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

East Building, PHH-23
1200 New Jersey Ave, SE
Washington, D.C. 20590

June 23, 2021

Dr. James M. Shuler
Manager, Packaging Certification Program
Department of Energy
U.S. Department of Energy
1000 Independence Ave, SW
EM-60
Washington, DC, 20585
USA

Dear Dr. James M. Shuler,

As your June 18, 2021 letter requested, Department of Energy has been registered as a user of IAEA Certificate of Competent Authority USA/0578/B(U)-96 for the Nordion (Canada) Inc. Models F-231, F-231-L, F-231-MK2 and F-231-MK2-L, Serial Nos. 11 and up. This certificate, which revalidates the Canadian Certificate of Competent Authority No.2077 authorizes the transport of the package from the point of entry to final destination in the United States, from point of origin in the United States to point of exit, and through the United States.

A copy of the certificate is enclosed. All future revisions of the certificate will be forwarded to Department of Energy at James.Shuler@em.doe.gov.

Sincerely,

Richard W. Boyle, Chief
Radioactive Materials Branch
Office of Engineering and Research

East Building, PHH-23
1200 New Jersey Ave, SE
Washington, D.C. 20590

U.S. Department of Transportation

Pipeline and Hazardous Materials Safety Administration

COMPETENT AUTHORITY CERTIFICATION FOR A TYPE B(U) RADIOACTIVE MATERIALS PACKAGE DESIGN CERTIFICATE USA/0578/B(U)-96, REVISION 6

REVALIDATION OF CANADIAN COMPETENT AUTHORITY CERTIFICATE CDN/2077/B(U)-96

The Competent Authority of the United States certifies that the radioactive material package design described in this certificate satisfies the regulatory requirements for a Type B(U) package as prescribed in the regulations of the International Atomic Energy Agency[1] and the United States of America[2] The package design is approved for use within the United States for import and export shipments made in accordance with applicable international and domestic transport regulations.

1. Package Identification - Nordion (Canada) Inc. Models F-231, F-231-L, F-231-MK2 and F-231-MK2-L, Serial Nos. 11 and up.

2. Package Description and Authorized Radioactive Contents - as described in Canadian Certificate of Competent Authority CDN/2077/B(U)-96, Revision 7 (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 Engineering and Research, (PHH-23), Pipeline and Hazardous Materials Safety Administration, U.S. Department of Transportation, Washington D.C. 20590-0001.

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[1] "Regulations for the Safe Transport of Radioactive Material, 2012 Edition, No. SSR-6" published by the International Atomic Energy Agency (IAEA), Vienna, Austria.

[2] Title 49, Code of Federal Regulations, Parts 100-199, United States of America.

CERTIFICATE USA/0578/B(U)-96, REVISION 6

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.

d. Records of Management System activities required by Paragraph 306 of the IAEA regulations[1] 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, 2026. Previous editions which have not reached their expiration date may continue to be used.

This certificate is issued in accordance with paragraph(s) 810 of the IAEA Regulations and Section 173.473 of Title 49 of the Code of Federal Regulations, in response to the February 25, 2021 petition by Nordion (Canada) Inc., Ottawa, Ontario, and in consideration of other information on file in this Office.

Certified By:

March 22, 2021
(DATE)

for William Schoonover
Associate Administrator for Hazardous Materials Safety

Revision 6 - Issued to revalidate Canadian Certificate of Approval No. CDN/2077/B(U)-96, Revision 7.

Canadian Certificate No.: **CDN/2077/B(U)-96 (Rev. 7)**
Issue Date: **Feb-16-2021**
Expiry Date: **Nov-30-2026**
CNSC File: **30-A2-196-1**

Certificate

CDN/2077/B(U)-96 (Rev. 7)

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, F-231-L, F-231-MK2 and F-231-MK2-L, 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 and F-231-L transport packagings are as shown on Nordion Drawing No. F102001-017 (Issue G). The Model F-231- MK2 and F-231-MK2-L transport packagings are as shown on Nordion Drawing No. F102001-016 (Issue J). All packagings consist 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 containment system consists of the source assemblies and the cavity.

The F-231(-L) and F-231-MK2(-L) models differ in the design of the shield plug. The shield plug of the F-231 and F-231-L models 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 and F-231-MK2-L models 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. For the "-L" option of the F-231 and F-231-MK2 models, stainless steel lift rings are added to raise the plug by 15.9 mm (0.63") or 34.9 mm (1.38"), thus increasing the height of the cavity.

