AUTHORIZATION OF RADIOACTIVE WASTE MANAGEMENT FACILITY IN SUPPORTING THE MANAGEMENT OF RADIOACTIVE SOURCES WASTE

E. YULIATI
Indonesia Nuclear Energy Regulatory Agency (BAPETEN)
Jakarta, Indonesia
E-mail: y.evin@bapeten.go.id

A.S. HERMAWAN
Indonesia Nuclear Energy Regulatory Agency (BAPETEN)
Jakarta, Indonesia

Abstract

Radioactive waste management faces challenges in Indonesia. Despite various uses of radioactive sources all over the country, Indonesia only has one radioactive waste management facility. Especially on the use of radioactive sources, there are wide use of these sources for medic and industry. Radioactive sources for medical purposes are usually used for radiotherapy in mostly major city hospitals. In industry, radioactive sources are used for non-destructive testing and gauging. Disused radioactive sources from medic and industry are collected and sent to waste management centre. Nevertheless, problem arise lately as the bankruptcies hit some industries owning some radioactive sources, such as paper industries. Therefore, those sources are orphan sources that threaten safety and security. It is estimated many sources left in industrial area needs to be collected and sent to waste management centre. This is one of many challenges in radioactive waste management. BAPETEN as regulatory body is involved to solve those challenges. For the waste management facility, it should prepare to accept those orphan sources to be managed properly. In the near future, the facility has a plan to improve the effectivity of source management by developing category 1 and 2 sources dismantling hot cell. As the license of facility has not covered this improvement, it will need adjustment. Government Regulation No. 29 Year 2008 on the Licensing of Ionizing Radiation Source and Nuclear Material regulates waste management facility to have license starting from siting stage, construction, commissioning, operation, until its closure. The revision of operational license will also follow regulation on this government regulation.

1. INTRODUCTION

Radioactive waste management faces challenges in Indonesia. Despite various uses of radioactive sources all over the country, Indonesia only has one radioactive waste management facility. Especially on the use of radioactive sources, there are wide use of these sources for medic and industry. There are more than 7000 radioactive sources utilized by 584 companies that dominated by those in industrial area. Utilization of sources in this area covers the utilization for industrial radiography, gauging, well logging, and irradiator. Sources for medical purposes are used in 18 hospitals mostly operated in big cities in Indonesia. These sources are used for radiotherapy activities.

One of challenges relating to the increasing number of orphan source due to bankruptcy of industries. As Covid-19 pandemic increase the use of online culture in many aspects of life, paper industry as radioactive user was one which suffers. At least, there are 66 gauging sources left without proper supervision in some paper industries. BAPETEN as regulatory body has taken actions to help solving this problem.

Other challenge is about radioactive waste coming from nuclear facilities, depleted uranium waste from radiography camera, and potential waste coming from nuclear facility development plan and from nuclear facility decommissioning plan. Those waste and potential waste will finally burden RWMC capacity. Moreover, there are also challenge in transport of radioactive waste such as the lack of transport container and certification of container as well as certification of transport vehicle.

It is Government Regulation No. 61 Year 2013 on Radioactive Waste Management (GR 61/2013) that regulates the practice of radioactive waste management in Indonesia that covers collecting, classifying, treatment, transporting, storage, and final disposal. GR 61/2013 is also designating Radioactive Waste Management Centre in Serpong as the only facility to manage radioactive waste in Indonesia. As challenges arises, this radioactive waste management centre needs to be upgraded.

In relation to licensing, Government Regulation No. 29 Year 2008 on The Licensing of Ionizing Radiation Source and Nuclear Material (GR 29/2008) is one that requires RWMC to have licences from siting phase, construction, operation, until its closure.

2. REGULATIONS

As previously mentioned that radioactive waste management is regulated by GR 61/2013. At least, there are four principles in radioactive waste management mentioned in GR 61/2013. Firstly, it is about the categorization of waste as can be seen on the picture below.

