



Design and construction work experience of interim storage facility for spent fuels

June 15-19 2015

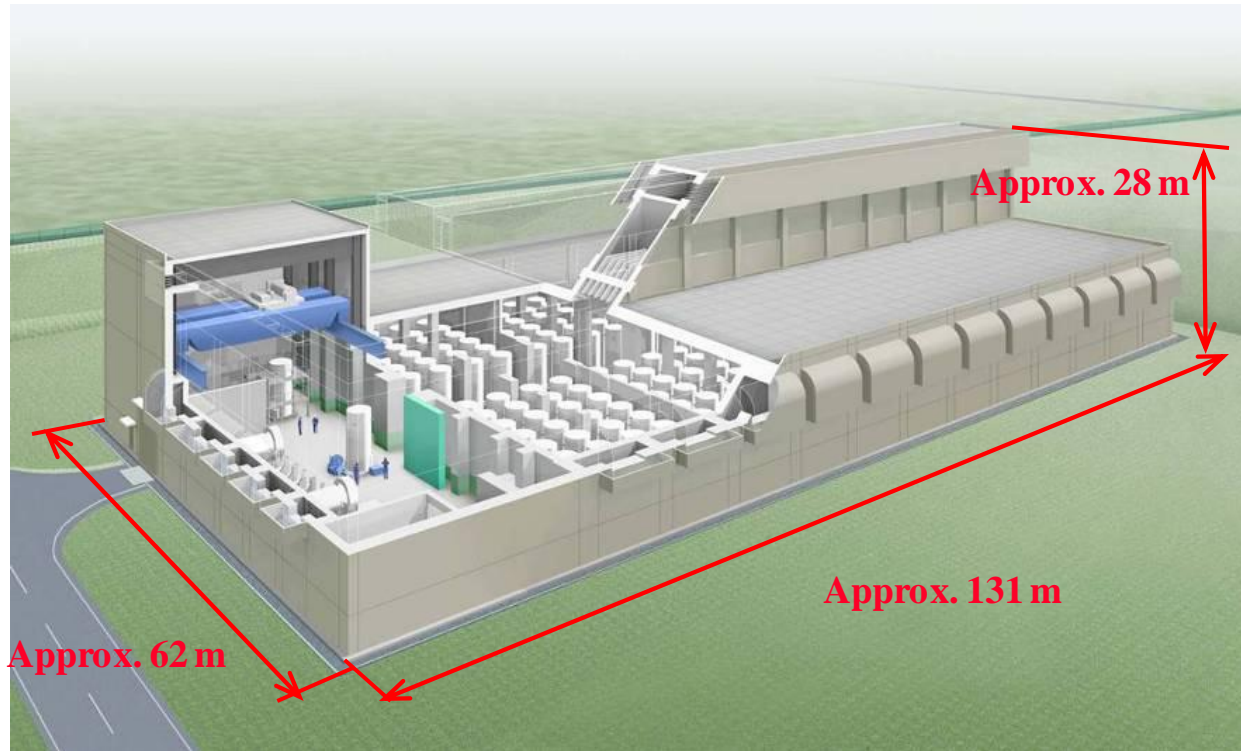
IAEA International Conference on Management of Spent Fuel from Nuclear Power

Masahiko Takahashi, Hideyuki Chikahata, Tatsuya Ishikawa
Recyclable-Fuel Storage Company, Japan

Introduction

- Recyclable-Fuel Storage Company (RFS) was jointly invested and established on Nov.2005 by Tokyo electric power company and the Japan Atomic Power company as Japanese first off-site interim storage operator.
- Recyclable-Fuel Storage Center (RFSC) is located in Mutsu city of Aomori Prefecture.
- This interim storage facility is intended to temporarily store the spent nuclear fuels till they are reprocessed. The spent nuclear fuels are planned to be stored for 50 years.
- Storage capacity of the first building is up to about 3,000 ton-U of spent fuels ie. 288 dry metal casks. Final storage capacity is planned to be 5,000 ton-U of spent fuels.

