

U.S. Spent Fuel Transportation Security in the Post 9/11 World

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Abstract

On September 11, 2002 the terrible tragedies in New York, Pennsylvania and Washington, DC changed the world forever. Security issues not only impact our daily lives, but are also in a state flux concerning the shipment of spent nuclear fuel in the United States. The formation of the Homeland Security Advisory System and Interim Compensatory Measures from the NRC, along with other security measures, have affected the way we transport spent nuclear fuel.

This paper describes the challenging and demanding way that security is planned, implemented and maintained in support of spent fuel shipments in the United States.

Paper

Introduction

The regulatory framework for transport of spent nuclear fuel in the United States is contained in the US Code of Federal Regulations, Title 10 for the Nuclear Regulatory Commission (NRC) and Title 49 for the Department of Transportation (DOT). While historic shipments (pre-1990) were made in strict compliance with the regulations, the Urgent Relief and Foreign Research Reactor program shipments were subject to a number of “extra-regulatory” requirements intended to assure the safety and security of the materials. As time passed, a process of selection took place where some of the requirements were retained and extended to other shipments, while others were abandoned.

Around the year 2000, spent fuel transport once again was receiving elevated attention due to impending Government action on approval of Yucca Mountain as the spent fuel repository for the United States. As other grounds for appeal were lost, opponents of Yucca Mountain turn to the public risks associated with transportation as the basis of their opposition. This was the environment on September 11th when multiple coordinated acts of terrorism redefined the threat scenarios for those assigned to protect public safety. Investigations since September 11 have evaluated the likelihood of various threats, potential safety impacts of the threats on varying designs of nuclear packages, and the need to reassure the public as to the safety of commercial transport of hazardous materials in the United States. The effects of these assessments on requirements for transport are still emerging. Due to the length of time required for rule making

(making formal changes to the Code of Federal Regulations), changes made by the NRC to date have been in the form of Regulatory Advisories (shortly following 9/11), and more recently in the form of Interim Compensatory Measures. This process is resulting in near term uncertainty as to the specific requirements to be met for a given shipment but will no doubt have lasting effects on our future way of doing business.

Safeguards & Security Recommendations and Regulations

The regulations for protection of Nuclear Material in transit in the United States are contained in 10CFR 71, providing the package design requirements, 10CFR73 providing for security of materials in transit, and 49CFR171 – 180 providing transport requirements for hazardous materials in transit. In addition, DOE and international shipments are also subject to DOE Orders and Directives and the IAEA standards respectively.

More specifically, security requirements during the transport of spent nuclear fuel in the United States are defined in 10 CFR 73.20 thru 73.37, and 73.72. These include:

- Protection of Safeguards Information. This includes the composite transportation physical security plan, schedules and itineraries for specific shipments, details of vehicle immobilization features, alarms & communication systems, capabilities of Local Law Enforcement Agency (LLEA) response, locations of safe havens, limitations of communication systems, and procedures for response to safeguards emergencies.
- Records
- Planning and Scheduling
- NRC Route Approval. This includes identification of the shipper, consignee, carrier, LLEA, fuel & packaging information, primary & alternate routes, planned rest & vehicle fueling stops, safe havens, and escort instructions.
- Communications Center
- Notifications to US Nuclear Regulatory Commission (NRC) and states along the route.

Commercial shipments of spent nuclear fuel must be made in compliance with the regulations above. From a practical standpoint, pressure from specific States or contractual requirements imposed by DOE or other shippers has often dictated that transporters comply with additional requirements. Those in most common use include satellite tracking during a shipment, and imposition of the Commercial Vehicle Safety Alliance (CVSA) Level VI inspection, immediately prior to movement of spent nuclear fuel. This inspection is often referred to as the “enhanced” CVSA inspection. It is different from other motor vehicle inspections, in that it allows “zero” tolerance on all inspection criteria prior to initiation of transport.

New Requirements Since September 11, 2001

Since the terrorist attacks of September 11, 2001, the focus on homeland security, and the international environment associated with the military actions currently underway in Afghanistan, an in-depth review of nuclear material shipments, both international and domestic, was initiated by several agencies within the US Government. This review continues today and ultimately can

be expected to culminate in rule-making action to amend Titles 10 and 49 to the Code of Federal Regulations.

However, near term actions in response to the attacks and resultant intelligence information include the NRC issuance of several Safeguards and Threat Advisories in order to strengthen responses to a potential attack on a nuclear or regulated activity. Nuclear transportation advisories, outlining additional security-related steps to be taken during the transport of spent nuclear fuel, have also been issued. The NRC has also communicated with other federal, State and local government agencies and industry representatives to discuss and evaluate the current threat environment, in the process of conducting a review of its safeguards and security programs and requirements. Pending rule making, the NRC has determined that certain compensatory measures are required to strengthen the protection given nuclear material shipments. On October 10, 2002, the NRC published in the Federal Register, an order for implementation of these advisories, which have been combined and refined into a final document, titled "Interim Compensatory Measures (ICM) for the Transportation of Spent Nuclear Fuel". This document deals with the current environment and dictates requirements for safeguards in the elevated threat situation presently experienced. However, the content is designated Safeguards Information and details are released on a "need to know" basis. As a result, we are precluded from addressing any of the detail in the heightened security environment other than to acknowledge that it exists. These measures have been determined by the NRC to be "*prudent, interim measures to address the current threat environment in a consistent manner.*" The requirements are to be met by November 2, 2002 or upon the next shipment, whichever is later.

