevant partners in these efforts.

Some of the metrics that will be used to measure performance for the Multi-Pathway Systems Evaluation project include core SDP activities. Additionally, metrics on the number of RIIDs or other hand-held rad/nuc identification equipment acquired and deployed will be included. Other key metrics will address the number and percent of TSA sites with enhanced rad/nuc detection capabilities, and the percent of total domestic passenger flow that is covered by the deployed systems. Those metrics will be established upon refinement of operational alternatives and deployment configurations.

Domestic General Aviation Systems Evaluation - Description
The goal of the Domestic General Aviation Systems Evaluation project is to enhance capability of Federal, State, and local public safety organizations and applicable private organizations to secure domestic general aviation environments, and identify and respond to rad/nuc threats.

The following is the strategic approach for the Domestic General Aviation Systems Evaluation project:

- The Domestic General Aviation Systems Evaluation project is currently in SDP Initialization/ Stage 0 and plans to utilize Architecture capability based assessments and previously performed TSA studies to initiate Stage 1a in FY 2013.
- The MNS, P-CONOPS, CDP, ORD, and AoA will be developed with interagency partners, such as TSA, FAA, as well as applicable State, local, tribal, and private sector entities.

- The project will support programs (guidance/program assistance) for State and local agencies and the domestic general aviation community, and may lead to regulatory changes to enhance security in domestic general aviation environments.

As a planning process, many of the measures for this project will be output-based (i.e. measurements of activities done by DNDO), but will ultimately improve the outcomes of programs operated by other entities (other Federal agencies, State and local) by providing these entities with the means to make better decisions about how to reduce the risk of a terrorist attack involving radiological material. Some of the metrics that will be used to measure performance for the Domestic General Aviation Systems Evaluation project include core SDP activities. Additionally, metrics will be established to measure the number of planning, training and awareness programs that are developed for domestic GA and the number of agencies/individuals/communities that have received the training or information. Those metrics will be established upon refinement of operational alternatives/priorities and associated training/planning requirements. Metrics measuring the impact of any new regulations will also be established (for example, the number of registered aircraft subject to new security regulations).

Pre-Arrival Systems Evaluation - Description
This project seeks to enhance systems outside of the U.S. and the U.S. operating authority to prevent rad/nuc weapons and materials from being transported by aircraft into the country (thereby moving this threat away from U.S. borders), and to support enhancements to U.S. air domain awareness systems to detect non-compliant flights. The project includes points of departure for international general aviation, international air cargo, and commercial passengers as well as transit environments. Overseas general aviation and commercial environments have some important commonalities where joint/combined solutions can be leveraged, yet other distinct differences that will need to be addressed separately. Therefore, separate project activities will address the unique aspects of these environments, while maintaining synergy between activities through the solutions development process to ensure that efficiencies and effectiveness are maximized across those aviation pathways.

In an effort to maintain a level of uncertainty in the adversary, DNDO must continue to develop scanning solutions along the "compliant" portion of the IGA pathway, while simultaneously addressing non-compliant IGA issues with interagency partners. The investment will enable DNDO to begin working with stakeholders, including other DHS component organizations, the interagency, and foreign partners, to develop a mission needs statement (MNS) and continue participation on several interagency working groups. Interagency efforts will focus on support programs to assist international partners in designing and developing IGA security and rad/nuc scanning program, and may also result in new international agreements related to IGA security.

The funds requested in FY 2013 will enable DNDO to expand efforts with its stakeholders to address vulnerabilities in pre-arrival operational environments, with more extensive analyses and operational support activities in out-years. Interagency efforts will focus on support programs to assist international partners in designing and developing IGA security and rad/nuc scanning programs, and may also result in new/enhanced international agreements related to commercial aviation security. A metric to determine the effectiveness of the Pre-Arrival Systems Evaluation project will be to measure the number of foreign partners that incorporate DNDO-developed guidance at overseas points of departure.

Algorithm Improvement Program

Description
The Algorithm Improvement Program's (AIP) aim is to improve algorithm performance in Government-sponsored as well as commercial sector algorithms. Thus, the ultimate objective is to increase detection and identification speed and accuracy in the field for spectroscopic and non-spectroscopic, e.g., NaI and PolyVinyl Toluene (PVT) systems. Benchmark spectra will be identified and collected to capture the response needed in the field and to simultaneously develop and establish the infrastructure needed for scoring algorithms. The DHSIsotope ID project will continue support and development of DHSIsotopeID as a crucial tool needed for secondary reachback analysis.

The Algorithm Improvement Program has four projects: (1) Benchmark Define and Collection; (2) Benchmark Analysis and Evaluation; (3) Algorithm Test Bed (ATB) Management and Replay Scoring; and (4) DHSIsotopeID and Support and Development.

Benchmark Define and Collection - Description
The Benchmark Define and Collection project will focus on identifying isotopes of concern, shielding variations expected in the field, detector materials of interest, detector electronics, statistics for the data, source strengths, data collection distances, and needed benchmark documentation requirements.

Benchmark Analysis and Evaluation - Description
The Benchmark Analysis and Evaluation project will analyze proposed benchmark configurations prior to the data collection. After the data has been collected, an analysis will be made to ensure the spectrum can be used for algorithm development as well as to score algorithm performance. The project will continuously evaluate the proposed benchmarks for improvements or needed improvements to the approach.

Before and after the spectrum files are identified and collected, an analysis effort will be conducted to ensure the benchmarks are consistent with the conditions expected in the field and the collected spectrum file will help improve algorithm performance if included in the open and closed data sets. Spectra files will be replayed in an algorithm to ensure the file will improve detection and event analysis from the standpoint of improved isotope identification.

ATB Management and Replay Scoring - Description
In the ATB Management and Replay Scoring project, Benchmark files collected for spectroscopic and non-spectroscopic detectors will be validated as being properly collected, in the correct data format, placed under configuration control, stored as either open or classified (e.g., FOUO or Secret), or closed data sets. Each organization will score the performance of their submitted algorithm (i.e., industry and Government) using the open data sets. The ATB will independently score the performance of any submitted algorithm by rescoring any vendor claims with the open data sets as well as to score the algorithm against the closed data set.

Spectra data files collected will be archived in a standardized data format, validated to be properly collected with all the ground truth associated with the spectrum file, replay tool defined, and the scoring criteria for algorithms to ensure all interested parties will have the information.

DHSIsotopeID Support and Development Project - Description
The DHSIsotopeID Support and Development Project will support improvement of the leading secondary reachback analysis tool. It will improve isotope identification performance, range of applicable isotopes, and expand the algorithm capability for run time, low power processors, ease of use, and emerging new detector materials and detectors.

Annually improve and maintain under configuration control DHSIsotopeID to improve algorithm performance as needed and to expand the capability to address new detection materials and shielding variations needed to support the secondary reach back analyst.

Land Border Capabilities

Description
The Land Border Capabilities Program is composed of three projects. In performing these projects, DNDO will partner with representatives from Customs and Border Protection (CBP) Office of Field Operations (OFO), Office of Border Patrol (OBP), Office of Intelligence and Operations Coordination (OIOC), and Laboratories and Scientific Services (LSS) to further define requirements and identify and evaluate technology solutions. The Ports of Entry (POE) Project addresses rad/nuc detection capabilities at official land ports of entry other than rail ports of entry. The OBP Checkpoint Fixed Detection Project and Non-POE Project address rad/nuc detection capabilities in areas between the official land ports of entry. The OBP Checkpoint Fixed Detection Project is focused on the 35 permanent checkpoint areas through which vehicular traffic travels. These checkpoints are not considered as part of the official land ports of entry. The Non-POE Project covers the vast area between the official land POEs not addressed by the OBP Checkpoint Fixed Detection Project.

OBP Checkpoint Fixed Detection - Description
Within the GNDA there is a lack of deployed capabilities to address radiation and nuclear detection between official POEs. The OBP Checkpoint Fixed Detection Project will address rad/nuc detection for vehicles at 110 checkpoint lanes located at 35 permanent checkpoint areas.

Some initial capabilities have been deployed to OBP checkpoints through the Phased Deployment Implementation Plan (PDIP), which formally ended in FY 2010. PDIP involved the evaluation of COTS detectors in both laboratory and operational environments, integration of these COTS detectors with existing CONOPS, and the purchase and deployment of those detectors found technically and operationally acceptable. The outcome of this phase was the fielding of Personal Radiation Detectors (PRDs) and Radio-Isotope Identification Devices (RIIDs) to Border Patrol Agents at checkpoints along the northern and southern borders of the United States. Procurement of this equipment is anticipated to be completed in FY 2012.

Activities are being performed within the Land Border Capabilities Program to address gaps not addressed by the aforementioned PRD and RIID deployment at OBP checkpoints. The deployment of rad/nuc detection capabilities at these locations must address potential impacts on traffic flow, fourth amendment issues and operational demands on OBP agents. An AoA is targeted for FY 2013 to recommend proposed solutions to be implemented. Current assumptions are that the solutions selected will be commercially available and will not require Government-led development.

Non-POE - Description
The Non-POE Project will address the lack of deployed capabilities to meet the GNDA goals to provide rad/nuc detection between official POEs and supplement the coverage provided by the OBP Check Point Fixed Detection capability.

Within the Land Border Capabilities Program, activities are being performed to address gaps associated with Non-POE locations. Addressing rad/nuc detection in these vast non-POE geographic areas has many major challenges. In these areas the probability of encounter is the major issue and the deployment of rad/nuc detection capabilities must be able to operate in extremely varied environments. An AoA for the Non-POE Project is targeted for FY 2015 to recommend proposed solutions for implementation. Current assumptions are that the solution(s) identified will be commercially available and will not require Government R&D funding.

POE - Description
The POE project continues to develop time-phased strategies and plans for improving the probability of preventing and deterring rad/nuc attacks. Plans are developed jointly with DNDO's intra-agency and interagency partners and in close coordination among relevant DNDO offices. The time-phased aspect of the plans is important because it allows for the integration of current and near-term technologies and approaches, as well as longer-term options that may draw upon technologies that are currently in the R&D phase and not available for implementation for several years.

Efforts during FY 2013 will continue to support analyses of detection strategies for the remaining vulnerabilities at Land Border POEs, as well as modeling and risk assessments focused on characterizing the threat and identifying opportunities for detection and interdiction at the border. A specific area of study will be an evaluation of the Land Border POE architecture and technology base. A study will assess the effectiveness of the existing rad/nuc prevention and deterrence capabilities currently at the Land Border POEs in light of new prevention and deterrence technologies on the horizon, updated operational approaches to prevent the smuggling of illicit rad/nuc materials, and the introduction of prevention/deterrence processes. Then, if warranted, technological, operational, and policy changes will be recommended to make rad/nuc prevention and deterrence efforts more effective and in-line with current approaches to the rad/nuc smuggling challenge. Starting in FY 2013, radiation portal monitors will be addressed. As these units, which are deployed most heavily at Land POEs, approach the time period when equipment repair costs requirements due to aging could spike, a study to explore alternatives is prudent.

The Land Border POEs is addressing several major challenges to include the potential impacts on traffic flow and the operational and staffing demands on port personnel. Many capabilities have been deployed to these POE's (e.g., RPM's, RIID's, and PRD's); however, architecture and other studies will continue with a goal of identifying improved strategies and/or advanced technologies that would provide optimum POE detection capabilities.

PVT Improvement Program

Description
The FY 2010 DHS Appropriations Act (P.L. 111-83) Explanatory Statement and Senate Report 111-31 created the PVT Improvement Program to develop improvements to operations and capabilities of currently deployed PVT radiation portal monitors (RPM). The program focuses on the development

and testing of prototype improvement candidates for deployed PVT systems. The two main areas of interest are algorithm and hardware/life extension improvement projects.

Many of the DHS Radiation Portal Monitors (RMP) are approaching 10-years in service. The RPM program began deployment of the current generation PVT Portal Monitors in 2003 and has deployed approximately 1,400 systems which represent a very significant dollar and material investment for DHS. DNDO has been studying the issue of how to extend the usefulness of this investment and develop the system to its full potential. The program investigates ideas and suggestions for improving the hardware and software to increase system performance and extend the service life.

SUMMARY: System Development projects and activities, in conjunction with transformational development R&D activities, maintain the Nation's preeminent research and development program. The following table illustrates the crosswalk between specific programs and the DNDO mission areas. It is clear that programs and activities have applicability to more than one mission area and are represented in a cross-cutting manner.

PPA: SYSTEMS DEVELOPMENT						
MISSION ALIGNMENT						
	Cross Mission Capability Development	**Infrastructure and Support**	**Land Border**	**Interior**	**Maritime**	**Aviation**
S&L Initiatives Rad/Nuc Challenge	X					
Human Portable Systems	X					
Cargo Imaging for Shielded Nuclear Threats	X					
Long-Range Radiation Detection	X					
International Rail			X			
On Dock Rail					X	
Small Vessel Standoff Detection					X	
^{3}He Shortage Mitigation	X					
Multi-Pathway Scanning Integration						X
Algorithm Improvement		X				
Land Border Capabilities			X			
GNDA Development – Aviation Requirement Studies						X
PVT Improvements	X					

QHSR ALIGNMENT			
	Goal	**Obj.**	**Description**
S&L Initiatives Rad/Nuc Challenge	1.2	1.2.3 1.2.4	Control Movement of CBRN Protect Against Hostile Use of CBRN
Human Portable Systems	1.2	1.2.3 1.2.4	Control Movement of CBRN Protect Against Hostile Use of CBRN
Cargo Imaging for Shielded Nuclear Threats	1.2	1.2.3 1.2.4	Control Movement of CBRN Protect Against Hostile Use of CBRN
Long-Range Radiation Detection	1.2	1.2.3 1.2.4	Control Movement of CBRN Protect Against Hostile Use of CBRN
International Rail	1.2	1.2.3 1.2.4	Control Movement of CBRN Protect Against Hostile Use of CBRN
On Dock Rail	1.2	1.2.3 1.2.4	Control Movement of CBRN Protect Against Hostile Use of CBRN
Small Vessel Standoff Detection	2.1	2.1.1	Prevent illegal entry; protect against cross-border threats
^{3}He Shortage Mitigation	1.2	1.2.3 1.2.4	Control Movement of CBRN Protect Against Hostile Use of CBRN
Multi-Pathway Scanning Integration	1.2	1.2.3 1.2.4	Control Movement of CBRN Protect Against Hostile Use of CBRN
Algorithm Improvement	1.2	1.2.3 1.2.4	Control Movement of CBRN Protect Against Hostile Use of CBRN
Land Border Capabilities	1.2	1.2.3 1.2.4	Control Movement of CBRN Protect Against Hostile Use of CBRN
GNDA Development – Aviation Requirement Studies	1.2	1.2.3 1.2.4	Control Movement of CBRN Protect Against Hostile Use of CBRN
PVT Improvements	1.2	1.2.3 1.2.4	Control Movement of CBRN Protect Against Hostile Use of CBRN

DHS QHSR Mission 1- *Preventing Terrorism and Enhancing Security*
Goal 1.2 *- Prevent Unauthorized Acquisition or Use of CBRN Materials and Capabilities*
DHS QHSR Mission 2- *Securing and Managing our Borders*
Goal 2.1 *– Effectively Control U.S. Air, Land, and Sea Borders*

Department of Homeland Security
Domestic Nuclear Detection Office
Research, Development, and Operations:
Transformational Research and Development
Program Performance Justification
(Dollars in Thousands)

PPA: Transformational Research and Development

	Perm. Pos	FTE	Amount
2011 Actual Obligations	**-**	**-**	**98,478**
2012 Enacted Budget Authority	**-**	**-**	**40,000**
2013 Adjustments-to-Base	-	-	-
2013 Current Services	**-**	**-**	**40,000**
2013 Program Change	-	-	43,897
2013 Total Requested Budget Authority	**-**	**-**	**83,897**
Total Change 2012 to 2013	-	-	43,897

The Domestic Nuclear Detection Office (DND) request $83.897 million for this program activity in FY 2013. The level requested represents a healthy and robust research and development program.

CURRENT SERVICES PROGRAM DESCRIPTION:

DNDO's transformational research and development (R&D) program seeks to identify, explore, develop, and demonstrate scientific and technological approaches that meet one or more of the following criteria: address gaps in the GNDA, dramatically improve the performance of nuclear detection components and systems, or significantly reduce the operational burden of radiological/nuclear (rad/nuc) detection. Dramatic technological improvements include improvements in system effectiveness and performance characteristics; reduction in cost of acquisition or maintenance; or reduction of operational burden by users in the field. R&D investments are made based on competitive awards, with investigators in all sectors – government laboratories, academia, and private industry – encouraged to participate. This program takes advantage of the qualities and advantages of all three sectors to develop products. Teaming is encouraged across the sectors. Transformational R&D is carried out within three major programs: Advanced Technology Demonstration (ATD), Exploratory Research (ER), and the Academic Research Initiative (ARI). Each program is described in detail below.

Strategic Alignment: Transformational and Applied Research

- DHS Quadrennial Homeland Security Review (QHSR)

- Mission 1: Preventing Terrorism and Enhancing Security
    - Goal 1.2: Prevent the Unauthorized Acquisition or Use of Chemical, Biological, Radiological, and Nuclear (CBRN) Materials and Capabilities
  - Objective 1.2.3: Control Movement of CBRN
  - Objective 1.2.4: Protection Against Hostile Use of CBRN
- Maturing and Strengthening the Homeland Security Enterprise
    - Foster Innovative Approaches and Solutions Through Leading-Edge Science and Technology
  - Scientifically study threats and vulnerabilities
  - Develop innovative approaches and effective solutions

Advanced Technology Demonstration Program

Description:
The ATD program performs accelerated development, characterization, and demonstration of leading-edge technologies that address critical gaps in nuclear detection capabilities. It builds on technology concepts previously demonstrated under the ER program, research conducted by our interagency partners, or privately funded research. Through the ATD, technology concepts are developed into prototype systems called Performance Test Units (PTU) that are capable of providing reliable and scalable performance measurements in a challenging and realistic simulated operational environment. Through this technology characterization process, sufficient understanding of the technology potential is obtained to inform a Cost-Benefit Analysis (CBA) for the transition of the PTU technology to a Government acquisition program or to commercial system development. Contracts awarded under the ATD programs are typically executed in four distinct phases: preliminary design review (PDR), critical design review (CDR), characterization readiness review (CRR), and a Government characterization assessment. Historically, one ATD had been initiated each fiscal year. The ATD projects are discussed separately below:

- *Long Range Radiation Detection (LRRD) Project*: This demonstration seeks to enhance and assess performance of LRRD systems based on findings and observations from the LRRD Limited User Experiment (LUE) and Stand-off Radiation Detection System (SORDS) characterization events conducted in 2010 and2011. Specifically, the effort will perform a detailed characterization of the Roadside Tracker (RST) and Target Linked Radiation Imaging (TRLI) technologies, and support algorithm development on these and the SORDS demonstration systems. RST and TRLI will enable advanced chokepoint monitoring without impacting the flow of commerce, providing a significant new capability to the GNDA. The RST and TRLI units were originally developed under the ER program, and were deemed ready for full ATD characterization. The SORDS units can support intelligence directed surge operation where surveillance or search of wide areas is required. This multi-faceted ATD will conclude in 2013.
- *Shielded Nuclear Alarm Resolution (SNAR) Project*: This project develops and characterizes advanced technologies required to resolve alarms and to detect special nuclear material (SNM) even when heavily shielded or masked. The project has two principal applications: 1) Dramatic performance enhancement to commercially or near commercially available x-ray non-intrusive inspection (NII) screening systems by integrating solutions directly into hardware and software to substantially reduce the number of manual inspections while increasing probability of SNM detection; and 2) Targeted and choke point screening in multiple venues, including vehicle

border crossings, checkpoints, rail, air cargo, and general aviation, with rapidly re-locatable inspection systems. Currently there are two SNAR Performance Test Units (PTUs) in development.

