NRC FORM 618 (9-83) 10 CFR 71

U.S. NUCLEAR REGULATORY COMMISSION

CERTIFICATE OF COMPLIANCE
FOR RADIOACTIVE MATERIALS PACKAGES

1.a. CERTIFICATE NUMBER	b. REVISION NUMBER	c. PACKAGE IDENTIFICATION NUMBER	d. PAGE NUMBER	e. TOTAL NUMBER PAGES
9791	0	USA/9791/B(U)	1	3

2. PREAMBLE

a. This certificate is issued to certify that the packaging and contents described in Item 5 below, meets the applicable safety standards set forth in Title 10, Code of Federal Regulations, Part 71, Packaging of Radioactive Materials for Transport and Transportation of Radioactive Material Under Certain Conditions.

b. This certificate does not relieve the consignor from compliance with any requirement of the regulations of the U.S. Department of Transportation or other applicable regulatory agencies, including the government of any country through or into which the package will be transported.

3. THIS CERTIFICATE IS ISSUED ON THE BASIS OF A SAFETY ANALYSIS REPORT OF THE PACKAGE DESIGN OR APPLICATION

a. PREPARED BY (Name and Address)

U.S. Department of Energy
Division of Naval Reactors
Washington, DC 20545

b. TITLE AND IDENTIFICATION OF REPORT OR APPLICATION

PWR-2 Lower Core Barrel Safety Analysis Report for Packaging dated January 1982

c. DOCKET NUMBER 71-9791

4. CONDITIONS

This certificate is conditional upon fulfilling the requirements of 10 CFR Part 71, as applicable, and the conditions specified below.

5.

(a) Packaging

(1) Model No.: PWR-2 Lower Core Barrel Shipping and Disposal Container

(2) Description

The package consists of an irradiated PWR-2 lower core barrel (LCB) and irradiated LWBR components (non-fuel) packaged in an inner, lead-filled container which is placed inside an outer container. The package weighs approximately 400,000 pounds

The PWR-2 LCB outer ocntainer is a 4-inch thick steel cylinder, 127 inches in outside diameter, 212 inches long, with two 6-inch thick end plates. The bottom end plate is welded to the cylinder with a full penetration weld and the top end plate is bolted with 112 2-inch diameter fasteners.

The package is equipped with two 2.5-inch thick by 10-inch long circumferential impact limiter rings on the side and two concentric impact limiter rings and aluminum honeycomb crush blocks on the ends.

The container is supported horizontally on the railroad car by eight gussets welded on each side of the container two horizontal plates. Each plate is bolted to the top flange of an I-beam. The bottom flange of the I-beam is bolted to a 300-ton railroad car.

5. (a) (2) Description (continued)

The inner container, which will be disposed of along with the PWR-2 LCB and the irradiated LWBR components, is a cylinder with two steel shells containing lead in between. The inner container is 117 inches in O.D. and 181 inches long. The inner steel shell is 1.0-inch thick and the outer steel is 0.5-inch thick. There are 4.25 inches of lead shielding between the shells. The inner container is supported radially in the outer container by two rings, one at each end, which have a radial clearance of 0.25 inches. The inner container is centered axially in the outer container by the aluminum honeycomb crush blocks. The bottom of the inner container is a 4.5-inch thick end plate attached to the cylinder with 40 one-inch diameter fasteners. A spiral-wound, graphite filled gasket is located between the bolted cover and the cylinder. The gasket is preloaded by the 40 bolts, which have an applied torque of 700 ft-lb. The inner container is made primarily from HY-80 steel, except for the lead shielding and the top cover, which are made from ASTM A 588.

(3) Drawings

The packaging is constructed in accordance with Westinghouse Drawings Nos. 1575E12 and 1920F52.

(b) Contents

(1) Type and form of material

An irradiated PWR-2 lower core barrel and the following LWBR irradiated contents: (a) six blanket support tubes, (b) ten seed support shaft assemblies, (c) seven sectioned flux thimbles, and (d) five sectioned BIF supply tubes. In addition, the shipment may include approximately 33 gallons of residual water and surface contamination in the form of activated corrosion products.

(2) Quantity of material in package

One irradiated lower core barrel assembly and irradiated LWBR structurals as described in 5(b)(1). Surface contamination not to exceed 18.9 curies. The irradiated lower core barrel and LWBR structurals not to exceed 32,000 curies.

6. The package will be operated in accordance with the procedures described in Chapter 7 of the application and tested and maintained in accordance with the procedures in Chapter 8 of the application.

7. Expiration date: November 31, 1988.

REFERENCES

PWR-2 Lower Core Barrel Safety Analysis Report for Packaging, WAPD-LP(CEW)CS-670 dated January 1982.

