

Suthipong Boonmak 2007: An Analysis of Heat Transfer in Nuclear Reactor Pool
A Case Study for Research Reactor at Office of Atoms for Peace. Master of Engineering
(Safety Engineering), Major Field: Safety Engineering, Interdisciplinary Graduate Program.
Thesis Advisor: Associate Professor Prakob Surawattanawan, Ph.D. 85 pages.

The purpose of this thesis is to study the heat transfer characteristic in Nuclear Reactor Pool. Both force and natural convection are utilized in the system. The components are water pumps, plate heat exchanger, shell and tube heat exchanger, and cooling towers. Analysis shows that the primary cooling system is able to receive 1.25-MW heat power while the secondary one is able to transfer 2.11-MW heat power. The main parameters having influences on the system performance are the flow rate of cooling water and the temperature difference between inlet and outlet flow.

Simulation result obtained from Computational Fluid Dynamics (CFD) programs shows that the 1,000-GPM volume flow rate in primary cooling system and the 1,600-GPM volume flow rate in secondary cooling system are sufficient to remove heat from reactor pool to surrounding. The minimum of water flow rate in primary cooling system which allows the water temperature in the reactor pool reaches 40 deg C was found to be 700 GPM. The influences of inlet flow position can be investigated by CFD program. It was found that the adjustment of the inlet flow position is able to enhance the performance of heat transfer rate and safety of reactor pool.

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