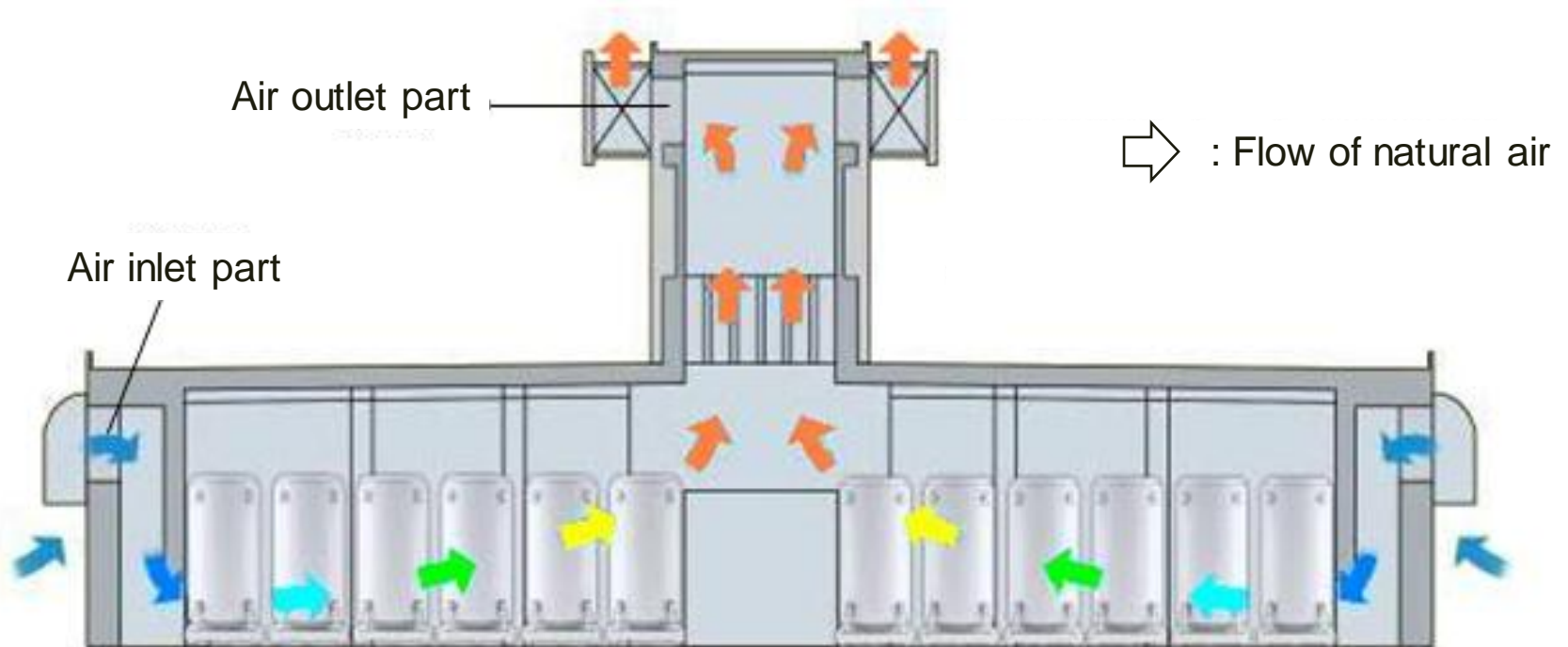
Overview of the storage facility



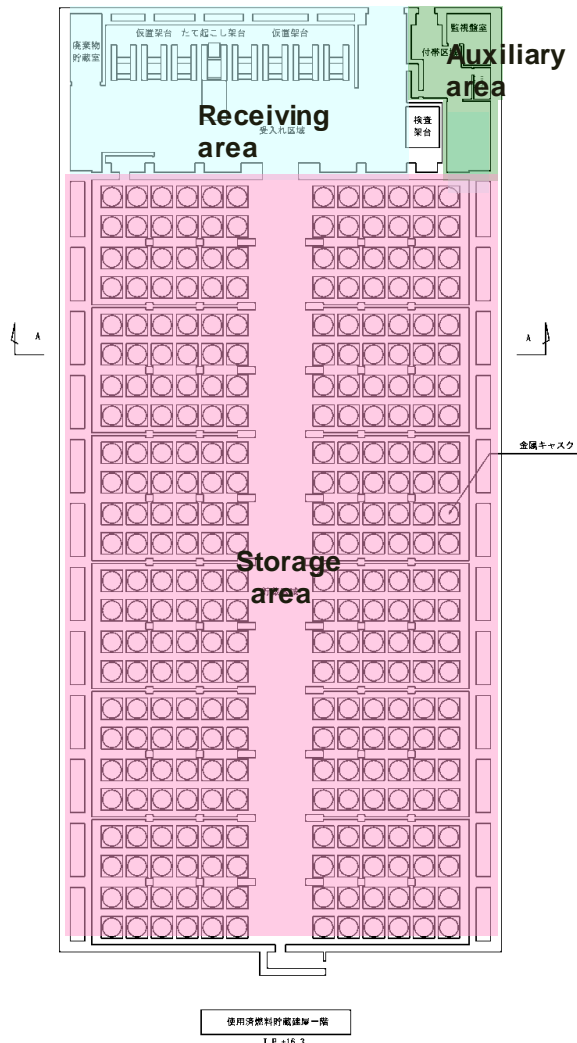
- **Storage capacity**
3,000ton-U
288 Metal casks

- **Key dimensions of storage building**
Length : Approx. 131 m
Width : Approx. 62 m
Maximum height: Approx. 28 m
Ceiling height: Approx. 15 m

