West Valley Spent Fuel Shipment Project

LESSONS LEARNED

December 2003

Table of Contents

Topic Page Number

Executive Summary . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . .

WV SNFS Chronology . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . .

Topic 1 Railroad-Related Operations . . . . . . . . . . . . ……... . . . . . . . . . . . . . . . . . . . . . . . . . . . . . .

Topic 2 Inspections . . . . . . . . . . . . . . . . . . . . . . . . . . ………. . . . . . . . . . . . . . . . . . . . . . . . . . . . . .

Topic 3 TRANSCOM . . . . . . . . . . . . . . . . . . . . . . . . . ………. . . . . . . . . . . . . . . . . . . . . . . . . . . .

Topic 4 Emergency Response Planning and Preparedness . ……. . . . . . . . . . . . . . . . . . . . . . . . . .

Topic 5 Security . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . ……….. . . . . . . . . . . . . . . . . . . .

Topic 6 Communications . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . …….... . . . . . . . . . . . . . . . .

Conclusions . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . ………………… . . . . . . . .

**EXECUTIVE SUMMARY**

On July 17, 2003, the U.S. Department of Energy (DOE) completed the movement of 125 commercial spent nuclear fuel (SNF) assemblies from the West Valley Demonstration Project (WVDP) to the Idaho National Engineering and Environmental Laboratory (INEEL). The assemblies were transported by rail in two dual-purpose shipping and storage casks specifically designed for the one shipment to the INEEL and for interim storage.

The movement of more than 2300 miles was completed more than 17 hours ahead of schedule without incident. Planning, preparation and conduct involved 4 railroads, 11 states (more than 22 state agencies), 2 tribes and 5 Federal Railroad Administration (FRA) regions.

The DOE began planning in 1999 and was prepared to ship in August 2001. In late October 2001, the DOE chose to postpone the shipment to focus efforts at the INEEL on meeting legal commitments with the state of Idaho on waste management. Shipment planning was consistent with DOE Order 460.2, *Radioactive Material Practices Manual*, issued in 2002. DOE worked with the corridor states and tribes on route evaluation and selection, emergency response preparedness, security planning, and shipment timing and general coordination issues.

DOE notified the corridor states and tribes in December 2002 of its intent to conduct the shipment in 2003 based on the planning and preparation completed in 2001. Changes were to be limited to only those that were essential to safety and/or conduct.

Following successful completion of this shipment, DOE actively sought input on the shipment planning and conduct from staff in the involved railroads, states, and the Federal Railroad Administration. It was requested that input focus on steps to standardize shipment conduct and thereby reduce costs while ensuring safety.

Following are key areas that offer the greatest opportunity to develop standard, routine processes that

will significantly reduce redundant or unnecessary planning and preparedness efforts. For future single or multiple rail shipments of SNF addressing these areas could result in recurring savings in resource expenditures both at the federal and state levels.

**Areas to Address:**

DOE and Railroad Agreement

Work with Class 1 railroads at a systems level to develop a standard rate on fee approach for all DOE SNF shipments offers a great potential to expedite planning and reduce costs. The West Valley shipment offers an excellent starting point to resolving railroad and DOE business issues dealing with the special requirements and issues related to SNF movements.

Information Control and Dissemination

Review current shipment-related information control practices at the system level to meet essential security needs and the public’s right-to-know. Develop clear guidelines identifying the type of SNF shipment information that is to be provided only on a need-to-know basis and that which can be provided to the public.

Shipment Scheduling

Adhering to planned schedules is exceptionally crucial in achieving greater efficiency in rail movements. Cross-country movements, such as the West Valley shipment, involve hundreds of railroad, state, and federal personnel. Any rescheduling, days or weeks, requires significant re-planning by all involved organizations.

Radiological Inspection Protocol

Development of a protocol to expedite en route radiological inspections of the shipments by personnel other than FRA or FRA-certified state inspectors, or elimination of such direct inspections, would be highly beneficial. Direct discussions with states would be required.

Training

The role of the Transportation Emergency Preparedness Program (TEPP), to provide radiological training, should be increased to incorporate a proactive system which prepares states and tribes for upcoming shipments along existing or new corridors and which ensures on-going preparedness of emergency response personnel. Notification to states and tribes of planned shipments 24 months in advance will allow for planning of training as part of the annual local responder training.

Phased Approach

Initial shipments in future multiple shipment rail campaigns will undoubtedly include redundant measures to ensure the safe conduct of the shipments. A planned, ongoing review and assessment of shipment conduct is essential to identify steps to streamline the process and improve performance.

Lack of attention to routine program evaluation to identify efficiencies may foster continuation of unneeded activities.

