

**CERTIFICATE OF COMPLIANCE
FOR RADIOACTIVE MATERIAL PACKAGES**

¹ a. CERTIFICATE NUMBER	b. REVISION NUMBER	c. DOCKET NUMBER	d. PACKAGE IDENTIFICATION NUMBER	PAGE	PAGES
9793	20	71-9793	USA/9793/B(U)F-85	1 OF	6

2. PREAMBLE

- a. This certificate is issued to certify that the package (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 and Transportation of Radioactive Material."
- 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

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| <p>a. ISSUED TO (<i>Name and Address</i>)</p> <p>U. S. Department of Energy
Division of Naval Reactors
Washington, D.C. 20585</p> | <p>b. TITLE AND IDENTIFICATION OF REPORT OR APPLICATION</p> <p>"Core Independent M-140 Safety Analysis Report for Packaging," transmitted on February 27, 1991, as supplemented.</p> |
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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.: M-140
- (2) Description

The M-140 is a stainless steel package for transporting spent fuel. The package is a right-circular cylinder and is transported in the upright position. The package's approximate dimensions and weights are as follows:

Cavity diameter	70 inches
Cavity height	146 inches
Body outer diameter	98 inches
Body steel wall thickness	14 inches
Package overall outer diameter	126 inches
Package overall height	194 inches
Packaging weight, including standard internals	315,000 pounds
Maximum package weight, including contents	375,000 pounds

The package body is made from 304 stainless steel forgings. The package walls are 14 inches thick and the bottom plate is 12-inches thick. The package body flange provides

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9793	20	71-9793	USA/9793/B(U)F-85	2 OF	6

5.(a)(2)

Description (continued)

a seating surface for the closure head and its protective dome. The flange contains 36 wedge assemblies located radially around the inside diameter. Retention of the closure head is achieved by engaging the wedges in a tapered groove in the circumferential edge of the closure head. The package body has 180 external cooling fins welded to the exterior wall. A support ring is welded to the external cooling fins at a point above the center of gravity. The support ring is bolted to a specially designed well-type railcar. The package bottom is equipped with an energy absorber which is composed of five concentric stainless steel rings varying in thickness and height.

The closure head is made from forged 304 stainless steel and is approximately 13 inches thick and 81.7 inches in diameter. The closure head is equipped with an access port, which is approximately 24 inches in diameter, and is offset from the center of the closure head. The access port plug is a stepped design with a maximum diameter of approximately 31 inches and is attached to the closure head by 24 bolts. The closure head and access port are sealed with double ethylene propylene O-ring seals. Seal test ports are provided for the closure head and access port seals. A stainless steel protective dome is positioned over the closure head and is secured to the package body flange by 12, 1.38-inch diameter, 38.5-inch long studs installed in a vertical direction and six, 2.5-inch diameter, 9-inch long shear bolts installed in the radial direction.

The containment system is composed of the package body, the closure head, and the closure head access port plug. There are seven penetrations in the standard containment system: 1) a closure head, 2) a drain port, 3) a vent port, 4) an access port in the closure head, 5) a thermocouple penetration, 6) a water inlet penetration, and 7) a water outlet penetration in the package body. Each penetration is sealed with a plug and a double ethylene propylene O-ring seal and is equipped with a leak test port. For some shipping configurations, two additional penetrations may be present in the closure head: 1) a removable fuel assembly (RFA) access port and 2) another vent penetration.

The spent fuel modules are positioned in an internals assembly. The internals assembly is composed of stacked internal spacer plates, which have openings for the spent fuel modules. The internals assembly has a top plate or top plate subassembly, which is preloaded by springs against a retaining ring fitted in a groove in the package cavity wall. The internals assembly may be a standard, Type 1, Type 2, or Type 3 internals assembly.

(3) Drawings

The packaging is constructed and assembled in accordance with the Westinghouse Electric Corporation Drawings in Appendix 1.3.2 of the application. Internals assemblies and fuel modules are constructed and assembled in accordance with drawings in Chapter 1 of the applicable Safety Analysis Reports for Packaging.

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9793	20	71-9793	USA/9793/B(U)F-85	3 OF	6

5.(b) Contents

(1) Type and form of material

Spent fuel, limited to the following types, including associated activated corrosion products:

- (i) S3G-3 spent fuel.
- (ii) S8G spent fuel.
- (iii) D2W spent fuel.
- (iv) S6W spent fuel.
- (v) S9G spent fuel.

(2) Maximum quantity of material per package

Total package weight, including spent fuel and internals assembly, not to exceed 375,000 pounds; and

(i) For contents described in 5(b)(1)(i):

S3G-3 spent fuel modules, not to exceed 62,300 BTU/hr decay heat per package.

(ii) For contents described in 5(b)(1)(ii):

S8G spent fuel, not to exceed 47,050 BTU/hr decay heat per package.

(iii) For contents described in 5(b)(1)(iii):

For Type 3 core, the total core decay heat level shall not exceed 68,390 BTU/hr at the time of container draining. The total core decay heat level shall not exceed 66,550 BTU/hr when the container is shipped. For the Type 5 core, the total core decay heat level shall not exceed 62,210 BTU/hr at the time of container draining.

