



U.S. Department
of Transportation

Pipeline and
Hazardous Materials
Safety Administration

COMPETENT AUTHORITY CERTIFICATION FOR A
TYPE B(U)F FISSILE
RADIOACTIVE MATERIALS PACKAGE DESIGN
CERTIFICATE USA/0401/B(U)F-96, REVISION 14

REVALIDATION OF JAPANESE COMPETENT AUTHORITY
CERTIFICATE J/111/B(U)F-96

East Building, PHH-23
1200 New Jersey Ave, SE
Washington, D.C. 20590

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)F package as prescribed in the regulations of the International Atomic Energy Agency¹ and the United States of America².

1. Package Identification - JMS-87Y-18.5T.
2. Package Description and Authorized Radioactive Contents - as described in Japanese Certificate of Competent Authority J/111/B(U)F-96, Revision 2 (attached).
3. Criticality - The minimum criticality safety index is 0.0. 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 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.

CERTIFICATE USA/0401/B(U)F-96, REVISION 14

- 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 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.

5. Special Conditions -

- a. The package is not to be transported by air.
- b. Maximum decay heat per package is 1.5 kilowatts.
- c. Known or suspected failed fuel assemblies and fuel with cladding defects greater than pin holes and hairline cracks are not authorized.
- d. Neutron poison plates in the fuel basket must be constructed in accordance with JAERI document entitled "JMS-87Y-18.5T Package Information" dated June 11, 2003.
- e. For shipments which enter into or transit the United States, all international approvals and revalidations, including Approval of Packaging and Confirmation of Packaging certificates issued by the government of Japan, shall be issued prior to the commencement of transport.

6. Marking and Labeling - The package shall bear the marking USA/0401/B(U)F-96 in addition to other required markings and labeling.

7. Expiration Date - This certificate expires on September 11, 2023. Previous editions which have not reached their expiration date may continue to be used.

CERTIFICATE USA/0401/B(U)F-96, REVISION 14


This certificate is issued in accordance with paragraph(s) 810 and 816 of the IAEA Regulations and Section 173.472 and 173.473 of Title 49 of the Code of Federal Regulations, in response to the November 2, 2018 petition by Edlow International Company, Washington, DC, and in consideration of other information on file in this Office.

Certified By:

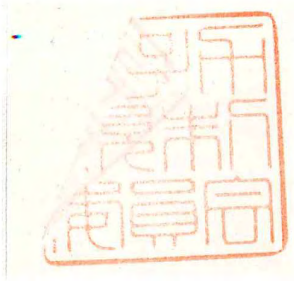


November 16, 2018

(DATE)

 William Schoonover
Associate Administrator for Hazardous
Materials Safety

Revision 14 - Issued to endorse Japanese Certificate of Competent Authority No. J/111/B(U)F-96 (Rev.2) dated August 3, 2018.



IDENTIFICATION MARK
J/111/B(U) F-96(Rev.2)

COMPETENT AUTHORITY
OF
JAPAN

CERTIFICATE FOR APPROVAL OF
PACKAGE DESIGN
FOR THE TRANSPORT OF
RADIOACTIVE MATERIALS

ISSUED BY
NUCLEAR REGULATION AUTHORITY
1-9-9, ROPPONGI MINATO-KU
TOKYO, JAPAN



CERTIFICATE FOR APPROVAL OF PACKAGE DESIGN
FOR THE TRANSPORT OF RADIOACTIVE MATERIALS

This is to certify, in response to the application by Japan Atomic Energy Agency, that the package design described herein complies with the design requirements for a package containing spent fuel elements, specified in the 2012 Edition of the Regulations for the Safe Transport of Radioactive Material (International Atomic Energy Agency, Safety Standards Series No.SSR-6) and the Japanese rules based on the Act on Regulation of Nuclear Source Material, Nuclear Fuel Material and Reactors.

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.

