DEVELOPMENT OF BAGLESS TRANSFER SYSTEM FOR STANDARD WASTE BOXES

S. Brock Presgrove and Kamlesh Patel
Bechtel Savanna River, Inc.
802 E. Martintown Road, BTC 416
North Augusta, SC 29841

ABSTRACT

At several DOE sites, substantial volumes of Transuranic (TRU) waste has been handled on a daily basis. Usually, the waste has been transferred from the facilities to the Waste Isolation Pilot Plant (WIPP) or to an on site storage facility using the "bag-out" technique. This process begins in the most contaminated area by placing the waste in a strong plastic bag, twisting closed the neck of the bag, then taping the closed neck. This reduces the exposed TRU waste and the resulting contamination. However, even though that the contamination is reduced, it remains high enough to prevent direct transfer into the environment. In order to reduce the contamination to acceptable levels, the "bag-out" process is repeated until the outside contamination on the plastic bag is acceptable. This procedure has been affective, however, it also generates organic waste in the process. During the design of the Transuranic Waste Facility (TWF) at the Savanna River Site, a conceptual alternative was developed using the Standard Waste Box (SWB).

DEVELOPMENT

Bagless Transfer Systems have been developed and are in operation by at least two European companies. However, the design has been limited to double lid cylindrical drums. In the conceptual design of the TWF at the Savanna River Project, needs for Bagless Transfer Systems were identified in two specific areas. One area is the use of a system in combination with the Large Shredder. The out put of the Shredder will be placed in drums using existing Bagless Transfer Systems.

The other area is the use of the WIPP Standard Waste Box (SWB) for large bulky waste forms. Consideration was given to the existing Bagless Transfer Systems using double lid mechanisms for drums. Since the SWB is a combination of a cylindrical and rectangular box however, it would be necessary to design machined surfaces on both lids and the box opening with extremely tight tolerances. Economics ruled out this design because each SWB is used only once for burial of the TRU waste.

A conceptual design was then initiated using the "sliding seal" concept in stead of double lid. Briefly, the floor of the Transuranic Waste Facility is designed with a square opening to match a modified SWB lid. A modified SWB is initially installed under the loading chute and an additional modified SWB is mated up to the "ENTRANCE" side of the positioned SWB. (see Figs. 1 and 2) When the Transuranic Waste Facility is placed in operation and the first positioned SWB is filled with the contaminated bulk waste, the mated up SWB pushes the full SWB out the "EXIT" side. A modified lid is positioned so that the full SWB slides under the lid as it is pushed out from under the chute. (see Fig. 3) When that process is complete, a new empty SWB is open to receive bulk waste and the full SWB is sealed ready for transportation to the WIPP project. (see Fig. 4)

DETAIL DESIGN AND OPERATION

First, the Standard Waste Box opening is modified to form a rectangular shape. The half circle portion of the box opening is covered with a metal plate. At the straight edge of the new plate a metal rectangular tube is installed in parallel with and under the edge to support the new opening edge. A slotted gasket is placed along the straight edge of the newly installed plate. (see Fig. 5) The sliding gasket will be attached to the modified SWB just prior to positioning the modified SWB under the loading chute. The gaskets will be mated to the modified SWB with a tight tolerance frame attached to the ceiling.

Next, an opening in the floor of the waste handling facility is sized to match with the rectangular opening of the modified Standard Waste Box. From the basement side of the opening, slotted metal guides are attached on the ceiling to align up with the new SWB slotted gaskets. The ceiling plate slots match up with the SWB slotted gasket and act as labyrinth seals during transfer of contaminated waste into the SWB. (see Fig. 6)

When a modified SWB is positioned to slide under the ceiling opening, the slotted gasket will be 1/8" to 1/4" higher than the metal guide. As the SWB is forced under the ceiling opening, the slotted plate will compress the slotted gasket 1/8" to 1/4" which insures complete contact of the surfaces of the seals.

From the basement side again, at the opening side labeled as the "EXIT", a foam injection system is installed. (see Figure 7) When the initial modified SWB is slid in place and prior to transferring contaminated waste to the SWB, foam is injected between the leading edge of the SWB and the "EXIT" side of the ceiling opening. The foam is designed to set up with some pressure on both the ceiling and SWB surfaces. This insures a continuous and complete seal. Also, the foam and sealing surfaces are designed so that the foam will adhere to the SWB but not the ceiling.

Fig. 1. Initial set up.

Fig. 3. Full SWB transfer.

