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	PAGES
9355	1	71-9355	USA/9355/B(U)-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)*

National Nuclear Security Administration
P.O. Box 5400
Albuquerque, NM 87185

b. TITLE AND IDENTIFICATION OF REPORT OR APPLICATION

National Nuclear Security Administration
application dated August 25, 2016, as supplemented.

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.: 435-B

(2) Description

The Model No. 435-B package consists of multiple configurations. The package is a Category I container. When loaded and prepared for transport, the external dimensions of the 435-B package are approximately 83 inches (in.) (210.8 centimeters (cm)) tall and 70 in. (177.8 cm) in diameter (over the lower impact limiter). The maximum weight of the package is 10,100 pounds (lbs) (4,545.5 kilograms (kg)).

Unless noted in the application, all elements of the 435-B package are made of Type 304 stainless steel in conformance with the American Standards for Testing Materials (ASTM) A240. The major components of the package include:

(i) *A base*—The base consists of the lower torispherical head, lower flange, lower internal impact limiter, and external impact limiter. The volume inside the external impact limiter is filled with 15 pounds per cubic feet (lb/ft^3) polyurethane foam poured in place. The inside surface of the bottom shell is covered with a ¼-inch thick layer of refractory insulation paper. A full penetration weld connects the lower torispherical head (½-inch thick plate) to the lower flange.

(ii) *A bell*—The bell consists of the upper torispherical head, cylindrical shell, upper flange, vent and test port blocks, upper internal impact limiter, dual side thermal shield, head thermal shield, and the closure bolt access tube structure. Two, ¼-inch thick, layers of refractory insulation paper cover the area of the containment wall adjacent to the tubes. Machined blocks of 30 lb/ft^3 polyurethane foam are located between the tubes.

5.(a) Packaging (Continued)

(2) Description

(iii) *An internal lodgment*, made of aluminum, which supports the Long Term Storage Shield (LTSS)—The lodgment and the inner container designs allow maintaining the position of the payload in the package cavity during normal conditions of transport and hypothetical accident conditions. The LTSS rests on a ½-inch thick plate covered with a ½-inch thick layer of neoprene rubber.

(iv) *LTSS*—The LTSS consists of a central steel magazine, or barrel, surrounded by thick lead encased in a steel shell. The barrel contains four longitudinal holes, each of which can accommodate one drawer assembly.

(v) *An inner container*, which supports shielded devices—The inner container holds a shielded device and provides support for the device and the blocking (dunnage) materials during transport.

(vi) *Two internal impact limiters*—The internal impact limiters located at each end of the payload cavity include an array of 130 ASTM A249 or A269, Type TP304, stainless steel tubes. The impact limiters are curved on one side to match the inside of the torispherical head, and flat on the other. Each of the 130 tubes is tack-welded in three places to a stainless steel tube stabilizer sheet. Four stainless steel clips welded to the inner surface of the containment boundary in the lower and upper position hold the internal impact limiters in place.

The LTSS or shielded devices provide shielding. Shielding materials are lead, tungsten, steel, or depleted uranium. The LTSS provides the shielding for the sealed capsule content specified in Tables 1 and 2. Therefore, these sources must be packed in the LTSS drawer(s). The shielded devices, identified in Table 3, are self-shielding, and must be packed in an inner container for shipment as specified in Table 4.

(3) Drawings

The packaging is constructed in accordance with AREVA Federal Services LLC drawings:

1) 1916-01-01-SAR, "435-B Package Assembly SAR Drawing," sheets 1-7, Revision 5
2) 1916-01-02-SAR, "435-B LTSS Lodgment SAR Drawing," sheets 1-2, Revision 2
3) 1916-01-03-SAR, "435-B Inner Container SAR Drawing," sheets 1-2, Revision 3

5.(b) Contents

(1) Type and form of material

Radioactive sealed sources of isotopes described in Tables 1 and 2.

