

**DOMESTIC RADIOLOGICAL TRANSPORT SECURITY—
GOVERNMENT AND INDUSTRY COOPERATION TO STRENGTHEN
TRANSPORT SECURITY***

Ken Martin

Oak Ridge National Laboratory
Oak Ridge, TN

Paul Gray

Oak Ridge National Laboratory
Oak Ridge, TN

Richard Rawl

Oak Ridge National Laboratory
Oak Ridge, TN

ABSTRACT

The United States National Nuclear Security Administration's Office of Radiological Security has initiated the formation of a government and industry stakeholders' group to strengthen transport security in the United States. The Transport Security Unified Stakeholders Group provides a forum for potentially affected parties to collaboratively identify transport security challenges and develop solutions to strengthen security approaches. The group's operating approach is to identify issues; facilitate common understanding; and develop, implement, and monitor enhancements to these transport security issues.

The Transport Security Unified Stakeholders Group will consist of voluntary members from governmental agencies, industry (shippers and carriers), and related professional associations. Using a combination of face-to-face meetings and correspondence, the group will identify and prioritize issues being faced by its members, identify and explore solutions to the issues, and determine the most effective solution for implementation. Working groups will be used to ensure that progress on the issues continues between meetings and to develop recommendations for consideration by the entire group. The group is expected to begin operation in 2019 with the objective of ensuring US government agencies and industry have opportunities to work together collaboratively to enhance effective radioactive source transport security for the nation.

* Notice: This manuscript has been authored by UT-Battelle, LLC, under contract DE-AC05-00OR22725 with the US Department of Energy (DOE). The US government retains and the publisher, by accepting the article for publication, acknowledges that the US government retains a nonexclusive, paid-up, irrevocable, worldwide license to publish or reproduce the published form of this manuscript, or allow others to do so, for US government purposes. DOE will provide public access to these results of federally sponsored research in accordance with the DOE Public Access Plan (<http://energy.gov/downloads/doe-public-access-plan>).

BACKGROUND

Oak Ridge National Laboratory (ORNL), in support of the National Nuclear Security Administration's (NNSA's) Office of Radiological Security (ORS), conducted an assessment of radioactive source transportation in the United States. The assessment included a review of regulatory requirements, identification of the radioactive materials being transported, a review of the transport supply chain, and a review of the typical security posture of the transportation process.

APPROACH

The intent of this assessment was to characterize material shipments to provide a qualitative evaluation regarding the ability of common transport security approaches to mitigate actions by an adversary. The assessment utilized readily available information found from open sources, key stakeholders, expert knowledge of industry standards and practices, and interviews with entities currently working within the industry supply and transport chain. The scope of the assessment was limited to Category 1 and 2 isotopes of cobalt-60, cesium-137, americium-241, and iridium-192. The team was composed of experts spanning source production, regulatory authorities, source logistics, transportation physical protection, and vulnerability assessment.

The list below describes the areas of investigation for characterization, identification, and definition that composed the assessment.

- Category 1 and 2 radiological shipments based on a review of available data for 2013–2016
- The primary transport routes, states, and/or cities of interest that see the highest frequency and most significant activity associated with such shipments, as well as the known origins and destinations of those shipments
- The principal stakeholders (regulators and shippers) involved with the transportation of Category 1 and 2 radiological materials
- The known carriers for all modes of transportation where shipments of Category 1 or 2 materials occur, whether they be road, rail, maritime, or air
- The typical transport configurations; typical packaging and protection measures; typical transport safety and security practices, procedures and controls; and response capabilities

SUMMARY OF SOURCE TRANSPORT PROCESS

Radioactive sealed sources are used in a wide array of industrial, medical, radiography, agricultural, pharmaceutical, research, security, and operational functions throughout the United States and globally every day.

The number of shipments is increasing due to new applications, growing demand, and in many cases, lack of any alternative that can function or work as well as radioisotopes. In addition, as the global economy grows, global infrastructure gets more complex and interwoven,

demographics change, and the population ages, and as improved healthcare in many high-population areas of the world improves, the need for sealed radioactive sources becomes more critical. This demand serves such applications as sterilization of medical products, drug discovery, teletherapy, blood irradiation, cancer treatment, quality control, nondestructive testing and industrial radiography, calibration, agriculture, security, and a myriad of other applications. The United States is a primary supplier to the rest of the world of many of these products and is the primary user of many of these radioactive sources; the equipment using these sources; and products, materials, and structures that benefit from the application of these sources.

Control of radioactive sources is tightly regulated, and ensuring their safe and secure production, transport, and use is imperative. Category 1 sources have the highest activity and therefore the greatest level and number of controls necessary to protect those who work with them, the public, and the environment. Safety and security controls, practices, and regulatory requirements are sequentially greater both in terms of number and detail as you move from Category 5 to Category 1 sources. For example, the size and structure of sources and the containers used to transport them vary significantly from one category to another. Furthermore, controls for transporting the sources in terms of equipment; licensing; exclusive (i.e., dedicated) use vs. combination carriage; driver and carrier training; security checks; and controls get progressively greater and more stringent as the category of the source moves up the scale to Category 1.

