Importing Nuclear Weapons Through the Selectively-Permeable Border of the United States

by William T. Eckles

The health of the U.S. parallels the health of a living organism. The body needs and seeks beneficial substances and interactions. The skin, lungs, and digestive tract of an organism are like the border. Food and gasses must freely enter and leave the organismfor basic functioning and good health. Likewise, legitimate commerce, travel, and information exchange across the border are necessary for the health of the U.S. Occasionally, the mechanisms that keep bad things out and facilitate beneficial transactions break down. In the body, the immune system reacts and in the U.S., various agencies and institutions respond to known threats. The border represents the transition from external threats and opportunities to internal concerns. The desired operation of the country depends on the selective permeability of a border that allows or facilitates desired cross-border transit while denying illicit passage. Of the many harmful things that the selectively-permeable border of the U.S. must exclude, none present more urgency than the illicit importation of nuclear weapons. However, despite the best efforts of the interagency, U.S. borders remain porous with respect to this urgent threat.

Nuclear and Radiological Detection

As part of the 2014 Quadrennial Homeland Security Review (QHSR), the Department of Homeland Security (DHS) identified two long-term foundational capabilities necessary to prevent nuclear terrorism: (1) nuclear detection, and (2) nuclear forensics.

Nuclear and radiological materials emit characteristic signatures that can alert screening personnel. Detection is critical to prevent illicit movement of nuclear material or an improvised nuclear devise (IND) into the U.S. Terrorist acquisition of a nuclear device may result from the theft, sale, or provision from a state production facility.

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Nuclear forensics focuses efforts to find the source of nuclear material through technical means, relying on specific signatures (detectable attributes) of the material to help identify where and how it was produced. Nuclear forensics may provide conclusive, attributional evidence to hold a state accountable.[1]

The Domestic Nuclear Detection Office (DNDO) under the DHS is the lead agency to develop the Global Nuclear Detection Architecture (GNDA) that is a framework for detecting, analyzing, and reporting nuclear and radiological materials that are outside regulatory control.[2] Established in 2005 by U.S. Presidential directive, DNDO relies on other U.S. agencies and global partners to implement its strategic objectives. The National Academy of Sciences (NAS), asked to evaluate the GNDA, observed that it had no clear decision authority for program implementation. Although the DNDO is the coordinator, it is not obligated to the Congressional appropriation for any single program element of the GNDA.[3] Secretaries of State, Defense, and Energy maintain their responsibilities for guidance and implementation for any GNDA portion outside of the U.S. Early detection off the shores of the U.S. bolsters the defense against nuclear weapons. Although no attempt to smuggle an IND into the U.S. has been reported, inspections and programs to determine the effectiveness of safeguards against such attempts continue to point to vulnerabilities.

The DNDO is the proponent for domestic nuclear detection responsibility to coordinate federal, state, and local efforts to detect nuclear and radiological materials domestically. The DNDO partners closely with Customs and Border Protection (CBP) to provide detection at and between points of entry (POEs). In support of the GNDA and as part of the DNDO strategy, the CBP invested over $2.5 billion to acquire and deploy radiation detection equipment through 2013, principally in support of its outer layer of border security that resides offshore and is focused on foreign ports. Although as part of the 9/11 Commission Act of 2007, Congress mandated 100 percent of all U.S.-destined cargo ships at all 58 CBP-staffed foreign ports be scanned for radiation by July 2012, the current Secretary of Homeland Security has extended the deadline for the mandate to July 2016.[4] Extending the deadline is a way to acknowledge that the task is unfeasible given the imbalance between screening capacity and shipping volume. Risk-based methodologies and extended deadlines for implementing the mandate are symptomatic of capacity and capability shortfalls that leave the U.S. borders vulnerable.

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Large radiation portal monitors (RPMs) are critical to land and sea-POEs. Radiation portal monitors are the workhorses of radiological inspection of cargo and conveyances and a keystone in the nuclear detection framework. Their presence at the borders, while not a 100 percent safeguard to screen cargo and conveyance are purposeful in potentially deterring a nuclear smuggler or terrorist from attempting to bring an IND on a conveyance or through POEs. Over 1,400 RPMs are in use at the 110 U.S. land POEs and 444 RPMs operate at seaports throughout the U.S, including the 22 busiest seaports that account 99 percent of containerized cargo who work together to establish a border-sensing network.[5]

Whether containerized from maritime cargo, on trains, or in vehicles, the United States Government Accountability Office (GAO), CBP, and DNDO all report that nearly 100 percent of cargo passes through a radiological portal at POEs and permanent checkpoints. In May

2009, the GAO reported that while RPMs are an effective deterrent for nuclear smuggling, they have limitations. Namely, they can only detect materials that are unshielded or lightly shielded.[6] Shielding is a term used to describe efforts taken to protect people and property from radioactivity. Shielding also prevents radioactive material signals from reaching sensors. Shielding tends to be heavy, and the detection of shielding is a flag for CBP inspectors to inspect cargo.