COMPETENT AUTHORITY

IDENTIFICATION MARK : J/111/B(U)F-96(Rev.2)

August 3, 2018
Date

青木 一哉
Kazuya Aoki

Director, Division of Licensing for
Nuclear Fuel Facilities

Secretariat of Nuclear Regulation Authority
Competent Authority of JAPAN
for Package Design Approval



1. The Competent Authority Identification Mark : J/111/B(U)F-96(Rev. 2)
2. Name of Package : JMS-87Y-18.5T
3. Type of Package : Type B(U) package containing fissile materials
4. Specification of Package
 - (1) Materials of Packaging
 - (i) Body & Lid : Stainless steel
 - (ii) Basket : Stainless steel, Boral plate
 - (iii) Shock absorber : Stainless steel, Fir-plywood
 - (2) Total Weight of Packaging : 18110 kg or less
 - (3) Outer Dimensions of Packaging
 - (i) Outer Diameter : Approximately 1.9 m
 - (ii) Height : Approximately 2.0 m
 - (4) Total Weight of Package : 18440 kg or less
 - (5) Illustration of Package : See the attached Figure
5. Specification of Radioactive Contents : See the attached Table
6. Description of Containment System

Containment system consists of the body, the lid, the vent valve and the drain valve made of the stainless steel.

Silicone rubber is used for contact surface of lid, valves, and valve seat.
7. For Package containing Fissile Materials
 - (1) Restrictions on Package
 - (i) Restriction Number "N" : No restriction
 - (ii) Array of package : No restriction
 - (iii) Criticality Safety Index(CSI) : 0
 - (2) Description of Confinement System

Confinement system consists of the basket which maintains the fuel elements contained in the package.
 - (3) Assumptions of Leakage of Water into Package

It is assumed in criticality analysis that water will leak into void spaces of inner packaging.
 - (4) Special Features in Criticality Assessment

There is no special device.

8. For Type B(M) Packages, a statement regarding prescriptions of Type B(U) Package that do not apply to this Package

No application. (This package is Type B(U))

9. Assumed Ambient Conditions

- (i) Ambient Temperature Range : $-40^{\circ}\text{C}\sim 38^{\circ}\text{C}$
- (ii) Insolation Data : Table 12 of IAEA Regulation(No.SSR-6)

10. Handling, Inspection and Maintenance

(1) Handling Instructions

- (i) Package should be handled carefully in accordance with the schedule and procedures established properly taking all possible safety measures.
- (ii) Package should be handled using appropriate lifting devices and the crane.
- (iii) When packaging is stored outdoors, it should be covered with an appropriate waterproof sheet, avoiding the situation where it is placed directly on the ground.

(2) Inspections and Maintenance of Packaging

The following inspections should be performed not less than once a year (once for every ten times in a case where the packaging is used not less than ten times a year) and defect of packaging should be repaired, if any, in order to maintain the integrity of packaging.

- (i) Visual Appearance Inspection
- (ii) Pressure Durability Inspection
- (iii) Leakage Rate Measurement Inspection
- (iv) Maintenance of O-ring, Valve, etc. Used for Containment System
- (v) Shielding Inspection
- (vi) Subcriticality Inspection
- (vii) Heat Transfer Inspection
- (viii) Lifting Inspection

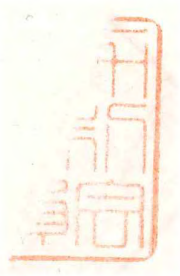
(3) Actions prior to Shipment

The following inspections should be performed prior to shipment.

- (i) Visual Appearance Inspection
- (ii) Lifting Inspection
- (iii) Weight Measurement Inspection
- (iv) Surface Contamination Measurement Inspection
- (v) Radiation Dose Rate Inspection
- (vi) Subcriticality Inspection
- (vii) Contents Specification Check Inspection
- (viii) Surface Temperature Inspection
- (ix) Leakage Rate Measurement Inspection
- (x) Pressure Inspection

(4) Precautions for Loading of Package for Shipment

Package should be securely loaded to the conveyance at the designated tie-down portion of the packaging so as not to move, roll down or fall down from the loading position during transport.



