DOE Form EV-618
(11-77)
10 CFR 71

U.S. DEPARTMENT OF ENERGY

CERTIFICATE OF COMPLIANCE

For Radioactive Materials Packages

1a. Certificate Number	1b. Revision No.	1c. Package Identification No.	1d. Page No.	1e. Total No. Pages.
5507	8	USA/5507/BLF (DOE-OR)	1	3

2. PREAMBLE

2a. This certificate is issued to satisfy Sections 173.393a, 173.394, 173.395, and 173.396 of the Department of Transportation Hazardous Materials Regulations (49 CFR 170-189).

2b. The packaging and contents described in item 5 below, meets the safety standards set forth in Subpart C of Title 10, Code of Federal Regulations, Part 71, "Packaging of Radioactive Material for Transport and Transportation of Radioactive Material Under Certain Conditions."

2c. 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—

(1) Prepared by (Name and address):	(2) Title and Identification of report or application:	(3) Date:
Oak Ridge National Laboratory Post Office Box X Oak Ridge, TN 37830	a. Safety Analysis Report for Packaging (SARP)--HFIR Spent Fuel Element Shipping Cask Report No.: ORNL/ENG/TM-12 (continued on next page)	November 1977

4. CONDITIONS

This certificate is conditional upon the fulfilling of the requirements of Subpart D of 10 CFR 71, as applicable, and the conditions specified in item 5 below.

5. Description of Packaging and Authorized Contents, Model Number, Fissile Class, Other Conditions, and References:

(a) Packaging:

(1) Model: HFIR (High Flux Isotope Reactor) Spent Fuel Element Shipping Cask

(2) Description:

Packaging for irradiated fuel elements and irradiated UCC primary ^{99}Mo target capsules. The inner cavity is 17-7/8-in. diameter x 32-in. deep. The internal configuration is determined by the type of fuel elements being shipped as follows:

(i) For HFIR fuel elements--a removable post consisting of aluminum wrapped with cadmium is centered in the cavity. The fuel assembly (1 inner element and 1 outer element) is positioned in the cavity by a concentric fuel basket fabricated of stainless steel clad cadmium.

(ii) For ORR (Oak Ridge Research Reactor) type fuel elements which also include BSR (Bulk Shielding Reactor) fuel elements, for PRR (Puerto Rico Research Reactor) fuel elements, and for CP-5 (Chicago Pile No. 5) fuel assemblies--the fuel elements are positioned in the cavity by a magazine fabricated of stainless steel clad cadmium. The primary ^{99}Mo target capsules will be positioned in the same magazine. Adapters will be utilized to hold the capsules in the magazine. The center post is removed.

6a. Date of Issuance: August 2, 1982	6b. Expiration Date: August 1, 1987

FOR THE U.S. DEPARTMENT OF ENERGY

7a. Address (of DOE Issuing Office)	7b. Signature, Name, and Title (of DOE Approving Official)
US Department of Energy Post Office Box E Oak Ridge, TN 37830	William H. Travis William H. Travis, Director Safety & Environmental Control Division

3.(2) (Continued)

b. Memorandum, R. M. Moser to William H. Travis, December 30, 1975.

c. Memorandum, R. M. Moser to William H. Travis, October 27, 1976.

d. Letter, M. E. Ramsey to J. A. Lenhard, July 26, 1979.

e. Letter, K. W. Sommerfeld to J. A. Lenhard, July 29, 1982.

5. (Continued)

(iii) For PRNC (Puerto Rico Nuclear Center) TRIGA/FLIP type fuel assemblies--the fuel assemblies are positioned in the cavity by a steel, aluminum, and elastomer basket. The center post is removed.

Shielding consists of a nominal 8-3/4-in. thickness of lead between 1/2-in. thick stainless steel inner and outer liners. Overall dimensions are 46-3/8-in. diameter x 72-1/2-in. high. Access to the cavity is through a top plug having 14 1-1/2-in. alloy steel studs. The gross weight is 23,000 lb.

(3) Drawings:

The cask and modifications are described in Oak Ridge National Laboratory Drawings: M-10191-EL-001-D through -006-D, -007-C, and -008-D through 012-D.

The PRNC TRIGA/FLIP fuel basket is described in Argonne National Laboratory Drawing No.: W-0170-0090-DE-00.

(b) Contents:

(1) Type and Form of Material

Solid, large quantity of radioactive materials, fissile encased in metal cladding as irradiated fuel elements OR as irradiated primary ^{99}Mo target capsules.

(2) Maximum quantity of fissile material per package

(i) One HFIR irradiated fuel assembly containing up to 9,500 g of ^{235}U as uranium oxide at a ^{235}U enrichment up to 93%.

