

ПРЕДПРИЯТИЕ ГОСКОРПОРАЦИИ «РОСАТОМ»

# Development of the Container Fleet for SNF Transportation

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**Moscow**

**Key Activities Plan on SNF Management Programme for 2013-2015 approved by Mr S.V. Kirienko, Director General of Rosatom State Corporation, Ref. No. 1-1-1/48 dated 04.04.2013**

**Plan of Activities within the SNF Management System for Supply of SFA Casks in the Framework of the Long-Term SNF Management Contract between 2014 and 2018 approved by the Rosatom Director for the State Policy in the field of RW, SNF and Nuclear Decommissioning and endorsed by the Director General of OJSC FCNRS**

OJSC FCNRS

**Completed:** collection of updated information arranged with regard to the TUK-VVER-1000+ cask performance specifications and progress of design development;  
-Information on proposed TUK designs submitted for review to the operators, Rosatom State Corporation and OJSC Rosenergoatom Concern.

**Objective:** Supply TUK-VVER-1000+ casks and railway carriages for cask transport.

Operators  
(OJSC Rosenergoatom  
Concern,  
FSUE MCC)

**Completed:** analysis of the TUK-VVER-1000+ cask performance specifications compliance with nuclear facility/ site conditions.

**Objective:** Start using TUK-VVER-1000+ casks at nuclear facilities/ sites with minimal capital expense costs of upgrading the SNF transportation and handling processes.

## Organisations involved in the TUK-VVER-1000+ cask development in a proactive manner

JSC Leading Institute  
VNIPIET

TUK-138/18, TUK–138/12, steel, double-body, for 18/12 SFAs. Full weight incl./ excl. dumper: 133/120–120/112 T.

FSUE RFNC – VNIIEF

TUK-137T, steel, for 20 SFAs. Full weight incl./ excl. dumper: 123.5/120 T.

Academician Y.I. Zababakhin  
FSUE RFNC VNIITF

RT–5023, steel, for 18 SFAs. Full weight incl./ excl. dumper: 115/109 T.

JSC Izhorskiye Zavody

TUK–151, steel, for 18 SFAs. Full weight incl./ excl. dumper: 104 T.

JSC KBSM

TUK–146, high-strength cast iron, for 18 SFAs. Full weight incl./ excl. dumper: 150/130 T.

OJSC Engineering Centre of  
Nuclear Containers

TUK-141/TUK-141T, high-strength cast iron, for 18 SFAs. Full weight incl./ excl. dumper: 112/108 T.

A working group was established following Rosatom's Decision Ref. No. 1-1/195-R dated 25.06.2013 in order to determine the input requirements for a TUK cask to transport VVER-1000 SNF comprising:

Project Office for the SNF Management System  
Establishment, Rosatom State Corporation

OJSC Rosenergoatom Concern

OJSC FCNRS

FSUE MCC

FSUE PA Mayak

JSC NIAEP

JSC Atomenergoproekt

JSC SPbAEP

Rosatom State  
Corporation

**Completed:**

- Decision Ref. No. 1-1/195-R dated 25.06.2013 on establishment of the working group issued;
- input technical requirements for the TUK VVER-1000+ cask approved.

**Objective:**

- determine input technical requirements for the TUK VVER-1000+ cask ;
- analyse preparedness for starting use at nuclear facilities/ sites of TUK VVER-1000+ cask designs developed in a proactive manner.

OJSC FCNRS

**Completed:**

- findings from consideration of economic assessment of TUK VVER-1000+ designs summarized;
- draft input technical requirements for the TUK VVER-1000+ cask developed.

**Objective:** supply TUK VVER-1000+ cask .

Operators  
(OJSC Rosenergoatom  
Concern,  
FSUE MCC)

**Completed:** analysis of the TUK-VVER-1000+ cask performance specifications compliance with nuclear facility/ site conditions.

**Цель:** start using at nuclear facilities/ sites of TUK-VVER-1000+ casks compliant with input technical requirements endorsed by Rosatom.

