



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

East Building, PHH-23
1200 New Jersey Avenue Southeast
Washington, D.C. 20590

**COMPETENT AUTHORITY CERTIFICATION
FOR A TYPE B(U)F FISSILE
RADIOACTIVE MATERIALS PACKAGE DESIGN
CERTIFICATE USA/0773/B(U)F-96, REVISION 2**

**REVALIDATION OF JAPANESE COMPETENT AUTHORITY
CERTIFICATE J/119/B(U)F-96**

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 Agency¹ and the United States of America².

1. Package Identification - JRF-90Y-950K (Kyoto University).
2. Package Description and Authorized Radioactive Contents - as described in Japan Certificate of Competent Authority J/119/B(U)F-96, dated June 27, 2008 (attached). Special content and loading restrictions are found in Section 5 of this certificate.
3. Criticality - The minimum criticality safety index is 4.2 for KUR fuel and 0.0 for JRR and JMTRC fuel. 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.

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.

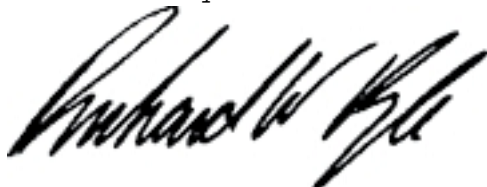
CERTIFICATE USA/0773/B(U)F-96, REVISION 2

- 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. This certificate provides no relief from the limitations for transportation of plutonium by air in the United States as cited in the regulations of the U.S. Nuclear Regulatory Commission 10 CFR 71.88.
 - e. Records of Quality Assurance activities required by Paragraph 310 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. Kyoto University Research (KUR) fuel contents are limited to 8 KUR fuel assemblies loaded such that the inner two basket cells/locations remain empty (no fuel contents are allowed to be loaded in the inner 2 basket spots). This restricts the maximum uranium/package mass to 8920 grams; the maximum U-235/package to 1744 grams; and the maximum KUR fuel content weight to 48 kilograms.
 - b. Silicone rubber upper and lower fuel spacers which maintain the vertical position of the fuel must be used when transporting KUR fuel. Use of these fuel spacers must be verified as part of the pre-shipment inspection. Lower fuel spacer must have the same dimensions as shown in drawing NXP-038-S09. Upper fuel spacers must have the same cross sectional area as spacers used for other contents and a 371.9 mm nominal length/height for standard and half loaded KUR elements and a 292.5 mm nominal length/height for special KUR elements.
 - c. The aluminium alloy spacer described in the application must be placed around each KUR fuel element loaded in the package.
 - d. Package is not authorized for transport by air.
6. Marking and Labeling - The package shall bear the marking USA/0773/B(U)F-96 in addition to other required markings and labeling.
7. Expiration Date - This certificate expires on May 08, 2013.

CERTIFICATE USA/0773/B(U)F-96, REVISION 2

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 October 29, 2008 petition by Areva - TN Inc, Columbia, MD, and in consideration of other information on file in this Office.

Certified By:



Sep 10 2010

(DATE)

Dr. Magdy El-Sibaie

Associate Administrator for Hazardous Materials Safety

Revision 2 - Issued to revalidate, subject to special conditions found in Section 5, Japanese Certificate of Approval No. J/170/B(U)F-96.

IDENTIFICATION MARK
J/170/B (U) F-96

COMPETENT AUTHORITY
OF
JAPAN

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

ISSUED BY MINISTRY OF EDUCATION, CULTURE,
SPORTS, SCIENCE AND TECHNOLOGY
3-2-2 KASUMIGASEKI, CHIYODA-KU, TOKYO, JAPAN

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

This is to certify, in response to the application by KYOTO UNIVERSITY on June 18, 2008, that the Design of Package described herein satisfies the design requirements of Type B (U) F Package specified in "Regulations for the Safe Transport of Radioactive Material (International Atomic Energy Agency, Safety Standards Series No. TS-R-1 (2005 Edition))" and the Japanese rules based on the Law for the Regulations of Nuclear Source material, Nuclear Fuel Material and Reactors.

