NRC FORM 618
(8-2000)
10 CFR 71

U.S. NUCLEAR REGULATORY COMMISSION

CERTIFICATE OF COMPLIANCE
FOR RADIOACTIVE MATERIAL PACKAGES

1 a. CERTIFICATE NUMBER	b. REVISION NUMBER	c. DOCKET NUMBER	d. PACKAGE IDENTIFICATION NUMBER	PAGE	PAGES
9796	0	71-9796	USA/9796/B(U)F-96	1 OF	4

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

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

a. ISSUED TO *(Name and Address)*

U. S. Department of Energy
Division of Naval Reactors
Washington, D.C. 20585

b. TITLE AND IDENTIFICATION OF REPORT OR APPLICATION

"Core Independent M-290 Safety Analysis Report for Packaging," dated May 13, 2013, as supplemented

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-290

(2) Description

The M-290 is a right circular cylinder for transporting spent fuel. The package's approximate dimensions and weights are as follows:

Cavity diameter	71 inches
Cavity height	242 inches
Body outer diameter,	
upper section	92.15 inches
lower section	96.15 inches
Body steel wall thickness,	
upper section	10.6 inches
lower section	12.6 inches
Maximum outer diameter	128 inches
Maximum height (including domes)	361.5 inches
Maximum weight (including contents)	520,000 pounds

The M-290 package body is fabricated primarily from dual-certified Type 304/304L stainless steel forgings, with the upper portion fabricated from a forging constructed of Nitronic 40. All forgings are joined via full-penetration welds. The upper inside wall of the package body includes two grooves (one for engagement of an internal retaining ring, and the other for

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

engagement of a closure shear ring system). Between these grooves is a seating ledge for the closure head or canister restraint plate. The package bottom plate is approximately 11.56 inches thick. The thicker lower region of the package body is encircled by a set of 50, equally-spaced, thermal fins welded to the exterior surface. The upper and lower regions of the package body include exterior flanges into which impact mitigating, top and bottom domes are engaged during shipment.

The M-290 container body has no penetrations other than the main top opening, which is sealed during transport via a 5-inch thick, Nitronic 40 containment cover. The containment cover includes three, concentric O-rings, and is attached to the package body using 30 high-strength fasteners. Penetrations in the containment cover (for leak testing or venting operations) are plugged and sealed prior to transport.

Each end of the M-290 includes a large, impact mitigating dome that is also used for attachment of package handling hardware. The domes are fabricated from Type 304 stainless steel and are engaged in grooves in the package body. The top dome is attached via a set of 24 high-strength fastening pins; the bottom dome is attached via a set of 12 retention wedges, each of which is attached via two high-strength fasteners. The domes are custom-designed to reduce package loadings and protect the upper containment seals under accident conditions.

The M-290 employs two categories of spent fuel internals: direct-loaded and canistered. Direct-loaded spent fuel configurations include an internal assembly installed directly in the M-290 package body and held in place via an internal retaining ring (engaged in the package wall groove). Direct-loaded spent fuel shipments also include a thick closure head that seats on the internal package ledge and includes an access port for installation and removal of the spent fuel. The access port is closed and sealed via a bolted access plug. The head and plug each include supplemental O-ring seals.

Canistered configurations include a separate, sealed canister in which the spent fuel is located (within unique internals inside the canister). The canister is restrained within the M-290 utilizing a canister restraint installed in the same region occupied by the closure head for non-canistered configurations. The closure head (or canister restraint) is restrained and preloaded via a segmented shear ring that engages in the upper package body groove. The shear ring system is engaged in the groove and preloaded via a set of 28 shear ring jack screws. The shear ring is further prevented from disengagement via a backing ring bolted to the closure head or canister restraint.

Each M-290 is shipped at a 1-degree tilt (with the closure end upward) on a specially-designed railcar. The center of the package body sits within a custom shipping cradle (welded to the railcar deck), and cradle caps (which gird the upper portion of the body) provide vertical restraint. Two reaction pads (one at each end of the package) provide additional vertical support to the package.

5.(a)(3) Drawings

The packaging is constructed and assembled in accordance with the drawings in Appendix 1.3.3 of the M-290 application, the safety analysis report for packaging (SARP). Internals assemblies and fuel modules for the A1W spent fuel are constructed and assembled in accordance with drawings in Appendix 1.3.3 of the A1W SARP.

5.(b) Contents

(1) Type and form of material

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

(i) A1W spent fuel modules.

(2) Maximum quantity of material per package

Total package weight, including spent fuel, canister and internals, not to exceed 520,000 pounds, and

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

Authorized fuel loadings, internals assembly, and other loading restrictions are specified in the A1W SARP. A1W spent fuel modules, not to exceed 14,730 Btu/hr decay heat per package at the time of canister draining.

(c) Criticality Safety Index 0

6. In addition to the limitations above, the A1W fuel is limited to:
   (a) The A1W modules are packaged with internals inside one A1W canister in the M-290 packaging.
   (b) Shipment shall be made no earlier than 730 days after shutdown.
   (c) The A1W canister draining shall occur no earlier than 805 days after shutdown, or at a time after shutdown as determined from applicable safety analyses.
   (d) Module Installation Lifting Adapters must be installed on all A1W modules and Control Rod Locking Devices must be installed in all modules with control rods.
   (e) The A1W core age must be per Section 1.2.5 of the A1W SARP.
   (f) The loaded A1W canister inside the M-290 shipping container must not be sealed for greater than 30 years.
   (g) The package must contain no more than 7 gallons of residual water.

7. Failed fuel or fuel with defective cladding is not authorized for shipment.

8. Each packaging must meet the Acceptance Tests and Maintenance Program of Chapter 8 of the application.

9. The package must be prepared for transport and operated in accordance with Chapter 7 of the application.

10. Transport by air of fissile material is not authorized.

11. Expiration date: December 31, 2019.

REFERENCES

"Core Independent M-290 Safety Analysis Report for Packaging," dated May 13, 2013.

"A1W Spent Nuclear Fuel in the M-290 Safety Analysis Report for Packaging," dated March 31, 2014.

Supplements dated May 20 and June 30, 2014.

FOR THE U.S. NUCLEAR REGULATORY COMMISSION

/RA/

Michele Sampson, Chief
Spent Fuel Licensing Branch
Division of Spent Fuel Management
Office of Nuclear Material Safety
and Safeguards

Date: December 12, 2014