Department of Energy
Washington, DC 20585

March 21, 2023

MEMORANDUM FOR MICHAEL D. BUDNEY
MANAGER
SAVANNAH RIVER OPERATIONS OFFICE

FROM: JULIA C. SHENK JULIA SHENK Digitally signed by JULIA SHENK Date: 2023.03.21 11:13:52 -04'00'
HEADQUARTERS CERTIFYING OFFICIAL
DIRECTOR
OFFICE OF PACKAGING AND TRANSPORTATION

SUBJECT: Renewal of Department of Energy Certificate of Compliance Number 9980

In response to the February 23, 2023 email request from Luke Sobus, Savannah River Operations Office, to Dr. James Shuler of my staff, Department of Energy (DOE) Certificate of the Compliance (CoC) Number 9980, Revision 6, for the Model 9980 package is issued for renewal with its Safety Evaluation Report. Changes to the CoC are indicated by vertical bars in the right page margin.

This CoC is issued by DOE under the authority of 49 CFR 173.7(d) and is conditional upon 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 the certificate is October 31, 2028.

If you have any questions, please contact me or Dr. Shuler at (301) 903-5513.

Attachments

cc: Luke Sobus, SR
Matthew Howard, SRNL
Brian Anderson, LLNL
James Shuler, EM-4.24
Docket 23-15-9980

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
9980	6	USA/9980/AF-96 (DOE)	1	7

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 Savannah River Operations Office P.O. Box A Aiken, South Carolina 29808	Safety Analysis Report for Packaging Model 9980 Type A Fissile, S-SARP-G-00007, Revision 4, June 9, 2022, as supplemented in 5(e).	June 9, 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: 9980

(2) Description:

The 9980 packaging assembly is defined by the Engineering Drawings [See 5(a)(3)] and is illustrated in Figure 1. The packaging comprises a Carrier Assembly that secures the radioactive content within an insulated 10-gallon Overpack. The Overpack includes an integral Liner Weldment that separates the Carrier from the insulation materials within the Overpack.

A threaded Overpack Plug secures the Carrier Assembly between two Spacers within the Overpack. The Carrier Assembly provides convenience handling of and positioning for the content within the Package. A Quick Lever Lock Ring is used to secure a standard Drum Cover to the top of the Package.

General package weights are summarized in Table 1. The gross weight of the package is 105 lb. with a maximum content weight of 8.3 lb. There are no minimum weight restrictions applicable to the package.

6a. Date of Issuance: March 21, 2023	6b. Expiration Date: October 31, 2028

FOR THE U.S. DEPARTMENT OF ENERGY

7a. Address *(of DOE Issuing Office)*	7b. Signature, Name, and Title *(of DOE Approving Official)*
U.S. Department of Energy Office of Packaging and Transportation (EM-4.24) 1000 Independence Avenue, SW Washington, DC 20585	JULIA SHENK Digitally signed by JULIA SHENK Date: 2023.03.21 11:07:08 -04'00' Julia C. Shenk Director Headquarters Certifying Official Office of Packaging and Transportation

