

71-3076



U.S. Department  
of Transportation

**Research and  
Special Programs  
Administration**

400 Seventh Street, S.W.  
Washington, D.C. 20590

FEB -4 2005

Mr. William Brach, Director  
Spent Fuel Project Office  
Office of Nuclear Material Safety and Safeguards (NMSS)  
U.S. Nuclear Regulatory Commission  
Washington, DC 20555

Dear Mr. Brach:

In accordance with the Memorandum of Understanding between our Agencies, I request that you review the enclosed Canadian Package Design Certificate No. CDN/2078/B(U)-96 for the MDS Nordion Transport Packages 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 and make a recommendation concerning our revalidation of the certificate for import and export use. To assist you in your review, I enclose two proprietary copies and one non-proprietary copy of the safety analysis report. An affidavit justifying the withholding of information is also enclosed.

Thank you for your assistance and please feel free to contact me or Fred Ferate if you need any further information. We can both be reached at 202-366-4545.

Sincerely,

A handwritten signature in black ink, appearing to read "Richard W. Boyle".

Richard W. Boyle, Chief  
Radioactive Materials Branch  
Office of Hazardous Materials  
Technology

Enclosures

NMSS01



January 19, 2005

Mr. Richard W. Boyle  
Director of Hazardous Materials Technology  
Research and Special Programs Administration  
Office of Hazardous Materials Transportation  
Radioactive Materials Branch  
U.S. Department of Transport, Room 8430  
400 7th Street, South West  
Washington, D.C. 20590

**Subject: Application for Validation of the Canadian Nuclear Safety  
Commission Package Design Approval Certificate CDN/2078/B(U)-96  
(Rev.0) for the 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**

Dear Mr. Boyle,

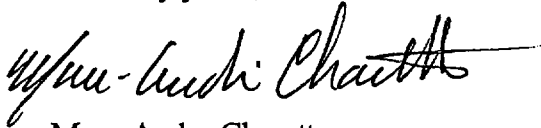
This letter is to request the validation of the Canadian certificate CDN/2078/B(U)-96. Please find attached a copy of the Canadian certificate. MDS Nordion is requesting a two-year validation of the Canadian certificate to allow the US Nuclear Regulatory Commission sufficient time to review the Safety Analysis Report.

The F-458 package will replace the F-327 outer drum. The same shielding vessels and leakproof inserts used in the F-327 family of packages will be used in the F-458 transport package.

Attached are two proprietary copies of the revised Safety Analysis Report, MDS Nordion document number IN/TR 1791 F458 (3) and two non proprietary copies. Attached is an affidavit to support MDS Nordion's request to withhold the above-mentioned document from public disclosure. This document is specific to the design and fabrication of the 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 and would enable a third party to manufacture similar transport packages.

Thank you for your consideration of this matter. Should you have any questions or require further information, please do not hesitate to contact me by telephone at (613) 592-3400 ext. 2421 or by fax at (613) 592-2006 or by email at [mcharette@mds.nordion.com](mailto:mcharette@mds.nordion.com).

Sincerely yours,

A handwritten signature in black ink, appearing to read "Marc-Andre Charette". The signature is written in a cursive style with a long horizontal stroke extending to the right.

Marc-Andre Charette  
International Transport & Nuclear Initiatives  
Manager, Regulatory Affairs

Encl: CDN/2078/B(U)-96 (Rev.0), IS/TR 1791 F458 (3), Affidavit

Copy to: Mike Krzaniak, Karine Glenn, Luc Desgagné



# Certification



Canadian Nuclear  
Safety Commission

Commission canadienne  
de sûreté nucléaire

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## RADIOACTIVE MATERIAL TYPE B(U) PACKAGE DESIGN APPROVAL CERTIFICATE NO. CDN/2078/B(U)-96, (REV. 0)

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30-A2-243-0

September 9, 2003

The Canadian Nuclear Safety Commission hereby certifies that the package, as described below, has been demonstrated to meet the regulatory requirements prescribed for Type B(U) packages as described in the Canadian *Packaging and Transport of Nuclear Substances Regulations*<sup>[1]</sup> and in the IAEA Regulations<sup>[2]</sup>, subject to the following limitations, terms and conditions.

All users of this authorization shall register their use of the package, 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.

