
Outline of Fresh MOX Fuel Transportation in Japan and Development Status of Transportation Cask for LWR

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JAPAN NUCLEAR FUEL LIMITED



Introduction

- The completion of the nuclear fuel cycle - a flow of processing nuclear fuel, reprocessing, and conducting waste management - has been long awaited in Japan, in which energy resources are scarce.
 - In order to complete the nuclear fuel cycle, Japan Nuclear Fuel Limited (JNFL) aims to construct the first commercial MOX fuel fabrication plant domestically in Rokkasho-village, in Japan.
 - JNFL acquired the permission to MOX fuel fabrication business from the government on May 13, 2010. Construction of the plant will be started in October, 2010. After the plant starts commercial operation, a full-scale MOX fuel transportation will be performed.
 - Therefore, JNFL would like to show the outline of fresh MOX fuel transportation for LWR in Japan and development status of MOX fuel transportation cask today.
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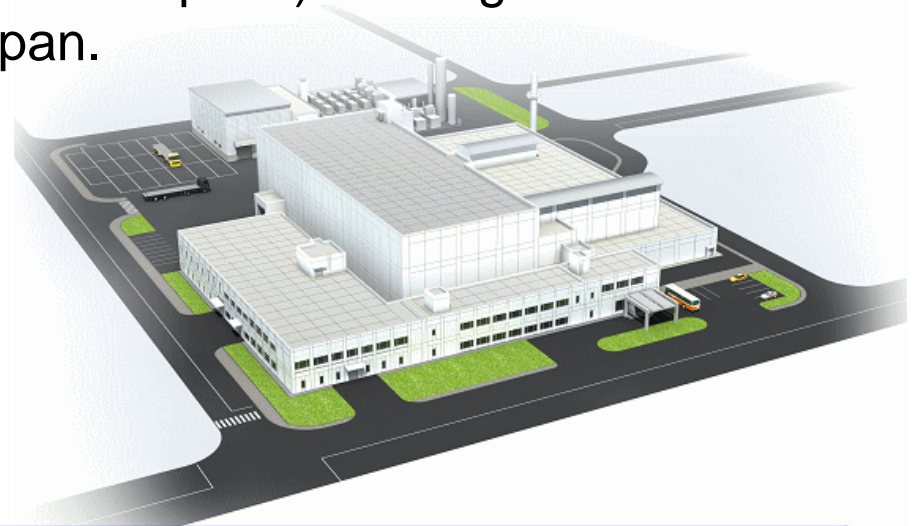


The outline of the J-MOX plant

JNFL's MOX fuel fabrication plant (J-MOX plant) is designed to fabricate MOX fuels for domestic LWRs in Japan.

Image of MOX fuel →

PWR fuel assembly
Length approximately 4m
Weight approximately 700kg.



