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国立大学法人　京都大学
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原子力規制委員会

核燃料輸送物設計承認英文証明書について

核燃料物質等の工場又は事業所の外における運搬に係る核燃料輸送物設計承認及び容器承認等に関する申請手続ガイド（令和2年2月26日付け原規規発第2002264号）2.4.に基づき、令和2年6月8日付け20京大施環化第22号をもって申請のあった標記の件について、添付のとおり証明します。

IDENTIFICATION MARK

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 KYOTO UNIVERSITY, that the package design described herein complies with the design requirements for a package containing fresh fuel elements and low irradiated fuel elements in research reactors, 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:

Jun. 23. 2020.
Date

Hasegawa Kiyomitsu
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 :

2. Name of Package :

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

4. Specification of Package
   (1) Materials of Packaging
      (a) Main Body : Stainless steel,
      (b) Outer lid : Stainless steel,
      (c) Inner lid : Stainless steel
      (d) Fuel Basket : Stainless steel
   (2) Total weight of Packaging :
   (3) Outer Dimensions of Packaging
      (i) Outer Diameter :
      (ii) Length :
   (4) Total Weight of Package :
   (5) Illustration of Package : See the attached Figure-1 (Bird's-eye View)

5. Specification of Radioactive Contents : See the attached Table-1, 2, 3 and 4

6. Description of Containment System
   Containment system consists of the inner shell and the inner lid (made of the stainless steel). O-ring made of is used for the contact surface between inner shell and inner lid.

7. For Package containing Fissile Materials
   (1) Restrictions on Package
      (i) Restriction Number "N" :
      (ii) Array of Package :
      (iii) Criticality Safety Index (CSI) :
   (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 space of inner shell.

(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 (This package is Type B(U))

9. Assumed Ambient Conditions

(i) Ambient Temperature Range : -40°C~38°C

(ii) Insolation Data : Table 12 of IAEA Regulation

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 coverd 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) Maintenance of O-ring Used for Containment System

(iv) Leakage Rate Measurement Inspection

(v) Subcriticality Inspection

(vi) 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 Cointamination Measurement Inspection
(v) Radiation Dose rate Inspection
(vi) Subcriticality Inspection
(vii) Contents Specification Check Inspection
(viii) Leakage Rate Measurement 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 package 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 :
(ii) Expiry Date :