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.

### 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

### PACKAGING 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-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. The dimensions of the keg are 400 mm in diameter by 490 mm high.

The fire shield is provided by polyurethane foam filled in the space 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: 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 3).

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

### AUTHORIZED RADIOACTIVE CONTENTS

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            | 37 TBq<br>(1000 Ci)              | 37 TBq<br>(1000 Ci)   | 37 TBq<br>(1000 Ci)              | Solid   |
| I-131            | 7.4 TBq<br>(200 Ci)              | 13 TBq<br>(351 Ci)  | --                               | Aqueous NaOH solution or aqueous NaOH with up to 0.2 M Na <sub>2</sub> SO <sub>4</sub>                            |
| Ir-192           | --                               | --  | 300 TBq<br>(8100 Ci)             | Special Form capsule  |
| Mo-99/<br>Tc-99m | 37 TBq<br>(1000 Ci)              | 55.5 TBq<br>(1500 Ci)                                       | --                               | Solid or aqueous NaOH solution or aqueous NaOH with up to 1 M NH <sub>4</sub> NO <sub>3</sub> or up to 0.4% NaOCl |
| Sr-90/<br>Y-90   | 18.5 TBq<br>(500 Ci)             | 18.5 TBq<br>(500 Ci)  | --                               | Solid   |
| Sr-90/<br>Y-90   | 6.4 TBq<br>(173 Ci)              | 11.1 TBq<br>(300 Ci)  | --                               | Liquid in up to 1 N HCL   |
| Y-90             | 18.5 TBq<br>(500 Ci)             | 18.5 TBq<br>(500 Ci)  | --                               | Solid   |
| Y-90             | 6.4 TBq<br>(173 Ci)              | 11.1 TBq<br>(300 Ci)  | --                               | Liquid in up to 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-248insert | F-247 with F-242 insert | F-245 with F-336 insert |  |
| Co-60            | --                     | --                      | 275 GBq<br>(7.4 Ci)     | Solid  |
| I-131            | 7500 GBq<br>(202 Ci)   | 3300 GBq<br>(89 Ci)     | --                      | Solid or aqueous NaOH solution or aqueous NaOH with up to 0.2m $Na_2SO_4$                    |
| Ir-192           | --                     | 37 TBq<br>(1000 Ci)     | --                      | Solid pellets  |
| Ir-192           | --                     | --                      | 300 TBq<br>(8100 Ci)    | Solid pellets in a C-133 capsule   |
| Ir-192           | --                     | 110 TBq<br>(2970 Ci)    | --                      | Special form capsule   |
| Mo-99/<br>Tc-99m | 37 TBq<br>(1000 Ci)    | 25 TBq<br>(676 Ci)      | --                      | Solid or aqueous NaOH solution or aqueous NaOH with up to 1 M $NH_4NO_3$ 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<br>(200 Ci)  | 7,400 GBq<br>(200 Ci)  | Solid or Aqueous NaOH solution  |
| I-131            | 5,180 GBq<br>(140 Ci)  | 10,000 GBq<br>(270 Ci) | Solid or Aqueous NaOH solution or Aqueous NaOH solution with 0.02 M $Na_2SO_4$                        |
| Mo-99/<br>Tc-99m | 555 GBq<br>(15 Ci)     | 1,110 GBq<br>(30 Ci)   | Solid or Aqueous NaOH solution or Aqueous NaOH solution with up to 1 M $NH_4NO_3$ or up to 0.4% NaOCl |
| Y-90             | 16,000 GBq<br>(432 Ci) | --                     | Solid or liquid in up to 0.04 N MC1   |
| Sr-90/Y-90       | 16,000 GBq<br>(432 Ci) | --                     | Solid or liquid in up to 1 N MC1  |