Natural air cooling for the storage facility

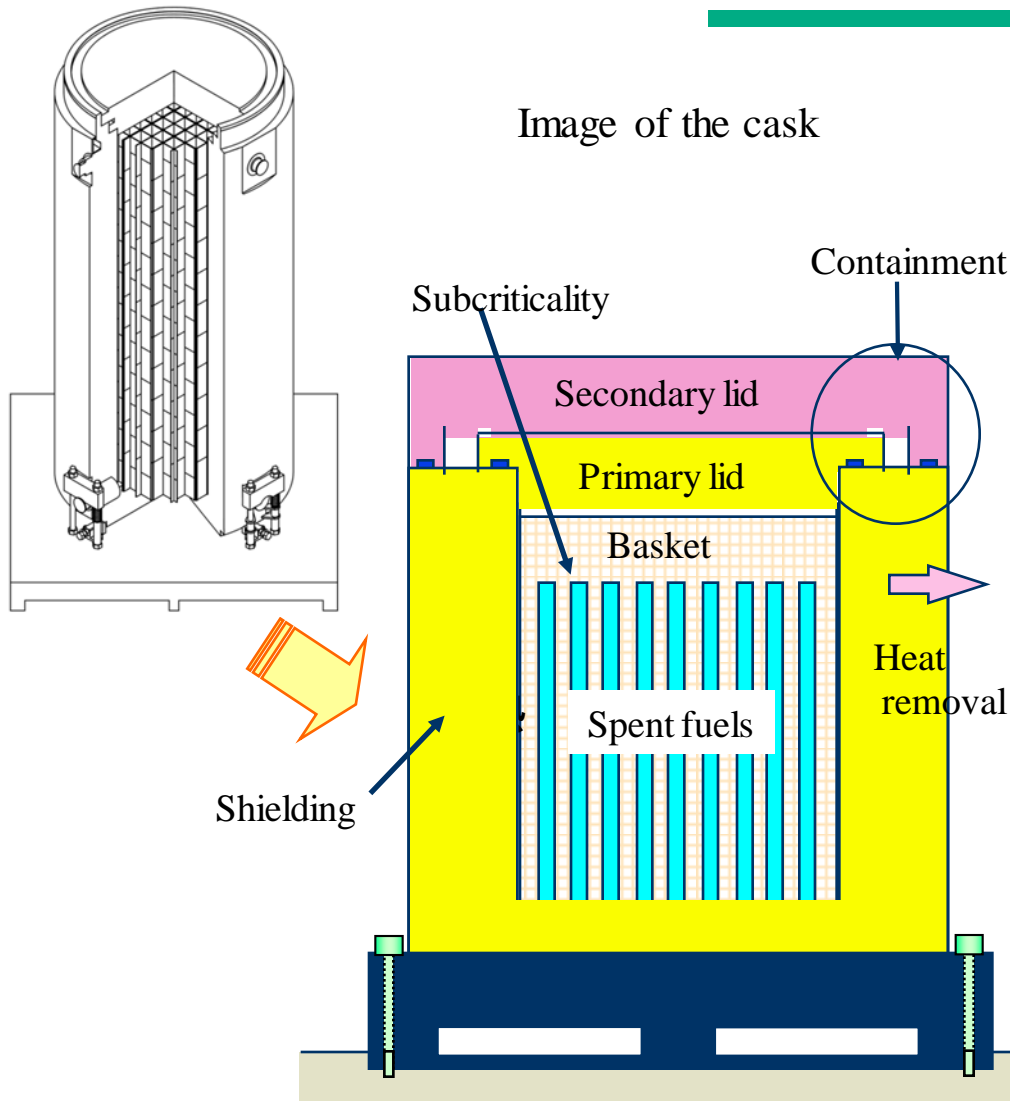


Outline of the storage facility



- **Receiving area**
 - 7 temporary racks
 - 1 inspection rack
 - 1 uprighting rack
 - 1 overhead traveling crane
- **Storage area**
 - Using air pallet transporter for moving casks
- **Auxiliary area**
 - Indicators and recording systems for monitoring devices

Basic safety functions of the metal casks



◆ Key design concept

- Metal casks are used for both storage and transport.