11. Issue Date and Expiry Date

(i) Issue Date :Sep.12, 2018

(ii) Expiry Date :Sep.11, 2023

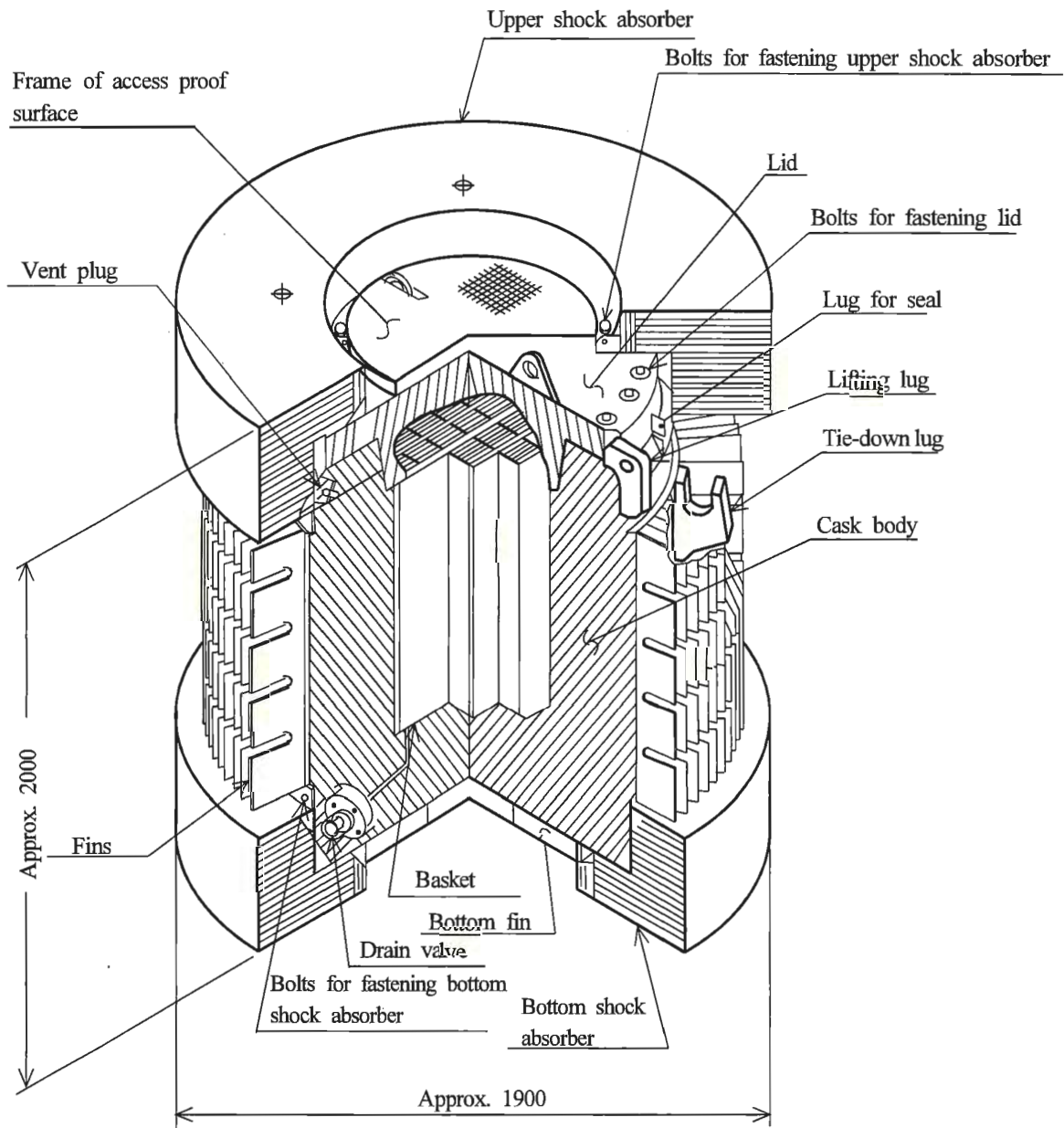


Figure Illustration of JMS-87Y-18.5T Package (Unit : mm)