The specifications of the J-MOX plant

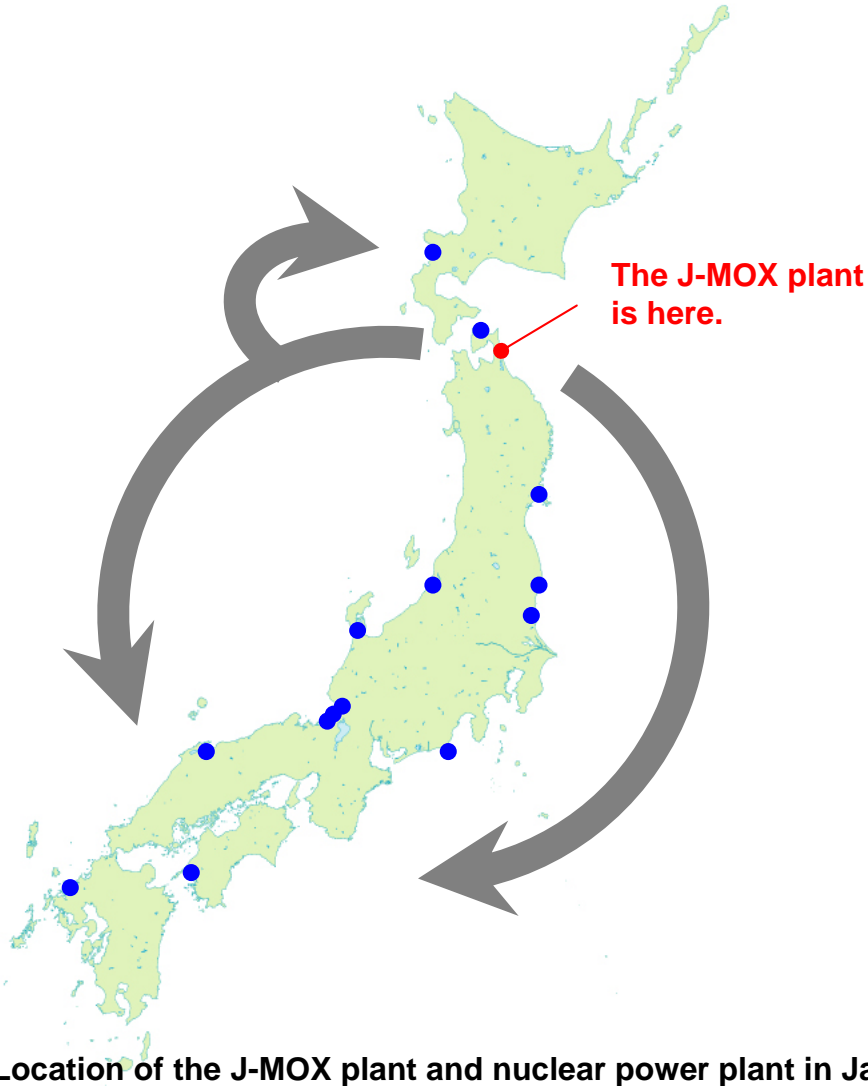
Product	MOX fuel assembly for domestic light water reactors (BWR and PWR)
Fabrication capacity	Maximum 130 tons-Heavy Metal* / year
Size of main building	Approximately 85m x 85m with 2 above-ground levels and 3 underground levels.
Construction schedule	Starts construction in <u>October, 2010</u> . (Coming soon!) Starts operation in <u>March, 2016</u> .
Location	Adjacent to the MOX storage building of JNFL RRP**.
Operating Employees	Approximately 300 persons.

* "tons-Heavy Metal" indicates the weight of plutonium and uranium metallic content in MOX.

** Rokkasho Reprocessing Plant.



Plutonium for thermal use



Japanese electric power companies aim to introduce MOX fuel into 16~18 reactors in whole country by fiscal year 2015.

MOX fuels fabricated in the J-MOX plant will be transported toward these nuclear power plants.

Number of nuclear reactors in Japan.

Under operation	54 Reactors
Under construction	2 Reactors
Total	56 Reactors

(Note) As of December, 2009

Location of the J-MOX plant and nuclear power plant in Japan*

* This figure shows the location of the nuclear power plant which has the plan to introduce MOX fuel.



The framework of MOX fuel transportation

MOX fuel transportation from the J-MOX plant to each nuclear power plant will be performed as following framework.

Customers

Japanese Electric Power Companies

Prime Contractor

Japan Nuclear Fuel Ltd.

- Administrative work about MOX fuel transportation.
- Securing fuel integrity.