Although imperfect, the nuclear and radiological detection methodologies rely on multiple sensors in depth.

In 2005, the DNDO initiated an acquisition plan that relied on the procurement of the Cargo Advanced Automated Radiography System (CAARS). The system was fraught with requirements and implementation problems, and DNDO canceled the acquisition program in 2007. However, the DHS stated that DNDO/CBP CAARS production and deployment program was developed, and DHS 2010 and 2011 budget justifications included CAARS program elements. The dysfunction evidenced among the coordinating bodies is symptomatic of other unsynchronized efforts leading to ineffective border management. Poor management and unrealized technical solutions continue to leave the border vulnerable.

The DNDO continues to make advancements with its RPMs and replaces or upgrades RPMs as part of its core budgetary elements. In 2008, the DNDO implemented the Advanced Spectroscopic Portal Program. It completed installing portals along the northern border in 2010 and budgets upgrades and replacements through 2016.[7] Starting in 2013, the DNDO identified the need to scan aviation cargo at air POEs. DNDO funding anticipates enabling the CBP to scan more than 40 percent of inbound air cargo within three years. Scanning by portal remains a strongpoint in the CBP border defenses. After the bulk of RPMs were installed and operated by trained personnel in the U.S. by 2012, the priority of effort shifted toward more flexible and portable detection devices.

The DHS Office of Inspector General (OIG) investigated the use of RPMs at sea-POEs and observed that at the seven ports visited, an average of 10 percent of the RPMs and ancillary equipment was not used or rarely used. The OIG assessed that DHS personnel were not fully updating databases to share information that informs other systems as part of the GNDA.[8]

Although imperfect, the nuclear and radiological detection methodologies rely on multiple sensors in depth. At POEs, there are sensors that when tripped should trigger further investigation. Portable and handheld sensors may interrogate targeted cargo and conveyances. Portable and handheld detectors augment permanent detection systems such as RPMs at POEs. Portable and handheld detectors may be moved to other areas as the threat moves or attempts to circumvent known detector locations. Between permanent portals, CBP protects the border from radiological hazards with handheld or portable scanners. Even if a nuclear smuggler got away from CBP at the border, similar capabilities exist in major cities.

Nuclear smuggling into the U.S. would most likely occur via a monitored road or land-POE. CPB anticipates scanning 40 percent of all air cargo for radioactivity by the end of 2016. Air cargo is more scrutinized, subject to weight restrictions, and visually inspected with greater rigor due to the everyday hazards posed by flammable and volatile hazards to the airframe. A terrorist that attempted nuclear smuggling through an air POE would require inside support to thwart multiple layers of monitoring and scrutiny. Smuggling a nuclear or radiological device through an air POE is highly mitigated by existing security efforts and is a low risk.

Small aircraft and boat nuclear smuggling rely on cooperative interdiction efforts of the CBP, Department of Interior, Federal Bureau of Investigation, and the U.S. Coast Guard. Upon detection, authorities work together to characterize the intruder. As remote sensing technologies improve, the ability to characterize cargo will also improve. Until that time, interdiction is followed by search operations that use inspections to determine if contraband is present.

Less than 1 percent of all maritime containerized traffic is deemed high-risk and flagged for inspection. The CBP takes the risk to facilitate commerce and provides numerous waivers that allow rapid transit from POE holding facilities. The CBP and other agencies accept this risk in part because other systems like RPMs exist. Waivers, poorly-trained border agents, and failure to use a secondary detection system all result in a vulnerable border.

A terrorist with a radiological or nuclear device still can exploit vulnerabilities. Nuclear and radiological vulnerabilities are not wholly the result of technological deficiency. Much of the concern rests with ensuring individuals are trained appropriately, that they apply that training using the available equipment, and that they are given enough time to execute protocols. The GAO identified that DHS has not completely aligned gaps within the GNDO with science and technology efforts. Basic science funding and partnerships with industries have often resulted in redundant efforts and not addressed known vulnerabilities. Not aligning efforts potentially result in vulnerability propagation and drive unnecessary cost for unnecessary programs.[9]

During 2013–2014, 325 publicly reported incidents involving radiological and nuclear material were reported by the Center for Nonproliferation Studies Database.[10] The International Atomic Energy Agency categorized an incident involving less than one gram of weapons-grade uranium and 16 other international incidents as extremely or very dangerous. The majority of nuclear and radiological material incidents relate to regulatory control violations with industrial use. None of the publicly reported incidents involved CPB agents or attempted smuggling across the border. In fact, there have been no publicly disclosed radiological or nuclear interdictions at the U.S.