**WEST VALLEY (WV) SPENT NUCLEAR FUEL SHIPMENT (SNFS) CHRONOLOGY**

* 1966-1972 Nuclear Fuel Services (NFS) operated the United States’ first and only commercial nuclear fuel reprocessing plant on a 200-acre parcel of the New York State-owned Western New York Nuclear Service Center.
* 1972 NFS halted reprocessing operations.
* 1976 NFS notified New York State that they intended to withdraw from the site when their lease expired in 1980. 750 used (spent) commercial fuel assemblies that had been sent to the site for reprocessing remained in storage in the facility’s fuel pool.
* 1980 The WVDP Act was passed by Congress directing DOE to conduct a high-level waste management project at the former reprocessing facility.
* 1981 DOE hired West Valley Nuclear Services Company (WVNSCO) to manage and operate the WVDP.
* 1983-1986 625 of the spent fuel assemblies were returned to the utilities that owned them. This effort required 257 individual truck shipments by four different utilities. DOE took title to the remaining 125 assemblies from NFS. As part of a program at the INEEL, two casks were specially designed and procured which are suitable for both shipping the fuel by rail to the INEEL and storing it there.
* 1995 The State of Idaho, the United States Navy, and DOE reached an agreement settling a lawsuit regarding a number of INEEL issues. This agreement includes provisions for SNF to be shipped to the INEEL for storage. The Idaho Settlement Agreement includes an allowance to transfer the spent fuel assemblies from the WV site to the INEEL after December 31, 2000.
* 2001 DOE planned to ship the 125 remaining fuel assemblies from the WV site to the INEEL in 2001 to support closing the 35-year-old storage pool and proceeding with its mission of facility decontamination. That same year, the NRC licensed the casks for one full-load shipment to the INEEL. The team brought together to prepare for and to conduct the shipment included staff from DOE’s WVDP and Idaho offices, and contractor personnel from WVNSCO and Bechtel, Babcock & Wilcox Idaho (BBWI). The WV shipping team functioned as a project organization. There were three distinct areas of preparation: loading the shipping containers (casks) and associated activities, the cross-country rail shipment, and the receipt and storage of the loaded casks. Many activities required both technical and administrative support from personnel across the team. States and tribes along the potential shipment corridor were involved in review of proposed routes, and in emergency and security planning and preparedness.
* Aug. 2001 All preparations necessary to conduct the rail shipment of 125 commercial SNF assemblies from the WVDP to the INEEL were completed.
* Oct. 18, 2001 DOE announced postponement of the shipment to allow DOE-ID to focus on improving shipment of stored transuranic wastes from the INEEL to the Waste Isolation Pilot Plant in New Mexico in accordance with near-term legal commitments. Members of the WV SNFS Team maintained communications with corridor states and tribes by attending meetings of the Midwest and Northeast Councils of State Governments and the Western Governors’ Association.
* Jan. 2003 DOE rescheduled the shipment once desired production levels of shipments of transuranic wastes from the INEEL were achieved. As most of the preparation had been completed in 2001, the WV SNFS Team was able to complete preparations for the 2003 shipment by renewing existing contracts, planning documents, operational considerations, and relationships with involved federal, tribal and state agencies.
* July 2003 The WV SNFS departed the WVDP at 12:01 a.m. (EDT) on July 13 and safely arrived at the INEEL at 2:38 a.m. (EDT) on July 17.
* Sept. 2003 Members of the WV SNFS Team, involved states and railroads, and FRA representatives met to review planning effectiveness and derive lessons learned for future shipment of SNF.

**RAILROAD-RELATED OPERATIONS**

**Summary of Operations**

The railroad carriers played an integral role in the successful completion of the WV SNFS. Contracts

were established with four carriers: Buffalo and Pittsburgh Railroad (BPRR), Norfolk Southern (NS)

Railway, CSX Transportation (CSXT), and Union Pacific Railroad (UPRR).

Negotiating contracts with the railroad carriers was one of the most complicated and time-consuming activities in preparing for the WV shipment. DOE started negotiating the contracts as soon as the railroad carriers were identified. It required nearly two years to negotiate the contracts for a 2001 shipment and an additional six months to renegotiate the contracts for the 2003 shipment. Even with these lead times, there were compromises accepted during the contract negotiations primarily to meet the shipping schedule.

Early in the planning process the decision was made to pursue contracts with each of the railroad carriers. This approach was selected to accommodate requirements being imposed on the carriers by

DOE including: a dedicated train, use of a preferred route, straight-through shipping schedule, security, and emergency response. The use of tender rates was ruled out because tender rates are used primarily for multi-shipment campaigns and the WV SNF shipment was a one-time only shipment. Carriers typically control the route, schedule and all aspects of the shipment when a tender rate is applied.

Before beginning negotiations with each of the railroad carriers, INEEL explored having either UPRR or BPRR make the arrangements with the other carriers. However, each of the carriers declined to coordinate the shipment due to the complexity, visibility and perceived liability of the shipment.

The selection and evaluation of the route was one of the first activities undertaken by DOE. The Oak Ridge National Laboratory (ORNL) was tasked with identifying, evaluating and prioritizing possible rail routes from the WVDP to the INEEL. ORNL used the INTERLINE rail routing computer model to identify the routes. A total of 28 routes were identified. The routes were then evaluated and ranked based on transit time, distance, population, interchanges, carriers and class of track. DOE had additional restraints that needed to be factored into the route selection such as limited route options within the State of New York; however, those restraints did not compromise the ranking of the routes. Once the preferred route was identified work with the affected railroads, states, and tribes began.

The four potential rail carriers were contacted to verify that the route was acceptable for making the shipment. The carriers concurred with using the route. The corridor states and tribes were then given an opportunity to comment and agree upon the route.

An alternate route was not identified for the WV SNFS. It was determined that the best approach to managing a re-route during shipment was to allow the railroads to select alternate routing in coordination with DOE, FRA, and the involved states and tribes.

Throughout the planning and preparations for the shipment, the carriers expressed concern over the impact a shipment like West Valley has on their system. The railroad carriers are structured to handle large quantities of routine commodities such as agricultural products, automobiles, coal, fuel, etc. These commodities are profitable while requiring minimal liability, visibility, planning, coordination and resources. DOE SNF shipments, however, are highly visible, have a significant perceived liability, and require a significant amount of planning, coordination and resources. Some of the railroad carriers questioned the wisdom and profitability of making this one-of-a-kind shipment considering the effort and resources involved to plan, coordinate and execute the movement.

The DOE SNF shipments have a significant impact on the railroad carriers when the schedule is constantly changing. Transporting SNF by rail is significantly different than transporting by highway. Highway shipments can have a dedicated crew of two or three individuals for the entire shipment. Crosscountry rail shipments involve numerous crew changes and potentially hundreds of railroad employees. Training crew members to handle DOE SNF shipments requires a significant amount of planning and coordination. Current union agreements with railroads preclude assigning a dedicated crew to make a DOE shipment. Therefore, schedule delays, even for a day or two, can result in all new crews needing to be trained and coordinated.

Shipments of SNF for DOE have numerous requirements above and beyond those imposed on other

shipments. DOE M 460.2-1 has requirements for carrier training (tie-down systems, public affairs, first responder, use of TRANSCOM, etc), route selection, safety performance, scheduling, travel conditions, operational contingencies, safe parking, emergency response, security, recovery and cleanup, and en route inspections. The railroad business is organized to transport commodities in large volumes at low cost in compliance with established, standard requirements. The system has difficulty accommodating one-time, specialty shipments with nonstandard requirements.

As a result of the West Valley shipment, the following lessons have been learned and recommendations are being made for consideration for future shipments.