- *Intelligent Radiation Sensing System (IRSS)*: This project utilizes advanced data fusion algorithms to maximize performance of a group of independent sensors communicating through a flexible wireless network. IRSS leverages recent breakthroughs in small, efficient radiation detectors and information synthesis methods developed under various ER programs to enable improved detection and source localization capabilities and situational awareness in both monitoring and search operations. USCG boarding parties and security teams at special events could benefit from the networked system, which may include many different types of detectors. This system could increase sensitivity, expand surveillance area, locate threats faster, and detect and identify radiation sources more accurately compared to single detectors or multiple detached (non-networked) detectors.
- *Advanced Radiation Monitoring Device (ARMD) Project*: This project builds upon advances in new detection materials discovered under previous ER projects utilizing advanced scintillator materials and neutron detection techniques. Two materials of particular interest are strontium iodide (SrI_2) and cesium lithium yttrium chloride (CLYC). SrI_2 has demonstrated exceptional performance as a gamma ray detector with excellent energy resolution and a potentially lower cost due to outstanding growth characteristics. CLYC has demonstrated excellent performance for detecting both gamma rays and neutrons. In addition, CLYC material provides a cost effective alternative to helium-3 neutron detectors. The photo-multiplier tube (PMT) replacements evaluated for this project are much more compact, rugged, and have lower power requirements and cost compared to traditional PMTs. This project combines these breakthroughs in new detection materials with both gamma and combined gamma/neutron detection capabilities to develop lower cost and greater efficiency hand-held detection system to ensure wider deployment of high performance equipment.
- *Aerial and Maritime Stand-off Detection (AMSD) Project:* This project develops stand-off radiation measurement systems for the detection of rad/nuc material from an airborne or maritime platform. These systems will be able to detect and locate point-like sources in a complex and dynamic background. These systems could be used in urban, maritime, and costal environments, with a concept of operations more in line with law enforcement practices rather than past radiological mapping operations. The proposed systems will be deployable on rotary winged aircraft or an appropriate maritime vessel. The system will provide real time data on the presence, location, and isotope identification enabled by the fusing of radiation detection with other sensing modalities (e.g. multispectral imaging, GPS, altimetry, etc). Utilizing new materials, innovative packaging, and algorithm improvements, these systems will offer greater detection sensitivity, lower false alarms, and simultaneously provide a greater range of operation.
- *New Advanced Technology Demonstrations*: New ATD projects will be initiated on a yearly basis based on: 1) prioritized gaps in the Global Nuclear Detection Architecture and; 2) technological successes from the ER Program, the ARI, or other private or public research programs that support Item 1. Multiple research projects are being monitored for potential transition to an ATD. The following projects are key in upcoming technologies demonstrations:
    - The Mobile Radiation Imaging and Tracking System (MRITS) ATD project. This project will develop and characterize land-based radiation detection, identification, localization,

and tracking system by integrating into a single mobile platform the technology and the lessons learned from the Stand-Off Radiation Detection System (SORDS) ATD, the Roadside Tracker ER Program, and DNDO's Long Range Radiation Detection (LRRD) Limited Use Experiment (LUE). This device could be used in multiple applications including urban search, long range monitoring in between ports of entry, multi-lane vehicle inspection, mobile replacement for fixed portals, and special event monitoring.

- The Portable Advanced Neutron Detector (PAND) project will develop and characterize solid-state neutron detection technology to replace He-3 detectors commonly being used in pager and hand-held devices including DNDO's Human Portable Radiation Detection System (HPRDS) handheld detectors. This ATD will investigate several new promising technologies developed through the ER and ARI programs, which include but is not limited Li_6/ZnS optical fiber scintillators, boron lined straw type gas tubes, and Li/B intrinsic semiconductor materials. This technology will enable rugged low cost neutron detection solutions enabling wide spread utilization.

Exploratory Research Program

Description:
The ER Program explores innovative, high-risk, early-stage technologies, concepts, and ideas that can make transformational contributions to support the GNDA and reduce the risk of nuclear terrorism. Specifically, the ER program researches technology and techniques that:

1) Address capability gaps and weaknesses in the GNDA, with emphasis on radiological and nuclear detection;
2) Provide substantial performance improvement or cost reduction of rad/nuc detection capabilities; and,
3) Improve nuclear forensics capabilities.

Efforts under the ER program are intended to transform the basic building blocks of nuclear detection technology and supporting fields, with the research generally culminating in a proof of concept or proof of feasibility demonstration in a laboratory setting. Successful ER technologies and concepts may then transition to support subsequent ATD projects or spur commercial development. ER also provides performance modeling, improved algorithm development, and other support capabilities for the broader DNDO mission. The ER Program is divided into the six topic areas described below.

- *Materials Research and Other Supporting Technologies Project*: Advances radiation detection through focused research in sensor materials, front-end electronics, signal processing, modeling, and supporting technologies. Advances in one or more of these areas can provide new and improved capabilities to search and screen for rad/nuc materials of concern, improved identification of these materials, and reduced or simplified operational burden for end-users. Main categories of sensor materials include scintillators, semiconductors, 3D topologies, and materials which provide non-traditional mechanisms of gamma or neutron detection. Advances in one or more of these areas can impact a number of application spaces and venues. The main component of Other Supporting Technologies is Photomultiplier Tube (PMT) replacements. Elements of this project are noted below:

- *Advanced scintillator development* explores gamma-sensitive scintillator materials that most deployed radiation detection systems use (including large portal monitors, mobile, backpack, and hand-held detectors). This effort researches materials to 1) improve energy resolution and hence improve capabilities to discriminate threat from benign radiation sources; 2) increase available volume and other parameters to improve detector element sensitivity; and 3) decrease costs through improved fabrication techniques and lower-cost raw materials.
- *Advanced semiconductor development* investigates room temperature operating semiconductor materials to sense and characterize radiological threat materials. Current state-of-the-art high-performance semiconductors require cryogenic cooling, which significantly limits deployment of detector systems using these materials. This effort researches: 1) novel semiconductor materials or 2) economical production methods (less than $\$1000/cm^3$) for high-performance semiconductor materials.
- *Photomultiplier tube (PMT) replacements/photon conversion* effort includes Solid State Photomultipliers (SSPMs) and other semiconductor-based and non-semiconductor-based technologies that convert scintillation photons into electrical signals, and hold the promise to provide photo-detectors which are far superior to traditional PMTs, due to their compact size, low voltage and power requirements, mechanical robustness, insensitivity to radio frequencies and magnetic fields and other environmental effects, non-vacuum requirements, and low cost.

- *Passive Detection Systems Project*: Develops next-generation neutron and gamma ray detection systems for a broad range of passive detection applications. Current deployed radiation portal monitors use large polyvinyl toluene (PVT) panels. The majority of current handheld radionuclide identification systems use sodium iodide (NaI) or cesium iodide (CsI) scintillators, or high-purity germanium or cadmium zinc telluride (CZT) semiconductor materials. Research in this program encompasses new materials integrated with advanced electronics, new detector configurations, and specialized algorithms to greatly improve passive sensing with emphasis on simultaneously improving detection sensitivity and specificity, while minimizing operational burdens associated with employment of these systems. Performance benefits to be derived from this research include longer range stand-off detection of threat materials, improved differentiation of threat materials from environmental background and benign sources of radioactivity, and decreased false alarms with greater confidence in alarm resolution.
- *Helium-3 Replacement Technologies and Fast Neutron Detection Project*: Explores near-term and longer-term alternatives to ^3He neutron detectors currently used in various radiation portal monitor (RPM) applications, as well as backpack, hand-held and personal radiation detection instruments. ^3He has been a vital isotope in instrumentation for neutron detection because of its high absorption cross-section for thermal neutron beams, excellent gamma rejection properties, and, until recently, it's historically low cost. However, there is now a generally-recognized, world-wide critical shortage of ^3He due to 1) increased demand by industries such as oil, medicine, basic science, defense, and security; and 2) decreased supply because the source of ^3He has been from the nuclear weapons program, which has reduced production over the years. Because the need for better and more efficient neutron detectors continues, an intensified and more focused research and development effort has gone into alternative technologies for ^3He neutron detectors. Particular focus was initially on portal applications since this requires the most ^3He, but increasing attention is being given to applications which are the next largest users of ^3He – backpacks and handhelds. This project investigates a range of materials, technologies,

and sensor systems, many of which are based on either boron-10 or lithium-6 as neutron capture agents. This project also explores novel techniques for fast neutron detection.

- *Detection of Shielded SNM Project*: Expand and improve detection technologies for highly shielded special nuclear material (SNM) for existing and new application scenarios. SNM produces a relatively weak passive signature that can be easily shielded, making passive detection difficult, if not impossible. Active Interrogation (AI) detection, which includes radiography, uses particle interrogation techniques to produce and/or enhance one or more unique signature from SNM, greatly improving detection performance. AI detection methods typically employ x-rays, gamma-rays, or neutrons to penetrate shielding and the normal cargo found in containers, vehicles, or trucks. Other techniques of interest use natural fields such as cosmic rays and gravity to penetrate large volumes and detect the presence of objects with high mass density such as metals with high atomic numbers found in shielding and in SNM.
- *Algorithms, Modeling, and Software Project*: Researches signal processing and signal analyses that improve detection and characterization of signals from threat objectives, and compensation, correction, or reduction of background noise to improve detector performance. Normally occurring background radiation affects detector sensitivity and limits current radiation detection technologies' performance. Further, temporal and spatially varying environmental background and nuisance sources (e.g., benign materials containing naturally occurring radioactive materials and patients experiencing nuclear medicine procedures) often lead to unacceptable false alarm rates. This project uses advanced statistical approaches to data analysis to include machine learning and use of correlated data to improve the sensitivity/specificity of nuclear detection and models detector performance. Research in this area also includes advanced abilities to model detector performance and support capability-based design of advanced detection concepts.
- *Forensics Data Collection and Analyses Project*: Develops analytical techniques for determining the origin and transit route of nuclear materials. Nuclear forensics analyzes pre-detonation materials and supports analysis of post-detonation materials. These analyses inform and support attribution and response decision-making. Laboratory analysis determines physical, chemical, radiological, or morphological properties of sample material or debris. Analytical results help determine specific processing the material underwent, geographic origins, transport pathways, and intended use of the materials.

New Exploratory Research activities are initiated through a yearly Broad Agency Announcement (BAA) for industry and a Call for Proposals (CFP) for National and Government Laboratories. Topics areas for this research are defined from prioritized gaps in the Global Nuclear Detection Architecture, technology needs defined by DNDO and other DHS Components, and remaining technology hurdles discovered in prior research.

Academic Research Initiative

Description:
This program has two primary objectives: 1) Engage the academic community to advance fundamental knowledge for rad/nuc threat detection and related sciences with emphasis on fundamental research to solve long-term, high-risk challenges; and 2) Develop human capital for the nuclear science and engineering profession. Further, the program works to sustain a long-term commitment to basic research in this field and coordinates research efforts across the Federal government. In January 2007,

DNDO formally established the ARI through a Memorandum of Understanding with the National Science Foundation (NSF). NSF administers the proposal solicitation, evaluation, and grant award process as well as manages the first year of grant execution. The DHS Grants Office administers the subsequent years in conjunction with DNDO. Since inception, 57 grants have been awarded to over 45 academic institutions across the country. In FY 2011 the ARI program supported 39 grants and over 150 students. In addition to its focus on basic and fundamental radiation detection science, the ARI funds academic disciplines traditionally not associated with radiological/nuclear detection, such as social sciences and applied mathematics. The ARI program portfolio encompasses a number of research categories described below.

- *New Radiation Detector Materials Research:* Focuses on long-term research aimed at developing greatly improved radiation detector materials that are highly sensitive, selective, low cost, and rugged. Research to significantly improve the yield and performance of sensor materials beyond those presently available is needed with particular emphasis on the growth, processing, and characterization of new detection materials. This includes development and improvement of scintillator materials (e.g., faster response, higher light output, better linearity, and improvements in growth and fabrication) as well as semiconductor materials (e.g., reducing impurities, optimizing charge transport, allowing room temperature operation, and innovatively improving contacts and charge collection) with the goals of excellent efficiency and energy resolution at room temperature.
- *Novel Nuclear Detection System Concepts, Approaches, and Architectures Research*: Explores radically new approaches to threat detection, eventually leading to sensor or detection system concepts that are highly sensitive to rad/nuc signatures and selective in the ability to distinguish and locate these materials from naturally occurring background. This includes research into new detection system concepts, approaches, and architectures that can support detection of rad/nuc threats being transported via general aviation (non commercial aircraft), small maritime craft (under 300 tons), and/or across the expansive land borders between official Points of Entry. A large focus of this research is on fundamental understanding of how threat detection can be enabled through radiation imaging and modeling threat detection environments.
- *Alternative Neutron Detection (He3 Alternative) Technologies Research*: Investigates alternatives for neutron detection due to the scarcity of Helium-3 (^{3}He). It also seeks to greatly improve neutron detection capabilities in general, with performance that would provide substantial improvements over existing ^{3}He technologies. This includes development and improvement of neutron sensitive scintillator materials as well as semiconductor materials with the goals of excellent efficiency and excellent ability to discriminate neutrons from gamma-rays. Additionally, neutron detection systems that improve the directionality, localization, and/or imaging capabilities are also being investigated.
- *Shielded SNM Detection Technologies, Signatures, and Sources Research*: Investigations to overcome the challenge of detecting shielded SNM, principally through non-intrusive inspection (NII) approaches to air, land, and sea cargo scanning; vehicle scanning; and human portable scanning applications. Existing NII systems use radiography, computed tomography, spectral analysis and neutron-based assays. Fundamental research in this area addresses a range of studies to augment conventional NII approaches including: 1) transformational low-power, low weight, high-yield neutron and gamma ray production sources; 2) high-efficiency, fast-recovery, low cost spectral detectors; 3) novel inspection concepts and 4) investigations

into unique signatures and fundamental data associated with active detection methods such as nuclear resonance fluorescence (NRF).

- *Expert Systems, Networks, Algorithms, and Data Processing for Nuclear Detection Research*: Investigates innovative data processing and analysis techniques that will lead to significant performance improvements, including 1) accuracy of spectral analysis of gamma-ray sensor systems, 2) sensitivity and precision of detection systems, 3) sensor fusion (both radiation and other sensors), and 4) detector implementation and networking. The research includes significant simulation and modeling to provide a fundamental basis to support these new approaches.
- *Nuclear Forensics Technologies Research:* Investigates advanced analytical techniques used to determine the origin and transit route of pre-detonation nuclear materials. Research emphasis includes 1) identifying ways to improve techniques and methodologies (i.e., speed, accuracy, and precision in both existing and emerging methods) for the physical, chemical, radiological, or morphological analysis of nuclear or radioactive materials, including determining specific processing the material underwent, geographic origins, transport pathways, and intended use; 2) improving the separation or analysis of non-nuclear material associated with nuclear materials; and/or 3) improving the use of signatures to identify source materials in the nuclear fuel cycle.

The ARI program refreshes its research portfolio every year through an annual solicitation developed jointly between the NSF and DNDO, and administered by the NSF. Topic areas for this research solicitation are derived from a number of collaborative sessions with the NSF to determine areas of investigation that best support both DNDO and NSF goals. DNDO goals include addressing gaps in the Global Nuclear Detection Architecture, addressing fundamental technology needs defined by DNDO and other DHS Components, and focusing on technology challenges that are best addressed by the unique capabilities and skills of academia. NSF goals include supporting research that could have broad societal impact, and that is of the highest technical caliber.

PPA: TRANSFORMATIONAL RESEARCH AND DEVELOPMENT						
MISSION ALIGNMENT						
	Cross Mission Capability Development	**Infrastructure and Support**	**Land Border**	**Interior**	**Maritime**	**Aviation**
Academic Research Initiative	X					
Exploratory Research Program	X					
Advanced Technology Demonstrations	X					

QHSR ALIGNMENT			
	Goal	**Obj.**	**Description**
Academic Research Initiative	1.2	1.2.3 1.2.4	Control Movement of CBRN Protect Against Hostile Use of CBRN
Exploratory Research Program	1.2	1.2.3 1.2.4	Control Movement of CBRN Protect Against Hostile Use of CBRN
Advanced Technology Demonstrations	1.2	1.2.3 1.2.4	Control Movement of CBRN Protect Against Hostile Use of CBRN

DHS QHSR Mission 1- *Preventing Terrorism and Enhancing Security*
Goal 1.2 - *Prevent Unauthorized Acquisition or Use of CBRN Materials and Capabilities*
DHS QHSR Mission 2- *Securing and Managing our Borders*
Goal 2.1 *– Effectively Control U.S. Air, Land, and Sea Borders*

Department of Homeland Security
Domestic Nuclear Detection Office
Research, Development, and Operations:
Assessments
Program Performance Justification
(Dollars in Thousands)

PPA: Assessments

	Perm. Pos	FTE	Amount
2011 Actual Obligations	**-**	**-**	**40,799**
2012 Enacted Budget Authority	**-**	**-**	**38,000**
2013 Adjustments-to-Base	-	-	(608)
2013 Current Services	**-**	**-**	**37,392**
2013 Program Change	-	-	(4,194)
2013 Total Requested Budget Authority	**-**	**-**	**33,198**
Total Change 2012 to 2013	-	-	(4,802)

The Domestic Nuclear Detection Office (DNDO) requests $33.198 million for this activity. DNDO has identified efficiency savings of $0.608 million in FY 2013 through the review of test facility requirements and funding strategy for conducting Pilots and the Directed Test Program. DNDO will utilize test facilities located at the National Laboratories to simulate operational environments to achieve the necessary test results that were formerly conducted at actual operational sites.

