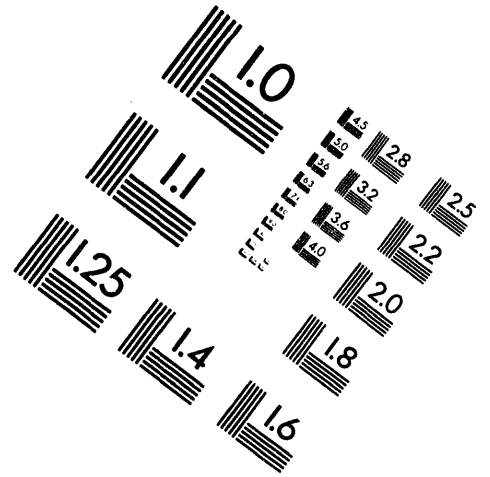
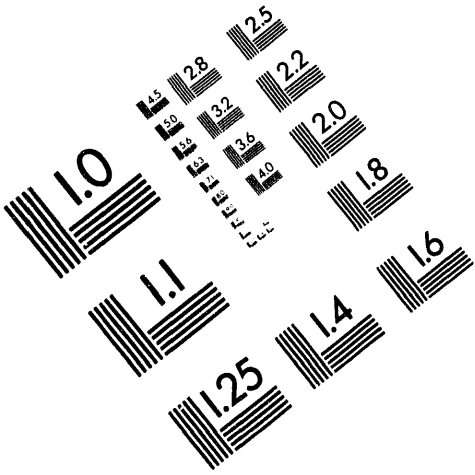




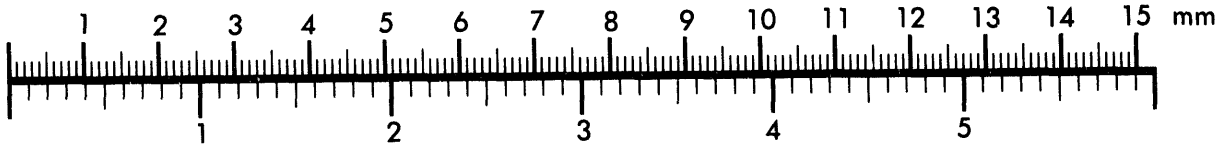
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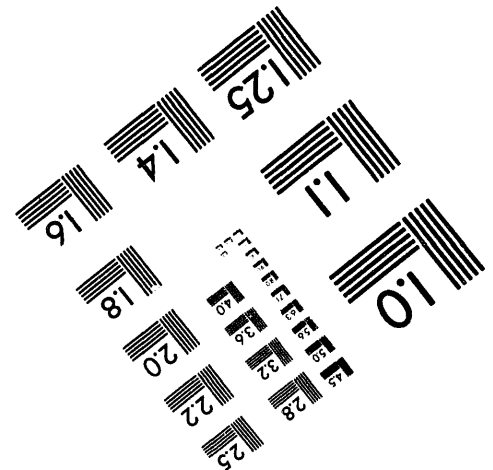
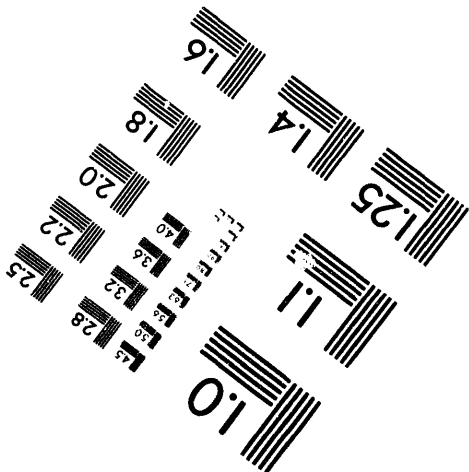
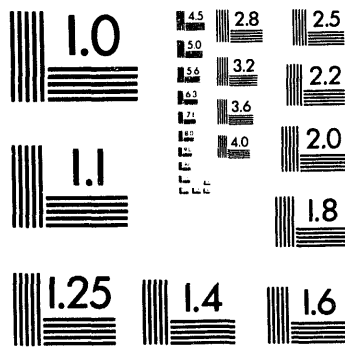
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## Type B Drum Packages

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## TYPE B DRUM PACKAGES

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### SUMMARY

The Type B drum packages (TBD) are conceptualized as a family of containers in which a single 208 L or 114 L (55 gal or 30 gal) drum containing Type B quantities of radioactive material (RAM) can be packaged for shipment. The TBD containers are being developed to fill a void in the packaging and transportation capabilities of the U.S. Department of Energy as no container packaging single drums of Type B RAM exists offering double containment.