(iv) For contents described in 5(b)(1)(iv):

S6W spent fuel modules, not to exceed 41,712 BTU/hr decay heat per package for a shipboard core or 38,663 BTU/hr for a prototype core.

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9793	20	71-9793	USA/9793/B(U)F-85	4 OF	6

5.(b)(2) Maximum quantity of material per package (continued)

(v) For contents described in 5(b)(1)(v):

S9G spent fuel modules, not to exceed 55,002 BTU/hr decay heat per package at the time of container draining.

(c) Criticality Safety Index

Spent fuel module	Criticality Safety Index
S3G-3	100
S8G	0
D2W	0
S6W	0
S9G	0

6. For S3G-3 spent fuel shipments:

- (a) Authorized fuel loadings, internals assembly, and other loading restrictions are specified in Section 1.2 of the Safety Analysis Report for Packaging.
- (b) Minimum fuel cooling time is 130 days after shutdown.
- (c) Core age must be per Section 1.2.3.8 of the S3G-3 SAR (with its Addendum).
- (d) Control rod hold-down devices must be installed on cells which have control rods.

7. For S8G spent fuel shipments:

- (a) Authorized fuel loadings, internals assembly, and other loading restrictions are specified in Section 1.2 of the Safety Analysis Report for Packaging.
- (b) Minimum fuel cooling time is 105 days after shutdown.
- (c) Full and partial fuel modules may be shipped in any combination, but all modules must be shipped with control rods.
- (d) Control rod holddown devices must be installed on the cells. Module grapple adapters serve as control rod holddown devices.

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9793	20	71-9793	USA/9793/B(U)F-85	5 OF	6

8. For D2W spent fuel shipments:

- (a) Authorized fuel loadings, internals assembly, and other loading restrictions are specified in Section 1.2 of the Safety Analysis Report for Packaging.
- (b) Minimum fuel cooling time is 150 days after shutdown.
- (c) Control rod holddown devices must be installed on all rodded modules. The universal grapple adapters serve as the rod holddown devices.

9. For S6W spent fuel shipments:

- (a) Authorized fuel loadings, internals assembly, and other loading restrictions are specified in Section 1.2 of the Safety Analysis Report for Packaging.
- (b) Container draining shall occur no earlier than the time determined in the safety analysis report.
- (c) All fuel modules must be shipped with control rods, control rod restraints, and grapple adapters installed. A lower pedestal must be installed in each module holder port.

10. For S9G spent fuel shipments:

- (a) Authorized fuel loadings, internals assembly, and other loading restrictions are specified in Section 1.2 of the Safety Analysis Report for Packaging.
- (b) The minimum fuel cooling time is 100 days.
- (c) All S9G spent fuel modules must have control rods, control rod holddown devices, and grapple adapters installed.

- 11. The package must contain no more than 6 gallons of residual water, except that shipments of D2W recoverable irradiated fuel may contain up to 11 gallons of residual water.
- 12. Failed fuel or fuel with defective cladding is not authorized for shipment.
- 13. Each packaging must meet the Acceptance Tests and Maintenance Program of Chapter 8 of the application, as amended, except:

All containment seals, including the main closure head seal, must be replaced with new seals within the 12-month period prior to each shipment, or earlier if inspection shows any defect.

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9793	20	71-9793	USA/9793/B(U)F-85	6 OF	6

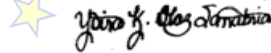
14. The package must be prepared for transport and operated in accordance with Chapter 7 of the application, except:
- a. The containment seals, excluding the main closure head seal, must pass a leak test after final closure prior to each shipment. The leak test must have a sensitivity of at least 1×10^{-3} std-cm³/sec.
 - b. Based on containment assumptions, shipments shall be made no earlier than 150 days after shutdown.
15. Prior to first use, and within the 12-month period prior to each shipment, all containment seals, including the main closure head seal, must be leak tested to show a leak rate no greater than 1×10^{-4} std-cm³/sec. The leak test must have a sensitivity of at least 5×10^{-5} std-cm³/sec.
16. Fabrication of packages must have been completed by December 31, 2006, in accordance with 10 CFR 71.19(c).
17. Transport by air of fissile material is not authorized.
18. Expiration date: July 31, 2027.

REFERENCES

"Core Independent M-140 Safety Analysis Report For Packaging," transmitted on February 27, 1991.

Supplements dated: May 23, June 21, and July 17, 1991; February 4 and 7, August 17, and December 2, 1992; October 14, 1994; September 1, and November 16, 1995; May 13, August 7, September 26, and November 26, 1996; February 10, 1997; June 11, 1998; April 11, 2001; March 5 and November 27, 2002; April 18, 2006; August 5, 2009; July 27, and October 12, 2011; November 5, 2013; July 2, 2014; April 5, 2016; June 10, 2016; and May 1, 2017; March 23, and August 26, 2021; and April 1, and April 29, 2022.

FOR THE U.S. NUCLEAR REGULATORY COMMISSION



Signed by Diaz-Sanabria, Yaira
on 07/22/22

Yaira K. Diaz-Sanabria, Chief
Storage and Transportation Licensing Branch
Division of Fuel Management
Office of Nuclear Material Safety
and Safeguards

Date: July 22, 2022

Issuance of CoC 9793, Revision 20 DATE July 22, 2022

DISTRIBUTION:

ADAMS Accession No.: ML22195A034; ML22195A036

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