Advantages of WIPP Rail Transportation

The Department of Energy (DOE) is currently evaluating the use of rail for transportation of transuranic (TRU) waste to the Waste Isolation Pilot Plant (WIPP) in New Mexico. As discussed in this paper, the option of including rail transportation could provide significant benefits, both in the economics of transportation and in the handling of oversize material.

In 2001, DOE conducted a study to provide additional information for a decision on whether or not to use rail for shipments of Contact–Handled TRU waste[1]. This report analyzed shipments of TRU waste in current TRUPACT–II and HalfPact shipping containers. It also evaluated the continued development of a larger package (TRUPACT–III) for shipment of oversized containers. The conclusions in this report are based on proprietary cost data provided by the Burlington Northern Santa Fe (BNSF) railroad for rail shipments to WIPP. Therefore, independent verification of the economic advantages of rail shipments can not be completed at this time. Several conclusions can be drawn, however, from the report.

The report concludes that rail shipping costs could be significantly lower than previously assumed[2]. This conclusion is based upon the assumption that the shipments would be made in "general commerce" instead of by special "dedicated" trains, which would add up to $50 per mile additional cost. Advantages for rail include avoiding many weather delays and significantly reducing the weight limitation problems experienced by truck shipments. Based on these findings, the DOE concludes that rail shipments "can be competitive with truck shipments."

Since DOE did not provide data on the cost estimates from the BNSF, it is not possible to evaluate the cost comparison between shipments by general commerce versus shipments by dedicated train. It should be noted, however, that conclusions regarding the use of dedicated trains should not be based solely on the cost differential between the two shipping methods. A detailed, systems analysis needs to be prepared in order to reach any valid conclusions regarding the costs and benefits of shipping by the various alternatives (truck, general commerce rail, dedicated train rail). This systems analysis should include all aspects of the proposed shipping campaign, including:

- Requirements of the transportation plan for each method
- An analysis of the weight restrictions for truck shipments compared to the removal of weight restrictions through the use of rail
- An analysis of costs/benefits of shipping oversize containers by rail versus truck in the proposed TRUPACT–III package

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[1] *Rail Infrastructure Report: A Strategy for the Use of Rail Shipments to WIPP*, U.S. Department of Energy, April 2001

[2] Ibid, p. 10

Transportation Plan

DOE has not yet indicated what requirements will be included within the transportation plan for rail shipments. The Western Governors' Association (WGA) has begun preparation of a Transportation Safety Program Implementation Guide for WIPP Shipments by Rail (Rail PIG). Based upon the program history for truck shipments, DOE should base the rail transportation plan on components included in the Rail PIG. WGA WIPP Transportation Technical Advisory Group has concluded that dedicated train service offers significant safety and security advantages when compared to general commerce. Additional analysis of these benefits should be included in the systems analysis.

Weight Restrictions

Rail shipments would minimize weight limit problems experienced by truck shipments[3]. DOE has agreed to use legal weight trucks for the shipments to WIPP. Legal weight trucks are limited to a total of 80,000 pounds for the tractor, trailer, shipping packages, and TRU waste contained in the shipping packages. This weight restriction places limitations on the volume of weight of TRU waste that DOE can include in each truck shipment. The weight problem was significant enough that DOE developed the HalfPact shipping package to help deal with the problem. The HalfPact is, in essence, a half size TRUPACT–II shipping package. By reducing the size, the weight of the package is significantly reduced, allowing more weight of TRU waste to be included in the shipment. In its "Path Forward for the TRU Waste System" report of July 2002, DOE notes that many of the shipments received at WIPP have only two TRUPACT–IIs per shipment. Thus, weight restrictions are reducing the capacity of the truck shipping program.

Rail shipments, in contrast, are not weight restricted. Although there are weight limitations imposed by the railroad, the proposed use of seven TRUPACT–IIs per railcar should not approach the weight limitation. Therefore, use of rail should eliminate the reduction in shipping capacity through weight restrictions.

Elimination of weight as a primary consideration in preparing shipments provides an additional benefit to the TRU waste disposal system. TRU waste at the various sites must be characterized before it can be shipped to WIPP. This characterization process can be a limiting factor on the volume of material shipped. Currently, because of the weight restrictions on truck shipments, the preparation of TRU waste to be shipped must be carefully managed based upon weight requirements. The use of rail would eliminate this requirement, allowing TRU waste characterization to be optimized.

