



U.S. Department
of Transportation

East Building, PHH-21
1200 New Jersey Ave., SE
Washington, D.C. 20590

**Pipeline and
Hazardous Materials
Safety Administration** **COMPETENT AUTHORITY CERTIFICATION
FOR A TYPE B(U)F FISSILE
RADIOACTIVE MATERIALS PACKAGE DESIGN
CERTIFICATE USA/0561/B(U)F, REVISION 1**

**REVALIDATION OF CANADIAN COMPETENT AUTHORITY
CERTIFICATE CDN/02048/B(U)F, REVISION 7**

This certifies that the radioactive material package design described below 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 - Model No. F-257, Serial No.2.
2. Package Description - as described in Canadian Competent Authority Certificate CDN/02048/B(U)F, Revision 7 (attached).
3. Authorized Radioactive Contents - as described in Canadian Competent Authority Certificate CDN/02048/B(U)F, Revision 7, consistent with the following specifications.

The SLOWPOKE-2 research reactor core at Dalhousie University is authorized by this certificate. This core shall be consistent with the following specifications:

Type of Nuclear Reactor Assemblies:	SLOWPOKE-2
Fuel Element Type:	Pin
Maximum mass of contents:	5234 grams
Maximum number of fuel elements per package:	297 fuel pins
Maximum fuel element length:	22 cm
Maximum fuel element outer diameter:	0.61 cm
Maximum decay heat per package:	1 watt
Maximum initial enrichment, weight percent U-235:	93.5%
Maximum initial mass, U-235:	825 grams
Maximum initial mass, Uranium:	886 grams
Maximum burnup Kwh/fuel core:	313,000 Kwh
Minimum cooling time:	530 days

4. Criticality - The minimum criticality safety index is 100.
5. 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

¹ "Regulations for the Safe Transport of Radioactive Material, 2009 Edition, No. TS-R-1", 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/0561/B(U)F, REVISION 1

petitioner, shall register his identity in writing to the Office of Hazardous Materials Technology, (PHH-21), 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.

6. Special Conditions -

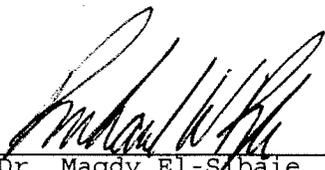
- a. Periodic Leak Test: The package must have completed a periodic leakage test, in accordance with ANSI N14.5, to verify a leakage rate not to exceed 1×10^{-7} std-cm³/s within one year prior to shipment.
- b. Transport by air is not authorized.

7. Marking and Labeling - The package shall bear the marking USA/0561/B(U)F in addition to other required markings and labeling.

8. Expiration Date - This certificate expires on September 30, 2012.

This certificate is issued in accordance with paragraphs 814 and 816 of the IAEA Regulations and Section 173.473 of Title 49 of the Code of Federal Regulations, in response to the August 20, 2010 petition by LFI Laurentide Forwarders (Canada) Inc., St-Laurent, Quebec and in consideration of other information on file in this Office.

Certified by:



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

FEB 18 2011

(DATE)

Revision 1 - Issued to endorse Canadian Competent Authority Certificate CDN/02048/B(U)F, Revision 7 with contents as given in paragraph 3, CSI as given in paragraph 4, and the special conditions of paragraph 6.



Canadian Certificate No. CDN/2048/B(U)F (Rev. 7)	Issue Date Aug-20-2008	Expiry Date Sep-30-2012	CNSC File 30-A2-214-0
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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 1973 Revised Edition (as amended) 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: **Atomic Energy of Canada Limited**
Make/Model: **F-257 Shipping Package, Serial No. 002**
Mode of Transport: **Sea, Road, Rail**

IDENTIFICATION MARK

The package shall bear the competent authority identification mark "**CDN/2048/B(U)F**".

PACKAGE DESCRIPTION

The packaging, as shown on Nordion International Drawing No. F125701-001, (Rev. D), consists of an inner container and an impact limiting fire shield overpack. The container is a stainless steel encased lead cylinder, with a removable top plug attached by eight high strength 5/8 inch diameter bolts. Sealing is provided by a silicone "O" ring. Vent and drain lines are supplied to facilitate wet loading. The lines are safety plugged. The overpack consists of a double carbon steel wall, capped cylinder mounted on a disk base. The cylinder voids are filled with "Fibrefax" thermal insulation. "Transite" sheets protect the base. External fins are welded to the outer skin to provide heat transfer and impact absorption. Hoisting lugs are integral with four of these fins. The cylinder is attached to the base by eight 1 inch diameter bolts. Skids are provided for mechanical handling. The inner container is mounted onto the disk of the overpack by four resilient steel brackets and eight 3/4 inch diameter steel bolts.