Sufficient to say, today's expanded security measures, including satellite systems, enhanced communications, vehicle safety inspections, LLEA involvement and federal oversight, ensure the safe transport of spent nuclear fuel in the United States.

These requirements will remain in effect pending notification from the NRC that a significant change in the threat environment has occurred, or the NRC determines other changes are needed.

Impact of the New Requirements on the FRR Program

The spent fuel shipments performed under the Foreign Research Reactor return's program are more complex than those above since all of these shipments are international. As a result, they must comply with the US, DOE and international regulations discussed previously. In addition, many different organizations are involved in an FRR shipment:

- DOE Headquarters
- DOE Operations Offices at Savannah River and Idaho
- US Department of State
- Other US Federal Agencies (Federal Railroad Administration, US Coast Guard, Department of Transportation - Research and Special Programs Administration, Nuclear Regulatory Commission, Federal Bureau of Investigation, Environmental Protection Administration, Federal Emergency Management Agency, etc.)
- Reactor Operators
- Transportation Contractors

- Foreign Governments

Because of the complexity of the interfaces between the multiple organizations and the need to clarify their roles and responsibilities, DOE dictated that special planning be applied. For the DOE's Transportation Services contract as a whole and for each shipment, a transportation plan and a security plan were required. Master Transportation and Security Plans were the first tasks required of the Transportation Services contractors. The shipment specific security plan, based on a Master Security plan, is issued because the threat to DOE's assets will vary depending on the location, timing and route selected. This plan, the details of which are Safeguards Information, addresses the following issues:

- Roles and Responsibilities
- Shipment Schedule
- Shipment Tracking
- Communications
- Threat Assessment
- Physical Protection Requirements
- Emergency Preparedness

Shipments of spent nuclear fuel under the Foreign Research Reactor program have always been subject to elevated safety and security requirements. Before the restart of the return program in 1994, DOE performed an extensive safety, security, and environmental assessment in order to ensure that the shipments would meet public and governmental expectation for protection of the population. This evaluation is documented in the "Final Environment Impact Statement (EIS) on a Proposed Nuclear Weapons Nonproliferation Policy concerning Foreign Research Reactor Spent Nuclear Fuel" EIS DE/EIS-218F, February 1996 (Reference 1). As part of this process, a lengthy and extensive set of public hearings and meetings with States' representatives transpired. The outcome of this process was a set of negotiated "extra-regulatory" protections considerably exceeding the requirements of the regulations in effect at the time. Early shipments under the Urgent Relief Program were distinguished by having airborne surveillance, a security inspection (lead locomotive) of the entire rail route from receipt port to DOE receiving site, local law enforcement escort for the locomotive, on-board escort, satellite tracking, additional notifications beyond those in the regulations, and enhanced inspections of all elements of the transport path, cranes, locomotives, rail cars, and tractor-trailers. While many of these requirements have been deleted in recent shipments, many still remain. As a result, the level of security as defined by DOE for the Return's Program shipment has routinely exceeded the regulatory requirements. Consequently, the ability of the program to adapt to interim compensatory measures has been quite straightforward and not unlike the program response to other extra-regulatory transportation protections imposed on the FRR shipments.

As a result, FRR shipments have continued to be performed, in compliance with regulatory requirements and those imposed by NRC Order, and accommodated without significant cost or schedule impact to the program. Interestingly, a ship was on its way to Charleston on 9/11. The casks were unloaded at Charleston and safely transported by train to Savannah River Site using the security protections enforced by the shipment security plan. Three other shipments from Europe have been performed successfully in December 2001, June 2002 and September 2002.

The 9/11 attacks have not impacted significantly the process used to perform the shipments. That process dictates preparation of a security plan based on the threat assessment applicable to the shipment. While in the past, this has primarily been focused on international threats, the homeland security threat level is now also a factor. No “*Other Than High Income Country*” shipments have been performed since 9/11, due in part to the security threat in candidate shipping countries.

NAC’s Response to New Requirements

Safeguards and security expertise has always been a core capability in the inventory of disciplines that NAC offers its customers in meeting their transportation needs. NAC has a history of performing very high-level security activities for the Government. This has included NAC’s current work in North Korea, our prior work in Iraq and the Republic of Georgia, as well as during FRR shipments from Colombia, Indonesia, Thailand, Philippines, and other areas of the world subject to in-country or transportation security threats. Consequently, NAC has developed a comprehensive security posture that includes DOE security clearance for NAC personnel, classified information storage capability, secure telephone and fax capability, and the full spectrum of all other transportation security provisions. NAC’s response to NRC’s new requirements has been planned and implemented in a manner similar to that with which the “extra-regulatory” FRR requirements were addressed. We see nothing in the Interim Compensatory Measures that NAC would not be able to meet consistent with customer shipment schedules. We also understand that we need to be responsive and anticipate any additional changes for strengthening security levels during transportation that might be prompted by further escalation in the threat level. NAC has been able to avoid any significant cost impact in implementing the measures in force to date, due to the inventory of capabilities available in-house. However, at some level, impact on shipment cost is inevitable.

Summary

The events of 9/11, however awful, have had only modest impact on NAC’s transportation security functions. The planning process used for the FRR program and the extra-regulatory security provisions used on FRR and other sensitive Government programs have prepared NAC well in responding to the NRC directives and to customer requirements. Because of NAC’s comprehensive security capabilities, changes to date have been absorbed with little impact. However, the process of intelligence collection and threat assessment continues. NAC and other transportation service providers will continue to be tested by changing security requirements as the process of rulemaking and interim compensatory measures matures.