5.(b) Contents (Continued)

(2) Maximum quantity of material per package

(i) LTSS

Table 1. Maximum Activity of LTSS Payload Source Nuclides [1, 2]

Nuclide	Maximum Activity Ci
^{60}Co	12,970
^{137}Cs	14,000
^{90}Sr	1,000
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^{241}Am (no Be) [3]	1,000
^{241}Am Be [3]	6.6
^{192}Ir	200
^{75}Se	80

Notes:
1. Physical form of all nuclides is solid material in a sealed capsule.
2. The maximum activity listed is the maximum for a single nuclide in the LTSS. For combinations of different nuclides, lower activity limits apply as discussed in Chapter 5, "Shielding Evaluation," and Operating Procedures in Chapter 7 of the application.
3. Impurities may include oxygen and chlorine.

Table 2. Maximum Mass of LTSS Payload Source Nuclides. [1, 2]

Nuclide	Maximum Mass grams of Pu
^{238}Pu (no Be)	75 g Pu
^{239}Pu (no Be)	15 g Pu
^{239}Pu Be	15 g Pu

Notes:
1. Physical form of all nuclides is solid material in a sealed capsule.
2. Impurities may include oxygen.

5.(b) Contents (Continued)

(2) Maximum quantity of material per package (Continued)

(ii) Inner Container-Shielded Devices

Table 3. Maximum Activity and Weight of Shielded Devices [1]

Model Name/Type	Maximum Activity Ci	Nominal Weight [2] lbs.	Sealed Source Device Registry No.[2]
Group 1 Devices			
Gammator 50B, B, B34, G-50-B	420	1,800	NR-0880-D-802-S
Gammator M34	1,920	1,850	NR-0880-D-806-S
Gammator M38	3,840	2,250	NR-0880-D-806-S
Gammacell 1000 (GC-1000) -Models A through D -Elite A through D, Type I and Type II	3,840 (bounding value)	2,800	NR-0880-D-808-S, NR-1307-D-102-S
Gammacell 3000 (GC-3000) -Elan A through C, Type I and Type II	3,048	3,300	NR-1307-D-102-S
Group 3 Devices			
Gammacell-40 (GC-40 Exactor)	2,250 [3]	2,650	NR-1307-D-101-S

Notes:
1. Radionuclide in all cases is ^{137}Cs.
2. Consult NRC's Sealed Source Device Registry for design and safety features of each model.
3. GC-40 activity is given for one of the two device components that make up a complete GC-40. Only one device component may be shipped at one time.

(3) Maximum weight of contents

(i) LTSS

For the LTSS, the payload of isotopes other than plutonium is limited by the activity rather than their weight.

5.(b) Contents (Continued)

(3) Maximum weight of contents (Continued)

(ii) Inner Container

Table 4. Maximum Weight of Inner Container Contents

Content Type	Maximum Weight lbs.
Dunnage	≤ 500
Group 1-Shielded Device	≤ 3,500
Group 3-Shielded Device	≤ 3,500

The maximum weight of the shielded device includes the mass of radioactive material and the source drawer.

(iii) The total fissile mass limit for the 435-B package is 15 grams.

(4) Maximum decay heat:

(i) For the contents described in Condition No. 5.(b)(2)(i), the maximum decay heat shall not exceed 200 watts per package.

(ii) For the contents described in Condition No. 5.(b)(2)(ii), the maximum decay heat shall not exceed 30 watts per package.

6. Plutonium sources are not permitted for transport by air.

7. Americium sources are not permitted for transport by air.

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

(a) The package shall be prepared for shipment and operated in accordance with the Operating Procedures in Chapter 7 of the application; and

(b) The package must meet the Acceptance Tests and Maintenance Program of Chapter 8 of the application.

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

10. Expiration date: July 31, 2019.

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REFERENCES

National Nuclear Security Administration application dated August 25, 2016.

Supplements dated: October 26 and December 13, 2016.

FOR THE U.S. NUCLEAR REGULATORY COMMISSION

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

Date: 2/2/17