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

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

**COMPETENT AUTHORITY CERTIFICATION
FOR A TYPE B(U)F FISSILE
RADIOACTIVE MATERIALS PACKAGE DESIGN
CERTIFICATE USA/0485/B(U)F, REVISION 2**

**REVALIDATION OF CANADIAN COMPETENT AUTHORITY
CERTIFICATE CDN/4212/B(U)F**

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[1] and the United States of America[2].

1. Package Identification - Atomic Energy of Canada Limited Model 4H Enriched Fuel Bundle Shipping Package, Serial Nos. 1 to 8 (inclusive).

2. Package Description and Authorized Radioactive Contents - as described in Canadian Certificate of Competent Authority CDN/4212/B(U)F, Revision 9 (attached).

3. Criticality - The minimum criticality safety index is as specified in the attached Canadian certificate. The maximum number of packages per conveyance is determined in accordance with Table X of the IAEA regulations cited in this certificate.

4. 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.

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[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.

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 Quality Assurance activities required by Paragraph 310 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 and consignees in the United States exporting or importing shipments under this certificate shall satisfy the requirements of Subpart H of 10 CFR 71.

5. Marking and Labeling - The package shall bear the marking USA/0485/B(U)F in addition to other required markings and labeling.

6. Expiration Date - This certificate expires on April 30, 2009.

This certificate is issued in accordance with paragraph 814 of the IAEA Regulations and Section 173.472 and 173.473 of Title 49 of the Code of Federal Regulations, in response to the August 02, 2006 petition by GE Energy, Wilmington, NC and in consideration of other information on file in this Office.

Certified By:

Robert A. McGuire
Associate Administrator for Hazardous Materials Safety

Aug 14 2006
(DATE)

Revision 2 - issued to endorse Canadian Certificate of Competent Authority CDN/4212/B(U)F, Revision 9, and to extend the expiration date.

Canadian Nuclear Safety Commission | Commission canadienne de sûreté nucléaire

Canadian Certificate No.	Issue Date	Expiry Date	CNSC File
CDN/4212/B(U)F (Rev.9)	**Mar-23-2005**	**Apr-30-2009**	**30-A1-153-0**

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 Radiactive 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	**Model 4H Enriched Fuel Bundle Shipping Package, Serial Nos. 1 to 8 inclusive**
Mode of Transport	**Sea, Road, Rail**

IDENTIFICATION MARK

The package shall bear the competent authority identification mark **"CDN/4212/B(U)F"**.

PACKAGE DESCRIPTION

The Atomic Energy of Canada Limited (AECL) Model 4H Enriched Fuel Bundle Shipping Package, as shown on AECL Drawing Nos. A-5580-A12, E-5580-A2, E-5580-2, E-5580-3 and E-5580-SA1, consists of a reinforced 208 litre drum filled with foam, vermiculite and plywood. The matching lid is attached by a 2.66 mm (12 gauge) closure ring with drop forged lugs and a 15.9 mm diameter bolt. A 2.4 mm diameter hole is provided for a security seal. The drum contains a weldment of spacers and plates attached to four Specification 2R containers on 216 mm centres. The 2R containers are closed by luted (Teflon tape) and threaded steel plates. The plates are colour-coded and numbered to match the 2R containers. The 2R containers enclose felt-lined aluminum carriers, packing materials as restricted below, and the authorized radioactive contents. Containment for Type A and LSA quantities is provided by the closed drum and Specification 2R containers and additional containment for Type B quantities is provided by the leak tight fuel cladding on the elements and bundles.

An illustration of the package is shown on attached Drawing No. A-5580-A12, (Rev. 0).

Shape:	**Drum**	Shielding:	**n/a**
Mass:	**250 kg**	Outer Casing:	**Steel**
Length:	**n/a**	Height:	**884 mm**
Width:	**n/a**	Diameter:	**606 mm**

Canada

Canadian Certificate No.	Issue Date	Expiry Date	CNSC File
CDN/4212/B(U)F (Rev.9)	Mar-23-2005	Apr-30-2009	30-A1-153-0

AUTHORIZED RADIOACTIVE CONTENTS

See APPENDIX A attached.

QUALITY ASSURANCE

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

- AECL Radioactive Material (RAM) Transportation Compliance Program No. 9200-01900-MAN-001 RC-2000-025, (Rev. 0)
- Canadian Packaging and Transport of Nuclear Substances Regulations
- IAEA Regulations

SHIPMENT

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

- AECL Procedure No. A-12052-PR-1
- Canadian Packaging and Transport of Nuclear Substances Regulations
- IAEA Regulations

Shipment is authorized as fissile with a minimum Criticality Safety Index (CSI) as specified under the Authorized Radioactive Contents.