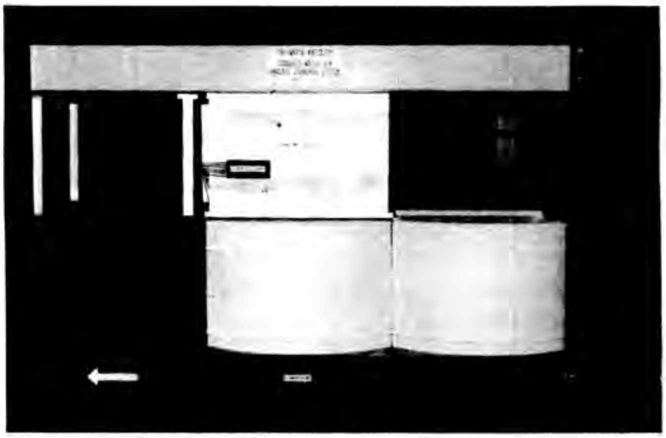

Fig. 2. SWB ready to receive TRU waste.

Fig. 4. Full SWB ready for shipment.

At the "ENTRANCE" side of the ceiling opening, when the first clean SWB is to be slid in place to accept contaminated waste, a second new SWB is mated up with the trailing edge of the entering SWB. Between the two SWB's will be placed a removable formed foam "ENTRANCE" seal. (see Fig. 6) As the entering SWB is slid in place, the formed seal will be slightly compressed to fit under the "ENTRANCE" side of the ceiling opening. At that time, all four sides of the Modified SWB will be completely sealed and filling the SWB will begin.

During the sliding process of the SWB's, contamination is contained and controlled at the "ENTRANCE" and the "EXIT" side of the opening. At the "ENTRANCE" seal, during sliding a new SWB in place, the basement atmospheric pressure will be higher than that inside the Transuranic Waste Facility. (see Fig. 8) This differential pressure insures that when a new SWB is slid in place, the minimum clean air flow rate of 200 ft/min flows through the clean SWB into the contaminated TWF building. At the "EXIT" seal, the SWB lid is positioned so that as a contaminated, full SWB slides out from under the "EXIT" seal, the foam breaks loose from the ceiling surface and continues to adhere to the SWB surfaces, there by maintaining the foam seal in contact with the underneath of the lid. Once the full SWB is positioned under the lid, the lid is permanently attached to the SWB and the SWB is now ready for shipment to the WIPP Project.

As the replacing modified SWB is slid in place, the formed foam "ENTRANCE" seal between the SWB's will be forced off of the SWB surface with the shear blade. The formed foam "ENTRANCE" will fall back into the replacing modified SWB. This will insure that no contaminated ser-

Fig. 5. Modified SWB.

Fig. 7. Exit foam injection.

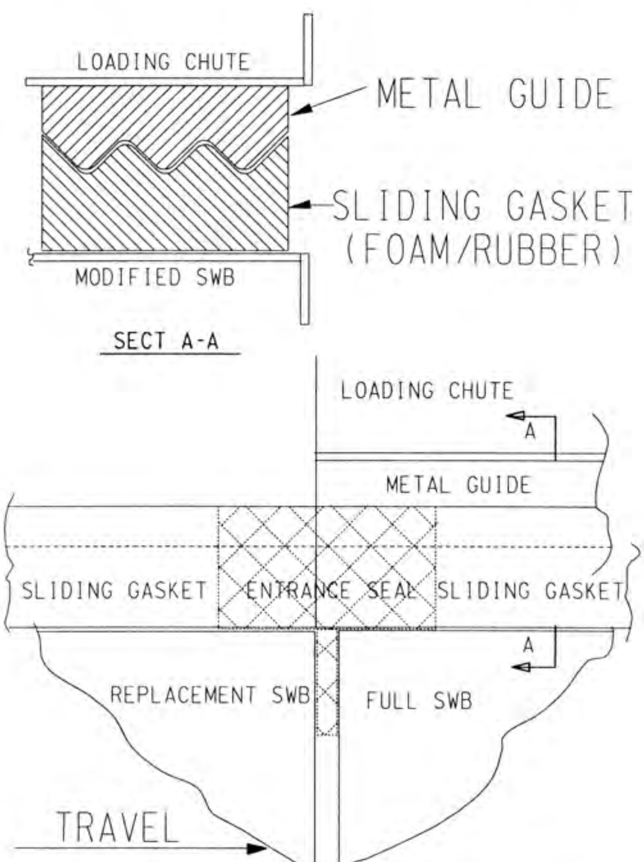

Fig. 6. Labrinth seal and entrance sea.