**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<br>(0.1 Ci)    | 15.0 GBq<br>(0.4 Ci)   | 4.0 GBq<br>(0.1 Ci)    | 15.0 GBq<br>(0.4 Ci)   |
| Ir-192     | 2,405 GBq<br>(65 Ci)   | 9,250 GBq<br>(250 Ci)  | 4,800 GBq<br>(130 Ci)  | 33,300 GBq<br>(900 Ci) |
| Sb-124     | 7.4 GBq<br>(0.2 Ci)    | 11.1 GBq<br>(0.3 Ci)   | 7.4 GBq<br>(0.2 Ci)    | 44.4 GBq<br>(1.2 Ci)   |
| Y-90       | 18,000 GBq<br>(486 Ci) | 18,000 GBq<br>(486 Ci) | 18,000 GBq<br>(486 Ci) | 18,000 GBq<br>(486 Ci) |
| Sr-90/Y-90 | 18,000 GBq<br>(486 Ci) | 18,000 GBq<br>(486 Ci) | 18,000 GBq<br>(486 Ci) | 18,000 GBq<br>(486 Ci) |

### QUALITY ASSURANCE

Quality Assurance for the package design shall be in accordance with MDS Nordion Document No. IN/QA 0224 Z000 (5)<sup>[3]</sup> "Radioactive Material Transport Package Quality Plan", the Canadian *Packaging and Transport of Nuclear Substances Regulations*<sup>[1]</sup> and as required by the IAEA Regulations<sup>[2]</sup>.

The package shall be designed, manufactured, inspected and maintained in accordance with MDS Nordion Document No. IS/DS 1789 F458 (3) "Design, Manufacturing and Operating Specification for the F-458 Family of Transport Package".

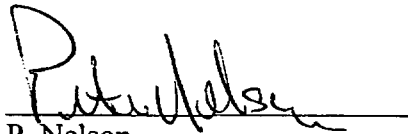
### SHIPMENT

This package shall be prepared for shipment in accordance with MDS Nordion Document No. IS/DS 1789 F458 (3) "Design, Manufacturing and Operating Specification for the F-458 Family of Transport Packages" the Canadian *Packaging and Transport of Nuclear Substances Regulations*<sup>[1]</sup>, and the IAEA Regulations<sup>[2]</sup>.

If the average heat flux of the package exceeds  $15\text{W/m}^2$ , supplementary arrangements must be made with the carrier to ensure adequate heat dissipation.

**EXPIRY DATE**

This certificate expires October 31, 2007.



P. Nelson  
Designated Officer pursuant to  
Subsection 37.(2)(a) of the  
Nuclear Safety and Control Act

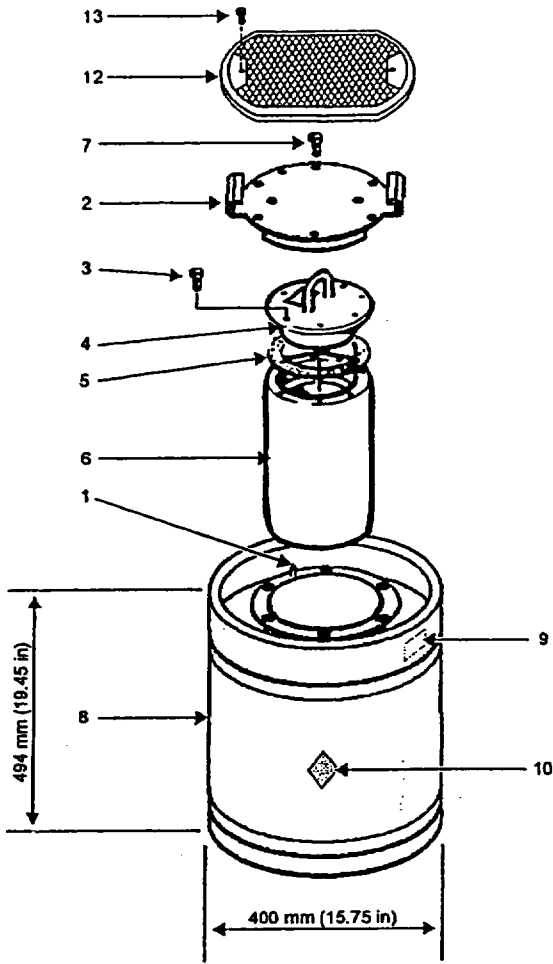
**REFERENCES**

- [1] *Canadian Packaging and Transport of Nuclear Substances Regulations*, SOR/2000-208, 31 May 2000.
- [2] International Atomic Energy Agency Safety Standards Series No. TS-R-1 (ST-1 Revised), *Regulations for the Safe Transport of Radioactive Material*, 1996 Edition (Revised).
- [3] Or latest current revision.