- The basic safety functions are safely maintained during storage periods of 50 years.

● Containment:

- Metal gaskets are set for double lids for storage
- Negative pressure for the cavity/ Positive pressure for the part between double lids
- Tertiary lids are set for transport

● Shielding:

- Cask components and resin have a function of shielding

● Subcriticality:

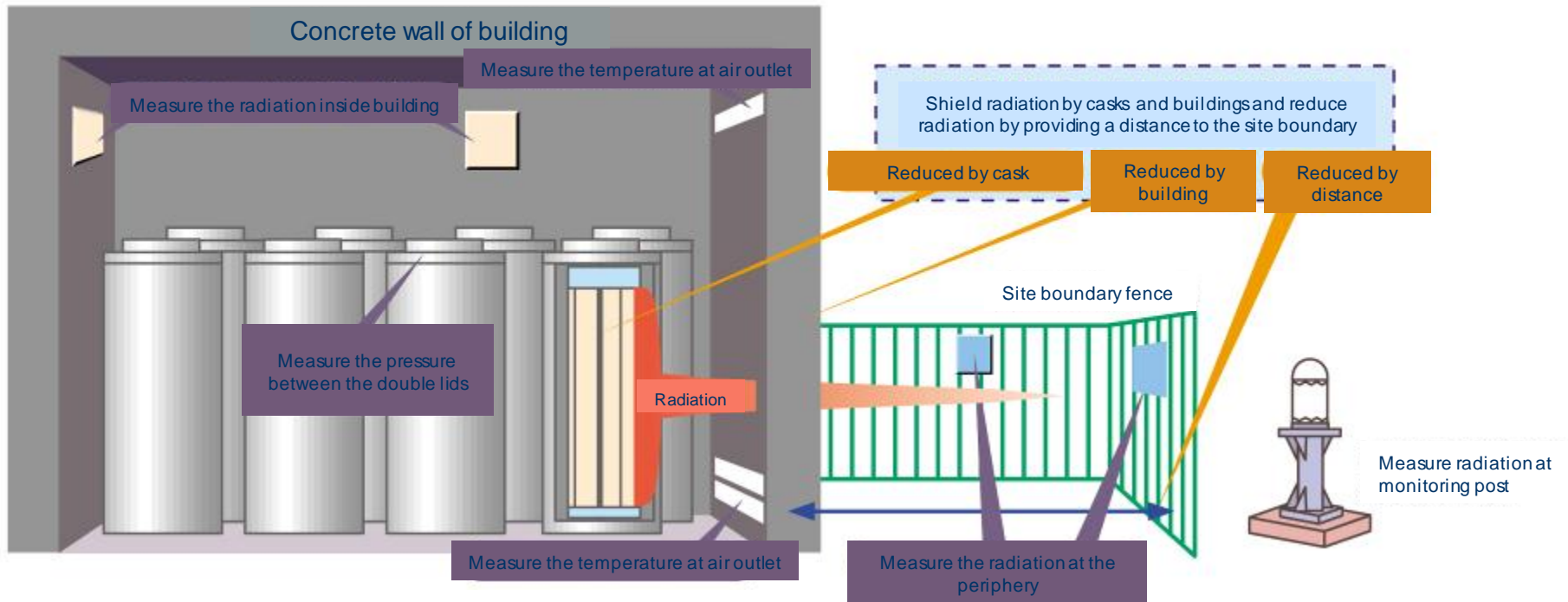
- Stainless steel with boron basket are used