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

Canada

APPENDIX A

AUTHORIZED RADIOACTIVE CONTENTS :

The contents are described for individual Specification 2R compartments. When the contents of the four compartments are common, the package mass limit is four times (4x) the compartment mass limits. When the contents of the four compartments are not common, the package mass limit is the total of each of the appropriate compartment mass limits but the Criticality Safety Index (CSI) and allowable number for the package shall be based on the most restrictive contents of anyone compartment.

Paragraphs (a) through (e) below list the appropriate Criticality Safety Indices (CSI) and allowable number (N) of packages in each arrangement.

As prepared for shipment, each of the Specification 2R compartments may contain up to lOO grams hydrogen, and

(a) not more than 22.6 kg of unirradiated uranium oxide containing up to 20 kg uranium enriched in the isotope U-235 to a maximum of 10 weight percent in the form of pellets, powder or scrap with Allowable Numbers and Criticality Safety Indices as set out in Table 1;

TABLE I: UO2 Limits on Criticality Safety Indices and Allowable Numbers

Max. weight percent U-235 in	Criticality Safety U Index (CSI) (per package)	Allowable Number (N)
2.75	1.3	38
3.00	1.7	29
3.50	2.7	18
5.00	4.2	11
10.00	50.0*	1

*Transport as Exclusive Use

Or

(b) not more than 20 kg of unirradiated uranium enriched in the isotope U-235 up to 5 weight percent as metal in the form of slugs, powder, pellets or scrap or as carbide (UC) in the form of pellets, elements or bundles sealed in fuel cladding with Allowable Numbers and Criticality Safety Indices as set out in Table 2;

TABLE 2: U and UC Limits on Criticality Safety Indices and Allowable Numbers

Max. weight percent U-235 in U	Criticality Safety Index (CSI) (per package)	Allowable Number
2.00	1.3	38
2.25	1.4	35
2.50	2.0	25
2.75	3.0	16
3.00	4.2	11
3.50	8.4	5
5.00	12.5*	4

*Transport as Exclusive Use

Or

(c) not more than 0.35 kg of unirradiated uranium enriched in the isotope U-235 up to a nominal level of 93 weight percent (maximum of 0.33 kg U-235) as slugs, powder, pellets or scrap shipped under exclusive use with an Allowable Number of2 and Criticality Safety Index of25; or

(d) mixed oxides of unirradiated uranium and thorium, (U, Th)O2, containing not more than 5 weight percent UO2 with uranium enriched in the isotope U-235, up to 93 weight percent in quantities not exceeding:

i) 7 kg total uranium plus thorium when the UO2 content is equal to or exceeds 1.75 weight percent (U+Th)O2 in the form of powder, pellets or scrap not in sealed fuel cladding; or

ii) 20 kg total uranium plus thorium when the UO2 content is less than 1.75 weight percent (U+Th)O2 in the form of powder, pellets or scrap not in sealed fuel cladding; or

ii) 20 kg total uranium and thorium in the form of pellets, elements or bundles sealed in zirconium alloy fuel cladding, with Allowable Numbers and Criticality Safety Indices as set out in Table 3;

TABLE 3: (U,Th)O2 Limits on Criticality Safety Indices and Allowable Numbers

Max. Weight percent UO_2 in (U, Th)O_2	Criticality Safety Index (CSI) (per package)	Allowable Number
4.25	1.3	38
4.50	1.4	35
4.75	1.6	31
5.00	1.8	27

