



UNITED STATES
NUCLEAR REGULATORY COMMISSION
WASHINGTON, D.C. 20555-0001

October 25, 2012

Dr. James M. Shuler
Manager, DOE Packaging Certification Program
U.S. Department of Energy
Office of Packaging and Transportation
EM-33, CLOV-2047
1000 Independence Ave., SW
Washington, DC 20585

SUBJECT: REVISION NO. 18 OF CERTIFICATE OF COMPLIANCE NO. 5797

Dear Dr. Shuler:

As requested by your letter dated June 28, 2012, enclosed is Certificate of Compliance No. 5797, Revision No. 18, for the Model No. Inner and Outer HFIR Unirradiated Fuel Element Shipping Containers. Changes made to the certificate are indicated by vertical lines in the margin. The staff's Safety Evaluation Report is also enclosed.

This approval constitutes authority to use the package for shipment of radioactive material and for the package to be shipped in accordance with the provisions of 49 CFR 173.471.

If you have any questions regarding this certificate, please contact Pierre Saverot of my staff at (301) 492-3408.

Sincerely,

for 

Michael D. Waters, Chief
Licensing Branch
Division of Spent Fuel Storage and Transportation
Office of Nuclear Material Safety
and Safeguards

Docket No. 71-5797
TAC Nos. L24671, L24674

Enclosures: 1. Certificate of Compliance No. 5797, Rev. No. 18
2. Safety Evaluation Report

cc w/encls: R. Boyle, Department of Transportation
Registered Users

**CERTIFICATE OF COMPLIANCE
FOR RADIOACTIVE MATERIAL PACKAGES**

1.	a. CERTIFICATE NUMBER	b. REVISION NUMBER	c. DOCKET NUMBER	d. PACKAGE IDENTIFICATION NUMBER	PAGE	PAGES
	5797	18	71-5797	USA/5797/B(U)F	1 OF	3

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 (<i>Name and Address</i>)
U.S. Department of Energy
Washington, D.C. 20585 | b. TITLE AND IDENTIFICATION OF REPORT OR APPLICATION
U.S. Department of Energy
application dated May 30, 1991,
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.: Inner HFIR Unirradiated Fuel Element Shipping Container, and Outer HFIR Unirradiated Fuel Element Shipping Container

(2) Description

Packaging for unirradiated fissile radioactive material as fuel elements for the High Flux Isotope Reactor (HFIR). The containers are right circular cylinders with an 11-gauge carbon steel shell. The lid is attached to the container with sixteen 3/8-16x1-inch steel bolts. The steel shell is filled with stacked fir plywood rings. The plywood rings form a central cavity which is lined with 1-inch thick polyethylene foam.

The packaging for the inner HFIR fuel element has overall dimension of 25 inches OD by 45 inches high, a 10-7/8-inch diameter by 30-1/4-inch deep cavity, and a 660 pound gross weight.

The packaging for the outer HFIR fuel element has overall dimensions of 31.5 inches OD by 45.75 inches high, a 17-3/8-inch diameter by 31-1/8-inch deep cavity, and a 1,050 pound gross weight.

(3) Drawings

- (i) The packaging for the inner HFIR fuel is constructed in accordance with Martin Marietta Energy Systems, Inc., Drawing Nos. M-20978-EL-003E, Rev. F, and M-20978-EL-008E, Rev. C.

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1.	a. CERTIFICATE NUMBER	b. REVISION NUMBER	c. DOCKET NUMBER	d. PACKAGE IDENTIFICATION NUMBER	PAGE	PAGES
	5797	18	71-5797	USA/5797/B(U)F	2 OF	3

5. (a) (3) Drawings (continued)

(ii) The packaging for the outer HFIR fuel is constructed in accordance with Martin Marietta Energy Systems, Inc., Drawing Nos. M-20978-EL-002E, Rev. E, and M-20978-EL-008E, Rev. C.

