



U.S. Department
of Transportation

Pipeline and
Hazardous Materials
Safety Administration

East Building, PHH-23
1200 New Jersey Ave, SE
Washington, D.C. 20590

**COMPETENT AUTHORITY CERTIFICATION FOR A
TYPE B(M)F FISSILE
RADIOACTIVE MATERIALS PACKAGE DESIGN
CERTIFICATE USA/9516/B(M)F-96, REVISION 14**

The Competent Authority of the United States certifies that the radioactive material package design described in this certificate satisfies the regulatory requirements for a Type B(M)F package for fissile material as prescribed in the regulations of the International Atomic Energy Agency¹ and the United States of America² The package design is approved for use within the United States for import and export shipments made in accordance with applicable international and domestic transport regulations.

1. Package Identification - 9516.
2. Package Description and Authorized Radioactive Contents - as described in U.S. Department of Energy Certificate of Compliance No. 9516, Revision 14 (attached).
3. Criticality - The minimum criticality safety index is 0. There is no restriction on the number of packages per conveyance.
4. General Conditions -
 - a. Each user of this certificate must have in his possession a copy of this certificate and all documents necessary to properly prepare the package for transportation. The user shall prepare the package for shipment in accordance with the documentation and applicable regulations.
 - b. Each user of this certificate, other than the original petitioner, shall register his identity in writing to the Office of Engineering and Research, (PHH-23), Pipeline and Hazardous Materials Safety Administration, U.S. Department of Transportation, Washington D.C. 20590-0001.

¹ "Regulations for the Safe Transport of Radioactive Material, 2012 Edition, No. SSR-6" published by the International Atomic Energy Agency (IAEA), Vienna, Austria.

² Title 49, Code of Federal Regulations, Parts 100-199, United States of America.

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- c. This certificate does not relieve any consignor or carrier from compliance with any requirement of the Government of any country through or into which the package is to be transported.
- d. This certificate provides no relief from the limitations for transportation of plutonium by air in the United States as cited in the regulations of the U.S. Nuclear Regulatory Commission 10 CFR 71.88.
- e. Pursuant to Paragraph 558 of the IAEA Regulations, for each shipment made in accordance with this certificate, the shipper shall notify the competent authorities of each country through or into which the shipment is to be transported. The shipper shall ensure that this notification has been received by the competent authority at least 15 days prior to the commencement of the shipment.
- f. Records of Management System activities required by Paragraph 306 of the IAEA regulations¹ shall be maintained and made available to the authorized officials for at least three years after the last shipment authorized by this certificate. Consignors in the United States exporting shipments under this certificate shall satisfy the applicable requirements of Subpart H of 10 CFR 71.

5. Special Conditions -

- a. All conditions as described in Paragraph 5 (d) of U.S. Department of Energy Certificate of Compliance No. USA/9516/B(U)F-96(DOE), Revision 14.

6. Marking and Labeling - The package shall bear the marking USA/9516/B(M)F-96 in addition to other required markings and labeling.

7. Expiration Date - This certificate expires on January 1, 2030. Previous editions which have not reached their expiration date may continue to be used.

CERTIFICATE USA/9516/B(M)F-96, REVISION 14

This certificate is issued in accordance with paragraph(s) 813 and 816 of the IAEA Regulations and Section 173.471 and 173.472 of Title 49 of the Code of Federal Regulations, in response to the January 13, 2026 petition by Department of Energy, Washington, DC, and in consideration of other information on file in this Office.

Certified By:



March 03, 2026
(DATE)

 William Quade
Acting Associate Administrator for
Hazardous Materials Safety

Revision 14 - Issued to endorse DOE Certificate of Compliance
USA/9516/B(U)F-96(DOE), Revision 14.



CERTIFICATE OF COMPLIANCE For Radioactive Materials Package

Table with 5 columns: 1a. Certificate Number (9516), 1b. Revision No. (14), 1c. Package Identification No. (USA/9516/B(U)F-96 (DOE)), 1d. Page No. (1), e. Total No. Pages (8)

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 --

Table with 3 columns: (1) Prepared by (Name and address): U.S. Department of Energy Idaho Operations Office, 1955 Fremont Ave. Idaho Falls, ID 83415; (2) Title and Identification of report or application: Safety Analysis Report for Packaging (SARP) for the 9516 Package, R1033-0062-ES, Rev. 6, June 2025, as supplemented [See 5(e)]; (3) Date: June 2025

4. CONDITIONS

This certificate is conditional upon the 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: 9516 Package
(2) Description:

A stainless-steel package for the transport of plutonium oxide (PuO2) heat source material. The packaging consists of (1) a Personnel Shield, (2) a Cask with bolted lid, (3) a single-use Containment Vessel (CV) and (4) internal components for positioning the contents in the CV. The approximate dimensions and weights of the package are.

