ПРЕДПРИЯТИЕ ГОСКОРПОРАЦИИ «РОСАТОМ»

Experience of Cask Technology for SNF Management

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One of the key tasks of nuclear power development in Russia

ROSATOM

SNF and RAW management

- Accumulated problems
- One of the problems of dynamic nuclear power development

Solution:

- Federal target program «Nuclear and radiation safety for 2008 and for a period up to 2015»
- Creation of the infrastructure for the safe SNF implementation, including

- Commissioning of dual-purpose casks for SNF of the different types of the reactors
- Renewal of Cask Fleet for VVER SFAs Transportation to Centralized Storage Facilities

Dual-purpose metal - concrete casks

UKH-104 (TUK-104)

UKH-109 (TUK-109)

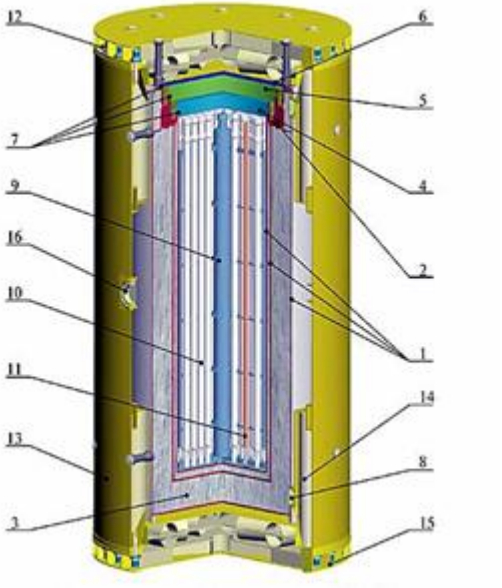
UKH-121

UKH-123 (TUK-123)

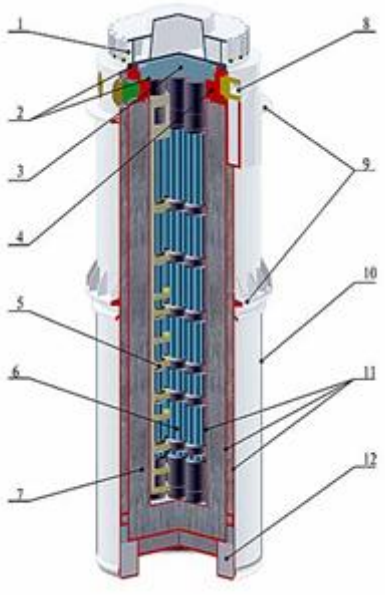
TUK-108/1

TUK-120

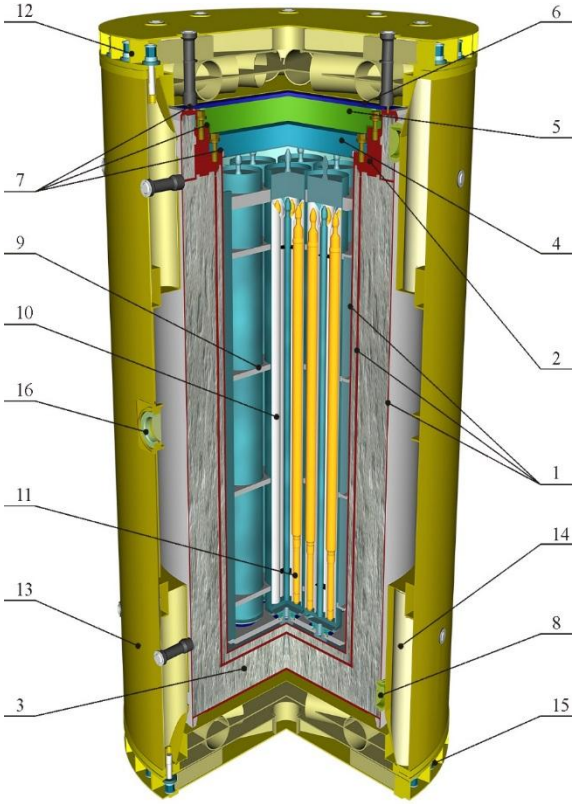
Structural peculiarities of metal-concrete casks



1-steel shells of the metal-concrete cask (MCC) body; 2-coaming; 3- heavyweight high-strength concrete; 4-inner lid; 5-outer lid; 6-sealing sheet; 7-pack-offs; 8-sockets for storage cask (UKH) lifting and manipulating; 9-spacer grid; 10-canisters for RBMK-1000 reactor SNF; 11-SNF; 12-upper lid of the energy absorption container (EAC); 13-EAC cylindrical sheath; 14-tubular elastoplastic elements; 15-EAC bottom; 16-sockets for TUK lifting and manipulating