**Issues**

*Contract vs. Tender*

The number of railroad carriers servicing specific areas may be limited. This combined with a carrier’s possible reluctance to be involved in the shipment due to its complexity and the perceived liability leads to a very difficult contracting situation. Any project/program planning SNF shipments by rail needs to start negotiating with the railroad carriers early in the planning process. A minimum of two years should be allocated to negotiate a basic agreement and even longer for complex shipments.

Use of tender rates vs. contracts will need to be determined early in the planning. The following items should be considered when making that determination:

1. A contract may be the best vehicle for services if there is a minimum number of shipments and there are a significant number of special requirements imposed on the carriers. Fewer imposed requirements will facilitate easier negotiations.
2. Tender rates are better for multiple shipment campaigns. An advantage of using tender rates is that disputes between the carriers and the shipper can be resolved through the Surface Transportation Board. It should be noted, however, that the Surface Transportation Board will make its decisions based on safety of the shipment and not impeding commerce.

Liability will be the most complicated issue to resolve in negotiating an agreement with the railroad carriers. The equitable adjustment clause developed by DOE and the railroads for the WV shipment supplemented Price-Anderson coverage. While Price-Anderson coverage only applies to nuclear accident consequences, the railroads were concerned with liabilities unrelated to any radioactive release. Their concerns involved accidents or public disturbances that; halted traffic on the rail line, led to precautionary evacuations of surrounding communities, or resulted in lost business to associated railroads. These concerns stem from major judgments against railroads involving non-nuclear incidences where there were no injuries or fatalities.

**RECOMMENDATION:** Future shipping campaigns would benefit by having DOE begin immediately negotiating a system-wide tender rate with key railroad carriers for making SNF shipments over the major routes. This would eliminate the need for a specific project/program to expend the time and resources to negotiate agreements. It would also ensure consistency of the price, terms, and conditions from one shipment to another.

*Multiple Contracts*

At this time, it is unlikely any railroad carrier will accept the responsibility for arranging for and contracting with other carriers to make a SNF shipment. The perceived liability and additional requirements currently being imposed by DOE make it difficult, if not impossible, for a carrier to coordinate a multi-carrier shipment.

**Recommendation:** See recommendation for contract vs. tender.

*Route Evaluation/Selection*

DOE must be able to quantitatively defend the route chosen for making SNF shipments. There must be clearly-defined route selection criteria such as time, distance, population, interchanges, carriers and class of track. Use of a computer program, like INTERLINE, scientifically identifies the possible routes and ranks those routes based on the accepted criteria. This independently shows that the route was selected on meaningful criteria and not arbitrarily. Every effort should be made to only change the route if there is a strong technical justification. Changing the route for other reasons opens the entire route to change, which can result in no state, tribe, and/or community allowing the shipment through their jurisdiction.

STRACKNET is another possible approach to identify future routes. These lines have been qualified to the Department of Defense’s (DOD) rigorous standards for safety and logistics. Using these rail lines may help to address the questions of safety and equity that may be posed by entities within the shipping corridor.

**Recommendation:** A uniform system-wide process for evaluating rail routes should be established with the input of states, tribes, and the FRA.

*Alternate Routes*

The lack of flexibility in the railroad system makes it very difficult to identify alternate routes for cross-country shipments. Feedback from state representatives indicates that using an alternate route would have caused concern to the states. The states would be concerned if the alternate did not have adequate training for the first responders and FRA stated that track inspections for all of the possible alternate routes wouldn't be realistic. If a SNF shipment cannot proceed on the preferred route the railroad involved has 48 hours to re-route and continue the shipment to comply with hazardous material regulations.

**RECOMMENDATION:** To mitigate possible conflicts if an alternate route becomes necessary, DOE, states, tribes should consider broadening the training being provided by TEPP to include alternate routes. The goal should be to eventually integrate radioactive materials training into general responder training for hazardous materials.

*Impact on Rail System/Added DOE Requirements*

The railroads operate a highly efficient system that moves hundreds of thousands of carloads of commodities per day throughout the country. There are a limited number of rail lines, equipment, and personnel available to accommodate these movements. The railroads have developed effective systems to maximize the use of their resources, but have difficulties accommodating all of the special requirements imposed for DOE SNF shipments.

**RECOMMENDATION:** Future DOE SNF shipping projects/programs need to clearly understand the operations of railroads to maximize the potential benefits of moving SNF by rail. It is essential to understand that rail is significantly different than truck transport. The following are steps that can be taken to minimize the impact on the railroad carriers and ensure the safe and secure shipment of DOE SNF.

1. Minimize the number of requirements imposed on the railroad carriers. Not only will negotiating of the agreement for transporting the material be easier, it may also prevent having requirements being imposed that cannot be met by the carriers due to federal regulations and or union agreements.
2. Minimize the training and/or operations expected from the train crews. Federal regulations limit the number of hours a crew can work each day to12 hours. Union agreements with railroad (Union Pacific power was used for the entire route) carrier management are very specific about duties to be performed and only those duties identified in the contracts can be imposed on the train crews. It is not possible to have dedicated crews operate the train. The crews operate under the “first in”- ”first out” principle. The carriers are not able to pick and choose crews. Therefore, DOE needs to understand the ramifications before imposing the requirements on the carriers. DOE M 460.2-1, Section 7.3, has requirements that cannot be met by the railroad carriers such as “. . . railroad carriers are also responsible for maintaining a training program addressing a list of areas, such as, operation of specific package tie-down systems... first responder training, and use of TRANSCOM.”
3. If extra requirements are needed for rail shipments, DOE should consider using DOE personnel to meet those requirements (i.e., TRANSCOM operations, radiation monitoring, etc.).
4. For large shipping campaigns, DOE should consider owning or long-term leasing the rail equipment. Owning and/or long term leasing of equipment allows DOE better control over delivery, use, maintenance, and inspection of the equipment. This will also allow the Department better flexibility coordinating the movement of SNF from various facilities throughout the country.
5. Consider discussing with one or two large chemical companies how they handle their shipping campaigns. This information can be used as a benchmark for DOE SNF shipments. Companies like Dupont have their own equipment, maintenance programs, and operate unit trains. The chemical industry have similar institutional problems.