CURRENT SERVICES PROGRAM DESCRIPTION:

The DNDO development and acquisition process is anchored by the assessment of DNDO mission-related technologies as they are developed, deployed, and implemented. DNDO continually assesses the global nuclear detection and reporting architecture through a variety of means, including test and evaluation (T&E) campaigns to characterize and collect performance data on commercially available and emerging technologies and systems; execution of pilots with operational agencies to evaluate concepts of operations (CONOPS); red team assessments to deepen the understanding of adversary capabilities; and net assessments to identify the effectiveness of the planned and deployed global nuclear detection and reporting architecture.

QHSR Strategic Alignment – Assessments

- Department of Homeland Security (DHS) Quadrennial Homeland Security Review (QHSR) Mission 1, Preventing Terrorism and Enhancing Security
  - Goal 1.2: Prevent the Unauthorized Acquisition or Use of Chemical, Biological, Radiological, and Nuclear (CBRN) Materials and Capabilities

- Objective 1.2.1: Anticipate Emerging Threats
- Objective 1.2.3: Control Movement of CBRN
- Objective 1.2.4: Protection Against Hostile Use of CBRN

Test and Evaluation (T&E) Program

Description
DNDO technology development and acquisition programs are supported by test and evaluation (T&E) campaigns to characterize and assess the effectiveness of technologies under development as well as Commercial Off-The-Shelf (COTS) and/or Government Off-The-Shelf (GOTS) technologies or systems. The DNDO research, development, and acquisition process is anchored by rigorous assessments of mission related technologies as they are developed, deployed, and implemented. The testing of detection systems against special nuclear materials (SNM) in significant quantities and in realistic configurations is a key to assessment of radiological and nuclear (rad/nuc) systems. This type of testing requires highly specialized and secure testing facilities, such as the Radiological & Nuclear Countermeasures Test and Evaluation Complex (RNCTEC), and resourced with appropriate test instrumentation, equipment, radioactive sources, measurement devices/sensors, and test data collection/archiving systems. The T&E program is comprised of the following projects: T&E Facility Infrastructure, T&E Operations, Test Data Management, Algorithm Test Bed, Directed Testing, Graduated Rad/Nuc Detector Evaluation and Reporting (GRaDER^{SM}) program, and Test Modeling and Simulation.

Evaluating the performance and operational utility of technologies developed or purchased to detect and identify nuclear weapons and special nuclear material is crucial to thwarting nuclear proliferation and terrorism, the primary goal of DNDO. The T&E Program maintains the core capability to test and evaluate rad/nuc detection technologies in support of DNDO's primary goal, including maintaining essential T&E assets, resources, and facilities and relationships with nuclear scientists who assist in the design and execution of test campaigns. Beyond testing facilities, test data collection systems and nuclear experts, a critical component of T&E is the nuclear material used in the testing of detectors, referred to as sources. Based on threat information, this program identifies the amount (ranges of quantities are listed under the official DOE Category I through IV) and configuration of test objects or sources used for testing, and then uses the DOE national labs to design and fabricate different sources in varying sizes. A T&E source program has been developed to build up the test sources inventory of four different Radiation Signature Training Devices (RSTD) and three plutonium (Pu) source sizes for testing.

T&E – Operations, Facilities, and Infrastructure

Operations – Description
Test and Evaluation capabilities support multiple DNDO program offices, generating and providing critical data to support design and development decisions and to support decision makers with analytical results necessary to make informed decisions. The credibility and timeliness of test products are paramount to advance technology development programs at key decision points and milestones. As such, the need for a repeatable, controlled process in the planning and conduct of testing is required to manage all testing complexities. This process is described and formalized in DNDO Operating Instruction -1 (OI-1) for Test Event Planning, and is used for all testing conducted by DNDO.

Testing strategies differ depending on the program strategy, system(s) to be tested and the questions to be answered through the testing. Based on the purpose and objective of the test, each test effort requires a unique and detailed plan to support its individual needs. Methods such as scientific experimentation, technical evaluations, operational relevance, and characterization must be applied appropriately. As such, individuals must be properly trained in the different aspects of testing and how to apply them while developing the experience to know when to apply them. The DNDO test leaders assemble the proper mix of experts needed to develop and execute timely and credible test and evaluation campaigns by leveraging the intellectual and manpower resources of other organizations, such as the National Institute of Standards and Technology (NIST), the National Laboratories and other Federal agencies.

Facilities and Infrastructure - Description
Conducting rad/nuc detection systems testing has been accomplished at several locations including the RNCTEC, the primary DNDO test center located at the Nevada National Security Site (N2S2), as well as the Rail Test Center (RTC) at the Port of Tacoma, and various national laboratory facilities such as Pacific Northwest, Los Alamos, Oak Ridge, and Savannah River National Laboratories. DNDO has invested substantial resources in establishing RNCTEC, and intends to leverage this investment to the maximum extent possible by encouraging its use by other agencies with similar needs.

Testing of rad/nuc systems poses many challenges to classic T&E practices due to issues such as nuclear material handling regulations, health and safety of personnel, and security. Compared to other government programs, the challenges for rad/nuc systems testing involve specialized facilities with uniquely qualified experts. In order to enhance the robustness and operational relevance of testing, DNDO has utilized a test center at the Port of Tacoma and has performed system data collections at other ports of entry. Reflecting the need to prioritize infrastructure expenses to match program needs the RTC at the Port of Tacoma, Washington will not be funded in FY 2013. If needed, DNDO will utilize testing capabilities at the national laboratories or at RNCTEC.

Rad/nuc systems require specialized equipment to measure results and collect the necessary data to conduct credible testing with repeatable results. In addition, forecasting the needs of developmental and research systems is vital to maintain state of the art facilities. Included in this outfitting is the special consideration of fabricated SNM sources which represent threat articles and configurations.

T&E – Test Data Management

Description
This project focuses on the collection, verification and validation, analysis, reporting and archiving of test data collected during DNDO test campaigns as well as the collection of similar test reports by other agencies. There are three data management systems included in the Test Data Management program: the Archive and Retrieval Management System (ARMS), the Report Analysis and Archive System (RAAS), designing and/or maintaining test data collection software.

The Archive and Retrieval Management System (ARMS) is a repository that will store and retrieve all T&E data for every DNDO system under test. This includes all test data associated with every DNDO test including spectra, scenarios, sources, test plans, and reports. The fundamental need for this system

is derived from the requirement for a centrally controlled repository of verified data sets, traceable distribution of DNDO data as requests are made to perform additional analysis with the test results, document ground truth-based detector response characteristics for all systems under every test, and retrievable test data for independent audit report recommendations.

RAAS was developed to store and retrieve test reports containing evaluations of radiation detection and radiography systems from various agencies such as DHS, DOD (Defense Threat Reduction Agency), Department of Energy National Laboratories, and others. These agencies have sponsored and/or conducted studies, evaluations and tests on equipment currently in their inventories and deployed for the detection, localization and identification of SNM and other radioactive materials. This repository of test reports is made available to all appropriate organizations with an interest in rad/nuc detection and radiography equipment performance. There are approximately 40 active users of this system that can access approximately 700 reports in 14 classes of technologies.

ARMS and RAAS are linked efforts. Links to ARMS are created in the RAAS system to allow the user to access the data supporting the report for a more cost effective approach, leveraging similar assets for both projects.

The Data Collection Systems (DCS), which uses a client-server software architecture model, is a highly configurable test data management system that is customizable for each specific test event. The baseline DCS software will require continued development to keep pace with the new technologies and operational environments being considered by DNDO programs.

T&E – Algorithm Test Bed

Description
Radiation detectors utilize algorithms to alert users of the presence of radioactive material. For some instruments, these algorithms can also identify and classify the type of material that is detected, such as medical isotopes. In short, algorithms interpret the collected data and determine the response of the detector whether it be to alarm or identify radioactive material. The sophistication of algorithms varies between radiation detectors; therefore it is important to understand the capabilities and limitations of algorithms utilized in a variety of different radiation detectors.

To this end, DNDO needs the capability to evaluate the baseline performance of detector algorithms; and compare new and existing detector algorithms against standardized sets of both modeled and measured threats in a virtual environment. These modeled results can be used to significantly augment the physical tests performed by DNDO to help improve current algorithms and map out the limits of performance for existing algorithms. DNDO's primary resource for performing these types of computational studies is the Algorithm Test bed (ATB). Additionally, this program is designed to integrate with the parallel Algorithm Improvement Program (AIP). ATB will provide an evaluation capability for the algorithms developed under AIP.

The ATB provides an avenue for performing algorithmic studies, which can supplement physical testing that is significantly more expensive, and often limited in what measurement configurations can be evaluated due to time, resource, and budgetary constraints. More specifically, some of the analytical studies that can be investigated at the ATB include threat injection studies, receiver operator

characteristic (ROC) curve studies, degraded mode studies, and concept of operations studies. Currently, DNDO has developed and continues to develop the capability to evaluate a variety of different types of radiation detectors using the ATB including portal monitors (ASP and PVT-based systems), hand-held radioisotope identification devices, and mobile platform radiation detection systems. The ATB provides a mechanism to evaluate the effectiveness of improvements to algorithms against a standard reference set of measured threats.

T&E – Directed Testing

Description
DNDO routinely conducts test campaigns to evaluate the performance and operational relevance of rad/nuc equipment currently available. Such tests provide for the independent assessment of equipment to confirm vendor performance claims. State and local entities have repeatedly stated their need for these test results to inform them in the development of effective nuclear detection programs at the State, local, and tribal level using appropriate CONOPS.

State and local law enforcement and other public safety personnel are procuring nuclear detection technologies that are commercially available. Two primary issues associated with the use of nuclear detection technologies by law enforcement and public safety personnel are: 1) their effectiveness in detecting various radioactive sources, and 2) their performance in certain operationally relevant environments. DNDO has evaluated off-the-shelf or government available rad/nuc detection equipment in order to provide performance evaluation information on specific models and their potential operational utility. The following classes of detectors have been evaluated in the past under the Directed Test funding: personal radiation detectors, handheld, backpack and mobile detection systems, and radiation detection systems suitable for maritime environments and aerial platforms (testing conducted 4Q FY 2011through 1Q FY 2012). In FY 2012, funding will be used to complete a collaborative test with the European Union on nine classes of rad/nuc technologies used in the U.S. as well as worldwide.

While the Directed Testing program has similar goals and users of the test data as the GRaDER program, Directed Testing is conducted by DNDO and is based on threat informed and mission related DHS performance requirements. Such requirements are based on the current nuclear threat. The test objectives therefore change for specific scenarios and over time.

T&E – Graduated Rad/Nuc Detector Evaluation and Reporting Program

Description
The Graduated Rad/Nuc Detector Evaluation and Reporting (GRaDER®) Program evaluates commercial off-the-shelf (COTS) rad/nuc detection equipment independently tested against national consensus standards adopted by the Department of Homeland Security and Federal government Technical Capability Standards (TCSs). The program was established to provide objective and reliable performance testing information to Federal, State and local stakeholders. The information will assist stakeholders in making Rad/Nuc detection equipment procurement decisions.

This program was established to provide a venue to test, evaluate, and share test results of rad/nuc detection equipment against standards utilizing competent and capable independent, third-party

laboratories. Manufacturers may have their products tested against these consensus standards through a fee-for-service transaction with independent laboratories that have been accredited under the National Institute of Standards and Technology (NIST) National Voluntary Laboratory Accreditation Program (NVLAP), or accepted by DNDO pending accreditation. DNDO, with the support of NIST, performs an independent evaluation of the test results, determines the level of compliance with the applicable standards using published criteria, and publishes the results of evaluation in the form of a GRaDER Evaluated Equipment List (GEEL), an instrument model evaluation, and a brief model evaluation summary. These evaluation products are distributed through controlled access electronic media to validated stakeholders that may include Federal, State, local, tribal and territorial agencies with law enforcement and first responder mission requirements.

The Rad/Nuc detector industry continues to develop new technologies and enhancements to existing technology. Federal, State, and local technology users need accurate and objective performance information of this equipment before purchasing. The pace of innovation and new products in the marketplace and the cost of testing makes it prohibitive for the Federal government to continually test to ensure equipment procured meets DHS adopted voluntary consensus standards.

DNDO is mandated by Congress (SAFE Port Act of 2006) to implement a test and evaluation program to provide effectiveness information and metrics for evaluating nuclear detection technology. The GRaDER program was established to meet this mandate. This testing framework can be accessed any time a vendor has a new technology and is ready to perform testing of the technology against standards, rather than waiting for a government-sponsored test.

The law also requires DHS to publish technical capability standards (or government unique standards). The GRaDER program will integrate these technical capability standards into the program as the standards are approved. The first of these technical capability standards was published in November, 2011. The first use of this technical capability standard in a GRaDER test is planned in 2013.

While the Directed Testing program has similar goals and users of the test data as the GRaDER program, Directed Testing is conducted by DNDO and is based on threat informed and mission related DHS performance requirements. In GRaDER, tests are performed against the consensus standards by NVLAP accredited or DNDO accepted laboratories and therefore provide a common basis of comparison of instruments for each category of equipment.

T&E – Test Modeling & Simulation

Description
Recent National Academies' evaluation of DNDO efforts have strongly recommended increased focus by DNDO on modeling and simulation. In response, DNDO is establishing a test Modeling and Simulation strategy to guide the various testing efforts supporting DNDO programs. The purpose of the effort is to leverage the substantial radiation detector test, evaluation and analysis work that has been done, and consider whether a guiding methodology or architecture can be developed, to improve the efficacy of testing moving forward. The use of modeling and simulation will enhance test design and extend DNDO's understanding of system performance beyond the conditions tested.

Through DNDO's international relationship with the IAEA, we are evaluating the Replicative performance Assessment of Spectroscopic Equipment (RASE) program developed by the IAEA, utilizes a semi-empirical approach to study the performance of radionuclide identification equipment. The approach is to acquire gamma-ray spectra (base spectra) with high statistical accuracy using the detector systems. The base spectra are then used as the source to generate sample spectra, using a Monte Carlo approach, with user defined parameters such as acquisition time, superposition of spectra, and distortions due to environmental effects. These sample spectra are then run through the manufacturers' algorithms to assess their effectiveness, allowing a rigorous analysis of their overall capability.

RASE, first and foremost, generates empirical spectral data of any sources or configuration thereof, under any set of conditions as a function of instrument and instrument types. This is a key component of any modeling and simulation effort. The scoring logic of the algorithms, which can be easily modified in RASE, includes cases for which the solution found by the vendors' algorithms were complete, conclusive and correct, inconclusive, incomplete, incorrect, incorrect and incomplete (see NSS1 scoring criteria).

RASE can then perform an integral analysis of the performance of an algorithm by replicating a number of spectra, feeding them to the vendors', or anyone's, algorithms and analyzing the results there from in terms of correct, partially correct, etc solutions. The framework can also provide a differential analysis where the responses of the algorithms are analyzed in terms of isotope and how often they turn out to be correctly identified or misidentified.

The RASE process can be of use by DNDO and has a result DNDO is entering into a partnership with the IAEA. Together we will improve usability of the existing program and add a time component to it. This will be the basis for a new approach to modeling the response of portals and also determining the effectiveness of detection and identification of moving sources in the operational environment. It is essentially an algorithm test bed based on a comparatively small number of measurements.

Red Team and Net Assessments (RTNA)

RTNA is DNDO's primary means to independently assess the operational effectiveness and performance of DNDO programs and deployed rad/nuc detection capabilities at the Federal, State, local and tribal levels in support of the Global Nuclear Detection Architecture (GNDA).

RTNA is comprised of the following efforts:

Red Team (RT) Division - Description
RT employs two models in assessing the GNDA. Overt and covert tests use inside information to intentionally introduce radioactive sources against operationally deployed Federal, State, local, and tribal defenses to assess the performance of fielded technology, training, and protocols. Adversarial-based assessments are from an outsider's perspective without using any "inside" information of current or planned capabilities.

RT builds models that integrate validated lessons learned from overt and covert operations and assessments, intelligence estimates, expert elicitation, and workshops into probabilistic measures of the effect that implemented capabilities have on adversary decision making.

Net Assessments (NA) Division - Description
NA assesses the effectiveness of concepts of operations, protocols, training, technologies, and technical support for RPND programs and deployed capabilities. NA examines the various GNDA programs; reviews procedures and policies; identify lessons learned from all RTNA assessments; and conducts continuous independent assessments to determine value added against the global threat. These assessments provide DNDO Directorates with an analytical tool that affords independent evaluation of their programs and activities. The NA program, in cooperation with Federal, State, local and tribal operational partners, is part of an on-going strategy to improve the overall probability of success in the rad/nuc detection mission.

SUMMARY: The following table illustrates the crosswalk between specific projects and activities and the DNDO mission areas. Programs and activities have applicability to more than one mission area and are represented in a cross cutting manner.

PPA: ASSESSMENTS						
MISSION ALIGNMENT						
	Cross Mission Capability Development	**Infrastructure and Support**	**Land Borders**	**Interior**	**Maritime**	**Aviation**
Test & Evaluation (T&E) Program		X				
Operations, Facilities and Infrastructure		X				
Test Data Management		X				
Algorithm Test Bed		X				
Directed Testing		X				
GRaDER				X		
Test Modeling & Simulation		X				
RTNA		X				

QHSR ALIGNMENT			
	Goal	**Obj.**	**Description**
Test & Evaluation (T&E) Program	1.2	1.2.3 1.2.4	Control Movement of CBRN Protect Against Hostile Use of CBRN
Operations, Facilities and Infrastructure	1.2	1.2.3 1.2.4	Control Movement of CBRN Protect Against Hostile Use of CBRN
Test Data Management	1.2	1.2.1 1.2.4	Anticipate Emerging Threats Protect Against Hostile Use of CBRN
Algorithm Test Bed	1.2	1.2.3 1.2.4	Control Movement of CBRN Protect Against Hostile Use of CBRN
Directed Testing	1.2	1.2.3 1.2.4	Control Movement of CBRN Protect Against Hostile Use of CBRN
GRaDER	1.2	1.2.3 1.2.4	Control Movement of CBRN Protect Against Hostile Use of CBRN
Test Modeling & Simulation	1.2	1.2.3 1.2.4	Control Movement of CBRN Protect Against Hostile Use of CBRN
Red Team and Net Assessments	1.2	1.2.1 1.2.4	Anticipate Emerging Threats Protect Against Hostile Use of CBRN

DHS QHSR Mission 1- *Preventing Terrorism and Enhancing Security*
Goal 1.2 *- Prevent Unauthorized Acquisition or Use of CBRN Materials and Capabilities*

Department of Homeland Security
Domestic Nuclear Detection Office
Research, Development, and Operations:
Operations Support
Program Performance Justification
(Dollars in Thousands)

PPA: Operations Support

	Perm. Pos	FTE	Amount
2011 Actual Obligations	**-**	**-**	**32,656**
2012 Enacted Budget Authority	**-**	**-**	**33,000**
2013 Adjustments-to-Base	-	-	(611)
2013 Current Services	**-**	**-**	**32,389**
2013 Program Change	-	-	3,290
2013 Total Requested Budget Authority	**-**	**-**	**35,679**
Total Change 2012 to 2013	-	-	2,679

The Domestic Nuclear Detection Office (DNDO) requests $35.679 million for this program. DNDO has identified efficiency savings of $0.611 million in FY 2013 through a review of the Nuclear Assessments Program (NAP). The savings from NAP were achieved by prioritizing the assessments and eliminating the efforts that did not provide direct support to DNDO.