1-outer lid; 2- pack-offs; 3-inner lid; 4-coaming; 5-spacer grid; 6-SNF canisters; 7- heavyweight high-strength concrete; 8- sockets for TUK lifting and manipulating; 10-guidance device; 11- steel shells of the metal-concrete cask body; 12-bottom damping assembly



Technical specifications of dual purpose TUK casks for transport and storage of SNF from various reactor types

TUK-108/1	Storage and transportation of SNF from naval decommisioning submarines on DalRAO, PA Mayak, Zvyozdochka and FAP Zvezda and other	Capacity: 7 canisters Weight with SNF: 40t. 108 casks are using for SNF storage and transportation
TUK-120	Storage and transportation of SNF from nuclear ice-breaker fleet	Capacity: 7 canisters Weight with SNF: 40T. 50 casks are using for SNF storage and transportation.
TUK-104 (UKH-104)	Storage and transportation of SNF from RBMK-1000 reactors, Leningrad NPP	Capacity: 114 bundles of spent fuel rods Weight of TUK with SNF: 120T. Weight of UKH (storage cask) with SNF: 95T. Experimental prototypes have been manufactured by JSC Izhora Plants.
TUK-109 (UKH-109)	Storage and transportation of SNF from RBMK-1000 reactors, Leningrad and Kursk NPPs	Capacity: 144 bundles of spent fuel rods Weight of TUK with SNF: 126T. Weight of UKH with SNF: 101T. Manufacturing works: 1) JSC Energotex 2) JSC Izhora Plants 3) JSC PA Sevmash. 200 casks are using for SNF storage and transportation
UKH-121	SRW storage at the Kursk and Leningrad NPPs	Capacity: Canister – version 1 (for spent fuel assembly suspensions/ brackets, 513 seats). UKH weight: 58.43T. Canister – version 2 (for filters, 15 seats). UKH weight 58.385T. Manufacturing works: JSC Energotex.
TUK-123 (UKH-123)	Transportation and storage of SNF from BN-350 reactor, Aktay, Kazakhstan	Capacity: 8 canisters TUK weight with SNF: 124.2T. Weight of UKH (storage cask) with SNF: 98T. 60 casks are using for SNF transportation from NPP and storage in Semipolatinsk, Kazakhstan

Infrastructure for TUK-108/1 and TUK-120 operation

Infrastructure for RBMK-1000 SNF cask handling

Cask Storage Facility for SNF of BN-350, Semipalatinsk, Kazakhstan

Program of Renewal of Cask Fleet for Spent Nuclear Fuel

POCATOM

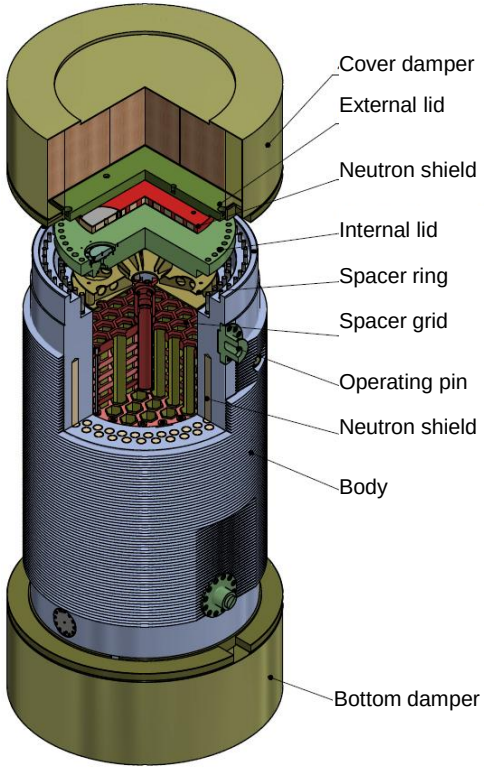
Modernization of existing Fleet Casks	Development of dual-purpose cask	Consideration of storage site	Experience of dry cask storage site
Development and manufacturing of new transport casks for VVER-1000 and VVER-440 SNF	Development and manufacturing of dual-purpose casks for VVER-1000 SNF	Development and building of storage cask site on MCC, Krasnoyarsk	Loading of SFA into dual-purpose cask on NPP, transportation and placing it on storage site on MCC,