*Schedule Changes*

Hundreds of railroad employees are involved in a cross-country shipment. Changing the schedule, even by a day or two, has a huge impact on rail operations, security, and logistics. During the WV shipment preparations, NS had approximately 30 officers trained for the West Valley shipment. A schedule delay would have had significant impact on security arrangements for the shipment. NS also stated their company would incorporate financial penalties for schedule changes in future agreements. BPRR stated they couldn’t afford to have assets, rail cars and crews that aren't working.

**RECOMMENDATION:** Set a firm shipping date that allows adequate time for the carriers’ to coordinate

the shipment and maintain that shipping date.

**INSPECTIONS**

*Summary of Operations*

The inspections involved in this rail shipment can be categorized as follows:

* Preshipment

- Inspection of the tracks and associated equipment

- Mechanical inspections of the rolling stock

- Radiological (radiation and surface contamination) inspections of the shipping casks

* En Route

- Mechanical inspections of the rolling stock

- Radiological inspections of the shipping casks

Issues

*Preshipment Mechanical Inspections*

Between January and July 2003 the FRA conducted inspections of the 2,300-mile rail route for the

WV shipment in accordance with the Administration’s Safety Compliance Oversight Plan (SCOP) or Rail Transportation of High-Level Radioactive Waste and Spent Nuclear Fuel (June 1998). Both FRA and FRA-certified state inspectors took part in these activities.

DOE arranged for FRA mechanical inspection of the rolling stock (locomotives, hopper cars, passenger car) at point-of-origin and in the Buffalo, New York, rail yard, where they were staged prior to delivery to the West Valley site, and again after the train was configured but prior to departure from the WVDP. At a number of these locations, inspectors from one or more of the involved railroads also conducted mechanical inspections. Representatives from B&P, NS, and CSXT railroads were at the WVDP at the time of shipment.

*Preshipment Radiological Inspections*

From the loading of the shipping casks in 2001, WVDP radiological personnel conducted routine direct radiation surveys, including neutron detection, and surface contamination surveys. In the spring of 2003, in preparation for the shipment, current survey results were forwarded to

all the corridor states and tribes, the railroads, and the FRA.

The New York State Department of Health (NYSDOH) requested that they conduct a preshipment radiological inspection within two weeks of the shipment’s departure. The inspection was scheduled 11 days prior to departure, which allowed the results to be finalized and distributed by e-mail (July 7, 2003) to all corridor states and tribes, the FRA, railroads and appropriate DOE points of contact. The actual inspection, which included surveys for direct radiation and sampling for possible surface contamination, required approximately two hours and went very smoothly. WVDP radiological technicians conducted inspections in parallel with the NYSDOH inspectors. Recipients of survey results noted that having the data before the shipment was helpful in preparing for the shipment.

On the day of shipment, Pennsylvania Bureau of Radiation Protection personnel and a radiation specialist from NS railroad were at the WVDP to observe the final radiological survey conducted by WVDP radiological technicians. The results of this survey were forwarded by e-mail to the same distribution along with copies of the shipping papers and other documentation at the time of shipment.

*En Route Inspections*

FRA and FRA-certified state rail inspectors conducted mechanical inspections as part of their standard operating practice. Inspections were performed when the train stopped for operational reasons and were conducted within the time available.

En route radiological inspections by non FRA-certified state inspectors presented the greatest challenge to arrange. Railroads own the property on which their tracks run and typically restrict access to their personnel and FRA or FRA-certified personnel. To accommodate the requests for radiological inspections by state agencies that do not have FRA-certified personnel, DOE coordinated inspections at three predesignated locations. An FRA employee was assigned at each stop to coordinate access to the railroad property and assist in escorting the non FRA-certified inspectors.

DOE radiological specialists among the onboard support crew conducted en route radiological surveys only in parallel with state and/or railroad personnel. The DOE support crew conducted no independent en route radiological inspections.

**RECOMMENDATION:** Standardize the preshipment radiological inspection, conduct it sufficiently in advance of the planned shipment to allow distribution to all involved parties, and use it as the cornerstone of the confirmatory inspections. Acceptance by all involved parties of the survey results by the state of origin will be a first step in developing a process where by redundant en route radiological inspections during routine shipping operations can be streamlined or eliminated.

*Mechanical Inspections of the Rolling Stock*

The multiple pre-shipment mechanical inspections (including at point-of-origin) of the rolling stock were in response to mechanical problems that were identified during the 2001 preparations when cars and locomotives arrived in the Buffalo rail yard. In 2001, rolling stock had to be sent out to other facilities for repair, which complicated planning.

No mechanical problems arose with the cars or locomotives during the shipment. However a repair,

at the request of NS, was made to the privately-owned passenger car after inspection at the Buffalo rail yard.

**RECOMMENDATION:** Multiple mechanical inspections prior to shipment are certainly recommended for single or first-of-a-series shipments by rail. For the shipment of SNF use of dedicated, government-owned rolling stock should be evaluated. If dedicated, government-owned rolling stock is not used then all rolling stock should be provided by the involved railroads.

Whatever equipment is employed, the mechanical inspection process for a rail shipping campaign will by necessity begin with multiple preshipment mechanical inspections. A campaign should have an established approach to review and adjust the inspection plan as the shipments proceed to ensure safety, and to identify redundancy and streamline the process.

*En Route Radiological Inspections*

Radiological inspections by state personnel were conducted at stops at or near New Castle, Pennsylvania; Peru, Indiana; and Cheyenne, Wyoming. Results were consistent with preshipment inspection results.

Although the actual inspection process went smoothly, the pre-shipment coordination of these inspections was time-consuming as was the effort to coordinate the timing of the arrival of inspectors at the designated locations with the arrival of the train. The challenges are clear when the stop at Peru, Indiana, is considered, which involved personnel from Illinois, Indiana, and Missouri. The objective was to get inspectors to the location approximately two hours prior to train arrival, but with variations in train transit times synchronizing the timing of inspections en route

proved very difficult.

**RECOMMENDATION:** The goal should be to eliminate the need to plan specific en route locations for radiological inspections by state and tribal agencies. To address current state and tribal requirements for monitoring, a working group should be established through the state regional organizations to consider ways to more efficiently conduct radiological monitoring.

