GAO
Accountability * Integrity * Reliability

Briefing to the Subcommittee on Oversight and Investigations, House Committee on Energy and Commerce

September 5, 2007

GAO Concerns Regarding the Testing of Advanced Spectroscopic Portal Monitors Conducted by the Domestic Nuclear Detection Office, Department of Homeland Security

Objective

- The Subcommittee on Oversight and Investigations, House Committee on Energy and Commerce, asked us to review and analyze the Domestic Nuclear Detection Office's (DNDO) testing of advanced spectroscopic portal (ASP) monitors conducted at the Nevada Test Site (NTS) between February and March 2007.

GAO
Accountability * Integrity * Reliability

Summary

- The tests conducted by DNDO at the Nevada Test Site between February and March 2007, in support of Secretarial Certification and the full-scale production of the next generation of radiation detection equipment, raise concerns.
- DNDO's test methods did not provide a fair and balanced evaluation of the ASPs' capabilities. Instead, DNDO's NTS tests were a demonstration of ASP performance under controlled conditions.
- We believe that the results do not demonstrate a "significant increase in operational effectiveness" relative to the current generation of detection equipment, and should not be relied upon to make a full-scale production decision.

GAO
Accountability * Integrity * Reliability

Summary

- Our concerns with the tests include:
  - DNDO pre-tested the ASPs' abilities to identify a majority of the materials that the monitors were tested against during formal testing. Specifically, DNDO conducted numerous preliminary runs of radiological, nuclear, masking, and shielding materials, as well as empty cargo containers, so that ASP contractors could collect test data and adjust their systems accordingly.
  - DNDO did not use a sufficient amount of the type of materials that would mask or hide dangerous sources and that ASPs would likely encounter at ports of entry.
  - DNDO did not use the complete set of standard operating procedures that support the use of the handheld detectors, or radioactive isotope identification devices (RIIDs) that are part of the currently deployed radiation detection system.

GAO
Accountability * Integrity * Reliability

Summary

- As a result of concerns raised about DNDO's NTS tests, DNDO now plans to conduct computer-simulated testing which will focus on an important missing piece of information—the limits of the ASPs' capabilities. However, in our view and that of other national laboratory experts, these computer simulations are not as good as testing with actual nuclear and masking materials.
- On August 29, 2007, we briefed DNDO, Customs and Border Patrol (CBP), and Department of Energy (DOE) officials regarding our audit results. On August 30, 2007, the DHS Undersecretary for Management recommended that the Secretary of Homeland Security delay Secretarial Certification of ASPs for an additional two months.

Definitions

- Background radiation: The amount of radiation naturally present in the environment.
- Detection: Determination of the presence of radiation above background levels.
- Identification: The ability of a detection system to determine specific radioactive isotopes.
- NORM: Naturally Occurring Radioactive Material is non-threatening radioactive material (such as potassium-40 that is present in bananas) that may nonetheless cause portal monitors to alarm.
- Threat Material: Radioactive material that could pose a danger through its use in a nuclear weapon or dirty bomb. It is the material that radiation detection equipment attempts to detect and identify.

GAO
Accountability * Integrity * Reliability

Definitions

- Radiological Emissions: The amount of radioactivity given off by radioactive sources. Some sources emit considerably more radiation than others.
- Masking: Using a mix of radioactive materials, such as NORM, to hide threat materials. The stronger the energy emission, the better it may be in masking the presence of threat material.
- Shielding: The absorption of radiological emissions before they reach a detector. This reduces the probability that such emissions will be detected.
- Injection Study: A computer simulation in which a threat spectrum is superimposed onto benign sources as a means to measure the performance of detection and identification algorithms.

GAO
Accountability * Integrity * Reliability

Background

- Preventing nuclear and radioactive material from being smuggled into the United States—perhaps to be used by terrorists in a nuclear weapon or in a radiological dispersal device (a "dirty bomb")—has become a key national security objective.
- DNDO was established within DHS in April 2005 to prevent the unauthorized import, transport, possession, or storage of nuclear or radiological materials intended for illicit use.
- DNDO is responsible for the development, testing, acquisition and deployment of a system of equipment and technology used to detect radiation at U.S. ports of entry (POE).
- A critical component of DNDO's radiation detection system involves the deployment of radiation portal monitors (RPMs) used to screen cargo container shipments and trucks as they enter the United States.

