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
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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

a. ISSUED TO *(Name and Address)*

Holtec International
1 Holtec Blvd.
Camden, NJ 08104

b. TITLE AND IDENTIFICATION OF REPORT OR APPLICATION

Holtec International Report No. HI-2146214.*Safety Analysis Report on the HI-STAR 190 Package*
Revision ~~1~~TBD, dated ~~June 8, 2017~~TBD

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.: HI-STAR 190

(2) Description

The HI-STAR 190 packaging consists of five major components: the overpack, the multi-purpose canister (MPC), the MPC spacer, the impact limiters, and the personn~~ae~~l barrier.

The overpack is a right circular cylinder featuring a containment vessel formed by a nickel steel shell that is welded to a nickel steel baseplate and to a nickel steel top forging. The overpack also features collapsible trunnions. The top forging has a bolted closure lid with two machined concentric grooves for elastomeric seals. The outer surface of the overpack inner shell is buttressed with a layered combination of lead, steel and neutron shielding material. The overpack provides the containment boundary, the helium retention boundary, gamma and neutron radiation shielding, and heat rejection capability of the package. The containment system consists of the overpack inner shell, bottom plate, top flange, top closure plate, top closure inner O-ring seal, vent port plug and seal, and drain port plug and seal. The overpack is approximately 320 inches long, with an inside diameter of 76 inches, and an outer diameter of approximately 106.5 inches without impact limiters and 128 inches with impact limiters.

The MPC models, designated as MPC-37 and MPC-89, are welded cylindrical structures with flat ends and have identical exterior dimensions, i.e., outer diameter and cylindrical height. Each MPC consists of a honeycombed fuel basket made from panels of Metamic-HT, baseplate, canister shell, lid, and closure ring.

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

The MPC steel spacers, made of a cylindrical steel shell with flat ends and positioned at both ends of the MPC, may be used to transport MPCs of various lengths to restrict axial movements and control the center of gravity of the package.

Two identical impact limiters, fabricated of aluminum honeycomb completely enclosed by an all-welded austenitic stainless steel skin, are attached to the top and bottom of the overpack with 16 bolts.

The personnael barrier, placed over the package lying in a horizontal orientation during transport, is a packaging component when in use. It provides a physical barrier to prevent access to hot areas of the package.

The HI-STAR 190 packaging includes two versions, SL for a standard cavity length of 190 3/16 inches or XL for an extended cavity length of 213 5/16 inches, to accommodate all canisters. The SL version weighs approximately 238,944 pounds and the XL version weighs 260, 567 pounds. The closure lid sub-assembly weighs the same, 12,987 pounds, in each configuration. The maximum gross weight for transportation (including the overpack, the MPC, the contents, and the impact limiters) is nominally 417,000 pounds.

(3) Drawings

(a) HI-STAR 190 Cask Assembly Drawing 9841, Sheets 1-5, Rev. 1

(b) MPC-37 Enclosure Vessel Drawing 6505, Sheets 1-4, Rev. 19

(c) MPC-37 Fuel Basket Drawing 6506, Sheet 1, Rev. 13

(d) MPC-89 Fuel Basket Drawing 6507, Sheet 1, Rev. 12

(e) MPC-89 Enclosure Vessel Drawing 6512, Sheets 1-3, Rev. 20

(f) HI-STAR 190 Impact Limiter Drawing 9848, Sheets 1-3, Rev. 1

(g) Damaged Fuel Container (DFC) Drawing 10234, Sheets 1-5, Rev. 0

(h) HI-STAR 190 MPC Spacer Ring Drawing 9849, Sheet 1, Rev. 0

(b) Contents

(1) Type and form of material

(a) PWR and BWR fuel assemblies with the characteristics listed in Tables 7.C.1, 7.C.2, and 7.C.3 of the application, and with fuel assembly cross section characteristics as defined in Section 6.D.5 of the application.

(b) Damaged fuel assemblies and fuel debris meeting the configurations described in Table 7.C.5 for PWR fuel assemblies and Table 7.C.6 for BWR fuel assemblies.

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5(b) Contents (Continued)

(2) Maximum quantity of material per package:

37 Pressurized Water Reactor (PWR) fuel assemblies in the MPC-37.

89 Boiling Water Reactor (BWR) fuel assemblies in the MPC-89.

6. The Criticality Safety Index (CSI) is 0.0.

7. In addition to the requirements of Subpart G of 10 CFR Part 71:

(a) The package shall be prepared for shipment and operated in accordance with the Operating Procedures in ~~Section~~Chapter 7 of the application; and

(b) The package must meet the Acceptance Tests and Maintenance Program ~~of Section 8.0~~in Chapter 8 of the application.

