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Sizing of Drying Processes to Optimize Conservation of the Nuclear Power Plants on Stationary

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Abstract : The life of a nuclear power plant is regularly punctuated by short or long period outages to carry out maintenance operations and/or nuclear fuel reloading. During these stops periods, it is essential to conserve all the secondary circuit equipment to avoid corrosion priming. This kind of circuit is one of the main components of a nuclear reactor. Indeed, the conservation materials on shutdown of a nuclear unit improve circuit performance and reduce the maintenance cost considerably. This study is a part of the optimization of the dry preservation of equipment from the water station of the nuclear reactor. The main objective is to provide tools to guide Electricity Production Nuclear Centre (EPNC) in order to achieve the criteria required by the chemical specifications of conservation materials. A theoretical model of drying exchangers of water station is developed by the software Engineering Equation Solver (EES). It used to size requirements and air quality needed for dry conservation of equipment. This model is based on heat transfer and mass transfer governing the drying operation. A parametric study is conducted to know the influence of aerothermal factor taking part in the drying operation. The results show that the success of dry conservation of equipment of the secondary circuit of nuclear reactor depends strongly on the draining, the quality of drying air and the flow of air injecting in the secondary circuit. Finally, theoretical case study performed on EES highlights the importance of mastering the entire system to balance the air system to provide each exchanger optimum flow depending on its characteristics. From these results, recommendations to nuclear power plants can be formulated to optimize drying practices and achieve good performance in the conservation of material from the water at the stop position.

Keywords : dry conservation, optimization, sizing, water station
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