CURRENT SERVICES PROGRAM DESCRIPTION:

Radiological and nuclear (rad/nuc) detection capability development and enhancement are not solely accomplished by technology deployments. All detection and interdiction efforts must be conducted in coordination with trained Federal, State, local, and tribal law enforcement agencies, as well as the larger intelligence and counterterrorism communities. Accordingly, while DNDO has initiated the capability enhancement and training and exercise functions, it is also responsible for developing the information sharing and analytical tools necessary to create a fully-integrated and common operating picture. Furthermore, DNDO establishes additional protocols and procedures to ensure that the detection of unauthorized nuclear explosive devices, fissile material or radiological material is promptly reported to the Secretaries of Defense, Homeland Security and Energy, the Attorney General, and other appropriate officials for appropriate action by law enforcement, military, emergency response, or other authorities.

DNDO must have the ability to integrate detection data and intelligence assessments in near real-time to develop information that enables an overall system and situational awareness. This requires DNDO to closely interact with the Intelligence Community (IC) as a developer of intelligence requirements and consumer of intelligence products, not as an intelligence collection agency. Conversely, DNDO

partners directly with the law enforcement community, which is the primary user of preventive radiation detection equipment in the domestic layer of the GNDA. This integrated approach to detection and information analysis provides a substantial improvement and efficiency in alarm resolution, threat assessments, data trend analysis, and, most importantly, overall probability of success in countering the threat of nuclear terrorism.

QHSR Strategic Alignment – Operations Support

- Department of Homeland Security (DHS) Quadrennial Homeland Security Review (QHSR) Mission 1, Preventing Terrorism and Enhancing Security
  - Goal 1.2: Prevent the Unauthorized Acquisition or Use of Chemical, Biological, Radiological, and Nuclear (CBRN) Materials and Capabilities
    - Objective 1.2.3: Control Movement of CBRN
    - Objective 1.2.4: Protection Against Hostile Use of CBRN

Joint Analysis Center (JAC)

Description
The Joint Analysis Center (JAC) was established as an element of DNDO to provide a timely information sharing and analysis capability that monitors the status of and collecting information from both overseas and domestic elements of the GNDA. In other words, the JAC serves as the interagency coordination mechanism and central monitoring point for the GNDA, maintaining awareness of and for the GNDA – to include status of rad/nuc detection operations, visibility into the status of rad/nuc alarms, and awareness of rad/nuc-related incidents and events. To do so, the JAC coordinates adjudication of nuclear detection events (including Technical Reachback); analyzes intelligence and sensor information; facilitates technical support to Federal, State, and local authorities; and coordinates the government technical response to rad/nuc detection incidents. GNDA priorities for crosscutting and foundational capabilities include fully stand up and equip the JAC, which will receive detection information from as many sources as possible electronically, enhance communication and coordination mechanisms, and create a global situational analysis capability for monitoring radiological threats. Within the JAC program are two operational elements and an Information Technology (IT) system. Previous CJ characterizations of the JAC have described in terms of "JAC Operations" and "Secondary Reachback" capabilities. As the GNDA has been better defined during the past year, culminating in the publication of the GNDA Strategic Plan, we have found it useful to align JAC functions to new operational elements. Presently the operational elements are: JAC Information Sharing, maintaining a common operating picture for stakeholders throughout the GNDA; and Information Analysis, providing technical assistance, data mining, and trends analyses to stakeholders. The JAC relies on the national laboratory-based Secondary Reachback Program (SRB) to provide expert advice and analysis in support of detection operations, and on the Nuclear Assessment Program (NAP). The Joint Analysis Center Collaborative Information System (JACCIS) is the IT system that supports the overall JAC mission.

JAC Information Sharing – Description
JAC Information Sharing consists of three primary activities which combine to ensure a common operating picture across the GNDA and facilitate coordination between Federal, State, and local jurisdictions. The three activities are Information Product Development and Deployment, Enable

Operational Planning, Cross-jurisdictional Collaboration Support, and Information Product Development and Deployment generates packaged information on both a routine and on-demand basis and delivers them directly to stakeholders or publishes them on appropriate Community of Interest sites. Enable Operational Planning provides information support to GNDA stakeholders as they plan or prepare to conduct rad/nuc detection operations. Cross-jurisdictional Collaboration Support facilitates the timely delivery of pertinent information across the GNDA to appropriate stakeholders to ensure accurate and relevant awareness supporting ongoing operations. All three activities look across the GNDA including intelligence/law enforcement traffic, operational activity including exercises, training, and incident response, and serve as a mechanism with which partners submit and receive information pertinent to radiological nuclear terrorism prevention. The strategy for JAC Information Sharing includes use of existing processes and policies and sharing visibility of information with appropriate stakeholders.

JAC Information Analysis– Description
Information Analysis consists of SRB Adjudication Support and Data Fusion & Analysis. SRB is an essential component of the "U.S. Government Nuclear and Radiological Alarm Technical Adjudication and Resolution Process," Annex 1 to NSPD-43/HSPD-14 (Domestic Nuclear Detection) and Annex 1 to PDD-41 (U.S. Policy on Improving Nuclear Material Security in Russia and the Other Newly Independent States), 15 May 2007. In coordination with the Department of Energy's (DOE) National Nuclear Security Administration (NNSA), SRB provides 24/7 technical capability, at the National Level, to facilitate radiation detection alarm resolution and effectively transition to response operations if required. SRB is used when alarms can't be resolved at the point of detection. Facilitated and coordinated by JAC program management, SRB provides support to Federal, State, local, tribal, and territorial stakeholders at the National Reachback Level including response to CBP's Laboratories and Science Services (LSS).

To be accomplish this mission, the JAC ensures SRB maintains a strong foundation that includes: maintaining a qualified and trained expert workforce at the appropriate level and quantity, ensuring the reachback community has access and training on the best analytic tools, data fusion of multiple data sources to provide a most complete vision of the operational environment, and developing awareness within the nuclear detection community to enable alarm resolution at the lowest level possible. Data Fusion & Analysis ensures that stakeholders are armed with the most complete and relevant information, in addition to the spectral analysis support provided by SRB, to ensure timely adjudication of detections in keeping with the operational concepts prescribed by the GNDA. Data Fusion & Analysis integrates broader knowledge of the operational situation with data derived from a detection event to help set adjudication and post adjudication action priorities.

JAC – Secondary Reachback Program Description
SRB provides 24/7 technical capability to facilitate radiation detection alarm resolution and effectively transition to response operations if required. SRB is used when alarms can't be resolved at the point of detection. Facilitated and coordinated by DNDO, SRB provides support to Federal, State and local customers. The program sustains this reachback function, while enhancing the expertise of the technical personnel who support reachback capability through knowledge of equipment capabilities and limitations, awareness of technical signatures of threats, and specific knowledge of end-user CONOPS.

JAC – Nuclear Assessment Program Description
DNDO has refocused the technical expertise resident within NAP towards specific requirements of DNDO to include the development of classified annexes for architectural studies; creation of GNDA visualization tools; operations support activities and the ongoing development and execution of red teaming and assessment activities. Specifically, NAP provides technical advice and assistance to DNDO operations and the supporting elements of the GNDA. NAP assists DNDO in defining, monitoring, and updating the evolution of the GNDA.

JACCIS – Description
The Joint Analysis Center Collaborative Information System (JACCIS) supports the JAC in both its Information Sharing and Information Analysis roles. It is the information technology system developed to receive, manage, analyze, transfer, and report on all data relevant to the GNDA. The JACCIS provides an enterprise infrastructure that integrates the Joint Analysis Center (JAC) operational construct and its processes by means of a focused fusion of raw data from multiple sources (alarm adjudication, intelligence sources, etc.) through collaboration, with shared data between communities of interest. This system will also facilitate the sharing of radiation detection data among Federal, regional, and municipal users and empower the lowest level of authority to evaluate detection events as either threat or legitimate, rapidly determining the appropriate response while reducing the impact on commerce and personal movement. This system is also the backbone for moving technical data from lower levels to the nation's technical experts for those cases when the first responders are not capable of determining threat vice legitimate. This integration was previously done via phone and e-mail and was manpower intensive.

The JAC will manage, control, and maintain the authorization and access for JACCIS ensuring all agencies using JACCIS are properly vetted. Federal, State, and local departments and agencies will have access to JACCIS via a public facing external web interface with a Single Sign-On functionality allowing authorized users to access and query data stored by JACCIS per information sharing agreements. Agencies will use the JACCIS interface to upload (attach files in reachback case) event/case information, request reachback, query material license information, query if a conveyance has previously undergone alarm adjudication/resolution, submit requests for information to the JAC, and access reports and information. The JACCIS, via the external web interface, will facilitate the sharing of information and situational awareness and provide the following performance:

- Provide rad/nuc collaboration in the exchange of information relevant to alarm adjudication.
- Provide rad/nuc operational picture.
- Retrieve information available from the GNDA.
- Store Information: Storage of event information history to include reachback alarms, and exercises.
- Publish Information: Publish mapping information in common user formats.
- Authenticate User.
- Authorize User.
- Provide situational awareness in aggregating information elements relative to the rad/nuc domain.
- Provide status of detection events/alarms.
- Facilitate technical assistance (technical assistance as to technical information regarding detector performance, capabilities, etc).

- Provide detection equipment information.
- Facilitate Request for Information:
  - Publish information.
  - Facilitate operational adjudication.
  - Provide Reliability Availability Maintainability Quality Control (RAMQC) information.
  - Provide license and permit information.

Rad/Nuc Detection Training and Exercises Programs

Description
The following are a list of activities that comprise the Radiological and Nuclear (Rad/Nuc) Training and Exercises programs:

- Developing comprehensive Federal/National planning guidance.
- Developing nuclear detection training policies and standards, identifying and resolving nuclear detection training curriculum and delivery gaps, development and delivery of next generation nuclear detection training, assistance and integration of nuclear detection training within Federal, State, and local agencies, maximizing development and use of decentralized support mechanisms, and training program assessment.
- Developing a comprehensive set of nuclear detection exercise templates and tools to be made available for use by all DNDO stakeholders and partners.

The development, continued improvements, and direct delivery of exercise support consists of a common suite of products and methodologies that support exercise design, development, conduct, and reporting. This support includes tools to track the improvement actions of identified deficiencies and to ensure all exercise products are created in accordance with the needs of the GNDA.

As national awareness increases and more resources are dedicated by Federal, State, and local governments to the nuclear detection mission, operational programs will expand and create further demand on support services. To meet these needs, DNDO will develop additional training, exercise, and other support resources that remain relevant to the full range of operations, technologies, and threats. Specialized capabilities at the State and local levels, as well as Federal capabilities such as the Transportation Security Administration's (TSA) Visible Intermodal Prevention and Response (VIPR) program and DNDO's Mobile Detection Deployment Program (MDDP), will require much greater coordination to foster and develop comprehensive, integrated, and regional approaches to nuclear detection.

DNDO will also continue close working relationships with the Federal Emergency Management Agency (FEMA) to assist them in developing National planning guidance, including specific planning scenarios, Target Capability Lists (TCLs), and guidance for Homeland Security grants related to nuclear detection. Beyond existing partnerships, DNDO will enhance relationships with other Federal partners inside and outside DHS. As a result, DNDO will leverage DHS resources, contacts, and expertise to foster more expansive and fully networked communities integrating State and local agencies at regional and national levels to achieve effective nuclear detection capabilities.

The Training and Exercises Program develops and executes nuclear detection training and exercises for Federal, State, and local law enforcement and public safety professionals to increase operational

capabilities. The program's main objectives are to increase operational capabilities at the Federal, State, and local levels; develop and exercise protocols and standards for effective use of radiation detection equipment and associated alarm resolution and reporting processes; develop training curricula in support of emerging detection technologies; and foster organic capabilities by assisting Federal, State, and local agencies in institutionalizing training courses in their academies.
The Training and Exercises Program is responsible for the development, oversight and administration of the design, delivery, evaluation and continual improvement of the radiation detection training and associated exercise support services. This training is directed by DNDO personnel and provided by contracted instructors in the vicinity of the requesting State or local agency utilizing their own equipment. Additionally, the Training and Exercises Program will finalize development of a comprehensive Train-the-Trainer curriculum, including distribution of self-study courseware compact discs to a wide spectrum of State and local law enforcement and public safety agencies. This training will significantly increase the number, awareness and capabilities of participants involved with the DNDO mission.

Furthermore, the Training and Exercises Program supports exercise services for nuclear detection and prevention in States, regions and domains within the Interior layer of the GNDA, as well as providing exercise support and consultation to international partners. The Securing the Cities (STC) program in New York is a customer of the Training and Exercise program. Funding will be used to further develop training curricula and exercise execution for the maturing and expanding domains, including: (1) Conduct training gap analyses for ongoing curriculum development; (2) Develop alternative training methods and products that sustain and enhance skills for target audiences; (3) Conduct exercises, drills and workshops to test and evaluate capabilities and pre-and post-training course deliveries, and (4) develop regional training hubs.

Interior Capability Development

Description
Interior capability development programs utilize various levels of engagement and program assistance to initially develop rad/nuc detection capabilities among Federal, State, local, and tribal jurisdictions, and then continue to assist these stakeholders to sustain their programs. Interior capability development consists of:

- Nuclear Detection Program Assistance,
- The Securing the Cities program which helps build capability in Tier I Urban Area Security Initiatives (UASIs) (funded through the Systems Acquisition Appropriation), and,
- Equipment refresh to sustain the twenty five existing TSA Visible Intermodal Prevention and Response (VIPR) Teams.

Rad/Nuc Detection Program Assistance (PA) - Description
Rad/Nuc Detection (RND) Program Assistance is designed to provide guidance to non-STC State and local partners on how to plan, develop, manage, evaluate, and sustain a rad/nuc detection program. In support of this approach, DNDO Directorates coordinate expertise and resources to develop and deliver the necessary threat awareness and understanding, training and exercise support, equipment test reports, information sharing capabilities, and other essential program tools to create an integrated rad/nuc detection environment.

Program assistance includes the following phases:

- *Outreach Phase.* Provides the State, local and tribal (SL&T) partners with general information to raise their awareness or enhance familiarity with rad/nuc detection practices and protocols.
- *Engagement Phase.* Provides the SL&T partners with solution packages and performance models, best practices and experiences that guide implementation of various initiatives.
- *Program Delivery Assistance and Support Phase.* Delivers rigorous, customized solutions to the SL&T partners through direct on-site support. In addition to the resources required to develop the engagements materials up front, providing direct on-site support is the most resource intensive method of delivery and is provided to the highest priority State and local partners first.
- *Sustainment Phase.* Beyond awareness and promotion of the rad/nuc detection mission, DNDO is addressing the needs of State and local partners that are dedicating resources toward the rad/nuc detection mission by establishing support systems that will grow over time to meet increasing demands.

The various DNDO programs to develop and sustain rad/nuc detection capability all utilize a graded approach. Federal agencies that need to develop and sustain rad/nuc detection capability are engaged with and a Memorandum of Understanding signed to outline the mutually agreed-upon support.

SL&T agencies are engaged based on their priority, as determined through the prioritization methodology described in the Integrated State, Local, and Tribal Engagement Strategy Strategic Approach based on the rad/nuc detection capability development framework tool. This then corresponds to a desired level of capability class based on population, pathways and risk factors. Because resources are limited, employing this graded approach helps DNDO to determine the appropriate level of rad/nuc detection capability development resources and methods to apply corresponding to the class of capability. It allows DNDO to maximize the number of engagements conducted while conserving more costly resources to address partners that are considered of higher priority.

Initial engagements focus on threat and mission familiarization and are accomplished either by phone and electronic media contact or by State and UASI rad/nuc awareness visits. Subsequent engagements provide training and guidance on rad/nuc detection operations to State, county and municipal agencies in an effort to spur the development of regional nuclear detection programs, thus preparing their expansion over time and addressing gaps in the GNDA. These efforts lead to improved DNDO awareness of the domestic portion of the GNDA and its expanded rad/nuc detection capabilities.

Visible Intermodal Prevention and Response Teams – Description
The VIPR Project provides coordination between DNDO and TSA to maintain currency with rad/nuc detection plans, training, and exercises; and funds the equipment for the 25 VIPR teams so they may conduct rad/nuc detection missions as part of their routine operations. Funding provides SETA planning support and coordination for the modification/update of VIPR training and exercises.

A VIPR team consists of a supervisor and six members who will be equipped with seven Personal Radiation Detector (PRD) pagers, three Radio-Isotope Identification Devices (RIIDs), and two to four

Radiation Detection Backpacks per team including spares. In addition, a training suite will be provided with a VIPR train-the-trainer module. DNDO is working closely with TSA/VIPR to institutionalize RND courses in VIPR's training academy so that TSA can maintain this capability, as well as aiding VIPR exercise officials to institutionalize rad/nuc detection exercise capabilities.

The TSA VIPR teams are supported pursuant to a Memorandum of Understanding signed by DNDO and TSA which outlines the mutually agreed-upon support.

Maritime Capability Development

Description
This program is intended to use the lessons learned from the West Coast Maritime Pilot (WCMP) to facilitate development of rad/nuc detection capabilities in maritime regions throughout the U.S. Through this program, maritime stakeholders will receive guidance and assistance from DNDO on operational protocols, training, and exercises that support developing small vessel radiation detection capabilities.

The three-year WCMP program began in September 2007 and concluded in December 2010. It contributed to the development of a radiation detection architecture that reduces the risk of rad/nuc threats that could be illicitly transported on recreational or small commercial vessels. The pilot validated the effectiveness of the use of radiation detection equipment by local authorities and maritime partners as part of their routine operations in the maritime environment.

DNDO will work with Federal, State and local authorities, as well as our other maritime partners in maritime regions to assess the geographic configurations of the ports to maximize detection and interdiction opportunities. Maritime stakeholders will also receive guidance from DNDO on operational protocols, training, and exercises that support small vessel rad/nuc detection capabilities.