**NOTES**

- 1. Revision 0: September 9, 2003. Original issue.



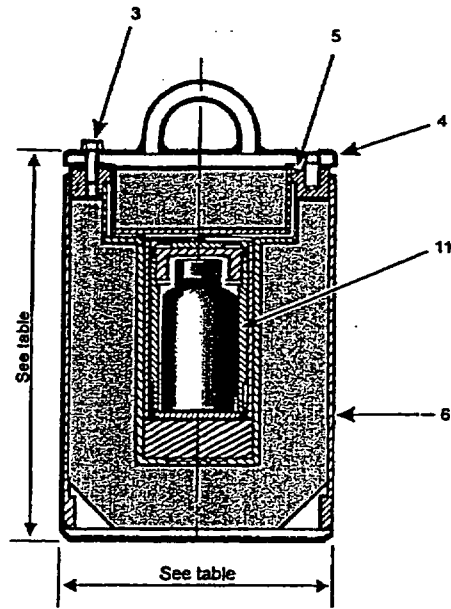


**Parts List**

1. Wire seal on guide pin
2. Lid
3. 3/8 - 16UNC hex head stainless steel screws (6)
4. Shielded plug
5. Neoprene seal
6. Shielding vessel
7. Stainless steel bolt M10 x 35 mm long (6)
8. Stainless steel Cylinder
9. Shipping container identification and radiation caution label (1)
10. Radioactive Category Labels (2): on two opposite sides
11. Leakproof insert and radioactive contents
12. Heat screen
13. Stainless steel bolt M8 x 16 mm long (2)

**Notes**

1. Meets IAEA Type B(U) requirements
2. CNSC Certificate CDN/B(U) - 96, pending
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



CROSS SECTION THROUGH ITEM 6

| 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                 | 167                       | 184                            | 274                          | F-320<br>F-250<br>F-248 | F-368                            |
| F-458/F-318                 | 164                       | 171                            | 268                          | F-320<br>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<br>F-286<br>F-382<br>F-389 |

**MDS Nordion**

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

TITLE

**F-458 Transport Packaging**

REF. IS/SS 1699 F458  
F545801-001

REVISED Sept 01

DCN A1205-D-12B

DATE Nov 00

No.

**F-458**

ISSUE

**3**

DRAWN CHECKED APPROVED

*[Handwritten signatures]*

SHEET 1 OF 2

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.



# Certification



Canadian Nuclear  
Safety Commission

Commission canadienne  
de sûreté nucléaire

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## CERTIFICAT N° CDN/2078/B(U)-96, (RÉV. 0) D'APPROBATION DE MODÈLE DE COLIS DE TYPE B(U) CONTENANT DES MATIÈRES RADIOACTIVES

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30-A2-243-0

Le 9 septembre 2003

La Commission canadienne de sûreté nucléaire certifie, par les présentes, que le colis, tel que décrit ci-dessous, est réputé satisfaire aux exigences réglementaires visant les colis de Type B(U) dans le *Règlement sur l'emballage et le transport des substances nucléaires*<sup>[1]</sup> du Canada et dans le Règlement de l'AIEA<sup>[2]</sup>, sous réserve des conditions et des restrictions suivantes.

Toute personne qui voudrait l'utiliser pour la première fois doit s'inscrire par écrit auprès de la Commission canadienne de sûreté nucléaire et attester qu'elle possède les instructions nécessaires pour préparer le colis à l'expédition.

Le présent certificat ne dispense pas l'expéditeur de toute exigence imposée par les autorités de tout pays étranger vers lequel ou à travers lequel le colis est transporté.

### IDENTIFICATION DU COLIS

Modèles de conteneur de transport F-458/F-245, F-458/F-247, F-458/F-251, F-458/F-251 MK2, F-458/F-318 et F-458/F-448 de MDS Nordion.

### DESCRIPTION DE L'EMBALLAGE

Le colis comprend quatre assemblages partiels principaux, soit le système de confinement, la cuve de blindage, le conteneur extérieur et l'écran pare-feu.