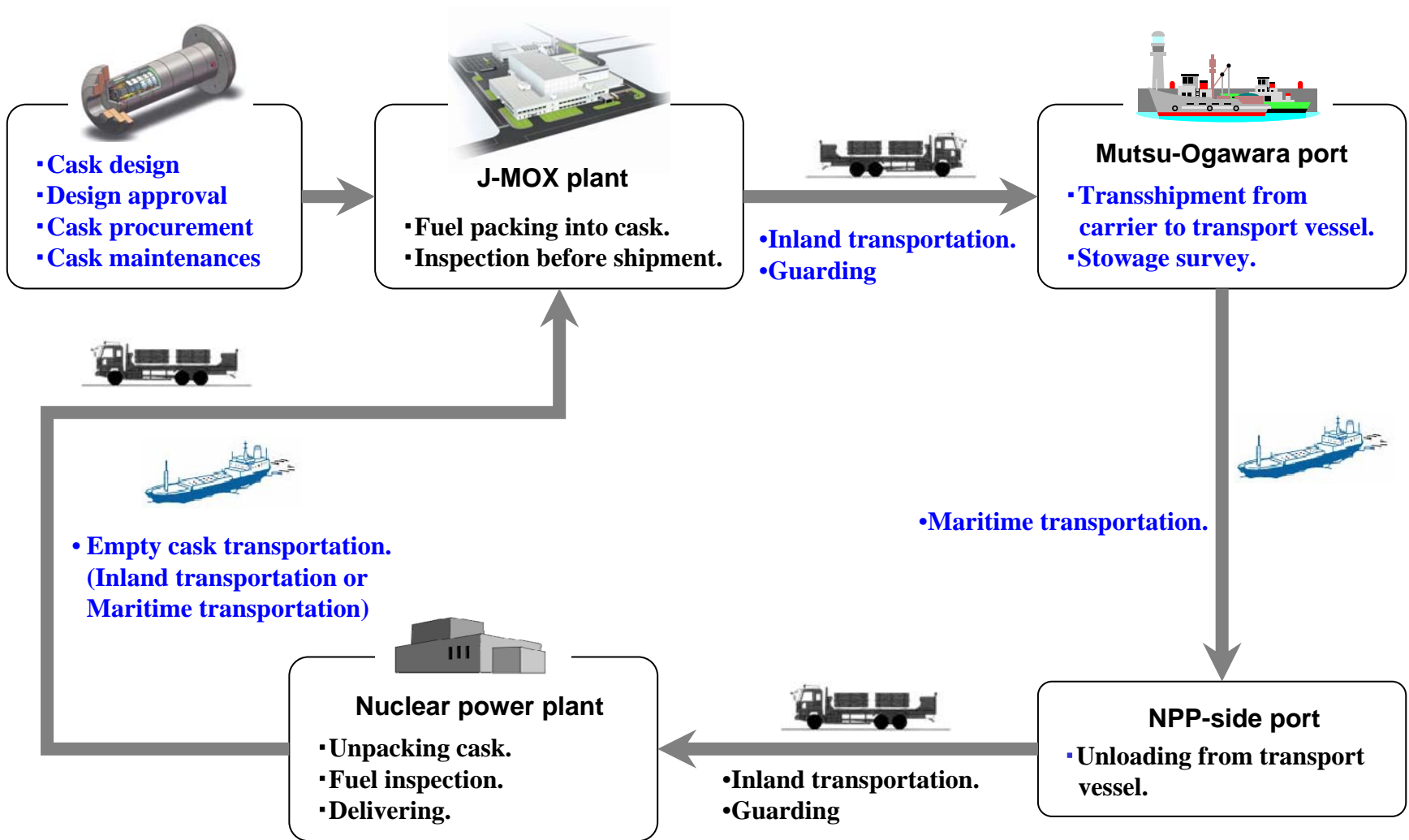
Sub-contractor

Nuclear Fuel Transport Co., Ltd.

- Cask design, cask procurement.
- Design approval.
- MOX fuel transportation. (Including acquiring concerning permission)
- Cask maintenance, etc.



Images of MOX fuel transportation



Black colored letter means scope of JNFL service.

Blue colored letter means scope of NFT service.