(b) Contents

(1) Type and form of material

Uranium as U_3O_8 -Al cermet, enriched up to 95% in the U-235 isotope, and clad in aluminum, 10-mils thick, and:

(i) For the packaging described in 5(a)(3)(i), the contents are described in ORNL/RRD/INT-37-V3, "Specification for High Flux Isotope Reactor Fuel Elements RRD-FE-3," Revision 4, and in the following Oak Ridge National Laboratory Drawing Nos.: E-42118, Rev. R; E-42112, Rev. H; D-42113, Rev. G; D-42114, Rev. K, and E-42117, Rev. H.

(ii) For the packaging described in 5(a)(3)(ii) the contents are described in ORNL/RRD/INT-37-V3, "Specification for High Flux Isotope Reactor Fuel Elements RRD-FE-3," Revision 4, and in the following Oak Ridge National Laboratory Drawing Nos.: E-42126, Rev. N; E-42120, Rev. H; D-42121, Rev. H; D-42122, Rev. K, and E-42125, Rev. J.

(2) Maximum quantity of material per package

(i) For the contents described in 5(b)(1)(i) not more than 2.63 kg of U-235.

(ii) For the contents described in 5(b)(1)(ii) not more than 6.88 kg of U-235.

(c) Criticality Safety Index  0.4

6. The lid lifting attachments must be blocked as shown on Martin Marietta Energy Systems, Inc., Drawing No. M-20978-EL-009E, Rev. 2, to prevent inadvertent use of the attachments during transport.

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	5797	18	71-5797	USA/5797/B(U)F	3 OF	3

7. In addition to the requirements of Subpart G of 10 CFR Part 71:
- (a) Each package shall be maintained in accordance with the Maintenance Program in Chapter 8 of the application;
 - (b) Each package shall be operated and prepared for shipment in accordance with the Operating Procedures in Chapter 7 of the application; and
 - (c) The fuel element shall meet the fabrication inspection requirements of ORNL/RRD/INT-37-V3, "Specification for High Flux Isotope Reactor Fuel Elements RRD-FE-3," Revision 4.
8. Use of packaging fabricated after December 31, 1976, is not authorized.
9. The packaging authorized by this certificate is hereby approved for use under the general license provisions of 10 CFR 71.17.
10. Transport by air of fissile material is not authorized.
11. Expiration date: October 31, 2017.

REFERENCES

U.S. Department of Energy Application dated May 30, 1991.

Supplements dated: February 26, 1992; April 2, 1993; September 23, 1996; September 2, 1998; February 24, 2000; February 4, 2002; August 20, 2007; and October 29, 2007; June 28, 2012.

FOR THE U.S. NUCLEAR REGULATORY COMMISSION



for

Michael D. Waters, Chief
Licensing Branch
Division of Spent Fuel Storage and Transportation
Office of Nuclear Material Safety
and Safeguards

Date: October 25, 2012.



UNITED STATES
NUCLEAR REGULATORY COMMISSION
WASHINGTON, D.C. 20555-0001

SAFETY EVALUATION REPORT

Docket No. 71-5797

Model No. Inner and Outer HFIR Unirradiated Fuel Element Shipping Containers

Certificate of Compliance No. 5797

Revision No. 18

SUMMARY

By application dated June 28, 2012, the U.S. Department of Energy (the applicant) submitted a request for renewal of Certificate of Compliance (CoC) No. 5797 for the Inner and Outer HFIR Unirradiated Fuel Element Shipping Containers. The submittal included minor updates to two of the container drawings, four of the fuel drawings and a revised fuel specification to accommodate improved fuel inspection techniques, and updated material specifications and more appropriate standards.

The certificate has been renewed for a five year term expiring on October 31, 2017.

EVALUATION

By letter dated June 28, 2012, the applicant submitted a renewal request, meeting the timely renewal requirements of 10 CFR 71.38(b), for CoC No. 5797. The applicant also requested that the CoC be revised to reflect revisions of two of the container drawings and four of the fuel drawings along with the addition of the latest revision of the fuel specifications. These changes were made to accommodate improved fuel inspection techniques, more appropriate standards, and current intermediate material specifications. The fuel design and base fabrication process are unchanged; thus, the physical form of the fuel remains also unchanged.