The Operational Field Testing Division (OFTD) of the DHS challenged the ability of the CBP to detect nuclear material through covert means. OFTD tested the capacity and capability of the CBP to detect and interdict nuclear and radiological material attempting to cross the border. Although the OFTD was less than transparent in documenting deficiencies, the GAO findings indicate that the CBP has gaps and deficiencies to detect nuclear material under the test conditions. More troubling, the OFTD (and DHS) does not report to the GAO or Congress if found gaps are closed through appropriate action.

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The Inadequacy of the Status Quo

Border and POE screening and enforcement appear adequate. A robust DHS directed Automated Targeting System (ATS) acts to rapidly and efficiently screen cargo.[11] Intelligently-assessed (and less risky) legal traffic is expedited for cross-border traffic through numerous special waivers and automation based on changing requirements. Targeting information and advanced algorithms are continuously refined to pinpoint dangerous cargo. Ensuring that legitimate cargo and persons transit borders and POEs not only supports the economic interest of the U.S., it far outweighs any harm that a few "leakers" might potentially inflict if other internal systems do not mitigate the threat. The U.S., in theory, could absorb the cost of an IND functioning and manage the consequences. Perhaps the cost of a single failure to detect and interdict an IND or nuclear weapon, resulting in nuclear explosion within the U.S., is less than the cost of building the structures and institutions necessary to prevent a nuclear incident.

The amount of illicit contraband entering the United States is manageable. Only by decreasing the demand for illicit goods and contraband will supply stop. No publicly documented or recorded entry or attempt of entry of unauthorized radiological or nuclear material is available. Whether nuclear or radiological monitoring is sufficient in absolute terms is meaningless; it is obviously good enough to deter nuclear smuggling and identify suspicious cargo because there is not a confirmed case of nuclear smuggling across the U.S. border.

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Conclusion

The defense of the homeland does not solely reside with CBP administered POEs and borders. The CBP in neither sourced nor expected to be able to implement an impenetrable barrier to unauthorized entry. The CBP is, however, supposed to act as the primary filter that keeps the majority of illicit, illegal, and, otherwise, non-sanctioned activity away from U.S. interests. Nuclear weapons present a special case that demands a 100 percent denial rate into the U.S. At current levels of staffing, training, and equipping, the CBP cannot guarantee a 100 percent nuclear weapon denial rate.

Because of resource availability and the necessity to expedite legitimate transactions, CBP cannot conduct 100 percent inspections of inbound cargo or persons. The task is prohibitive due to resource availability and necessity to expedite legitimate transactions. The volume of cargo traffic and the need to speed perishable goods to market and maintain supply chain viability all work to limit viable options. The CBP, therefore, relies on risked-based targeting to pinpoint suspicious cargo and persons for further examination. Targeting is reliant on numerous cross-referencing systems and predicated on accurate data entry. The ATS does not always "get it right." When cargo is flagged, supply chain disruption costs U.S. and international businesses money and time. When low or no risk cargo is wrongly flagged for high-risk examination, unnecessary disruption occurs. Not identifying high-risk cargo increases the risk that harmful cargo will be allowed into the U.S. Nuclear detection is the most robust architecture in place but has demonstrated vulnerabilities.

Cargo, conveyances, and persons can enter the U.S. illegally. A terrorist trying to bring in a nuclear weapon must skew the odds of discovery to ensure the mission succeeds. The majority of applied research and the subsequent U.S. detection network is tailored for nuclear weapon detection as opposed to chemical or biological agent detection. However, nuclear weapon detection tools along the U.S. border are not perfect. Moreover, the CBP may not conduct follow-up investigations of radiological readings or even use all of the detection equipment available to monitor cargo. A terrorist would not necessarily know when or where the CBP was not following protocols and cannot afford to guess with nuclear cargo. A nuclear smuggler might attempt to shield or disguise the cargo and assemble a device after movement through the border, but such activity increases the risk of detection and would not be preferred. The border is porous to a determined and unencumbered terrorist. Since nuclear weapons tend to be heavy and their movement is restricted to a conveyance that must pass through POEs or permanent checkpoints, the ability to bring them across the border is limited. However, components and nuclear material are not encumbered by such restrictions.

A review of the DHS fiscal year 2016 budget proposal highlights a commitment to programs designed to provide early warning and detection capability.[12] Over $100 million of the $60 billion DHS budget is earmarked for radiological and nuclear detection equipment, such as portal and handheld monitoring equipment, and $85 million is earmarked for more imaging systems for cargo and conveyances.

As part of its Strategic Vision through 2020,[13] the CBP works with local and tribal officials to counter the growing threat of transnational criminal organizations (TCOs). Transnational criminal organizations dominate the smuggling domain and are increasingly involved in human trafficking. Effective border management must engage whole-of-government approaches, and nuclear weapon detection and interdiction remain critical concerns.