Development of transportation cask

Development of the transportation cask for JNFL MOX fuel (BWR and PWR)

Fiscal Year	~ 2008	2009	2010	2011
(Basic design)	(Basic design of transportation cask is studied as a joint research project by Japanese electric power companies, JNFL and NFT in advance.)			
Detail design	BWR PWR			
Safety Analysis				
Design Approval				
Drop test				

- The transportation cask for JNFL MOX fuel (J-MOX cask) is designed as two types of special cask for BWR and PWR.
- Each type of J-MOX cask is under final phase of detail design by NFT now.



Important Requirements for the J-MOX cask

- Safety requirements
 - ➔ To meet technical standards provided in domestic laws.
 - Requirements from securing fuel integrity
 - ➔ To tighten MOX fuels in the cask in order to prevent from vibration during transportation.
 - Other requirements
 - ➔ To meet the requirements based on the weight limit of the J-MOX plant.
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General specifications of the J-MOX(B) cask

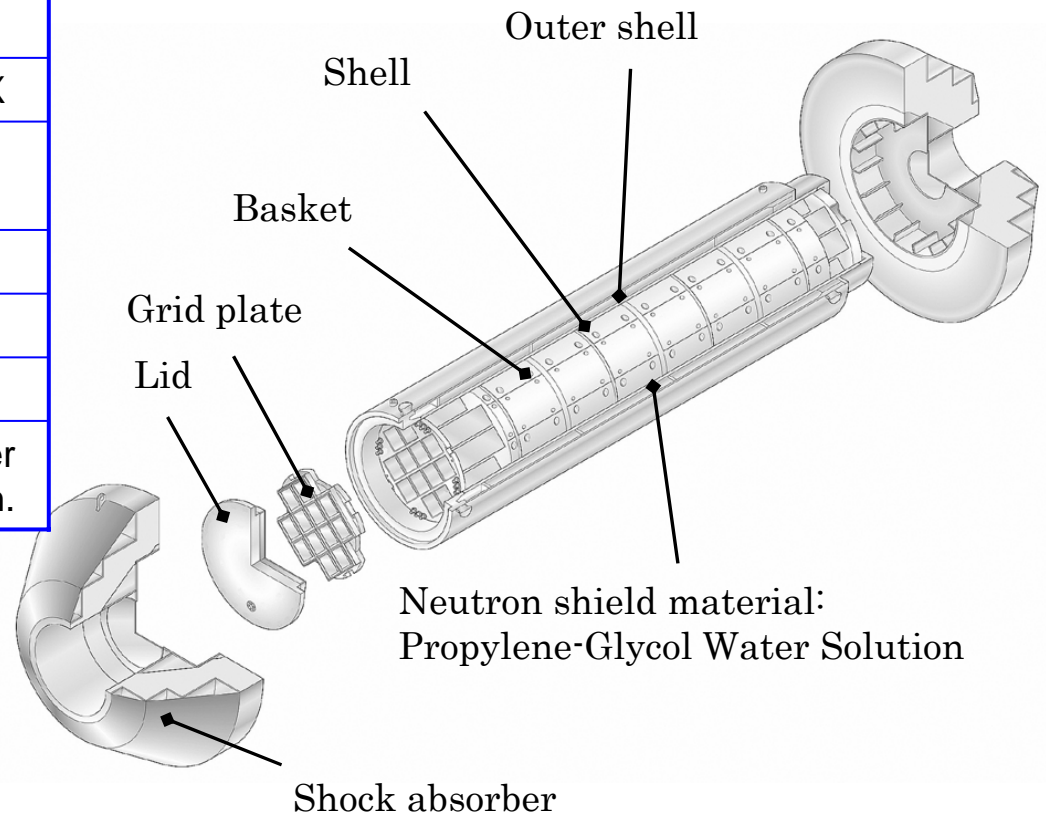
The J-MOX cask designed for BWR fuel is called as J-MOX(B) cask.