Le système de confinement est constitué d'une capsule sous forme spéciale, qui est une capsule scellée ou soudée C-133 dotée d'une garniture en alliage de tungstène F-336, ou d'une pièce F-248, F-250, F-242, F-256 ou F-320 à l'épreuve des fuites. La pièce à l'épreuve des fuites est composée d'une pièce et d'un couvercle en acier inoxydable qui sont filetés ensemble et scellés à l'aide d'un joint torique.

Le blindage est assuré par une cuve de cylindrique placée dans un étui en acier inoxydable. Les cuves de blindage F-251, F-318, F-245 et F-247 sont en uranium appauvri et la cuve F-448 est remplie de plomb.

Le contenant extérieur F-458 est un barillet cylindrique à double paroi en acier inoxydable à deux ouvertures élévatoires sur le dessus. Le couvercle est fixé au moyen de six boulons M10 en acier inoxydable. Les dimensions du barillet sont de 400 mm de diamètre sur 490 mm de hauteur.

L'écran pare-feu comprend de la mousse de polyuréthane insérée dans l'espace entre les deux parois du barillet en acier inoxydable. Les deux événements du couvercle ainsi que les deux autres événements dans le corps du cylindre sont dotés de tuyaux de plastique à bouchon fileté.

Les divers modèles de colis sont illustrés sur les dessins de MDS Nordion n<sup>os</sup> F-458/F245 : F624501-002; F-458/F247 : F624701-002; F-458/F251 : F625101-002; F-458/F318 : F631801-002 et F-458/F448 : F644801-002.

La masse totale du colis pour les différents types de modèles est telle qu'indiquée sur le dessin ci-joint, de MDS Nordion n<sup>o</sup> F-458 (édition 3).

Le colis doit porter la marque d'identification «CDN/2078/B(U)-96» de l'autorité compétente.

### CONTENU RADIOACTIF AUTORISÉ

Le contenu radioactif pour les différentes configurations du colis F-458 sont énumérés dans le tableau ci-dessous.

**Configurations du colis et contenu radioactif autorisé  
pour le F-458/F-251 et le F-458/F-318**

| Isotope          | Configuration du colis          |   |                                 | Forme chimique et physique   |
|------------------|---------------------------------|---|---------------------------------|--|
|                  | F-251 ou F-318 avec pièce F-248 | F-251 ou F-318 avec pièce F-320 ou F-251 avec F-250 | F-251 ou F-318 avec pièce F-368 |  |
| I-131            | 37 TBq<br>(1000 Ci)             | 37 TBq<br>(1000 Ci)                                 | 37 TBq<br>(1000 Ci)             | Solide   |
| I-131            | 7.4 TBq<br>(200 Ci)             | 13 TBq<br>(351 Ci)                                  | --                              | Solution aqueuse NaOH ou aqueuse NaOH avec moins de 0.2 M Na <sub>2</sub> SO <sub>4</sub>                                |
| Ir-192           | --                              | --  | 300 TBq<br>(8100 Ci)            | Capsule de forme spéciale  |
| Mo-99/<br>Tc-99m | 37 TBq<br>(1000 Ci)             | 55.5 TBq<br>(1500 Ci)                               | --                              | Solide ou solution aqueuse NaOH ou aqueuse NaOH avec moins de 1 M NH <sub>4</sub> NO <sub>3</sub> ou moins de 0.4% NaOCl |
| Sr-90/<br>Y-90   | 18.5 TBq<br>(500 Ci)            | 18.5 TBq<br>(500 Ci)                                | --                              | Solide   |
| Sr-90/<br>Y-90   | 6.4 TBq<br>(173 Ci)             | 11.1 TBq<br>(300 Ci)                                | --                              | Liquide en moins de 1 N HCL  |
| Y-90             | 18.5 TBq<br>(500 Ci)            | 18.5 TBq<br>(500 Ci)                                | --                              | Solide   |
| Y-90             | 6.4 TBq<br>(173 Ci)             | 11.1 TBq<br>(300 Ci)                                | --                              | Liquide en 0.04 N HCl  |