State and Local Users' Groups

Description
There are numerous ongoing support activities that are important mechanisms for communicating and getting feedback from rad/nuc detection stakeholders. These activities are reflected in the planned projects for this program. Projects included are:

1. State and Local Stakeholder Working Group (SLSWG) Meetings,
2. Executive Steering Council (ESC) Meetings, and,
3. Interior Focus Group (IFG) Meetings.

State and Local Stakeholder Working Group (SLSWG) and Executive Steering Council (ESC) - Description
The SLSWG meetings and the ESC meetings are part of DNDO's ongoing outreach to and collaboration with S&L agencies involved in nuclear detection. Both meetings target operator and leadership partners, and are specifically designed to obtain feedback on DNDO's initiatives, learn about advances in S&L programs, and facilitate communication and coordination among the S&L agencies building rad/nuc detection capabilities.

Interior Focus Group (IFG) - Description
The IFG is primarily inward focused on the refinement or future development of DNDO's Interior mission area strategy and programs. An initial IFG meeting was held at DNDO in February 2010. Two meetings are planned per year to continue efforts to gather user needs and requirements to develop future programs and projects for Interior customers. The focus group is composed of 10-15 State and local representatives and an equal number of representatives from Federal agencies involved in the rad/nuc detection mission. The IFG agenda includes user need collection to drive future rad/nuc detection capability development, identification of areas of interest for future DNDO architecture studies and roundtable discussions to review proposed ideas and identify future initiatives to close domestic rad/nuc detection gaps. The IFG members have also been utilized to peer-review applications from SL&T jurisdictions requesting allocations of ^{3}He for the procurement of neutron detection equipment.

Mobile Detection Deployment Program (MDDP)

Description
Five MDDP systems are currently deployed at DOE Radiological Assistance Program (RAP) team locations around the U.S. and are designated Mobile Detection Deployment Units (MDDUs). These MDDP systems provide a surge capability that can be readily deployed to support rad/nuc detection operations for special events and intelligence-driven searches. RD&O program funds provide for maintenance and operations for 15 deployments annually.

The plan for the deployment of detection systems as part of MDDP was determined by representatives of DNDO and DOE RAP/NA-42. The initial specialized MDDP unit (delivered and fielded in FY 2008) was modeled after a RAP deployment system. The unit will provide a rad/nuc detection package that can be utilized by a myriad of State and local public safety and Federal agencies and will increase RAP capability.

In FY 2009, DNDO procured one large and three small MDDP systems. Utilizing system acquisition funds in FY 2012, the three small systems will be upgraded to large systems by proving an additional 20 sets of HPRDS radiation detection and radionuclide identification instruments, and mobile detection and communications equipment. The five large MDDP response systems will assure full coverage of National Security Special Events (NSSE) and Special Events catagorized under the DHS Special Events Assessment Rating Methodology 2008, levels 1 through 4. The deployment strategy is focused on adding systems to expand coverage across the country, increasing the number of events that could be supported, and reducing response times and logistics (costs and resources) to support deployment. Each large response system will consist of a truck towing a tag-along trailer that is configured to safely transport radiation detection and identification instruments, sufficient to field a 40-member team, certain communications-related equipment and support equipment to sites across the United States (i.e., CONUS). Location of systems will be determined according to concentration and priority of identified NSSEs, and Special Events.

Information Sharing

Description
The DNDO Information Sharing Program establishes and maintains the necessary enterprise and data architectures that enable programs in DNDO, DHS, as well as our Federal, State, local and commercial partners to effectively share rad/nuc information for the purpose of preventing terrorism and enhancing National security. The DNDO Information Sharing program provides subject matter expert support for Governance, Enterprise Architecture, and Data Architecture (to include data management planning and support) to aid the evolution of standardized systems for robust rad/nuc information exchange. The DNDO Information Sharing program conducts activities to aid DNDO programs and projects in collection, documentation, analysis and validation of GNDA-related information. Integrated information sharing and exchange policies, operational concepts, tactics, techniques, and procedures are produced. This enables improved and timelier rad/nuc detection, incident, and information correlation to "connect the dots."

There are five projects within the Information Sharing program:

- The Data Architecture project provides and sustains validated methods and means for GNDA information exchanges and includes GNDA standard message protocols for information sharing as well as tools and components for implementing interfaces required to exchange data. This project sustains stewardship of the National Information Exchange Model (NIEM) Chemical, Biological, Radiological, and Nuclear (CBRN) domain, maintains the NIEM-conformant N.25 information exchange protocol, and technical tools for producing and validating NIEM artifacts. Subject matter experts under this project are key contributors to and validators of ANSI N42.42, *American National Standard Data Format Standard for Radiation Detectors Used for Homeland Security*.
- The Enterprise Architecture project validates alignment of SDP programs/projects with DHS, DNDO, and GNDA architectures and strategies and assists program/project managers in SDP tailoring decisions. It maintains the DNDO repository of enterprise architecture artifacts and decisions for SDP programs/projects and updates the DHS Enterprise Architecture repositories. This project develops and maintains architecture models and provides associated tools to permit visualization of the GNDA to aid in acquisition decision making.
- The Governance and Process project provides support to all aspects of integrated governance and capital planning: including Capital Planning and Investment Control (CPIC) required under the Clinger Cohen Act, IT Acquisition Review (ITAR) required under DHS Management Directive (MD) 0007.1, and Acquisition Review Process under DHS Directive 102-01. This project provides support for DNDO's fulfillment of required Enterprise Architecture and Data Architecture governance functions including DNDO participation in the DHS Headquarters governance bodies such as the Data Management and Enterprise Architecture working groups, as well as the Enterprise Architecture Center of Excellence.
- Information Sharing Support provides assistance to DNDO programs to ensure information sharing and interoperability requirements are addressed. The project defines information exchange requirements, strategies, concepts of operation, and develops program and project artifacts such as conceptual and logical data models (CDM and LDM), maps to the DHS, DNDO, and GNDA architecture reference models. This effort also provides support to program and project reviews of artifacts for architecture validation, as well as implementation,

maintenance and administration of the DNDO Enterprise Architecture Repository (DEAR) tool used by various DNDO Directorates.

- The Analysis and Verification project provides expertise and environments for analysis and verification of DNDO's information sharing architecture and capability. The project provides analysis of DNDO's standards and architecture and support for legacy interfaces, and in conjunction with exchanges with existing and emerging GNDA partners provides verification of information exchange architecture, standards, and technology programs and in support of DNDO's programs and projects, to include STC, JACCIS, and MCM. DTRA also maintains a test bed to evaluate compliance with GNDA protocols and standards.

Mission Critical Messaging (MCM)

Description
Mission Critical Messaging (MCM) responds to information integration-related capability gaps identified in the 2009 Joint Interagency Annual Review of the GNDA and the GNDA Annual Report of 2011 - particularly the integration of unclassified information from systems to be used for situational awareness across the GNDA. MCM facilitates the development and implementation of a messaging infrastructure for communicating rad/nuc situational awareness in real time using the NIEM and geospatial message routing by Federal, State, local, tribal, and territorial partners. MCM will leverage the information sharing architecture and standards developed by DNDO to allow our partners to establish messaging infrastructures using commercially available message routing hardware and software which can be acquired and deployed by our Federal, State, and local partners.

Under the efforts of the Southeast Transportation Corridor Pilot (SETCP)) in 2007 and 2008, DNDO explored the use of rad/nuc information exchange standards to enhance our ability to share cargo screening information and to support rad/nuc alarm adjudication. With lessons learned in the SETCP, DNDO began prototyping solutions that would scale to provide effective GNDA information sharing. DNDO's partner, DTRA, identified commercial message routing solutions that met DNDO's requirements, and DNDO has successfully connected those technologies to a State counter-terrorism center display system. Based on the success of experimental prototyping efforts and the recommendation of the White House Interagency Policy Committee on "Information Sharing and Architecture," the MCM program is planned to enter the Analyze/Select phase of the DHS Acquisition Lifecycle in FY 2012.

SUMMARY: *The following table i*llustrates the crosswalk between specific projects and activities and the DNDO mission areas.

PPA: OPERATIONS SUPPORT						
MISSION ALIGNMENT						
	Cross Mission Capability Development	**Infrastructure and Support**	**Land Borders**	**Interior**	**Maritime**	**Aviation**
Joint Analysis Center (JAC)		X				
RND Training & Exercises				X		
Interior Capability Development				X		
Maritime Capability Development					X	
State and Local Users' Groups				X		
MDDP Maintenance and Operations				X		
Information Sharing		X				
Mission Critical Messaging		X				

QHSR ALIGNMENT			
	Goal	**Obj.**	**Description**
Joint Analysis Center (JAC)	1.2	1.2.3 1.2.4	Control Movement of CBRN Protect Against Hostile Use of CBRN
RND Training & Exercises	1.2	1.2.3 1.2.4	Control Movement of CBRN Protect Against Hostile Use of CBRN
Interior Capability Development	1.2	1.2.3 1.2.4	Control Movement of CBRN Protect Against Hostile Use of CBRN
Maritime Capability Development			
State and Local Users' Groups	1.2	1.2.3 1.2.4	Control Movement of CBRN Protect Against Hostile Use of CBRN
MDDP Maintenance and Operations	1.2	1.2.3 1.2.4	Control Movement of CBRN Protect Against Hostile Use of CBRN
Information Sharing	1.2	1.2.3 1.2.4	Control Movement of CBRN Protect Against Hostile Use of CBRN
Mission Critical Messaging	1.2	1.2.3 1.2.4	Control Movement of CBRN Protect Against Hostile Use of CBRN

DHS QHSR Mission 1- *Preventing Terrorism and Enhancing Security*
Goal 1.2 *- Prevent Unauthorized Acquisition or Use of CBRN Materials and Capabilities*

Department of Homeland Security
Domestic Nuclear Detection Office
Research, Development, and Operations:
National Technical Nuclear Forensics Center
Program Performance Justification
(Dollars in Thousands)

PPA: National Technical Nuclear Forensics Center

	Perm. Pos	FTE	Amount
2011 Actual Obligations	**-**	**-**	**23,032**
2012 Enacted Budget Authority	**-**	**-**	**23,000**
2013 Adjustments-to-Base	-	-	(1,899)
2013 Current Services	**-**	**-**	**21,101**
2013 Program Change	-	-	4,463
2013 Total Requested Budget Authority	**-**	**-**	**25,564**
Total Change 2012 to 2013	-	-	2,564

The Domestic Nuclear Detection Office (DNDO) requests $25.564 million for this activity. DNDO has identified efficiency savings of $1.899 million in FY 2013 through a collaborative approach with the national laboratories in the development of methodologies and material signatures.

CURRENT SERVICES PROGRAM DESCRIPTION:

The importance of accelerating efforts to advance technical nuclear forensics (TNF) capabilities has been highlighted in recent high-level USG policy and planning documents, a study by the National Academy of Sciences (NAS), international counterterrorism forums, and by Congress. The President wrote to Congress on April 30, 2010, in his letter transmitting the *National Strategic Five-Year Plan for Improving the Nuclear Forensics and Attribution Capabilities of the United States,* that nuclear forensics and attribution are "vital national security priorities." Both the *Nuclear Posture Review Report* and the *Quadrennial Defense Review (QDR) Report* call for increased efforts to develop nuclear forensics capabilities in light of shifting nuclear policy priorities to a focus on preventing nuclear terrorism. The *QDR* states: "Improving our ability to attribute nuclear threats to their sources can help deter aggressors from considering the use of nuclear weapons, as well as deter state and non-state actors that may provide direct or indirect support of nuclear terrorism…"[3] In its report, *Implementing 9/11Commission Recommendations: Progress Report 2011,* DHS highlights its efforts to advance nuclear forensics as key to strengthening prevention of rad/nuc terrorism.[4] The NAS conducted a comprehensive two-year study of the nation's nuclear forensics capabilities and

[3] Quadrennial Defense Review Report, February, 2010, United States Department of Defense, Washington, D.C. p. 36.
[4] *Implementing 9/11 Commission Recommendations: Progress Report 2011,* United States Department of Homeland Security, Washington, D.C., p. 32.

concluded, "Our nation's ability to conduct forensic analysis of nuclear materials, nuclear explosions, and debris from radiological dispersion devices can contribute substantially to deterring, limiting, and responding to nuclear terrorism."[5] The NAS report also concluded that nuclear forensics capabilities are "fragile, under resourced, and, in some respects deteriorating. Without…additional resources these capabilities will decline."[6] This report has become a rallying call for DHS and its partner agencies. International attention has also been turned to the need to develop nuclear forensic capabilities. Participants at the 2010 Nuclear Security Summit stated they would "work together to develop national capacities for nuclear forensics."[7] Recently, the Global Initiative to Combat Nuclear Terrorism (GICNT) identified nuclear forensics capability development as a near-term priority and established the GICNT Nuclear Forensics Working Group.

DNDO's responsibility in supporting these national priorities were codified by Congress passed in the *Nuclear Forensics and Attribution Act* (NFAA), which the President signed into law (Public Law 111-140) on February 16, 2010. The NFAA establishes the National Technical Nuclear Forensics Center (NTNFC) within DNDO with the responsibility to provide "centralized stewardship, planning, assessment, gap analysis, exercises, improvement, and integration for all Federal nuclear forensics and attribution activities." The NFAA also mandates the NTNFC to lead the National Nuclear Forensics Expertise Development Program (NNFEDP) and the development of a Joint Interagency Annual Review of the *National Strategic Five-Year Plan for Improving the Nuclear Forensics and Attribution Capabilities of the United States*.[8]

To fulfill its responsibilities, the NTNFC is organized into three key mission areas. The first assures "Operational Readiness" of the USG national technical nuclear forensics (NTNF) enterprise. Coordination of TNF activities are critical to the success of the forensics mission – ad hoc actions in the aftermath of an event will fail to meet intense demands for rapid and effective response. NTNFC is meeting its integration responsibility by leading joint planning, requirements development, increasingly rigorous exercises, and assessments of nuclear forensics activities to assure readiness at all times and without warning.

Second, the "Technology Advancement" program supports the DNDO mission to serve as the national capability developer for TNF of radiological and nuclear (rad/nuc) materials interdicted before a detonation. These efforts focus on advancing the speed, accuracy, and confidence of TNF analyses, including the development of reference materials necessary for the validation of methods used for characterizing materials; developing new signatures to help identify the origin and pathway of materials; and creating and improving data evaluation and simulation tools to enable the linking of measurement results to both comparison samples and characteristics predicted through modeling and simulation.

Third, NTNFC leads the National Nuclear Forensics Expertise Development Program (NNFEDP), to restore and sustain an enduring nuclear forensics expertise pipeline – one of the most significant challenges facing the national capability. NTNFC is increasing the emphasis it has placed on the

[5] *Nuclear Forensics: A Capability at Risk*, (Abbreviated Version), National Research Council of the National Academies, Committee on Nuclear Forensics, (National Academies Press, Washington, D.C.), July 2010, p. vii.
[6] Ibid., 1
[7] *Work Plan of the Washington Nuclear Security Summit*, April 13, 2010, Washington, D.C., p.7
[8] Public Law 111-140-Feb. 16, 2010, United States Government Printing Office.

development and retention of TNF expertise, across the human capital spectrum from the most junior (e.g., student interns, fellows, and junior faculty) to the most senior (e.g., forensic scientists' knowledge capture, formal mentoring, and a stable and sufficient research and development program). The activities in this mission area are well-aligned with the goals for the NNFEDP, as outlined in the NFAA.

Strategic Alignment – National Technical Nuclear Forensics Center

The three mission areas and associated projects of the NTNFC are aligned under the DHS Quadrennial Homeland Security Review (QHSR) Mission 1: Preventing Terrorism and Enhancing Security.

- Goal 1.1: Prevent Terrorist Attacks
  - Objective 1.1.2: Deter and Disrupt Operations
- Goal 1.2: Prevent the Unauthorized Acquisition or Use of Chemical, Biological, Radiological, and Nuclear (CBRN) Materials and Capabilities
  - Objective 1.2.1: Anticipate Emerging Threats
  - Objective 1.2.2: Control Access to CBRN
  - Objective 1.2.4: Protection against Hostile Use of CBRN.

The programs and activities of the NTNFC are also aligned with the goals and investment priorities delineated in the *National Strategic Five-Year Plan for Improving the Nuclear Forensics and Attribution Capabilities of the United States*.

Operational Readiness Program

Description
As highlighted in the NFAA, a fundamental responsibility of DNDO is to advance the TNF readiness of the USG. As the program integrator, NTNFC provides centralized planning, evaluation, and stewardship of USG TNF capabilities through interagency coordination and integration, international collaboration, exercises, assessment, and corrective actions. NTNFC leads the joint development, coordination, and review of foundational planning documents that establish interagency strategic goals, objectives, requirements, processes, plans, and operational procedures for the USG NTNF mission. NTNFC sponsors and leads assessments to evaluate these efforts and improve the TNF capability across the mission spectrum from pre-detonation to post-detonation, both within the U.S. and abroad. NTNFC coordinates partner agency budgets to facilitate program alignment. Improved integration yields better results by eliminating duplication of effort and examining unfunded gaps.

Concurrent with full interagency integration, another key component of ensuring operational readiness, emphasized by the NAS, is the conduct of regular, rigorous NTNF exercises. Such exercises assess field sampling techniques, laboratory analysis, data evaluation and reporting, and communication flow. The major exercises alternate between pre-detonation and post-detonation scenarios involving rad/nuc materials. These exercises and focus on the continuous improvement of interactions across the nuclear forensics community. Exploring the technical and operational shortcomings and gaps enable DNDO and its partners to identify corrective actions based on After Action Reports and Lessons Learned. A comprehensive proficiency testing program will also be implemented in step with the validated methodology requirements.

Projects within the Operational Readiness Program:

- The Centralized Planning project addresses the requirement set out in governing documents (NFAA and NSPD-17/HSPD-4) to strengthen USG TNF capability through interagency coordination and stewardship.
- The Assessments and Analysis project addresses the requirement set out in governing documents to strengthen TNF capability through regular evaluations.
- The Exercises project addresses the requirement set out in governing documents to strengthen TNF capability through multi-agency exercises.

Technology Advancement

Description
As recommended by the NAS, the technology of TNF should be advanced, from analytical methods to modeling to validation standards. NTNFC leads activities that advance the USG capability to rapidly, accurately, and credibly characterize and identify the nature, origin and history of rad/nuc materials intercepted before a detonation. The capability develops techniques that enable forensically associating a questioned sample with existing signature families, predictive results from process modeling, or comparative samples (if available) to formulate inclusionary or exculpatory technical conclusions. These efforts strive to close capability gaps in nuclear forensics while increasing performance capabilities for speed, quality, and confidence in collection, analysis, and evaluation techniques. The Technology Advancement program is working to validate methodologies that will provide quality results with well-understood uncertainties in the exploitation of signatures for TNF purposes. NTNFC is developing signatures and data evaluation tools that incorporate all relevant TNF information into technical conclusions that support attribution assessments. Developed methods and signatures are provided to FBI, DoD, DOE, and the Intelligence Community, and other directorates within DNDO could benefit from the products of the Reference Material Development and U and Pu Processing Signatures projects.

