



WIPP Technical Fact Sheet Planned Change Request for Shielded Containers

Summary

The U. S. Department of Energy (DOE) has submitted a planned change request to use shielded containers for emplacement of selected remote-handled (RH) transuranic (TRU) waste streams on the floor of the repository. The use of the shielded containers will enable DOE to significantly increase the efficiency of transportation and disposal operations for RH TRU waste at the Waste Isolation Pilot Plant (WIPP).

The shielded container design has 1-inch thick lead shielding sandwiched between a double-walled steel shell with a 3-inch thick steel lid and base. The lead for the container may be recycled from excess DOE stock. This design has passed the drop testing for Department of Transportation (DOT) Type 7A specifications and the U.S. Nuclear Regulatory Commission (NRC) Type B specifications for shipping in the HalfPACT transportation container. The drop tests demonstrated that there will be no significant reduction in shielding capabilities under normal or accident conditions. These results ensure that the shielded container is safe for transportation and handling and will prevent releases under the most severe accident conditions. The design and testing results are being prepared for submittal and regulatory approval.

RH TRU waste whose activity is low enough to result in a dose rate of less than 200 millirem/hour on the outside surface of the shielded container is a candidate for emplacement in shielded containers. The shielded containers will be emplaced in the disposal rooms, along with CH TRU waste, but these waste streams will remain designated as RH TRU waste in the WIPP Waste Information System. A recent performance assessment has demonstrated that the use of shielded canisters for these waste streams has an insignificant impact on long-term performance of the repository.

Background/History

On January 24, 2007, WIPP received its first shipment of RH TRU waste (DOE 2007). RH TRU waste is currently packaged for disposal in RH canisters. The RH canisters are loaded into horizontal boreholes that are drilled perpendicular to the walls of the disposal rooms (DOE 2004, Section 3.2). The RH canister is cylindrical in shape with a length of about 120 inches and a diameter of 26 inches. The RH canister has a nominal wall thickness of 0.25 inches and is made entirely of steel.

The emplacement of RH TRU waste in the walls of the disposal rooms is appropriate and necessary for higher activity waste streams; however, there are several reasons why an alternative disposal method is advantageous for lower activity RH TRU waste streams. The drilling and emplacement operations for the RH canisters impede direct

access to a room. This is the result of the large specialized equipment required to emplace the canisters into boreholes. Borehole drilling is limited to drilling 1 to 2 boreholes per shift. The borehole drilling equipment also restricts access to the room. The operations are time consuming; it requires one 8-hour shift to emplace a single RH TRU waste canister. A single RH waste canister evolution from receipt of the RH-TRU 72B until emplacement in the wall of the underground disposal room requires more than 10 hours. WIPP is limited to a maximum of 6 RH shipments per week just from the operational constraints. In contrast, the CH waste handling processes routinely allow 4-5 shipments (i.e., 3 HalfPACTs per shipment) per day to be received, unloaded and emplaced per day. Panels 1, 2 and 3 have been filled without emplacing any RH TRU waste canisters in the walls, limiting the available wall space for emplacement of RH TRU waste. Thus, the use of shielded containers can improve the efficiency of facility operations by minimizing the disruptions from in-the-wall emplacement of RH TRU waste canisters while providing additional storage locations for some of the RH TRU waste.

Proposed Change

DOE is therefore proposing a change to the emplacement scheme for a portion of the RH TRU waste. DOE proposes to package a subset of the RH TRU waste streams in lead-shielded containers. These containers would then be placed in the disposal rooms, in a similar manner to the emplacement scheme for CH TRU waste containers. Candidate RH TRU waste for disposal in shielded containers must result in a dose rate at the container surface of less than 200 millirem/hour. These waste streams and containers will remain designated as RH TRU waste in the WIPP Waste Information System (WWIS). They will count against the limit of 5,100,000 Curies for RH TRU waste defined by the WIPP Land Withdrawal Act and the limit of 250,000 cubic feet (7,080 cubic meters) for RH TRU waste defined by the Consultation and Cooperation Agreement between DOE and the state of New Mexico.

Shielded Container Design

The shielded container is designed to hold a 30-gallon drum, and has approximately the same exterior dimensions as a 55-gallon drum. The cylindrical sidewall of the shielded container has 1-inch-thick lead shielding sandwiched between a double-walled steel shell with an external wall thickness of 1/8 inch and an internal wall thickness of 3/16 inch. The lid and bottom of the container are made from 3.0 inch thick steel. (Figure 1) The empty weight of the container is approximately 1,800 pounds. The shielded container and any inner 30-gallon drums will be vented. Additional technical drawings of this design are in Sellmer (2007).

