



U.S. Department  
of Transportation  
**Pipeline and  
Hazardous Materials  
Safety Administration**

East Building, PHH-23  
1200 New Jersey Avenue Southeast  
Washington, D.C. 20590

**COMPETENT AUTHORITY CERTIFICATION  
FOR A TYPE B(U)  
RADIOACTIVE MATERIALS PACKAGE DESIGN  
CERTIFICATE USA/0444/B(U)-96, REVISION 17**

**REVALIDATION OF CANADIAN COMPETENT AUTHORITY  
CERTIFICATE CDN/2051/B(U)-96**

This certifies that the radioactive material package design described is hereby approved for use within the United States for import and export shipments only. Shipments must be made in accordance with the applicable regulations of the International Atomic Energy Agency<sup>1</sup> and the United States of America<sup>2</sup>.

1. Package Identification - Nordion Inc. Model F-271 Transport Package, Serial Nos. 1 and up.
2. Package Description and Authorized Radioactive Contents - as described in Canada Certificate of Competent Authority CDN/2051/B(U)-96, Revision 14 (attached).
3. 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 Hazardous Materials Technology, (PHH-23), Pipeline and Hazardous Materials Safety Administration, U.S. Department of Transportation, Washington D.C. 20590-0001.
  - 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.

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<sup>1</sup> "Regulations for the Safe Transport of Radioactive Material, 1996 Edition (Revised), No. TS-R-1 (ST-1, Revised)," published by the International Atomic Energy Agency(IAEA), Vienna, Austria.

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

**CERTIFICATE USA/0444/B(U)-96, REVISION 17**

- d. Records of Quality Assurance activities required by Paragraph 310 of the IAEA regulations<sup>1</sup> 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.
4. Marking and Labeling - The package shall bear the marking USA/0444/B(U)-96 in addition to other required markings and labeling.
5. Expiration Date - This certificate expires on January 31, 2021.

This certificate is issued in accordance with paragraph 808 of the IAEA Regulations and Section 173.473 of Title 49 of the Code of Federal Regulations, in response to the January 04, 2016 petition by Nordion (Canada) Inc., Ottawa, Ontario, and in consideration of other information on file in this Office.

Certified By:



Dr. Magdy El-Sibaie  
Associate Administrator for Hazardous Materials Safety

**Jan 07 2016**

(DATE)

Revision 17 - Issued to correct typographical errors in Revision 16 and to revalidate Canadian Certificate for Transport Package Design No. CDN/2051/B(U)-96, Revision 14.



# Certificate

CDN/2051/B(U)-96 (Rev. 14)

## Transport Package Design

The transport package design identified below is certified by the Canadian Nuclear Safety Commission pursuant to paragraph 21(1)(h) of the *Nuclear Safety and Control Act* and Subsection 10(1) of the *Packaging and Transport of Nuclear Substances Regulations, 2015* and to the IAEA's *Regulations for the Safe Transport of Radioactive Material, 2012 Edition*.

### REGISTRATION OF USE OF PACKAGES

All users of this authorization shall register their identity in writing with the Canadian Nuclear Safety Commission prior to the first use of this authorization and shall certify that they possess the instructions necessary for preparation of the package for shipment.

### PACKAGE IDENTIFICATION

Designer: **Nordion (Canada) Inc.**  
Make/Model: **F-271 Transport Package, Serial Nos. 1 and up**  
Mode of Transport: **Air, Sea, Road, Rail**

### IDENTIFICATION MARK

The package shall bear the competent authority identification mark "**CDN/2051/B(U)-96**".

### PACKAGE DESCRIPTION

The packaging as shown on Nordion Drawing No. F627101-001 (Issue C) consists of an inner container and a crush and fire shield outer assembly. The inner container consists of a lead-filled, stainless steel encased cylinder and removable plug. The removable plug is secured with eight 1/2"-13 UNC socket head cap screws with minimum tensile strength of 1200 MPa and sealed with a silicone "O" ring. There are drain lines through the plug and inner container cavity to permit pool loading. The drain lines are capped with brass pipe plugs and internal stainless steel filters to prevent migration of material from the cavity. The outer crush and fire shield consists of a conical, finned, insulated mild steel shell with a skid attached by eight 1-8 hex head grade BD bolts. The 25.4 mm thick thermal insulation is sandwiched between protective mild steel plates. The containment system consists of the capsules or the leak proof insert and inner container cavity.

An illustration of the package is shown on attached Specification Sheet No. F-271 (1996) (Issue 3).