Background

- U.S. Customs and Border Protection (CBP) is responsible for managing U.S. POEs, including, among other things, operating radiation detection equipment.
- To screen commerce for radiation, CBP uses several types of detection equipment, including large stationary first generation RPMs that use polyvinyl toluene plastic scintillators, known as PVTs, and a system of standard operating procedures.
- PVTs can detect gamma radiation (emitted by all of the materials of greatest concern) and neutrons (emitted by only a limited number of materials, including plutonium—a material that can be used to make a nuclear weapon).
- CBP's standard procedures direct vehicles, containers, and people coming into the country to pass through PVTs to screen for the presence of radiation.

Background

- This "primary inspection" serves to alert CBP officers that a radioactive threat might be present.
- All traffic that causes an alarm during primary inspection is to undergo a "secondary inspection" that consists of screening with another PVT to confirm the presence of radiation, and includes CBP officers using RIIDs to determine the source of radiation being emitted.
- If CBP officers identify a nuclear or radiological threat during a secondary inspection, then officers are to establish a safe perimeter around the nuclear material and contact scientists in CBP's Laboratories and Scientific Services (LSS) for further guidance.
- Typically, if CBP officers find irregularities, physical examinations are conducted.

GAO
Accountability * Integrity * Reliability

Background

- DNDO believes the current radiation detection system has several weaknesses:
  - PVTs are able to detect, but unable to identify, radioactive isotopes and, therefore, cannot distinguish between dangerous (e.g., highly enriched uranium) and benign (e.g., ceramic tile) materials.
  - RIIDs have limited identification abilities and in 2006 were estimated, under certain testing conditions, to effectively identify radioactive isotopes about 40 to 50 percent of the time.
  - As handheld devices, RIIDs are subject to user error.
- DNDO also asserts that the number of secondary RIID inspections required to further investigate primary inspections—especially at high-volume POEs—results from too many false alarms that impede the flow of commerce.

Background

- Furthermore, according to CBP officials, secondary inspections significantly increase the CBP officers' inspection workload. These officials believe that if the number of secondary inspections could be reduced, CBP could devote more resources to its other border enforcement responsibilities, such as drug interdiction and immigration.
- While CBP officials recognize the limits of the currently deployed system and would like to reduce the number of secondary inspections, these officials told us that they believe that, when used together with other standard operating procedures, the system of PVT and RIID screening provides the best possible radiological and nuclear screening coverage available with current technology.

GAO
Accountability * Integrity * Reliability

Background

- According to DNDO, a new generation of portal monitors, known as advanced spectroscopic portal (ASP) monitors will address the weaknesses of the currently deployed PVT and RIID system.
- ASPs use sodium iodide or high-purity germanium crystals, similar to those contained in a RIID, to detect and identify radiological signatures.
- Whereas RIIDs contain a single, small crystal, ASPs contain multiple large crystals within multiple portal panels.
- According to DNDO, the ASP spectroscopic ability to differentiate between threat and innocent radioactive materials will reduce the number of false alarms, or "nuisance alerts" and, in the process, reduce the workload in secondary inspections.
- According to CBP officials, the ASPs will eventually reduce the number of CBP officers needed to conduct radiation screening.

Background

- In March 2006, we recommended that, to ensure that DHS' substantial investment in radiation detection technology yielded the greatest possible level of detection and identification capability at the lowest possible cost, no new equipment be purchased until DNDO fully understood the performance capabilities of ASPs.
- Moreover, we recommended that DNDO conduct an analysis of the benefits and costs of deploying ASPs—specifically, the extent to which the additional detection and identification capabilities of the new monitors were worth the additional cost.

GAO
Accountability * Integrity * Reliability

Background

- In response to our recommendation, in May 2006, DNDO issued a cost-benefit analysis (CBA) for the acquisition and deployment of new portal monitors.
- In July 2006, DHS announced that it had awarded contracts to three vendors to develop and purchase up to $1.2 billion worth of ASP monitors over 5 years.
- In October 2006, GAO concluded that DNDO's CBA did not justify DHS' plan to spend $1.2 billion to purchase and deploy ASPs and recommended that DNDO conduct further testing of ASPs and PVTs before spending additional funds to purchase ASPs.