**Configuration du colis et contenu radioactif autorisé  
pour le F-458/F-245 et le F-458/F-247**

| Isotope          | Configuration du colis  |                         |                         | Forme chimique et physique  |
|------------------|-------------------------|-------------------------|-------------------------|---|
|                  | F-245 with F-248 insert | F-247 with F-242 insert | F-245 with F-336 insert |   |
| Co-60            | --                      | --                      | 275 GBq<br>(7.4 Ci)     | Solide  |
| I-131            | 7500 GBq<br>(202 Ci)    | 3300 GBq<br>(89 Ci)     | --                      | Solide ou solution aqueuse NaOH ou acqueuse NaOH avec moins de 0.2M $Na_2SO_4$                        |
| Ir-192           | --                      | 37 TBq<br>(1000 Ci)     | --                      | Pastilles solides   |
| Ir-192           | --                      | --                      | 300 TBq<br>(8100 Ci)    | Pastilles solides dans une capsule C-133  |
| Ir-192           | --                      | 110 TBq<br>(2970 Ci)    | --                      | Capsule de forme spéciale   |
| Mo-99/<br>Tc-99m | 37 TBq<br>(1000 Ci)     | 25 TBq<br>(676 Ci)      | --                      | Solide ou solution acqueuse NaOH ou acqueuse NaOH avec moins de 1 M $NH_4NO_3$ ou moins de 0.4% NaOCl |

**Configuration du colis et contenu radioactif autorisé  
pour le F-458/F-448 dans le F-256 insert étanche**

| Isotope          | Configuration du colis |                        | Forme chimique et physique   |
|------------------|------------------------|------------------------|--|
|                  | F-448/F-256            | F-448/F-256/F-389      |  |
| I-125            | 7,400 GBq<br>(200 Ci)  | 7,400 GBq<br>(200 Ci)  | Solide ou solution acqueuse NaOH   |
| I-131            | 5,180 GBq<br>(140 Ci)  | 10,000 GBq<br>(270 Ci) | Solide ou solution acqueuse NaOH ou solution acqueuse NaOH avec moins de 0.02M $Na_2SO_4$                      |
| Mo-99/<br>Tc-99m | 555 GBq<br>(15 Ci)     | 1,110 GBq<br>(30 Ci)   | Solide ou solution acqueuse NaOH ou solution acqueuse NaOH avec moins de 1 M $NH_4NO_3$ ou moins de 0.4% NaOCl |
| Y-90             | 16,000 GBq<br>(432 Ci) | --                     | Solide ou solution en 0.04 N MCl   |
| Sv-90/Y-90       | 16,000 GBq<br>(432 Ci) | --                     | Solide ou solution en 0.04 1 N MCl   |

**Configuration du colis et contenu radioactif autorisé  
pour le F-458/F-448 sources scellées de forme spéciale**

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

### ASSURANCE DE LA QUALITÉ

L'assurance de la qualité pour la conception de l'emballage doit être en conformité avec le document n° IN/QA 0224 Z000 (5)<sup>[3]</sup> de MDS Nordion, le *Règlement sur l'emballage et le transport des substances nucléaires*<sup>[1]</sup> du Canada et du Règlement de l'AIEA<sup>[2]</sup>.

Le colis doit être conçu, fabriqué, inspecté et maintenu conformément au document no. IS DS 1789 F458 (3) "Design, Manufacturing and Operating Specification for the F-458 Family of Transport Packages".

### EXPÉDITION

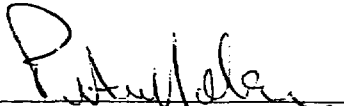
Le colis doit être préparé pour l'expédition conformément à la procédure n° IS/DS 1789 F458(3) de MDS Nordion, au *Règlement sur l'emballage et le transport des substances nucléaires*<sup>[1]</sup> du Canada et au Règlement de l'AIEA<sup>[2]</sup>.

Si le flux moyen de chaleur du colis dépasse 15W/m<sup>2</sup>, des arrangements supplémentaires doivent être fait avec le transporteur afin d'assurer la dissipation adéquate de la chaleur.

**DATE D'EXPIRATION**

Le présent certificat expire le 31 octobre 2007.