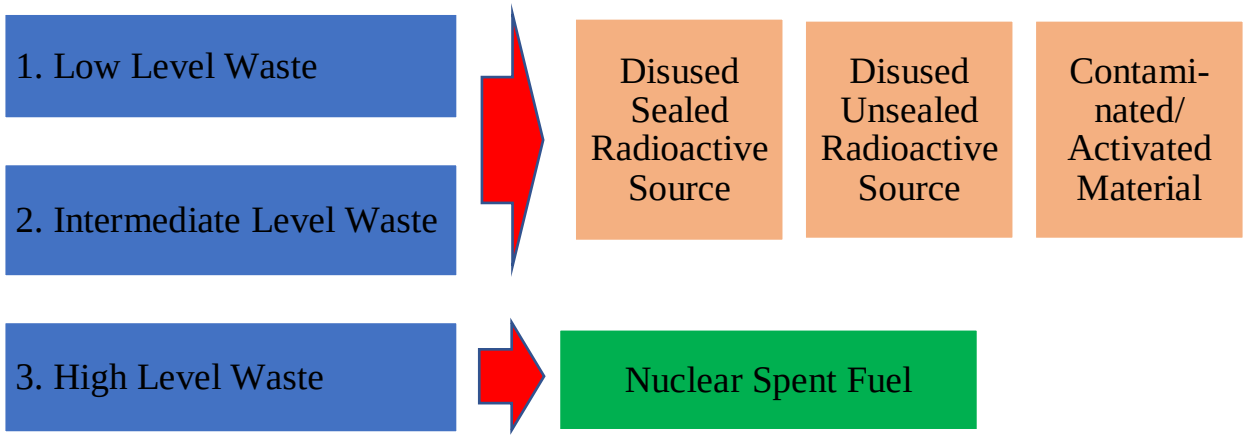

Fig 1. Radioactive Waste Categorization

Secondly, there is only one radioactive waste management centre (RWMC) which is government owned facility (BATAN) that assigned to manage all radioactive waste coming from all over Indonesia. Thirdly, facilities which generates radioactive waste should manage its waste generated from the use of ionizing radiation source, or from the operation of nuclear installation. And last, the RWMC should have license issued by regulatory body.

Below is obligation should be conducted by radioactive waste generating facility and RWMC in the radioactive waste management.

TABLE 1. MANAGEMENT OF RADIOACTIVE WASTE

	Radioactive Waste Generating Facility	**RWMC**
Management of Disused Sealed Radioactive Source (DSRS)	Collecting & Sorting	Collecting & Sorting
	Sending radwaste back to source originating country, or delivering radwaste to RWMC	Treatment: activity decay, conditioning
		Interim Storage
		Transporting
		Disposal: near surface, medium depth
Management of Disused Unsealed Source, Contaminated/Activated Material	Collecting & Sorting	Collecting & Sorting
	Treatment: activity decay, volume reduction, composition change, conditioning	Treatment
	Temporary storage	Clearance
		Transporting
		Disposal: near surface, medium depth
Nuclear Spent Fuel	Temporary storage	Spent fuel interim storage
	Sending spent fuel back to originating country, or delivering to RWMC (spent fuel interim storage)	Final disposal

At present, RWMC holds an operating license issued by BAPETEN. The development of RWMC in order to answer challenges in the future should follow requirement in GR 29/2008. Below are documents needed for license application. There are many other regulations (GR, chairman regulations, guidance, etc.) should be fulfilled to ensure safety and security of the facility.

TABLE 2. REQUIRED DOCUMENTS FOR LICENSING APPLICATION

Phase	Required Documents	
Siting	• Operating Procedure • Technical Specification • Radiation Safety & Security Equipment • Radiation Safety/Security Programme • Safety/Security Verification Report • Health Evaluation Report of radiation workers • Personnel Qualification data	• Site Evaluation Report • Quality Assurance Implementation Report
Construction		• Environmental Assessment Report • Construction Programme
Commissioning		• Construction Report • Commissioning Programme • Quality Assurance Programme
Operation		• Commissioning Report • Environmental Management and Monitoring Report • Quality Assurance Programme • Waste Acceptance Criteria • Initial Closure Plan • Financial Assurance for Closure
Closure		Closure Plan

There is also important regulation that support radioactive waste management to run more effective. BAPETEN Chairman Regulation No. 8/2016 on Radioactive Waste Management for Low and Intermediate Level Radioactive Waste enable RWMC to reuse DSRS. Pre-assessment of reuse feasibility should be carried out and DSRS should undergo standardization and leak test. As a final process, BAPETEN should assess whether the DSRS meets the safety requirement and then issues an approval for the reuse.

3. RADIOACTIVE WASTE MANAGEMENT CENTER

RWMC applies many types of treatment methods. Below are types of treatment operated in RWMC for radioactive waste and nuclear spent fuel.