Table with 3 columns: Package Feature, Dimension/weight, Units. Rows include Overall package (h x l x w), Cask (diameter x length), Cask cavity (diameter x length), CV (diameter x length), Maximum CV weight (including internal components and contents), and Maximum package weight.

6a. Date of Issuance: November 28, 2025; 6b. Expiration Date: January 31, 2030

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 SHENK, Digitally signed by JULIA SHENK, Date: 2025.11.28 14:19:06 -05'00', Julia C. Shenk, Headquarters Certifying Official, Director, Office of Packaging and Transportation

A sketch of the package is shown in Figure 1 below:

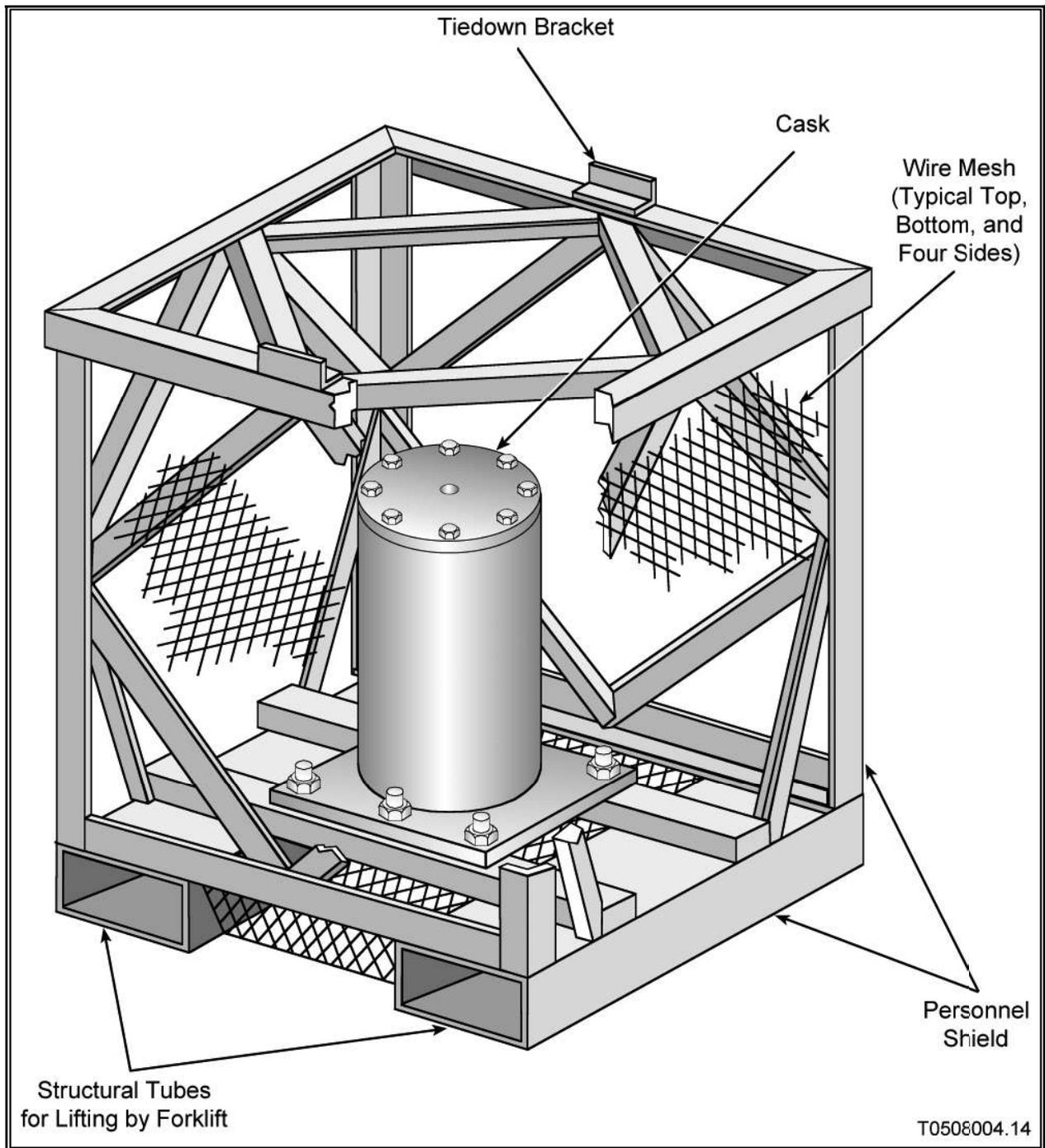


Figure 1. 9516 Package

The Personnel Shield provides a physical barrier to protect personnel from heat and radiation from the Cask, and acts as package impact limiter. It consists of a stainless-steel frame covered with an expanded metal mesh.

