



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/0578/B(U)-96, REVISION 5**

**REVALIDATION OF CANADIAN COMPETENT AUTHORITY  
CERTIFICATE CDN/2077/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 - MDS Nordion Models F-231 and F-231-MK2, Serial Nos. 11 and up.
2. Package Description and Authorized Radioactive Contents - as described in Canada Certificate of Competent Authority CDN/2077/B(U)-96, Revision 6 (attached). The package shall not contain more than 1.2 PBq of Cobalt-60 when transported by air.
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.

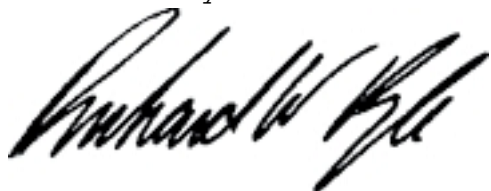
<sup>2</sup> Title 49, Code of Federal Regulations, Parts 100-199, United States of America.

**CERTIFICATE USA/0578/B(U)-96, REVISION 5**

- 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/0578/B(U)-96 in addition to other required markings and labeling.
5. Expiration Date - This certificate expires on November 30, 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 September 09, 2016 petition by Nordion (Canada) Inc., Ottawa, Ontario, and in consideration of other information on file in this Office.

Certified By:



William Schoonover  
Acting Associate Administrator for Hazardous Materials Safety

**Oct 17 2016**  
(DATE)

Revision 5 - Issued to revalidate Canadian Certificate of Approval No. CDN/2077/B(U)-96, Revision 6.



# Certificate

**CDN/2077/B(U)-96 (Rev. 6)**

## 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-231 and F-231-MK2, Serial Nos. 11 and up**  
Mode of Transport: **Air, Sea, Road, Rail**

### IDENTIFICATION MARK

The package shall bear the competent authority identification mark "**CDN/2077/B(U)-96**".

### PACKAGE DESCRIPTION

The Model F-231 transport packaging, as shown on Nordion Drawing No. F102001-017 (Rev. F) and Model F-231-MK2 transport packaging, as shown on Nordion Drawing No. F102001-016 (Rev. H) consists of a lead filled, steel encased cylindrical assembly with external fins, surrounded on the sides by an insulated cylindrical fire shield, on the top by an insulated top shield cap and a heat screen, and at the bottom by a layer of steel encased insulation sheet and a removable skid. There are vent and drain lines to facilitate wet loading which are plugged by safety cables and capped. The cylindrical fire shield consists of 25 mm of insulation sandwiched in steel and is attached to the packaging assembly by eight bolts and slotted holes at the top of the container's fin. The heat screen covers the insulated top shield cap and is attached to the fire shield via eight slotted bracket assemblies and eight 3/8 inch bolts. The top shield cap assembly consists of 25 mm of insulation sandwiched between 1/4 inch steel plates and is attached to the container assembly via four slotted bracket assemblies and four 1/2 inch fasteners.



The shield plug of the F-231 consists of a lead filled stainless steel encased plug weighing 480 kg and closed by eight 3/4 inch socket head bolts and two 7/8 inch hex head bolts. The shield plug of the F-231-MK2 consists of a lead and tungsten filled stainless steel encased plug weighing 490 kg and closed by eight 3/4 inch socket head bolts and two 7/8 inch hex head bolts.

The containment system consists of the source assemblies and the cavity of the F-231 or F-231-MK2.

The F-231 and F-231-MK2 transport packages are further described in Nordion Document No. IN/DS 1846 F-231 (2), "Design, Manufacturing and Operating Specification for F-231 and F-231-MK2 Transport Packages to 1996 IAEA Transport Regulations".

An illustration of the F-231 and F-231-MK2 transport packages is shown on attached Drawing No. F-231 (-MK2) (1996), (Issue 4).

Any modification to the package design must be submitted to the CNSC for approval prior to implementation.