Fig. 8. Air flow during SWB transfer.

vices will come in contact with the open basement atmosphere. (see Fig. 9)

The secondary barrier will be an enclosure of the basement portion of the process. This enclosure will contain contamination should any seal failure occur. The modified SWB's and personnel will enter and exit the enclosure through air locks.

SPECIAL ASPECTS

One goal was to minimize or eliminate maintenance of moving parts/systems in the contaminated TWF. Therefore all equipment associated with the system are accessible in the clean basement.

During a transfer, should a loss of power occur, a manual override will be designed so that the transfer can be completed to prevent contamination "creep". In addition, a bank of pressurized air tanks will be kept in standby to maintain the air flow from clean to contaminated areas during the manual override operation.

All precision dimensions are associated with the system, not the SWB's. Using flexible sliding seals and foam

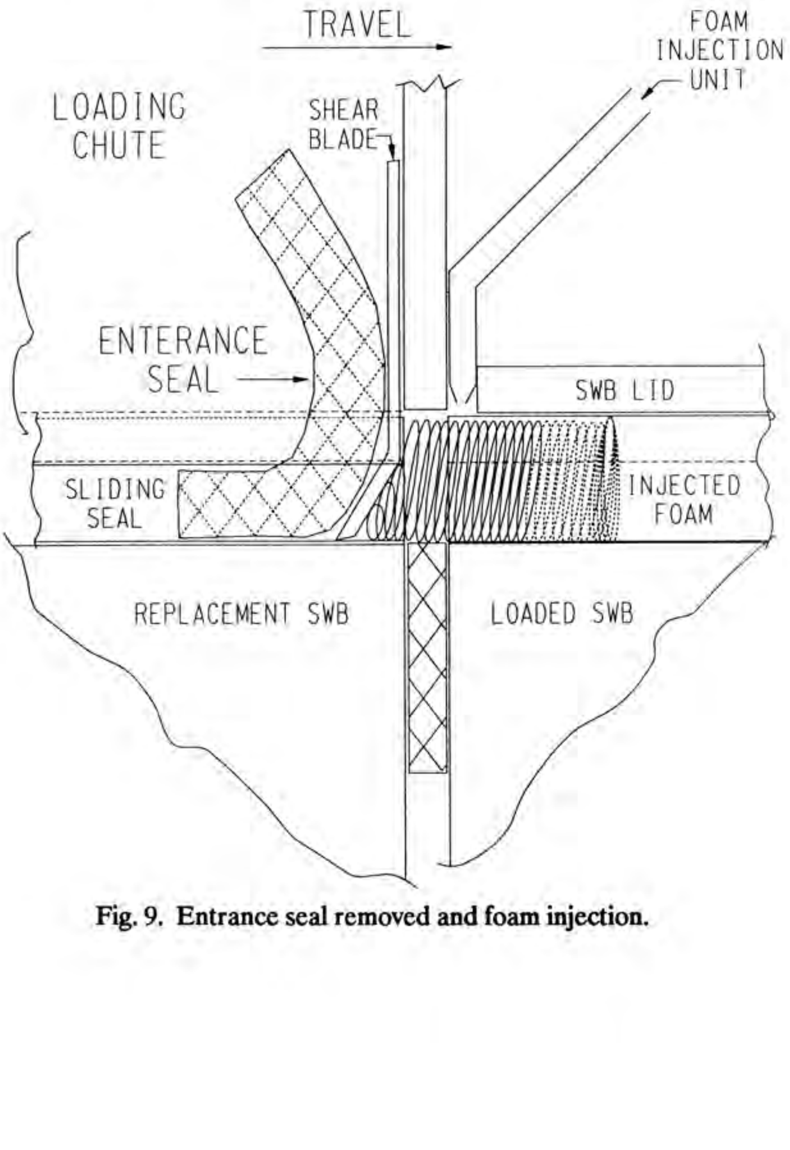

Fig. 9. Entrance seal removed and foam injection.

injection, relative commercial code tolerances on the SWB are acceptable.

As described, the SWB will be modified to have a rectangular opening on top. In order to prevent inadvertent jamming of the loading the chute, the waste may be placed in a rectangular box the same size as the opening. The SWB modification and use of the transfer box will reduce the volume of waste that can be placed in the SWB. However, since the SWB weight limit is so restrictive, weight will most likely be the controlling factor rather than volume.