The configuration of the package is as follows:

Shape:	<b>Cylindrical</b>	Shielding:	<b>Lead</b>
Mass:	<b>1640 kg</b>	Outer Casing:	<b>Mild steel</b>
Length:	<b>n/a</b>	Height:	<b>1173 mm</b>
Width:	<b>n/a</b>	Diameter:	<b>1100 mm</b>

### **AUTHORIZED RADIOACTIVE CONTENTS**

This package is authorized to contain not more than:

- a) the maximum activity corresponding to each isotope (in solid form) listed in Appendix A. If more than one isotope is transported, the activity of each isotope divided by the authorized maximum activity, when summed, shall not exceed one. The isotope shall be contained in one of the following aluminium capsules: AC-103, AC-139 or AC-150. The maximum decay heat of the contents and impurities shall not exceed 290 watts;
- b) 11 TBq total of Strontium 82, Strontium 85, Rubidium 82, Rubidium 83, Niobium 92m, Chromium 51, Cobalt 58, Vanadium 48, Cobalt 56, Zirconium 88, Yttrium 88, Niobium 95, Yttrium 91, Zirconium 89, Yttrium 89 and small amounts of other radionuclides contained in proton irradiated molybdenum powder and associated stainless steel target shells all contained within the F-455 insert. These are shipped four days or later after the end of proton bombardment;
- c) 11 TBq total of Strontium 82, Strontium 83, Strontium 85, Rubidium 82, Rubidium 83, Rubidium 84, Cobalt 55, Vanadium 48, Manganese 52 and other radionuclides contained in proton irradiated rubidium based target material and associated target shells all contained within the F-455 insert; or
- d) 111 TBq of fission produced Iodine 131 and associated impurities contained within the F-455 leakproof insert.

### **QUALITY ASSURANCE**

Quality assurance for the design, manufacture, testing, documentation, use, maintenance and inspection of the package shall be in accordance with:

- Nordion Document No. IS/DS 2048 F271 (3), "Design, Manufacturing and Operating Specification for the F-271 Transport Package"
- Packaging and Transport of Nuclear Substances Regulations, 2015
- IAEA Regulations for the Safe Transport of Radioactive Material, 2012 Edition





## **SHIPMENT**

The preparation for shipment of the package shall be in accordance with:

- Nordion Document No. IS/DS 2048 F271 (3), "Design, Manufacturing and Operating Specification for the F-271 Transport Package"
- Packaging and Transport of Nuclear Substances Regulations, 2015
- IAEA Regulations for the Safe Transport of Radioactive Material, 2012 Edition

This certificate does not relieve the consignor from compliance with any requirement of the government of any country through or into which the package will be transported.

A handwritten signature in black ink, reading "S. Faille", is positioned above a horizontal line. The signature is written in a cursive style.

S. Faille  
Designated Officer pursuant to paragraph 37(2)(a) of  
the Nuclear Safety and Control Act





## Appendix A

### Maximum Activities for Nordion Model F-271 Transport Package

<b>Isotope Product</b>	<b>Activity (TBq)</b>
Na 24	0.18
P 32	20.00
S 35	100.00
Cl 36	0.40
K 42	10.00
Ca 45	13.80
Sc 46	20.00
Cr 51	37.00
Fe 55	88.00
Fe 59	8.00
Co 60	4.50
Ni 63	100.00
Cu 64	18.00
Zn 65	4.00
As 76	7.40
Se 75	80.00
Br 82	8.50
Rb 86	4.00
Sr 85	25.00
Y 90	18.00
Zr 95	3.70
Mo 99	40.00
Pd 103	200.00
Ag 110m	7.40
Cd 109	10.00
Cd 115m	20.00
Sn 113	20.00
Sn 119m	25.00
Sb 124	2.00
I 131	50.00
Cs 131	1.20
Cs 134	0.80
Cs 137	80.00
Ba 131	100.00
Ba 133	10.00
La 140	2.00
Ce 141	0.40
Eu 152	16.00
Eu 154	1.20
Gd 153	12.00
Tm 170	20.00
Yb 169	40.00
Ta 182	20.00
W 185	1.00
Ir 192	1700.00
Au 198	20.00
Hg 197	300.00
Tl 204	20.00
Po 210	3.70

\* All other isotopes with atomic number 1 to 81 limited to the lesser of  $10 \times A_2$  or 4 TBq.