TUK-140

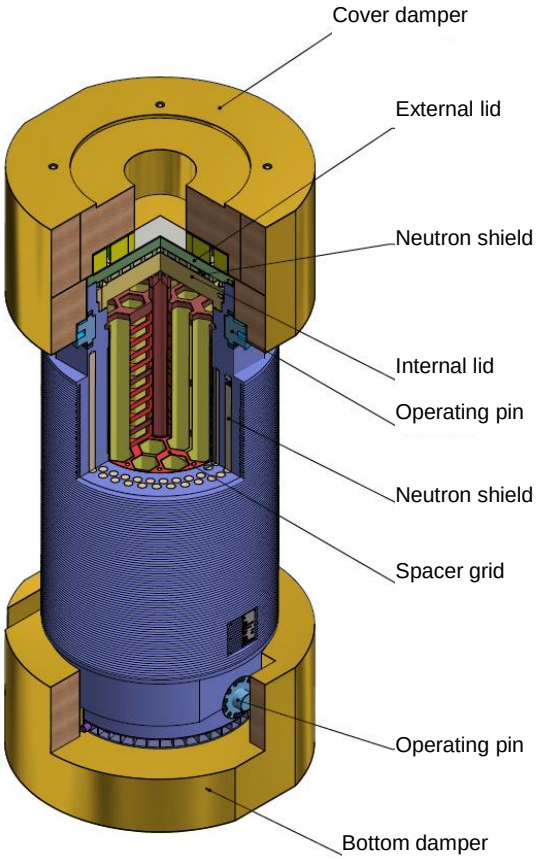
TUK-141

TUK-140 and TUK-141 casks

TUK-140

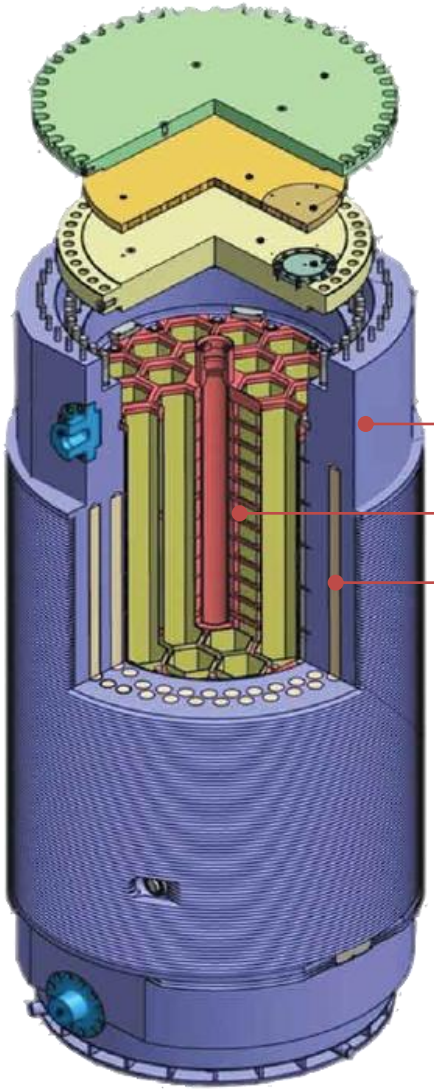


TUK-141



TUK-140 and TUK-141 are packages of B(U)F type for transportation of VVER SFA having higher enrichment by U-235 and burn-up

TUK-141 dual-purpose cask for higher burn-up fuel



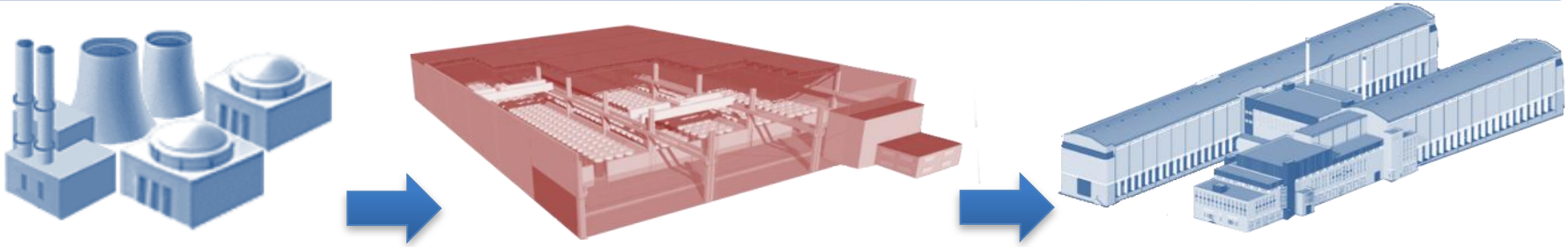
Body – high-strength cast iron with spheroidal graphite

