Application of the Federal Railroad Administration Safety Compliance Oversight Plan for Rail Shipments to the U.S. Department of Energy Waste Isolation Pilot Plant

Introduction

Beginning as early as 2005, the Department of Energy (DOE) plans to ship transuranic (TRU) waste to the Waste Isolation Pilot Plant (WIPP) by rail. DOE proposes to ship waste in TRUPACT-II containers on flat–bed rail cars (cask cars). Each cask car could hold up to seven TRUPACT-II containers. A typical shipment would consist of up to three cask cars and two buffer cars. DOE proposes to make as many as 1,700 shipments consisting of more than 4,400 rail cars over a 33-year time frame. DOE is also considering using a larger package called a TRUPACT–III.

The highway transportation safety program developed between the Western states and DOE for the shipment of TRU waste to WIPP is a model and should serve as a guide for developing a program suitable for planned rail shipments to WIPP. The policy of the Western Governors is that if DOE decides to transport TRU waste by rail, DOE must ensure that such shipments follow standards, procedures and protocols comparable to those used for shipments of TRU waste by truck.

Western States can convert most of the elements of the highway program implementation guide to a rail shipping campaign. However, without additional assistance, Western States do not have the capability of implementing equivalent programs for "Qualified Crews and Carrier Compliance" and "Inspections of Track and Equipment."[1] The primary reason for this is that the federal government has preempted the states from taking a lead role on railroad safety programs, which means the role of the states is limited to implementing federal law and policy through voluntary participation in the U.S. Department of Transportation Federal Railroad Administration (FRA) State Participation Program. Not all states participate in this program, and those that do have very few inspection personnel. Therefore, an alternative approach is needed to help ensure the success of the safety program developed for truck shipments of TRU waste can be replicated when rail shipments begin.

Fortunately, FRA has recognized the need for an enhanced safety program for radioactive waste shipments, but currently the program only applies to spent nuclear fuel and high level waste rail shipments. To address this need, FRA developed the *Safety Compliance Oversight Plan for Rail Transportation of High–Level Radioactive Waste and Spent Nuclear Fuel* (SCOP), which provides an enhanced rail transportation inspection program to ensure safe transportation of spent nuclear fuel and high–level waste materials. To achieve the same high standards in the rail

[1]See Appendix A for a description of these elements of the Transportation Safety Program.

shipping campaign that have been achieved for truck shipments, FRA must apply its SCOP to TRU waste shipments.

Overview of the FRA Safety Compliance Oversight Plan

FRA does have an inspection policy for inspection of high–level nuclear waste rail transportation.[2] This policy provides for inspections of the track, signal systems and train crews before the first shipment. It also provides that prior to each shipment, locomotives and cars are inspected to ensure compliance with standards and hazardous materials regulations.

FRA recognized that the public has a high degree of concern about radioactive materials shipments and also realized that the volume of these shipments is expected to increase dramatically above historic shipment levels. Therefore, FRA developed the SCOP to enhance the existing inspection policy to provide increased assurance to the public that future shipments will be conducted safely.[3]

The SCOP is designed to address various issues associated with the railroad operating environment such as human factors and mechanical equipment. It includes three main elements: Planning, Inspections, and Training/Oversight. Planning elements include route selection and identification of safe holding areas. Inspection elements include inspection of track, equipment, crew qualifications, dispatch procedures and carriers operating practices. Training/Oversight includes emergency response training and safety briefings for crews and review of carrier emergency response plans.

The actual tasks included in the SCOP are organized into the categories of Operational Integrity, Emergency Response, Route Infrastructure Integrity, Highway–Rail Grade Crossing Safety, Security, and Miscellaneous. A listing of the main tasks for each of these categories is included in Appendix B along with a cross reference to the elements of the WGA Transportation Safety Program Implementation Guide (PIG). Each main task of the SCOP contains several subtasks, which are described in detail in the SCOP. Taken together, the tasks within the SCOP provide a comprehensive program that address many, if not all of the components for “High–Quality Drivers and Carrier Compliance” and “Independent Inspections.”

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[2]*Safety Compliance Oversight Plan for Rail Transportation of High–Level Radioactive Waste and Spent Nuclear Fuel*, U.S. Department of Transportation, Federal Railroad Administration, June 1998, Appendix A, p. 16.