Eliminating the need for prearranged en route stops of rail shipments for radiological inspections would be a tremendous benefit in expediting shipments and reducing the costs of the shipper and the impacted states and tribes. Reducing transit time and movement complexity will also enhance security.

*FRA Route Inspection*

With significant planning and knowledge of the route in place from the preparations in 2001, sufficient time was provided for the FRA to prepare for the shipment. Although it was not possible to perform detailed inspections of the entire route this time, areas or sections that had previously shown higher defect ratios were focused on. This allowed time for correction of deficiencies and re-inspections.

**RECOMMENDATION:** With current resources FRA personnel would not be able to support conducting inspection activities as outlined in the SCOP for multiple cross-country rail shipments. If DOE anticipates multiple SNF rail campaigns, FRA and DOE need to begin discussions on routes, route selection, and route inspection to determine if efficiencies can be achieved while maintaining appropriate safety assurance levels.

**TRANSCOM**

**Summary of Operations**

The project followed the requirements of DOE M 460.2-1 Radioactive Material Transportation Practices Manual which requires the use of TRANSCOM as the tracking mechanism for certain shipments of DOE radioactive materials. A TRANSCOM Plan was written to ensure coordination and communication with the DOE/AL TRANSCOM Communications Center (TCC) and to outline multiple back-up contingencies in the event of varying degrees of TRANSCOM failure. DOE Support Personnel on the passenger car entered into the QUALCOMM system which fed to the TRANSCOM system accessed by users along the shipping corridor. Two complete QUALCOMM units were installed on the passenger car the day prior to the shipment. A third unit was stored on the passenger car as a back-up. System testing and communication links were verified the day prior to the shipment and upon departure from West Valley. In addition to the installation of QUALCOM equipment the Support Personnel received training to operate the system while escorting the shipment.

In addition to TRANSCOM responsibilities DOE Support Personnel on the train participated in all radiological control inspections en route, provided technical expertise, emergency response back-up and ensured availability of alternate communications through use of cell and satellite phones. To support entry into the TRANSCOM system, project planning included development of a TRANSCOM Plan, and contingencies were established early on.

**Issues**

*TRANSCOM Installation*

TRANSCOM equipment had to be installed on the roof of the passenger car and removed after the shipment. Activities necessary for working on the roof of the passenger car need to be reviewed to ensure this work is completed safely. Contingency plans for foul weather should be included in the review, as inclement weather conditions have the potential to create slippery or dangerous conditions.

**RECOMMENDATION:** Perform safety reviews for the installation and removal of the TRANSCOM equipment.

*System Vulnerabilities*

Sandia National Laboratories (SNL) provides primary communications support for TRANSCOM.

SNL had a scheduled Heating, Ventilating, and Air Conditioning (HVAC) maintenance that TRANSCOM operators weren't cognizant of, and when the Internet router was shut down in preparation for the HVAC shutdown, states and tribes were no longer able to view the shipment. The TCC wasn't aware that states and tribes were unable to view the shipment on TRANSCOM. As a result of this occurrence, SNL will supply a backup router.

**RECOMMENDATION:** DOE-AL should identify a method for recognizing that users have lost their connection or for end users to notify TRANSCOM when they can't view the shipment.

*TRANSCOM Procedures*

During the time TRANSCOM was unavailable for viewing, INEEL Status Center staff reverted to established procedures to determine the actions that needed to occur to accommodate communications with the states and tribes. Upon review of the WV SNFS TRANSCOM Plan, the Warning Communications Center (WCC) Plan and the Contingency Plan, Status Center staff determined that the three plans provided inconsistent direction. Also, it's not clear that TRANSCOM has contingency procedures for communicating with users when their system becomes unavailable for viewing. Although the Status Center, WCC and TRANSCOM personnel accomplished the communications and there were no visible consequences to the end users, the potential existed for unnecessary delays and confusion.

**RECOMMENDATION:** Use the TRANSCOM Plan developed by the TCC and include shipment-specific information on TRANSCOM in the shipment-specific transportation plan. This shipment-specific transportation plan should be one document that includes all necessary information on operations, emergency preparedness, and communications. Also, DOE-AL should develop a contingency plan for addressing loss of communications with TRANSCOM end users. If the one-plan approach isn't acceptable, it is vital to ensure that all plans that reference TRANSCOM operations be consistent with each other.

*TRANSCOM Back-up Communications Systems*

The use of cell phones used by the Support Personnel while on-board the passenger car is recommended as they proved to be more reliable and had better clarity than the satellite telephones that were also available. Satellite telephones are not operable from inside the passenger car (railroads prohibit the use of external antenna) or while traversing through mountainous terrain, tunnels, bridges and during overcast weather.

**RECOMMENDATION:** Strengthen communications with the Support Personnel on-board the train by using cell phones and limiting the use of satellite telephones. Specify the use of cell phones to communicate with the WCC, local responders, the Status Center and TRANSCOM. Specify the use of cell phones and when the satellite telephones should be used.

**EMERGENCY RESPONSE PLANNING AND PREPAREDNESS**

**Summary of Operations**

In preparation for a 2001 shipment, extensive emergency preparedness activities were coordinated with states and tribes along the shipping corridor. Presentations were given to impacted states at multiple regional board meetings [Western Governors’ Association (WGA), Council of State Governments–Northeast (CSG-NE), and the Council of State Governments–Midwest (CSG-MW)] and the Shoshone-Bannock Tribes. Training materials and information packets were developed and distributed for states/tribes use in preparing local emergency responders. Regional boards maintained the key coordination role in 2003 preparations assisting the project in identification of primary points-of-contact for transportation/operations, emergency preparedness and security. Several conference calls with each regional board were conducted to status the project, obtain feedback on planning documents and identify additional emergency preparedness needs. TEPP assumed responsibility for emergency preparedness and identified and met the training needs in the impacted states and with the Shoshone-Bannock Tribes.