The configuration of the package, without the optional shipping skid, is as follows:

Shape:	<b>Cylindrical</b>	Shielding:	<b>Lead</b>
Mass:	<b>7955 kg</b>	Outer Casing:	<b>Steel</b>
Length:	<b>n/a</b>	Height:	<b>1510 mm</b>
Width:	<b>n/a</b>	Diameter:	<b>1320 mm</b>

### **AUTHORIZED RADIOACTIVE CONTENTS**

The F-231 transport package is authorized to contain not more than 14.8 PBq of Cobalt 60 metal contained within one of the following:

- either AC-195 Type capsules and bundles with 2, 3, or 4 capsules per bundle or AC-339 Type capsules and bundles with up to 6 capsules per bundle carried within a carrier; or
- a maximum of 86 AC-345 Type capsules carried within a capsule carrier; or
- welded stainless steel or Zircaloy capsules that meet the requirements of the International Organization for Standardization, International Standard 2919: First Edition, under the Classification Number E53424 with the capsules retained within a holder that distributes them throughout the cavity volume.

The F-231-MK2 transport package is authorized to contain:

- the contents specified for the F-231 Transport Package; or
- not more than 7.4 PBq of Cobalt 60 contained within not more than 108 C-188 special form sources transported within up to four F-424 capsule bundle carriers and one F-425 bundle carrier.



## **QUALITY ASSURANCE**

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

- Nordion Specification No. IN/QA 0224 Z000 (10)\*, "Radioactive Material Transport Package Quality Plan"
- Nordion Procedure No. IN/DS 1846 F231 (2), "Design, Manufacturing and Operating Specification for F-231 and F-231-MK2 Transport Packages to 1996 IAEA Transport Regulations"
- Nordion Document No. IN/QA 0562 A000 (4)\*, "Sealed Source Quality Plan"
- Packaging and Transport of Nuclear Substances Regulations, 2015
- IAEA Regulations for the Safe Transport of Radioactive Material, 2012 Edition
- \* or latest current revision

## **SHIPMENT**

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

- Nordion Procedure No. IN/DS 1846 F231 (2), "Design, Manufacturing and Operating Specification for F-231 and F-231-MK2 Transport Packages to 1996 IAEA Transport Regulations"
- Packaging and Transport of Nuclear Substances Regulations, 2015
- IAEA Regulations for the Safe Transport of Radioactive Material, 2012 Edition

The package shall not contain more than 1.2 PBq of Cobalt 60 when it is transported by air.

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.

S. Faillie

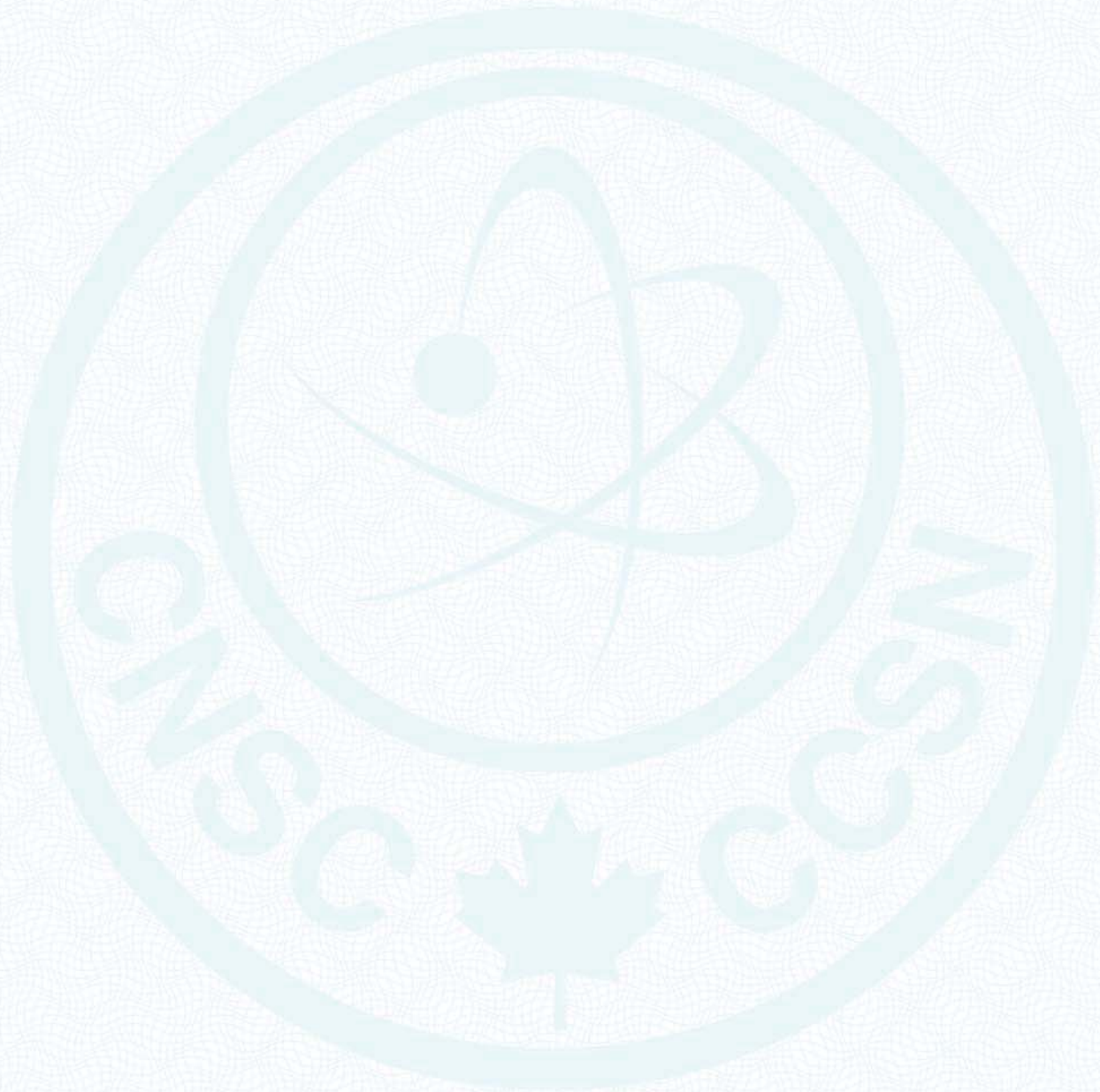
Designated Officer pursuant to paragraph 37(2)(a) of  
the Nuclear Safety and Control Act