An illustration of the transport packages is shown on attached Nordion Drawing No. F502001-001 (Issue A).

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:	**Cylindrical**	Shielding:	**Lead**
Mass:	**8010 kg**	Outer Casing:	**Steel**
Length:	**n/a**	Height:	**1510 mm**
Width:	**n/a**	Diameter:	**1320 mm**

AUTHORIZED RADIOACTIVE CONTENTS

The F-231 and F-231-L transport packages are authorized to contain not more than 14.8 PBq of cobalt-60 metal contained within one of the following:

a) 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

b) a maximum of 86 AC-345 Type capsules carried within a capsule carrier; or

c) welded stainless steel or Zircaloy capsules that meet the requirements of the ISO 2919:2012 standard of the International Organization for Standardization, under the Classification Number E53424 with the capsules retained within a holder that distributes them throughout the cavity volume.

The F-231-MK2 and F-231-MK2-L transport packages are authorized to contain:

a) the contents specified for the F-231 and F-231-L transport package; or

b) 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.

MANAGEMENT SYSTEM

The management system 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 (12)*, "Radioactive Material Transport Package Quality Plan"
- Nordion Procedure No. IN/DS 1846 F231 (3), "Design, Manufacturing and Operating Specification for F-231 and F-231-MK2 Transport Packages to IAEA Transport Regulations"

- Nordion Document No. IN/QA 0562 A000 (5)*, "Sealed Source Quality Plan"
- Packaging and Transport of Nuclear Substances Regulations, 2015
- * or latest current revision

SHIPMENT

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

- Nordion Procedure No. IN/DS 1846 F231 (3), "Design, Manufacturing and Operating Specification for F-231 and F-231-MK2 Transport Packages to IAEA Transport Regulations"
- Packaging and Transport of Nuclear Substances Regulations, 2015

The average surface heat flux of the package with 14.8 PBq of Cobalt 60 is 970 W/m². For heat fluxes exceeding 15 W/m², supplementary arrangements must be made with the carrier to ensure adequate heat dissipation.

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.

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

NOTES

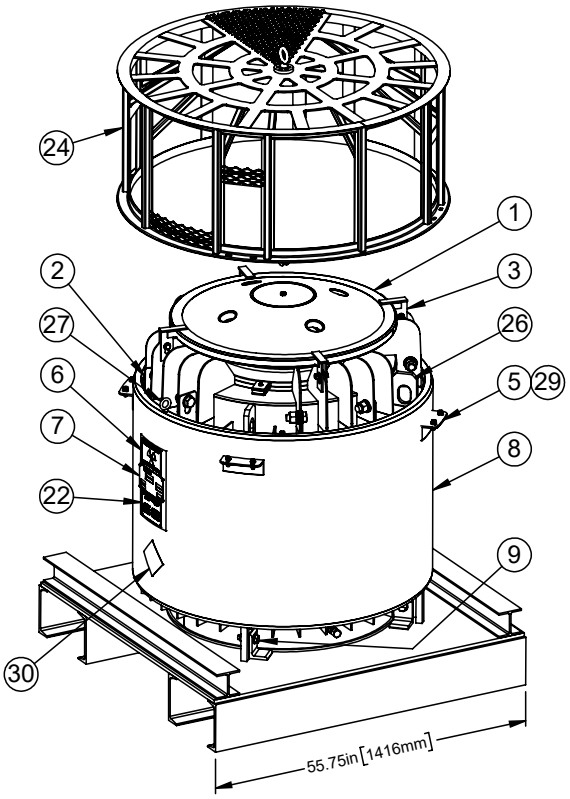
Revision 5: December 19, 2014. Certificate revised to incorporate Revision 2 of Nordion Procedure No. IN/DS 1846 F231.

