

METHODS FOR ASSESSING AND JUSTIFYING THE REPLACEMENT OF MATERIALS FOR EXISTING AND NEWLY CONSTRUCTED STEAM GENERATING UNITS

Yefimov O.V., Kavertsev V.L., Zhydetskyi A.I., Sidorkin I.D.

National Technical University «Kharkiv Polytechnic Institute», Kharkiv

An important role in ensuring the operability of BBEP reactor plants (water-water-power reactors) is played by the correct choice of structural materials not only for the reactor core, but also for various purposes of main and auxiliary pipelines.

Particular attention should be paid to the formation of corrosion products due to the use of relatively inexpensive pearlite steel grades in steam-water paths. When deciding on the use of pearlite steels, it is necessary to take into account their corrosion resistance and increased contamination of the water coolant with corrosion products, equipment destruction due to local corrosion or embrittlement during flooding. In addition, pearlite steels are less protected from the effects of hydrogen (H) and OH free radicals, which are formed as a result of radiolysis.

As corrosion products transfer to the coolant, corrosion products are deposited on the fuel rods, heat exchangers, and steam generators, which in turn reduces the plant's capacity and worsens the radiation background in the circuit.

Up to 50% of the total corroded metal goes into water, and about 50% remains on the steel surface in the form of an oxide film, which is essentially protective. With an increase in the velocity of the medium and oxygen concentration, as well as a decrease in pH, the proportion of corrosion products that pass into water increases. Naturally, deaeration and an increase in pH reduce the yield of corrosion products. All of this means that more stringent requirements for the quality of the coolant must be met when using pearlite steel elements in the path.

To improve the safety and reliability of existing NPS circuits, as well as in the construction of new ones, these features should be taken into account. We also analyze the current situation at currently operating NPS in Ukraine. The results of studies of service life are presented, as well as the possibilities of improving the characteristics of structures. The possibilities of modernization of individual elements of the steam and water path, which can be replaced during the overhaul, are presented.

References:

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