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	PAGE
9330	17	71-9330	USA/9330/AF-96	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

a. ISSUED TO *(Name and Address)*

U.S. Department of Energy
Washington, DC 20585

b. TITLE AND IDENTIFICATION OF REPORT OR APPLICATION

Safety Analysis Report, Advanced Test Reactor Fresh Fuel Shipping Container, ATR FFSC, Revision No. 17, dated May 2022.

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.: ATR FFSC

(2) Description

An insulated stainless steel package for the transport of unirradiated research reactor fuel, including intact fuel elements or fuel plates. The packaging consists of (1) a body, (2) a closure lid, and (3) inner packaging internals. The approximate dimensions and weights of the package are:

Overall package outer width and height	8 inches
Overall package length	73 inches
Cavity diameter	5-3/4 inches
Cavity length	68 inches
Packaging weight (without internals)	240 pounds
Maximum package weight (including internals and contents)	299 pounds

The body is composed of two thin-walled, stainless steel shells. The outer shell is a square tube with an 8-inch cross section, a 73-inch length, and a 3/16 inch wall thickness. The inner shell is a round tube with a 6-inch diameter and a 0.120-inch wall thickness. The inner tube is wrapped with ceramic fiber thermal insulation, overlaid with a stainless steel sheet. At the bottom end, the shells are welded to a 0.88-inch thick stainless steel base plate. At the top end (closure end), the shells are welded to a 1.5-inch thick stainless steel flange.

5.(a)(2) Description (Continued)

The closure is composed of circular stainless steel plates with ceramic fiber insulation. The closure engages the top end flange by way of four bayonets that are rotated and secured by two spring pins. The closure is equipped with a handle, which may be removed during transport. The closure does not have a gasket or seal.

The package internals consist of either a Fuel Handling Enclosure (FHE) for intact fuel elements and Design Demonstration Elements (DDE), or a Loose Fuel Plate Basket. The NBSR DDE does not utilize a FHE.

(3) Drawings

The packaging is constructed and assembled in accordance with the following Areva Federal Services LLC. or Packaging Technology, Inc., Drawing Nos.:

60501-10, Sheets 1-5, Rev. 3	ATR Fresh Fuel Shipping Container SAR Drawing
60501-20, Rev. 1	ATR Loose Plate Basket Assembly
60501-30, Rev. 1	ATR Fuel Handling Enclosure
60501-40, Rev. 0	MIT Fuel Handling Enclosure
60501-50, Rev. 0	MURR Fuel Handling Enclosure
60501-60, Rev. 0	RINSC Fuel Handling Enclosure
60501-70, Rev. 0	Small Quantity Payload Fuel Handling Enclosure
60501-90, Rev. 0	COBRA Fuel Handling Enclosure

(b) Contents

(1) Type and form of material

Unirradiated ATR HEU fuel element. Each ATR HEU fuel element contains up to 1,200 g U-235, enriched up to 94 wt.% U-235. The fuel fissile material is uranium aluminide (UAL_x) and the cladding and structural materials are aluminum alloy. The nominal fissile material thickness is 0.02 inches and the nominal fuel plate thickness varies between 0.050 and 0.100 inches. The maximum channel thickness between fuel plates is 0.087 inches. The ATR HEU fuel elements contain 19 fuel plates, swaged into the fuel element side plates.

5.(b)(1) Type and Form of Material (continued)

The fuel element may be bagged and must be contained in the ATR FHE.

Unirradiated ATR LEU fuel element. Each ATR LEU fuel element contains up to 1,681 g U-235, enriched up to 20 wt.% U-235. The fuel fissile material is U-10Mo and the cladding and structural materials are aluminum alloy. The nominal fissile material thickness varies between 0.008 inches and 0.016 inches. The plate thickness varies between 0.050 inches and 0.100 inches thick, with a 0.001-inch thick layer of zirconium between the fuel meat and the cladding. The nominal channel thickness between fuel plates is 0.078 inches. The ATR LEU fuel elements contain 19 fuel plates, swaged into the fuel element side plates. The fuel element may be bagged and must be contained in the ATR FHE.

Unirradiated MIT HEU fuel element. Each MIT HEU fuel element contains up to 515 g U-235, enriched up to 94 wt.% U-235. The fuel fissile material is uranium aluminide (UAL_x) and the cladding and structural materials are aluminum alloy. The nominal fissile material thickness is 0.030 inches, and the plates are nominally 0.080 inches thick. The maximum channel thickness between fuel plates is 0.090 inches. The MIT HEU fuel elements contain 15 fuel plates, swaged into the fuel element side plates. The fuel element may be bagged and must be contained in the MIT FHE.

