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/0820/B(U)-96, REVISION 2**

**REVALIDATION OF CANADIAN COMPETENT AUTHORITY CERTIFICATE CDN/2094/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 - F-522.

2. Package Description and Authorized Radioactive Contents - as described in Canadian Certificate of Competent Authority CDN/2094/B(U)-96, Revision 3 (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 Engineering and Research, (PHH-23), Pipeline and Hazardous Materials Safety Administration, U.S. Department of Transportation, Washington D.C. 20590-0001.

[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.

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. Special Conditions -

a. The impurities within the 99Mo fission product content must meet one of the three impurity profiles in document No. R119.017.SUR, "Shielding Analysis Report for F522 Mo-99 Impurities," Table 6.

5. Marking and Labeling - The package shall bear the marking USA/0820/B(U)-96 in addition to other required markings and labeling.

6. Expiration Date - This certificate expires on March 31, 2025. 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 19, 2020 petition by BWXT ITG Canada Inc., Ottawa, Ontario, and in consideration of other information on file in this Office.

Certified By:

William Schoonover
Associate Administrator for Hazardous Materials Safety

February 25, 2020
(DATE)

Revision 2 - Issued to revalidate Canadian Certificate of Approval No. CDN/2094/B(U)-96, Rev. 3.

Canadian Certificate No.: **CDN/2094/B(U)-96 (Rev. 3)**
Issue Date: **Feb-10-2020**
Expiry Date: **Mar-31-2025**
CNSC File: **30-A2-247-0**

# Certificate

## CDN/2094/B(U)-96 (Rev. 3)

## 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: | **BWXT ITG Canada, Inc.** |
| Make/Model: | **F-522** |
| Mode of Transport: | **Air, Sea, Road, Rail** |

## IDENTIFICATION MARK

The package shall bear the competent authority identification mark **"CDN/2094/B(U)-96".**

## PACKAGE DESCRIPTION

The F-522 package, as shown on Drawing No. F652201-001 (Rev. H) consists of an F-522 overpack, a UK-201 shielding vessel and a containment system.

The overpack consists of a double-walled stainless-steel cylindrical vessel with fittings for lifting and tie-down. The inner space between the stainless steel wall is filled with a closed-cell polyurethane foam used for impact and thermal protection. The overpack uses a top loading lid design which is secured by screws and incorporates a tamper evident seal. A heat shield may be added to restrict access to the top of the package when required.

The UK-201 shielding vessel, consists of a body and a lid which are attached and sealed together by eight M10 bolts and a silicone O-ring. The lid and body consist of 75 mm thick depleted uranium encased within stainless steel.

The containment system consists of either an F-248X leak proof insert, or stainless steel or Zircaloy capsules. The leak proof insert consists of a body and a cap that are threaded together and sealed with a silicone O-ring. A source holder is used to maintain the capsules in place.

An illustration of the package is shown on attached Drawing No. F-522 (Issue F).

Any modification to the package design must be submitted to the CNSC for approval prior to implementation.

The configuration of F-522 package is as follows:

| | | | |
|---|---|---|---|
| Shape: | **Cylinder** | Shielding: | **Depleted Uranium** |
| Mass: | **259 kg** | Outer Casing: | **Stainless Steel** |
| Length: | **n/a** | Height: | **566 mm** |
| Width: | **n/a** | Diameter: | **447 mm** |

## AUTHORIZED RADIOACTIVE CONTENTS

See Appendix 1

## QUALITY ASSURANCE

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

- BWXT Document No. IS/QA 2663 Z000 (Issue 3)*, "Radioactive Material Transport Package Quality Plan"
- BWXT Document No. IS/DS 2651 F522 (Rev. 6), "Design, Manufacturing and Operating Specification for the F-522/UK-201 Transport Package"
- Packaging and Transport of Nuclear Substances Regulations, 2015
- IAEA Regulations for the Safe Transport of Radioactive Material, 2012 Edition
- * or latest current revision

## SHIPMENT

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

- BWXT Document No. IS/DS 2651 F522 (Rev. 6), "Design, Manufacturing and Operating Specification for the F-522/UK-201 Transport Package"
- Packaging and Transport of Nuclear Substances Regulations, 2015

- IAEA Regulations for the Safe Transport of Radioactive Material, 2012 Edition

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.