Projects within Technology Advancement include:

- The Methodology Benchmarking project will evaluate and benchmark laboratory capability to perform specific analyses and methods that are appropriate for operational forensics use and identify gaps where improved methods are needed.
- Certified reference materials are required by the NTNF Quality Assurance (QA) Program to validate measurement methods. Well-characterized materials are also required for methodology development, proficiency testing, and exercise activities. The primary goal of the Reference Material Development project is to prepare reference materials and standard tracers to support the schedule of the Methodology Benchmarking project, exercises, and operational QA activities performed by FBI and DOE.
- The New Methodology Development project will develop new methods or improvements to existing methods that increase the speed, accuracy, or precision of a measurement technique. Methodologies developed under this project will advance to the Methodology Benchmarking schedule.

- The Material Characterization project will characterize domestic and foreign material to allow for operational use of validated analytical methods, to inform and support signature development, and to provide information to the Nuclear Materials Information Program (NMIP). As new signatures are developed, materials will be characterized to support development and validation of those signatures. This will be a continuing effort, coordinated with DOE (NMIP), New Methodology Development, New Signature Development, and Data Evaluation Tools projects.
- The New Signature Development project will perform studies to determine material and statistical population characteristics that can uniquely identify linkages with known or predicted material characteristics.
- The Uranium Processing Signatures project will perform small-scale production of uranium materials using a modifiable processing platform for signature development and ability to create well-pedigreed reference materials for signature development and methodology validation.
- Similarly, the Plutonium Processing Signatures project will perform small-scale production of plutonium materials using a modifiable processing platform for signature development and ability to create well-pedigreed reference materials for signature development and methodology validation.
- The Data Evaluation Tools project will develop and demonstrate the next-generation of tools for pattern analysis and methods to articulate whether or not measurements from questioned samples can be included or excluded from specific families of signatures.

Expertise Development Program

Description
A top priority of DNDO's stewardship mission is to lead USG efforts to restore and sustain an enduring nuclear forensics expertise pipeline, one of the most significant challenges facing the national capability. As mentioned, the NFAA recognizes the NNFEDP as critical to cultivating and maintaining a technical workforce capable of performing the NF mission. Led by NTNFC, the NNFEDP provides graduate and undergraduate scholarships, fellowships, and internships; post-graduate fellowships; and university and junior faculty awards for studies and research in specialties relevant to nuclear forensics. Initiatives include the Nuclear Forensics Undergraduate Scholarship Program (NFUSP), the Nuclear Forensics Graduate Fellowship Program (NFGFP), the Nuclear Forensics Post-Doctorate Fellowship Program (NFPDFP), the Nuclear Forensics Education Award Program (NFEAP), and the Nuclear Forensics Junior Faculty Award Program (NFJFAP), among other efforts. The NNFEDP addresses the nation's need for talented, qualified, next-generation nuclear forensics scientists to support an enduring TNF capability. DNDO continuously evaluates the state of work force within the national laboratory system relative to USG NTNF mission requirements in order to appropriately scale and scope the NNFEDP into the out-years. In addition, DNDO has partnered with the National Academy of Sciences on a study to assess the supply and demand for nuclear chemistry and radiochemistry expertise in the U.S. over the next 20 years.

This program is unique from broader science and technology Federal education programs in its deliberately narrow focus on filling specific, identified gaps within the nuclear forensics field. NNFEDP scholars, fellows, university, and faculty awardees must pursue degrees, conduct research, and build academic programs that directly contribute to advancing the USG TNF mission. The

NNFEDP utilizes a unique interdisciplinary approach to the TNF problem that encourages collaboration among academic programs, universities, and the national laboratories. In addition, DNDO chairs the NTNF Expertise Development Committee (EDC) in order to ensure cross-agency integration and participation in the NNFEDP. The EDC provides a forum to plan, coordinate, and execute joint initiatives within the NNFEDP to facilitate collaborative efforts among NTNF interagency partners, avoiding duplication, leveraging funding, and ensuring robust Federal support and unity of effort. Active participants include DHS, DOE/NNSA, DoD/DTRA, and the FBI.

Projects within Expertise Development include:

- The Academics project supports a current GPRA Performance Metric for DNDO. NTNF Strategic Five-Year Plan activities and investment areas under this goal include the implementation of academic and workforce programs designed to fill gaps in the expertise pipeline and ensure a robust and enduring TNF workforce, and the need to build upon the success of activities initiated in FY 2008-2009 and expand them in a controlled and measured fashion to achieve a steady-state goal beginning in FY 2012. Initiatives included in this project include graduate and undergraduate scholarships, fellowships, and internships and university and junior faculty awards for studies and research in specialties relevant to nuclear forensics.
- The Laboratories project supports post-doctorate fellowships at the national laboratories, and funds these laboratories to provide one-on-one mentorship to graduate students in nuclear forensics-related research areas.
- The Assessments project maintains a current assessment of the needs and status of the TNF workforce and pipeline.

SUMMARY: The table below illustrates the crosswalk between specific projects and activities and the DNDO mission areas.

PPA: FORENSICS					
MISSION ALIGNMENT					
	Forensics	**Land Border**	**Interior**	**Maritime**	**Aviation**
Operational Readiness	X				
Technology Advancement	X				
Expertise Development	X				

QHSR ALIGNMENT			
	Goal	**Obj.**	**Description**
Operational Readiness	1.2	1.2.4	Protect Against Hostile Use of CBRN
Technology Advancement	1.2	1.2.4	Protect Against Hostile Use of CBRN
Expertise Development	1.2	1.2.4	Protect Against Hostile Use of CBRN

DHS QHSR Mission 1- *Preventing Terrorism and Enhancing Security*
Goal 1.2 *- Prevent Unauthorized Acquisition or Use of CBRN Materials and Capabilities*

IV. Program Justification Changes

Department of Homeland Security
Domestic Nuclear Detection Office
Research, Development, and Operations:
Justification of Program Changes
(Dollars in Thousands)

Program Increase 1: Transformational Research and Development
PPA: Transformational Research and Development
Program Increase: Positions 0, FTE 0, Dollars $43,897

Funding Profile

	FY 2011 Actual Obligations			FY 2012 Enacted Budget Authority			FY 2013 Requested Budget Authority		
	Pos	FTE	Dollars ($000)	Pos	FTE	Dollars ($000)	Pos	FTE	Dollars ($000)
Current Services Level							-	-	40,000
Program Increase							-	-	43,897
Total Request	**-**	**-**	**98,478**	**-**	**-**	**40,000**	**-**	**-**	**83,897**

Description of Item

Transformational Research and Development focuses on dramatically improving nuclear detection capabilities, addressing enduring vulnerabilities, and reducing the operational burden of rad/nuc detection. The funds requested for Transformational Research and Development in FY 2013 will allow DNDO to sufficiently support efforts across the three major research programs that constitute the TAR research portfolio, including Advanced Technology Demonstrations (ATDs), the Exploratory Research program, and the Academic Research Initiative. The amount requested for FY 2013 will restore DNDO R&D programs to funding levels commensurate with prior years.

Justification

The funding increase for the Transformational Research and Development (TAR) PPA supports six ongoing programs and restores 14 projects that were put on hold. This restoration of funding ensures a healthy and robust R&D program which delivers new and integrated technologies. To ensure a strong return on investment for R&D projects, all projects are aligned with identified needs or GNDA gaps, and are characterized and evaluated throughout their life to determine their feasibility and merit for further investment or transition to commercial development.

Impact on Performance (Relationship of Increase to Strategic Goals)

Examples of items funded in FY 2013 include:

- Advanced Technology Demonstrations:

- Due to FY 2012 funding constraints, the Mobile Radiation Imaging and Tracking System (MRITS) ATD initially planned for FY 2012 will begin in FY2013.
- TAR will restore the full effort to the Nuclear and Radiological Imaging Portal (NRIP) ATD and initiate the Mobile Radiation Imaging and Tracking System (MRITS) and Portable Advanced Neutron Detector (PAND) ATD's. These changes will allow TAR to continue its research focus on active interrogation methods using naturally-occurring radiation flux, integration of multiple sensor systems to enhance long-range radiation detection, and alternative systems for neutron detection.

- Exploratory Research Program:
  - Exploratory Research Programs: Restore solicitations for new research and development in all six topic areas considered key to filling gaps in the GNDA including: Algorithms, Materials, Neutron, Passive Detection, Shielded SNM, and Nuclear Forensics. These solicitations will develop high-reward technologies and will resume support for ongoing promising research at both National Laboratories and Industry.

- Academic Research Initiative:
  - Academic Research Initiative: With funding requested in FY 2013, DNDO will renew the DNDO/National Science Foundation partnership by initiating solicitations designed to support research efforts in five topic areas designed to address the gaps identified in the GNDA. In addition to providing potentially break-through technologies, renewing the partnership will have the added bonus of supporting over 90 students conducting graduate research in nuclear chemistry, engineering and physics.

Department of Homeland Security
Domestic Nuclear Detection Office
Research, Development, and Operations:
Justification of Program Changes
(Dollars in Thousands)

Program Increase 2: Operations Support
PPA: Operations Support
Program Increase: Positions 0, FTE 0, Dollars $3,290

Funding Profile

	FY 2011 Actual Obligations			FY 2012 Enacted Budget Authority			FY 2013 Requested Budget Authority		
	Pos	FTE	Dollars ($000)	Pos	FTE	Dollars ($000)	Pos	FTE	Dollars ($000)
Current Services Level							-	-	32,389
Program Increase							-	-	3,290
Total Request	**-**	**-**	**32,656**	**-**	**-**	**33,000**	**-**	**-**	**35,679**

Description of Item

DNDO is focusing its efforts towards domestic prevention and detection capabilities, particularly efforts with State and local agencies, including the Maritime Domain, and prioritizing its prime mission of developing the domestic portion of the GNDA. Examples of funded initiatives include establishing and maintaining the necessary enterprise and data architectures that enable programs in DNDO, DHS, as well as our Federal, State, local and commercial partners to effectively share rad/nuc information for the purpose of preventing terrorism and enhancing National security.

Justification

The Information Sharing Program (ISP) provides the necessary Enterprise and Data Architecture to enable our Federal, State, local and commercial partners to share rad/nuc information against a common operating picture. The Mission Critical Messaging (MCM) program provides the capability to implement automated sharing of rad/nuc information across a wide range of partners utilizing protocol translation techniques. DNDO is consolidating these programs under the Operations Support PPA to enable and better align with the common objectives of GNDA partners.

The Maritime Capability Development (MCD) program is being combined with all other rad/nuc assistance programs to address standard, but tailorable, methods to scan people, cargo, vessels, and other conveyances at seaports of entry and on seas, oceans, or other navigable waterways. DNDO is working with maritime stakeholders to standardize operational protocols, training, and exercises in the maritime domain to the extent possible.

Impact on Performance (Relationship of Increase to Strategic Goals)

Funds requested will contribute to the attainment of the GNDA Strategic Plan Performance Goals for international and domestic information sharing; the development of Federal, State and local nuclear

and radiological detection architectures; and the maintenance of connectivity among those deployed systems.

The MCD program is similar to other assistance programs that provide standard tailorable training, equipment and operational doctrine to aid State and local partners with the implementation or enhancement of their local detection capabilities and the operational coordination with Federal Stakeholders. This program is linked to DNDO programs that will implement additional capability with Federal Partners to ensure a coordinated approach to address this GNDA vulnerability.

These program changes provide for enhanced GNDA situational awareness among all Federal partner organizations as well as improved communication infrastructures, protocols, public messaging systems, and coordination with international organizations and foreign partners.

Department of Homeland Security
Domestic Nuclear Detection Office
Research, Development, and Operations:
Justification of Program Changes
(Dollars in Thousands)

Program Increase 3: National Technical Nuclear Forensics Center
PPA: National Technical Nuclear Forensics Center
Program Increase: Positions 0, FTE 0, Dollars $4,463

Funding Profile

	FY 2011 Actual Obligations			FY 2012 Enacted Budget Authority			FY 2013 Requested Budget Authority		
	Pos	FTE	Dollars ($000)	Pos	FTE	Dollars ($000)	Pos	FTE	Dollars ($000)
Current Services Level							-	-	21,101
Program Increase							-	-	4,463
Total Request	**-**	**-**	**23,032**	**-**	**-**	**23,000**	**-**	**-**	**25,564**

Description of Item

The National Technical Nuclear Forensics Center (NTNFC) serves as the USG focal point for the National Technical Nuclear Forensics program. Specific advancements in laboratory technical capabilities for special nuclear material forensics and processing will be funded to enhance the Nation's ability to handle and examine materials. Additionally, the NTNFC will use funds to strengthen interagency and international coordination and analysis for nuclear forensics, including an end-to-end interagency nuclear forensics exercise.

Justification

The forensics funding increase of $4.463 million will support priorities which are required by Public Law 111-140, Presidential Directive, and the National Strategic Five-Year Plan. Funding will support national Expertise Development, Technology Advancement, and Operational Readiness.

Impact on Performance (Relationship of Increase to Strategic Goals)

Requested funding will support implementation of the NFAA requirements for nuclear forensics activities and priorities. The NTNFC will utilize the increase in funds to address capability development identified by the National Academy of Sciences Report ("Nuclear Forensics: A Capability at Risk") and focus on DHS responsibilities to continue advancement of technical pre-detonation forensics analytical methods, capabilities exercises, and address academic pipeline issues.

With this increase to the Forensics PPA, DNDO will increase its interagency stewardship and leadership in the post-detonation area by expanding its planning and logistics support to accomplish a multi-phase or end-to-end exercise in the FY 2013 timeframe. NTNFC is the driving force behind this

effort to meet the Presidential requirement and NAS recommendation for periodic large scale robust exercises. Additionally, the increase will enable DNDO to produce three certified reference materials as well as advance methods for trace actinide, trace element, and age-dating analyses in preparation for multiple bulk Uranium and Plutonium benchmarking studies. These materials and studies will be used to further forensic analysis development, operational laboratory method validation, and quality assurance.

Department of Homeland Security
Domestic Nuclear Detection Office
Research, Development, and Operations:
Justification of Program Changes
(Dollars in Thousands)

Program Increase 4: Systems Engineering and Architecture
PPA: Systems Engineering and Architecture
Program Increase: Positions 0, FTE 0, Dollars $1,295

Funding Profile

	FY 2011 Actual Obligations			FY 2012 Enacted Budget Authority			FY 2013 Requested Budget Authority		
	Pos	FTE	Dollars ($000)	Pos	FTE	Dollars ($000)	Pos	FTE	Dollars ($000)
Current Services Level							-	-	28,796
Program Increase							-	-	1,295
Total Request	**-**	**-**	**34,607**	**-**	**-**	**30,000**	**-**	**-**	**30,091**

Description of Item

In the National Security Presidential Directive (NSPD) 43 / Homeland Security Presidential Directive (HSPD) 14, DNDO is mandated to, "serve as the primary entity in the United States Government to further develop, acquire, and support the deployment of an enhanced domestic system to detect and report on attempts to import, possess, store, transport, develop or use an unauthorized nuclear device, fissile material or radiological material in the United States."

Systems Architecture determines gaps and vulnerabilities in the existing GNDA and then formulates recommendations and plans to develop an enhanced architecture. Several key elements exist with global architecture including (a) a multi-layered structure of Rad/Nuc detection systems, deployed both domestically and overseas, (b) a well-defined and carefully coordinated network of interrelationships among them, and (c) guidelines governing the architecture's design and evolution over time. Systems Architecture, in cooperation with DNDO's intra- and interagency partners, develops time-phased strategies and plans for improving the probability of detecting and preventing rad/nuc attacks.

Justification

The funding increase of $1.295 million will support priorities which are consistent with DHS Secretary's goal to focus on programs that provide maximize benefit by shifting funds from lower priority activities resulting in gaining resources due to efficiencies.

Impact on Performance (Relationship of Increase to Strategic Goals)

Efficiencies initiatives within DNDO have resulted in additional resources to complete Capabilities Based Assessments, and modeling in support of the radiological and nuclear threat risk assessment (RNTRA). These efforts support developing an enhanced GNDA, including both domestic and

international components. DNDO is also leading the development of the GNDA Implementation Plan that catalogs USG Activities that serve to detect, analyze, and report on rad/nuc materials that are out of regulatory control.

Department of Homeland Security
Domestic Nuclear Detection Office
Research, Development, and Operations:
Justification of Program Changes
(Dollars in Thousands)

Program Decrease 1: Systems Development
PPA: Systems Development
Program Decrease: Positions 0, FTE 0, Dollars $(21,496)

Funding Profile

	FY 2011 Actual Obligations			FY 2012 Enacted Budget Authority			FY 2013 Requested Budget Authority		
	Pos	FTE	Dollars ($000)	Pos	FTE	Dollars ($000)	Pos	FTE	Dollars ($000)
Current Services Level							-	-	49,897
Program Decrease							-	-	(21,496)
Total Request	**-**	**-**	**68,420**	**-**	**-**	**51,000**	**-**	**-**	**28,401**

Description of Item

Funding reductions to the Systems Development PPA are partially the result of DNDO's transition from large, government-sponsored development initiatives to Commercial First approaches in order to more efficiently and effectively develop and deploy technology. The decrease is also a result of prioritizing funding to support the procurement of HPRDS for DHS frontline operators and solutions to address aviation cargo scanning.

Justification

The proposed decrease in Systems Development reflects a prioritization of funds to meet the critical need for rad/nuc detection equipment by DHS Operational Components. DNDO reviewed its programs to ensure the right mix of programs are funded and will support GNDA priorities. The following programs will not be funded in FY 2013:

- Cargo Imaging for Shielded Nuclear Threats (CISNT)
- On Dock Rail & International Rail

The following high priority programs will be funded:

- Human Portable Tripwire (HPT) program is able to complete a commercial first approach in FY 2013.
- Algorithm Improvement, ^{3}He Shortage Mitigation, Human Portable Wide-Area Search (HPWAS), Small Vessel Standoff Detection, Land Border Capabilities, and Multi-Pathway Scanning are fully funded in FY 2013.

- Polyvinyl Toluene (PVT) Improvement program is funded in FY 2013.

Impact on Performance (Relationship of Increase to Strategic Goals)

Meeting the critical acquisition needs for rad/nuc detection equipment by DHS operational components resulted in the elimination of development programs such as International Rail, On Dock Rail, and CISNT, which were planned to deliver solutions for their respective capability gaps. In the future, DNDO will revisit potential solutions that address the technical challenges associated with addressing these capability gaps, and evaluate the risk of threats transported through these gaps to maintain the possibility of restart along with the other funded development programs.