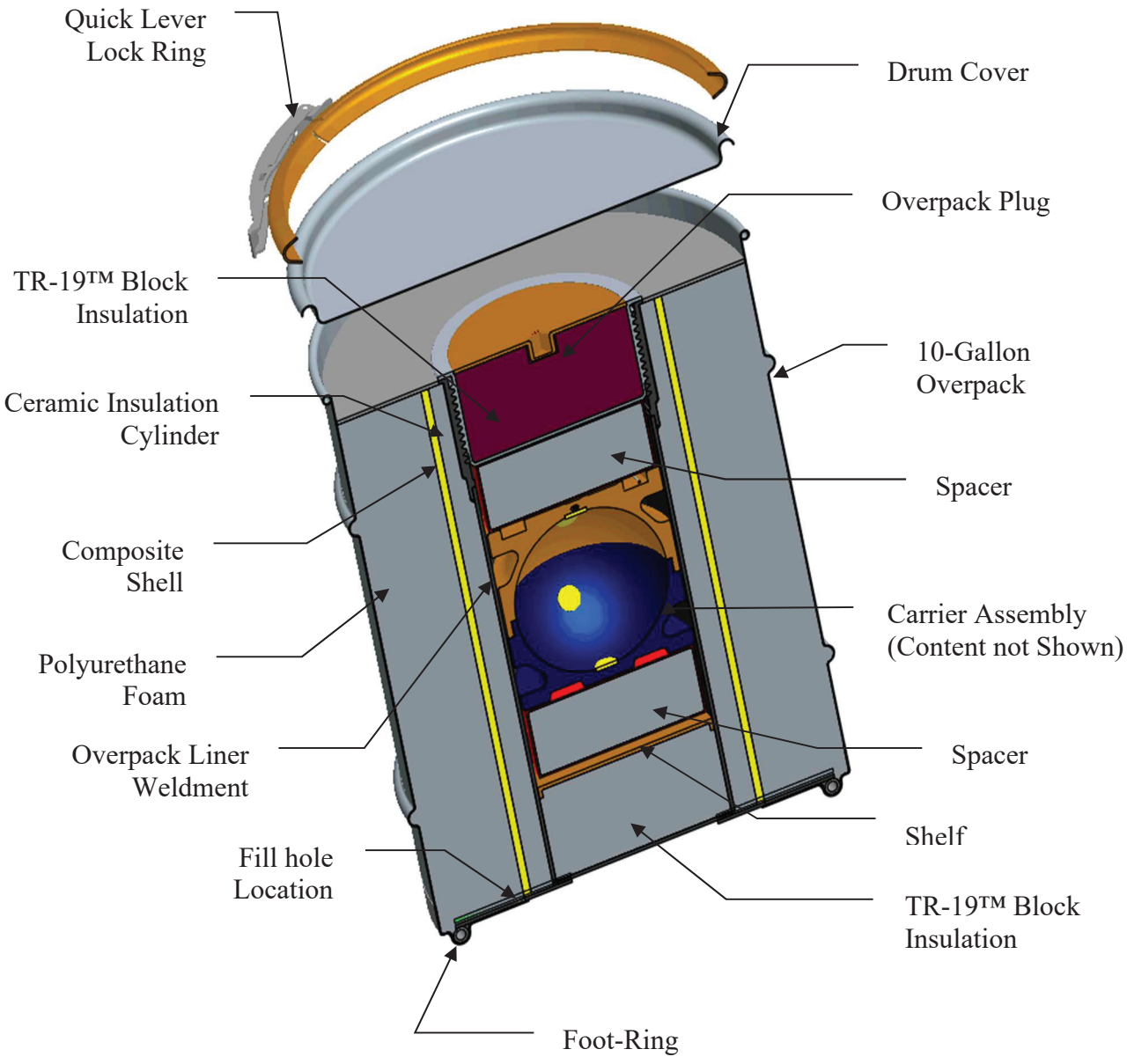

Figure 1 – 9980 Type AF Shipping Packaging Configuration

Table 1 - General Package Weights (lb.)

Nominal Packaging Component Weights			Maximum Weights	
Overpack [a]	Carrier Assembly	Aluminum Foam Spacers	Content	Package Gross
86.3	5.9	2	8.3	105

a) Excludes the aluminum foam Spacers and aluminum Carrier Assembly but does include Overpack Plug, Drum Cover and Quick Lever Lock Ring.

The package design does not incorporate a pressure-retaining leak-testable containment boundary because its authorized contents are limited to an A_1 mixture of special form radioactive material. The two-piece threaded Carrier Assembly confines the contents during transport and is used for operational handling outside of the packaging.

The package design does not incorporate any specific radiation shielding features. The package configuration provides sufficient attenuation of radiation at the required regulatory measurement locations due to the minimal radiation hazard of the content.

Overpack: The 9980 Overpack design incorporates an open-head 10-gallon drum with an integral Liner Weldment and Overpack Plug made from stainless steel. A 14 inch diameter 304L stainless steel Drum Cover and painted carbon steel Quick Lever Lock Ring close the Overpack. The outside dimensions of the Overpack are approximately 15 ¼ inches in diameter at its Drum Cover closure by 19 ⅛ inches high. The internal cavity of the overpack is approximately 6 inches in diameter by 10 ¾ inches high, without Spacers installed. A rolled tube is fitted in the formed foot-ring on the bottom of the drum; the rolled tube stiffens the foot-ring which acts as a base to the drum and facilitates nested overpack stacking. The Overpack includes polyurethane foam, vermiculite insulation, composite materials and ceramic insulation that provide both structural support and thermal insulation for the package.