GAO
Accountability * Integrity * Reliability

Why the Tests at the Nevada Test Site Were Conducted

- The FY 2007 Homeland Security appropriation bill states that "none of the funds appropriated…shall be obligated for full scale procurement of (ASP) monitors until the Secretary of Homeland Security has certified…that a significant increase in operational effectiveness (over the current system) has been achieved."
- DNDO stated that its request for Secretarial Certification of ASPs would be presented in the context of DHS Management Directive 1400 (MD 1400) Key Decision Point Three (KDP-3), which details DHS guidelines for the review and approval of complex developmental acquisition investments to move from the "Capability Development and Demonstration" phase to the "Production and Deployment" phase.
- Further, MD 1400 states that "With approval at KDP 3, the [acquisition] investment is authorized to commence the Production and Deployment Phase and the future years program plan must be fully funded."

GAO
Accountability * Integrity * Reliability

Why the Tests at the Nevada Test Site Were Conducted

- To meet the legislative requirement to certify the "significant increase in operational effectiveness," and DHS Acquisition requirements, DNDO, with input from subject matter experts, developed a series of test campaigns intended to demonstrate, among other things, ASP performance and deployment readiness.
- The tests were conducted at several venues, including NTS, the New York Container Terminal (NYCT), the Pacific Northwest National Laboratory, ASP contractor facilities, and eight operational sites, including five POEs.
- To guide the test operations, DNDO defined a set of Critical Operational Issues that outlined the tests' technical objectives and provided the baseline to measure demonstrated effectiveness.
- DNDO stated that its request for KDP-3 approval would be based upon completed and documented results of these tests.
- To meet the Secretary's goal of deploying 225 ASPs by the end of calendar year 2008, Secretarial Certification was scheduled for the end of June 2007.

GAO
Accountability * Integrity * Reliability

Why the Tests at the Nevada Test Site Were Conducted

- The purpose of Critical Operational Issue One (COI 1) is to "verify operational effectiveness" of ASPs and determine whether "ASP systems significantly increase operational effectiveness relative to the current generation detection and identification system."
- In February-March 2007, DNDO conducted a series of tests at NTS, the single focus of which, according to DNDO, was resolution of COI 1.
- DNDO's NTS test plan, identified three primary test objectives comparing the operational effectiveness of the ASP systems with existing detection and identification systems at current high-volume operational thresholds.

Why the Tests at the Nevada Test Site Were Conducted

- Specifically, DNDO sought to determine the ASPs' probability to
  - detect and identify nuclear and radiological threats (probability to detect special nuclear material (SNM) and radiological dispersion device (RDD) threats),
  - discriminate threat and non-threat radionuclides in primary [screening positions], and
  - detect and identify threat radionuclides in the presence of non-threat radionuclides.

See Appendix I for a detailed description of DNDO Critical Operational Issues.

GAO
Accountability * Integrity * Reliability

How the Tests at the Nevada Test Site Were Conducted

- According to the NTS test plan, dated January 12, 2007, to the greatest extent possible, PVT, ASP, and RIID handheld devices would be operated consistent with approved CBP standard operating procedures.
- Testing at NTS was designed to compare the current system—using PVTs in primary inspections and a PVT and RIID combination in secondary inspections—to other configurations including PVTs in primary and ASPs in secondary, as well as ASPs in both primary and secondary inspection positions.
- DNDO tested three ASPs and four PVTs positioned in one row along the NTS test track.
  - ASP vendors were Thermo, Raytheon, and Canberra.
  - PVT vendors were SAIC, TSA, and Ludlum.
- Trucks carrying various configurations of threat, masking, and shielding materials were driven through each of the portal monitors at 5 miles per hour and then at 2 mph. After driving through the portal monitors, trucks stopped and test personnel used RIIDs to further scan containers.