In the United States, Category 1 and 2 sources have multiple specific additional controls when the activity in a single package meets or exceeds a Highway Route Controlled Quantity (HRCQ). For radioactive sources, the HRCQ value is 3000 times the A_1 value of the radionuclide as specified in Title 49 Code of Federal Regulations §173.435 or 1000 TBq (27,000 curies), whichever is least.

Source transportation in the United States, like in most countries, is a complex undertaking. Transportation of radioactive material is highly regulated, involving multiple regulatory and government agencies at the federal, state, and local levels. Modern transportation logistics for radioactive materials, especially at the Category 1 and 2 levels, is also complex and frequently involves logistics providers and multiple carriers working with both the consignor and consignee to ensure regulatory requirements are met, particularly when the shipments involve multiple modes and foreign destinations and origins.

Because of the difficulty that private organizations and individuals face in gathering threat information (typically law enforcement information) about a route, carriers face a daunting task in meeting the en route security requirements described in 49 CFR 172.802(a)(3), "Measures to address the assessed security risks of shipments of hazardous materials covered by the security plan en route from origin to destination, including shipments stored incidental to movement." Information about ongoing law enforcement actions is extremely sensitive and very closely held by law enforcement agencies.

ASSESSMENT RESULTS

Based on the ORS assessment, it was found that there exists a good regulatory environment and a very positive safety and security experience and record in moving radioactive sources in the United States. However, a number of issues became apparent during the review and characterization process, as identified by regulators, shippers, and carriers, that could potentially affect security system effectiveness and may require additional analysis.

The areas identified include consistency of physical protection measures on and in vehicles transporting these materials; consistency of regulatory requirements both within the United States and globally; insider threats throughout the shipping and approvals process; adequacy of response times to incidents by authorities; consistency and availability of training programs across the transport supply chain and process; changing cyber-security risk and capability; and an integrated and broad risk management approach.

RECOMMENDATIONS

Based on the assessment and the detailed evaluation conducted, several recommendations arose which should enhance current security measures associated with source transportation within the United States. The suggested approach and primary recommendation involve the creation of a **Transport Security Unified Stakeholders Group (TSUSG)**, which will provide a forum for all potentially affected parties to collaboratively identify transport security challenges and develop solutions to strengthen security approaches.

Transport Security Unified Stakeholders Group (TSUSG)

The TSUSG will bring together US government agencies, private industry, and related professional associations to identify and examine current and potential transport security issues and to develop new or modified approaches that will strengthen transport security in the United States. This diverse membership provides an active and focused forum to facilitate these actions. The responsibilities, interests, and activities of the participants vary, as depicted in Figure 1. Being able to integrate different groups toward agreed-upon understandings and actions is challenging but will create win: win outcomes for all parties.

The TSUSG operating approach is to identify issues; facilitate common understanding; and develop, implement, and monitor enhancements to these transport security issues; as well as promote the exchange and potential development of new and/or improved transport security practices.

The TSUSG will consist of voluntary members from governmental agencies, industry, and related professional associations. Organizations that choose to participate will be asked to provide a single representative, with a designated backup, who will attend the TSUSG meetings and serve as a point of contact for all communications. Governmental agencies from other countries (such as Canada) also may be invited to participate when their involvement and integration with US counterparts are appropriate. In addition, the International Atomic Energy

Agency (IAEA) may be involved when the issues being discussed have either global implications or broader international implications.

Figure 1. Source Transport Security Stakeholders	
<p>Government Agency Responsibilities</p> <ul style="list-style-type: none"> • Develop/establish new regulations • Update/amend existing regulations • Interpret regulatory requirements • Liaise with industry • Perform inspections to ensure compliance • Enforce regulations • Deliver penalties 	<p>Industry Responsibilities</p> <ul style="list-style-type: none"> • Understand regulations for application/compliance • Implement compliant controls/programs • Provide input to regulatory agencies during regulatory Development/implementation of requirements • Use industry associations to establish best practices
<p>Transport Security Unified Stakeholders Group Responsibilities</p> <ul style="list-style-type: none"> • Coordinate/facilitate meetings of government agencies and industry • Create a forum for discussion of source transport security issues • Establish an environment for open and transparent discussions • Strive to establish a common understanding of practical and potential issues • Facilitate development of issue resolution actions with a focused action plan • Monitor progress and encourage completion of action plan items • Maintain momentum in working through prioritized transport security issues • Jointly create, monitor, and maintain collaborative solutions 	

Format and Process

Formal face-to-face meetings, expected to be 2 days in length, will be held annually or semi-annually, depending upon the number and urgency of the issues to be addressed. At the first meeting, the focus will be on structure, intent, and understanding of the TSUSG organization, function, charter, terms of reference, meeting format, expectations, roles and responsibilities, work processes, and schedule. In addition, a prioritized listing of key security issues will be developed and agreed upon. An initial security issue will be identified for review utilizing the process that will typically be followed in all subsequent meetings.

