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**Rosatom starts reactor tests in order to increase nuclear fuel enrichment**

*Implementation of the new solution would enable to significantly boost the efficiency of nuclear power*

Russian scientists, for the first time, started reactor testing of nuclear fuel for VVER reactors with its matrix containing neutron absorber erbium and uranium-235 enrichment of about 5 %. The irradiation is taking place at the MIR.M1 research reactor at the Dimitrovgrad Research Institute of Nuclear Reactors (a facility of the Scientific Division of Rosatom).

At present, the main fleet of nuclear commercial reactors worldwide operates is running on nuclear fuel with uranium-235 enrichment of less than 5% (mainly in the range of 3-4.95 %), which meets international standards for high capacity reactors fuel (except for fast reactors, small-scale NPPs and research reactors).

This is the first step in the project of the gradual validation of nuclear fuel with enrichment above 5 %. The introduction of such fuel has a significant potential for increasing the economic efficiency of nuclear power and improving the competitiveness of NPPs compared to other energy sources. According to Rosatom engineers estimates, it will enable to extend the reactor fuel campaign from the current 12-18 months to 24 months, i.e. power units will be stopped less often to replace irradiated fuel bundles with fresh one and produce more electricity annually. Additional economic impact could be also be obtained by reducing the number of fresh fuel bundles in a reload batch.

The research program in the MIR.M1 reactor is designed for four one-year-long irradiation cycles. For this purpose, the Elemash Machine-Building Plant in Elektrostal (an enterprise of TVEL Fuel Company of Rosatom) manufacture an experimental assembly consisting of 12 VVER-1000 size fuel elements with uranium-erbium matrix. This is the first time that VVER fuel with uranium-erbium matrix has been loaded into any reactor. According to the estimates, erbium is better suited as a neutron absorber for operation of fuel with enrichment above 5 % in fuel cycles longer than 18 months in comparison with gadolinium, which is used a regular absorber for VVER reactors (the absorber is added to nuclear fuel to compensate for reactivity in the reactor core). For the manufacturing such experimental fuel, the plant used its long-time expertise in fabrication of uranium-erbium fuel for RBMK type reactors.

The results of the research will contribute to development of a technology for batch production of uranium-erbium fuel for VVER reactors, as well as validation of such fuel introduction at NPPs of Russian design.

“Increasing uranium enrichment to 6%, and in the long term to 7-8 %, is a global trend and a task that the industry leaders are working on. So far, reactor efficiency has been improved by introducing new designs and modifications of fuel assemblies. Basically, most of these innovations have been aimed at increasing physical volume of enriched uranium a fuel element and ultimately produce more energy from a single fuel bundle. The industry has now reached a fork in the road where further enhancing of NPPs performance probably requires crossing the 5 % enrichment threshold for high-capacity thermal reactors. Considering that there are 163 fuel assemblies in the core of the modern VVER reactors, and each of them contains more than 500 kg of uranium, the impact from increasing enrichment by just 1 % will already be very significant,” said Alexander Ugryumov, Vice President for Research and Development at TVEL Fuel Company of Rosatom.

TVEL Fuel Company of Rosatom (Nuclear Fuel Division of Rosatom) includes enterprises for fabrication of nuclear fuel, uranium conversion and enrichment, production of gas centrifuges, as well as research and development organizations. As the sole supplier of nuclear fuel for Russian NPPs, TVEL provides fuel for more than 70 power reactors in 15 countries, research reactors in nine countries and propulsion reactors of the Russian nuclear fleet. Every sixth power reactor in the world is fueled by TVEL. Rosatom’s Fuel Division is the world’s largest producer of enriched uranium, as well as the leader of the global stable isotope market. <http://www.tvel.ru>