

## **SOFT-SIDED CONTAINERS IMPROVE D&D EFFICIENCY**

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### **ABSTRACT**

The Decontamination and Decommissioning (D&D) Program helped the Idaho National Engineering and Environmental Laboratory (INEEL) become more cost effective and develop a new and improved way to dispose of waste. In the past, the D&D Program used rigid containers (metal and wooden boxes) to dispose of waste and debris from D&D sites. The D&D Program furthered the development and use of the soft-sided containers by using them for more typical waste generated on D&D projects, such as large concrete chunks, wood, metal, piping, and other debris. In the fall of 1998, the D&D Program began filling soft-sided containers made of polypropylene to store and dispose of low-level waste (LLW) generated from the Sewage Treatment Plant (STP) D&D project located at the Central Facilities Area (CFA). Compared to the rigid containers, using soft-sided containers results in an estimated 8-to-1 cost savings. The soft-sided containers create less void space in packaging and stacking.

### **RIGID CONTAINERS**

D&D projects typically use rigid metal and wooden boxes to containerize LLW for storage and disposal. These sizes range from the standard metal box of 4 x 3 x 8 ft or the wooden box of 2 x 4 x 8 ft or 4 x 4 x 8 ft. The capacity of these boxes is roughly 96 cubic feet and 8,000 pounds. The wooden boxes had to have a plastic liner placed inside them. The metal boxes cost \$1300.00 each and the wooden boxes with liner cost about \$900.00 although the INEEL is phasing out the wooden boxes.

### **TYPICAL D&D DEBRI**

Typical D&D LLW consists of concrete, cinder block, metal, piping, wood, gravel, soil, and other miscellaneous debris. Like most D&D job sites across the country you deal with buildings, structures, and utilities. These facilities are constructed with many different types of building materials, so that the waste from a D&D project is multifaceted. Buildings and structures can range from wooden, cinder block, concrete pour, to metal constructions. Also included in most projects is the soils and fill materials that exist inside and outside these facilities. All or portions of this construction materials makes up the LLW debris encountered on a typical D&D project.

## SOFT-SIDED CONTAINERS

The soft-sided containers have a woven and coated 25-mil (0.025-inch) polypropylene fabric outer liner and a double 40-mil (0.040-inch) polyethylene inner liners and are equipped with 20 polyester straps. The containers have a volume capacity of 250 cubic feet, a weight rating of 24,000 pounds, measure 7 x 8 x 5 feet and cost \$365 a set, outer and inner liner. The containers can be vertically lifted (via a spreader bar and crane), enabling careful placement onto flatbed transport vehicles and into the Disposal Pit's waste stack (see Figure 1). The soft-sided containers qualify as a DOT Strong Tight or Industrial Package for Low Specific Activity(LSA) material and Surface Contaminated Objects(SCO). This gives the soft-sided containers the same DOT packaging designation as the wooden boxes. The system includes a loading frame used to support the outer and inner liner during loading and a lifting frame. The lifting frame attaches to the lifting straps for hoisting the container from the loading frame onto a transport vehicle and from the transport to the disposal pit. A forklift can move the loading frame and lifting frame.



## WHAT WE LOADED

The smaller the waste container you have to place your waste into the more time it takes to process and size your waste. This there by increasing worker time and exposure. With the soft-sided container a larger opening and package reduced the processing time. At the STP D&D project large concrete chunks, wooden planks, metal plates, piping, valves, pumps, and other large debris was produced. Piping and wood was several feet in length, and the concrete slabs were four to five square feet. Whole pumps and valves were loaded into soft-sided containers.

## COST COMPARISON

The cost comparisons in Table 1 are based upon representative work performed by D&D. Because the wooden containers are no longer available for purchase, the comparison information in Table 1 is limited to the soft-sided and metal containers. The cost of the soft-sided containers is \$365 each. This results in savings of about \$1,800 in container cost for each soft-sided container filled versus filling three 4 x 3 x 8 ft metal boxes.

**Table 1. Cost comparison between soft-sided and metal containers.**

	<b>Soft-Sided Containers</b>	<b>Metal Containers</b>
Waste Volume	200 cubic feet	81 cubic feet
Container Cost	\$365 each	\$1,300 each
Packaging Cost	\$1.70 per cubic foot	\$16.05 per cubic foot
Labor & Equipment Cost	\$2.17 per cubic foot	\$3.67 per cubic foot
<b>Total Cost</b>	<b>\$3.67 per cubic foot</b>	<b>\$19.72 per cubic foot</b>

## LESSONS LEARNED

The D&D workers found the soft-sided containers to be much easier to use than the rigid waste containers. The following are some things to consider for use with either container:

- It is best to place a small layer of soil or crushed material in the bottom portion of the soft-sided container, the bottom 8-12 inches. This layer provides protection for the bottom of the container when loading large debris and helps the container conform to the waste form. Some of the concrete debris was crushed into smaller pieces to provide this protection layer. Re-bar and other sharp objects need to be strategically placed so as to not puncture the container.
- Forklift pockets were installed on the bottom of our loading frames. This enabled us to move the frame and partial or fully loaded soft-sided containers around the job site for easier handling and loading. This does require a large capacity forklift.
- In the event of a puncture through the soft-sided container, we re-bagged the existing container. First, the object that punctured the container was removed (re-bar cut off) or

softened (corners blunted), then the whole patched (duct tape) and finally if required this bag placed inside a new outer liner.

- Working with the vendor the inner liner has gone through several evolutions to make it more pliable in cold temperature and more puncture resistant.
- Different string attachments were further developed at our request to ease in bag closure. Adjustments were also made in the stitching of the lifting straps that improved reliability.

## **CONCLUSIONS**

The soft-sided containers were the easiest to load efficiently. The rigid containers tend to have a lot more void space and if you load them too full you end up unloading or trying to resize the load just to get the rigid lid on. Although the soft-sided containers have greatly enhanced our capabilities the rigid containers still have a need. The rigid containers are more efficient for sharp, contorted material, like broken lengths of pipes, twisted re-bar and other similar waste that may puncture the soft-sided containers. Soft-sided containers take less processing time because larger debris loads into them. The soft-sided containers reduce void space and disposal pit subsidence. Less storage space is required for empty soft-sided containers. Compared to rigid containers, using soft-sided containers results in a 8-to-1 generator procurement cost savings and a reduction in labor costs. In addition, soft-sided containers are more volumetrically-efficient, easier to use, and will reduce future disposal pit subsidence. The INEEL D&D Program has added a new way in which to make us more efficient and cost effective.