



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/0697/B(U)-96, REVISION 2

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

REVALIDATION OF CANADIAN COMPETENT AUTHORITY
CERTIFICATE CDN/2078/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 Agency¹ and the United States of America².

1. Package Identification - MDS Nordion F-458/F-245, F-458/F-247, F-458/F-251, F-458/F-251 MK2, F-458/F-318 and F-458/F-448 Transport Packages.
2. Package Description and Authorized Radioactive Contents - as described in Canada Certificate of Competent Authority CDN/2078/B(U)-96, 2 (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.

¹ "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.

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

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- d. Records of Quality Assurance activities required by Paragraph 310 of the IAEA regulations¹ 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. Special Conditions -
 - a. The leak proof insert O-ring must be tested to demonstrate a leakage rate not more than $1E-7$ ref-cm³/s prior to use. This test may be performed prior to loading the contents in the leakproof insert. This condition is waived for contents consisting only of solid or liquid Iodine 125 or Iodine 131.
 - b. All shipments of normal form radioactive material must be in leakproof inserts. The maximum heat load of normal form radioactive material in a leak proof insert is 6.1 Watts.
 - c. After loading and prior to each shipment of normal form Sr-90, the seals of the F-248, F-250, F-256, and F-320 containment vessels must show no leakage when tested to a sensitivity of at least $1E-3$ ref-cm³/s.
 - d. The shipper must provide the consignee special instructions for safely opening the package. The instructions must give special consideration to any byproducts generated by the radiolysis of water.
 5. Marking and Labeling - The package shall bear the marking USA/0697/B(U)-96 in addition to other required markings and labeling.
 6. Expiration Date - This certificate expires on June 30, 2008.


CERTIFICATE USA/0697/B(U)-96, REVISION 2

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 June 07, 2007 petition by MDS Nordion, Ottawa, Ontario, and in consideration of other information on file in this Office.

Certified By:



Jun 20 2007
(DATE)

 Bob Richard
Deputy Associate Administrator for Hazardous Materials Safety

Revision 2 - Issued to revalidate Canadian Certificate of Competent Authority CDN/2078/B(U)-96, Rev. 2, with the indicated conditions, for a period of one year.



Canadian Nuclear Safety Commission
Commission canadienne de sûreté nucléaire

Canadian Certificate No. CDN/2078/B(U)-96 (Rev. 2)	Issue Date May-02-2007	Expiry Date Oct-31-2011	CNSC File 30-A2-243-0
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Certificate for 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 Section 7 of the *Packaging and Transport of Nuclear Substances Regulations*, and to the 1996 Edition (Revised) of the *IAEA Regulations for the Safe Transport of Radioactive Material*.

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: MDS Nordion
Make/Model: F-458/F-245; F-247; F-251; F-251 MK2; F-318 and F-448
Mode of Transport: Air, Sea, Road, Rail

IDENTIFICATION MARK

The package shall bear the competent authority identification mark "CDN/2078/B(U) - 96".

PACKAGE DESCRIPTION

The packaging, comprising of four major sub-assemblies consists of the containment system, the shielding vessel, the outer container and the fire shield.

The containment system consists of a special form capsule, or a C-133 welded sealed capsule within the F-336 tungsten alloy insert, or an F-248, F-250, F-242, F-256 or F-320 leak proof insert. The leak proof insert consists of a stainless steel body and cap that are threaded together and sealed with an O-ring.

The shielding is provided by a cylindrical vessel encased in stainless steel sheet. The F-251, F-251 MK2, F-318, F-245 and F-247 shielding vessels are depleted uranium vessels and the F-448 is a lead filled vessel.

The F-458 outer container consists of a double skinned cylindrical stainless steel keg with two lifting apertures in the top. A lid is bolted with six M10 stainless steel bolts.



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The fire shield is provided by polyurethane foam filled between the double skins of the stainless steel keg. Two vent holes in the lid and two in the body of the cylinder are provided with plastic pipe thread plugs. The various packaging models are further shown on MDS Nordion Drawing Nos. F-458/F245: F624501-002; F-458/F247: F624701-002; F-458/F251 and F251 MK2: F625101-002; F-458/F318: F631801-002 and F-458/F448: F644801-002.

The total mass of the package for various model types are as shown in the attached MDS Nordion Drawing No. F-458, (Issue 7).

The package is further described and the other essential technical requirements for design, manufacturing, maintenance, inspection are listed in MDS Nordion Document No. IS/DS 1789 F-458 (9) "Design, Manufacturing and Operating Specification for the F-458 Family of Transport Package".

The configuration of the F-458 packaging is as follows:

Shape: Cylinder	Shielding: Lead or Depleted Uranium
Mass: n/a	Outer Casing: Stainless Steel
Length: n/a	Height: 494 mm
Width: n/a	Diameter: 400 mm

AUTHORIZED RADIOACTIVE CONTENTS

The radioactive contents for the various configurations of the F-458 Transport Packages are listed in Appendix A attached.