Several multiple-drum containers currently exist, as well as a number of shielded casks, but the size and weight of these containers present many operational challenges for single-drum shipments. As an alternative, the TBD containers will offer up to three shielded versions (light, medium, and heavy) and one unshielded version, each offering single or optional double containment for a single drum. To reduce operational complexity, all versions will share similar design and operational features where possible.

The primary users of the TBD containers are envisioned to be any organization desiring to ship single drums of Type B RAM, such as laboratories, waste retrieval activities, emergency response teams, etc. Currently, the TBD conceptual design is being developed with the final design and analysis

to be completed in 1995 to 1996. Testing and certification of the unshielded version are planned to be completed in 1996 to 1997 with production to begin in 1997 to 1998.

### I. INTRODUCTION

The Transportation and Packaging Department within the Westinghouse Hanford Company provides packaging support to the Transportation Management Division (TMD/EM-261) within the U.S. Department of Energy (DOE), Office of Environmental Management. One of the tasks being performed is the development of the Type B drum package (TBD). The objective of this task is to develop a Type B(M) container that allows the shipment of a single 208 L or 114 L (55 gal or 30 gal) drum containing Type B quantities of radioactive materials (RAM) as defined by 10 CFR 71.<sup>1</sup> In 1993, a feasibility study outlining some of the requirements for a TBD package, as well as the potential users of such a package, was conducted.<sup>2</sup>

Based on the initial feasibility study and a survey of selected potential customers, development of the TBD continues in 1994. A conceptual design is being developed for a single unshielded version and three shielded versions. The unshielded container will offer single containment with double containment as an option. The shielded versions will offer varying degrees of thickness of carbon steel

shielding in addition to the containment options. To reduce operational complexity, all versions will share features as practicable.

Future development of the TBD will concentrate on the unshielded version as it has the widest potential use within the DOE complex. For instance, the TBD may have a role in the planned shipping campaign to dispose of transuranic (TRU) waste. In this program, the TBD would be used as a shipping container for those sites with small quantities of TRU. As presently conceived, the plan is to ship the small quantities of TRU to a larger site where the drums would be consolidated into the TRUPAC II container for shipment to the Waste Isolation Pilot Plant (WIPP) in Carlsbad, New Mexico.

Further development of shielded TBD beyond the conceptual design stage will depend on identifying the need for such a container. Several shielded containers will be, or are currently, available to ship single drums of high-activity materials including the CNS 1-13 G, the GE 2000, and the Pacific Nuclear (NuPac) 72-B.<sup>3,4,5</sup> Although these containers are heavy, ranging from 7,257 kg to 20,412 kg (16,000 lb to 45,000 lb), they have been, or are being, developed to support current DOE programs. For example, the NuPac 72-B is specifically being developed to support the TRU program, facilitating the shipment of up to three drums at a time of remote-handled TRU (RH-TRU) waste to the WIPP site. If developed, the only advantage shielded versions of the TBD would offer compared to these containers is a number of smaller and lighter containers with a maximum weight of 7,257 kg (16,000 lb). As such, the shielded TBDs would offer operational advantages to smaller sites, but

firm requirements have not been identified.

## II. BACKGROUND

Steel drums, normally 208 L (55 gal), and smaller drums have been among the most widely used containers for storage and shipment of radioactive materials for more than 50 years. As regulations developed more rigorous safety standards, such drums, traditionally U.S. Department of Transportation Specification 17C or 17H, became unsuitable for the shipment of Type B RAM. Instead of repackaging the Type B RAM into suitable containers, an overpack--the N55<sup>6</sup>--was developed in the mid-1970's. The N55 provides thermal protection, as well as an impact limiter, but no leak-testable containment boundary or shielding. Under current rules, without a containment boundary, the N55 cannot be used to over pack the majority of drums containing Type B RAM necessitating the need for a new single-drum container.