Staff reviewed the proposed change in Section VI.A.6, 7, 9, "General Fuel Plate Requirements," from "plate thickness uniformity after cold rolling of ± 0.0002 -inches," to "plate thickness uniformity after cold rolling of ± 0.0005 -inches." Staff noted that the applicant justified that the hot roll anneal temperature and plate lot thickness uniformity changes have no physical effect on the structural properties of the fuel. Staff believes that (i) neither the nominal weight nor shape of the fuel has changed, (ii) the existing drop calculations are still bounding, and (iii) no revisions are required to the structural evaluations of the package. Staff determined that the proposed change will not compromise the safety function of the package, and that the new ± 0.0005 -inch thickness uniformity will satisfy the requirements of 10 CFR Part 71. Also, the addition of a marking in compliance with 49 CFR 172, Appendix B, is of no safety significance.

The applicant clarified the standards/specifications that are referenced in the new specification revision but were not listed in the previous Revision 0 (ORNL/TM-9220). Those standards are the following: MS-106, NQA-1:2000 Part 1, MMP-4110, AWS-D1.2-1997, ORNL/TM-2000/309, ORNL-313, ORNL-311, EPRI-NP-5652, ASTM B-241, ANSI/ANS-8.21, RRD-JS-24, and SNT-

TC-1A. The staff found that the processes in place to fabricate the fuel did not change as a result of the implementation of updated standards and that the form, fit, and function of the fuel assembly for operation in the reactor was not altered using these new or updated standards. The applicant explained that, for example, the replacement of specification WW-T-700/6c with an equivalent ASTM B-241 specification for aluminum tubes required no changes (other than editorial) to the fabrication procedures/processes.

The applicant clarified that the radiography of HFIR fuel elements is mainly performed by digital radiography. The applicant also explained that operating procedures currently in use at the fuel fabrication vendor were developed with guidance from ASTM E-142 but, since this standard is withdrawn, it is not referenced in RRD-FE-3, Rev. 4. All operating procedures at the fuel fabrication vendor for HFIR fuel elements are required by Section 12.2 of RRD-FE-3, Rev. 4 to be reviewed and approved by ORNL prior to implementation. This review ensures that ORNL personnel approve any change in the process which could affect the quality of the finished assembly, which includes radiography. The staff finds that the materials and specification requirements discussed in the application are acceptable and provide reasonable assurance for the safety of the package.

Staff did not find any changes that would significantly impact the thermal material properties used in normal conditions of transport (NCT) or hypothetical accident conditions (HAC) analysis. Staff also did not find any changes that would significantly modify the dimensions assumed in the thermal analysis and, therefore, there would be no significant changes to the predicted temperature results of the NCT or HAC analyses. The staff also notes that the predicted temperature of the contents is well below the auto-ignition temperature of the polyethylene wrapping that can be used as packaging material for the unirradiated inner and outer HFIR element assemblies.

Similarly, staff did not identify any changes that would affect the conclusions or assumptions used in the applicant's nuclear criticality safety analysis. Staff did not find any changes that would alter the neutronic characteristics of the fuel elements.

Based on the statements and representations in the application, as supplemented, staff concludes that the proposed changes to the CoC are acceptable and do not affect the ability of the package to meet the requirements of 10 CFR Part 71.

The following revisions to the certificate have been made:

Condition No. 5(a)(3)(i) was modified to include revised drawings.

Condition No. 5(a)(3)(ii) was modified to reference revised drawings.

Condition No. 5(b)(1)(i) was modified to reference revised drawings and Revision 4 of the specifications for the HFIR fuel elements.

Condition No. 5(b)(1)(ii) was modified to reference revised drawings and Revision 4 of the specifications for the HFIR fuel elements.

Condition No. 7(c) was modified to reference the fabrication requirements of Revision 4 of the HFIR fuel elements specifications.

Condition No. 11 was modified to change the expiration date of the certificate to October 31, 2017.

The references section includes the June 28, 2012, amendment request submittal.

CONCLUSION

Based on the statements and representations in the application, as supplemented, and the conditions listed above, the staff concludes that the design has been adequately described and evaluated and meets the requirements of 10 CFR Part 71.

The certificate has been renewed for a five year term that expires on October 31, 2017.

Issued with Certificate of Compliance No. 5797, Revision No. 18,
on October 25, 2012.