COMPETENT AUTHORITY

IDENTIFICATION MARK: J/170/B (U) F-96

June 27, 2008

Date

for

Kaoru Kohara

YASUTAKA MORIGUCHI

Director General
Science and Technology Policy Bureau
Ministry of Education, Culture,
Sports, Science and Technology
Competent Authority of Japan for
Package Design of Radioactive Materials

1. The Competent Authority Identification Mark : J/170/B (U) F-96

2. Name of Package : JRF-90Y-950K

3. Type of Package : Type B (U) Package containing fissile material

4. Specification of Package

(1) Materials of Packaging :

- (a) Main Body : Stainless steel, Balsa wood and
Hard polyurethane foam
- (b) Outer lid : Stainless steel, Balsa wood and
Hard polyurethane foam
- (c) Inner lid : Stainless steel and Silicone rubber
- (d) Fuel Basket : Stainless steel and Silicone rubber

(2) Total Weight of Packaging : 950 kg or less

(3) Outer Dimensions of Packaging

- (i) Outer Diameter : Approximately 84 cm
- (ii) Height : Approximately 180 cm

(4) Total Weight of Package : Approximately 860 kg

(5) Illustration of Package : See the attached Figure (Bird's-eye view)

5. Specification of Radioactive Contents : See the attached Table

6. Description of Containment System

The containment system of the package is composed of an inner shell main body and an inner shell lid. Contact parts between the inner shell main body and the inner shell lid are contained by O-rings made of silicone rubber of the inner shell lid.

The containment system is designed to keep its performance for the requirements of type B (U) package under normal and accident conditions of transport

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

The confinement system of the package is composed of the followings.

- For the fuel element
 - > Fuel plate (Uranium (silicon) aluminum alloy)
 - > Side plate (Aluminum alloy)
- Fuel basket
 - > Basket (Stainless steel)
- Main body
 - > Inner shell (Stainless steel)

(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
Not applicable

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

9. Assumed Ambient Conditions

- (i) Ambient Temperature Range : 38°C
- (ii) Insolation Data : Table 11 of IAEA Regulation TS-R-1(2005)

10. Handling, Inspection and Maintenance

(1) Handling Instructions

- (i) Package shall be handled using by exclusive lifting device and carrier such as crane etc.
- (ii) Package shall be handled carefully in accordance with the schedule and procedures established properly taking all possible safety measures, confirming it every time not to find abnormality in the packaging and handling devices.

(2) Inspections and Maintenance of Packaging

Packaging is stored indoors.

The following inspections shall 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 (only for the repair that influences the pressure durability is done.)
- (iii) Maintenance of O-ring Used for Containment System
- (iv) Leakage Rate Measurement Inspection
- (v) Subcriticality Inspection

(3) Actions prior to Shipment

The following inspections shall be performed prior to shipment.

- (i) Visual Appearance Inspection
- (ii) Lifting Inspection
- (iii) Weight Inspection
- (iv) Surface Contamination Inspection
- (v) Dose Rate Inspection
- (vi) Subcriticality Inspection
- (vii) Contents Inspection
- (viii) Leakage Rate Measurement Inspection