(ii) Seventeen ORR-type irradiated fuel elements (These fuel elements are also referred to as MTR-type fuel elements. Other MTR-type fuel elements with up to 400 g ^{235}U loading and construction similar to the ORR fuel elements are also authorized.) each containing up to 400 g of ^{235}U as uranium-aluminum alloy at a ^{235}U enrichment up to 93% for a maximum ^{235}U content of 6,800 g.

(iii) Seventeen irradiated PRR fuel elements each containing up to 192 g of ^{235}U as uranium oxide as a ^{235}U enrichment up to 20% for a maximum ^{235}U content of 3,264 g.

(iv) Seventeen irradiated ANL-CP-5 fuel assemblies each containing up to 170 g of ^{235}U as uranium-aluminum alloy at a ^{235}U enrichment up to 93% for a maximum ^{235}U content of 2,890 g.

(v) Forty-eight PRNC TRIGA/FLIP irradiated fuel assemblies, cooled for at least 30 days, each containing up to 125 g ^{235}U as a uranium-zirconium hydride mixture, with a ^{235}U enrichment of 70%, for a maximum ^{235}U content of 6,000 g.

(vi) Four irradiated primary ^{99}Mo target capsules, cooled for eight hours after an irradiation period of less than 30 days, each containing up to 20 g of ^{235}U at 93% ^{235}U enrichment, for a maximum ^{235}U content of 80 g.

The heat load is $\leq$ 3.57 kw.

(c) Fissile Class III

OAK RIDGE NATIONAL LABORATORY
OPERATED BY
UNION CARBIDE CORPORATION
NUCLEAR DIVISION

POST OFFICE BOX X
OAK RIDGE, TENNESSEE 37830

July 29, 1982

Department of Energy, Oak Ridge Operations
Attention: Mr. J. A. Lenhard, Assistant Manager
for Energy Research and Development
Post Office Box E
Oak Ridge, Tennessee 37830

Gentlemen:

Request for Revision to Certificate of Compliance
No. 5507, HFIR Spent-Fuel-Element Cask

We request that the subject Certificate of Compliance be revised to permit shipment of ORR fuel containing up to 350 grams of ^{235}U. This change will permit the shipment of low and medium enriched fuel currently being tested in the ORR, and will bring the certificate into agreement with ^{235}U limits in the ORR Technical Specifications.

The attached letter, Nuclear Criticality Safety Addendum to ORNL-HFIR Spent-Fuel-Element Shipping Cask, J. T. Thomas to R. V. McCord, indicates that the shipment of fuel elements with initial fuel content as high as 400 grams of ^{235}U per element is acceptable.

Very truly yours,

K. W. Hammerfeld
Executive Director for
Support and Services

KWS:SSH:mca

Attachment

cc: J. H. Evans
R. F. Hibbs, w/o attachment
H. Postma, w/o attachment
W. R. Ragland, w/o attachment
J. H. Swanks (6)
W. E. Terry
File - RC

UNION CARBIDE

NUCLEAR DIVISION

copies forwarded by RVM:
B. L. Corbett
S. S. Hurt

1/25/82 - ma

January 21, 1982

R. V. McCord

Nuclear Criticality Safety Addendum to the ORNL-HFIR Spent-Fuel-Element Shipping Cask

Under the present Nuclear Safety Request No. 7851 ORR elements containing 300 g ^{235}U or less may be shipped in the HFIR carrier. A recent study, "Criticality Assessment of Basket Designs for Use in the MH-1A Shipping Cask", ORNL/CSD/TM-172, demonstrates that the presence of a strong thermal neutron absorber in the shipping cask renders the cask k_{eff} insensitive to increases in the ^{235}U loading in the range from 250 to 380 g ^{235}U per element. Since cadmium is positioned in the HFIR cask in a distribution more favorable than the Boral proposed for the MH-1A cask it is reasonable not to expect a change in the k_{eff} of the HFIR carrier were ORR elements containing ~400 g ^{235}U per element to be shipped. In the absence of the absorber, an estimate of the Δk_{eff} expected for a Δm increase of 100 g ^{235}U to the elements of a critical system would be about 0.05. Further, elements which have experienced ~25% ^{235}U burnup, ignoring the presence of fission products, can be expected to evidence a $-\Delta k$ of ~0.06 compared to the initial loading.

It is concluded, therefore, that the shipment of spent fuel elements containing initial loadings as great as 400 g ^{235}U per element would not compromise the level of subcriticality in the use of the HFIR carrier.

J. T. Thomas
Chairman, Criticality Committee

JTT:jh

cc: H. G. Burger
Criticality Committee
William A. Pryor, ORO