## **NOTES**

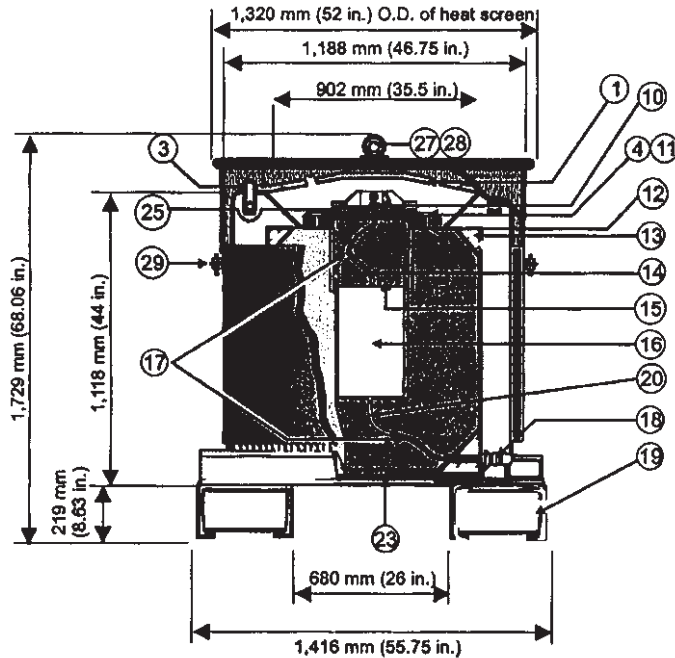
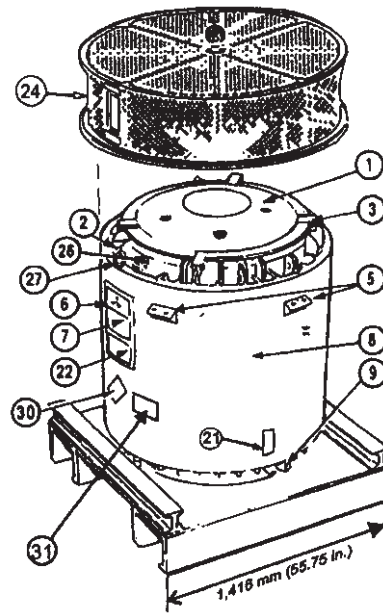
Revision 5: December 19, 2014. Certificate revised to incorporate Revision 2 of Nordion Procedure No. IN/DS 1846 F231.