(4) Precautions for Loading of Package for Shipment

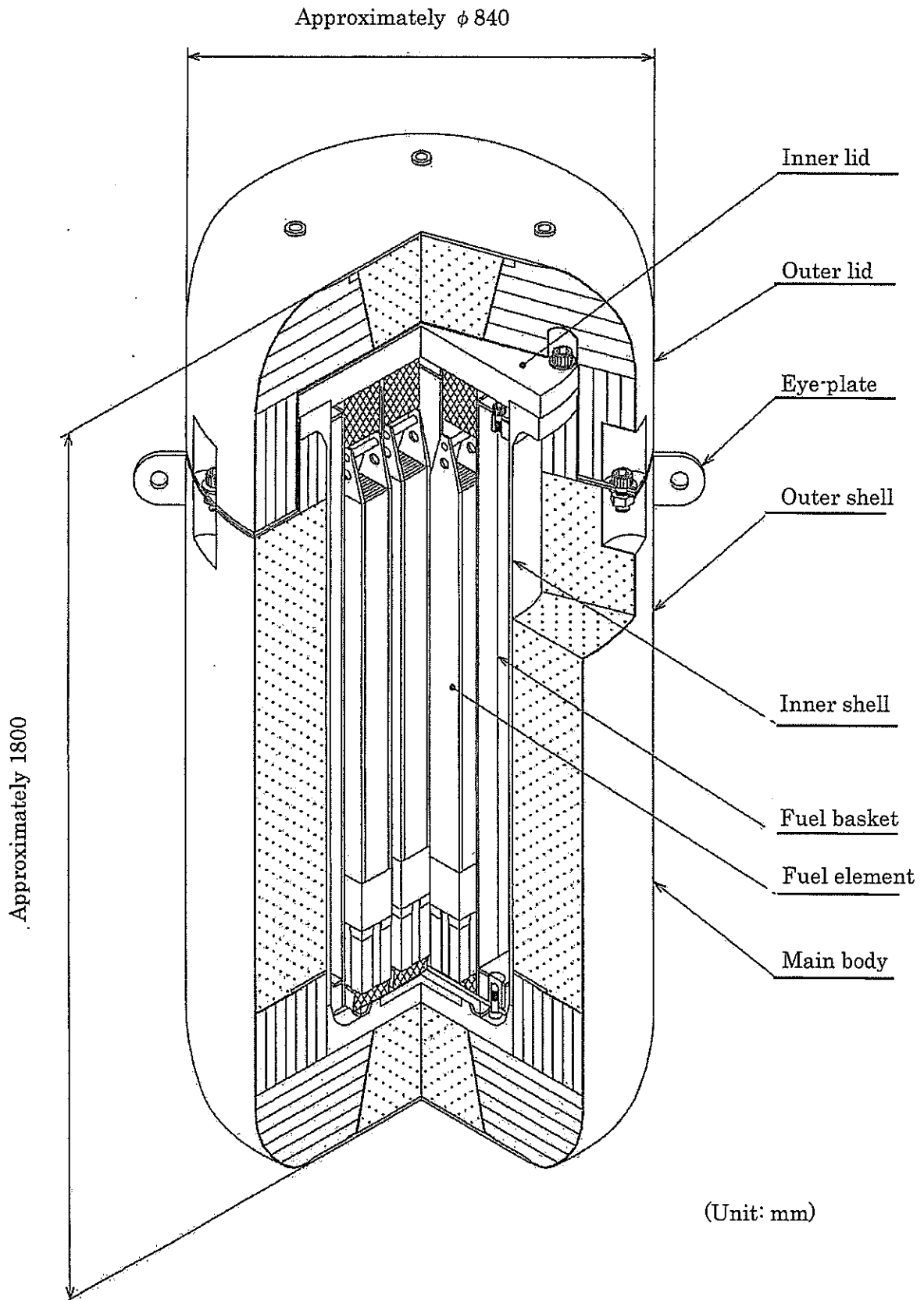
Loading of the packages shall be performed such that the packages will not move or fall down during transport.

11. Issue Date and Expiry Date

- (i) Issue Date : May 9, 2008
- (ii) Expiry Date : May 8, 2013

12. Note

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.



Attached Figure Illustration of JRF-90Y-950K package

Attached Table (1/3) Specification of Radioactive Contents (Fresh Fuel Element)