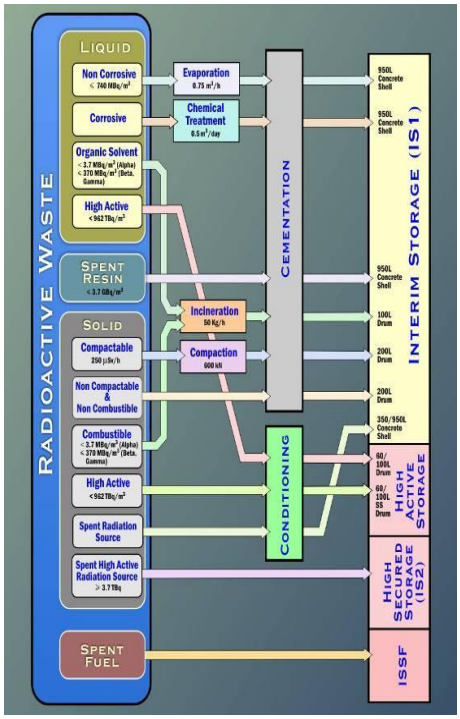

Fig. 2. Waste Types and Process

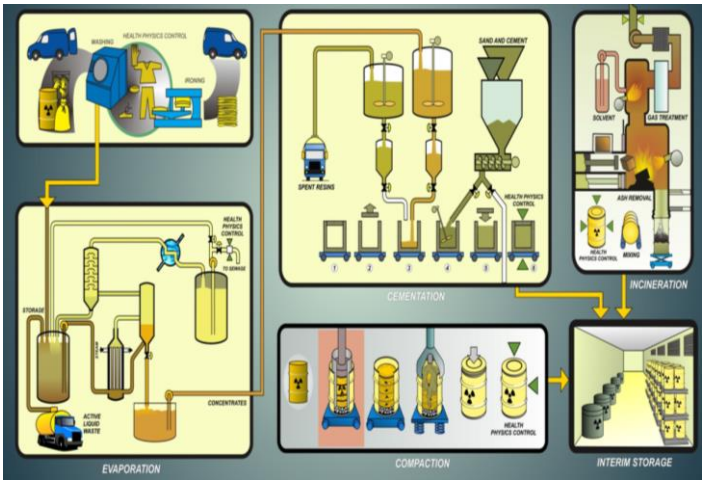

Fig. 3. Types of Treatment

Other than waste treatments as mentioned above, BATAN Chairman Regulation No.7/2017 on Reuse and Recycle of Disused Sealed Radioactive Sources enable RWMC to conduct reuse and recycle if it met safety requirement.

At this time, RWMC has four storage facilities which are an interim storage for spent fuel (ISSF), two interim storages to store low level waste and intermediate level waste (IS-1 and IS-2), and an interim storage for high level waste (ISHLW). The capacity of ISSF is 1458 spent fuel elements. Capacity of IS-1 and IS-2, each are to store 1500 drums (200L) and 500 concrete shells (950/350L). And for ISHLW, it is equipped with 20 wells with total capacity 70 m^3 and 3 pools with total capacity 129.6 m3. As challenges increases in storing LLW and ILW, it is predicted that IS-1 and IS-2 be full in 2025 and 2024.

Fig.4. Spent Fuel Interim Storage

Fig. 5. High Level Waste Storage

Fig. 6. Interim Storage 1

Fig. 7. Interim Storage 2

As IS-1 and IS-2 are predicted to be full soon, RWMC plans to improve its treatment capacity as well as its storage. There is a plan to develop new interim storage (IS-3) for LLW and ILW. Moreover, with IAEA assistance, RWMC plans to upgrade existing dismantling hot cell to be able to dismantle category 1 and 2 DSRS. Therefore, operating license that will be expired in July 2022, needs to be renewed by including those new facilities. RWMC should submit required documents as listed in Table 2 and follow licensing process as determined in GR No.29/2008.

4. CONCLUSION

Indonesia faces many challenges in radioactive waste management. There are radioactive wastes which are still stored in medical, industrial, or nuclear facilities for various reasons. Some of those are left without proper supervision due to bankruptcy problem of company owned radioactive sources. Besides potential wastes from normal operation of medical, industrial, or nuclear facilities, potential wastes arise from the development or dismantling nuclear facility are something need to be considered. As RWMC faces challenges on its capacity in treatment as well as storage, strategies need to be applied to assure the safety of worker and public, as well as protection to environment. BAPETEN has taken some action to assist facilities to keep waste or sources safely and securely before it transports to RWMC. RWMC has plan to develop new interim storage (IS-3) for LLW

and ILW. Moreover, plan to upgrade dismantling hot cell with the assistance of IAEA is still in progress. Hopefully, it will improve RWMC ability in reuse and recycle DSRS in the future. Furthermore, in licensing, RWMC needs to renew the operating license by following safety and security requirement.

REFERENCES

[1] Government Regulation No. 61 Year 2013 on Radioactive Waste Management, The Government of the Republic of Indonesia (2013).

[2] Government Regulation No. 29 Year 2008 on The Licensing of Ionizing Radiation Source and Nuclear Material, The Government of the Republic of Indonesia (2008).

[3] BAPETEN Chairman Regulation No. 8 Year 2016 on Radioactive Waste Management for Low and Intermediate Level Radioactive Waste (2016).

[4] BATAN Chairman Regulation No.7 Year 2017 on Reuse and Recycle of Disused Sealed Radioactive Sources (2017).

[5] National Report on Compliance to Joint Convention on The Safety of Spent Fuel Management and on The Safety of Radioactive Waste Management, The Government of the Republic of Indonesia (2021).

[6] INDONESIA NUCLEAR ENERGY REGULATORY AGENCY, Inspection Report (2020).