[3]The SCOP was developed through a coordinated effort between FRA, the Department of Energy, the American Association of Railroads (AAR), labor organizations and representatives of affected states.

Capability of Western States to Implement Rail Safety Program

For highway shipments of TRU waste, states have independent authority to conduct inspections and implement other safety requirements. However, the Western States have very limited authority and capability to implement a rail safety program for TRU waste shipments without assistance from FRA. The primary reason for this is that the federal preemption of state regulation of railroads limits states to the FRA State Participation Program. Since the regulation of railroads for safety is primarily FRA's responsibility, most states either have elected to implement limited participation in the FRA State Participation Program or have opted out of the program entirely.

The FRA inspection program consists of six unique disciplines, but because of the complexity of rail regulation, most inspectors become certified in only one discipline. The training and apprenticeship program required to become an FRA inspector is lengthy. Therefore, even if states chose to begin implementing inspection programs for WIPP shipments, it would take several years before the new state inspectors would become qualified.

The FRA inspection categories, and the number of State Participation inspectors in each category are shown in the table below[4]:

FRA State Participation Program Inspectors													
	AZ	CA	CO	ID	NE	NM	NV	OR	TX	UT	WA	WY	Total
Track	1	5	0	0	1	0	1	2	3	1	1	0	15
Motive, Power & Equipment	1	5	0	0	1	0	1	2	4	1	0	0	15
Operating Practices	1	8	0	0	0	1	1	1	4	0	1	0	17
Signal & Train Control	0	2	0	0	0	0	0	0	1	0	3	0	6
Grade Crossing Signal System	0	0	0	0	0	1	0	1	0	1	1	0	4
Hazardous Materials	2	4	0	1	0	0	1	1	3	0	1	0	13
Total	5	24	0	1	2	2	4	7	15	3	7	0	70

[4]State Participation Program List of State Coordinators and Inspectors, Federal Railroad Administration, January 2003.

It is significant to note that the states along the possible route from the Hanford site in Washington to WIPP (WA, OR, ID, UT, WY, CO, and NM, shaded columns in the table) have very few inspectors. For example, there are only four Track inspectors, with no Track inspectors in four of the seven states. If the states were to attempt to inspect track without FRA assistance, the vast majority of the track would not be inspected. There are only three Motive Power and Equipment inspectors located in only two states. There are no Motive Power and Equipment inspectors in Western States that host DOE sites originating rail shipments for TRU waste (WA, ID, CO). No point of origin inspections could be completed by the state where the shipments originate, or at the destination. As can be seen from these examples, many of the significant portions of the highway transportation safety program for TRU waste can not be converted as appropriate to rail and implemented effectively by the states alone given their limited number of rail inspectors.

Conclusions

Western Governors are committed to the cleanup of DOE sites in the West. Early on, Governors recognized that safe, uneventful and secure transportation of the waste to final disposal sites is essential if the cleanup is to be completed in a timely manner. The transportation safety program implemented for highway shipments of TRU waste has been very successful.

Western Governors also recognize that shipping TRU waste by rail would expedite the cleanup process while reducing risk to workers.[5] WGA has begun preparation of a WIPP Rail Transportation Safety Program Implementation Guide. This Guide, based on the experience Western States have gained through highway shipments, will provide the basis for a commensurate safety programs for rail shipments. Western States cannot, however, implement the "High–Quality Drivers and Carrier Compliance" and the "Independent Inspection" elements of this program by themselves.

Therefore, the WGA proposes that FRA, with Western State participation, implement the SCOP for rail shipments of TRU waste. In the introduction to the SCOP, FRA suggests that it be applied to specific shipment campaigns, such as the foreign research reactor return fuel program and to other existing and future rail shipments involving spent nuclear fuel as necessary and appropriate. The campaigns cited by FRA where the SCOP will be applied all use NRC certified Type B packages, are of extended duration, consist of a significant number of shipments, have high public visibility, and significant consequences to the program would ensue if there were an accident or incident involving shipment. The TRU waste rail shipment campaign fits all of these criteria.

Prepared by:
Richard C. Moore, P.E.