Or

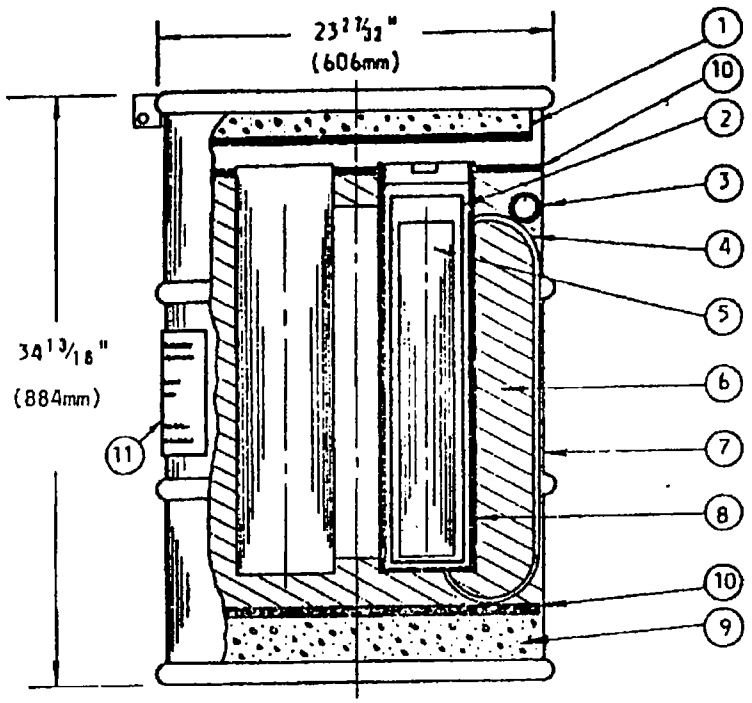
(e) not more than 22.6 kg of oxides of unirradiated uranium (l.1atural or depleted) and plutonium (separated and further described in reference[)], (U,PU)O2, containing a maximum of 20 kg total of uranium and plutoniumwith up to 4 weight percent PUO2 in (U+PU)O2 sealed in zirconium alloy fuel cladding with Allowable Numbers and Criticality Safety Indices as set out in Table 4;

TABLE 4: (U,PU)O2 Limits on Criticality Safety Indices and Allowable Numbers

Max. weight percent PUO_2 in $(U, PU)O_2$	Criticality Safety Index (CSI) (per package)	Allowable Number
1.25	1.3	38
1.50	1.5	33
1.75	2.0	25
2.00	2.8	17
2.25	3.8	13
2.50	5.0	10
2.75	6.3	7
3.00	8.4	5
3.50	10.0	5
4.00	12.5*	4

.*Transport as Exclusive Use

(1] Fissile Material Packaging 4H Compliance with Canadian Transport Regulations, Report No. CRNL 1698, W.R. Taylor.



1. TOP THERMAL SHIELD (VERMICULITE)
2. FELT LINED ALUMINUM CAN
3. 1½ INCH SCH.40 RETAINING PIPE
4. 12.7mm DIAMETER STEEL SPIDER - 4 PLACES
5. PAYLOAD (FUEL BUNDLE SHOWN)
6. CUSHIONING MATERIAL (URETHANE FOAM)
7. CTC 17H OR 17C DRUM, 45 IMPERIAL GALLONS, 16 GAUGE MATERIAL, FULL REMOVABLE HEAD
8. CTC SPECIFICATION 2R CONTAINER, 146mm O.D. x 133mm I.D., 610mm OUTSIDE HEIGHT x 572mm INSIDE HEIGHT - 4 PLACES
9. BOTTOM THERMAL SHIELD (VERMICULITE)
10. 12.7mm PLYWOOD SHEET
11. IDENTIFICATION AND TREFOIL SYMBOL PLATE

NOTES:

1. AUTHORIZED RADIOACTIVE CONTENTS - SEE AECB CERTIFICATE NO. CDN/4212/B(U)F1
2. CONFORMS TO IAEA TYPE B(U) AND FISSILE PACKAGING REQUIREMENTS AS SPECIFIED IN "REGULATIONS FOR THE SAFE TRANSPORT OF RADIOACTIVE MATERIALS" SAFETY SERIES NO. 6
3. GROSS WEIGHT 250 kg (550 lb.) MAXIMUM
   TARE WEIGHT 150 kg (350 lb.)
4. RADIOACTIVE CONTENTS TO BE PACKAGED AS PER DRAWINGS A-12052-PR1 AND E-5580-SA1
5. PACKAGING DESIGN DRAWINGS

E-5560-A2	ASSEMBLY
E-5580-7	SUB-ASSEMBLY AND DETAILS
D-5580-3	DRUMHEAD DETAILS
E-5580-SA1	PACKING SUBASSEMBLIES
A-12052-PR1	OPERATING PROCEDURES

FIGURE 1 MODEL 4H PACKAGING CDN/4212/B(U)F

ATOMIC ENERGY OF CANADA LIMITED, CHALK RIVER ONTARIO, CANADA	APPROVED	A-5580-A12 REV. No. 0	SHEET 1 OF 1

Canadian Nuclear Safety Commission | Commission canadienne de sûreté nucléaire

Canadian Certificate No.	Issue Date	Expiry Date	CNSC File
CDN/4212/B(U)F (Rev.9)	**Mar-23-2005**	**Apr-30-2009**	**30-A1-153-0**

Certificate
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Transport Package Design

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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	**Model 4H Enriched Fuel Bundle Shipping Package, Serial Nos. 1 to 8 inclusive**
Mode of Transport	**Sea, Road, Rail**

IDENTIFICATION MARK

The package shall bear the competent authority identification mark **"CDN/4212/B(U)F"**.