How the Tests at the Nevada Test Site Were Conducted

- The NTS test plan had two key components:
  - DNDO developed guidelines for basic test operations and procedures, including, test goals and expectations; test tasks and requirements; and roles and responsibilities of personnel involved in the testing, including the ASP contractors.
  - The National Institute of Standards and Technology (NIST) developed test protocols that defined, among other things, how many times a container carrying test materials would be driven through portal monitors in order to obtain statistically relevant results.

How the Tests at the Nevada Test Site Were Conducted

- According to the NTS test plan, prior to "formal" collection of the data that would be used to support the resolution of COI 1, DNDO conducted the following tests:
  - "Dry Runs"

    Purpose: To, among other things, verify ASP systems' software performance against representative test materials and allow test teams and system contractors to identify and implement software and hardware improvements to ASP systems.

    According to the test plan, a notable portion of "dry run" testing was devoted to supporting future test campaigns.

How the Tests at the Nevada Test Site Were Conducted

- "Dress Rehearsals"

  Purpose: To observe the ASPs in operation against representative test scenarios and allow the test team to, among other things,

  - develop confidence in the reliability of the ASP system so that operators and data analysts would know what to expect and what data to collect during the formal test,
  - collect sample test data, and
  - determine what errors were likely to occur in the data collection process and eliminate opportunities for error.

GAO
Accountability * Integrity * Reliability

How the Tests at the Nevada Test Site Were Conducted

- According to the NTS test plan, in addition to improving ASP performance through dry runs and dress rehearsals conducted prior to "formal" data collection, ASP contractors were also significantly involved in the NTS test processes.
  - Specifically, the NTS test plan stated that "[ASP] contractor involvement was an integral part of the NTS test events to ensure the systems performed as designed for the duration of the test."
  - Furthermore, ASP contractors were available on site to repair their system at the request of the test director and to provide quality control support of the test data through real time monitoring of available data.
- DNDO stated that PNNL representatives were also on site to provide the same services for the PVT systems.

GAO
Accountability * Integrity * Reliability

How the Tests at the Nevada Test Site Were Conducted

- DNDO conducted formal testing in two phases:
  - Phase 1 focused primarily on testing against special nuclear materials, such as plutonium and highly enriched uranium (HEU), and radiological sources, such as medical isotopes.
  - Phase 3 focused on many of the same materials as well as additional radiological sources.
- According to DNDO, only Phase 1 of the 2007 test was designed to support resolution of COI 1 with high statistical confidence and that only data collected during Phase 1 would be included in the final report presented to the Secretary to request ASP certification.
- As recently as August 23, 2007, DNDO told GAO that Phase 3 testing solely sought to provide data for algorithm development which targeted specific and known areas in need of work and to provide data to aid in the development of secondary screening operations and procedures. A broad range of test cases was more important than high statistics.

GAO
Accountability * Integrity * Reliability

How the Tests at the Nevada Test Site Were Conducted: "Special Testing"

- On May 30, 2007, following the formal tests and the scoring of their results, DNDO told GAO that it had conducted additional tests that they termed "Special Testing."
- The details of the special tests were not explicitly outlined in the NTS test plan.
- On June 20, 2007, DNDO provided GAO with a test plan document entitled "ASP Special Testing" which described the test sources used but did not say when the tests took place.
- According to DNDO, special testing was conducted throughout the formal testing process and included 12 combinations of threat, masking, and shielding materials that differed from "dry run," "dress rehearsal," and formal tests.
- DNDO also stated that the tests were "blind," meaning that neither DNDO nor the ASP vendors knew what sources would be included in the tests.

How the Tests at the Nevada Test Site Were Conducted: "Special Testing"

- According to DNDO, the special tests were recommended by subject matter experts outside the ASP program to address the limitations of the original NTS test plan, including
  - available time and funding resources;
  - special nuclear material sources; and
  - the number of test configurations that could be incorporated in the plan for test configurations, including source isotope and activity, shielding materials and thicknesses, masking materials, vehicle types, and measurement conditions.
- Special testing consisted of 161 test runs, compared with the more than 2,000 runs included in the formal COI 1 data collection tests.