Table Specification of contents(1/2)

Group		Group 1		Group 2	
Type	Reactor	JMTR		JMTR	
	Spent Fuel Elements	High Enriched Uranium Fuels(HEU)		Medium Enriched Uranium Fuels(MEU)	
		JMTR Standard Fuel Elements(HEU)	JMTR Fuel Followers (HEU)	JMTR Standard Fuel Elements(MEU)	JMTR Fuel Followers (MEU)
Number of Spent Fuel Elements(element/package)		Less than or equal to 30		Less than or equal to 30	
²³⁵ U Initial Enrichment (wt%)		Less than or equal to 93.3		Less than or equal to 46.0	
Initial Gross Weight of ²³⁵ U (g/element)		Less than or equal to 284.3	Less than or equal to 198.4	Less than or equal to 315.6	Less than or equal to 208.7
Initial Gross Weight of U (g/element)		Less than or equal to 307	Less than or equal to 214	Less than or equal to 719	Less than or equal to 475
Material	Fuel Core	Uranium-Aluminum Alloy		Uranium-Aluminum Dispersion Alloy	
	Cladding and Side Plate	Aluminum Alloy		Aluminum Alloy	
Burn-up (%)		Less than or equal to 40		Less than or equal to 40	
Cooling Time (days)		More than or equal to 360		More than or equal to 360	
Condition		Solid		Solid	
Activity of Contents (TBq/30 elements)	Total	1.65×10 ⁴	1.16×10 ⁴	1.78×10 ⁴	1.18×10 ⁴
	Principal radionuclide	⁹⁵ Zr : 9.62×10 ²	⁹⁵ Zr : 6.76×10 ²	⁹⁵ Zr : 1.02×10 ³	⁹⁵ Zr : 6.79×10 ²
		⁹⁵ Nb : 2.08×10 ³	⁹⁵ Nb : 1.46×10 ³	⁹⁵ Nb : 2.21×10 ³	⁹⁵ Nb : 1.47×10 ³
		¹⁴⁴ Ce : 4.61×10 ³	¹⁴⁴ Ce : 3.24×10 ³	¹⁴⁴ Ce : 4.98×10 ³	¹⁴⁴ Ce : 3.30×10 ³
		¹⁴⁴ Pr : 4.61×10 ³	¹⁴⁴ Pr : 3.24×10 ³	¹⁴⁴ Pr : 4.98×10 ³	¹⁴⁴ Pr : 3.30×10 ³
¹⁴⁷ Pm : 9.39×10 ²	¹⁴⁷ Pm : 6.60×10 ²	¹⁴⁷ Pm : 1.00×10 ³	¹⁴⁷ Pm : 6.65×10 ²		
Total Heat Generation Rate (KW/30 elements)		1.83	1.29	1.98	1.32

* Each package shall be loaded with a single fuel (i.e. only kind of "Spent Fuel Elements") or mixed fuels (i.e. two or more kinds of "Spent Fuel Elements") within an identical group. Regardless of the adobe condition, the loading of mixed fuels belonging to the group 2 and group 3 is acceptable up to 30 fuel elements.

In case of loading of mixed fuels, "Activity of contents" and "Total Heat Generation Rate" shall be determined by the proportional distribution.

Table Specification of contents(2/2)