PACKAGE DESCRIPTION

The Atomic Energy of Canada Limited (AECL) Model 4H Enriched Fuel Bundle Shipping Package, as shown on AECL Drawing Nos. A-5580-A12, E-5580-A2, E-5580-2, E-5580-3 and E-5580-SA1, consists of a reinforced 208 litre drum filled with foam, vermiculite and plywood. The matching lid is attached by a 2.66 mm (12 gauge) closure ring with drop forged lugs and a 15.9 mm diameter bolt. A 2.4 mm diameter hole is provided for a security seal. The drum contains a weldment of spacers and plates attached to four Specification 2R containers on 216 mm centres. The 2R containers are closed by luted (Teflon tape) and threaded steel plates. The plates are colour-coded and numbered to match the 2R containers. The 2R containers enclose felt-lined aluminum carriers, packing materials as restricted below, and the authorized radioactive contents. Containment for Type A and LSA quantities is provided by the closed drum and Specification 2R containers and additional containment for Type B quantities is provided by the leak tight fuel cladding on the elements and bundles.

An illustration of the package is shown on attached Drawing No. A-5580-A12, (Rev. 0).

Shape: **Drum**
Mass: **250 kg**
Length: **n/a**
Width: **n/a**

Shielding: **n/a**
Outer Casing: **Steel**
Height: **884 mm**
Diameter: **606 mm**

Canada

Canadian Certificate No.	Issue Date	Expiry Date	CNSC File
CDN/4212/B(U)F (Rev.9)	**Mar-23-2005**	**Apr-30-2009**	**30-A1-153-0**

AUTHORIZED RADIOACTIVE CONTENTS

See APPENDIX A attached.

QUALITY ASSURANCE

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SHIPMENT

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Shipment is authorized as fissile with a minimum Criticality Safety Index (CSI) as specified under the Authorized Radioactive Contents.

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

Canada

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As prepared for shipment, each of the Specification 2R compartments may contain up to lOO grams hydrogen, and

(a) not more than 22.6 kg of unirradiated uranium oxide containing up to 20 kg uranium enriched in the isotope U-235 to a maximum of 10 weight percent in the form of pellets, powder or scrap with Allowable Numbers and Criticality Safety Indices as set out in Table 1;

TABLE I: UO2 Limits on Criticality Safety Indices and Allowable Numbers

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3.00	1.7	29
3.50	2.7	18
5.00	4.2	11
10.00	50.0*	1

*Transport as Exclusive Use

Or

(b) not more than 20 kg of unirradiated uranium enriched in the isotope U-235 up to 5 weight percent as metal in the form of slugs, powder, pellets or scrap or as carbide (UC) in the form of pellets, elements or bundles sealed in fuel cladding with Allowable Numbers and Criticality Safety Indices as set out in Table 2;

TABLE 2: U and UC Limits on Criticality Safety Indices and Allowable Numbers

Max. weight percent U-235 in U	Criticality Safety Index (CSI) (per package)	Allowable Number
2.00	1.3	38
2.25	1.4	35
2.50	2.0	25
2.75	3.0	16
3.00	4.2	11
3.50	8.4	5
5.00	12.5*	4

*Transport as Exclusive Use

Or

(c) not more than 0.35 kg of unirradiated uranium enriched in the isotope U-235 up to a nominal level of 93 weight percent (maximum of 0.33 kg U-235) as slugs, powder, pellets or scrap shipped under exclusive use with an Allowable Number of2 and Criticality Safety Index of25; or

(d) mixed oxides of unirradiated uranium and thorium, (U, Th)O2, containing not more than 5 weight percent UO2 with uranium enriched in the isotope U-235, up to 93 weight percent in quantities not exceeding:

i) 7 kg total uranium plus thorium when the UO2 content is equal to or exceeds 1.75 weight percent (U+Th)O2 in the form of powder, pellets or scrap not in sealed fuel cladding; or

ii) 20 kg total uranium plus thorium when the UO2 content is less than 1.75 weight percent (U+Th)O2 in the form of powder, pellets or scrap not in sealed fuel cladding; or

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TABLE 4: (U,PU)O2 Limits on Criticality Safety Indices and Allowable Numbers

Max. weight percent PUO_2 in (U, PU)O_2	**Criticality Safety Index (CSI) (per package)**	**Allowable Number**
1.25	1.3	38
1.50	1.5	33
1.75	2.0	25
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2.75	6.3	7
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3.50	10.0	5
4.00	12.5*	4