GAO
Accountability * Integrity * Reliability

DNDO's Test Methods Raise Concerns Regarding the Reliability of Test Results: Dry Runs and Dress Rehearsals

- Based on our analysis of DNDO's test plan, the test results, and discussions with experts from four national laboratories, we are concerned that DNDO's test methods may have favorably impacted the performance of the ASPs.
- In the dry runs and dress rehearsals, DNDO conducted many preliminary runs of radiological, nuclear, masking, and shielding materials so that ASP contractors could collect data on the radiation being emitted, and modify their software accordingly.
- Almost all of the materials, and combinations of materials, DNDO used in the formal tests were identical to those that the ASP contractors had specifically set their ASPs to identify from the dry runs and dress rehearsals.

DNDO's Test Methods Raise Concerns Regarding the Reliability of Test Results: Dry Runs and Dress Rehearsals

- According to our analysis, six of the seven source materials (and all of the masking and shielding materials) used in the tests were shown to the ASP contractors for data collection and ASP modification in the dry runs and dress rehearsals.
- Similarly, according to DNDO, 9 of 16 total configurations used the same combinations used in the dry runs and dress rehearsals.

- One ASP contractor that participated in the tests acknowledged that informing the contractors of the background NORM and masking materials makes it easier for ASPs to identify threat sources.

GAO
Accountability * Integrity * Reliability

DNDO's Test Methods Raise Concerns Regarding the Reliability of Test Results: Masking Materials

- A key component of the NTS tests was to test the ASPs' ability to detect and identify dangerous materials, specifically when that material was masked or "hidden" by benign radioactive materials.
- After reviewing a draft of the NTS test plan, DOE national laboratory officials raised concerns to DNDO in November 2006 that the masking materials DNDO planned to use in its tests did not emit enough radiation to mask the presence of nuclear materials in a container.
- DOE noted that many of the materials that DOE program officials regularly observe passing through international ports emit significantly higher levels of radiation than the masking materials DNDO used for its tests.
- They emphasized that it is important to know what radiation levels and masking agents are able to "fool" the ASPs, and therefore miss the presence of real threat materials.

GAO
Accountability * Integrity * Reliability

DNDO's Test Methods Raise Concerns Regarding the Reliability of Test Results: Masking Materials

- Based on our analysis, the masking materials used at NTS did not sufficiently test potential ASP performance limitations.
- DNDO officials told us that the masking materials used at NTS represented the average emissions seen in the stream of commerce at NYCT.
- The problem with this approach is that, according to data accumulated as part of DOE's program to secure international ports (the Megaports program), 35 percent of the cargo passing through one European port potentially on its way to the United States, had emission levels 5 times greater than the average radiation level for cargo that typically sets off radiation detection alarms. It is this higher-radiation cargo that could mask SNM from the sight of an ASP.
- DNDO officials told us that the masking materials used at NTS were not intended to provide insight into the limits of ASP detection capabilities. However, DNDO's test plan for "ASP Special Testing," states, "The DNDO ASP NTS Test Plan was designed to... measure capabilities and limitations in current ASP systems."

GAO
Accountability * Integrity * Reliability

DNDO's Test Methods Raise Concerns Regarding the Reliability of Test Results: Complete Set of CBP Standard Procedures Were Not Used

- After analyzing test results and procedures used at NTS, CBP officials determined that DNDO had not used the complete set of CBP standard operating procedures.
  - In particular, when RIIDs cannot conclusively identify radioactive material detected during primary inspections, CBP procedures require officers to contact DHS's LSS for further assistance.
- DNDO did not include this step in its final tests.
- Furthermore, in May 2007, we met with CBP officials and discussed DNDO's preliminary test results. They noted that the RIIDs results were inconsistent with what they have experienced in the field.

GAO
Accountability * Integrity * Reliability

DNDO's Test Methods Raise Concerns Regarding the Reliability of Test Results: "Special Testing"

- Although we asked for more detailed documentation regarding the special or blind tests conducted by DNDO, to date, we have not received any information beyond the test plan and we have not seen the results of the tests.
- Based on what DNDO has told us about the special tests, and our own evaluation of the special test plan, we note the following:
  - Because the tests consisted of 161 test runs, compared to the formal tests, which consisted of approximately 2,000, and because DNDO did not consult NIST on the design of the blind tests, we do not know the statistical significance of the results.
  - The tests were not entirely blind because some of the nuclear materials used in the blind tests were also used to calibrate the ASPs on a daily basis.