Fonctionnaire désigné en vertu de  
l'alinéa 37(2)(a) de la Loi sur la  
Sûreté et la réglementation nucléaires

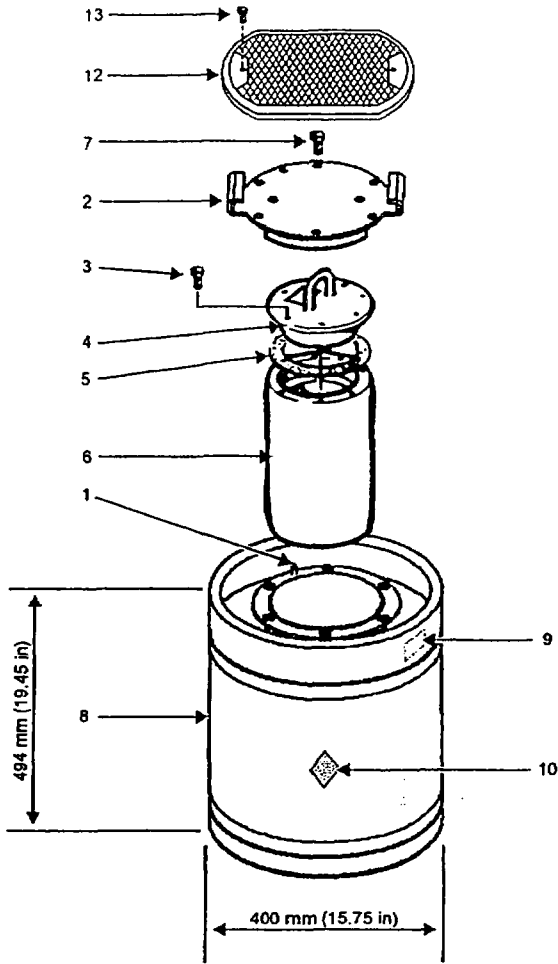
  
P. Nelson

**RÉFÉRENCES**

- [1] *Règlement sur l'emballage et le transport des substances nucléaires* du Canada, DORS/2000-208, 31 mai 2000.
- [2] Agence internationale de l'énergie atomique, collection normes de sécurité n° TS-R-1(ST-1, Révisées) *Règlement de transport des matières radioactives*, édition de 1996 (Révisée).
- [3] Ou la plus récente révision.

**NOTES**

1. Révision 0: le 9 septembre 2003. Premier certificat.

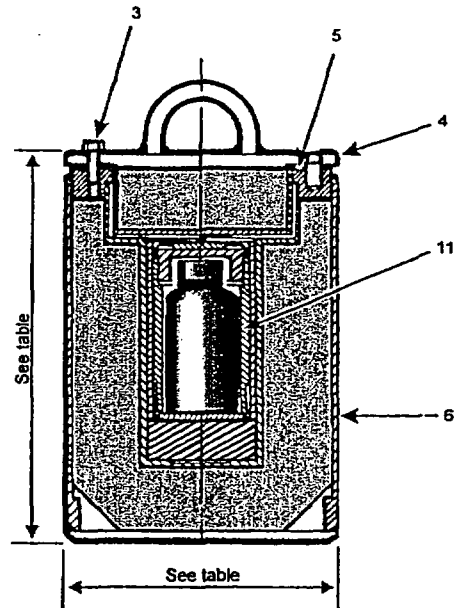


**Parts List**

1. Wire seal on guide pin
2. Lid
3. 3/8 - 16UNC hex head stainless steel screws (6)
4. Shielded plug
5. Neoprene seal
6. Shielding vessel
7. Stainless steel bolt M10 x 35 mm long (6)
8. Stainless steel Cylinder
9. Shipping container identification and radiation caution label (1)
10. Radioactive Category Labels (2): on two opposite sides
11. Leakproof insert and radioactive contents
12. Heat screen
13. Stainless steel bolt M8 x 16 mm long (2)

**Notes**

1. Meets IAEA Type B(U) requirements
2. CNSC Certificate CDN/B(U) - 96, pending
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



CROSS SECTION THROUGH ITEM 6

| 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                 | 167                       | 184                            | 274                          | F-320<br>F-250<br>F-248 | F-368                            |
| F-458/F-318                 | 164                       | 171                            | 268                          | F-320<br>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<br>F-286<br>F-382<br>F-389 |

**MDS Nordion**

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TITLE

**F-458 Transport Packaging**

REF. IS/SS 1699 F458  
 F545801-001

REVISED Sept 01 DCN A1205-D-12B

DATE Nov 00

No. **F-458**

ISSUE

DRAWN CHECKED APPROVED

*[Handwritten signatures]*

SHEET 1 OF 2

**3**

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