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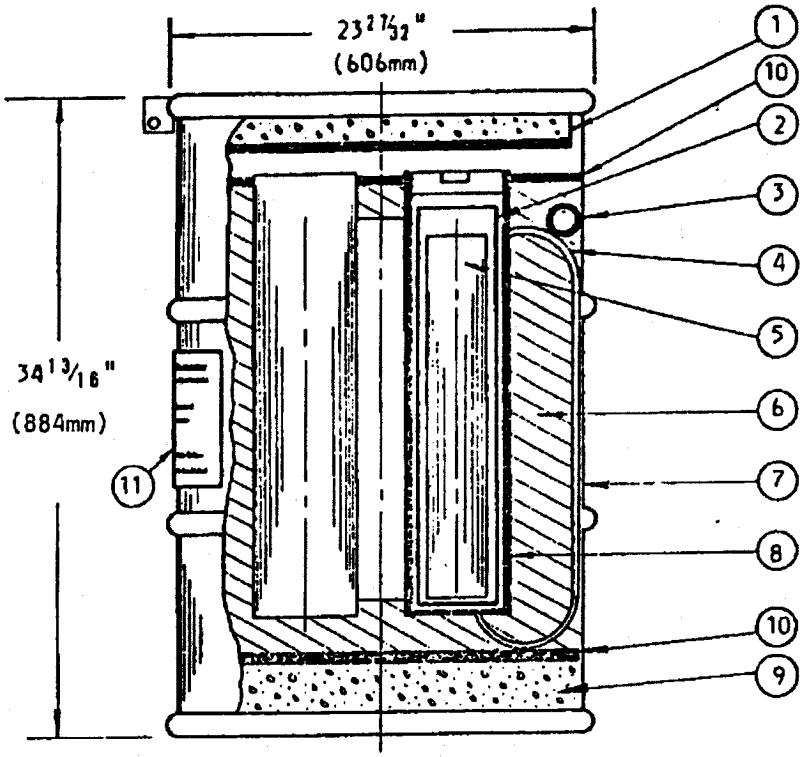
(1] Fissile Material Packaging 4H Compliance with Canadian Transport Regulations, Report No. CRNL 1698, W.R. Taylor.



1. TOP THERMAL SHIELD (VERMICULITE)
2. FELT LINED ALUMINUM CAN
3. 1½ INCH SCH.40 RETAINING PIPE
4. 12.7mm DIAMETER STEEL SPIDER - 4 PLACES
5. PAYLOAD (FUEL BUNDLE SHOWN)
6. CUSHIONING MATERIAL (URETHANE FOAM)
7. CTC 17H OR 17C DRUM, 45 IMPERIAL GALLONS, 16 GAUGE MATERIAL, FULL REMOVABLE HEAD
8. CTC SPECIFICATION 2R CONTAINER, 146mm O.D. x 133mm I.D., 610mm OUTSIDE HEIGHT x 572mm INSIDE HEIGHT - 4 PLACES
9. BOTTOM THERMAL SHIELD (VERMICULITE)
10. 12.7mm PLYWOOD SHEET
11. IDENTIFICATION AND TREFOIL SYMBOL PLATE

NOTES:

1. AUTHORIZED RADIOACTIVE CONTENTS - SEE AECB CERTIFICATE NO. CDN/4212/B(U)F1
2. CONFORMS TO IAEA TYPE B(U) AND FISSILE PACKAGING REQUIREMENTS AS SPECIFIED IN "REGULATIONS FOR THE SAFE TRANSPORT OF RADIOACTIVE MATERIALS" SAFETY SERIES NO. 6
3. GROSS WEIGHT 250 kg (550 lb.) MAXIMUM
   TARE WEIGHT 150 kg (350 lb.)
4. RADIOACTIVE CONTENTS TO BE PACKAGED AS PER DRAWINGS A-12052-PR1 AND E-5580-SA1
5. PACKAGING DESIGN DRAWINGS

E-5560-A2	ASSEMBLY
E-5580-2	SUB-ASSEMBLY AND DETAILS
D-5580-3	DRUMHEAD DETAILS
E-5580-SA1	PACKING SUBASSEMBLIES
A-12052-PR1	OPERATING PROCEDURES

FIGURE 1 MODEL 4H PACKAGING CDN/4212/B(U)F

B

ATOMIC ENERGY OF CANADA LIMITED CHALK RIVER ONTARIO, CANADA	APPROVED	A-5580-A12 REV. No. 0	SHEET 1 OF 1