The specifications of the J-MOX(B) cask

Package	Type B(M)-fissile
Contents	8x8 / 9x9 BWR-MOX
Capacity	12 fuel assemblies with fuel holder
Pu-f content	Less than 6.1wt%
Heat Generation	Less than 5,760 W
Weight* ¹	About 24 ton
Size* ²	About 2.4 m diameter × about 6.2 m length.

*1 Including contents, shock absorbers, and not including transportation frame.

*2 including shock absorbers.





General specifications of the J-MOX(P) cask

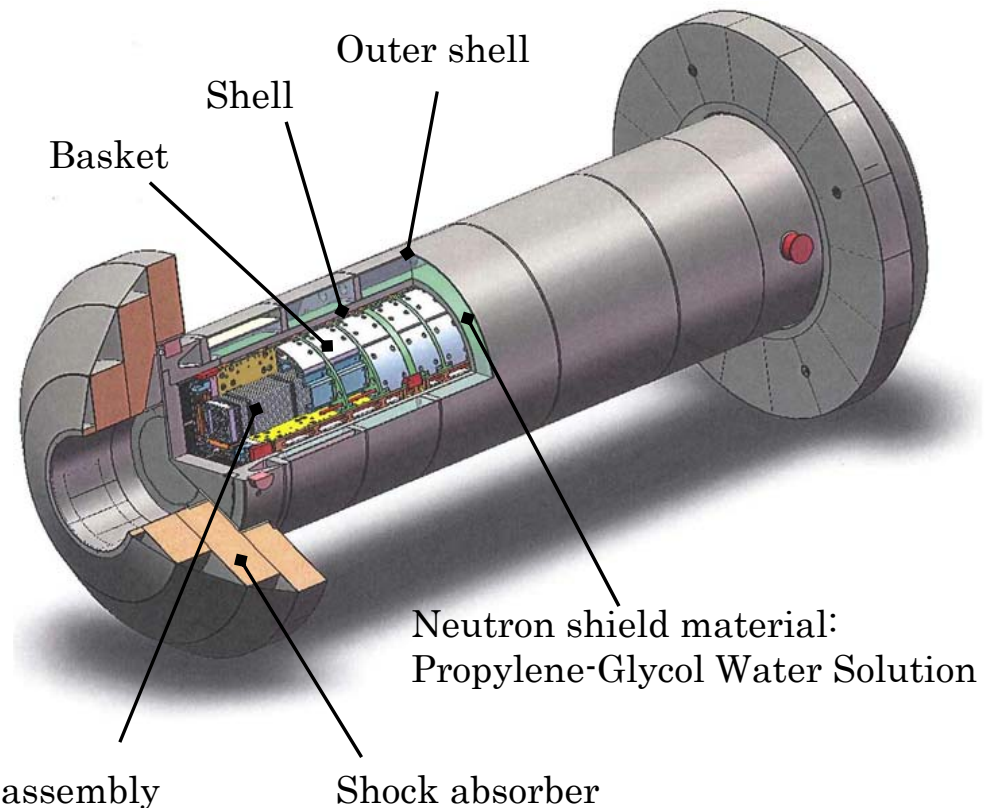
The J-MOX cask designed for PWR fuel is called as J-MOX(P) cask.

The specifications of the J-MOX(P) cask

Package	Type B(M)-fissile
Contents	17x17 PWR-MOX
Capacity	4 fuel assemblies
Pu-f content	Less than 9.1wt%
Heat Generation	Less than 7,640 W
Weight ^{*1}	About 24 ton
Size ^{*2}	About 2.4 m diameter × about 5.9 m length.

*1 Including contents, shock absorbers, and not including transportation frame.