GAO
Accountability * Integrity * Reliability

GAO Concerns Discussed with DNDO Officials and Other Stakeholders

- On multiple occasions, GAO, CBP, and DOE have discussed concerns with NTS testing with DNDO.
  - On May 30, 2007, DNDO briefed GAO and CBP on the results of its NTS tests. At that time, we raised several concerns about DNDO's test methods, including many of those that DOE and CBP had raised with us earlier.
  - On June 22, 2007, DNDO conducted another briefing on test results that included GAO, CBP, DOE, and select congressional staff. We again brought to DNDO's attention many of the concerns that subject matter experts had discussed with us.
  - Finally, during a June 26, 2007 meeting with DNDO, DOE, and congressional staff, we again discussed our concerns regarding DNDO's NTS testing.

GAO
Accountability * Integrity * Reliability

GAO Concerns Discussed with DNDO Officials and Other Stakeholders

- In response to key stakeholder concerns, specifically those posed by DOE, on June 27, 2007, DNDO convened a conference of technical experts to discuss the NTS test results and DNDO's test methods.
- As a result of discussions held during that meeting, subject matter experts agreed that injection studies could help determine the ASPs' ability to detect threats in the presence of highly radioactive masking material. In addition, senior DNDO officials said that further testing could be scheduled, if necessary, to fully satisfy DOE concerns. According to DNDO, however, it was the consensus opinion of the subject matter experts that the results of the injection studies were not necessary for Secretarial Certification.

GAO
Accountability * Integrity * Reliability

GAO Concerns Discussed with DNDO Officials and Other Stakeholders

- According to a PNNL report submitted to DNDO in December 2006, injection studies are particularly useful for measuring the relative performance of algorithms, but their results should not be construed as a measure of (system) vulnerability. To assess the limits of portal monitors' capabilities, the PNNL report states that actual testing should be conducted using threat objects immersed in containers with various masking agents, shielding, and cargo.

GAO
Accountability * Integrity * Reliability

DHS Secretary Chertoff announces an independent review of the ASP testing process

- On July 20, 2007, DHS Secretary Chertoff notified certain members of the Congress of his plans to convene an independent expert panel to review DNDO's test procedures, test results, associated technology assessments, and cost-benefit analyses to support the final decision to deploy ASPs.
- In making this announcement, Secretary Chertoff noted the national importance of developing highly effective radiation detection and identification capabilities as one of the main reasons for seeking an independent review of DNDO's actions.
- On August 29, 2007, we briefed DNDO, CBP, and DOE officials regarding our audit results. On August 30, 2007, the DHS Undersecretary for Management recommended that the Secretary of Homeland Security delay Secretarial Certification of ASPs for an additional two months.

GAO
Accountability * Integrity * Reliability

Conclusions

- Effectively detecting and identifying radiological or nuclear threats at U.S. borders and ports of entry is a vital matter of national security and the development of new and advanced technology is critical to U.S. efforts to prevent a potential future attack.
- However, also critical to that effort is a full understanding of the strengths and weaknesses of any next generation radiation detection technology before it is deployed in the field and to know, to the greatest extent possible, when or how that equipment may fail.
- In our view, the tests conducted by DNDO at the Nevada Test Site between February and March 2007 used biased test methods and were not an objective assessment of the ASPs' performance capabilities.
- We believe that DNDO's test methods—specifically, conducting dry runs and dress rehearsals with contractors prior to formal testing—enhanced the performance of the ASPs.

GAO
Accountability * Integrity * Reliability

Conclusions

- DNDO contends that the NORM packages used at NTS to test the ASPs' ability to detect and identify masked, or hidden, dangerous threat materials, were never intended to provide insight into the limits of ASP detection capabilities.
- By not collaborating with DOE until late in the test planning process, DNDO missed an important opportunity to procure a broader, more representative set of well-vetted and characterized masking materials.
- Instead, DNDO now asserts that it will use "injection studies" or computer simulations with data collected from tests conducted at NYCT to "explore the limits of detecting threats in the stream of commerce."
- However, we believe, and DOE national laboratory experts have reported, that simulated tests of this kind do not sufficiently represent the possible limitations of radiation detection systems and should not be considered a substitute for actual testing.