Reactor	KUR (Kyoto University Research reactor)		
	KUR Standard Fuel Element	KUR Special Fuel Element	KUR Half-loaded Fuel Element
Number of Fuel Elements (Element/Package)	10 or less		
Fuel Type	LEU Fuel		
Materials of Nuclear Fuel	Uranium Silicon Aluminum Dispersion Alloy		
Weight	²³⁵ U (g/package)	1,090 or less	1,090 or less
	U (g/package) ²³⁵ U	5,580 or less	5,580 or less
	(g/element)	109 or less	109 or less
	U (g/element)	558 or less	558 or less
Enrichment (wt%)	19.95 or less		
Activity (GBq/package)	29.8 or less		
Main isotopes (GBq/package)	²³⁴ U: 28.6 or less		
	²³⁵ U: 0.38 or less		
	²³⁶ U: 0.59 or less		
	²³⁸ U: 0.24 or less		
Physical state	Solid		
Burn-up (%)	0 (Fresh Fuel)		
Generation heat (W/package)	0 (Fresh Fuel)		
Cooling time (Day)	0 (Fresh Fuel)		

Attached Table (2/3) Specification of Radioactive Contents (Fresh Fuel Element)

Reactor	JRR-3			JRR-4			JMTR		
	JRR-3 Standard	JRR-3 Follower	JRR-4 B	JRR-4 L	JRR-4	JMTR Standard	JMTR Fuel element	JMTR Follower	
Number of Fuel Elements (Element/Package)	10 or less								
Fuel Type	10 or less								
Materials of Nuclear Fuel	LEU Fuel			LEU Fuel		MEU Fuel	LEU Fuel		
	Uranium Silicon Aluminum Dispersion Alloy			Uranium Aluminum Dispersion Alloy	Uranium Silicon Aluminum Dispersion Alloy	Uranium Aluminum Dispersion Alloy	Uranium Silicon Aluminum Dispersion Alloy		
Weight	²³⁵ U (g/package)	4,850 or less	3,100 or less	1,700 or less	2,300 or less	2,100 or less	3,200 or less	4,250 or less	
		24,810 or less	15,860 or less	1,830 or less	11,770 or less	10,750 or less	7,280 or less	21,740 or less	
	²³⁵ U (g/element)	485 or less	310 or less	170 or less	230 or less	210 or less	320 or less	425 or less	280 or less
		2,481 or less	1,586 or less	183 or less	1,177 or less	1,075 or less	728 or less	2,174 or less	1,433 or less
Enrichment (wt%)	19.95 or less			93.3 or less		19.95 or less		46.0 or less	
Activity (GBq/package)	29.8 or less								
Main isotopes (GBq/package)	²³⁴ U: 28.6 or less								
	²³⁵ U: 0.38 or less								
	²³⁶ U: 0.59 or less								
	²³⁸ U: 0.24 or less								
Physical state	Solid								
Burn-up (%)	0 (Fresh Fuel)								
Generation heat (W/package)	0 (Fresh Fuel)								
Cooling time (Day)	0 (Fresh Fuel)								

Attached Table (3/3) Specification of Radioactive Contents (Lowly Irradiated Fuel Element)

Reactor	JMTRC				
	JMTRC Standard	JMTRC Special	JMTRC Follower	JMTRC Standard	JMTRC Follower
Number of Fuel Elements (Element/Package)	10 or less				
Fuel Type	HEU Fuel		MEU Fuel		
Materials of Nuclear Fuel	Uranium Aluminum Alloy		Uranium Aluminum Dispersion Alloy		
Weight	²³⁵ U (g/package)	2,850 or less	1,990 or less	3,170 or less	2,100 or less
	U (g/package)	3,180 or less	2,220 or less	7,210 or less	4,780 or less
	²³⁵ U (g/element)	285 or less	199 or less	317 or less	210 or less
	U (g/element)	318 or less	222 or less	721 or less	478 or less
Enrichment (wt%)	90.0 or less		46.0 or less		
Activity (GBq/package)	17.3 or less				
Main isotopes (GBq/package)	²³⁴ U: 16.2 or less				
	²³⁵ U: 0.25 or less				
	²³⁶ U: 0.29 or less				
	²³⁸ U: 0.05 or less				
Others: 0.52 or less					
Physical state	Solid				
Burn-up (%)	7.23x10 ⁻⁵ or less		1.76x10 ⁻⁵ or less		
	4.30x10 ⁻⁵ or less		3.29x10 ⁻⁵ or less		
Generation heat (W/package)	5,475 or more				
Cooling time (Day)	1,460 or more				