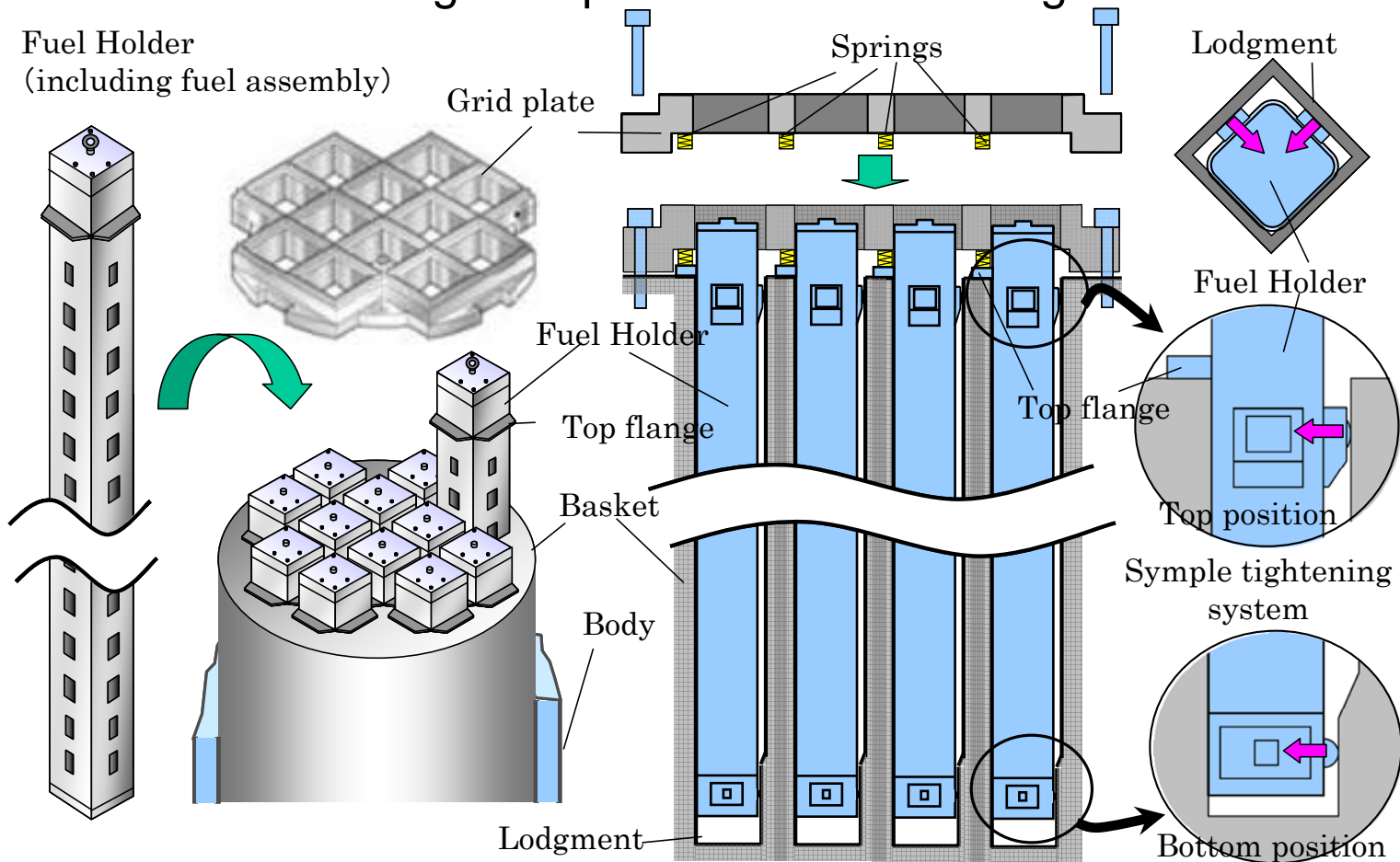
*2 including shock absorbers.





