



IX International Forum ATOMEXPO 2017

20 June 2017

STATE ATOMIC ENERGY CORPORATION «ROSATOM»

## New energy platform: nuclear power engineering on fast neutrons and closed fuel cycle - environmental aspect

**Round-table: «Environmental safety of the nuclear industry: strategy, regulation, and technologies»**

**Alexakhin R.M. – Chief Ecologist of the Proryv Project**

**Spirin E.V. – Head of the Department Chief Ecologist of the Proryv Project**

**Solomatin V.M. – Principal Specialist of the Department Chief Ecologist of the Proryv Project**

Innovation and technology center for the «PRORYV»

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**The importance of environmental issues in the system of factors determining the development of nuclear power (economic, political, social, demographic, etc.)**

**Ranking these factors according to importance**

**Radioecological aspects of the protection of the environment is a decisive condition for the successful development of nuclear energy**

**The share of nuclear energy in the energy balance of the Russian Federation in 2016 – 18,3 %, the preservation of this indicator in the coming years**

**Structure of nuclear energy of the Russian Federation today and trends to 2050 and to the end of the century. A two-component model – energy in thermal and fast reactors (the ratio of TR:FR)**

**Implementation of the Federal target program «Nuclear power technologies of new generation for the period 2010-2015 and on prospect till 2020»**

**The program provides for the development of nuclear energy technologies on the basis of closed nuclear fuel cycle using fast reactors**

## I Radioactive waste

- Limiting the amount of SNF and RW
- The formation of the RW with a more "friendly composition of radionuclides in relation to the natural environment" before the burial
- Transmutation. The problem transuranic radionuclides

## **II Heavy radiation accidents**

The exclusion of the possibility of severe accidents with release of radionuclides into the environment

## **III Fuel reserves**

- The possibility of disposing spent fuel and radioactive waste from the accumulated reserves and current production of thermal reactors;
- Depleted uranium
- The solution to the problem of providing resources for nuclear power (the use of  $^{238}\text{U}$  and thorium cycle)

## **IV The impact on the environment**

Station type of radioactive waste compared with the centralized

## **V Climate – greenhouse effect**

The limitation or exclusion of greenhouse gas emissions, leading to adverse climate changes

## **VI Radioecological principles of equivalence**

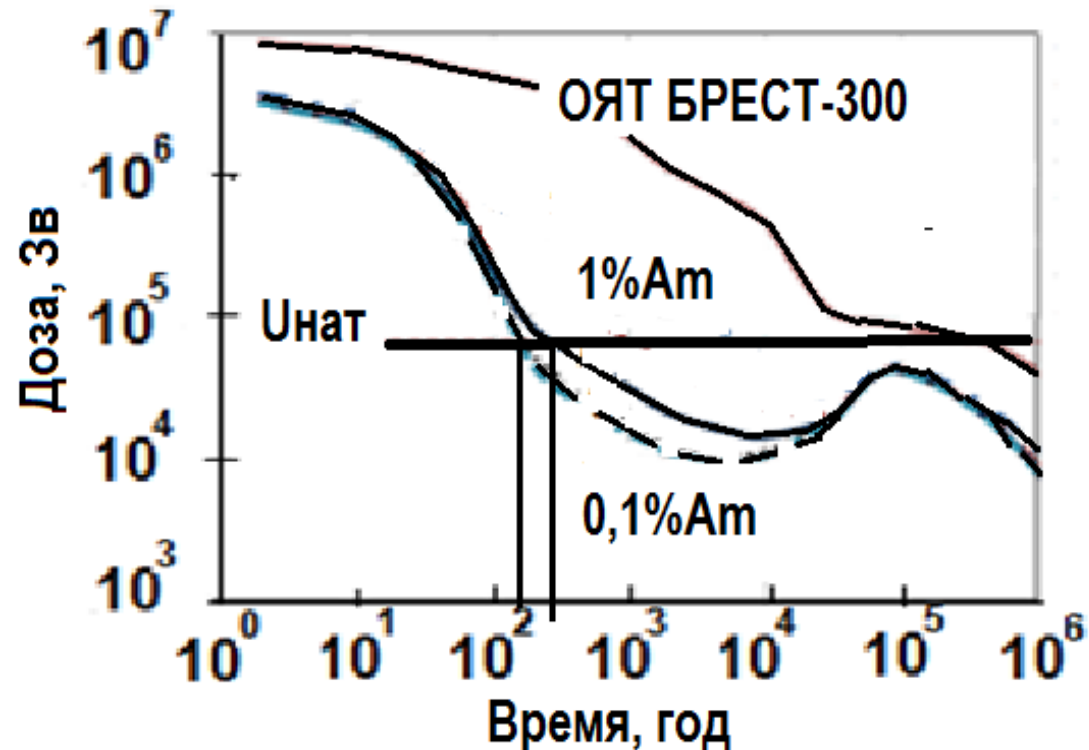
Dose people (and biota) from the extracted uranium ore body (fuel – uranium and its decay products) is equal to the doses to human beings (the biota) to the place of burial of long-lived radwaste resulting equivalent uranium is withdrawn from the body (fuel)



# Reducing the potential biohazard RW

A radical solution to the problem of SNF and RW:

- Recycle of FM;
- Reducing the amount of radioactive waste (transmutation).



**The allocation of 99% Am from SNF FR is optimal for the observance of the principle of radiological equivalence of radioactive waste and natural uranium after the breakup of  $^{137}\text{Cs}$  and  $^{90}\text{Sr}$  discharge from the SNF 99% Tc**

**The construction of the Siberian Chemical Combine  
PDEC – "Pilot Demonstration Energy Complex " (the  
reactor facility "BREST-OD-300“, fuel re-processing  
module and the fuel fabrication/re-fabrication module)**

# Specific features of CNFC facilities in the project “Proryv” to ensure environmental safety



Heat carrier medium -  
lead

(absence of high pressure  
in a safety rod)

Nitride fuel

(generation of C-14)

On-site fuel cycle  
(SNF recycling on-site)

**THANK YOU FOR  
ATTENTION!**