Unirradiated MIT LEU fuel element and DDE. Each MIT LEU fuel element contains up to 1,070 g U-235, enriched up to 20 wt.% U-235. The fuel fissile material is U-10Mo and the cladding and structural materials are aluminum alloy. The nominal fissile material thickness varies between 0.013 inches and 0.025 inches, and the plates are nominally 0.049 inches thick, with a 0.001-inch thick layer of zirconium between the fuel meat and the cladding. The maximum channel thickness between fuel plates is 0.082 inches. The MIT LEU fuel elements contain 19 fuel plates, swaged into the fuel element side plates. The MIT LEU DDE has the same U-235 mass, enrichment, plate and swaging design, and number of plates as the MIT LEU fuel element. The fuel element may be bagged and must be contained in the MIT FHE.

Unirradiated MURR HEU fuel element. Each MURR HEU fuel element contains up to 785 g U-235, enriched up to 94 wt.% U-235. The fuel fissile material is uranium aluminide (UAL_x) and the cladding and structural materials are aluminum alloy. The nominal fissile material thickness is 0.020 inches, and the plates are nominally 0.050 inches thick. The maximum channel thickness between fuel plates is 0.090 inches. The MURR HEU fuel elements contain 24 fuel plates, swaged into the fuel element side plates. The fuel element may be bagged and must be contained in the MURR FHE.

Unirradiated MURR LEU fuel element and DDE. Each MURR LEU fuel element contains up to 1,660 g U-235, enriched up to 20 wt.% U-235. The fuel fissile material is U-10Mo and the cladding and structural materials are aluminum alloy. The nominal fissile material thickness varies between 0.009 inches and 0.020 inches. The plate thickness varies between 0.044

5.(b)(1) Type and Form of Material (continued)

inches and 0.049 inches thick, with a 0.001-inch thick layer of zirconium between the fuel meat and the cladding. The nominal channel thickness between fuel plates is 0.092 inches to 0.093 inches. The MURR LEU fuel elements contain 23 fuel plates, swaged into the fuel element side plates. The MURR LEU DDE has the same U-235 mass, enrichment, plate and swaging design, and number of plates as the MURR LEU fuel element. The fuel element may be bagged and must be contained in the MURR FHE.

Unirradiated NBSR DDE. Each NBSR DDE contains up to 460 g U-235, enriched up to 20 wt.% U-235. The fuel fissile material is U-10Mo and the cladding and structural materials are aluminum alloy. The nominal fissile material thickness is 0.0085 inches, and the plates are nominally 0.050 inches thick, with a 0.001-inch thick layer of zirconium between the fuel meat and the cladding. The nominal channel thickness between fuel plates is 0.116 inches. The NBSR DDE contains 17 fuel plates in each of two sections for a total of 34 separate fuel plates, swaged into the DDE side plates. The NBSR DDE may be bagged and must be blocked within the packaging using up to 4 kg of cellulosic material such as cardboard.

Small Quantity Payloads where the maximum mass of U-235 is 400 grams and maximum U-235 enrichment is 94 weight percent. The Small Quantity Payload must be in the form of unirradiated foils, fuel plates or fuel elements and miscellaneous non-fueled associated components. The Small Quantity Payload must not include beryllium, carbon, deuterium, or materials with a hydrogen density greater than that of water, except as specified in 6. The Small Quantity Payload must be contained within the Small Quantity Payload Fuel Handling Enclosure, as specified in 5(a)(3), except the RINSC fuel element must be contained within the RINSC Fuel Handling Enclosure, as specified in 5(a)(3). Aluminum plates, shapes, and sheets, miscellaneous steel or aluminum fasteners, and cellulosic material such as cardboard may be used as dunnage to fill gaps between the small quantity payloads and the small quantity FHE. Loose plates may be separated by craft paper and taped or wire tied together. Dunnage shall be used to limit motion of the small quantity payload within the FHE to 1/4” or less. 1/8” neoprene strips may be used between the small quantity FHE and small quantity payloads and/or between the optional aluminum dunnage and the small quantity payload. The 1/8” neoprene strips shall not be stacked in more than two layers between the small quantity payload and any interior face of the small quantity FHE.