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[5]See *Advantages of WIPP Rail Transportation*, Richard C. Moore, P.E., March 2003, prepared for the Western Governors Association.

Appendix A

WGA WIPP Transportation Safety Program Implementation Guide

Section 1: High–Quality Drivers and Carrier Compliance

Section 2: Independent Inspections

The objective of the Western Governors' Association (WGA) Radioactive Waste Transportation Safety Program is the safe and uneventful transport of radioactive waste from temporary storage facilities to more suitable treatment and storage facilities. Western Governors recognize development and implementation of a successful transportation program requires the continued cooperation among the Western states, the U.S. Department of Energy (DOE), its carriers, and the U.S. Department of Transportation.

The Waste Isolation Pilot Plant (WIPP) highway shipping campaign has proceeded in a safe and uneventful manner since WIPP began accepting transuranic waste in March 1999. To date, over 1,400 shipments of transuranic (TRU) waste have been delivered safely to WIPP. The success of the WIPP campaign is directly attributable to the cooperative effort between DOE and the Western states to plan, develop and implement the WIPP Transportation Safety Program which addresses both accident prevention and emergency response.

Two of the key elements in the safety program for highway shipments are "High–Quality Drivers and Carrier Compliance" and "Independent Inspections." The approach for these elements is to recognize that the possibility of incidents cannot be eliminated, but that it can be significantly reduced by requiring highly trained and qualified drivers, by strict adherence to all applicable laws and regulations, through provisions in the carrier contracts to enhance safety and performance, and by independent inspections to identify and correct defects before they pose a threat to shipment safety. WGA has provided suggested requirements for the WIPP transportation contract and the carrier's management plan which include above minimum regulatory requirements for driver qualifications, driver performance, driver training, carrier performance, inspection requirements, and vehicle maintenance.

With the assistance of the Conference of Radiation Control Program Directors, the Consumer Vehicle Safety Alliance developed inspection procedures that provide uniform standards for radiation surveys, inspection of drivers, shipping papers, vehicles, and packages. The standards also provide for vehicle inspections at points–of–origin and destination, and for en route inspections. The enhanced inspection procedures also require a higher level of out–of–service criteria than the North American Inspection Standards. WGA and DOE have agreed to apply these inspection standards to TRU waste shipments.

The success of these elements of the safety program is evident through the safe delivery of TRU waste to WIPP. In addition, a comparison of inspection data for inspections of other motor carriers and WIPP shipments dramatically demonstrates the effort made to keep TRU waste shipments safe. For the year 2000, over 70% of the motor vehicles inspected under the Federal Motor Carrier Safety Assistance program were found to have violations and over 23% of these violations were significant enough to put the vehicle out of service. In contrast, through September of 2002, only 8.5% of all WIPP shipments had violations, and only 2.8% of the

violations resulted in the vehicle being placed out of service.[6] It should also be noted that the "out of service" criteria for the WIPP shipment vehicles are much more stringent than for other motor carriers. Many of the out of service violations for WIPP vehicles would not have been considered out of service violations using standard inspection criteria. The WIPP vehicles were also subject to many more inspections than the average motor carrier.

[6]Sources: FMCSA Motor Carrier Management Information System and CVSA Level VI Inspection Data

Section 1: High–Quality Drivers and Carrier Compliance

Lead States: Colorado, New Mexico

The Issue: Highly qualified, well–trained drivers; diligent vehicle maintenance; carrier compliance with regulations; and enhanced carrier and driver performance requirements can greatly reduce the risk and consequences of truck incidents.

The Objective: Establish, implement and maintain an enhanced carrier contract and management plan for the dedicated WIPP carriers focusing on high quality drivers and vehicles.

The Approach: Although the possibility of incidents cannot be eliminated, it can be significantly reduced by requiring stringent driver qualifications and training; through strict adherence to all applicable laws and regulations; and special provisions in the carriers' transportation contracts to enhance safety and performance.

In 2000 the contract was divided between two carriers. Both carriers are required to dedicate those trucks and drivers used for WIPP shipments to only the WIPP program.

