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Modeling of water leak into sodium in the BN-600 steam generator

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The report presents the results of comparing the calculated data and readings of devices for monitoring water leakage into sodium, observed during a real leak in the BN-600 steam generator.
BN-600 implemented a section-modular scheme of a sodium-water steam generator. The damage of the heat exchange surface of the BN-600 steam generator occurred mainly in the initial period of plant operation (1980-1985).
The calculations were performed using two codes designed to analyze the efficiency of the steam generator protection system in case of "small" leaks and the secondary circuit protection system against overpressure in "intermediate" and "large" leaks. The use of two calculation codes made it possible to simulate the operation of the BN-600 steam generator protection system in case of a water leak in the steam generator, taking into account its leak evolution from "small" to "large".
The SLEAK code was used to calculate the readings of the control devices for "small"leaks in the BN-600 steam generator: IVA-1 –control of hydrogen in sodium, mounted at the outlet of each steam generator section; KAV-7 –control of hydrogen in gas, mounted on the expansion tank; ITI and ISHIT are systems detecting gas phase appearance in the sodium flowing through the SG relief pipelines and the sodium sampler line to IVA-1.
Readings of the BN-600 "large"leak monitoring devices were obtained by the LLEAK-3C code such as: the pressure sensor in the expansion tank and magnetic flow meters mounted at the outlet of the steam generator sections.

Country/Int. organization

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