The Cask is the package confinement boundary. It consists of a stainless-steel cylinder with a welded bottom plate and a bolted lid. The Cask is bolted in the center of the Personnel Shield base.

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The CV (not visible in Figure 1) is the package containment boundary. It consists of a one-time use stainless-steel cylinder with welded top and bottom lids.

SARP Table 1-3 lists the internal components required for each of the 14 authorized shipping configurations, that function as dunnage material for positioning the contents in the CV. SARP Table 1-4 lists each internal component by drawing number and item number for each authorized configuration. SARP Section 1.2.2.1 describes how the PuO₂ is prepared for each shipping configuration and loading arrangement in the CV.

(3) Drawings:

| Drawing No. | Rev | Title/Notes |
|---------------|-----|--|
| 756179 | 6 | 9516 Shipping Container Cask Frame (11 Sheets) |
| 756180 | 3 | Cylinder Product Can (2 Sheets) |
| 756181 | 2 | Liner — 5.00 High Weldment (2 Sheets) |
| 756182 | 2 | Liner — 5.75 High Weldment (2 Sheets) |
| 756183 | 0 | Graphite Filler Block (1 Sheet) |
| 756184 | 1 | Graphite Support Block, GPHS Module (1 Sheet) |
| 756185 | 0 | Graphite Support Blocks for Product Cans (1 Sheet) |
| 756186 | 0 | PuO ₂ Powder Can Set (3 Sheets) |
| 756187 | 0 | Cylinder Product Can (2 Sheets) |
| 756188 | 0 | Graphite Support Block for Product Cans (1 Sheet) |
| 756189 | 3 | Containment Vessel 16.25 High (2 Sheets) |
| 796848 | 1 | Graphite Support Block (for FSO, 1 Sheet) |
| 796849 | 001 | Graphite Filler Block (for FSO, 1 Sheet) |
| 1009022 | 001 | Fuel Storage Overpack (FSO) Weldment (2 Sheets) |
| 1009094 | 001 | Oak Ridge Inner Shipping Capsule Weldment (2 Sheets) |
| 26Y1103537 | E | WR Fuel Storage Inner Container Assy. (3 Sheets) |
| SKNEN2-5663 | B | Stainless Steel Can, Large (2 Sheets) |
| SKNEN2-5664 | B | Stainless Steel Can, Medium (2 Sheets) |
| SKNEN2-5665 | B | Stainless Steel Can, Small (2 Sheets) |
| 853326 | 0 | Top Graphite Filler Block (1 Sheet) |
| 853327 | 0 | Stainless Filler Block Spacer (1 Sheet) |
| 853328 | 1 | Spacer Weldment (1 Sheet) |
| 853329 | 0 | Large Graphite Support Block (1 Sheet) |
| 853330 | 0 | Medium Graphite Support Block (1 Sheet) |
| 853331 | 0 | Small Graphite Support Block (1 Sheet) |
| 853332 | 0 | Tall Top Graphite Filler Block (1 Sheet) |
| 853333 | 0 | Spacer Plate (1 Sheet) |
| R1034-0011-EB | 2 | ALTB Fueled Capsule Assembly (1 Sheet) |
| 805406 | 1 | Liner — 11.16 High Weldment (2 Sheets) |
| 805407 | 0 | Graphite Filler Block, 3.38 in. high (1 Sheet) |
| 805408 | 1 | Graphite Support Block (1 Sheet) |
| 1027426 | 001 | 9516 Clad Dunnage Assembly (2 Sheets) |
| 1042469 | 001 | 9516 Welded Can Clad Dunnage Assembly (2 Sheets) |
| 1027425 | 001 | Packaging Organizer Assembly (1 Sheet) |
| 1040135 | 001 | Thumb Screw Weldment (1 Sheet) |
| 1040136 | 001 | LWRHU Top Spacer (1 Sheet) |
| 1040137 | 001 | Tray (1 Sheet) |
| 1040139 | 001 | LWRHU Base (1 Sheet) |