8. Additional operating requirements of the Model No. HI-STAR 190 package include:

(a) Verification that the fuel assemblies to be placed in the MPC meet the post-irradiation minimum cooling time, maximum burnup, maximum decay heat load, and minimum initial enrichment per assembly, as listed in Tables 7.C.8 and 7.C.10 for the MPC-37 and the MPC-89, respectively.

(b) For burnup values not listed in Tables 7.C.8(a), 7.C.8(b), and 7.C.10, minimum enrichment and minimum cooling time can be determined by linear interpolation, except for the bottom two lines, between 45,000 and 60,000 MWd/MTU, of Table 7.C.8(b). Interpolations are only permitted between values within a single column (same heat load) and only if the cooling time increases with burnup.

(c) Verification of the burnup of PWR spent fuel assemblies that need to meet the burnup requirements specified in Table 7.C.4(a) of the application, in accordance with Appendix 7.D of the application.

(d) ~~For PWR fuel assemblies that need to meet the burnup requirements specified in Table 7.C.4(a) of the application, verification that control rod insertion did not exceed eight inches from the top of the active fuel during full power operation. Fuel assemblies for which this requirement is not satisfied may be transported in Configuration 2 of the MPC-37 canister, in basket cells intended for fresh fuel assemblies~~Deleted.

(e) Verification of the allowable heat load patterns for loading, as identified in Table 7.C.7 for the MPC-37 and Table 7.C.9 for the MPC-89, with cell identifications shown in Figures 7.C.1 and 7.C.2 respectively.

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8. Additional operating requirements of the Model No. HI-STAR 190 package (continued)

(f) Undamaged PWR or BWR fuel assemblies may have missing fuel rods, provided they are replaced with a dummy rod that displaces an equal or greater volume of water than the fuel rod.

(g) Low-enriched, channeled BWR fuel, for which the cladding condition is indeterminable, may be transported in the MPC-89 canister. For this fuel, the channel must be attached to the fuel assembly, must be essentially undamaged, and the maximum planar average initial enrichment of the assembly must be less than or equal to 3.3 weight percent ^{235}U. When present in the canister, all intact fuel is also limited to 3.3 weight percent ^{235}U initial maximum planar average enrichment.

9. Additional acceptance test requirements of the Model No. HI-STAR 190 package include:

(a) In addition to the radial points described (three cross sectional planes through the radial shield and at four points along each plane's circumference) in Section 8.1.6 and 8.2.3.2 for the shielding effectiveness tests and the periodic neutron shield tests respectively, points on the axial bottom of the package (impact limiter) shall also be included. For the package to be acceptable for use, the measured dose rates must not exceed the calculated dose rates. Measurements that exceed the calculated dose rates will require appropriate corrective actions to be taken.

(b) For the shielding effectiveness tests, as described in Section 8.1.6 of the application, measurements of radiation levels of both gamma and neutrons shall be performed.

(c) Prior to transport of MPCs containing high burnup fuel previously in dry storage for periods exceeding 5 years, a minimum of 20% of the MPCs to be shipped shall be subject to eddy current testing (ECT) capable of identifying surface defects (flaws) of depth, per the criteria in Table 8.1.13 of the application, anywhere on the external cylindrical surface of the MPC enclosure vessel. Any MPC identified to have a surface defect exceeding the maximum allowable flaw depth specified in Table 8.1.13 is not acceptable for transport, and shall require the remaining 80% of the MPCs to be shipped to undergo ECT. ECT inspections for a given shipment shall not be credited for future shipments.

10. The personnel barrier shall be installed and remain installed during transport, if necessary to meet package surface temperature and/or package dose rates requirements.

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

12. The package authorized by this certificate is hereby approved for use under the general license provisions of 10 CFR 71.17.

13. Expiration date: ~~August 31, 2022~~TBD.

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REFERENCES

Holtec International Report No. HI-2146214 *SafetyAnalysis Report on the HI-STAR 190 Cask System* Revision ~~1~~TBD, dated ~~June 8, 2017~~TBD.

FOR THE U.S. NUCLEAR REGULATORY COMMISSION

John McKirgan, Chief
Spent Fuel Licensing Branch
Division of Spent Fuel Management
Office of Nuclear Material Safety
and Safeguards

Date: ~~August 8, 2017~~TBD.