An Emergency Preparedness Coordination Plan was developed to outline coordination roles and responsibilities and provide a systematic approach to emergency preparedness coordination among DOE, states and tribes, carriers and other involved agencies. The 2003 Emergency Preparedness Coordination Plan was significantly different from the 2001 Emergency Preparedness Coordination Plan due to the removal of information that was deemed, “Official Use Only (OUO).” The OUO information that was removed from the Emergency Preparedness Coordination Plan was incorporated into the Security Plan, as appropriate. Individual Emergency Response Plans from railroad carriers were collected and included in the project files.

**Issues**

*Communications with States and Tribes*

Participating states agreed that a single point-of-contact would be preferable for future shipments and recommended that the single-point-of-contact be the Governor's designee as identified in 10 CFR 73.37.

Because states had the earlier version of the plan, the 2003 version of the Emergency Coordination Plan was acceptable, even though many of the details had been deemed OUO and had been removed. It was noted that it was difficult to determine whether or not the 2003 plan would have provided adequate information for emergency preparedness coordination, absent the detailed 2001 plan. Feedback from meeting participants indicated that the 2003 plan probably wouldn’t have been adequate.

**RECOMMENDATION:** It would be beneficial to be able to identify effective, sensible methods for communicating information that is also mindful of protecting information that needs to be treated as "need-to-know." It would also be beneficial if various agencies coordinated the definition for *OUO information* and *safe-guarded information* to ensure consistency.

In addition, other states should be polled to identify if planning, in-state distribution of information and decision-making should be coordinated through the official Governor's designee. However, general communications regarding shipments should continue to be coordinated through DOE participation in Regional Boards meetings.

*TEPP Training*

TEPP training was provided to meet needs along the shipping corridor. Like many agencies, state emergency planners schedule training for their first responders a year or more in advance. In light of that consideration, states requested adequate time to accommodate scheduling of training.

**RECOMMENDATION:** Increase the TEPP role as a proactive system to prepare for upcoming shipments along existing or new corridors to ensure on-going preparedness of states and tribes.

*Status Center*

The Status Center was staffed by WV SNFS Team members knowledgeable about the WV shipment and transportation in general. It was established to provide shipment status to other members of the internal WV SNFS Team. It was not established to act as an emergency operations center. Locating the Status Center in the same building/area as the WCC proved to be of value for both the Status Center and WCC.

The Status Center proved to be useful because there was always a WV SNFS Team member on duty who was knowledgeable about the shipment and the involved agencies/individuals and who could anticipate and resolve potential issues before they became situations that required remediation. As a tool for internal members of the WV SNFS Team, Status Center reports were valuable as a proactive means of maintaining regular information updates as the shipment progressed. These reports eliminated the need to provide individual status reports that would have been reactive and not necessarily consistent from one participant to another.

The scheduler/spreadsheet that was used to track the shipment was valuable and could be used in addition to TRANSCOM to enhance shipment tracking for future shipments. The scheduler was used on two occasions to notify states and tribes of a 6-hour schedule variance. The scheduler proved to be a valuable resource for making these notifications on time.

One of the issues Status Center staff encountered related to the state points-of-contact. There were 11 changes in either a telephone number or who the point of contact was during the notifications two hours prior to departure. Some of these changes were due to vacations, off-hours staffing, etc. These changes created challenges for Status Center staff, who had the significant and time-consuming task of making these notifications (26 in total).

**RECOMMENDATION:** Request that states and tribes provide a telephone number that is staffed 24 hours/day, 7 days/week to ensure notifications are effectively sent and received with a minimal number of changes.

A second Status Center challenge related to real-time information on train *rate of travel.* TRANSCOM was effective in identifying where the train was at a given point of time. However, train time lines are only estimates; train speeds can vary greatly depending on conditions. At times the rate of travel was faster than anticipated and time lines (which included a pre-determined rate of travel projections) weren’t especially useful in predicting where the train might be in six hours. This made providing six-hour notifications to state representatives scheduled to perform en route radiological inspections, extremely difficult.

**RECOMMENDATION:** Information on the rate of travel could be provided to the Status Center either by the involved railroad’s dispatch office or by the regional FRA inspector involved in that portion of the shipment.

During normal situations the equipment provided in the Status Center was adequate. However, if an off-normal–not emergency–situation were to develop, there would have been a need for additional telephones, computers, personnel, and space. Also, because no telephone recording devices were used, the only way to capture and relay messages was by listening and writing the message down. This method is, of course, subject to human error, the message is not repeatable, and there is the possibility of relaying the information inaccurately.

**RECOMMENDATION:** Consider a full complement of telephones, computers, a larger staff, and using a telephone recording device to ensure all messages are captured properly.

**SECURITY**

**Summary of Operations**

The security aspects of the WV SNFS were coordinated through BBWI at the INEEL, among representatives from corridor states and tribes, the involved railroads, the FBI, DOE-HQ, DOE-ID and DOE-WV. The Buffalo office of the FBI performed on-going threat assessments and coordinated with FBI offices along the shipping corridor, and contributed to the final threat assessment performed by DOEHQ.

Coordination among the parties was very good. Before the shipment took place, the security plan was reviewed and commented on by all security points of contact. Continuous threat assessments were conducted across the country, with a final threat assessment conducted by DOE-HQ just before the shipment left the WVDP. Security had one point of contact with the railroads and each state for coordinating security issues, which worked well.

In response to DOE’s need to meet Interim Compensatory Measures (ICMs), three of the four railroads provided armed escorts on the train. The fourth railroad augmented their security staff through partnership with New York and Pennsylvania law enforcement.

Railroad Security and state law enforcement used the general DOE security requirements to develop their own protection measures based on their own individual needs, so there were many variations of protection levels. Railroad Security maintained a log of events during the shipment, as required by DOE. The escort book also contained valuable reference material (e.g., time lines, list of state inspectors and their vehicles, etc.) for the escorts.

**Issues**

*Need-to-Know Information*

When the shipment was in the 2003 planning stages, sensitive information that had been classified as

“Need-to-Know” was removed from the Transportation Plan and placed in the Security Plan. This need-to-know information was classified as “Official Use Only” (OUO) information and included such topics as: route, schedule, SNF information, the security plan, and security measures. As OUO information, the Security Plan was only distributed to the security points-of-contact who then had to provide the Security Plan to those in their states with a need to know, placing excessive responsibility on the security point of contact. It also created a wider distribution for the Security Plan to points of contact who weren’t specifically responsible for security protection, which was not acceptable.