(b) Contents:

(1) Type and Form of Material:

Contents consist of PuO₂ in any solid form, for example powder, pellets, granules, etc., as described in SARP Section 1.2.2.1. The principal isotope in the PuO₂ is ²³⁸Pu. The initial isotopic composition for each shipping configuration is shown in Table 1 (below). The plutonium that is ²⁴¹Pu shall be less than 1 wt.% for all mixtures. The fissile isotopes of uranium, ²³⁵U and ²³³U, will only be present in trace amounts. Almost all the activity in these mixtures of PuO₂ is from the alpha decay of ²³⁸Pu; therefore, ²³⁸Pu is the decay heat source and the curie content (amount of ²³⁸Pu) is directly proportional to the decay heat. Limiting the amount of decay heat in the package to 500 W establishes the activity limit, which is approximately 15,930 Ci.

Table 1. Plutonium Initial Isotopic Limits (Ref SARP Table 1-1)

| Shipping Configuration (by number) | ²³⁶ Pu (ppm) ^a | ²³⁸ Pu (wt.%) ^b | ²³⁹ Pu + ²⁴¹ Pu (wt.%) ^c | Other ΣPu (wt.%) ^c | Individual actinide impurities (wt.%) ^d | ⁹⁵ Zr (Bq/g-PuO ₂) | ²³⁴ U (wt.%) |
|------------------------------------|--------------------------------------|---------------------------------------|---|-------------------------------|--|---|-------------------------|
| 1-6 | ≤ 2.0 | 74 – 90 | 23.9 – 7.9 | ≤ 4 | ≤ 1 | — | — |
| 7 | ≤ 6.0 | 80 – 94 | 20.0 – 3.9 | ≤ 4 | ≤ 1 | 1E+07 ^e | — |
| 8 | ≤ 6.0 | 80 – 92 | 20.0 – 5.9 | ≤ 4 | ≤ 1 | 1E+07 ^e | — |
| 9-11 | ≤ 2.0 | 80 – 90 | 20.0 – 7.9 | ≤ 4 | ≤ 1 | — | — |
| 12 | ≤ 2.0 | 74 – 90 | 23.9 – 7.9 | ≤ 4 | ≤ 1 | — | ≤ 10 |
| 13-14 | ≤ 2.0 | ≥ 79 | ≤ 23.9 | — | ≤ 1 | — | — |

NOTE: The isotopic limits in this table apply to the initial composition when back-decayed to the date of precipitation except for Shipping Configurations 7-11 where the limits apply to the initial composition at the date of conversion to oxide. The PuO₂ isotopics used in the shielding and criticality evaluations in SARP Chapters 5 and 6, respectively, vary but conservatively bound the allowable isotopics for each shipping configuration.

^a Main source of ²⁰⁸Tl; the photon maximum is at 17.5 years.

^b Main source of almost all α, n activity. Refer to footnote “d” (below) for the definition of instantaneous ²³⁸Pu content.

^c There is no contribution to the source term except for a few α decays from α, n reactions. Therefore, the source term is significantly less than ²³⁸Pu by orders of magnitude. Additionally, because the total inventory is low, there is not a criticality concern.

^d The shielding evaluation was completed with individual actinide impurities (²⁴¹Am, Np, U, and Th) at average concentrations based on historic assay data. However, sensitivity cases with all of the individual actinide impurities set to 1 wt.% resulted in very small (<1%) increases in the overall dose rates outside the package. Therefore, the shielding evaluation allows individual actinide impurities up to 1 wt.% of the total plutonium content when back-decayed to the date of precipitation. The relative amounts of U will vary depending on the age of the material. There is an approximate 0.7% per year growth of ²³⁴U due to the decay of ²³⁸Pu. The method for calculating instantaneous ²³⁴U and ²³⁸Pu is discussed in SARP Section 1.2.2.

^e The limit applies to the ⁹⁵Zr concentration at the time of shipment.

(2) Maximum Quantity of Material per Package

- A. The maximum decay heat per package is 500 W.
- B. The maximum activity for the package is 15,930 Ci.
- C. The maximum quantity of PuO₂ items or mass per package and decay heat per item for each shipping configuration is listed below in Table 2 (ref. SARP Sections 1.2.2.1.1 through 1.2.2.1.14).