Funding for the HPT and HWAS has been increased from prior years as DNDO attempts to drive development by industry to address nuclear detection requirements. The funding provides for the testing of commercially developed solutions utilizing government sources.

DNDO is shifting funding that would have been directed to improve the capability and possibly extend the service life of existing PVT Systems currently deployed. DNDO began to explore potential improvements in FY 2009, continuing with the funding provided in the FY 2010. In FY 2012, DNDO will complete development for selected improvement candidate solutions. Funding requested in FY 2013 will support the completion of developmental testing and provide for Field Validation testing of solutions.

Department of Homeland Security
Domestic Nuclear Detection Office
Research, Development, and Operations:
Justification of Program Changes
(Dollars in Thousands)

Program Decrease 2: Assessments
PPA: Assessments
Program Decrease: Positions 0, FTE 0, Dollars $(4,194)

Funding Profile

	FY 2011 Actual Obligations			FY 2012 Enacted Budget Authority			FY 2013 Requested Budget Authority		
	Pos	FTE	Dollars ($000)	Pos	FTE	Dollars ($000)	Pos	FTE	Dollars ($000)
Current Services Level							-	-	37,392
Program Decrease							-	-	(4,194)
Total Request	**-**	**-**	**40,799**	**-**	**-**	**38,000**	**-**	**-**	**33,198**

Description of Item

Specific Assessment programs that maintain level funding as on-going, support programs to all DNDO directorates include: Test and Evaluation (T&E) Operations, T&E Infrastructure, Algorithm Test Bed, Directed Testing, and Test Data Management, and Red Team and Net Assessments (RTNA).

Justification

Funding reductions in the Assessments PPA reflect prioritization of the operational need to provide frontline operators with human portable nuclear detectors. Reflecting this need, in FY 2013 infrastructure funding is decreased, eliminating the funding for the Rail Test Center at the port of Tacoma and reducing funding to support the DNDO test data collection system. In addition, funding to support on-going test operations and the DNDO Directed Testing has been reduced and funding for pilots has been eliminated.

Impact on Performance (Relationship of Increase to Strategic Goals)

Since 2007, DNDO has maintained a testing capability in an operational port environment with the RTC at the port of Tacoma, Washington. This capability has been invaluable in conducting operationally relevant test and evaluation of rad/nuc systems for use at sea ports of entry. Crane-mounted systems, mobile systems, hand-held detectors, and the radiation detection straddle carrier were all tested at the RTC. The capability of the RTC test team has also supported On-Dock Rail Program Stream of Commerce (SoC) testing, including performing specialized studies (Background Studies, Baseline Data Collections), and Modeling and Simulation support to inform the Alternatives Analysis. The RTC also provides DNDO with an alternative data collection system (CORE) that is currently supporting the ITRAP+10 test campaign. Without the RTC, DNDO will lose the capability to execute 1 or more test campaign annually. The Department will seek to use other facilities and the

RNCTEC, as appropriate, to test and evaluate nuclear detection systems, but these alternative test venues cannot replicate the environment in an actual operational port.

The Directed Test Program provides for structured test campaigns to characterize currently available equipment in operationally relevant scenarios and CONOPS to inform Federal, State and local entities of nuclear detection system capabilities to allow informed equipment selection decisions. The test campaigns funded under this line item have been some of the most impactful test activities conducted by DNDO, including the Crawdad (Maritime Rad/Nuc Detection Systems), Dolphin (Maritime Systems in operational environment), ITRAP+10, and Gryphon (Aerial-Mounted Radiation Detection Systems) test campaigns. At reduced funding levels, the scope and impact of future directed test campaigns will be lessened by approximated 20%.

Funding has also been reduced in the Test and Evaluation Operations Support line item. This will reduce the institutional support from independent Subject Matter Experts (SMEs) and test engineers to plan, execute, and analyze the results. The number of test and evaluation campaigns that can be supported by DNDO T&E program will be reduced by approximately 22%.

Similar to Directed Tests, the Pilots Program provides opportunities to evaluate operational utility of mature nuclear detection technology, but with the pilot conducted in an operational environment with actual end-users operating the equipment to screen stream of commerce in accordance with approved CONOPs, alarm adjudication, and reach-back procedures. DNDO will defer conducting pilots to focus on the highest priority requirements in FY 2013 or those funded by a transformational or development program.

V. Exhibits and Other Supporting Material
A. Justification of Proposed Legislative Language

For necessary expenses for radiological and nuclear research, development, testing, evaluation, and operations, $236,830,000, to remain available until September 30, 2015. (Department of Homeland Security Appropriations Act, 2013.)

Explanation of Changes:
No substantive changes included.

B. FY 2012 to FY 2013 Budget Change

Department of Homeland Security
Domestic Nuclear Detection Office
Research, Development, and Operations:
FY2012 to FY2013 Budget Change
(Dollars in Thousands)

	Pos.	FTE	Amount
FY 2011 Actual Obligations	**-**	**-**	**297,992**
FY 2012 Enacted Budget Authority	**-**	**-**	**215,000**
Adjustments-to-Base	-	-	-
Transfers	-	-	-
Decreases	-	-	-
Management efficiencies	-	-	(5,425)
Total, Decreases	**-**	**-**	**(5,425)**
Total, Adjustments-to-Base	-	-	**(5,425)**
FY 2013 Current Services	**-**	**-**	**209,575**
Program Changes	-	-	-
Increases	-	-	-
Systems Engineering and Architecture	-	-	1,295
Transformational Research and Development	-	-	43,897
Operations Support	-	-	3,290
National Technical Nuclear Forensics Center	-	-	4,463
Total, Increases	**-**	**-**	**52,945**
Decreases	-	-	-
Systems Development	-	-	(21,496)
Assessments	-	-	(4,194)
Total, Decreases	**-**	**-**	**(25,690)**
Total, Program Changes	**-**	**-**	**27,255**
FY 2013 Requested Budget Authority	**-**	**-**	**236,830**
FY 2012 to FY 2013 Total Change	**-**	**-**	**21,830**

C. Summary of Requirements

Department of Homeland Security
Domestic Nuclear Detection Office
Research, Development, and Operations:
Summary of Requirements
(Dollars in Thousands)

	Pos.	FTE	Amount
FY 2011 Actual Obligations	-	-	**297,992**
FY 2012 Enacted Budget Authority	-	-	**215,000**
Adjustments-to-Base	-	-	-
Increases	-	-	-
Decreases	-	-	(5,425)
Total, Adjustments-to-Base	-	-	**(5,425)**
FY 2013 Current Services	-	-	**209,575**
Program Changes	-	-	-
Increases	-	-	52,945
Decreases	-	-	(25,690)
Total, Program Changes	-	-	**27,255**
FY 2013 Requested Authority	-	-	**236,830**
FY 2012 to FY 2013 Total Change	-	-	**21,830**

[1]FY 2012 funding level reflects the funding levels provided in the FY 2011 Enacted Appropriation P.L. 112-10, including the .2% rescission.

Estimates by Program Project Activity	FY 2012 Enacted Budget Authority			FY 2013 Adjustments-to-Base			FY 2013 Program Change			FY 2013 Requested Budget Authority			FY 2012 to FY 2013 Total Change		
	Pos	FTE	Amount	Pos	FTE	Amount	Pos	FTE	Amount	Pos	FTE	Amount	Pos	FTE	Amount
Systems Engineering and Architecture	-	-	30,000	-	-	(1,204)	-	-	1,295	-	-	30,091	-	-	91
Systems development	-	-	51,000	-	-	(1,103)	-	-	(21,496)	-	-	28,401	-	-	(22,599)
Transformational research and development	-	-	40,000	-	-	-	-	-	43,897	-	-	83,897	-	-	43,897
Assessments	-	-	38,000	-	-	(608)	-	-	(4,194)	-	-	33,198	-	-	(4,802)
Operations support	-	-	33,000	-	-	(611)	-	-	3,290	-	-	35,679	-	-	2,679
National Technical Nuclear Forensics Center	-	-	23,000	-	-	(1,899)	-	-	4,463	-	-	25,564	-	-	2,564
Total	**-**	**-**	**215,000**	**-**	**-**	**(5,425)**	**-**	**-**	**27,255**	**-**	**-**	**236,830**	**-**	**-**	**21,830**

D. Summary of Reimbursable Resources

N/A

E. Summary of Requirements By Object Class

Department of Homeland Security
Domestic Nuclear Detection Office
Research, Development, and Operations:
Summary of Requirements by Object Class
(Dollars in Thousands)

Object Classes	FY 2011 Actual Obligations	FY 2012 Enacted Budget Authority	FY 2013 Requested Budget Authority	FY 2012 to FY 2013 Change
Direct Obligations	-	-	-	-
Personnel and Other Compensation Benefits	-	-	-	-
Other Object Classes	-	-	-	-
21.0 Travel	1,302	1,534	1,281	(253)
24.0 Printing	15	-	-	-
25.1 Advisory and assistance services	44,660	27,702	31,798	4,096
25.2 Other services	83	16	31	15
25.3 Purchases from Gov't accts.	145,015	70,630	106,507	35,877
25.4 Operation and maintenance of facilities	-	10,152	9,523	(629)
25.5 R&D of contracts	89,859	109,399	86,255	(23,144)
25.7 Operation and maintenance of equipment	62	65	143	78
26.0 Supplies and materials	127	84	78	(6)
31.0 Equipment	1,468	-	-	-
41.0 Grants/Subsidies/Contributions	15,401	7,809	1,215	(6,594)
Total, Other Object Classes	**297,992**	**227,391**	**236,830**	**9,439**
Total, Direct Obligations	**297,992**	**227,391**	**236,830**	**9,439**
Adjustments	-	-	-	-
Unobligated balance, end of year	-	-	-	-
Unobligated balance, start of year	-	(12,391)	-	12,391
Recoveries of Prior Year Obligations	-	-	-	-
Total, Adjustments	**-**	**(12,391)**	**-**	**12,391**
Total Requirements	**297,992**	**215,000**	**236,830**	**21,830**
Full Time Equivalents	-	-	-	-

F. Permanent Positions by Grade

N/A

G. Capital Investment and Construction Initiative Listing

N/A

H. PPA Budget Justifications

Department of Homeland Security
Domestic Nuclear Detection Office
Research, Development, and Operations:
Systems Engineering and Architecture
Summary of Requirements by Object Class
(Dollars in Thousands)

Object Classes	FY 2011 Actual Obligations	FY 2012 Enacted Budget Authority	FY 2013 Requested Budget Authority	FY 2012 to FY 2013 Change
Personnel and Compensation Benefits	-	-	-	-
Other Object Classes	-	-	-	-
21.0 Travel	194	167	136	(31)
25.1 Advisory and assistance services	6,406	3,325	4,442	(1,117)
25.2 Other services	80	-	-	-
25.3 Purchases from Gov't accts.	17,240	7,154	7,303	149
25.5 R&D of contracts	10,688	21,824	18,211	(3,613)
Total, Other Object Classes	**34,607**	**32,469**	**30,091**	**(2,378)**
Adjustments	-	-	-	-
Unobligated Balance, start of year	-	(2,469)	-	2,469
Unobligated Balance, end of year	-	-	-	-
Recoveries of Prior Year Obligations	-	-	-	-
Total, Adjustments	**-**	**(2,469)**	**-**	**2,469**
Total Requirements	**34,607**	**30,000**	**30,091**	**91**
Full Time Equivalents	-	-	-	-

Systems Engineering and Architecture Mission Statement

Systems Engineering and Architecture: DNDO Systems Engineering and Architecture programs are (1) developing an enhanced global nuclear detection architecture, including both domestic and international components, and (2) maintaining and supporting a disciplined systems engineering approach throughout DNDO. The global architecture is comprised of several key elements: a multi-layered structure of radiological/nuclear detection systems, deployed both domestically and overseas; a well-defined and carefully coordinated network of interrelationships among them; and a set of systems engineering-based principles and guidelines governing the architectures design and evolution over time.

Summary Justification and Explanation of Changes

	FY 2011 Actual Obligations	FY 2012 Enacted Budget Authority	FY 2013 Requested Budget Authority	FY 2012 to FY 2013 Change
21.0 Travel and transportation of persons	**194**	**167**	**136**	**(31)**

Travel includes all costs of transportation of persons, subsistence of travelers, an incidental travel expenses in accordance with Federal travel regulations. The FY 2013 request is $136,000.

	FY 2011 Actual Obligations	FY 2012 Enacted Budget Authority	FY 2013 Requested Budget Authority	FY 2012 to FY 2013 Change
25.1 Advisory and assistance services	**6,406**	**3,325**	**4,442**	**(1,117)**

Advisory and assistance services include services acquired by contract from non-Federal sources (that is the private sector, foreign governments, State and local governments, tribes, etc.) as well as from other units within the Federal Government. The FY 2013 request is $4,442,000.

	FY 2011 Actual Obligations	FY 2012 Enacted Budget Authority	FY 2013 Requested Budget Authority	FY 2012 to FY 2013 Change
25.2 Other services	**80**	**-**	**-**	**-**

Other services include report contractual services with non-Federal sources that are not otherwise classified under Object Class 25. The FY 2013 request is $0.

	FY 2011 Actual Obligations	FY 2012 Enacted Budget Authority	FY 2013 Requested Budget Authority	FY 2012 to FY 2013 Change
25.3 Purchases from Gov't accounts	**17,240**	**7,154**	**7,303**	**149**

Purchases from Government Accounts include costs for purchases from other Federal Government agencies or accounts that are not otherwise classified. The FY 2013 request is $7,303,000.

	FY 2011 Actual Obligations	FY 2012 Enacted Budget Authority	FY 2013 Requested Budget Authority	FY 2012 to FY 2013 Change
25.5 Research and development of contracts	**10,688**	**21,824**	**18,211**	**(3,613)**

Research and Development includes costs for contracts for the conduct of basic and applied research and development. The FY 2013 request is $18,211,000. DNDO develops time-phased strategies and plans for improving the probability of detecting and interdicting rad/nuc attacks. Studies and analyses are performed to characterize GNDA gaps, identify options, evaluate the advantages and disadvantages of alternative solutions, and formulate time-phased plans for reducing risk. The time-phased aspect of the plans is important because it allows for the integration of current and near-term technologies and approaches, as well as longer-term options that may draw upon technologies that are currently in the R&D phase that may not be available for implementation for several years.

Department of Homeland Security
Domestic Nuclear Detection Office
Research, Development, and Operations:
Systems Development
Summary of Requirements by Object Class
(Dollars in Thousands)

Object Classes	FY 2011 Actual Obligations	FY 2012 Enacted Budget Authority	FY 2013 Requested Budget Authority	FY 2012 to FY 2013 Change
Personnel and Compensation Benefits	-	-	-	-
Other Object Classes	-	-	-	-
21.0 Travel	56	89	45	(44)
25.1 Advisory and assistance services	12,411	3,136	5,715	2,579
25.2 Other services	2	-	-	-
25.3 Purchases from Gov't accts.	19,948	6,833	6,575	(258)
25.5 R&D of contracts	35,929	45,212	16,003	(29,209)
26.0 Supplies and Materials	73	70	63	(7)
Total, Other Object Classes	**68,420**	**55,340**	**28,401**	**(26,939)**
Adjustments	-	-	-	-
Unobligated Balance, start of year	-	(4,340)	-	4,340
Unobligated Balance, end of year	-	-	-	-
Recoveries of Prior Year Obligations	-	-	-	-
Total, Adjustments	-	**(4,340)**	-	**4,340**
Total Requirements	**68,420**	**51,000**	**28,401**	**(22,599)**
Full Time Equivalents	-	-	-	-

Systems Development Mission Statement

Systems Development: DNDO Systems Development is responsible for the engineering development, production, and all developmental logistics products associated with the current and next generation of nuclear detection systems. Product lines include radiation portal monitors (and associated materials development and facilitation), radiography, human-portable systems, and integration programs to address the needs of our operational customers (Federal, State, local, and tribal authorities).

Summary Justification and Explanation of Changes

	FY 2011 Actual Obligations	FY 2012 Enacted Budget Authority	FY 2013 Requested Budget Authority	FY 2012 to FY 2013 Change
21.0 Travel and transportation of persons	**56**	**89**	**45**	**(44)**

Travel includes all costs of transportation of persons, subsistence of travelers, an incidental travel expenses in accordance with Federal travel regulations. The FY 2013 request is $45,000.

	FY 2011 Actual Obligations	FY 2012 Enacted Budget Authority	FY 2013 Requested Budget Authority	FY 2012 to FY 2013 Change
25.1 Advisory and assistance services	**12,411**	**3,136**	**5,715**	**2,579**

Advisory and assistance services include services acquired by contract from non-Federal sources (that is the private sector, foreign governments, State and local governments, tribes, etc.) as well as from other units within the Federal Government. The FY 2013 request is $5,715,000.

	FY 2011 Actual Obligations	FY 2012 Enacted Budget Authority	FY 2013 Requested Budget Authority	FY 2012 to FY 2013 Change
25.2 Other services	**2**	**-**	**-**	**-**

Other services include report contractual services with non-Federal sources that are not otherwise classified under Object Class 25. The FY 2013 request is $0.

	FY 2011 Actual Obligations	FY 2012 Enacted Budget Authority	FY 2013 Requested Budget Authority	FY 2012 to FY 2013 Change
25.3 Purchases from Gov't accounts	**19,948**	**6,833**	**6,575**	**(258)**

Purchases from Government Accounts include costs for purchases from other Federal Government agencies or accounts that are not otherwise classified. The FY 2013 request is $6,575,000.

	FY 2011 Actual Obligations	FY 2012 Enacted Budget Authority	FY 2013 Requested Budget Authority	FY 2012 to FY 2013 Change
25.5 Research and development of contracts	**35,929**	**45,212**	**16,003**	**(29,209)**

Research and Development includes costs for contracts for the conduct of basic and applied research and development. The FY 2013 request is $16,003,000.

	FY 2011 Actual Obligations	FY 2012 Enacted Budget Authority	FY 2013 Requested Budget Authority	FY 2012 to FY 2013 Change
31.0 Supplies and materials	**73**	**70**	**63**	**(7)**

Supplies and materials are defined as commodities that are ordinarily consumed or expended within one year after they are put into use or converted in the process of construction or manufacture. The FY 2013 request is $63,000.