Border security that balances effective nuclear weapon interdiction with supporting the economy is problematic. Dedicated efforts to devise non-intrusive technology that rapidly scans all cargo continues but has not reached acceptable thresholds of capability. Obligating more resources to technological solutions may not achieve any marked increase in effectiveness. Trained personnel are required to use, analyze, and process any detected signals or ATS-flagged cargo and persons. Trained staff do not always use the current equipment available to them. The amount of cargo inspected, ATS-flagged or not, is throttled to match available resources with port throughput. To date, there have been no publicly documented attempts to smuggle a nuclear weapon across the U.S. border. However, a lack of documentation simply acknowledges two possibilities: (1) Either no nuclear weapon smuggling attempts have occurred, or (2) Detection has failed and there is a nuclear weapon somewhere within the U. S.

Terrorists may be deterred from nuclear weapon smuggling attempts because the risk of detection, the technical feasibility of manufacture and employment, and the associated attribution outweigh the possibility of a spectacular attack. A terrorist that perceives the detection network is not robust or susceptible might come to a different risk determination.

U.S. vital interests include security and the economy. The flow of trade is the lifeblood of the economy, and in seeking to guarantee safety, the security apparatus may interrupt the wanted flow. Detection capability and capacity are not sufficient, and personnel do not always use detection equipment or protocols appropriately. DHS and CBP are challenged to maintain pace with increasing populations, migrations, and trade. Nevertheless, until CBP and the interagency close the gaps identified in the nuclear weapon detection meshwork, the U.S. will remain vulnerable to nuclear weapons and materiel moving across a problematic semi-permeable border. ***IAJ***

NOTES

1 Department of Homeland Security, "The 2014 Quadrennial Homeland Security Review," 2014, pp. 63–64.

2 Department of Homeland Security, Global Nuclear Detection Architecture, <https://www.dhs.gov/global-nuclear-detection-architecture>, accessed on April 12, 2017.

3 Committee on Evaluating the Performance Measures and Metrics Development for the Global Nuclear Detection Architecture, 2013, p. 19. The NAS committee was tasked to find metrics. The observation referenced stems from the overall tone of the work that points to an international and interagency coordinating body that must use other organization's budgets to implement the DNDO coordination strategy. NAS found the challenge of assigning performance metrics to DNDO's coordination efforts difficult because the DNDO does not have budget or statutory authority over elements implementing the DNDO's goals.

4 Rebecca Gambler, "Border Security: Progress and Challenges in DHS's Efforts to Address High-Risk Travelers and Maritime Cargo," Government Accountability Office (GAO)-15-668T, testimony before the Subcommittee on Border and Maritime Security, Committee on Homeland Security, House of Representatives, 2015, p. 16.

5 Gene Aloise and Stephen L. Caldwell, "Combating Nuclear Smuggling: Inadequate Communication and Oversite Hampered DHS Efforts to Develop an Advanced Radiological System to Detect Materials," statement for the record to the Committee on Homeland Security and Governmental Affairs, U.S. Senate, 2010, p. 2.

6 David C. Mauer, "Preliminary Observations on the Domestic Nuclear Detection Office's Efforts to Develop a Global Nuclear Detection Architecture," GAO-08-999T, testimony before the Committee on Homeland Security and Governmental Affairs, U.S. Senate, Washington, DC, July 16, 2008, p. 3.

7 Refer to <http://www.dhs.gov/publication/dhs-budget>, FY2003 through FY2016 budget submissions are available with a breakdown of program elements.

8 Department of Homeland Security, Office of the Inspector General, "United States Customs and Border Protection's Radiation Portal Monitors at Seaports," OIG-13-16, <https://www.oig.dhs.gov/assets/Mgmt/2013/OIG_13-26_Jan13.pdf>, accessed on April 12, 2017.

9 Mauer.

10 Benjamin Lee, "CNS Global Incidents and Trafficking Database 2014 Annual Report," Center for Nonproliferation Studies, 2015, p. 3.

11 DHS/CBP/PIA-006(e), "Automated Targeting System," Privacy Impact Assessment Update, <https://www.dhs.gov/publication/automated-targeting-system-ats-update>, accessed on January 24, 2017.

12 U.S. Department of Homeland Security, "Budget-in-Brief," FY2016, Washington, DC, 2015, <https://www.dhs.gov/sites/default/files/publications/FY_2016_DHS_Budget_in_Brief.pdf>, accessed on April 12, 2017.

13 U.S Customs and Border Protection, "Vision and Strategy 2020," Washington, DC, 2015, <https://www.cbp.gov/document/publications/vision-and-strategy-2020>, accessed on April 12, 2017.