Table 2. Package Limits per Content Items

| | Shipping Configuration (number/description) | Maximum items or PuO ₂ mass per package | Watts (per item) | PuO ₂ form |
|----|---|--|---------------------|--------------------------|
| 1 | General Purpose Heat Source - Fueled Clad (GPHS FC) | 8 fueled clads | 63 | pellet |
| 2 | GPHS Graphite Impact Shell (GIS) | 8 fueled clads (2 GPHS FC per GIS) | 63 | pellet |
| 3 | GPHS Module | 8 fuels clads (4 GPHS FC per Module) | 63 | pellet |
| 4 | Domestic Powder | 8 product cans | 70 | powder |
| 5 | Russian Powder | 8 product cans | 70 | powder |
| 6 | Generic Contents | 1,100 g total (per Table 1) | 500 | any solid form |
| 7 | Fuel Storage Overpack (FSO) Container | 2 FSO Containers | 70 | powder |
| 8 | GPHS FC with ORNL Plutonium Dioxide | 5 fueled clads and 1,000 g Pu | 63 | pellet |
| 9 | Large Containers with Plutonium Dioxide Powder | 2 containers | 210 | powder |
| 10 | Medium Overpack Containers and Small Containers with Plutonium Dioxide Powder | 4 Small Containers at 194 g Pu each | 90 | powder |
| 11 | Medium Overpack Containers with Plutonium Dioxide Powder | 3 Small Containers at 194 g Pu each | 90 | powder |
| 12 | Advanced Long Term Battery - Fueled Capsule Assembly (ALTB FCA) | 3 FCAs | 166.7 | granular |
| 13 | Lightweight Radioisotope Heater Unit (LWRHU) Clad Pellets | 144 Clad Pellets | 1.1 | pellet |
| 14 | LWRHU Assemblies | 40 Clad Pellets (one per LWRHU aeroshell assembly) | 1.1 | pellet |

D. The maximum specific neutron emission rate, maximum package wattage, and estimated fuel density for each shipping configuration is listed below in Table 3 (Ref. SARP Table 1-2)

Table 3. Maximum Specific Neutron Emission Rate and Wattage, and Approximate Fuel Density for Plutonium Dioxide in the 9516 Package

| Shipping configuration (number/description) | | Maximum specific neutron emission rate (n/s/g- ²³⁸ Pu) | Maximum wattage per package ^a (W) | Fuel density (g/cm ³) ^e |
|--|---|---|---|---|
| 1 | GPHS FC | 12,000 | 500 | 9.63 – 9.86 |
| 2 | GPHS GIS | 12,000 | 500 | 9.63 – 9.86 |
| 3 | GPHS Module | 12,000 | 500 | 9.63 – 9.86 |
| 4 | Domestic Powder | 18,000 | 500 | 5.73 |
| 5 | Russian Powder | 18,000 | 500 | 5.73 |
| 6 | Generic Contents ^b | 18,000 (1.58 x 10 ⁷ neutron/s) ^c | 500 | 5.73 |
| 7 | FSO Container | 30,000 | 140 | 5.73 |
| 8 | GPHS FC with ORNL Plutonium Dioxide | 18,000 | 350 | 10.34 |
| 9 | Large Containers with Plutonium Dioxide Powder | 14,000 ^d | 420 ^g | 6 |
| 10 | Medium Overpack Containers and Small Containers with Plutonium Dioxide Powder | 14,000 ^d | 360 ^g | 6 |
| 11 | Medium Overpack Containers with Plutonium Dioxide Powder | 14,000 ^d | 270 ^g | 6 |
| 12 | ALTB FCA | 11,000 | 500 ^g | 3.8 |
| 13 | LWRHU Clad Pellets | 18,000 | 172.8 ^f | 9.614 |
| 14 | LWRHU Assemblies | 18,000 | 48 ^f | 9.614 |

^a Administrative controls will be placed on the loading arrangements to ensure that the maximum wattage is not exceeded.

^b Generic contents consists of plutonium dioxide in any solid form (e.g., powder, pellets, granules, etc.).

^c The shielding evaluation is based on 18,000 n/s/g-²³⁸Pu; however, SARP Section 5.4.5 provides an overall limit of 1.58 x 10⁷ neutron/s for fuel with higher impurities that result in up to 36,000 n/s/g-²³⁸Pu for Shipping Configurations 4-6.

^d The shielding evaluation uses 18,000 n/s/g-²³⁸Pu to conservatively bound the actual maximum specific neutron rate of 14,000 n/s/g-²³⁸Pu.