Spacer greed– stainless and boron steel

Solid neutron shielding

SFA capacity, pcs.	**18**
TUK lifetime, years	**60**
SNF storage period, years	**60**
Full weight (with SFA) of TUK including dampers, t	**125**
Weight of empty TUK including dampers, t	**98**
Max height including dampers (without dampers), mm	**7120 (5860)**
Max diameter including dampers (without dampers), mm	**3120 (2770)**

Dry SNF cask storage concept



NPP

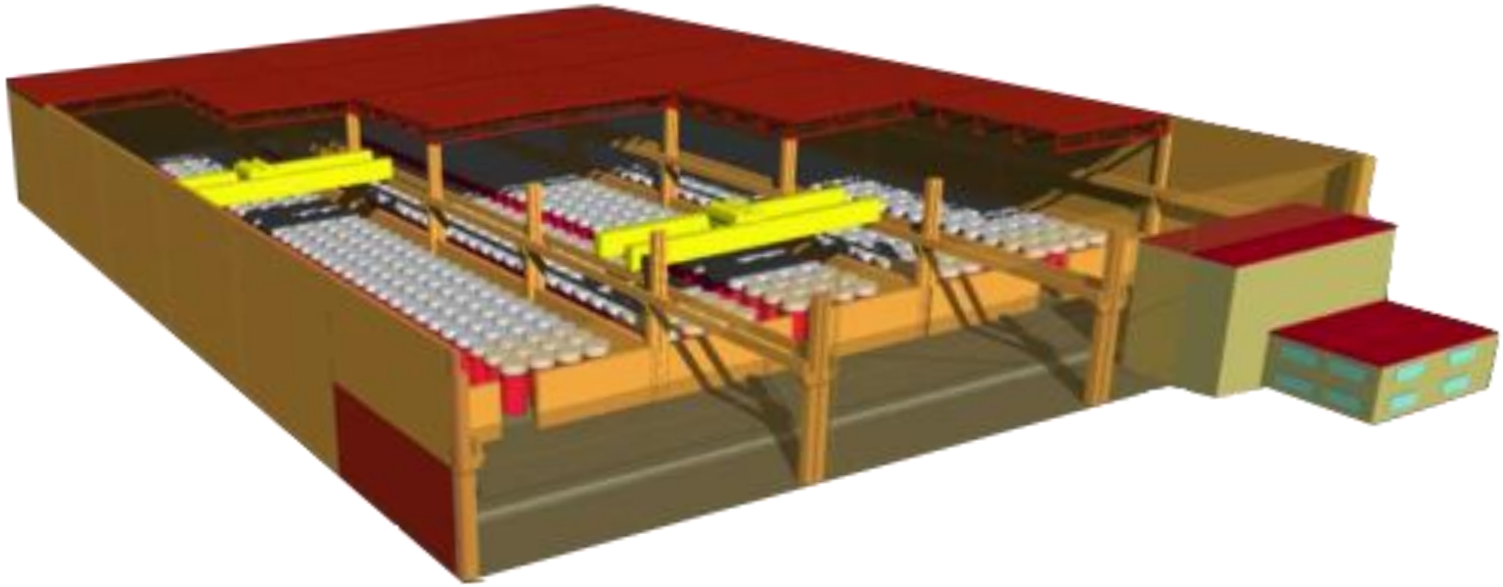
Dry cask storage facility

Reprocessing or disposal

Advantages of dry storage using dual-purpose casks

- Reduction of operation costs
- Modular design – possibility to expand the storage facility
- Independence of infrastructure facilities commissioning for reprocessing
- Enhanced storage safety
- Less number of SNF reloading operations (reactor cooling pool - cask)
- Mobility in decision-making on further SNF management strategy
- Technology unification

Objective



Commercial operation of dry cask storage facilities for VVER-1000+ SNF

Conclusion

The technology of dry long-term storage and transport of SNF in metal-concrete casks has become a commercial one.

Both the technology and equipment have been tested in SNF transport and process operations including container-type storage facilities at NPPs and other nuclear facilities and sites.

The dual purpose cask technology ensures reliable and safe SNF containment preventing any release into the environment.

Creating a new of dual-purpose casks for SNF from a new generation of VVER-1200 reactor is a true to life necessity. Commissioning of such dual – purpose TUK is planned by 2020.

ФЦЯРБ

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