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

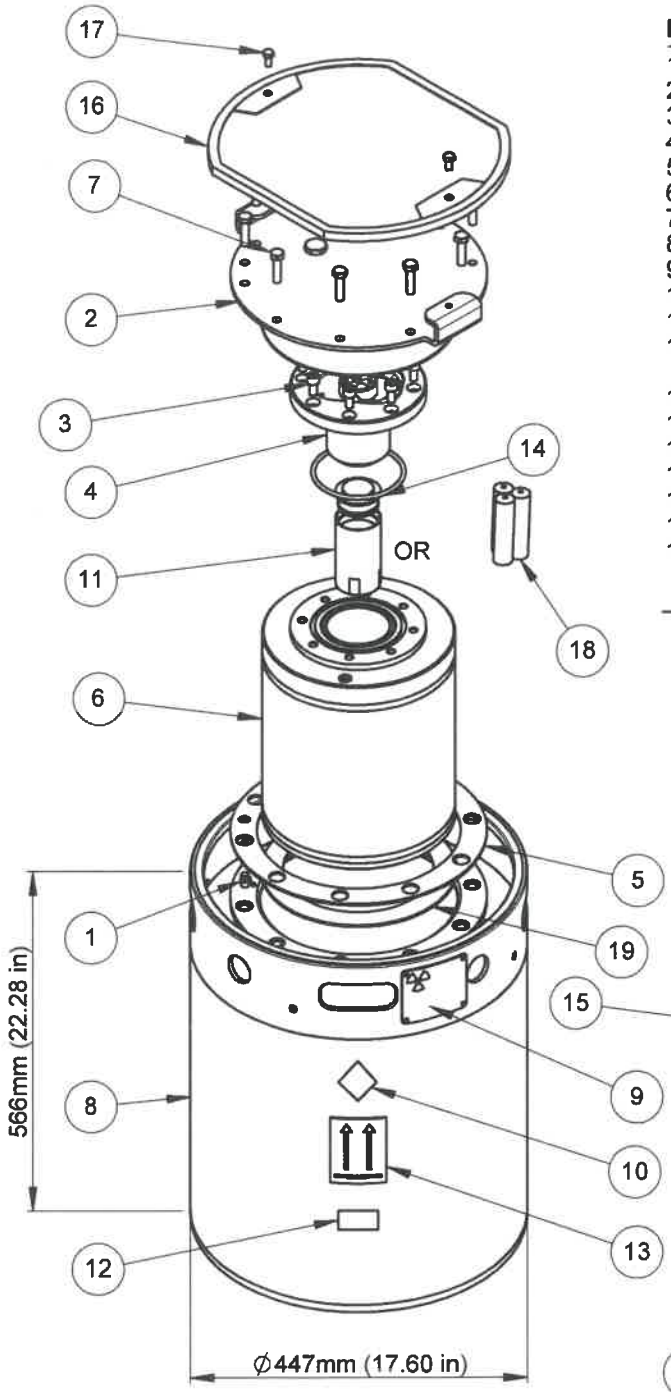
## Appendix 1

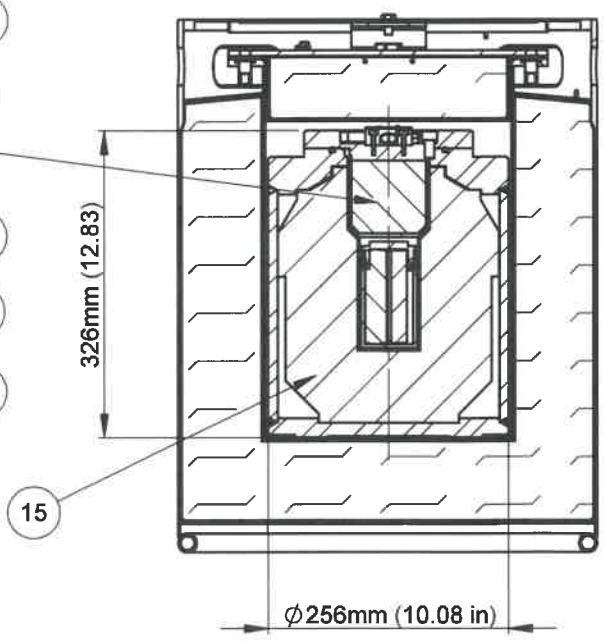
The F-522 Transport Package is authorized to contain the radioactive materials with maximum activities in the method of containment as listed in the following table:

| Isotope | Maximum Activity | Physical Form | Chemical Form | Method of Containment |
|---|---|---|---|---|
| Co-60 and associated activation products | 1000 GBq | Solid | Irradiated Cobalt metal | Stainless steel capsules that have a valid special form radioactive material certificate |
| Mo-99/Tc-99m | 37 TBq | Liquid | Aqueous NaOH solution or aqueous NaOH solution with up to 1 M $NH_4NO_3$ or up to 0.4% NaOCl | F-248X |
| Mo-99/Tc-99m | 8.4 TBq | Liquid | Aqueous $NH_4OH$ solution | F-248X |
| Mo-99/Tc-99m and associated impurities | 366 TBq with a maximum impurity level equivalent to 1850 GBq of I-132 | Solid | Fission product | F-248X |
| Sr-82, Sr-83, Sr-85, Rb-82, Rb-83, Rb-84, Co-55, V-48, Mn-52 and other radionuclides | 6 TBq (total) | Solid | Proton irradiated rubidium based target material and associated target shells | F-248X |
| Molybdenum and Zircaloy activation products | 185 TBq of Mo-99 and activation products associated with the neutron activation of Molybdenum targets<br>and<br>7.4 TBq of activation products associated with the neutron activation of Zircaloy cladding | Solid | Metal | Source Model number G615-01 or similar welded Zircaloy encapsulations that have been shown to pass a helium leak test in accordance with ISO 9978 following the completion of the impact, percussion and heat tests specified in paragraphs 705, 706 and 708 of IAEA SSR-6, respectively |

**NOTES**

Revision 0: March 15, 2016. New Certificate.
Revision 1: February 8, 2017. Certificate revised to increase the activity for the Mo-99 in solid form and to add an optional heat shield.
Revision 2: November 4, 2019. Certificate revised to add Zircaloy encapsulated Molybdenum target contents.
Revision 3: February 10, 2020. Certificate renewed.




## Parts List

1. Wire Seal on Guide Pin
2. Lid
3. Stainless steel bolt M10 x 20mm long (8)
4. Shielded Plug
5. Neoprene Gasket
6. UK-201 Shielding Vessel
7. Stainless steel bolt M10 x 30mm long (10)
8. F-522 Overpack
9. Shipping container identification and radiation caution label (2)
10. Radioactive Category Labels (2): on two opposite sides
11. F-248X Leakproof insert and radioactive contents
12. UN Number Labels (2): one next to each of the radioactive category labels
13. Label - This Side Up
14. Silicone 'O'-Ring
15. Mass of Depleted Uranium - 163 kg
16. Heat Shield (Optional)
17. Stainless steel bolt M8 x 16mm long (2)
18. Sealed Target Capsules (Holder not shown)
19. Optional Gasket

## Notes

1. Meets IAEA Type B(U) requirements
2. CNSC Certificate CDN/2094/B(U)-96
3. Prepare for shipment in accordance with IN/PP 2616 F522
4. Mass of F-522 Overpack = 52 kg
5. Mass of UK-201 Shield = 206 kg
6. Mass of Heat shield = 1 kg
7. Total mass = 260 kg
8. Heat Shield required for shipments greater than 26W.

BWXT

TITLE

# F-522/UK-201 TRANSPORT PACKAGE

| REF. F552201-001 | REVISED 2019-09-30 | CF 9146 |
|---|---|---|
| CREATED 2015-02-18 | No. F-522 | ISSUE F |
| DRAWN RD / CHECKED n/a / APPROVED SC | SHEET 1 OF 1 | |

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1200 New Jersey Ave, SE
Washington, D.C. 20590

U.S. Department of
Transportation

**Pipeline and
Hazardous Materials
Safety Administration**

**CERTIFICATE NUMBER:** USA/0820/B(U)-96

**ORIGINAL REGISTRANT(S):**

BWXT ITG Canada Inc.
447 March Road
Kanata, Ontario, K2K 1X8
Canada