



Methodology of corrosion loss of manifolds and equipment for boiling water reactor under life extension

Evgeny YURMANOV¹

¹ *NIKIET, Russia*

Abstract

In order to substantiate the extension of the service life of high-power channel-type boiling water reactor beyond the design service life, in the framework of in-depth safety assessment, calculations of the expected thinning due to general corrosion of equipment and pipelines of safety important systems were performed. In this work, a methodological approach has been developed to determine the value of corrosion thinning of pipelines of the main circulation loop and the cooling loop of the reactor control and protection system. To determine the kinetic dependence of general corrosion rate of the structural steels used, an analysis of the literature and experimental data was carried out, including the results of tests of corrosion-test specimens. When estimation performed, the periods of start-up, the shut-down, transient states during the operation of the power unit, as well as the thinning of constructive elements due to decontamination were taken into account. The completed operation period for considered power unit is characterized by the absence of strong deviation of water chemistry with a dangerous increase in the corrosive ability of water coolant and elimination of use of high-aggressive decontamination solutions for the main circulation loop cleaning. The quality indicators of coolant for main circulation loop and the water of reactor control and protection system were significantly lower than the allowed values due to reducing the corrosive ability of the coolant and decontamination solutions as the sequence of improvements in water chemistry and chemical technologies. Based on the conservative estimates of the expected corrosion thinning the values of calculated general corrosion gains for extended service period have been determined.

Key words: service life extension, corrosion