GAO
Accountability * Integrity * Reliability

Conclusions

- We believe that the test methods used by DNDO at NTS raise concerns, and that the tests were not a rigorous evaluation of the ASPs' capabilities, but rather a developmental demonstration of ASP performance under controlled conditions.
- Furthermore, as a result of DNDO's test methods and the limits of the tests—including an accelerated schedule to meet secretarial certification deadlines and the limited configurations of special nuclear material sources, masking, and shielding materials used—we believe that the results of the NTS tests do not demonstrate a "significant increase in operational effectiveness" relative to the current generation of detection equipment, and cannot be relied upon to make a full-scale production decision.

GAO
Accountability * Integrity * Reliability

Scope and Methodology

- To review DNDO's methods for testing of ASP portal monitors we:
  - Analyzed the agency's test plans and procedures by comparing DNDO practices with generally accepted national standards and DHS guidance for testing the performance of radiation detection equipment. Specifically, we reviewed
    - The Defense Acquisition Guidebook to assess the testing standards developed by DOD;
    - DHS's acquisition regulations, guidelines, and management directives;
    - Open source literature on the appropriate methods to test radiation detection equipment;

Scope and Methodology

- Discussed test methods that would have been appropriate for DNDO's ASP testing campaign with experts at DOE, NIST, the private sector, national laboratories, as well as our chief technologist.
- Observed DNDO's tests conducted in 2007 at the Nevada Test Site and New York Container Terminal. In doing so, we viewed the actual execution of DNDO's test plan.
- Analyzed all three ASP vendor contracts to develop, test, and produce ASPs. We reviewed:
  - DNDO's specifications for ASP performance;
  - the timeframes for project completion; and
  - vendor responsibilities during the testing process.

GAO
Accountability * Integrity * Reliability

Scope and Methodology

- Met with relevant equipment end users and testing experts to obtain their views on the efficacy of DNDO test methods. Specifically, we consulted
  - National laboratory officials to help determine whether DNDO's test methods could produce reliable results; and
  - CBP and DOE program officials, as the main end users of portal monitor equipment, to ascertain whether they considered these tests adequate to support ASP certification and deployment.

Scope and Methodology

- Obtained relevant information on DNDO's test methods from National Institute of Standards and Technology (NIST) officials. Among other things, NIST
  - analyzed many of the test results from the Nevada Test Site; and
  - provided detailed support to DNDO by developing the test protocols to ensure that test results were statistically reliable.
- Reviewed, with our chief technologist, all of the test results DNDO made available to us, as well as conducted our own secondary analysis of DNDO's test results.
- We conducted our work from March 2007 to September 2007, in accordance with Generally Accepted Government Auditing Standards (GAGAS).

Appendix I: DNDO Critical Operational Issues

The table below describes each critical operational issue, its purpose, and the location and description of the associated test.

Issue	Purpose	Test Venue	Description
COI 1	Verify operational effectiveness (CBA performance assumptions)	NTS and NYCT	Do the ASP systems significantly increase operational effectiveness relative to the current generation detection and identification system?
COI 2	Demonstrate deployment readiness	Integration Lab at PNNL, and Field Validation	Do the ASP systems meet the necessary integration requirements associated with their deployment in secondary screening and are they suitable for operator use?
COI 3	Demonstrate interoperability	Manufacturer's Site, Integration Lab at PNNL, and Field Validation	Is the ASP system interoperable with users/stakeholders to execute the nuclear detection and reporting mission?
COI 4	Demonstrate system suitability	Manufacturer's Site, Integration Lab at PNNL, and Field Validation	Is the ASP system suitable and deployable within the existing nuclear detection architecture?

Source: DNDO

Note: **During the course of analyzing the results of completed tests conducted at NTS, DNDO added a fifth critical operational Issue, COI 5, as follows:**

Issue: COI 5
Purpose: Demonstrate System Availability
Venue: Field Testing
Description: Do the ASP systems provide sufficient availability to deploy within the existing nuclear detection architecture?