The meeting process is expected to be used first day in reviewing updates and actions completed since the previous meeting. This will involve a meeting of the full TSUSG. Subsequently, separate meetings of the two subgroups (government and industry) will occur to allow review of the specific agenda security issue focus (as taken from the prioritized list developed and agreed upon at the initial TSUSG meeting) and to identify approaches that each group believes will resolve or assist in dealing with a particular issue. On the second day of the meeting, the TSUSG will meet as a whole to discuss, develop, and agree to an action plan to resolve the particular security issue. The action plan will identify the specific topics to be addressed, membership of any working groups that are established (with a designated leader or co-leaders from each subgroup), and a timeline for subsequent working group meetings and development of recommendations (recognizing that these recommendations are expected to be presented at the

subsequent formal meeting, and if not completed by then, providing a detailed schedule for completion).

This meeting format will provide for an open exchange of information among peers and the opportunity for each subgroup to collectively develop suggestions for consideration by the entire TSUSG. This allows both subgroups to collectively present their thoughts and suggested actions, without focusing on any specific member. A facilitator, who may or may not be a member of the subgroup, will be appointed for each subgroup.

For all formal meetings, a detailed agenda will be provided to attendees in advance, with the specific topic(s) of discussion noted. Members will be expected to arrive at each meeting prepared to openly discuss the security topic. Participants may be asked to give presentations that introduce issues, explain why they are an issue, describe problems faced because of it, and provide any data available that will help quantify the problem. In addition, relevant information will be sent to members in advance of the meeting to ensure the topic is fully understood and can be effectively handled in a timely manner.

Meeting minutes and the agreed-upon action plan (with specific actions, timelines, and responsibilities for actions) will be sent to all attendees after each meeting.

Status

A Working Group established by ORNL has been working on developing the structure and operating principles of the TSUSG over the past year in anticipation of establishing and holding the first meeting of the TSUSG in 2019. ORNL has also been integrating with ORS to ensure direction, resources, and key focus areas are agreed upon for the group. Key actions completed to date include the following.

- Establishing a working group with target dates for completion of key activities
- Creating an overall strategy for the TSUSG and identifying five focus areas derived from the conclusions of the ORS assessment noted earlier in this paper. These include (1) creation and implementation of the TSUSG; (2) containment; (3) insider mitigation; (4) training; and (5) analytical.
- Developing a charter and agreeing to a strategy for the TSUSG
- Creating and distributing introductory materials for the TSUSG including a trifold brochure and factsheet
- Initiating personal contact and conversation with the proposed members of the TSUSG and using various means to identify other potential members
- Developing an agenda for the initial meeting and issuing it with a cover letter to proposed members
- Presenting at PATRAM to raise awareness and to potentially identify any further membership

Next steps include holding the initial meeting of the TSUSG in Washington, DC, on September 2019.

ORNL will be responsible for the administration of the TSUSG, including the following.

- Issuing and managing formal invitations, agendas, and action plans with schedules and responsibilities, and meeting minutes
- Performing administrative duties including secretarial functions, announcements, solicitation of input
- Preparing agendas, moderating the meetings, organizing conference calls, etc.
- Preparing an annual report that will be provided to ORS and all TSUSG members

SUMMARY

The importance of radioactive sources to industry, healthcare, agriculture, and other sectors of the domestic economy is well known and understood. Control of these highly radioactive sources is tightly regulated, and ensuring their safe and secure production, transport, and use by industries is imperative. If these sources were to become uncontrolled, they could be used for adverse purposes that could pose a serious threat to national security, the public, and the environment.

Although US industries have a lengthy and successful record of ensuring the security of radioactive sources, significant opportunities for continuous improvement still exist in the area of transport security.

The function of the Transport Security Unified Stakeholders Group is to ensure that US government agencies and industry have opportunities to work together collaboratively in implementing effective radioactive source transport security in the United States.

It is expected that this joint interaction and subsequent agreed upon actions will result in the following.

- Strengthen transport security for domestic transport of radioactive sources
- Improve collective understanding of issues impacting industry and regulatory agencies
- Expand and create more effective working relationships between government and industry
- Provide for long-term integration and free flow of issues, comments, and jointly developed practices between government and industry
- Enhance and help to ensure interagency agreement on solutions to security challenges faced by the agencies, shippers, and carriers
- Facilitate shared best security practices and more cost-effective measures for providing transport security

This initiative will provide significant benefits to the security of the industry and the public, as well as broader benefits that can only be derived from such an interactive working structure and participation.