核燃料輸送物設計承認書

19学文科科978号
平成20年5月9日

国立大学法人京都大学
総長 尾池 和夫 殿

文部科学大臣
渡海紀三朗



平成20年3月28日付け京大研研2第77号をもって申請のあった核燃料輸送物設計承認申請については、核燃料物質等の工場又は事業所の外における運搬に関する技術上の基準に係る細目等を定める告示第41条第2項の規定により、下記のとおり承認します。

なお、本核燃料輸送物設計承認書は、当該核燃料輸送物が通過し又は搬入される国において定められた原子力事業者及び原子力事業者から運搬を委託された者が従うべき義務を免ずるものではないことを申し添えます。

記

1. 設計承認番号 : J/170/B(U)F-96
2. 氏名又は名称及び住所並びに法人にあっては、その代表者の氏名
住 所 : 京都府京都市左京区吉田本町
名 称 : 国立大学法人京都大学
代表者の氏名 : 総長 尾池 和夫
3. 核燃料輸送物の名称 : JRF-90Y-950K型
4. 核燃料輸送物の種類 : BU型核分裂性輸送物





5. 核燃料輸送物の外形寸法、重量その他の仕様

(1) 外径寸法及び重量

直径 : 約 84 cm

高さ : 約 180 cm

重量 : 約 860 kg

核燃料輸送物の総重量 : 950 kg 以下

(2) 輸送容器の材料の種類

容器本体 : ステンレス鋼、バルサ材、硬質ポリウレタンフォーム

外容器蓋 : ステンレス鋼、バルサ材、硬質ポリウレタンフォーム

内容器蓋 : ステンレス鋼、シリコンゴム

燃料バスケット : ステンレス鋼、シリコンゴム

(3) 外観 : 添付図のとおり

(4) 収納する核燃料物質等の仕様 : 添付表のとおり

(5) 輸送制限個数及び配列方法 : 任意

6. 臨界安全評価における浸水の領域に関する事項

臨界安全評価においては、輸送容器の内部及び外部の空隙が浸水するものと仮定している。

7. 収納物の密封性に関する事項

本輸送容器の密封境界は、内容器本体と内容器蓋で構成される内容器であり、内容器本体と内容器蓋との接触部は、シリコンゴム製リング（内容器蓋リング）で密封されている。

臨界解析においては、密封境界内部である内容器内部は浸水するものとして扱っており、密封境界内部への浸水により臨界安全の維持が損なわれることはないことを確認している。

8. BM型輸送物にあつては、BU型輸送物の設計基準のうち適合しない基準該当しない





9. 輸送容器の保守及び核燃料輸送物の取扱いに関する事項

(1) 輸送容器の保守の方法

輸送容器保管は屋内で行う。定期自主検査は、1年に1回以上（年間の使用回数が10回を超えるものにあつては、使用回数10回毎に1回以上）それぞれの輸送容器について、外観検査、耐圧検査（耐圧性能に影響する修理等を行った場合に限る。）、気密漏えい検査、密封装置の弁、ガスケット等の保守、未臨界検査を実施し、健全性の保持に努める。