The Liner Weldment is machined with an internal thread and is fitted with a ceramic Insulation Cylinder which is then wrapped with layers of Kevlar® and fiberglass that form a Composite Shell. A 304L stainless steel Shelf is welded within the liner to center the Carrier Assembly in the Overpack. A disk of TR-19™ Block Insulation is placed below the shelf and is secured in place by an 11-gauge, 17-4PH stainless steel plate welded to the bottom of the liner. The Liner Assembly is welded to the top and bottom of the 10-gallon drum. The space between the Composite Shell and drum wall is then filled with polyurethane foam through a fill-hole in the bottom of the drum. After filling, the hole is covered with aluminum tape.

The Overpack Plug screws into the Liner Weldment to secure the Spacers and Content Carrier. The threaded Overpack Plug is nominally 6 inches OD by 3 ¼ long and is fabricated from Nitronic-60 bar. A disk of TR-19™ Block Insulation is placed in the plug and secured in place by an 11-gauge, 17-4PH stainless steel plate welded to the top of the Plug.

The Overpack is closed with a 20-gauge stainless steel Drum Cover that incorporates an ethylene propylene diene monomer closure gasket for weather protection. The cover is attached to the Overpack with a Quick Lever Lock Ring. The Quick Lever Lock Ring includes a 5/16 inch tab to facilitate installation of a tamper indicating device.

Carrier Assembly: The Carrier Assembly consists of two machined aluminum threaded caps. The outside dimensions of the Carrier Assembly are 5.9 inches in diameter by approximately 6 inches high. The carrier caps are hard coat anodized to prevent thread galling. A lifting handle is incorporated in the top cap to facilitate loading and unloading into the Overpack. Eight ¾ inch diameter felt pad disks positioned in machined recesses on the internal spherical surface function as padding for the content, see Drawing R-R1-G-00053. The Carrier Assembly weighs approximately 5.9 lb.

Spacers: A pair of aluminum foam spacers, each approximately 5 ¾ inches in diameter by 2 ¼ inches tall, fit within the Liner Weldment above and below the Carrier Assembly. Each spacer is covered with a wear resistant silicone surface to eliminate sharp edges for handling and to create lifting features on the spacers to allow for installation and removal. Details of the Spacers are shown in drawing R-R4-G-00084.

Puck Holder: A sphere 4.9 inches in diameter and constructed of polyphenylsulfone or polyetherimide material in accordance with Drawing R-R4-G-00151. The Puck Holder is loaded with contents into the Carrier Assembly and is only required for transport of the *Pacific Northwest National Laboratory ANSI 96E66646 PSS MOD 0 Plutonium Series Sealed Source* (Pu-Puck). The Puck Holder weighs approximately 2 lb.

(3) Drawings:

The packaging is constructed in accordance with the Savannah River Site drawings listed below (Ref SARP Appendix 1.1).

Drawing Number	Revision Number	Title
R-R5-G-00010	2	Model 9980 Drawing Tree
R-R1-G-00051	2	9980 Packaging Assembly
R-R1-G-00052	3	Overpack Assembly
R-R1-G-00053	1	Carrier Assembly
R-R2-G-00072	2	Overpack Weldment
R-R2-G-00073	3	Overpack Plug
R-R2-G-00074	1	Carrier Top Subassembly
R-R2-G-00075	1	Liner Subassembly
R-R2-G-00076	1	Carrier Bottom Subassembly
R-R2-G-00077	3	Overpack Subassembly
R-R3-G-00058	2	10-Gallon Drum Weldment
R-R3-G-00060	2	Liner Weldment
R-R4-G-00082	2	Carrier Top Detail
R-R4-G-00083	2	Carrier Bottom Detail
R-R4-G-00084	2	Spacer
R-R4-G-00087	3	Model 9980 Identification Plate
R-R4-G-00088	2	Insulation Cylinder
R-R4-G-00095	2	Drum Cover
R-R4-G-00096	2	Handle
R-R4-G-00151	3	Puck Holder Details

(b) Contents

(1) Type and form of material:

(i) Solid uranium metal in special form capsule design USA/0782/S-96, Revision 3, *U.S. Department of Energy Highly Enriched Uranium (HEU) Test Object*.

