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1	1	QA: CR Hoover	<i>C.R. Hoover</i>	7/15/94	G1-11				
1	1	Safety: DW McNally	<i>D.W. McNally</i>	7/15/94	G1-11				
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18. Signature of EDT Originator <i>W.A. McCormick</i> 7/15/94		19. Authorized Representative Date for Receiving Organization		20. Signature of Cognizant Manager Date <i>J.G. Field</i> 7/15/94		21. DOE APPROVAL (if required) Ctrl. No. ☐ Approved ☐ Approved w/comments ☐ Disapproved w/comments			

Documentation and Analysis for Packaging for the 100 B/C Packagings

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Abstract: The purpose of this Documentation and Analysis for Packaging (DAP) is to certify that the packaging system currently in use for the 100 B and C Area large scale excavation and remediation campaign, meets the intent of U.S. Department of Transportation (DOT) requirements for bulk packaging (49 CFR 173.427) of radioactive materials, up to and including low specific activity (LSA) I quantities of Class 7 material.

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LIST OF TERMS

DAP	Documentation and Analysis for Packaging
DOT	U.S. Department of Transportation
ERDF	Environmental Restoration and Disposal Facility
LSA	low specific activity

DOCUMENTATION AND ANALYSIS FOR PACKAGING FOR THE 100 B/C PACKAGINGS

1.0 INTRODUCTION

The purpose of this Documentation and Analysis for Packaging (DAP) is to certify that the packaging system currently in use for the 100 B and C Area large scale excavation and remediation campaign, meets the intent of U.S. Department of Transportation (DOT) requirements for bulk packaging (49 CFR 173.427) of radioactive materials, up to and including low specific activity (LSA) I quantities of Class 7 material.

1.1 BACKGROUND

The 100 B and C reactor areas are undergoing a large scale excavation activity to remove contaminated soil, vegetation, and debris and transport it in large containers to the Environmental Restoration and Disposal Facility (ERDF) for long-term disposal. Millions of cubic yards of material will be transported to the ERDF in an effort to remove all contamination and stabilize the areas around the reactor facilities. While most of the material being removed contains an unregulated amount of radioactive material, there are instances where a package may contain enough activity to be considered a radioactive shipment.

In order to efficiently accommodate this eventual condition, a method for packaging using the currently employed containers has been developed to ensure that all safety and regulatory conditions are met.

2.0 PACKAGE DESCRIPTION

2.1 PACKAGING

The basic components of the 100 B/C packaging system(s) consist of four parts. The first component is the container itself, which is typically a large (20+ cubic yard) vessel of welded steel construction with the top and one end open. Attached to the container on the open end is a hinged lid (various configurations) which seals to the container via neoprene gasket material and a mechanical locking mechanism. The third component of the packaging is a plastic liner which is placed in the container prior to loading its contents. Once the container is filled, this liner is folded over the contents and sealed with glue, tape, or some other method to ensure that the contents will not excessively contaminate the interior of the container. The fourth component is a heavy tarp which is placed over the container after it has been hoisted onto the transport vehicle. For all regulated radioactive shipments, the tarp is pulled down securely over the container by an integral bungee cord system that attaches to hooks welded onto the sides of the container.

At present there are three different types of containers being used for the 100 B/C cleanup activity, although they all use the same basic components as that described previously. Other designs may be employed as well, provided they utilize the same basic method of containing the radioactive material contents.

2.2 CONTENTS

The contents of the packages will generally be contaminated soil, vegetation, rocks, and other miscellaneous debris excavated from the 100 B and C reactor areas. No free liquids are expected to be contained in the contents' matrices other than residual soil moisture. The radioactive constituents of the payload shall not exceed LSA I (10^{-6} A₂/g), as defined in 49 CFR 173.403.

2.2.1 Exterior Contamination Limits

The exterior surfaces of the packagings shall not exceed the contamination limits shown in Table 1.

Table 1. Contamination Limits.

Contaminant	Maximum Permissible Limits	
	$\mu\text{Ci}/\text{cm}^2$	dpm/cm ²
Beta-gamma emitting radionuclides; all radionuclides with half-lives less than ten days; natural uranium; natural thorium; uranium-235; uranium-238; thorium-232; thorium-228 and thorium-230 when contained in ores or physical concentrates	10^{-5}	22
All other alpha emitting radionuclides	10^{-6}	2.2

Table from 49 CFR 173.443.

3.0 DESIGN REQUIREMENTS

The general design requirements for the 100 B/C packagings are prescribed in 49 CFR 173.427 and 49 CFR 173.24, as applicable. Essentially, the packages must be strong, tight containers, which under normal transport conditions, do not allow leakage of the radioactive contents.

4.0 EVALUATION

This DAP serves as the document to certify that the 100 B/C packages, when loaded, secured on the transporter, and covered in the manner described in Section 2.0 of this DAP, meet the intent of the DOT regulations for bulk packaging of LSA material.

5.0 OPERATIONS

The basic packaging method is described in Section 2.0 of this document. There are no additional operational controls required other than those required by the *Hazardous Material Packaging and Shipping*, WHC-CM-2-14. It is worth restating, however, that for those shipments that are determined to be Class 7 Radioactive Material, up to and including LSA I quantities, the tarping for the containers must be securely fastened down over the top of the containers, using the appropriate method for the design, such that no material can be released during transport operations. In addition, all shipments must be exclusive use, as defined in 49 CFR 173.403.

6.0 REFERENCES

49 CFR 173, 1995, "Shippers-General Requirements for Shipments and Packaging," *Code of Federal Regulations*, as amended.

WHC-CM-2-14, *Hazardous Material Packaging and Shipping*, Westinghouse Hanford Company, Richland, Washington.

DISTRIBUTION SHEET

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Distribution	Packaging Engineering	Date 07/15/96
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