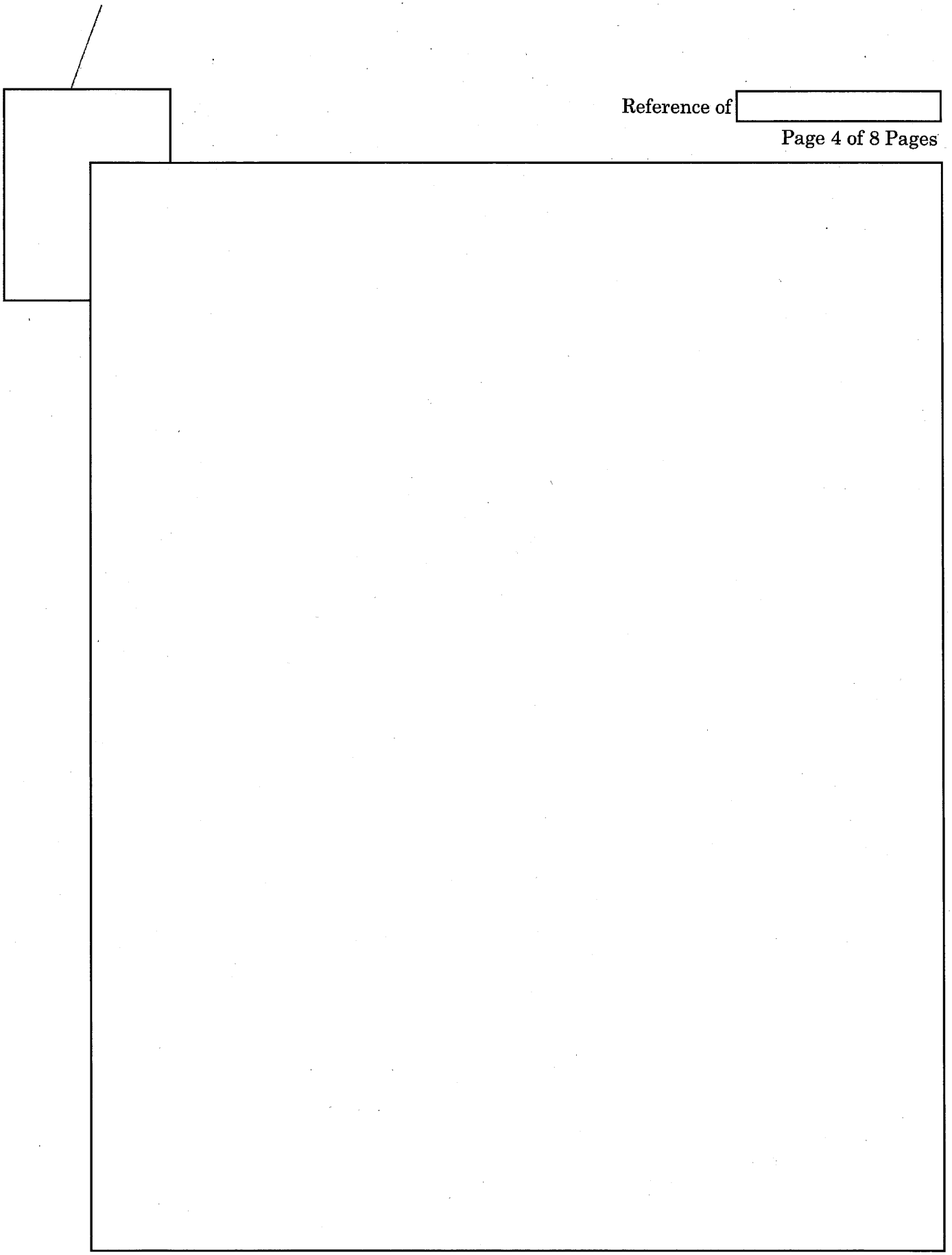

Figure-1 Illustration of [ ] package (Bird's-eye view)

Table-1 Specification of Contents (Fresh Fuel Element)

| Reactor | | KUR (Kyoto University Research reactor) | | |
|---|---|---|---|---|
| Fuel Element | | KUR Standard Fuel Element | KUR Special Fuel Element | KUR Half-loaded Fuel Element |
| Number of Fuel Elements (element/package) | | | | |
| Fuel Type | | | | |
| Materials of Nuclear Fuel | | | | |
| Weight | $^{235}$U weight (g or less/package) | | | |
| | U weight (g or less/package) | | | |
| | $^{235}$U weight (g or less/element) | | | |
| | U weight (g or less/element) | | | |
| Enrichment (wt% or less) | | | | |
| Activity of Contents | Total (GBq or less/package) | | | |
| | Principal Radionuclide (GBq or less/package) | | | |
| Physical State | | | | |
| Burn-up (% or less) | | | | |
| Total Heat Generation Rate (W or less/package) | | | | |
| Cooling Time (days) | | | | |

-Loading a transport package with different types of nuclear fuel material is allowed for each reactor only when all the fuel elements contained are the same type having the same enrichment level.For the nuclear fuel material from JMTRC, however, mixed loading of fuel elements of different types and different enrichment levels is allowed.

- The values of weight and heat generation are calculated proportionally from the maximum weight and heat generation for each type of fuel element according to the number of assemblies contained.