An illustration of the package is shown on attached Drawing No. SLWPK-F125701-4,(Rev. 0).



Canadian Certificate No. CDN/2048/B(U)F (Rev. 7)	Issue Date Aug-20-2008	Expiry Date Sep-30-2012	CNSC File 30-A2-214-0
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The configuration of the package is as follows:

Shape: Cylinder	Shielding: Lead
Mass: 3160 kg	Outer Casing: Steel
Length: n/a	Height: 1522 mm
Width: n/a	Diameter: 1255 mm

AUTHORIZED RADIOACTIVE CONTENTS

This package is authorized to contain one irradiated SLOWPOKE fuel core consisting of up to 342 uranium-aluminum alloy fuel rods, as described on AECL Drawing No. A10720, contained within an aluminum alloy cage as shown on AECL Drawing No. A10721. Each rod is 28% - 72% by weight uranium-aluminum with a maximum enrichment of 93.5% U-235. The maximum mass of U-235 is 2.8 g per rod before irradiation.

QUALITY ASSURANCE

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

- Canadian Packaging and Transport of Nuclear Substances Regulations
- IAEA Regulations

SHIPMENT

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

- AECL Operating Procedure No. SLWPK-35000-PRO-001, (Rev. 1) "Preparation for Shipment of the F-257 Transport Package"
- Canadian Packaging and Transport of Nuclear Substances Regulations
- IAEA Regulations

Shipment is authorized as fissile with a minimum Criticality Safety Index (CSI) of 50 for criticality control.

Post irradiation decay time shall not be less than 48 hours.



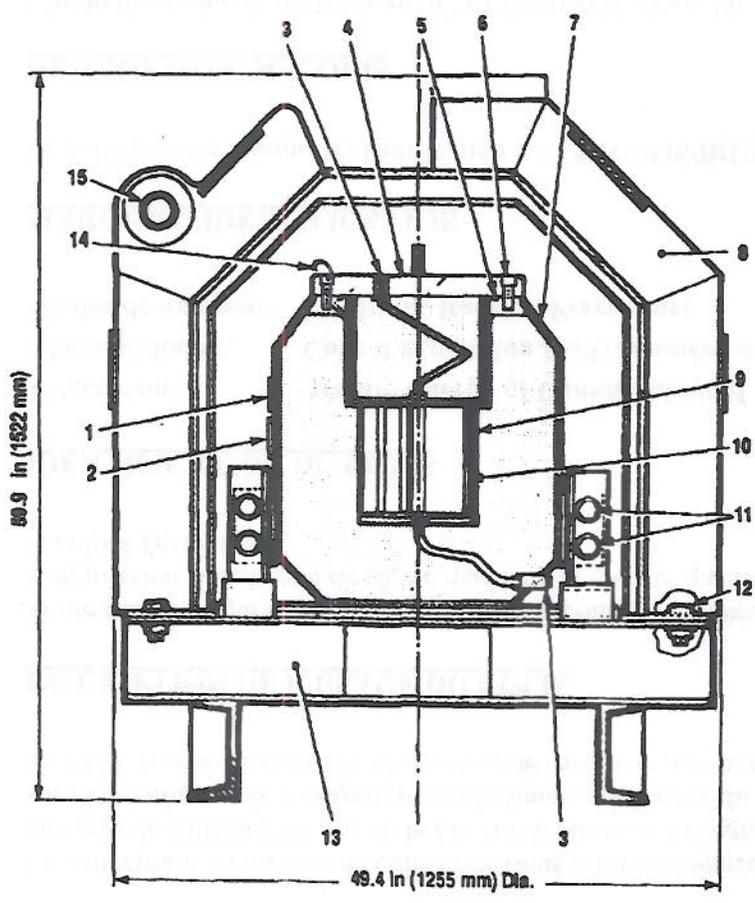
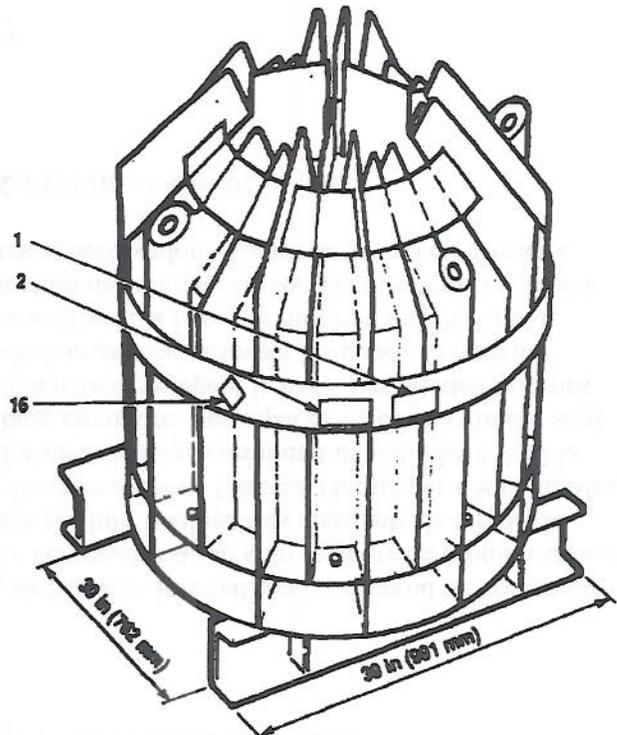
Canadian Certificate No. CDN/2048/B(U)F (Rev. 7)	Issue Date Aug-20-2008	Expiry Date Sep-30-2012	CNSC File 30-A2-214-0
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This certificate does not relieve the shipper from any requirement of the government of any country through or into which the package will be transported.