(2) 核燃料輸送物の取扱いの方法

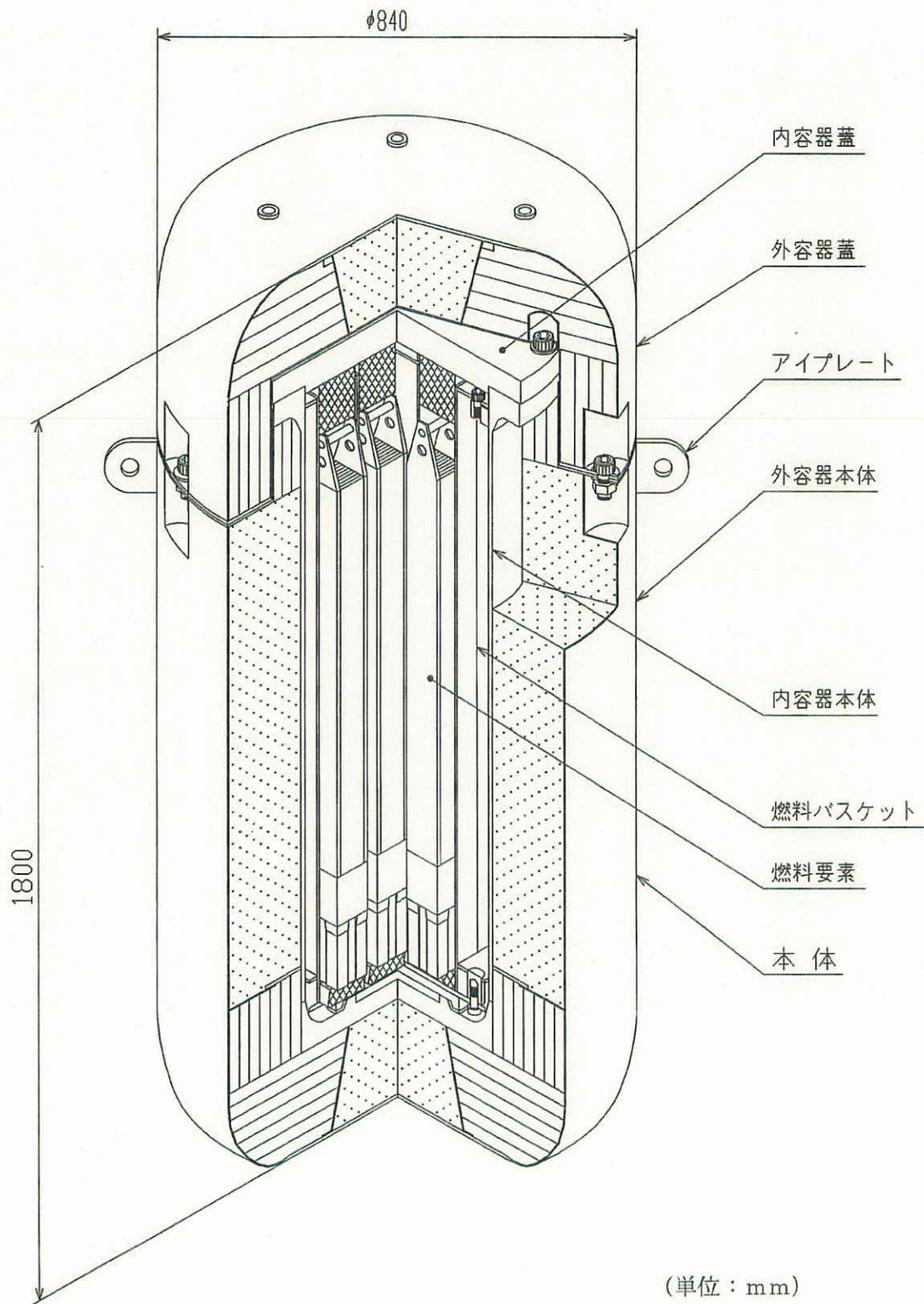
輸送容器の取扱いは専用の取扱い治具及びクレーン等を用いて行い、そのつど輸送容器、取扱い治具に異常のないことを確認するとともに、十分な配慮と計画のもとに慎重に取扱い、安全対策に万全を期す。

輸送物の発送にあたっては、外観検査、吊上げ検査、重量検査、表面密度検査、線量当量率検査、未臨界検査、収納物検査及び気密漏えい検査を行う。

10. 核燃料輸送物設計承認書の有効期間

平成20年5月9日から平成25年5月8日まで





添付図 輸送容器の概念図



添付表 収納する核燃料物質の仕様 (1/3) (新燃料)