Supplement: Naval Reactors memorandum G#7241 dated December 2, 1982.

FOR THE U.S. NUCLEAR REGULATORY COMMISSION

Charles E. MacDonald, Chief
Transportation Certification Branch
Division of Fuel Cycle and
Material Safety, NMSS

Date: NOV 16 1983

U.S. Nuclear Regulatory Commission
Transportation Certification Branch
Approval Record
PWR-2 Lower Core Barrel Disposal Container
Docket No. 71-9791

By application dated December 2, 1982 (G#7241), Naval Reactors, U.S. Department of Energy, requested an NRC Certificate of Compliance for the PWR-2 Lower Core Barrel Shipping and Disposal Container. The package is used to transport the irradiated PWR-2 lower core barrel and irradiated LWBR components. The radioactive contents are packed in an inner, lead-filled container. The inner container is placed within an outer container. The total weight of the package is approximately 400,000 pounds.

The outer container is a 4-inch thick steel cylinder (HY-80), 127 inches in outside diameter, 212 inches long, with two 6-inch thick end plates. The bottom end plate is attached to the cylinder by a full penetration weld while the top end plate is bolted by 112 2-inch diameter capscrews. The package is equipped with aluminum honeycomb impact limiters at each end and with two circumferential fins around the side.

The inner container is constructed of two concentric steel shells (1.0 and 0.5 inch thick) with a 4.5 inch thick annulus filled with lead. The bottom of the inner container is a 4.5 inch thick steel plate while the top is closed by an 8-inch thick steel plate and 40 1-inch diameter capscrews. The inner container is sealed by means of a spiral-wound, graphite-filled gasket. The inner container is stationed and supported axially within the outer container by aluminum honeycomb crush blocks at each end. Radial spacing is by two circumferential rings welded to the inner container.

The contents consist of activated components which may contain surface contamination in the form of activated corrosion products. The contents are held and sealed within the inner container which provides containment for normal and accident conditions of transport. The inner container is shown to maintain containment integrity for normal and accident condition tests. The containment system has been reviewed and found satisfactory for the contents identified with surface contamination not exceeding 18.9 Ci.

The SPAN4 (3D-point kernel) computer shielding program was used to estimate dose rates under normal and accident conditions for the PWR-2 shipping container having the lower core barrel (LCB) assembly as contents. The normal contact dose rate on the side of the container was 65.4 mrem/hr. Accident conditions resulted in 706.0 mrem/hr for the same location. The accident mode assumed all LCB components to be relocated to the impact side of the container after the 30-foot drop which considered the side puncture as well as the lead slump in the calculational model.

The staff reviewed the applicant's source terms, geometric modeling and regional shielding materials and found them to represent the cases intended.

The staff performed an independent shielding calculation for finite cylinder R=127 cms, H=300 cms, containing 5600 curies Co-60 intermixed with aluminum. A 1.5 inch iron shield was followed by 4.25 inches of lead. The SDC computer program calculated 95.6 mrem/hr at the side contact. This compares favorably with the applicant's SPAN4 estimate of 65.4 mrem/hr for the same case. The staff concludes the package meets the shielding requirements of 10 CFR Part 71.

The applicant's evaluation of the package for normal conditions of transport relied primarily upon simple equations. The information in the application was adequate to demonstrate that the package design would meet the requirements of 10 CFR Part 71 for normal conditions of transport.

The applicant's evaluation of the 30-foot drop test and 40-inch puncture test was held upon existing techniques described in standard textbooks. Several orientations were considered for the 30-foot drop test: bottom end, top end, side, corner (COG), and oblique angles of 40°, 50°, 60°, and 80° from the vertical. The results of the analyses indicate that the package would maintain its containment integrity under the 30-foot drop test. The analysis also indicates that the 40-inch puncture test would not result in penetration through the 4-inch thick outer cylinder or the end plates.

The outer container is not intended to be removed from the rail car during the course of normal operations. Two lugs are provided on the side of the package to facilitate rotation of the package between vertical and horizontal positions. The inner container is placed on the outer container while the outer container is in a vertical orientation on the deck of the rail car. The outer container is then rotated to a horizontal position and bolted in place. At the disposal site, the inner container is removed from the outer container in the same manner as was used for loading. Although the inner container and outer container are not intended to be lifted together, the application shows that the two lugs are capable of lifting three times the weight of the package without exceeding the yield stress.

Based upon the information in the application, the staff concludes that the package meets the structural requirements of 10 CFR Part 71.

Charles E. MacDonald, Chief
Transportation Certification Branch
Division of Fuel Cycle and
Material Safety, NMSS

Date: NOV 16 1983