

Safety and sustainability considerations in the operation management of spent nuclear fuel interim storage facilities in Indonesia.

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Abstract

Indonesia has stored spent nuclear fuels (SNFs) from operational of G. A. Siwabessy Multipurpose Reactor (GAS-MPR) in the interim storage for spent fuel (ISSF). SNFs, as high-level radioactive waste, are stored in a pool of water that requires structures, systems, and components (SSC) according to the safety requirements of non-reactor nuclear installations. ISSF operations are inevitable from generating radioactive waste, and sustainable solutions for radioactive waste management are necessary to achieve sustainable development goals. This paper presents operating experience in safe management of the radioactive waste and the efforts towards sustainability at the ISSF operation by ensuring safety of the SSC, the worker, and the public; minimizing the formation of the radioactive waste; and monitoring effluent into the environment. The method used is performed by identification of the systems or processes at the ISSF focused on process that generate radioactive waste followed by an evaluation of the safety performance of these systems. Major considerations in it are protection of workers, people and the environment, minimization of waste, and safety of the facility. The results of this study summarize the efforts that have been made such as minimization of contamination, application of risk-informed approach, minimization of leaks and spills, detection of leakage, avoidance of the release of contamination, periodic review of operational practices, provision for early detection of leakage and contaminant migration. This study also proposes several points of change in the limits of system operating conditions after evaluation to optimize sustainability and safety. The results also show that the radioactive waste from spent fuel storage pool operations can be minimized after further safety evaluation such as performance of the purification system, etc. Furthermore, the radioactive waste that can be minimized includes radioactive waste in the form of spent resin purification systems, filter waste used for purification and cooling systems, liquid radioactive waste, HEPA filter, and doubtful effluent. Low and intermediate levels of radioactive waste from ISSF operations will be sent to the radioactive waste installation (RWI) located on the same site and managed by the same agency. This paper also presents the optimization of safe and efficient management and minimization of radioactive waste throughout the entire life cycle, from cradle to grave.

Keywords: radioactive waste, safety and sustainability, safety evaluation, spent nuclear fuel storage, waste minimization.