● Heat removal:

- Heat transmission plates/fins etc. are set

Image of monitoring

- Monitoring the pressure between the double lids of casks
- Checking the temperature of the casks surface
- Monitoring the radiation inside and outside of the building
- Monitoring the temperature at air inlet and outlet



History of RFSC construction work

<Licensing phase>

- RFS submitted application for establishment permit to operate the “Recyclable Fuel Storage Center” to the Nuclear and Industrial Safety Agency (NISA) of Ministry of Economy, Trade and Industry (METI) in March 2007.
- The establishment permit was issued in May 2010.
- RFS submitted application for approval of design and construction methods for spent fuel facilities to NISA of METI in June 2010.
- Approval of design and construction methods was issued in Aug.2010.

<Construction phase>

- RFS started construction work of the storage building and fabrication work of metal casks in Aug. 2010.
- Construction work of the first building was completed in Aug. 2013.
- Fabrication of several metal casks was also completed with various inspections as transport and storage casks

Experience of construction work for RFS facility (Outside of the Storage building)



Feb. 2011 (Construction rate: about 45%)



April 2013 (Construction rate: about 90%)



July 2012 (Construction rate: about 65%)



August 2013 (Construction rate: 100%)

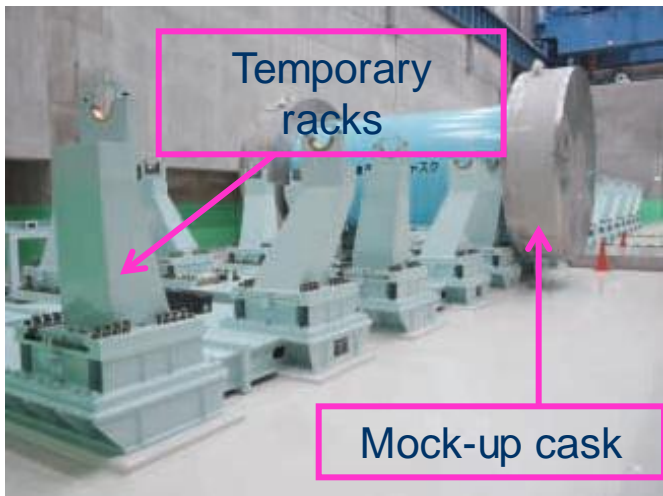
Experience of construction work for RFS facility (Inside of the storage building)