Table-2 Specification of Contents (Fresh Fuel Element)

| Reactor | | JRR-3 | | JRR-4 | | | JMTR | |
|---|---|---|---|---|---|---|---|---|
| Fuel Element | | JRR-3 standard fuel element | JRR-3 follower type fuel element | JRR-4B type fuel element | JRR-4L type fuel element | JRR-4 type fuel element | JMTR standard fuel element | JMTR fuel followers |
| Number of Fuel Elements (element/package) | | | | | | | | |
| Fuel Type | | | | | | | | |
| Materials of Nuclear Fuel | | | | | | | | |
| Weight | $^{235}$U weight (g or less/package) | | | | | | | |
| | U weight (g or less/package) | | | | | | | |
| | $^{235}$U weight (g or less/element) | | | | | | | |
| | U weight (g or less/element) | | | | | | | |
| Enrichment (wt% or less) | | | | | | | | |
| Activity of Contents | Total (GBq or ess/package) | | | | | | | |
| | Principal Radionuclide (GBq or less/package) | | | | | | | |
| Physical State | | | | | | | | |
| Burn-up (% or less) | | | | | | | | |
| Total Heat Generation Rate (W or less/package) | | | | | | | | |
| Cooling Time (days) | | | | | | | | |

-Loading a transport package with different types of nuclear fuel material is allowed for each reactor only when all the fuel elements contained are the same type having the same enrichment level.For the nuclear fuel material from JMTRC, however, mixed loading of fuel elements of different types and different enrichment levels is allowed.

- The values of weight and heat generation are calculated proportionally from the maximum weight and heat generation for each type of fuel element according to the number of assemblies contained.

Reference of

Table-3 Specification of Contents (Low Irradiated Fuel Element)

| Reactor | | JMTRC | | | | | |
|---|---|---|---|---|---|---|---|
| Fuel Element | | JMTRC Standard | JMTRC Special | JMTRC Follower | JMTRC Standard | JMTRC Special | JMTRC Follower |
| Number of Fuel Elements (element/package) | | | | | | | |
| Fuel Type | | | | | | | |
| Materials of Nuclear Fuel | | | | | | | |
| Weight | $^{235}U$ weight (g or less/package) | | | | | | |
| | U weight (g or less/package) | | | | | | |
| | $^{235}U$ weight (g or less/element) | | | | | | |
| | U weight (g or less/element) | | | | | | |
| Enrichment (wt% or less) | | | | | | | |
| Activity of Contents | Total (GBq or ess/package) | | | | | | |
| | Principal Radionuclide (GBq or less/package) | | | | | | |
| Physical State | | | | | | | |
| Burn-up (% or less) | | | | | | | |
| Total Heat Generation Rate (W or less/package) | | | | | | | |
| Cooling Time (days) | | | | | | | |

-Loading a transport package with different types of nuclear fuel material is allowed for each reactor only when all the fuel elements contained are the same type having the same enrichment level.For the nuclear fuel material from JMTRC, however, mixed loading of fuel elements of different types and different enrichment levels is allowed.

- The values of weight and heat generation are calculated proportionally from the maximum weight and heat generation for each type of fuel element according to the number of assemblies contained.

Table-4 Specification of Contents (Fresh Fuel Element)

| | | |
|---|---|---|
| Reactor | | KUCA (Kyoto University Critical Assembly) |
| Fuel Element | | |
| Number of Fuel Elements (element/package) | | |
| Fuel Type | | |
| Materials of Nuclear Fuel | | |
| Weight | $^{235}$U weight (g or less/package) | |
| | U weight (g or less/package) | |
| | $^{235}$U weight (g or less/element) | |
| | U weight (g or less/element) | |
| Enrichment (wt% or less) | | |
| Activity of Contents | Total (GBq or less/package) | |
| | Principal Radionuclide (GBq or less/package) | |
| Physical State | | |
| Burn-up (% or less) | | |
| Total Heat Generation Rate (W or less/package) | | |
| Cooling Time (days) | | |

-Loading a transport package with different types of nuclear fuel material is allowed for each reactor only when all the fuel elements contained are the same type having the same enrichment level.For the nuclear fuel material from JMTRC, however, mixed loading of fuel elements of different types and different enrichment levels is allowed.

- The values of weight and heat generation are calculated proportionally from the maximum weight and heat generation for each type of fuel element according to the number of assemblies contained.