COBRA fuel element. The COBRA HEU fuel element is composed of uranium aluminide (UAl_x) dispersed in aluminum powder, with the uranium enriched to a maximum of 94 weight percent U-235. The COBRA LEU fuel element is composed of uranium silicide (U_3Si_2) dispersed in aluminum powder, with the uranium enriched to a maximum of 20 weight percent U-235. The maximum mass of U-235 is 410.3 grams in the HEU configuration or 450 grams in the LEU configuration. The COBRA fuel element weighs a maximum of 20 lb., is bagged, and must be contained within the COBRA Fuel Handling Enclosure.

5.(b)(1) Type and Form of Material (continued)

ATR loose fuel plates: ATR loose plates may either be flat or curved and may be banded or wire-tied in a bundle. The ATR loose plate payload is limited to 600 grams of U-235. Additional aluminum plates may be used as dunnage to fill gaps between the fuel plates and the basket payload cavity. The fuel plates must be contained within the ATR Loose Fuel Plate Basket.

(2) Maximum quantity of material per package

The maximum total weight of contents and internals, including dunnage and other secondary packaging, is 59 lbs. Radioactive contents are not to exceed a Type A quantity.

For intact ATR HEU and LEU, MURR HEU and LEU, RINSC, COBRA, MIT HEU and LEU fuel elements and for NBSR DDE: One fuel element or DDE.

For ATR loose fuel plates: A maximum of 600 grams U-235.

For Small Quantity Payloads: A maximum of 400 grams U-235.

(c) Criticality Safety Index (CSI):

For ATR HEU, MIT HEU, MURR HEU fuel elements or ATR loose fuel plates:	4.0
For ATR LEU:	4.0
For MURR LEU element and DDE, MIT LEU element and DDE:	4.0
For NBSR DDE:	4.0
For Small Quantity Payloads and RINSC:	25
For COBRA HEU and LEU fuel elements:	4.0

6. Fuel elements and fuel plates may be bagged or wrapped in polyethylene. The maximum weight of the polyethylene wrap and tape shall not exceed (i) 100 grams per package for all HEU fuel elements, ATR Loose Plates, RINSC, Small Quantity, and Cobra LEU, (ii) 200 grams per package for ATR LEU, MURR LEU, MURR DDE, MIT LEU, MIT DDE, and NBSR DDE. The maximum weight of neoprene plus cellulosic material shall not exceed 4 kg per package.

7. Types of small quantity payloads cannot be mixed in a single Fuel Handling Enclosure.

8. Air transport of fuel elements or loose plates is authorized.

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

(a) The package must be loaded and prepared for shipment in accordance with the Package Operations in Section 7 of the application.

(b) The package must be tested and maintained in accordance with the Acceptance Tests and Maintenance Program in Section 8 of the application.

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

11. Revision No. 16 of this certificate may be used until May 31, 2024.

12. Expiration date: May 31, 2029.

REFERENCES

Safety Analysis Report, Advanced Test Reactor Fresh Fuel Container (ATR FFSC), Revision 17, dated May 2022.

Renewal Request letter dated December 19, 2023.

FOR THE U.S. NUCLEAR REGULATORY COMMISSION

Yoira K. Diaz-Sanabria

Digitally signed by Yoira K. Diaz-Sanabria
Date: 2024.01.12 09:58:26 -05'00'

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

Date: January 12, 2024

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

SAFETY EVALUATION REPORT
Docket No. 71-9330
Model No. ATR-FFSC
Certificate of Compliance No. 9330
Revision No. 17

EVALUATION

By letter dated December 19, 2023, the U.S. Department of Energy (DOE) requested renewal of certificate of compliance (CoC) No. 9330, for the Model No. ATR-FFSC package.

The current certificate, Revision No. 16, expires May 31, 2024, and DOE has a continued programmatic need for use of this package. There have been no changes to the package since the CoC was amended on February 9, 2023, and no other changes were requested.

The certificate has been updated to Revision No. 17.

CONDITIONS

The following changes have been made to the CoC:

Condition No. 11 limits the validity of Revision No. 16 of the certificate to May 31, 2024.

Condition No. 12 was updated to reflect the May 31, 2029, expiration date of Revision No. 17 of the certificate.

CONCLUSION

Based on the statements and representations in the renewal request, the staff finds that these changes do not affect the ability of the package to meet the requirements of Title 10 of the *Code of Federal Regulations* Part 71.

Issued with CoC No. 9330, Revision No. 17.