QUALITY ASSURANCE

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

- MDS Nordion Document No. IN/QA 0224 Z000 (6)* "Radioactive Material Transport Package Quality Plan"
- MDS Nordion Document No. IS/DS 1789 F458 (9) "Design, Manufacturing and Operating Specification for the F-458 Family of Transport Package"
- Canadian Packaging and Transport of Nuclear Substances Regulations
- IAEA Regulations
- * or latest current revision



Canadian Nuclear Safety Commission
Commission canadienne de sûreté nucléaire

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SHIPMENT

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

- MDS Nordion Document No. IS/DS 1789 F458 (9) "Design, Manufacturing and Operating Specification for the F-458 Family of Transport Package"
- Canadian Packaging and Transport of Nuclear Substances Regulations
- IAEA Regulations

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

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



Appendix A

The radioactive contents for the various configurations of the F-458 Transport Packages are listed in the following tables:

**Package Configurations and Authorized Radioactive Contents
for F-458/F-251 and F-458/F-318**

Isotope	Package Configuration			Chemical and Physical Form
	F-251 or F-318 with F-248 insert	F-251 or F-318 with F-320 insert or F-251 with F-250 insert	F-251 or F-318 with F-368 insert	
I-131	20 TBq (540 Ci)	20 TBq (540 Ci)	20 TBq (540 Ci)	Solid
I-131	7.4 TBq (200 Ci)	13 TBq (351 Ci)	--	Aqueous NaOH solution or aqueous NaOH with up to 0.02 M Na ₂ SO ₄
Ir-192	--	--	300 TBq (8100 Ci)	Special Form capsule
Mo-99/ Tc-99m	37 TBq (1000 Ci)	55.5 TBq (1500 Ci)	--	Solid or aqueous NaOH solution or aqueous NaOH with up to 1 M NH ₄ NO ₃ or up to 0.4% NaOCl
Sr-90/ Y-90	18.5 TBq (500 Ci)	18.5 TBq (500 Ci)	--	Solid
Sr-90/ Y-90	6.4 TBq (173 Ci)	11.1 TBq (300 Ci)	--	Liquid in up to 1 N HCl
Y-90	18.5 TBq (500 Ci)	18.5 TBq (500 Ci)	--	Solid
Y-90	6.4 TBq (173 Ci)	11.1 TBq (300 Ci)	--	Liquid in 0.04 N HCl



**Package Configurations and Authorized Radioactive Contents
for F-458/F-245 and F-458/F-247**

Isotope	Package Configuration			Chemical and Physical Form
	F-245 with F-248 insert	F-247 with F-242 insert	F-245 with F-336 insert	
Co-60	--	--	275 GBq (7.4 Ci)	Solid
I-131	7500 GBq (202 Ci)	3300 GBq (89 Ci)	--	Solid or aqueous NaOH solution or aqueous NaOH with up to 0.2 M Na ₂ SO ₄
Ir-192	--	37 TBq (1000 Ci)	--	Solid pellets
Ir-192	--	--	300 TBq (8100 Ci)	Solid pellets in a C-133 capsule
Ir-192	--	110 TBq (2970 Ci)	300 TBq (8100 Ci)	Special form capsule
Mo-99/ Tc-99m	37 TBq (1000 Ci)	25 TBq (676 Ci)	--	Solid or aqueous NaOH solution or aqueous NaOH solution with up to 1 M NH ₄ NO ₃ or up to 0.4% NaOCl

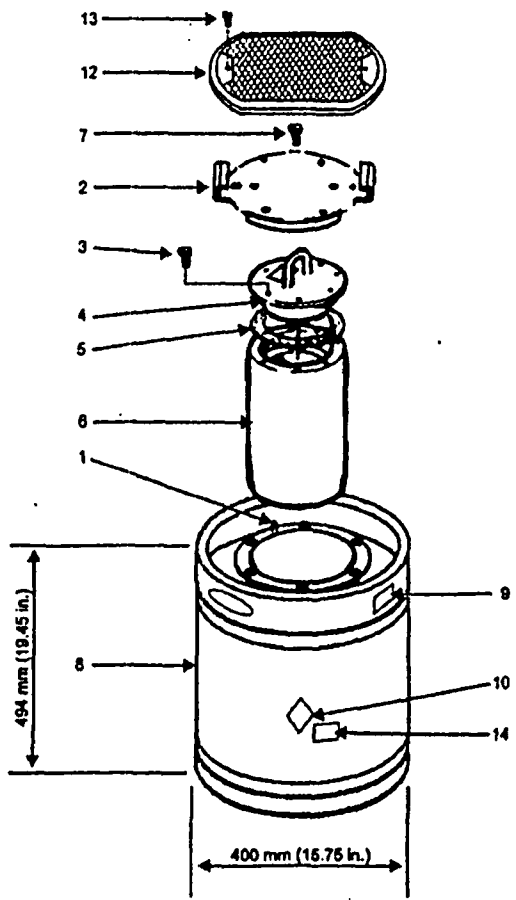
**Package Configurations and Authorized Radioactive Contents
for F-458/F-448 in F-256 Leakproof Insert**

