

**CERTIFICATE OF COMPLIANCE
FOR RADIOACTIVE MATERIAL PACKAGES**

1.	a. CERTIFICATE NUMBER	b. REVISION NUMBER	c. DOCKET NUMBER	d. PACKAGE IDENTIFICATION NUMBER	PAGE	PAGES
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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*)
- b. TITLE AND IDENTIFICATION OF REPORT OR APPLICATION

Global Nuclear Fuel - Americas, LLC
P.O. Box 780
Wilmington, NC 28402

Global Nuclear Fuel - Americas, LLC, application dated
December 12, 2019.

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.: NPC
- (2) Description

A cubic stainless steel and foam outer packaging with nine cylindrical containment vessels for the transport of type A quantities of low-enriched uranium oxide powder, pellets, and compounds of uranium as defined in 5(b). The overall package dimensions are approximately 45 inches wide, 45 inches deep, and 44 inches high.

The outer packaging consists of a 10-gage stainless steel outer shell with a ceramic fiber board liner and rigid polyurethane foam filler. The foam filler has a three-by-three array of vertical cylindrical cutouts that accommodate stainless steel sleeves for placement of the containment vessels. The outer packaging is equipped with a top cover that is secured to the outer packaging body by a combination of 16 closure cap screws and four closure strips secured by 24 bolts.

The containment vessel is a maximum 8.515 inches in inner diameter and approximately 32 inches in overall length. The containment vessel is constructed of 18-gage stainless steel, surrounded by a cadmium sheet and polyethylene wrap within a 24-gage stainless steel jacket. The containment vessel is closed by a 16-gage closure lid, a silicone rubber gasket, and a band clamp assembly, which is composed of a 0.063-inch thick strap and retainer, a T-bolt, and a nut.

The gross weight of the package (packaging and contents) is 1,302 kg (2,870 pounds). The maximum weight of the contents is 540 kg (1,190 pounds).

5.(a) (3) Drawings

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The packaging is fabricated and assembled in accordance with the following Global Nuclear Fuel - Americas, LLC, Drawing Nos.:

- 177D4970, Sheet 1, Revision 1
- 177D4970, Sheet 2, Revision 0
- 177D4970, Sheet 3, Revision 0
- 177D4970, Sheet 4, Revision 0
- 177D4970, Sheet 5, Revision 0
- 177D4970, Sheet 6, Revision 0
- 177D4970, Sheet 7, Revision 0
- 177D4970, Sheet 8, Revision 1
- SK105E4037, Sheet 2, Revision 1

(b) Contents

Table 1: Type, Form, and Maximum Quantity of Material Per Package

Material Form (≤5.00 wt.% U-235)	Particle Size Restriction: Minimum OD (Inches)	Maximum Loading per ICCA (kgs)		Maximum Loading per NPC (kgs)	
		Net	Uranium	Net	Uranium
Homogenous Uranium Compounds	N/A	60.0	52.89	540.0	476.1
Heterogenous UO ₂ Pellets (BWR)	0.342	60.0	48.48	540.0	436.3
Heterogenous UO ₂ Pellets(PWR)	0.300	60.0	46.71	540.0	420.4
Heterogenous Uranium Compounds	Unrestricted particle size	60.0	40.54	540.0	364.8

The "Material Form Column" must comply with the following constraints:

- Neither solutions, free liquids, uranium metal nor uranium metal alloys are authorized and shall not be present. Homogenous and heterogenous uranium compounds may be mixed with other non-fissionable diluent materials (e.g., sand, iron, iron hydroxide, silica, carbon from ash, etc.) except for deuterium, tritium and beryllium.
- The solid form material within any individual NPC must be the same.
- Homogeneous and heterogeneous uranium materials are limited to solid form.
- For purposes of determining if the homogenous or heterogeneous criteria apply: if the particle size distribution is such that a majority of the particles are 1730 μm or greater, then the heterogenous payload criteria of Table 1 applies. If a majority of the particle size distribution is below 1730 μm, the homogenous payload criteria of Table 1 apply.
- The maximum mass of any Inner Containment Canister Assembly (ICCA) inner packaging materials (e.g., plastic bags or bottles) is unrestricted provided the mean hydrogen atom density of the packaging materials to be shipped inside the inner volume of each ICCA is not greater than water.

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- Authorized materials also include UO_2 pellets present in standard PWR and BWR reactor fuel assembly lattice designs (e.g., 17X17 PWR fuel assemblies, 10X10, 9X9, 8X8 BWR fuel assemblies).
- The payload within an NPC may be distributed in any ratio within the nine ICCAs, provided that the Maximum Loading per ICCA and the Maximum Loading per NPC requirements of Table 1 are met. The payload within an ICCA can be enclosed in plastic poly bottle receptacles (e.g., bags, poly bottles, etc.).
- The "Material Form Column" homogeneous and heterogeneous uranium compounds are dry solids resulting from scrap recovery and waste incineration processes. Example compounds include:

- uranium oxides (UO_2 , U_3O_8 , or UO_x $x > 2$)
- uranyl nitrate (UN, $UO_2(NO_3)_2$)
- uranyl nitrate hexahydrate (UNH, $UO_2(NO_3)_2 \cdot 6H_2O$)
- uranium tetrafluoride (UF_4)
- sodium uranate (Na_2UO_4)
- sodium diuranate ($Na_2U_2O_7$)
- sodium diuranate hexahydrate ($Na_2U_2O_7 \cdot 6H_2O$)
- ammonium diuranate (ADU, $3UO_3 \cdot 2NH_3 \cdot 4H_2O$)
- ammonium uranyl carbonate (AUC, $(NH_4)_4 \cdot UO_2 \cdot (CO_3)_3$)
- dried calcium (Ca) uranium compounds/mixtures/sludges/ash, (e.g., $CaUO_3$, $CaUO_4$, Ca_2UO_5 , Ca_2UO_4 , Ca_3UO_6 , $CaU_3O_{10} \cdot 4H_2O$, $CaU_6O_{19} \cdot 11H_2O$ and $CaU_6O_{19} \cdot 10H_2O$)
- dried sodium (Na) uranium compounds/mixtures/sludges/ash, (e.g., $Na_2U_2O_7 \cdot 3H_2O$ and $Na_2U_2O_7 \cdot H_2O$)
- dried iron (Fe) uranium compounds/mixtures/sludges/ash

5.(c) Criticality Safety Index 0.7

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

- (a) The package must be prepared for shipment and operated in accordance with the Operating Procedures in Chapter 7 of the application, as supplemented. Within each ICCA, the contents and secondary packaging (i.e., dunnage) must provide a snug fit.
- (b) Each packaging must be acceptance tested and maintained in accordance with the Acceptance Tests and Maintenance Program in Chapter 8 of the application.

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

8. Transport by air of fissile material is not authorized.

9. Revision No. 8 of this certificate may be used until June 30, 2021.

10. Expiration date: November 30, 2025.

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REFERENCES

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FOR THE U.S. NUCLEAR REGULATORY COMMISSION

**John B.
McKirgan**

Digitally signed by John B.
McKirgan
Date: 2020.06.19 20:38:33
-04'00'

John McKirgan, Chief
Storage and Transportation Licensing Branch
Division of Fuel Management
Office of Nuclear Material Safety
and Safeguards

Date: June 19, 2020

