

# **Reducing Transportation and Shipping Costs by Utilizing Reusable Containers and Rail Conveyance**

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## **Abstract:**

Many variables factor into the equation regarding site decommissioning processes that the Department of Energy (DOE) Complexes have dissected in the attempt to reduce costs. Cost reduction and cost management are the major conditions for site decommissioning to become more feasible in the future. In order for costs to be reduced without sacrificing quality or safety, business must shift to a new generation of rationalization in all aspects of the process.

One particular DOE complex, The West Valley Demonstration Project (WVDP), has always been on the cutting edge of implementing new technologies and systems that reduce costs and accelerate the clean-up schedule of the complex. The latest initiative has been reducing transportation and shipping costs by utilizing reusable containers and rail conveyance.

Through the support of MHF Logistical Solutions, Inc. using specially modified cargo containers and unique railcars, The WVDP has been able to reduce: shipping costs, container handling problems, and As Low As Reasonable Achievable (ALARA) exposure to workers. A "turnkey" transportation logistical process has been developed for The WVDP to move large quantities of packaged, low-level waste (LLW) via rail and truck transport. Rail transportation offers material movement of a larger dimension and quantity as opposed to traditional methods. The concept is to move material in specialized equipment utilizing truck and rail transport verses small packages transported only by trucks.

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### **WVDP Background**

The West Valley Demonstration Project (WVDP) is part of the DOE's nationwide environmental restoration and waste management effort. The Project is located at the site of the only commercial nuclear fuel reprocessing facility to have operated in the United States, near West Valley, N.Y., about 35 miles south of Buffalo, NY.

DOE's primary mission at the WVDP is to:

- Safely solidify approximately 600,000 gallons of liquid high-level (radioactive) waste (HLW) into a durable, solid glass--a process known as vitrification.
- Clean up and close the facilities used.

Since this Project is publicly funded as a result of the West Valley Demonstration Project Act (Public Law #96-368), it is the goal of The WVDP to make all relevant information available to interested members of the public in as many different forms as possible.

The WVDP is a government-owned, contractor-operated facility. The prime contractor at the WVDP is West Valley Nuclear Services Company (WVNS). The latest achievement at The WVDP is the reduction of transportation and shipping costs by utilizing reusable containers and rail conveyance.

In Fiscal Year 1999, The WVDP was challenged to increase the amount of LLW shipped off site for disposal from a few thousand cubic feet shipped in previous fiscal years to a total of 30,000 cubic feet. The WVDP met this goal by shipping 36,000 cubic feet of boxed LLW debris by truck to Envirocare of Utah for disposal in Fiscal Year 1999.

In Fiscal Year 2000, The WVDP was faced with a milestone to ship 30,000 cubic feet of LLW for disposal. This volume took care of newly generated waste and started the process of reducing the amount of stored waste on site so the need for additional indoor storage capacity of LLW could be reduced.

This milestone was in addition to demonstrating the use of intermodals for excavated soil, preparing programmatic documents to assess and direct the site towards the shipping of LLW by rail, and the preparation and inspection of 20,000 cubic feet of LLW for rail shipment.

The underlying goal was to move The WVDP towards the shipment of LLW in bulk containers by rail, to increase the volume shipped, and decrease transportation costs. The challenging part of this goal is that the waste streams chosen to make up the 30,000 cubic feet of LLW represented hundreds of previously packaged soil boxes.

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The WVDP's goal was to maximize the number of boxes that could be shipped per conveyance in order to minimize the transportation and labor costs, represented by time, for these waste streams. Removing the soil from the boxes was evaluated and would have been a labor intensive alternative. Another option evaluated was the use of cargo containers to transport the prepackaged waste by truck to a rail spur for rail shipment to Envirocare. The ultimate goal was to transition from truck shipments, through truck-to-rail shipments, in preparation of shipping directly from the WVDP by rail.

### **The Equipment**

Twenty standard 20 foot top-loading cargo containers were outfitted with a specially designed rack system that could accommodate four S-70 boxes. The rack system allowed the boxes to be placed inside the cargo container with minimal time and labor. The railcar used to transport the cargo container was a Articulating Bulk Commodity (ABC) railcar with a maximum weight capacity of 177 tons and is capable of transporting four cargo containers.

### **Project Scope**

The project scope originally started by transporting the loaded cargo containers with S-70 (296 ft<sup>3</sup>) boxes in them to Conway, PA by truck. The cargo containers were then loaded onto an ABC railcar in Conway and transported by rail directly to Envirocare of Utah. Unfortunately, since the containers had to be trucked on the first leg, the weight of the containers had to be limited.

Later, the WVDP upgraded the rail sighting from the site and the cargo containers were modified to handle eight S-70 (2,368 ft<sup>3</sup>) boxes in each cargo container. Each railcar is now transporting 32 S-70 (9,472 ft<sup>3</sup>) boxes at a time. Appendix A represents pictures of the equipment and loading containment system.