原子炉		KUR (京都大学研究用原子炉)		
		KUR 標準燃料要素	KUR 特殊燃料要素	KUR 半装燃料要素
全装荷数 (体/容器)		10 以下		
燃料形式		LEU 燃料		
種類		ウランシリコンアルミニウム分散型合金		
重量	²³⁵ U 重量 (g 以下/容器)	2,180	1,090	1,090
	U 重量 (g 以下/容器)	11,150	5,580	5,580
	²³⁸ U 重量 (g 以下/体)	218	109	109
	U 重量 (g 以下/体)	1,115	558	558
濃縮度 (wt%)		19.95 以下		
放射能の量 (GBq 以下/容器)		29.8		
主な核種 (GBq 以下/容器)		²³⁴ U : 28.6 ²³⁵ U : 0.38 ²³⁶ U : 0.59 ²³⁸ U : 0.24		
性状		固体		
燃焼度 (%以下)		0 (新燃料)		
発熱量 (W 以下/容器)		0 (新燃料)		
冷却日数 (日)		0 (新燃料)		



添付表 収納する核燃料物質の仕様 (2/3) (新燃料)

原子炉	JRR-3		JRR-4		JMTR		
	JRR-3標準燃料要素	JRR-3700型燃料要素	JRR-4B型燃料要素	JRR-4L型燃料要素	JMTR標準燃料要素	JMTR燃料700	
全装荷数 (体/容器)	10 以下						
燃料形式	LEU 燃料		LEU 燃料		LEU 燃料		
種類	ウランジコニウム分散型合金		ウランジコニウム分散型合金		ウランジコニウム分散型合金		
重量	²³⁵ U 重量 (g 以下/容器)	4,850	3,100	2,300	2,100	3,200	2,800
	U 重量 (g 以下/容器)	24,810	15,860	11,770	10,750	7,280	14,330
	²³⁵ U 重量 (g 以下/体)	485	310	230	210	320	280
	U 重量 (g 以下/体)	2,481	1,586	1,177	1,075	728	1,433
濃縮度 (wt%)	19.95 以下		19.95 以下		46.0 以下		
放射能の量 (GBq 以下/容器)	29.8						
主な核種 (GBq 以下/容器)	²³⁴ U : 28.6 ²³⁵ U : 0.38 ²³⁶ U : 0.59 ²³⁸ U : 0.24						
性状	固体						
燃焼度 (%以下)	0 (新燃料)						
発熱量 (W 以下/容器)	0 (新燃料)						
冷却日数 (日)	0 (新燃料)						



添付表 収納する核燃料物質の仕様 (3/3) (低照射された燃料)

原子炉	JMTRC					
	標準燃料要素	特殊燃料要素	燃料7107	標準燃料要素	特殊燃料要素	燃料7107
全装荷数 (体/容器)	10 以下					
燃料形式	HEU 燃料		MEU 燃料			
種類	ウランアルミニウム合金		ウランアルミニウム分散型合金			
重量	²³⁵ U 重量 (g 以下/容器)	2,850	1,990	3,170	2,860	2,100
	U 重量 (g 以下/容器)	3,180	2,220	7,210	6,500	4,780
	²³⁵ U 重量 (g 以下/体)	285	199	317	286	210
	U 重量 (g 以下/体)	318	222	721	650	478
濃縮度 (wt%)	90.0 以下		46.0 以下			
放射能の量 (GBq 以下/容器)	17.3					
主な核種 (GBq 以下/容器)	²³⁴ U : 16.2 ²³⁵ U : 0.25 ²³⁶ U : 0.29 ²³⁸ U : 0.05 その他の核種 : 0.52					
性状	固体					
燃焼度 (%以下)	7.23 × 10 ⁻⁵		1.76 × 10 ⁻⁵			
発熱量 (W 以下/容器)	4.30 × 10 ⁻⁵		3.29 × 10 ⁻⁵			
冷却日数 (日)	5,475 以上		1,460 以上			





U.S. Department
of Transportation

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

**Pipeline and
Hazardous Materials
Safety Administration**

CERTIFICATE NUMBER: USA/0773/B(U)F-96, Revision 2

ORIGINAL REGISTRANT(S):

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