

ADVANCED STUDIES OF IRRADIATED VVER STEELS DEGRADATION

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VVER 2022-30

ABSTRACT

Long-term operation of VVER-440 is connected to deep safety analyses of crucial construction materials and components. In this case we present results from deep positron annihilation studies of VVER reactor pressure vessels steels. In comparison to surveillance specimen programs, some specimens were prepared using the light ion implantation at the accelerator. Via this treatment we simulated long-term operating conditions and achieved relatively simple handling without special measures connected to radiation shielding. As the most suitable, the 500 keV H⁺⁺ ions were used. Positron lifetime measurements using conventional ²²Na source confirmed production of new radiation-induced monovacancies. All our results confirmed assumption that the neutron embrittlement will not be limiting factor in case of 15Kh2MFA steels in considering 60+ operating lifetime.

Keywords: VVER-440, reactor pressure vessel steel, long term operation, neutron embrittlement