Department of Energy
Washington, DC 20585

April 11, 2024

MEMORANDUM FOR LANCE L. LACROIX
MANAGER
IDAHO OPERATIONS OFFICE

FROM: JULIA C. SHENK
HEADQUARTERS CERTIFYING OFFICIAL
DIRECTOR
OFFICE OF PACKAGING AND TRANSPORTATION

Julia C. Shenk
Digitally signed by Julia C. Shenk
Date: 2024.04.11 14:33:38 -04'00'

SUBJECT: Renewal and Amendment of DOE Certificate of Compliance 9330

In response to the request from Mike McAnulty, Idaho Operations Office, dated December 6, 2023, attached is Department of Energy (DOE) Certificate of Compliance (CoC) Number 9330, Revision 2, for the Model ATR FFSC package. DOE approval is based on endorsement of Nuclear Regulatory Commission CoC Number 9330, Revision 17, and its Safety Evaluation Report (SER), issued January 12, 2024. Changes to the DOE CoC are indicated by vertical bars in the right page margin.

This CoC is issued by DOE under the authority of 49 CFR Part 173.7(d) and is conditional upon the user fulfilling the applicable Operational and Quality requirements of 49 CFR parts 100-199 and 10 CFR Part 71, and the conditions specified in Item 5 of the CoC.

The expiration date of Revision 2 is May 31, 2029.

If you have any questions, please contact me or the Docket Manager at (803) 645-3490 or lawrence.gelder@em.doe.gov.

Attachments: NRC CoC 9330 Rev. 17 & SER

cc: Mike McAunlty, NE-ID
Daryn Moorman, NE-ID
Nick Adams, BEA
Lawrence Gelder, Docket Manager
Docket 24-08-9330

U.S. DEPARTMENT OF ENERGY

DOE Packaging Certification Program

CERTIFICATE OF COMPLIANCE
For Radioactive Materials Package

OE F 5822.1
5-85 (Formerly EV-618)

1a. Certificate Number	1b. Revision No.	1c. Package Identification No.	1d. Page No.	1e. Total No. Pages
9330	2	USA/9330/AF-96 (DOE)	1	5

2. PREAMBLE

2a. This certificate is issued under the authority of 49 CFR Part 173.7(d).

2b. The packaging and contents described in Item 5 below meet the safety standards set forth in subpart E, "Package Approval Standards" and subpart F, "Package Special Form, and LSA-III Tests" Title 10, Code of Federal Regulations, Part 71.

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:
U.S. Department of Energy Idaho Operations Office 1955 Fremont Ave. Idaho Falls, ID 83415	Safety Analysis Report — Advanced Test Reactor Fresh Fuel Shipping Container (ATR FFSC), Revision No. 17, dated May 2022	May 2022

4. CONDITIONS

This certificate is conditional upon fulfilling of the applicable Operational and Quality Assurance requirements of 49CFR parts 100 – 199 and 10CFR Part 71, and the conditions specified in Item 5 below.

5. Description of Packaging and Authorized Contents, Model Number, Transport Index, other Conditions, and References:

(a) Packaging:

(1) Model Number: 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 ¾	inches
Cavity length	68	inches
Packaging weight (without internals)	240	pounds
Maximum package weight (including internals and contents)	299	pounds

6a. Date of Issuance: April 11, 2024

6b. Expiration Date: May 31, 2029

FOR THE U.S. DEPARTMENT OF ENERGY

7a. Address *(of DOE Issuing Office)*
U.S. Department of Energy
Office of Packaging and Transportation (EM-4.24)
1000 Independence Avenue, SW
Washington, DC 20585

7b. Signature, Name, and Title *(of DOE Approving Official)*

Julia C. Shenk Digitally signed by Julia C. Shenk
Date: 2024.04.11 14:42:44 -04'00'

Julia C. Shenk
Headquarters Certifying Official
Director
Office of Packaging and Transportation

The body is composed of two thin-walled, stainless steel shells. The outer shell is a square tube 8 inches in cross section, 73 inches in length, and 3/16 inch in wall thickness. The inner shell is a round tube 6 inches in diameter and 0.120 inch in 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 inches-thick stainless steel flange.

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 Plate Basket Assembly. 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., ATR Fresh Fuel Shipping Container SAR Drawing Nos.:

Drawing No.	Revision	Title
60501-10, Sheets 1-5	3	ATR Fresh Fuel Shipping Container
60501-20	1	Loose Plate Basket Assembly
60501-30	1	Fuel Handling Enclosure
60501-40	0	MIT Fuel Handling Enclosure
60501-50	0	MURR Fuel Handling Enclosure
60501-60	0	RINSC Fuel Handling Enclosure
60501-70	0	Small Quantity Payload Fuel Handling Enclosure
60501-90	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 inch and the nominal fuel plate thickness varies between 0.050 and 0.100 inch. The maximum channel thickness between fuel plates is 0.087 inch. The ATR HEU 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 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 inch and 0.016 inch. The plate thickness varies between 0.050 inch and 0.100 inch, 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 inch. 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 inch, and the plates are nominally 0.080 inch thick. The maximum channel thickness between fuel plates is 0.090 inch. 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 inch and 0.025 inch, and the plates are nominally 0.049 inch 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 inch. 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 inch, and the plates are nominally 0.050 inch thick. The maximum channel thickness between fuel plates is 0.090 inch. 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 inch and 0.020 inch. The plate thickness varies between 0.044 inch and 0.049 inch 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 inch to 0.093 inch. 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 inch, and the plates are nominally 0.050 inch 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 inch. 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 Condition (1) of this certificate. The Small Quantity Payloads must be contained within the Small Quantity Payload FHE, except the RINSC fuel element must be contained within the RINSC FHE. 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 Payload FHE. Loose plates may be separated by kraft paper and taped or wire-tied together. Dunnage shall be used to limit motion of the payload within the FHE to 1/4 inch or less. Neoprene strips, 1/8-inch thick, may be used between the Small Quantity Payload FHE and Small Quantity Payloads and/or between the optional aluminum dunnage and the payload. The 1/8-inch thick neoprene strips shall not be stacked in more than two layers between the payload and any interior face of the Small Quantity Payload 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 FHE.

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 HEU and LEU, 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

(d) Conditions:

(1) 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.

(2) Types of small quantity payloads cannot be mixed in a single Fuel Handling Enclosure.

(3) Air transport of fuel elements or loose plates is authorized.

(4) 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 Safety Analysis Report (SAR).

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

(5) Only DOE elements or persons working under contract to DOE elements shall consign the package for domestic transport.

(6) Nuclear Regulatory Commission (NRC) or Agreement State licensees shall not consign a DOE certified package for domestic transport, but can transfer the material onsite to DOE elements or persons working under contract to DOE elements for consignment of the package.

(7) This certificate supersedes all previous revisions.

(e) Supplements:

None