Group		Group 3				Group 4	
Type	Reactor	JMTR				JRR-3	
	Spent Fuel Elements	Low Enriched Uranium Fuels(LEU)				Low Enriched Uranium Fuels(LEU)	
		JMTR Standard Fuel Elements (LEU)	JMTR Fuel Followers (LEU)		JRR-3 Standard-type Fuel Elements (LEU)	JRR-3 Follower-type Fuel Elements (LEU)	
Number of Spent Fuel Elements(element/package)		Less than or equal to 30				Less than or equal to 30	
²³⁵ U Initial Enrichment (wt%)		Less than or equal to 19.95				Less than or equal to 19.95	
Initial Gross Weight of ²³⁵ U (g/element)		Less than or equal to 450	Less than or equal to 302		Less than or equal to 315	Less than or equal to 205	
Initial Gross Weight of U (g/element)		Less than or equal to 2338	Less than or equal to 1569		Less than or equal to 1612	Less than or equal to 1049	
Material	Fuel Core	Uranium-Silicon-Aluminum Dispersion Alloy				Uranium-Aluminum Dispersion Alloy	
	Cladding and Side Plate	Aluminum Alloy				Aluminum Alloy	
Burn-up (%)		Less than or equal to 50	Less than or equal to 60	Less than or equal to 50	Less than or equal to 60	Less than or equal to 50	
Cooling Time (days)		More than or equal to 420	More than or equal to 540	More than or equal to 420	More than or equal to 540	More than or equal to 360	
Condition		Solid				Solid	
Activity of Contents (TBq/30 elements)	Total	2.43×10 ⁴	2.12×10 ⁴	1.63×10 ⁴	1.43×10 ⁴	1.76×10 ⁴	1.11×10 ⁴
	Principal radionuclide	⁹⁵ Zr : 8.28×10 ²	⁹⁰ Sr : 7.47×10 ²	⁹⁵ Zr : 5.56×10 ²	⁹⁰ Sr : 5.04×10 ²	⁹⁵ Zr : 6.64×10 ²	⁹⁵ Zr : 4.21×10 ²
		⁹⁵ Nb : 1.76×10 ³	⁹⁰ Y : 7.47×10 ²	⁹⁵ Nb : 1.18×10 ³	⁹⁰ Y : 5.04×10 ²	⁹⁵ Nb : 1.45×10 ³	⁹⁵ Nb : 9.17×10 ²
		¹⁴⁴ Ce : 7.41×10 ³	¹³⁷ Cs : 7.74×10 ²	¹⁴⁴ Ce : 4.97×10 ³	¹³⁷ Cs : 5.22×10 ²	¹⁴⁴ Ce : 5.27×10 ³	¹⁴⁴ Ce : 3.34×10 ³
		¹⁴⁴ Pr : 7.41×10 ³	¹⁴⁴ Ce : 6.63×10 ³	¹⁴⁴ Pr : 4.97×10 ³	¹⁴⁴ Ce : 4.47×10 ³	¹⁴⁴ Pr : 5.27×10 ³	¹⁴⁴ Pr : 3.34×10 ³
		¹⁴⁷ Pm : 1.44×10 ³	¹⁴⁴ Pr : 6.63×10 ³	¹⁴⁷ Pm : 9.68×10 ²	¹⁴⁴ Pr : 4.47×10 ³	¹⁴⁷ Pm : 9.58×10 ²	¹⁴⁷ Pm : 6.07×10 ²
¹⁴⁷ Pm : 1.40×10 ³	¹⁴⁷ Pm : 9.43×10 ²						
Total Heat Generation Rate (KW/30 elements)		2.80	2.40	1.88	1.61	1.94	1.23

** Each package shall be loaded with a single fuel (i.e. only kind of "Spent Fuel Elements") or mixed fuels (i.e. two or more kinds of "Spent Fuel Elements") within an identical group. Regardless of the adobe condition, the loading of mixed fuels belonging to the group 2 and group 3 is acceptable up to 30 fuel elements.

In case of loading of mixed fuels, "Activity of contents" and "Total Heat Generation Rate" shall be determined by the proportional distribution.



U.S. Department of
Transportation

**Pipeline and
Hazardous Materials
Safety Administration**

East Building, PHH-23
1200 New Jersey Ave, SE
Washington, D.C. 20590

CERTIFICATE NUMBER: USA/0401/B(U)F-96

ORIGINAL REGISTRANT(S) :

Edlow International Company
1666 Connecticut Ave, N.W
Suite 201
Washington, DC, 20009
USA

Department of Energy
U.S. Department of Energy
1000 Independence Ave, SW
EM-60
Washington, DC, 20585
USA

Secured Transportation Services
5210 Palmero Court
Suite 107
Buford, GA, 30518
USA