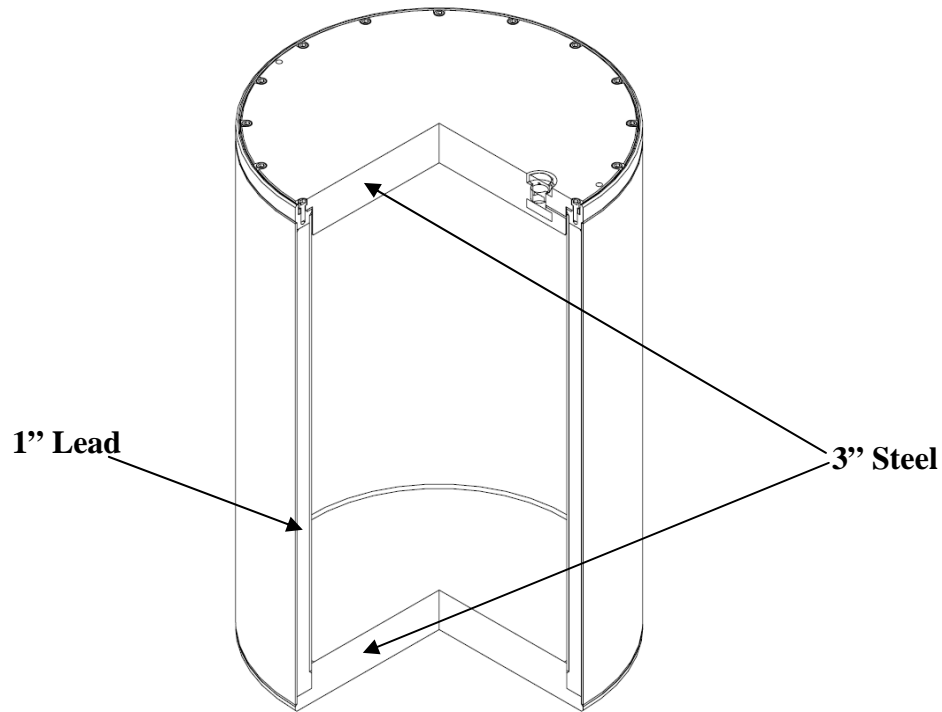


Figure 1. Isometric Exposed View of the Shielded Container

It has been estimated that RH TRU waste containing less than 2 curies of Cs-137 or 0.12 curies of Co-60 per 30 gallon drum is a candidate for packaging in shielded containers because the 1-inch lead shielding is predicted to reduce the surface dose rate to less than 200 millirem/hour.

Shielded Container Testing

The container design has successfully completed drop testing to the DOT 7A Type A specifications and to the NRC Type B specifications, for shipping in the existing HalfPACT, with three shielded containers and associated dunnage dropped in a HalfPACT inner containment vessel. These results ensure that the container is safe for transportation and handling and will prevent releases under the most severe accident conditions. The design for the shielded container and results of the testing are being prepared for submittal to the NRC for their review and approval as a shipping container for RH TRU waste.

Impact on WIPP Performance

The Shielded Container Performance Assessment (SCPA) (Dunagan et al. 2007) was conducted to evaluate the impact of emplacing RH TRU waste in shielded containers on the long-term performance of the repository. Given the uncertainty in the exact amount of RH TRU waste that can be emplaced in shielded containers, the SCPA used a bounding approach that considered several extreme cases, including a case with all the RH TRU waste in RH containers in the walls (the current baseline) and a case with all

the RH TRU waste in shielded containers in the rooms. The results from the SCPA indicate insignificant differences in repository releases for these two cases relative to the compliance limits (Dunagan et al. 2007 Figure 8). (Figure 2) This result is expected because the volume and radioactivity of all RH TRU waste streams is only a few percent of the total volume and total radioactivity for the baseline inventory in the PABC. RH TRU waste has negligible effect on long-term performance in any emplacement configuration.

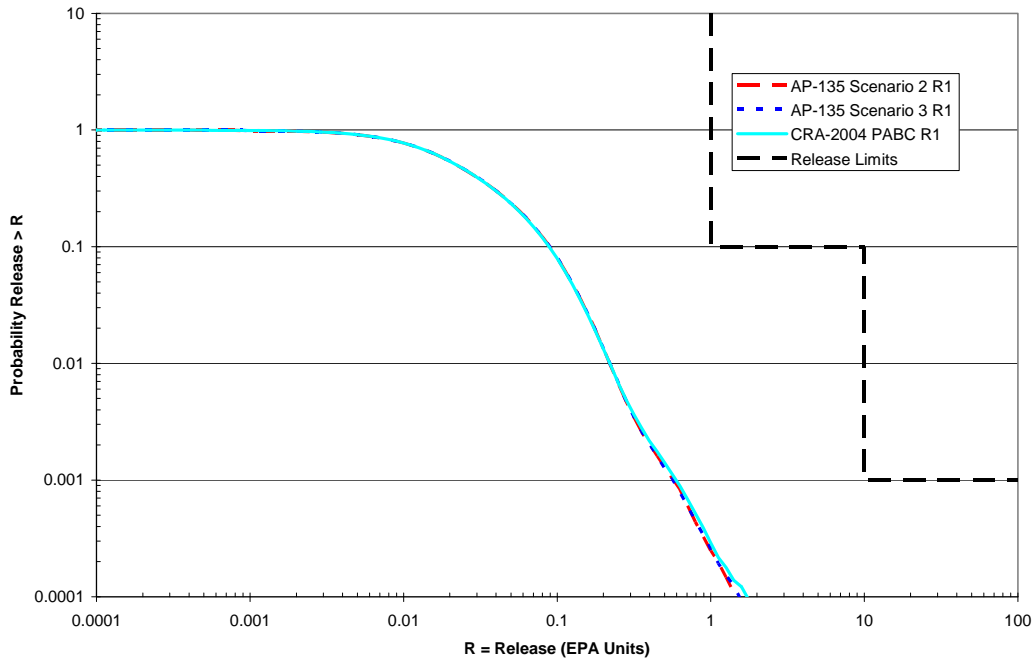


Figure 2. Mean Total Releases from SCPA Scenarios 2 and 3 and CRA-2004 PABC, Replicate 1

References

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