The Technical Advisory Group has been able to provide suggested requirements for the WIPP transportation contract and the carrier's management plan. The contract and management plan include above minimum regulatory requirements for driver qualifications, driver performance, driver training, carrier performance, inspection requirements, and vehicle maintenance. These and other safety requirements are described in detail in *Model Safety Elements in the WIPP Transportation Contract and Corresponding Carrier Management Plan*.

The Technical Advisory Group participates in the carrier selection process (*i.e.*, through solicitation review and the technical evaluation of responses), the development of contract requirements, and development of the carrier's transportation management plan. The Western States are committed to ensuring DOE–contractor compliance with the letter and intent of all transportation safety requirements governing the campaign.

The Technical Advisory Group established a *Compliance Audit Program* to verify compliance by the contract transportation carriers with all applicable laws, regulations, and other requirements. This program involves regularly scheduled site visits to the carrier's facilities by a designated state authority where record keeping audits and other inspection functions are performed. Audit checklists that identify applicable statutory, regulatory, and contractual requirements, were developed for use during the audit process. These checklists have been reviewed, modified and approved by the Technical Advisory Group, DOE-CBFO, and the contract carriers.
Audits of companies awarded carrier contracts will be required. These audits will be completed by the company's host state on a quarterly basis for new carriers (during the first year) and biennially for the older carriers. The frequency of these audits and the check-lists used will be reassessed periodically by the Technical Advisory Group and DOE-CBFO. Consultation and

coordination with DOE, its contractors/subcontractors, DOT, and other interested and affected entities will remain an important, integral component of the *Compliance Audit Program.*

On an annual basis, the lead states will review whether revisions are required to the checklists to incorporate changes in the applicable transportation requirements. Proposed revisions will be presented to the Technical Advisory Group, DOE-CBFO and its carriers for their consideration and approval. Upon approval, the checklists will be revised accordingly and used during subsequent compliance audits.

The lead states will prepare and analyze all audit reports. These reports will be analyzed both individually (on a semi–annual basis) and collectively (on a biennial basis). A summary of the results of each semi–annual audit will be presented at the first semi-annual meeting of the Technical Advisory Group following each audit. Audit exceptions, along with recommendations for correcting identified deficiencies, will be discussed at the meeting. Appropriate corrective actions will be pursued based on the consensus of the DOE-CBFO and the Technical Advisory Group.

Section 2: Independent Inspections

Lead States: Idaho, Washington

The Issue: A quality, independent inspection program assures that drivers and vehicles perform at optimum levels and that radiation levels are within allowable limits.

The Objective: Reduce the chance of incidents from mechanical failure or human error by identifying and correcting defects before they pose a threat to shipment safety.

The Approach: Inspection and enforcement activities for radioactive material transportation are shared by federal and state agencies. Implementation of the inspection program by state personnel will provide independent verification of regulatory compliance, enhancing public confidence in the safety of the WIPP shipping campaign. DOE selected the Commercial Vehicle Safety Alliance (CVSA), an organization of state motor carrier officials responsible for the administration and enforcement of motor carrier safety laws, to develop an inspection and enforcement program. CVSA has since developed the uniform inspection procedures and a model agreement for inspection reciprocity for radioactive material shipments. (CVSA Enhanced North American Safety Inspection Standards - Level VI).

These inspection procedures were developed with the assistance of the Conference of Radiation Control Program Directors. The procedures provide uniform standards for radiation surveys, inspection of drivers, shipping papers, vehicle, and package. The standards also provide for vehicle inspections at points-of-origin and-destination, and for en route inspections. The enhanced inspection procedures also require a higher level of out–of–service criteria than the North American Inspection Standards.

A comprehensive interstate inspection program should be based on a process that is consistent from state to state in terms of training, procedures, and application. The CVSA Enhanced Inspection Program meet these consistency requirements. The Western Corridor States inspect WIPP shipments using the CVSA Enhanced Inspection Criteria. DOE has agreed that vehicles carrying waste to WIPP will comply with the out–of–service standards of the enhanced criteria.

Evaluation: The Technical Advisory Group, DOE-CBFO, and CVSA all agree that the personnel completing the WIPP shipment inspections need to be competent and that all inspections are of the highest quality. The validity of the CVSA Enhanced North American Inspection Standards has been tested using other DOE radioactive material shipping campaigns. The CVSA prepared a final report with the findings from the different shipping campaigns. Additionally, the Technical Advisory Group and DOE-CBFO have used these standard and procedures to inspect over 400 WIPP shipments. CVSA maintains a statistical data base on these shipments and reports to the Technical Advisory Group semi-annually.