### **Reduction of Transportation Cost**

To demonstrate the direct cost savings achieved from the utilization of rail versus flat bed truck the following table is the actual cost savings and cubic foot costs comparison of transporting the containers to Envirocare of Utah from The WVDP. The first comparison represents transportation by truck to the burial site and returning with the empty over pack. The second comparison is transportation by truck to a rail spur 220 miles from the site. The third comparison represents the current method utilizing the upgraded rail spur at the site and ship directly rail to rail. The biggest advantage is the increased shipment volume and lower cost of rail exclusively.

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### Direct Costs

Transportation Type (Round Trip)	Origin	Destination	Savings per ton vs. truck only	Cost per cubic foot	Rail cars needed	Trucks Needed	Number of tons in a shipment
Truck	WVDP	Envirocare of Utah		\$26.14		4	70
Truck to Rail	WVDP	Envirocare of Utah	33%	\$20.00	1	4	70
Rail to Rail	WVDP	Envirocare of Utah	49%	\$13.60	1	0	124

Factors used: Shipments involving truck were 17.5 tons per container

Shipments involving direct rail were 31 tons per container

Amount shipped in FY 2000 was 33,705 cubic feet on material

### Material Handling Cost

Another advantage of the WVDP concept is lower material handling costs. When the volume of waste in an individual package is increased, the benefit achieved is less handling of the waste. Unpackaging packaged waste and cutting, sizing, and sorting material is costly and involves an increased labor effort. The handling costs increase as the containers and shipment volume decrease. Larger containers and increased shipment volume, such as direct loading into the cargo containers, can virtually eliminate the repackaging, cutting, sizing, and sorting exercise that occurs during the decommissioning effort. In many cases, the final disposer would rather receive the material in larger pieces because it can be more easily managed and takes less storage space than if it was broken up into smaller containers.

Other handling cost are realized through less surveying and monitoring of containers, E. G., more material can be surveyed for transportation with less survey paperwork. Also, there is a significant reduction in shipment manifest preparation, documentation, and the possibility of error when a lower number of individual containers are shipped.

### ALARA Benefit

The concept creates an ALARA benefit to the decommissioning project as well. As radioactive material is physically handled less, worker exposure is decreased. Workers will spend less time handling, surveying, and inspecting packages as the amount of the packages decrease. Again, as the amount of the material is increased per package, the benefits increase.

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### Lowered Risks

According to the, U.S. Department of Transportation (USDOT) Bureau of Transportation Statistics (BTS) the number of train crashes<sup>1</sup> is 1,300 times less than truck crashes. Also, the number of truck crashes has been steadily increasing while train crashes are steady, if not slowly, decreasing. The following comparison of number of freight moved demonstrates both truck and train crashes are increasing equally. The risk of moving material by rail is significantly lower than truck as demonstrated by the follow tables from the USDOT.

### Number of Crashes from 1991-1996

	1991	1992	1993	1994	1995 <sup>2</sup>	1996	1997 <sup>3</sup>
Truck <sup>4</sup>	2,519,000	2,554,000	2,776,000	3,008,000	3,071,000	3,293,000	3,767,000
Train <sup>5</sup>	2,658	2,359	2,611	2,504	2,459	2,443	2,397

Taken From Table 3-3 1998 BTS US DOT

### Number of Ton-Miles of Freight (in millions) from 1991-1996

	1991	1992	1993	1994	1995	1996	1997 <sup>6</sup>
Truck	758,000	815,000	861,000	908,000	921,000	986,000	993,000
Train	1,038,875	1,066,781	1,109,000	1,200,701	1,305,688	1,355,975	1,397,000

Taken From Table 1-11 1998 BTS US DOT

### Conclusion

The WVDP has moved into an “out of the box thinking” concept which a very old transportation method is being utilized by combining new technologies, tracking systems, and transportation logistical infrastructures. The combination of specialized “purpose-built” equipment and a sophisticated tracking and expediting effort results in a 50% or more cost reduction or more in bulk radioactive transportation. Proper implementation not only reduces the costs, it provides the indirect cost reductions as well.

<sup>1</sup> The U.S. DOT/NHTSA uses the term “crash” instead of accident in it its highway safety data.

<sup>2</sup> Revised Data

<sup>3</sup> Preliminary Data

<sup>4</sup> Includes commercial light and large trucks

<sup>5</sup> Includes Amtrak

<sup>6</sup> Preliminary Data

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## Appendix A



### **MHF-LS DOT Strong-Tight Cargo Container**

- Truck, rail, and marine certified
- 67,200 lbs. rated capacity
- 20' container, with end and top loading



### **MHF-LS Cargo Rack System**

- Easy loading
- Minimal blocking and bracing



## Reducing Transportation and Shipping Costs by Utilizing Reusable Containers and Rail Conveyance



### Loading Cargo Containers on to Rail Car

- Easy loading
- Minimal blocking and bracing



### MHF-LS ABC Rail Car

- 354,000 LBS. of net carrying capacity
- Transports: Intermodal containers sealand containers, ISO container tanks