

Optimization of dry storage for spent fuel from g.a. siwabessy nuclear research reactor

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Abstrak

This study proposes a method of optimizing the dry storage design for nuclear-spent fuel from the G.A. Siwabessy research reactor at National Nuclear Energy Agency of Indonesia (BATAN). After several years in a spent fuel pool storage (wet storage), nuclear spent fuel is often moved to dry storage. Some advantages of dry storage compared with wet storage are that there is no generation of liquid waste, no need for a complex and expensive purification system, less corrosion concerns and that dry storage is easier to transport if in the future the storage needs to be sent to the another repository or to the final disposal. In both wet and dry storage, the decay heat of spent fuel must be cooled to a safe temperature to prevent cracking of the spent fuel cladding from where hazardous radioactive nuclides could be released and harm humans and the environment. Three optimization scenarios including the thermal safety single-objective, the economic single-objective and the multi-objective optimizations are obtained. The optimum values of temperature and cost for three optimization scenarios are 317.8K (44.7°C) and 11638.1 US\$ for the optimized single-objective thermal safety method, 337.1K (64.0°C) and 6345.2 US\$ for the optimized single-objective cost method and 325.1K (52.0°C) and 8037.4 US\$ for the optimized multi-objective method, respectively.