Isotope	Package Configuration		Chemical and Physical Form
	F-448/F-256	F-448/F-256/F-389	
I-125	7,400 GBq (200 Ci)	7,400 GBq (200 Ci)	Solid or Aqueous NaOH solution
I-131	5,180 GBq (140 Ci)	10,000 GBq (270 Ci)	Solid or Aqueous NaOH solution or Aqueous NaOH solution with 0.02 M Na ₂ SO ₄
Mo-99/ Tc-99m	555 GBq (15 Ci)	1,110 GBq (30 Ci)	Solid or Aqueous NaOH solution or Aqueous NaOH with 1 M NH ₄ NO ₃ or up to 0.4% NaOCl
Y-90	16,000 GBq (432 Ci)	--	Solid or Liquid in 0.04 N HCl
Sr-90/Y-90	16,000 GBq (432 Ci)	--	Solid or Liquid in 1 N HCl



**Package Configurations and Authorized Radioactive Contents
for F-458/F-448 in Special Form Sealed Sources**

Isotope	Package Configuration			
	F-448	F-448/F-174	F-448-F/286	F-448/F-382
Co-60	4.0 GBq (0.1 Ci)	15.0 GBq (0.4 Ci)	4.0 GBq (0.1 Ci)	15.0 GBq (0.4 Ci)
Ir-192	2,405 GBq (65 Ci)	9,250 GBq (250 Ci)	4,800 GBq (130 Ci)	33,300 GBq (900 Ci)
Sb-124	7.4 GBq (0.2 Ci)	11.1 GBq (0.3 Ci)	7.4 GBq (0.2 Ci)	44.4 GBq (1.2 Ci)
Y-90	18,000 GBq (486 Ci)	18,000 GBq (486 Ci)	18,000 GBq (486 Ci)	18,000 GBq (486 Ci)
Sr-90/Y-90	18,000 GBq (486 Ci)	18,000 GBq (486 Ci)	18,000 GBq (486 Ci)	18,000 GBq (486 Ci)

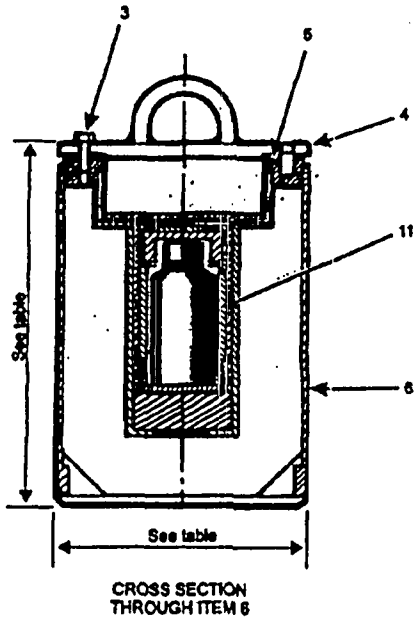


Parts List

1. Wire seal on guide pin
2. Lid
3. 3/8 - 16UNC hex head cap screws, SAE J429, Gr. 5, (F-245, F-247 and F-251 - 4 pcs., F-448, F-251 MKII and F-318 - 6 pcs.)
4. Shielded plug
5. Neoprene gasket
6. Shielding vessel
7. Stainless steel bolt M10 x 30 mm long (6)
8. Stainless steel cylinder
9. Shipping container identification and radiation caution label (2)
10. Radioactive Category Labels (2); on two opposite sides
11. Leakproof insert and radioactive contents
12. Heat screen. See Note 5.
13. Stainless steel bolt M8 x 16 mm long (2)
14. UN Number Labels (2); one next to each of the radioactive category label

Notes

1. Meets IAEA Type B(U) requirements
2. CNSC Certificate CDN/2078/B(U)-96
3. Prepare for shipment in accordance with IS/PP 1693 F458
4. Supplemental shielding inserts may be used in some configurations
5. Supplemental heat screen to be used for shipments of Ir-192 in excess of 150 TBq



Shielding Vessels & Inserts					
Package Model Type	Package Total Weight (kg)	Shielding Vessel Diameter (mm)	Shielding Vessel Height (mm)	Leakproof Insert Type	Shielding Insert Type
F-458/F-251 F-458/F-251MKII	167	184	274	F-320 F-250 F-248	F-368
F-458/F-318	164	171	268	F-320 F-248	F-368
F-458/F-245	153	181	245	F-248	F-336
F-458/F-247	125	165	218	F-242	
F-458/F-448	138	184	256	F-256	F-174 F-286 F-382 F-389

MDS Nordion

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TITLE

F-458 Transport Packaging

REF. IS/SS 1699 F458
 F545801-001

REVISED OCT 05 DC 19847

DATE Nov 00

No.

F-458

ISSUE

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CERTIFICATE NUMBER: USA/0697/B(U)-96, Revision 2

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