Fuel tightening method of J-MOX(B) cask

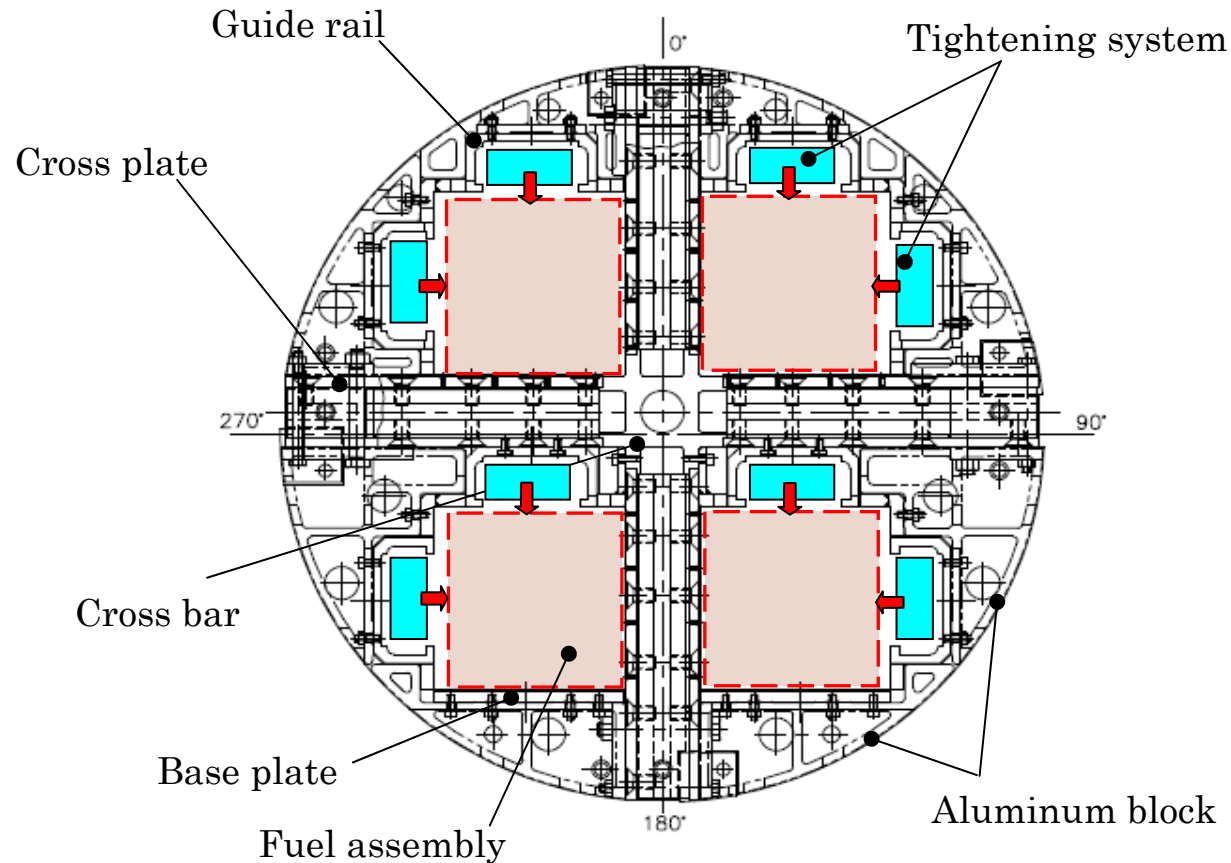
Fuel holder is used for the J-MOX(B) cask. The fuel holder prevents MOX fuel from vibration during transportation and handling.





Fuel tightening method of J-MOX(P) cask

MOX fuels are held by fuel tightening systems, which are installed in the J-MOX(P) cask.





Future targets

- To apply design approval of the J-MOX cask (BWR and PWR) by fiscal year 2011. (NFT has its responsibility)
 - To perform Drop test using a half sized dummy cask. (In order to confirm the validity of the J-MOX cask design) (NFT has its responsibility)
 - To study physical protection of nuclear material under MOX fuel transportation.
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