Receiving area

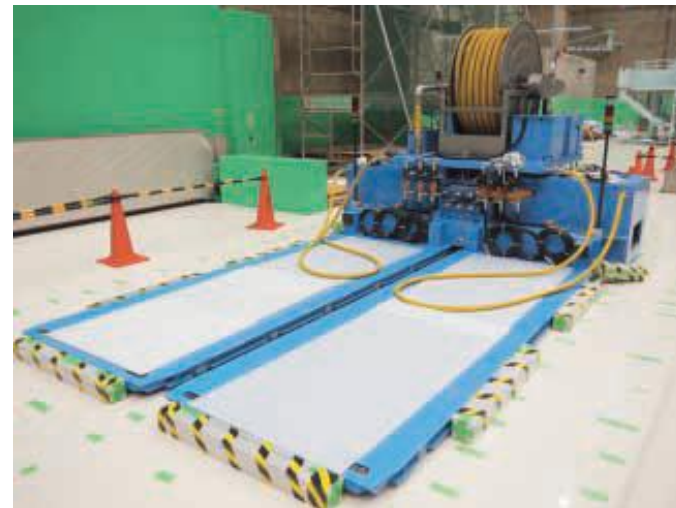


Storage area



Temporary racks

Mock-up cask



Air pallet transporter

Experience of construction work for RFS facility (Metal cask)



Image of operational flow

- RFS takes charge of storage work and electric power companies take charge of fuel loading and transport work between the facilities.
- Filled casks are handed over from electric power companies to RFS with the records of fuels loading and pre-shipment inspection, etc. after receiving inspection at the storage facility.