(ii) Solid uranium metal in special form capsule design USA/0783/S-96, Revision 2, *U.S. Department of Energy 10 kg HEU Equivalent Radiological Signature Training Device* (RSTD).

(iii) Solid plutonium, americium, and neptunium metal in special form capsule design USA/0784/S 96, Revision 3, *Pacific Northwest National Laboratory ANSI 96E66646 PSS MOD 0 Plutonium Series Sealed Source* (Pu-Puck).

(2) Maximum quantity of material per package: 8.3 lb.

One special form capsule per package.

Contents not to exceed an A_1 for the mixture, per package, and the mass limits in the tables below.

(i) HEU Test Object: The HEU Test Object capsule design is essentially identical to the RSTD, but with less uranium in its Shell and Core; therefore, its mass limits are bounded by Table 2 below and its maximum radionuclide activities must not exceed the limits authorized in USA/0782/S-96, Revision 3.

(ii) RSTD: The RSTD gross weight is approximately 7.8 lb. (3.56 kg.). The radioisotopes and their mass limits and non-radioactive elements and their mass limits for the RSTD are listed in Table 2 (ref. SARP Table 1.3).

Table 2 – RSTD Content Envelope Limits

Category	Material	Mass (g)	
		U/Al Shell	DU Core
Radioisotopes	U-233	0.01	0.10
	U-234	1.6	0.10
	U-235	150	2.5
	U-236	0.7	0.1
	U-238	150	810
	Total	150	810
Integral Non-Radioactive Materials	Al	1100	2
	Be, B, F, Li, Mg, Na	2	
RSTD Gross Mass (includes special form container)		3558.3	

(iii) Pu-Puck: The Pu-Puck gross weight is approximately 3.1 lb. (1.4 kg.). The radioisotopes and their mass limits and non-radioactive elemental impurities and their mass limits for the Pu-Puck are listed in Table 3 (ref. SARP Table 1.5).

Table 3 – Pu-Puck Content Envelope Limits

Category	Material	Mass (g)
Radioisotopes	Am-241	0.50
	Pu-238	0.10
	Pu-239	185.00
	Pu-240	20.00
	Pu-241	0.50
	Pu-242	1.00
	Np-237	0.50
Integral Non-Radioactive Impurities [a]	Be	1.0E-03
	Al, B, F, Li, Mg, Na	1.0E-02
	Other Impurities	12.0
Radioactive + Integral Non-Rad Impurity Limit		200
Plutonium Puck Gross Mass (Includes special form container)		1400

a. Plutonium includes up to 4.5% Gallium as an alloying metal (Pu-Ga)

(3) Maximum decay heat per package: 3.5 watts

(i) Decay heat of the RSTD (bounding for the HEU Test Object): 0.4 milliwatt

(ii) Decay heat of the Pu-Puck: 0.65 watt

(c) Criticality Safety Index

The Criticality Safety Index for the RSTD (bounding for the HEU Test Object) = 0.8

The Criticality Safety Index for the Pu-Puck = 0.1

(d) Conditions

(1) Transport of the HEU Test Object or RSTD contents by ground and air within the United States is authorized.

(2) Transport of the Pu-Puck contents by ground within the United States is authorized, but **AIR TRANSPORT IS NOT AUTHORIZED**.

(3) In addition to the requirements of Subparts G and H of 10 CFR Part 71, and except as specified in Section 5(d) of this certificate, each package must 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, as supplemented.

(4) Revision 5 of this certificate may be used until February 29, 2024.

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

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

(7) Special Form capsules fabricated to later revisions than USA/0782/S-96 Rev. 3, USA/0783/S-96 Rev. 2, or USA/0784/S-96 Rev.3, are authorized under this certificate only if they were issued to extend the certificate expiration date.

(e) Supplements:

None