State representatives noted that the ORNL and FRR shipping plans for 2003 shipments looked different from the West Valley plans. This observation led to discussions that there seems to be a difference of opinion as to what information should be considered OUO. For example, it was suggested that some of the sensitive information (e.g., fuel enrichment) could be excluded from the transportation plan. A DOE-HQ representative said that OUO information will not be included in transportation plans in the future, stating that the Assistant Secretary for Environmental Management has provided guidance on the components of transportation plans. Feedback from the states affirmed that if they had to choose between a document that required protection as OUO and a transportation plan that didn’t contain adequate information to prepare them for shipments, they would prefer an OUO document.

NRC balances the public's *right to know* with others’ *need to know*. NRC uses a single point of contact and passes both the information and the responsibility to safeguarding that information on to that single point of contact. NRC indicates they publish cask information and their routes to the general public; however, this general information is not connected to a schedule or a specific shipment.

**RECOMMENDATION:** DOE should investigate why OUO classifications differ among DOE sites to ensure consistency among transportation plans developed by different DOE facilities. It was also suggested that when transmitting OUO information, DOE should provide a packet that includes a definition of OUO and provides guidance on how to disseminate and handle those materials.

*Plan(s) Distribution*

The security plan was published as a separate document and distributed at a different time than the other shipment plans. This resulted in challenges with overall understanding of how the Security Plan was integrated into the other plans.

**RECOMMENDATION:** Distribute all the documents at the same time to ensure better integration.

*Communications*

The WCC, which was the 24 hour emergency number on the shipping papers, had good communication with states and the Status Center. The WCC received several inquiries during the shipment and was able to resolve all issues with assistance from the Status Center. WCC had regular communication with Security escorts. A WCC procedure was written for the shipment and the WCC operators were trained prior to the shipment, which was effective.

Consistent compliance with communication protection policies were difficult to follow and still provide adequate information to WV SNFS Project participants. Some of these inconsistencies included the type of information that could be relayed using telephones, cellular telephones, faxes, and e-mail. Although FEMA has issued secure lines to each of the states, not all of state representatives have equal access to the secure phones in their states as the security investigations required to use the secure lines haven't been completed (funding for the investigations has been an issue).

**RECOMMENDATION:** Ensure there are consistent security communication policies for disseminating sensitive information effectively. Also, investigate the possibility of using secure telephone lines when sensitive information needs to be relayed.

*Information Monitoring*

FRA participants indicated they talked to people who track rail movements as a hobby (rail fan) and they had a good deal of information about the shipment. Although Internet tracking of the rail cars was blocked by each railroad, the railroads and FRA indicated that a scanner could be used to track buffer cars. The UPRR engines drew attention because they were out of place in Buffalo, and even more out of place in Ashford, New York.

**RECOMMENDATION:** Continue to monitor the Internet to maintain cognizance of the information being viewed by rail fans and other members of the public. Also, use engines that are commonly used in the area, especially for the point of origin.

*Escorts*

Security escorts were well-coordinated between the railroads and states, and were effective. Three of the four railroads had their own police force; the fourth railroad augmented their services through partnerships with New York and Pennsylvania law enforcement to meet DOE's ICMs for armed escorts on the train. Pennsylvania has a statute which requires law enforcement escort through the state, so they had officers on the train through most of the state and shadowed the shipment to the greatest extent possible.

Although the coordination worked effectively for this shipment, the armed escort requirement may be difficult to meet for future shipments, depending on whether or not the involved carriers have a police department. The level of coordination and cooperation required to successfully meet the ICMs is a significant challenge and should not be underestimated.

**RECOMMENDATION:** Consider the use of Federal Marshals as shipment escorts.

*Formal Notification*

Feedback was received regarding the official notification: seven-day notification is preferred over the four-day notification.

**RECOMMENDATION:** Provide information in the planning documents and communications that clearly states that the formal notification can be provided within 4-7 days.

**COMMUNICATIONS**

**Summary of Operations**

Communications are always audience and message driven. Due to the many audiences involved in conducting a cross-country rail shipment, there are necessarily multiple communications levels. For the West Valley shipment there developed three general communications spheres with subgroups:

* Internal Team–DOE and the prime contractors at the WVDP and the INEEL. Within this team were a number of unofficial subgroups which naturally developed to deal with specific topics. There also were two groups established in 2003 specifically for the purpose of information control; security, shipment schedule.
* Expanded Team–Internal team plus the directly involved personnel in the corridor states and tribes, and the railroads and the FRA
* External–Elected officials, general public, special interest groups, and the media The obvious diversity of these audiences made communications challenging. The heightened security environment following the September 11, 2001, terrorist attacks only added complexities in terms of need-to-know and right-to-know.

The communications program for the West Valley shipment can be viewed as two programs with

dramatically different approaches: 1999 - 2001 Communications and 2002-2003 Communications.

*1999-2001 Communications*

A very open communications approach was employed. The only shipment information not available for general release was the specific date and time planned for the shipment.

DOE initiated work with potential corridor states and tribes, the railroads, and the FRA in late 1999. During 2000 and early 2001 these entities reviewed and commented on the rail route study and the West Valley shipment planning documents. Through these interactions, the individuals from these various groups in many ways became an extension (expanded team) of the internal team.

A “West Valley Spent Nuclear Fuel Shipment Resource Guide” was prepared for use in briefing personnel in state and tribal organizations along the shipping corridor. The “Guide” provided shipment specific information including details regarding the route, fuel, and casks, general background on radiation, radioactive materials shipping, and emergency response. Approximately 2,900 copies of the “Guide” were provided to corridor states and tribes, primarily for use in briefing local emergency responders.

Only two requests were made to personnel involved in the expanded team regarding information management: first, that the specific date and time of the shipment be protected and second, that all media and public inquiries be coordinated through a point of contact on the internal team. People in the states and tribes were encouraged to answer questions from their constituents and to provide that information to the internal team so that it could be shared with personnel in organizations along the route.

DOE conducted no proactive public or media outreach. There were no press releases or notifications of any type to local or national media outlets. Public awareness of shipment planning arose primarily from local responder training sessions and briefings. Typically local media inquiries followed emergency preparedness meetings in a specific locality.