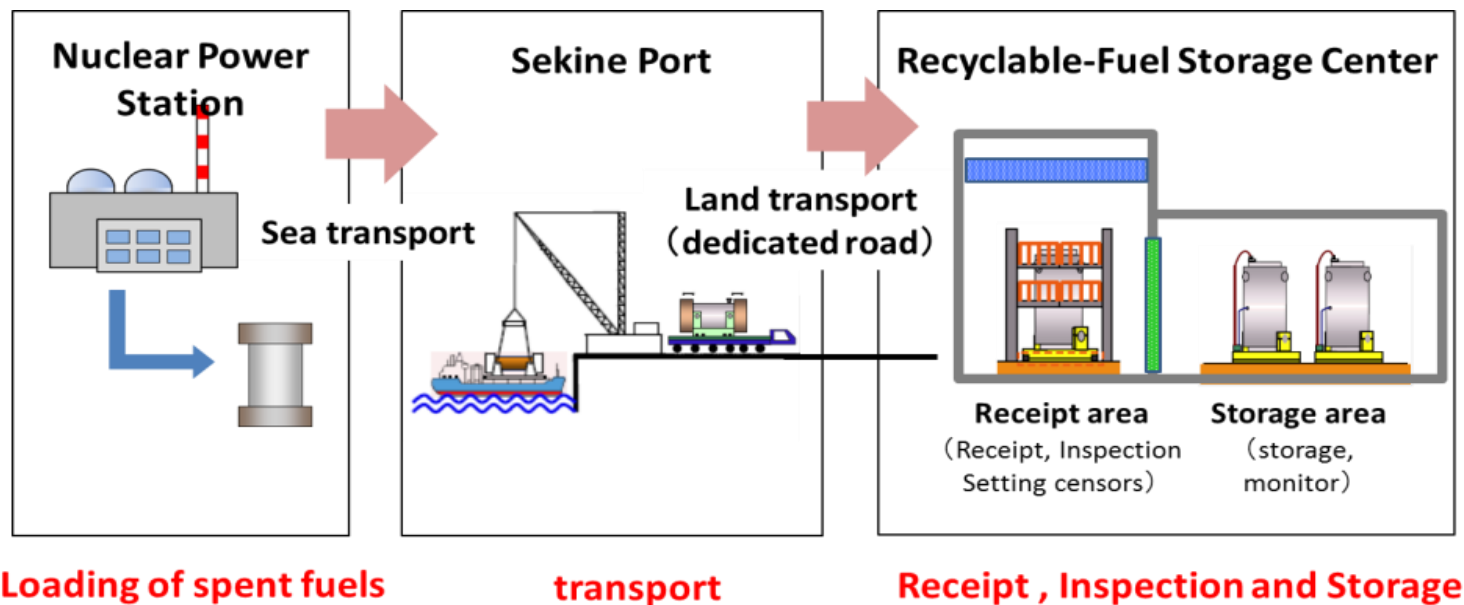
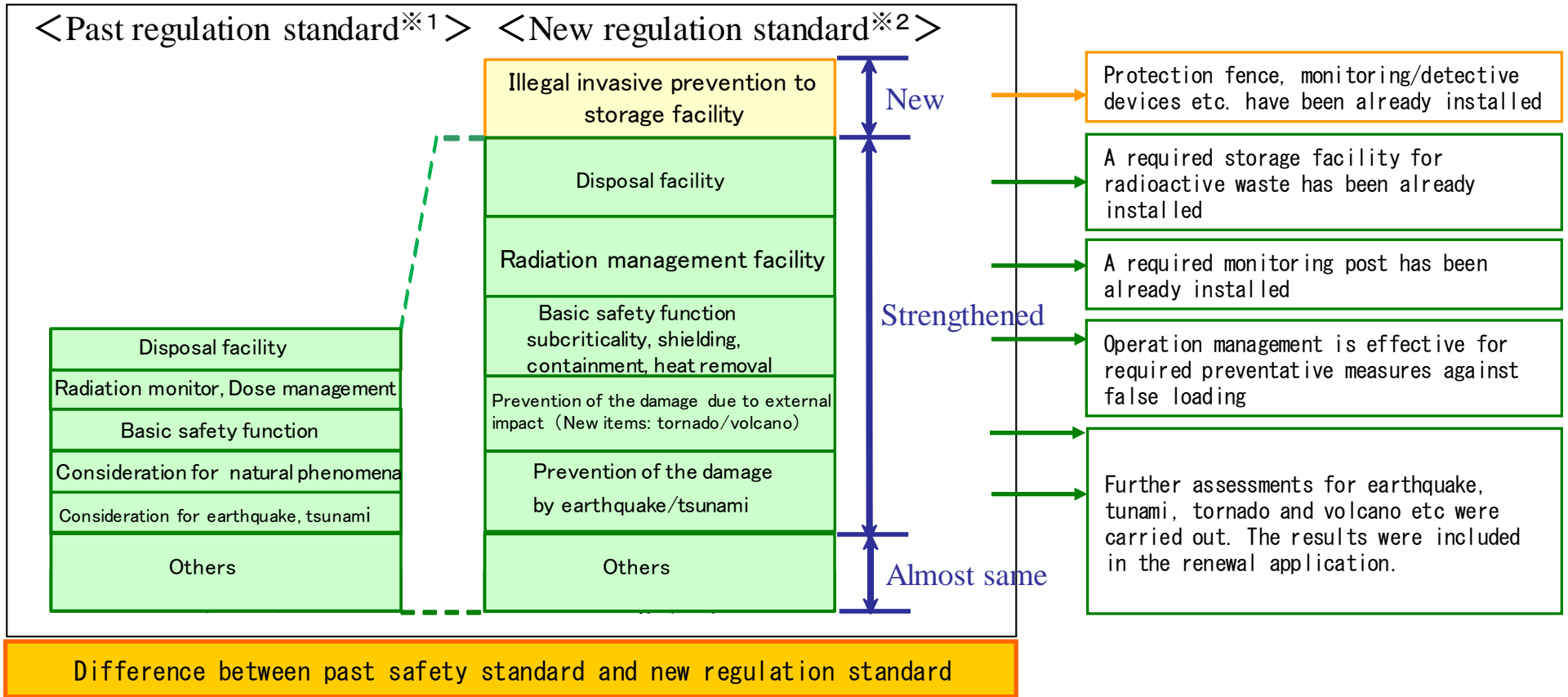


Image of new regulation standard

In December 2013, the new regulation standard based on the lesson learned by Fukushima-Daiichi accident was also enforced for storage facilities. RFS has been undertaking NRA review under new regulation standard.