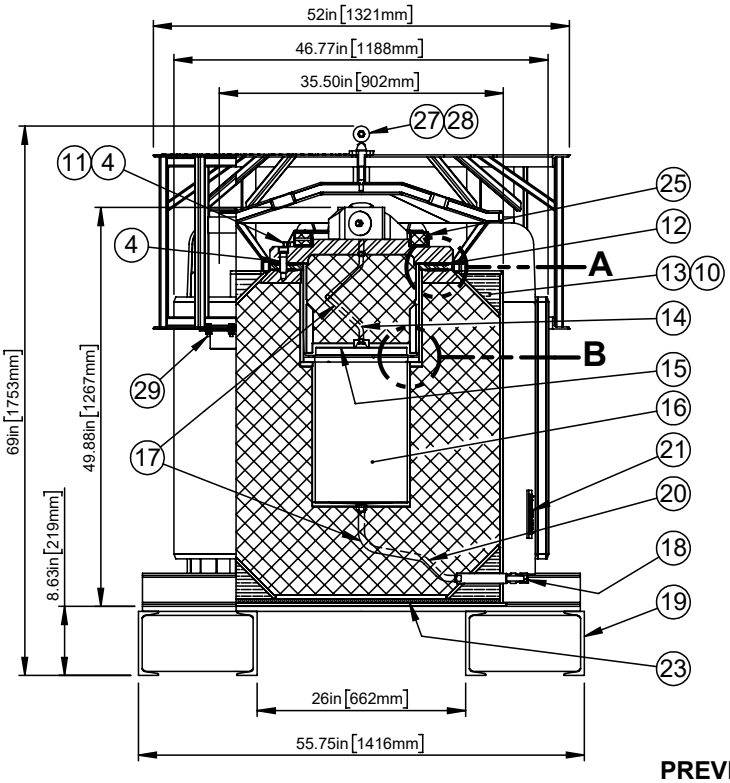
Revision 6: September 8, 2016. Certificate issued. Drawings and specifications updated.

Revision 7: February 16, 2021. Certificate amended to add the F-231-L and F-231-MK2-L configurations and amend the authorized radioactive contents, and renewed.

Parts list

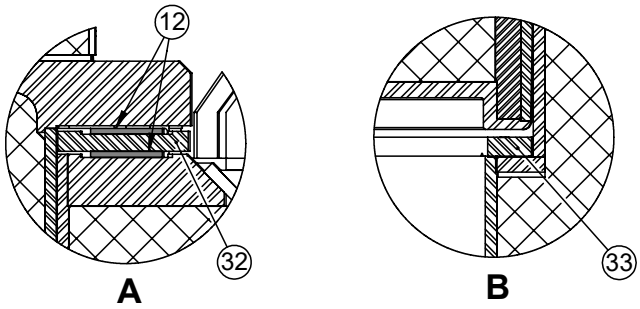
1. Shield cap with vent holes
2. Retaining brackets for fireshield (8): 1in.-8 hex bolt, washer, nut
3. Retaining brackets for shield cap (4): 1/2-13 hex bolt, washer, nut
4. Plug bolts: 3/4-10 socket hd. (8) and 7/8 - 9 hex hd. (2)
5. Heat screen mounting lugs (4)
6. Radiation caution plate
7. Nordion identification plate
8. Removable fireshield
9. 3/4-10 hex bolts (4)
10. 3/8 in. NPT pipe plug (2)
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
32. Upper Lift Ring for F-231 MK2-L configuration only
33. Gap Filler Ring for F-231 MK2-L configuration only





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: 8,010 kg (17,660 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): 3,995 kg/m2 (818 lb./sq. ft.)
7. Radionuclides carried: cobalt-60



F-231 MK2-L CONFIGURATION
MK2 PLUG SHOWN

PREVIOUS VERSION NUMBER: IN/SS 1850 F231-MK2-96, ISSUE 5

Nordion
447 March Road,
Ottawa, On K2K 1X8
Canada
Tel: (613) 592-2790
Fax: (613) 592-6937

TITLE

F-231 / F-231-L AND "F-231-MK2 / F-231-MK2-L" TRANSPORT PACKAGES

File: **F502001-001**	ISSUE **A**	REVISED	CF 9194

CREATED 2020-08-19

DRAWN	CHECKED	APPROVED
J. KAPLON	C. CHALMERS	J. CHAISSON

Package No:

F-231 (-MK2)(1996)

SHEET 1 OF 1

U.S. Department of
Transportation

**Pipeline and
Hazardous Materials
Safety Administration**

**East Building, PHH-23
1200 New Jersey Ave, SE
Washington, D.C. 20590**

CERTIFICATE NUMBER: USA/0578/B(U)-96

ORIGINAL REGISTRANT(S):

GE Hitachi Nuclear Energy
6705 Vallecitos Rd
Sunol, CA, 94586
USA

Nordion (Canada) Inc.
447 March Road
Ottawa, Ontario, K2K 1X8
Canada

REGISTERED USERS:

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1000 Independence Ave, SW
EM-60
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