Revision 6: September 8, 2016. Certificate issued. Drawings and specifications updated.



**Parts list**

1. Shield cap with vent holes
2. Retaining brackets for fireshield (8): 1 in. - 8 hex bolt, washer, nut
3. Retaining brackets for shield cap (4): 1/2 - 13 hex bolt, washer, nut
4. Plug bolts: 3/4 - 10 socket hd. (8) and 7/8 - 9 hex hd. (2)
5. Heat screen mounting lugs (4)
6. Radiation caution plate
7. MDS Nordion Identification plate
8. Removable fireshield
9. 3/4 - 10 hex bolts (4)
10. 3/8 in. NPT pipe plug
11. Wire seal installed through heads of hex bolts (item 4)
12. Neoprene gasket
13. Vermiculite packing
14. Vent tube
15. Removable plug (F-231-MK2 plug shown)
16. F-231 cavity: 292 mm dia. x 445 mm (11.5 in. dia. x 17.5 in.)  
F-231-MK2 cavity: 292 mm dia. x 474 mm (11.5 in. dia. x 18.68 in.)
17. Safety cables
18. Cap & nipple on end of drain line
19. Removable shipping skid
20. Drain tube
21. Warning plate ("Safety cable plugs must be used when shipping container loaded")
22. Warning plate ("Caution - Heat Emitter - Do not store in insulated or refrigeration container or insulated space")
23. Ceramic insulation - steel encased
24. Heat screen
25. Crack shield ring
26. Lifting/tie-down lugs (4)
27. Shoulder type eyebolts (3) - zinc plated
28. Bolt (1) 3/4 - 10, zinc plated washers (2)
29. Bolt (8) 3/8 - 16 hex, washers (16), zinc plated lock washers (16)
30. Category Label (2): on two opposite sides
31. UN Number Label (2): one next to each of the two radioactive category label



**Notes**

1. CNSC Certificate CDN/2077/B(U)-96
2. Meets IAEA Type B(U) requirements
3. Container shielding: 286 mm (11.25 in.) lead-steel encased  
F-231 plug shielding: 283 mm (11.16 in.) lead-steel encased  
F-231-MK2 plug shielding: 282 mm (11.12 in.) lead and tungsten-steel encased
4. Gross weight: 7,955 kg (17,500 lb.) maximum
5. F-231 plug weight: 477 kg (1,050 lb.) nominal  
F-231-MK2 plug weight: 489 kg (1,075 lb.) nominal
6. Floor loading (based on projected floor area):  
3,981 kg/m<sup>2</sup> (811 lb./sq. ft.)
7. Radionuclides carried: cobalt-60

**MDS Nordion**  
447 March Road, P.O. Box 13500  
Kanata, Ontario, Canada, K2K 1X8  
Tel: (613) 592-2790 · Fax: (613) 592-6937

**TITLE**

**F-231 & F-231-MK2 Transport Packages  
(To IAEA 1996 Transport Regulations)**

REF. IN/SS 1850 F231-MK2-96 F102001-016		REVISED July 03	DCN: A1944-D-34B
DATE April 1999	No.		ISSUE
DRAWN / CHECKED / APPROVED	<b>F-231(-MK2)(1996)</b>		<b>4</b>
SHEET 1 OF 1			

THIS DRAWING IS THE PROPERTY OF MDS NORDION INC. AND IS SUBMITTED FOR CONSIDERATION ON THE UNDERSTANDING THAT THERE SHALL BE NO EXPLOITATION OF ANY INFORMATION CONTAINED HEREIN EXCEPT WITH THE SPECIFIC WRITTEN AGREEMENT OF MDS NORDION INC.



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**CERTIFICATE NUMBER:** USA/0578/B(U)-96, Revision 5

**ORIGINAL REGISTRANT(S):**

Luc Desgagne  
Senior Licensing Coordinator  
Nordion (Canada) Inc.  
447 March Road  
Ottawa, K2K 1X8  
Canada

Jackie Kavanagh  
Manager, Facility & Transportation Licensing  
Nordion (Canada) Inc.  
447 March Road  
Ottawa, K2K 1X8  
Canada