Several containers currently certified or in development can ship multiple Type B drums and will be used for large shipping campaigns. If shielding is not required, the TRUPAC II offers double containment with a capacity of 14 drums.<sup>7</sup> The TRUPAC II is designated as the prime container to be used to ship contact-handled TRU (CH-TRU) waste drums to WIPP. For shipments requiring shielding, a number of containers are available or being developed with single or double containment that will allow shipment of one or more drums.

Although each of these containers could be used to ship single drums of Type B RAM, the size and weight of multi-drum containers as well as the necessity of using a special trailer in some cases, present operational and handling challenges

for facilities needing to ship a small number of drums. Therefore, it is specifically for these smaller sites that the TBD containers are being developed.

### III. DESCRIPTION

The contents of the TBD container will include the drums containing a whole range of Type B materials but not bulk Type B liquids, compressed gasses, or any material that could be chemically reactive. As the initial contents will probably be TRU waste, the contents list will be identical to that used for the TRUPAC II with exceptions made or added to the Safety Analysis Report for Packaging (SARP) as necessary.

The unshielded version of the TBD (TBD-US) will offer leak-testable single or double containment for a single 208-L drum (see Figure 1). If double containment is not required, a spacer will be used to take the place of the inner container. A 114-L drum can also be shipped with a spacer to make up the difference in size between the 114 L and 208 L drums. The TBD-US will offer a lid that, once removed, will expose the top 15 cm (6 in.) of the

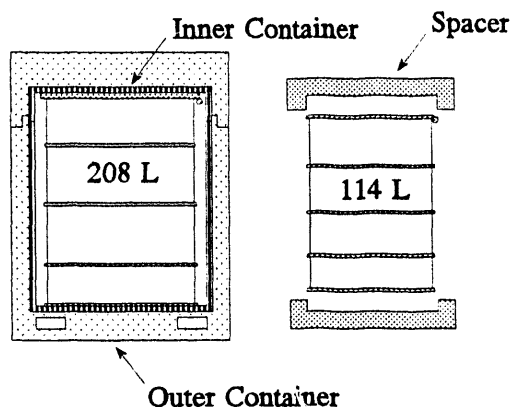


Figure 1. Type B Drum Package, Cutaway View of the Unshielded Version (TBD-US).

drum allowing space for attachment of handling devices. If double containment is not required, the inner container can be removed and replaced with a spacer to fill the void.

The shielded versions of the TBD packages (TBD-SS, M or H for light, medium and heavy), if developed, are anticipated to offer all the features of the unshielded version. These containers will have 8 cm, 15 cm, and 21 cm (approximately 3 in., 6 in., and 8 in.) of steel shielding and weigh 2,722 kg, 4,989 kg, and 7,257 kg (approximately 6,000 lb, 11,000 lb, and 16,000 lb), respectively. The medium-weight container is shown in Figure 2.

### IV. CONCLUSIONS

The Type B drum containers are being designed to fill a gap in current DOE packaging capabilities. These containers will offer the DOE packaging community the ability to ship single drums of Type B RAM in single or double containment with or without shielding.

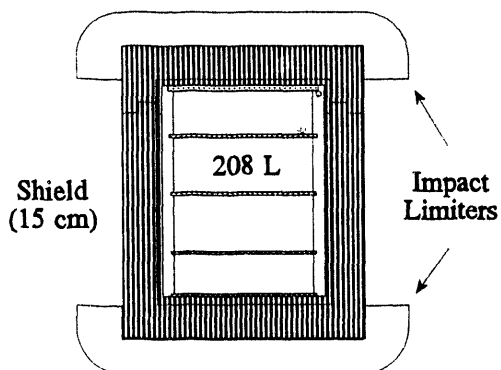


Figure 2. Type B Package, Cutaway View of the Medium-Weight Shielded Version (TBD-SM).

The primary development effort will concentrate on the unshielded version (TBD-US) after the conceptual design is completed. Under the current plan, the conceptual design will be completed in 1994 and the final design will be completed in 1995. Analysis and preparation of the SARP will begin in 1994 to be completed in 1996 with testing and final certification of the TBD in 1996 to 1997. Production is planned for 1997 to 1998 with the ultimate number of production units still to be determined.

#### ACKNOWLEDGEMENTS

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