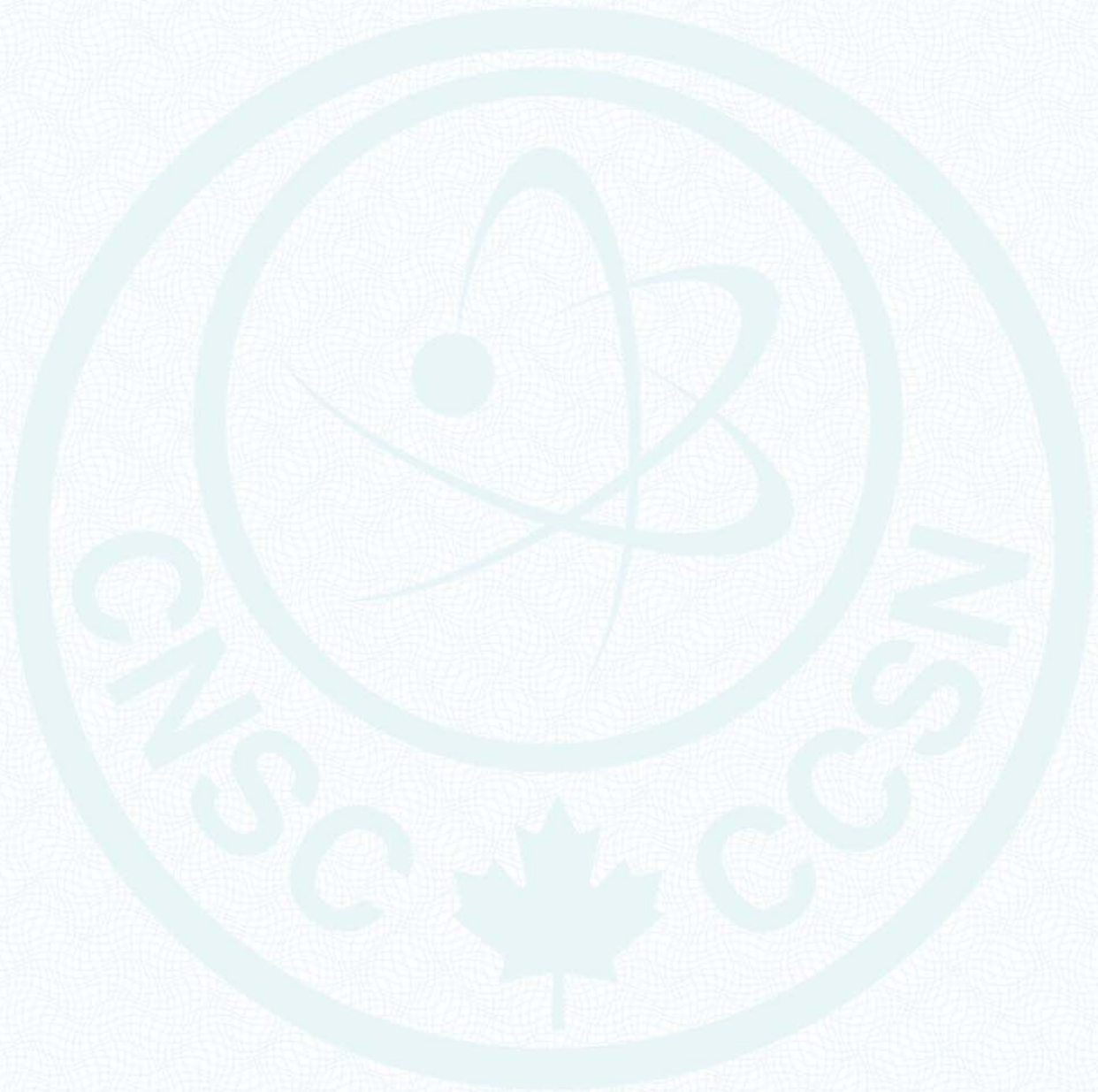




Canada's Nuclear Regulator  
L'organisme de réglementation  
nucléaire du Canada

## **NOTES**

Revision 14: December 9, 2015. Certificate revised. Removal of the F-341 insert.