Department of Homeland Security
Domestic Nuclear Detection Office
Research, Development, and Operations:
Transformational Research and Development

Summary of Requirements by Object Class
(Dollars in Thousands)

Object Classes	FY 2011 Actual Obligations	FY 2012 Enacted Budget Authority	FY 2013 Requested Budget Authority	FY 2012 to FY 2013 Change
Personnel and Compensation Benefits	-	-	-	-
Other Object Classes	-	-	-	-
21.0 Travel	196	260	223	(37)
25.1 Advisory and assistance services	5,719	2,100	4,019	1,919
25.2 Other services	-	16	31	15
25.3 Purchases from Gov't accts.	39,469	3,690	34,858	31,168
25.5 R&D of contracts	36,470	32,454	43,710	11,256
26.0 Supplies and Materials	39			-
31.0 Equipment	1,468			-
41.0 Grants/Subsidies/Contributions	15,117	3,809	1,056	(2,753)
Total, Other Object Classes	**98,478**	**42,328**	**83,897**	**41,569**
Adjustments	-	-	-	-
Unobligated Balance, start of year	-	(2,328)	-	2,328
Unobligated Balance, end of year	-	-	-	-
Recoveries of Prior Year Obligations	-	-	-	-
Total, Adjustments	**-**	**(2,328)**	**-**	**2,328**
Total Requirements	**98,478**	**40,000**	**83,897**	**43,897**
Full Time Equivalents	-	-	-	-

Transformational research and development Mission Statement

DNDO's transformational and applied R&D program seeks to identify, explore, develop, and demonstrate scientific and technological approaches that meet one or more of the following criteria: address gaps in the GNDA, dramatically improve the performance of nuclear detection components and systems, or significantly reduce the operational burden of rad/nuc detection. Dramatic technological improvements may include improvements in system or component effectiveness and performance characteristics; reduction in cost of acquisition or maintenance; or reduction of operational burden by users in the field. R&D investments are made based on competitive awards, with investigators in all sectors government laboratories academia, and private industry encouraged to participate. This program takes advantage of the qualities and respective advantages of all three sectors to develop products, and teaming among them is encouraged. Transformational and applied R&D is carried out within three major programs: Exploratory Research (ER), Academic Research Initiative (ARI), and Advanced Technology Demonstrations (ATD).

Summary Justification and Explanation of Changes

	FY 2011 Actual Obligations	FY 2012 Enacted Budget Authority	FY 2013 Requested Budget Authority	FY 2012 to FY 2013 Change
21.0 Travel and transportation of persons	**196**	**260**	**223**	**(37)**

Travel includes all costs of transportation of persons, subsistence of travelers, an incidental travel expenses in accordance with

Federal travel regulations. The FY 2013 request is $223,000.

	FY 2011 Actual Obligations	FY 2012 Enacted Budget Authority	FY 2013 Requested Budget Authority	FY 2012 to FY 2013 Change
25.1 Advisory and assistance services	**5,719**	**2,100**	**4,019**	**1,919**

Advisory and assistance services include services acquired by contract from non-Federal sources (that is the private sector, foreign governments, State and local governments, tribes, etc.) as well as from other units within the Federal Government. The FY 2013 request is $4,019,000.

	FY 2011 Actual Obligations	FY 2012 Enacted Budget Authority	FY 2013 Requested Budget Authority	FY 2012 to FY 2013 Change
25.2 Other services	**-**	**16**	**31**	**15**

Other services include report contractual services with non-Federal sources that are not otherwise classified under Object Class 25. The FY 2013 request is $31,000.

	FY 2011 Actual Obligations	FY 2012 Enacted Budget Authority	FY 2013 Requested Budget Authority	FY 2012 to FY 2013 Change
25.3 Purchases from Gov't accounts	**39,469**	**3,690**	**34,858**	**31,168**

Purchases from Government Accounts include costs for purchases from other Federal Government agencies or accounts that are not otherwise classified. The FY 2013 request is $34,858,000.

	FY 2011 Actual Obligations	FY 2012 Enacted Budget Authority	FY 2013 Requested Budget Authority	FY 2012 to FY 2013 Change
25.5 Research and development of contracts	**36,470**	**32,454**	**43,710**	**11,256**

Research and Development includes costs for contracts for the conduct of basic and applied research and development. The FY 2013 request is $43,710,000.

	FY 2011 Actual Obligations	FY 2012 Enacted Budget Authority	FY 2013 Requested Budget Authority	FY 2012 to FY 2013 Change
41.0 Grants/Subsidies/Contributions	**15,117**	**3,809**	**1,056**	**(2,753)**

Grants/Subsidies/Contributions includes cash payments to States, other political subdivisions, corporations, associations, individuals, and contributions to foreign countries, international societies, commissions, proceedings, or projects. The FY 2013 request is $1,056,000.

Department of Homeland Security
Domestic Nuclear Detection Office
Research, Development, and Operations:
Assessments

Summary of Requirements by Object Class
(Dollars in Thousands)

Object Classes	FY 2011 Actual Obligations	FY 2012 Enacted Budget Authority	FY 2013 Requested Budget Authority	FY 2012 to FY 2013 Change
Personnel and Compensation Benefits	-	-	-	-
Other Object Classes	-	-	-	-
21.0 Travel	413	573	421	(152)
25.1 Advisory and assistance services	7,129	6,505	5,008	(1,497)
25.3 Purchases from Gov't accts.	27,308	11,430	12,185	755
25.4 Operation and Maintenance of facilities	-	10,152	9,523	(629)
25.5 R&D of contracts	5,665	5,491	5,902	411
41.0 Grants/Subsidies/Contributions	284	4,000	159	(3,841)
Total, Other Object Classes	**40,799**	**38,150**	**33,198**	**(4,952)**
Adjustments	-	-	-	-
Unobligated Balance, start of year	-	(150)	-	150
Unobligated Balance, end of year	-	-	-	-
Recoveries of Prior Year Obligations	-	-	-	-
Total, Adjustments	-	**(150)**	-	**150**
Total Requirements	**40,799**	**38,000**	**33,198**	**(4,802)**
Full Time Equivalents	-	-	-	-

Assessments Mission Statement

Assessments: The DNDO research, development, and acquisition process is anchored by an independent assessment of DNDO-mission related programs as they are developed, deployed, and implemented, as well as a continual assessment of the global nuclear detection and reporting architecture, through a variety of means. Assessments programs include test and evaluation (T&E) campaigns to characterize technologies and systems, execution of pilots with operational agencies to evaluate concepts of operation, red teaming assessments to deepen our understanding of adversary capabilities, and net assessments to identify the effectiveness of the planned and deployed global nuclear detection and reporting architecture.

Summary Justification and Explanation of Changes

	FY 2011 Actual Obligations	FY 2012 Enacted Budget Authority	FY 2013 Requested Budget Authority	FY 2012 to FY 2013 Change
21.0 Travel and transportation of persons	**413**	**573**	**421**	**(152)**

Travel includes all costs of transportation of persons, subsistence of travelers, an incidental travel expenses in accordance with Federal travel regulations. Travel supports Cross Cutting Functions such as Red Team and Net Assessments, and includes Test and Evaluation Program and Test and Evaluation Operations as well. The FY 2013 request is $421,000.

	FY 2011 Actual Obligations	FY 2012 Enacted Budget Authority	FY 2013 Requested Budget Authority	FY 2012 to FY 2013 Change
25.1 Advisory and assistance services	**7,129**	**6,505**	**5,008**	**(1,497)**

Advisory and assistance services include services acquired by contract from non-Federal sources (that is the private sector, foreign governments, State and local governments, tribes, etc.) as well as from other units within the Federal Government. The FY 2013 request is $5,008,000.

	FY 2011 Actual Obligations	FY 2012 Enacted Budget Authority	FY 2013 Requested Budget Authority	FY 2012 to FY 2013 Change
25.3 Purchases from Gov't accounts	**27,308**	**11,430**	**12,185**	**755**

Purchases from Government Accounts include costs for purchases from other Federal Government agencies or accounts that are not otherwise classified. Purchase from Government Accounts includes inter-agency agreements with national laboratories. The FY 2013 request is $12,185,000.

	FY 2011 Actual Obligations	FY 2012 Enacted Budget Authority	FY 2013 Requested Budget Authority	FY 2012 to FY 2013 Change
25.4 Operation and Maintenance of facilities	**-**	**10,152**	**9,523**	**(629)**

Operation and maintenance of facilities include all payments for the operation and maintenance of facilities when done by contract with the private sector or another Federal Government account. The FY 2013 request is $9,523,000. The testing of detection systems against special nuclear materials in significant quantities and in realistic configurations is a key assessment of rad/nuc systems.

	FY 2011 Actual Obligations	FY 2012 Enacted Budget Authority	FY 2013 Requested Budget Authority	FY 2012 to FY 2013 Change
25.5 Research and development of contracts	**5,665**	**5,491**	**5,902**	**411**

Research and Development includes costs for contracts for the conduct of basic and applied research and development. The DNDO research, development, and acquisition process is anchored by the assessment of DNDO-mission related programs as they are developed, deployed, and implemented. The FY 2013 request is $5,902,000.

	FY 2011 Actual Obligations	FY 2012 Enacted Budget Authority	FY 2013 Requested Budget Authority	FY 2012 to FY 2013 Change
41.0 Grants/Subsidies/Contributions	**284**	**4,000**	**159**	**(3,841)**

Grants/Subsidies/Contributions includes cash payments to States, other political subdivisions, corporations, associations, individuals, and contributions to foreign countries, international societies, commissions, proceedings, or projects. The FY 2013 request is $159,000.

Department of Homeland Security
Domestic Nuclear Detection Office
Research, Development, and Operations:
Operations Support

Summary of Requirements by Object Class
(Dollars in Thousands)

Object Classes	FY 2011 Actual Obligations	FY 2012 Enacted Budget Authority	FY 2013 Requested Budget Authority	FY 2012 to FY 2013 Change
Personnel and Compensation Benefits	-	-	-	-
Other Object Classes	-	-	-	-
21.0 Travel	360	337	337	-
24.0 Printing	15	-	-	-
25.1 Advisory and assistance services	9,708	10,535	10,325	(210)
25.2 Other services	1	-	-	-
25.3 Purchases from Gov't accts.	21,703	20,490	22,679	2,189
25.5 R&D of contracts	793	4,188	2,179	(2,009)
25.7 Operation and maintenance of equipment	62	65	143	78
26.0 Supplies and materials	14	14	15	1
Total, Other Object Classes	**32,656**	**35,629**	**35,679**	**50**
Adjustments	-	-	-	-
Unobligated Balance, start of year	-	(2,629)	-	2,629
Unobligated Balance, end of year	-	-	-	-
Recoveries of Prior Year Obligations	-	-	-	-
Total, Adjustments	-	**(2,629)**	-	**2,629**
Total Requirements	**32,656**	**33,000**	**35,679**	**2,679**
Full Time Equivalents	-	-	-	-

Operations support Mission Statement

DNDO Operations Support is responsible for supporting the situational awareness of the nuclear and radiological landscape and the global nuclear detection architecture, while directly facilitating the technical adjudication of rad/nuc incidents. The capability of the JAC is the 24/7 DNDO information hub, and the essence of DNDO's rapid information reporting. Additionally, Operations Support develops training, exercises, information sharing capabilities, and analytical tools necessary to create a fully integrated operating environment to be used by Federal, State, and local law enforcement agencies, as well as the larger intelligence and counterterrorism communities.

Summary Justification and Explanation of Changes

	FY 2011 Actual Obligations	FY 2012 Enacted Budget Authority	FY 2013 Requested Budget Authority	FY 2012 to FY 2013 Change
21.0 Travel and transportation of persons	**360**	**337**	**337**	-

Travel includes all costs of transportation of persons, subsistence of travelers, an incidental travel expenses in accordance with Federal travel regulations. The FY 2013 request is $337,000.

	FY 2011 Actual Obligations	FY 2012 Enacted Budget Authority	FY 2013 Requested Budget Authority	FY 2012 to FY 2013 Change
24.0 Printing and reproduction	**15**	**-**	**-**	**-**

Printing includes all costs for printing and reproduction obtained from the private sector or from other Federal entities. The FY 2013 request is $0.

	FY 2011 Actual Obligations	FY 2012 Enacted Budget Authority	FY 2013 Requested Budget Authority	FY 2012 to FY 2013 Change
25.1 Advisory and assistance services	**9,708**	**10,535**	**10,325**	**(210)**

Advisory and assistance services include services acquired by contract from non-Federal sources (that is the private sector, foreign governments, State and local governments, tribes, etc.) as well as from other units within the Federal Government. The FY 2013 request is $10,325,000.

	FY 2011 Actual Obligations	FY 2012 Enacted Budget Authority	FY 2013 Requested Budget Authority	FY 2012 to FY 2013 Change
25.2 Other services	**1**	**-**	**-**	**-**

Purchases from Government Accounts include costs for purchases from other Federal Government agencies or accounts that are not otherwise classified. The FY 2013 request is $0.

	FY 2011 Actual Obligations	FY 2012 Enacted Budget Authority	FY 2013 Requested Budget Authority	FY 2012 to FY 2013 Change
25.3 Purchases from Gov't accounts	**21,703**	**20,490**	**22,679**	**2,189**

Purchases from Government Accounts include costs for purchases from other Federal Government agencies or accounts that are not otherwise classified. The FY 2013 request is $22,679,000.

	FY 2011 Actual Obligations	FY 2012 Enacted Budget Authority	FY 2013 Requested Budget Authority	FY 2012 to FY 2013 Change
25.5 Research and development of contracts	**793**	**4,188**	**2,179**	**(2,009)**

Research and Development includes costs for contracts for the conduct of basic and applied research and development. The FY 2013 request is $2,179,000.

	FY 2011 Actual Obligations	FY 2012 Enacted Budget Authority	FY 2013 Requested Budget Authority	FY 2012 to FY 2013 Change
25.7 Operation and maintenance of equipment	**62**	**65**	**143**	**78**

Operation and maintenance of equipment includes costs for operation, maintenance, repair, and storage of equipment, when done by contract with the private sector or another Federal Government account. The FY 2013 request is $143,000.

	FY 2011 Actual Obligations	FY 2012 Enacted Budget Authority	FY 2013 Requested Budget Authority	FY 2012 to FY 2013 Change
26.0 Supplies and materials	**14**	**14**	**15**	**1**

Supplies and materials are defined as commodities that are ordinarily consumed or expended within one year after they are put into use or converted in the process of construction or manufacture. The FY 2013 request is $15,000.

Department of Homeland Security
Domestic Nuclear Detection Office
Research, Development, and Operations:
National Technical Nuclear Forensics Center
Summary of Requirements by Object Class
(Dollars in Thousands)

Object Classes	FY 2011 Actual Obligations	FY 2012 Enacted Budget Authority	FY 2013 Requested Budget Authority	FY 2012 to FY 2013 Change
Personnel and Compensation Benefits	-	-	-	-
Other Object Classes	-	-	-	-
21.0 Travel	84	108	118	10
25.1 Advisory and assistance services	3,286	2,101	2,288	187
25.3 Purchases from Gov't accts.	19,347	21,034	22,908	1,874
25.5 R&D of contracts	315	230	250	20
Total, Other Object Classes	**23,032**	**23,473**	**25,564**	**2,091**
Adjustments	-	-	-	-
Unobligated Balance, start of year	-	(473)	-	473
Unobligated Balance, end of year	-	-	-	-
Recoveries of Prior Year Obligations	-	-	-	-
Total, Adjustments	-	**(473)**	-	**473**
Total Requirements	**23,032**	**23,000**	**25,564**	**2,564**
Full Time Equivalents	-	-	-	-

National Technical Nuclear Forensics Center Mission Statement

DNDO's National Technical Nuclear Forensics (NTNF) capability serves as an integral component and layer of the United States Government (USG) effort to combat nuclear terrorism. This capability provides means for the collection, analysis, and evaluation of rad/nuc materials and associated evidence for the purpose of comprehensive and timely forensic analysis to contribute to attribution conclusions. An effective forensics and attribution capability will inform national response deliberations and can also help to prevent a follow-on attack. At the strategic level, nuclear forensics can contribute to deterrence and prevention by promoting the concept of nuclear accountability for nations that may wittingly or unwittingly enable a terrorist to obtain nuclear devices or materials.

Summary Justification and Explanation of Changes

	FY 2011 Actual Obligations	FY 2012 Enacted Budget Authority	FY 2013 Requested Budget Authority	FY 2012 to FY 2013 Change
21.0 Travel and transportation of persons	**84**	**108**	**118**	**10**

Travel includes all costs of transportation of persons, subsistence of travelers, an incidental travel expenses in accordance with Federal travel regulations. The FY 2013 request is $118,000.

	FY 2011 Actual Obligations	FY 2012 Enacted Budget Authority	FY 2013 Requested Budget Authority	FY 2012 to FY 2013 Change
25.1 Advisory and assistance services	**3,286**	**2,101**	**2,288**	**187**

Advisory and assistance services include services acquired by contract from non-Federal sources (that is the private sector, foreign governments, State and local governments, tribes, etc.) as well as from other units within the Federal Government. The FY 2013 request is $2,288,000.

	FY 2011 Actual Obligations	FY 2012 Enacted Budget Authority	FY 2013 Requested Budget Authority	FY 2012 to FY 2013 Change
25.3 Purchases from Gov't accounts	**19,347**	**21,034**	**22,908**	**1,874**

Purchases from Government Accounts include costs for purchases from other Federal Government agencies or accounts that are not otherwise classified. The FY 2013 request is $22,908,000. The National Technical Nuclear Forensics Center (NTNFC) serves as the USG focal point for the National Technical Nuclear Forensics program. The funding increase in the NTNFC PPA supports priorities which are required by Public Law 111-140, Presidential Directive, and the National Strategic Five-Year Plan. Funding will support national Expertise Development, Technology Advancement, and Operational Readiness.

	FY 2011 Actual Obligations	FY 2012 Enacted Budget Authority	FY 2013 Requested Budget Authority	FY 2012 to FY 2013 Change
25.5 Research and development of contracts	**315**	**230**	**250**	**20**

Research and Development includes costs for contracts for the conduct of basic and applied research and development. The FY 2013 request is $250,000. The pre-detonation rad/nuc materials forensics capability development is the NTNFC's primary R&D mission. Forensics is focused on ensuring and advancing the capability to perform rad/nuc materials analysis and evaluation. This involves isotopic and chemical composition and physical structure. This R&D is used to address identified gaps and shortfalls in the capabilities.

I. Changes In Full Time Employment

N/A

J. FY 2013 Schedule of Working Capital Fund by Program/Project Activity

FY 2013 Schedule of Working Capital Fund by Program/Project Activity
(Dollars in Thousands)

Progam/Project/Activity	FY 2011 Actual Obligations	FY 2012 Enacted Budget Authority	FY 2013 Requested Budget Authority	Increase/Decrease for FY 2013
Total Working Capital Fund	**3,063**	**3,167**	**4,031**	**864**

The total cost share associated with Office of Procurement Operations (OPO) is distributed between M&A, RD&O and Systems Acquisition.

K. DHS Balanced Workforce Strategy

N/A