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

Parts List

1. AECL Identification plate (4)
2. Radiation caution plate (4)
3. Brass pipe plugs 3/8 NPT (2)
4. Removable closure plug - steel encased lead
5. Silicone rubber 'O' ring seal
6. Closure plug screws "UNBRAKO": 5/8 -11 UNC x 1.88 in (48 mm) long (8)
7. Flask proper - steel encased lead : 6.38 in. min. (162 mm)
8. Removable fire /crush shield (top)
9. Internal cavity, ID 9.0 in (229 mm) x 9.5 in (241 mm)
10. Radioactive contents
11. Flask bolts : 3/4 - 10 UNC x 2.5 in (64 mm) long
ASTM A354 grade BD (8)
12. Fire/crush shield bolts : 1 - 8 UNC x 3 in (76 mm) long
ASTM A354 grade BD (12)
13. Removable fire /crush shield assembly (bottom)
14. Wire seal (2) through holes in heads of 2 adjacent screws
15. Lifting eyes (4)
16. Radioactive Category I, II or III labels (2)



Notes

1. CNSC certification No. CDN/2048 B(U)/F
2. Weight (estimated)

Flask Proper	3,490 lb (1,586 kg)
Plug	420 lb (191 kg)
Fire/Crush Shield (Top)	1,875 lb (852 kg)
Fire/Crush Shield (Bottom)	1,175 lb (534 kg)
Total	6,960 lb (3,163 kg)
3. Floor loading (based on projected floor area):
696 lb/sq ft (3398 kg/m²)
4. This packaging is prepared for shipment in accordance with AECL procedure SLWPK-36900-PRO-001
5. Reference drawing SLWPK-F125701-1

CONTROLLED

No part of this document nor any information contained in it may be transmitted in any form to any third parties except with the prior written consent of Atomic Energy of Canada Limited.

F-257 Transport Packaging (for Slowpoke - 2 spent fuel core)	PREP <i>R. Hampel</i>	DATE 04 Oct 26	CHALK RIVER LABORATORIES CHALK RIVER ONTARIO CANADA						
	CHKD <i>D. Proulx</i>	DATE 2004-10-26							
	DSGN <i>[Signature]</i>	DATE 2004-10-26							
	APPD <i>S. Selovsky</i>	DATE 01.11.01							
	ACPT	DATE							
JOB NO. 13315	DWG NO. SLWPK-F125701-4	REV 0	<table border="1" style="width: 100%; border-collapse: collapse;"> <tr> <td style="width: 33%;">BLDG</td> <td style="width: 33%;">CODE</td> <td style="width: 33%;">CLASS</td> </tr> <tr> <td> </td> <td> </td> <td> </td> </tr> </table>	BLDG	CODE	CLASS			
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Washington, D.C. 20590

**Pipeline and
Hazardous Materials
Safety Administration**

CERTIFICATE NUMBER: USA/0561/B(U)F-96, Revision 1

ORIGINAL REGISTRANT(S):

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