Comparison of Arising Radioactive Wastes among Decommissioning Scenarios for a Small Research Reactor

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The radioactive inventory of TRIGA reactor (100 kW) was calculated to estimate the amount of radioactive waste production. Then potential decommissioning scenarios was studied from the radioactive waste management point of view.

Keywords: *research reactor, decommissioning scenario, radioactive waste*

1. Introduction

In the near future, Indonesia will face the challenge in decommissioning research reactors while the final disposal site of the radioactive waste and the decommissioning budget are not available yet. The objective of the present study is to develop the possible scenario for the decommissioning and radioactive waste management under such circumstances.

2. Study on Decommissioning Scenario and Radioactive Inventory

The end-state and strategy on managing the decommissioning wastes is a critical point on the success of decommissioning project. The end-state of the project as already stated by the licensee (BATAN – National Atomic Energy Agency) in the document[(1)] is to re-use the building for other nuclear project in the future. There are two scenarios; immediate dismantling and differed dismantling, which are analyzed considering the amount of the radioactive wastes and their category, and availability/capability of the radioactive waste storage. The radioactive inventory was estimated by calculating neutron activation of the core components using the data in the document.

3. Results and Discussion

The radioactive waste volume from the reactor structure some years after the shutdown of the reactor is shown in the table. The characterization of the reactor structure shows that all of the Relatively Low Level Waste (RLLW) are from the activated core components while most of the Very Low Level Waste (VLLW) are from the activated biological shielding (Barite Concrete). By introducing the clearance level for Ba-133, which is the predominant radionuclide in the biological shielding, as 1 Bq/g adopted [(2)] (no clearance level assigned for Ba-133 in Indonesia), there is a possibility to free-release the biological shielding 40 years after the shutdown. The table shows that 10 years after the shutdown of the reactor all of the RLLW will be categorized into VLLW. While 40 years after the shutdown the amount of the VLLW will decrease since the biological shielding waste will be in the clearance.

Table: Volume of Radioactive Waste (Unit: m^3)

Type of Wastes		Years after Shutdown		
		0	10	40
RLLW		0.0244	-	-
VLLW	Biological Shielding	222	222	-
	Others	1.11	0.911	0.719
Clearance		5.55	5.78	228

4. Conclusion and Next Study

The study showed that differed dismantling for 40 years after the shutdown has advantage from the radioactive waste management point of view. The next step of the study is to develop the scenarios by collecting more data and calculating. The scenarios will be then analyzed considering the other attributes especially stakeholder's concern.

References

[1] PSTA-BATAN, Program Dekomisioning Reaktor KARTINI PTAPB-BATAN, 2013.
[2] Meyer et.all, IAEA-TECDOC-1602, IAEA, 2006.