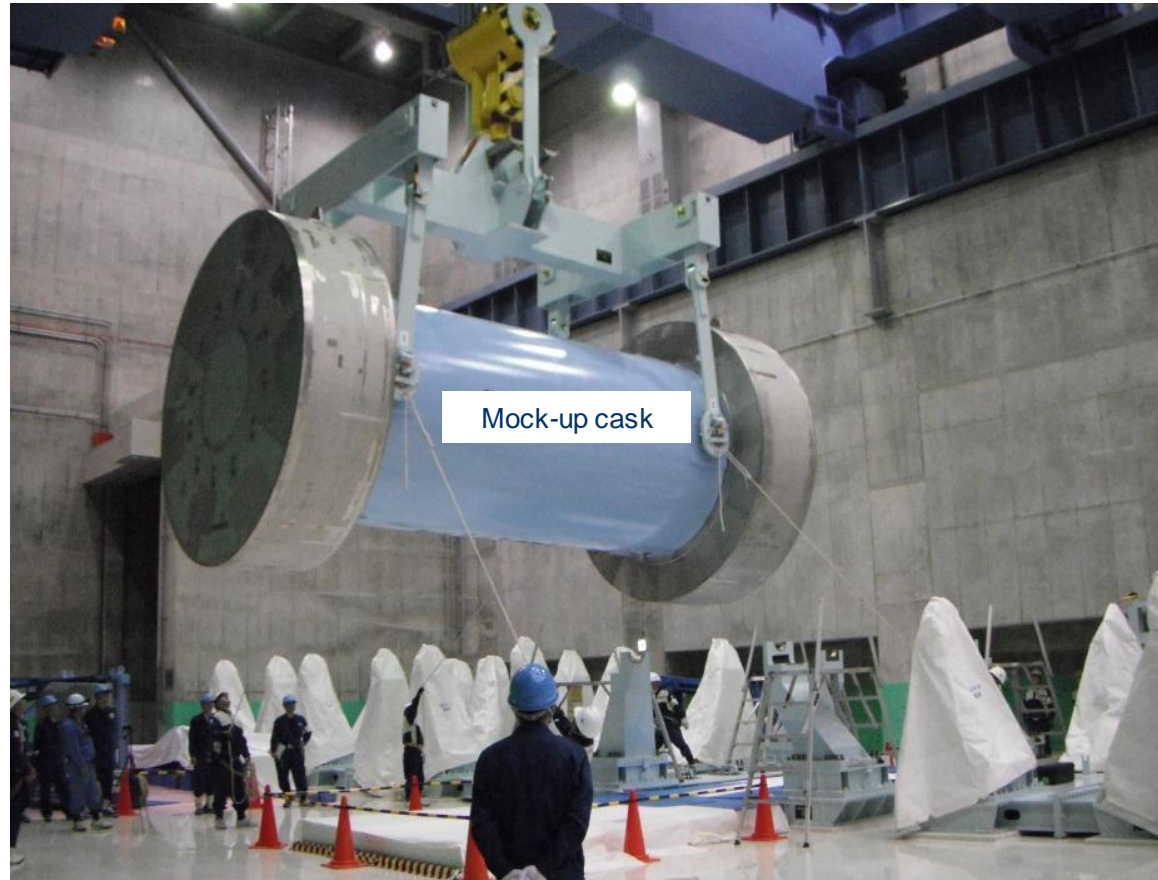


※¹ Safety review guidance for spent fuel interim storage facilities using metal dry casks (2002 October 3 Nuclear Safety Commission decision)

※² Regulation for standard of location, structure and equipment of the spent fuel storage facilities (2013 December 18 enforcement)

Operational training using mock-up cask

— Cask unloading at receiving area —



Summary

- Based on the establishment permit issued in March 2007 and approval of the design and construction method issued in Aug. 2010, construction of the first storage building and fabrication of several metal casks were completed.
- In December 2013, the new regulation standard based on the lesson learned by Fukushima-Daiichi accident was enforced.
- RFS conducted the further assessments for earthquakes, tsunami, volcanos and tornado etc.
- RFS submitted the application for renewal of establishment permit to operate the RFSC in January 2014.
- RFS has been undertaking NRA review under new regulation standard.
- As preparation work for the start of operation, RFS carried out the training of the handling using mock-up cask .