More than 100 media inquiries were handled from January 2001 until postponement of the shipment in October 2001. The majority were from print media along the route. Again, the only information withheld was the specific planned shipment date and time.

Media coverage was overwhelmingly factual and neutral to positive in tone. The early establishment of an e-mail list of communicators in the states, tribes, railroads, and FRA allowed inquiries to be directed to the right individuals for response and allowed members of the expanded team to be alerted of potential inquiries. The result was that media and public inquiries were answered in a very timely, thorough manner.

There are three observations relative to the open public communications approach employed in 2000/01 that are noteworthy.

* First, some of the best television and newspaper coverage was from interviews with local emergency responders and trainers.
* Second, media coverage did not in this case equate to extensive public concern or involvement. Public inquiries were received and anti-nuclear individuals and/or organizations were sometimes quoted by the media, but there were no local demonstrations or meetings. A national anti-nuclear organization conducted a cross country educational tour along the West Valley route and typically drew fewer than 20 people at planned stops.
* Third, media coverage, even if positive, raised concerns within organizations involved in the shipment. Dealing with media and public attention was clearly a challenge for many organizations. Some organizations clearly equated any media coverage with increased risk in fulfilling their responsibilities relative to the shipment.

*2002-2003 Communications*

When planning for a 2003 shipment began, the communications approach was dramatically altered to address the nation’s heightened security concerns. All of the shipment specific information that had been previously supplied to all involved personnel in the corridor states and tribes was placed in the shipment security plan, which was distributed to only one or two points of contact in each state or tribe.

More importantly the points of contact were directed to share that information only on a need-to-know basis. They were to decide what information needed to be provided to what individuals in their organizations.

All shipment-specific information was withheld from the public and media. The only response approved to inquiries was that the shipment was being planned for 2003, and that DOE was working with security and emergency response personnel in the corridor states and tribes to ensure the safety of the shipment.

Inquiries from the media typically came from reporters who had covered the story in 2000-01 and who had a significant amount of background information. All reporters demonstrated a great deal of respect for security and the restrictions in releasing shipment-specific information.

The first of the very limited media coverage of the shipment was a newspaper article on the fourth day of the shipment. The coverage that followed was minimal. DOE did not release any public announcement regarding the completion of the shipment.

*Notifications*

DOE officially notified the Governors or Governors’ designees in the corridor states four days in advance of the shipment as required by Title 10 of the Code of Federal Regulations Part 73. During the weeks prior to the shipment, notifications of the exact planned shipping date and time were made at the operational level to various organizations on a need-to-know basis.

*Results*

The shipment was successfully conducted with very little media or public attention. Certainly it is logical to attribute this primarily to the restricted distribution of shipment specific information. However, the media’s respect for the nation’s current security situation at the time of shipment was very important.

**Issues**

*Formal Notifications*

DOE unofficially notified state points of contact approximately 14 days in advance of the shipment.

**RECOMMENDATION:** Even though planning documents stated that a seven-day notification will be

delivered to Governor’s or Governors’ designees, more flexibility should be available to implement 10 CFR 73 and not be specific to seven-day formal notification.

*Dissemination of Planning Information*

While shipment-specific information dissemination was quite restricted within the states, tribes, and railroads, the general knowledge regarding the shipment from preparation in 2000-01 may have significantly facilitated preparations in 2003.

**RECOMMENDATION:** If security demands remain at current levels for future shipments, working with states, tribes, and railroads to determine how to disseminate information to the right personnel will be extremely important. While maintaining security, it is also necessary to ensure preparedness.

*Public and Media Interface*

A “closed-door” approach in responding to the public and the media was successful in this shipment.

This approach may continue to function until such time as the public’s and media’s focus begin to shift from security toward their right-to-know.\

**RECOMMENDATION:** Increasing the public’s understanding of the transport of radioactive materials and the proven safety of the shipping procedures will lessen public concerns and hopefully lead to general acceptance of transportation. If multiple future shipments are planned, a general public and media information program may be of benefit. More information could be shared without jeopardizing security, if the program is not connected to a specific shipment.

*States/Tribes/Railroads/FRA Points of Contact*

Maintaining communications to coordinate and facilitate operations is crucial. E-mail was an extremely effective means of communicating and providing information such as radiological surveys, shipping papers, etc. Maintaining current, accurate point-of-contact lists is time consuming when so many organizations are involved.

**RECOMMENDATION:** Multiple shipment campaigns that cover years would greatly benefit in development of a system-wide process for notifying points of contact in the states, tribes, railroads, and FRA. A secure web-based system that allowed the organizations to update their personnel information, telephone numbers, etc., on an ongoing basis would save an enormous amount of time and effort.

**CONCLUSIONS**

The WV SNF shipment from the WVDP to the INEEL was a successfully coordinated team effort.

External participants are to be commended for their diligence completing their responsibilities, and the professionalism and cooperation that made this shipment a success.

While the plan for this shipment was developed from 1999 to 2001, prior to issuance of DOE Order 460.2 *Radioactive Material Practices Manual*, the work and coordination with the corridor states and tribes were consistent with the Manual. DOE’s approach to conducting the shipment in 2003 was to use the planning that was in place and make only essential changes, which were minimal.

As a one time shipment, it was most efficient to work within accepted and established protocols, and to not attempt to develop new methods of interfacing with all the external parties involved in the shipment.

Conceptually the primary lesson learned from the WV SNF shipment is that to maximize the potential benefits of moving SNF by rail DOE needs to standardize the approach to rail shipment.

If it is DOE’s intent to conduct multiple cross-country SNF shipments by rail, the focus should be on establishing a *system-wide approach* to coordinating activities with railroads, states and tribes, and the FRA.

Areas that offer the greatest potential for increasing efficiency, ensuring quality performance, and reducing costs are:

* An accepted contracting system with the railroads
* Standard guidelines on information control and dissemination
* A process for establishing and maintaining schedules
* National protocol to provide for radiological inspections but eliminate en route inspections by non FRA-certified personnel
* Radiological training for first responders integrated into routine hazardous materials training
* DOE process to review and seek efficiencies and improvements should a multiple shipping campaign be initiated