

Determination of VVER-440/ V-213 Long-Term Operation Induced Activity

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Abstract. The aim of this work was to create a complex three-dimensional model of the VVER-400 / V-213 reactor, i.e., V-2 NPP, and the surrounding area using the MCNP code to perform a calculation of the induced activity of structural components with respect to the planned 60-year period of operation. The survey of operational history defined a reference campaign on the basis of which a neutron source term was developed, which took into account parameters such as height distribution of fuel and control assembly burnup, change in fuel density depending on burnup, moderator temperature distribution and moderator density change from temperature, boric acid concentration in the moderator and position of the 6th group of control assemblies. A model of the V2 NPP reactor was created at the core level. The calculation of the induced activity was performed using the code MCNP5 with effective cross-sectional library ENDF / B-VII.1. In addition to the methods and model used in this analysis, the paper also summarizes the results that can be generally applied to the mentioned types of nuclear power plants. At the time of shutdown, the total activity of the steel components reached the level of $7.14E + 09$ Bq / g. Reactor biological shielding concrete reached the level of $1E + 07$ Bq / g.