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[3]Ibid, p. 10

Oversize Containers

Some of the TRU waste destined for WIPP is currently stored in containers that will not fit in the TRUPACT–II package. DOE currently estimates that approximately 28% of the TRU waste by volume is stored in these oversize containers[4]. The largest container that will fit in a TRUPACT–II is approximately 4 x 4 x 5.5 feet. The TRU waste stored in oversized containers is primarily in boxes that are 4 x 4 x 7 feet or larger. Several options are available to address the transport requirements for this TRU waste, including:

- Repackage and/or resize TRU waste stored in oversize containers. This would require new repackaging and size reduction facilities at DOE sites.
- Develop and license new NRC certified packages for the oversize TRU waste.
- Use existing packages.

DOE has determined that the preferred option is to develop and license a new, larger package to handle the oversize TRU waste inventory. This decision is based on several important factors. New facilities at DOE sites for repackaging would be expensive and take time to bring on–line. Repackaging TRU waste would also result in the potential for significant worker exposure. The current inventory of existing packages is not well suited to the requirements of oversize TRU waste and is probably not sufficient to meet the demand for the TRU waste stored in oversize containers.

Preliminary Design Evaluation for New Shipping Package

DOE evaluated several options for new packages to handle the TRU waste in oversize containers, including a package that could be transported by either truck or rail and a package that could only be transported by rail due to its size. The truck package would be sized to handle TRU waste in containers up to 4.5 x 4.5 x 7 feet in size. This package would be large enough to handle approximately 89% of the TRU waste stored in oversize packages[5]. It could by used for both truck and rail shipments.

The package sized for rail only transport would be large enough to handle containers up to 6 x 6 x 14 feet in size. Approximately 95% of the TRU waste stored in oversized containers is stored in containers 5 x 5 x 8 feet in size or less[6].

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[4]TRUPACT–III Initiative Workshop Summary Report, Westinghouse TRU Solutions, LLC, Carlsbad, NM, April 2001, p. A–3

[5]Ibid, p. A–9

[6]Ibid, p. A–9

TRUPACT–III Design

DOE awarded a contract to PAC–TEC in September 2002 to design the TRUPACT–III package. PAC–TEC's design is based upon the TN Gemini package licensed in France. They chose to base the design on this package to expedite the licensing process. Current plans are to submit an application to the Nuclear Regulatory Commission (NRC) in August 2003 for the new package.

The current design is for a single containment package. The design could be upgraded to double containment if required by NRC, but would have less capacity than the single containment package.

The TRUPACT–III is designed primarily for rail transport, but could go over the road on trucks with an overweight permit. As presently designed, the package could accommodate containers up to 6' x 6.6' x 14.8 feet. It could also accommodate various configurations of 55–gallon drums and standard waste boxes. The package has a maximum payload of 12,000 pounds.

As an overweight truck package shipment, the truck, trailer and package would weigh 87,000 pounds, compared to the legal weight truck limit for Interstate Highways of 80,000 pounds. Overweight truck permits are issued by the states. A key consideration in issuance of overweight permits is whether or not the shipment is consider a non–divisible load. States also look at the capacity of bridges and highways along the route to handle the weight of the truck and the axle loadings of the truck. The issuance of an overweight permit is discretionary. If shipped as a legal weight truck, the payload would be reduced to 5,000 pounds. DOE has indicated that the overweight truck option would only be used for facilities without rail access, such as Los Alamos National Laboratory.[7]

Rail versus Truck Shipping Capacities

DOE did not provide estimates of the volume of TRU waste that is stored in containers of 6 x 6 x 14 feet in size or less. Therefore, the proposed TRUPACT–III package could transport at least 96% or more of the current inventory of TRU waste stored in oversized containers. The remaining 4% of the TRU waste would have to be repackaged. Future inventory of the TRU waste based upon the size capacity of the TRUPACT–III could result in even less of the TRU waste that would require repackaging.

Although the difference between 89% and 95% of the TRU waste may not seem like much, the volume of TRU waste that would require repackaging if truck only packages for oversize TRU waste containers are developed is significant. Approximately 4,000 cubic meters of TRU waste would require repackaging if the truck package is used, compared to approximately 1,440 cubic meters or less for the rail only package.

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[7]Dr. Inez Triay, Manager, U.S. Department of Energy Carlsbad Field Office, Presentation to WGA WIPP Transportation Advisory Group, April 2, 2003, Austin, TX.