The Technical Advisory Group will continue to review CVSA's report and monitor the WIPP shipping campaign, comparing the data for variances or oddities. Findings from these comparisons will be used to improve the inspections of WIPP shipments and recommend changes as appropriate.

Appendix B
Main Tasks Contained in the SCOP

(Corresponding Sections of the Western Governors' Association WIPP Transportation Safety Program Implementation Guide (PIG) for highway transportation are shown in parenthesis.)

Operational Integrity

1. Ensure that the rail carriers train crews operating the train transporting the SNF or HLRW are trained and experienced over the designated rail transport route. (High–Quality Drivers and Carrier Compliance)

2. Place FRA Operating Practices (OP) personnel in the carrier dispatching centers. (High–Quality Drivers and Carrier Compliance)

3. Continue FRA's existing inspection policy concerning routine OP inspections prior to the first shipment and associated routine follow–up inspections. (Independent Inspections)

4. Continue FRA's existing inspection policy concerning Motive Power & Equipment PR&E) and Hazardous Materials (HM) inspections for every shipment. (Independent Inspections)

5. Determine and designate the appropriate personnel to accompany the rail shipment or any rail vehicle that may precede the shipments. (N/A)

6. Include consideration of the track classification in the route selection process and ensure that the highest rated track is utilized to the maximum extent practicable over the route selected. (Highway Routing of WIPP Shipments)

7. Require every train be equipped with a two–way End–of–Train (EOT) braking device that complies with the 49 CFR Part 232 EOT regulatory requirements for design, performance, operational use, inspection and testing. (High–Quality Drivers and Carrier Compliance)

Emergency Response (ER)

1. Ensure that the train crew personnel and carrier's emergency response personnel receive specific training or briefing concerning the nature of the shipment. (High–Quality Drivers and Carrier Compliance)

2. Review the appropriate emergency response plans (offerer, carrier and DOE) to ensure that they adequately address the actions to be taken in the unlikely event of an accident or incident involving the train. (High–Quality Drivers and Carrier Compliance)

Route Infrastructure Integrity (RII)

1. Continue FRA's existing inspection policy concerning routine track and signal system inspections. (Independent Inspections)

2. Have a track geometry car operate over the selected rail route. (Independent Inspections)

3. Implement FRA's Bridge Inspection Policy to ensure that bridges along the routes are inspected for structural soundness. (Independent Inspections)

4. Review the carrier's rail flaw detection vehicle data to ensure integrity of the rail along the selected route. (Independent Inspections)

Highway–Rail Grade Crossing Safety (GC)

1. Provide a highway–rail grade crossing accident prediction model for grade crossings along the designated route to State, local or tribal emergency management or law enforcement agencies along the designated route. (N/A)

2. Ensure all highway–rail grade crossings equipped with active warning devices along the designated route are operating properly. (High–Quality Drivers and Carrier Compliance)

3. Focus routine Operation Lifesaver/Highway–Rail Grade Crossing Safety program training in communities along the designated route in conformance with current state and FRA programs. (Training and Exercises)

Security

1. The DOT Office of Intelligence and Security will assist the FRA in addressing and coordinating on security issues with the offerer, law enforcement and intelligence communities, such as the FBI, CIA, railroad security forces and other State, local and tribal agencies. (Security)

2. Assist in the development of rail route "safe haven" criteria. (Safe Parking During Abnormal Conditions)

Miscellaneous (MIS)

1. Continue to promote participation in the FRA State Participation Program for non–participatory states encourage expanded participation for those states who currently participate at a minimum level, and use the current inspectors in each state affected by the designated route where possible to achieve implementation of other SCOP items, as applicable. (N/A)

2. Assign a high priority to complaints concerning the designated route and ensure that a timely compliance check is conducted to resolve the complaints prior to a shipment. (N/A)

3. Establish a "SCOP Team" within the FRA consisting of appropriate FRA headquarters and field personnel, offerer personnel, and railroad management and labor representatives to coordinate activities associated with rail shipments. (N/A)