^e Approximate density. Fuel loading is based on mass or wattage. The plutonium dioxide density used in the shielding and criticality evaluations may vary but conservatively bound the densities for each shipping configuration.

^f Approximate wattage based on maximum of 1.2 W/pellet. Actual fuel loading is based on pellet mass.

^g These are bounding wattages used in the analytical evaluations. Actual wattages are used in the fuel age calculations in SARP Appendix 3.5.7.

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E. The maximum allowable fuel age of PuO₂ is listed in SARP Table 3-12 for numerous authorized configurations and variations with reduced contents. Since helium gas generated from the decay ²³⁸Pu is a significant source of pressure in the CV, these calculated fuel age limits ensure the pressure in the CV remains below the maximum normal operation pressure and maximum design pressure. For authorized configurations not shown in SARP Table 3-12, the maximum allowable fuel age shall be determined following the methodology in SARP Section 3.3.2.2.

(c) Criticality Safety Index (CSI): 0.0

(d) Conditions:

- (1) Transport shall be by exclusive use.
- (2) Due to the potential for helium off-gassing, the PuO₂ contents shall be shipped within a specified time after the PuO₂ is processed to ensure the CV maximum normal operating pressure is not exceeded. Depending on the content for Shipping Configurations 1 through 14, the maximum age the processed PuO₂ can be at the end of a shipment ranges from 4.77 to 86.23 years as shown in SARP Table 3-12, which shows the maximum age for the most common authorized shipping configurations. For authorized configurations not shown in SARP Table 3-12, the maximum allowable fuel age shall be determined following the methodology in SARP Chapter 3, Section 3.3.2.2.
- (3) Except for shipments made under the auspices of the Office of Secure Transportation, under the conditions provided in SARP Chapter 7, or except as provided in Condition 5.(d)(5), the 9516 Package shall be shipped exclusive use in an enclosed uninsulated trailer with no material impeding natural convection heat transfer within the trailer.
- (4) The 9516 Package shall not be covered with a tarpaulin or other material that impedes natural convection heat transfer with the atmosphere.
- (5) Cargo containers 8 ft. x 8 ft. x 20 ft. in size, made of metal (except for the flooring) single wall construction, uninsulated, and with at least 1.5 in. flooring, may transport up to three 9516 packages containing no more than 500 W of PuO₂ powder each. The packages must be spaced apart by a distance of at least 68 in. from the centerline of one package to the next package and the external surface of the cargo container must be 96 in. or more from the normally occupied space. Each package shall be positioned on the centerline of the cargo container floor as shown in SARP Figure 5-22. In land transport, all surfaces of the cargo container (except its bottom) must be fully exposed to the ambient air. In sea transport, the cargo container must be in the top layer of the on-deck stacks with at least 2-ft. of clearance on both long sides of the container from other cargo containers and ship structure.
- (6) The 9516 Package shall not be used to transport plutonium by air.
- (7) In accordance with 49 CFR 173.441(b)(4), the land transport crew shall wear radiation dosimetry devices and operate under provisions of a regulated radiation protection program. In sea transport the external surface of the cargo container shall be a minimum of 8 ft. from normally occupied positions.
- (8) In addition to the requirements of Subparts G and H of 10 CFR Part 71, each packaging shall be fabricated, acceptance tested, operated, and maintained in accordance with the Operating Procedures requirements of Chapter 7, Acceptance Tests and Maintenance Program requirements of Chapter 8, and packaging-specific Quality Assurance requirements of Chapter 9 of the SARP.
- (9) Shipments made under the auspices of the Office of Secure Transportation shall be made in accordance with the requirements specified in the latest revision to the Technical Manual

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DOE SNL TYPEBARG REV2 CHNG 0, "Tiedown Procedure for Type-A, Type-B, ARG and Miscellaneous Containers Transported in Safeguards Transporter (SGT)," March 2012.

- (10) Revision 13 of this certificate may be used until October 31, 2026.
 - (11) Only DOE elements or persons working under contract to DOE elements shall consign the package for domestic transport.
 - (12) Nuclear Regulatory Commission (NRC) or Agreement State licensees shall not consign a DOE certified package for domestic transport but can transfer the material on-site to DOE elements or persons working under contract to DOE elements for consignment of the package.
- (e) Supplements
- None.



U.S. Department of
Transportation

**Pipeline and
Hazardous Materials
Safety Administration**

East Building, PHH-23
1200 New Jersey Ave, SE
Washington, D.C. 20590

CERTIFICATE NUMBER: USA/9516/B (M) F-96

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