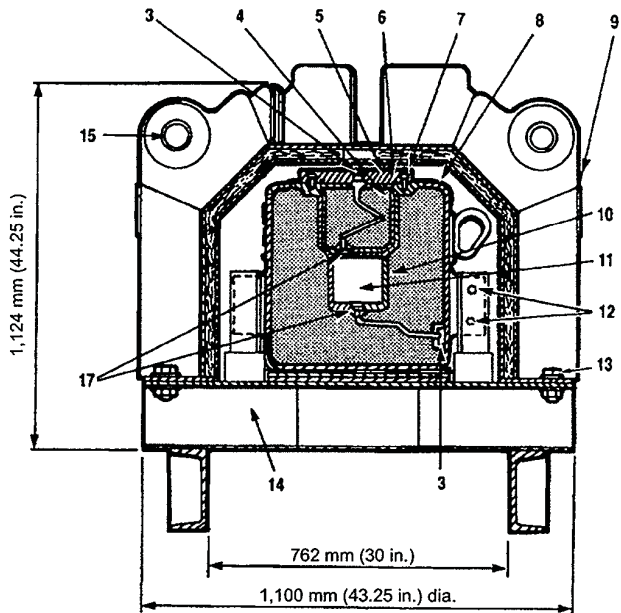
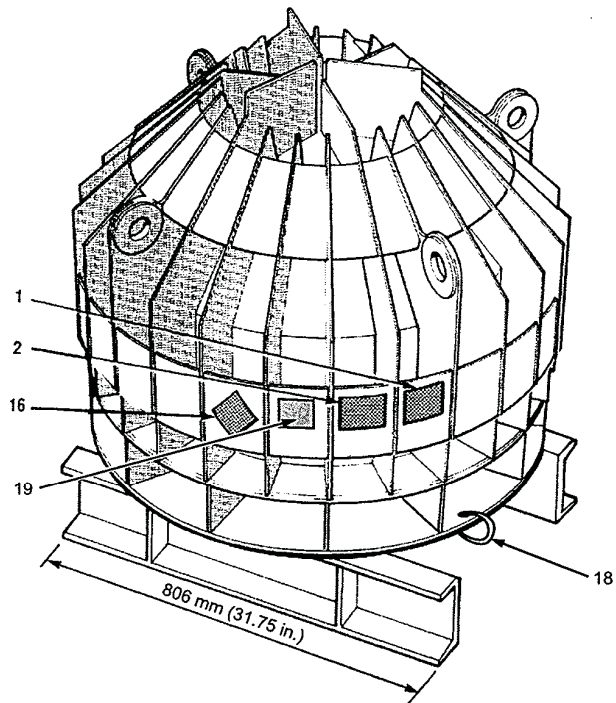
Canadian Nuclear  
Safety Commission

Commission canadienne  
de sûreté nucléaire

Canada

**Notes**

1. CNSC Certification No. CDN/2051/B(U)-96
2. Weight (estimated):  
Total: 1,640 kg (3,615 lb.)  
Flask proper: 829 kg (1,825 lb.)  
Plug: 57 kg (125 lb.)  
Fire/crush shield: 748 kg (1,650 lb.)
3. Floor loading (based on projected floor area): 2,310 kg/m<sup>2</sup> (472 lb./ft<sup>2</sup>)
4. This packaging must be prepared for shipment in accordance with MDS Nordion Specification IN/PP 1577 F271.



**Parts List**

1. MDS Nordion identification plate (2)
2. Radiation caution plate (2)
3. Brass or stainless steel pipe plugs, 1/2 in. NPT (2)
4. Removable shielding plug -steel encased lead
5. Removable containment cap
6. Silicone rubber "O" ring seal
7. Socket head cap screws 1/2 - 13 UNC x 1-1/4 in. long (8)
8. Flask proper - steel encased lead 162 mm (6-3/8 in.) thick
9. Removable fire/crush shield (top)
10. Internal cavity, I.D. 127 mm x 129 mm (5.0 in. x 5.1 in.)
11. Radioactive contents
12. Flask bolts 3/4 -10 UNC x 3 in. long heavy hex head ASTM A490 Type 1 or A354 GRADE BD (8)
13. Fire/crush shield bolts 1-8 UNC x 3 in. long hex head ASTM A490 Type 1 or A354 GRADE BD (8)
14. Removable fire/crush shield assembly (bottom)
15. Lifting eyes (4)
16. Label, Radioactive Category I,II or III (2)
17. Stainless steel filters (2)
18. Security seal
19. UN Number Labels (2): one next to each of the two radioactive category labels



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**TITLE**

**F-271 Transport Packaging  
(To 1996 IAEA Regulations)**

REF. IN/SS 1667 F271(96)  
F127101-001

REVISED Mar 04

DCN A1944-D-46B

DATE July 2000

No.

**F-271(1996)**

ISSUE

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APPROVED

BW

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SHEET 1 OF 1

**3**

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**CERTIFICATE NUMBER:** USA/0444/B(U)-96, Revision 17

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