

Inventory Prediction and BUC Calculations Related to MEU/LEU IRT Fuels of LVR-15 Research Facility

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The LVR-15 is one of the main research facilities of NRI at Rez, Czech Republic. As one of the older pool LWR research reactors of the Russian origin situated in many countries over the world, the LVR-15 used IRT-2M HEU fuel enriched to 80 wt. % ^{235}U until recently. It was subsequently replaced by IRT-2M fuel of 36 wt. % ^{235}U (MEU) and finally by the IRT-4M fuel of 19.75 wt.% ^{235}U (LEU) being implemented at present under the Reduced Enrichment for Research and Test Reactors (RERTR) Programme. The spent fuels are stored in the inner area of NRI - in pool at the reactor and then in the interim storage. In the course of the LVR-15 operation in NRI the original reactor was upgraded to give thermal power up to 15 MW and fuel is used up to quite a high burnup of about 60% of the ^{235}U initial amount. In the framework of the International RRRFR Project (Russian Research Reactor Fuel Return) Project of US DOE/GTRI (National Nuclear Security Administration's Global Threat Reduction Initiative) the spent fuel of the highest initial enrichment and most of fuel of the middle initial enrichment were transferred to the Mayak reprocessing plant (Russian Federation) in 2007. The rest of MEU spent fuel is being stored in NRI.

To try to optimize the storage capacity and assess burnup credit of the LVR-15 storage facilities the fuels were modeled for calculations by TRITON and KENO (SCALE 5.1). Models and results of preliminary calculations are performed and presented. The new tools for the depletion and criticality safety calculations should also support the LVR-15 operational calculations currently based on 1D depletion model (WIMSD4 code modified for IRT geometry by ANL under the RERTR program) and diffusion flux calculations (NODER, four-group 3D diffusion code) in connection with the requested fast and effective conversion to LEU cores.