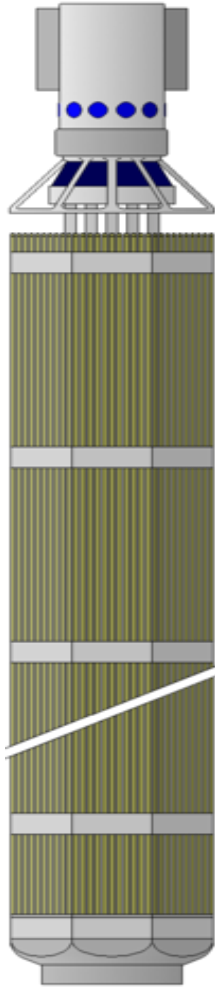
# Findings from consideration of TUK designs by the operators and working group

<b>TUK Cask Weight</b>	<p>Nominal capacity of overhead cranes in the separate SNF storage facility of certain reactor units <b>is reduced to 120 T</b> or might be so reduced in the years to come. Therefore, a bigger TUK weight is not desirable (TUK-137, TUK-138 options with a weight of 123.5 and 130 T correspondingly) while an 150-tonne TUK-146 is unacceptable.</p>
<b>up to 120 T</b>	<p><b>The weight of three out of six</b> TUK casks exceeds <b>120 tonnes</b>. A TUK operational safety case should be produced including consideration of design emergencies and emergencies associated with a TUK downfall into a cooling pond (a 120-tonne TUK downfall in the cooling pond is a beyond-design emergency).</p>
	<p>An analysis of higher TUK weight impact on the cooling pond (CP) bearing structures and standard equipment for TUK handling and process operations is required (polar crane, multipurpose seat, lifting beam).</p>
	<p>A new dumping platform will have to be developed for a TUK cask with a bigger weight since the existing one can only stand a downfall of a TUK cask whose weight does not exceed 120T.</p>

# Findings from consideration of TUK designs by the operators and working group

<b>Dimensions</b>	<p>Dimensions are suggested to be identical to the ones of TUK-13V and TUK-13/1V casks currently used: 6m height, 2.3m diameter.</p>
<p>Height: up to 6m, diameter: less than 2.48m</p>	<p>TUK-138, TUK-141 and TUK-146 with body heights ranging from 6.8 to 7.2m are unacceptable since the NPP lifting system cannot transfer the TUK cask for loading to the central hall of the reactor compartment due to insufficient clearance height.</p> <p>TUK-137, TUK-138/18, TUK-146 and RT5023 with a body diameter over 2.48m (CP multipurpose seat diameter) are unacceptable since it is impossible to place them for loading into the NPP CP multipurpose seat.</p>
<p><b>Burn-up</b> at least 68</p>	<p>The spent fuel burn-up should be at least 68 GW*day/Ut (allowed burn-up for new fuel types). <b>Two out of six</b> TUK casks have a burn-up of 60 and 65 GW*day/Ut;</p>
<p><b>Cooling period</b></p>	<p><b>Five</b> of the casks proposed require SNF to be cooled in the CP for at least 5, 7 and 9 years prior to loading.</p>
<p><b>Decontamination and corrosive resistance</b></p>	<p>The most resistant coatings are stainless steel ones of TUK-146 and TUK-137T, as well as a gas-thermal coating of TUK-151.</p> <p>Paint-and-lacquer coatings of other TUK cask bodies will require additional costs for resurfacing during a long operation period.</p>



TUK-13V		TUK-141 O
Total package weight : 113 T.		The total package weight during transport and handling processes at NPP and FSUE MCC is 110T
TUK height: 6035 mm.		The maximum height of TUK during transport and handling processes at NPP and FSUE MCC is 5600 mm.
TUK diameter, including trunnions: 2430 mm.		The TUK diameter during transport and handling processes at NPP and FSUE MCC is 2430 mm.
		The TUK diameter including shipping dampers is 2770 mm.
Capacity – 12 SFAs.		Capacity: 18 SFAs.
Heat removal : 1.67 kW per an SFA.		Heat removal: at least 2 kW per an SFA
Initial enrichment : 4.4 %wt		Initial enrichment : at least 4.95 %wt
Burn-up : 50 GW*day/Ut.		Burn-up : at least 68 GW*day/Ut.
Neutron shielding : liquid		Neutron shielding : solid

The TUK supplier has been selected following tender procedures and the contract for supply of a TUK-1410 commercial prototype is to be signed during VI International Forum Atomexpo 2014.



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# Thank you!

OJSC Federal Centre for Nuclear and Radiation Safety  
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