IAEA-CN-318-80-POS

Circular Economy Principles in the Regulatory Oversight of the Management of By-Products – Case Study: Tin Slag 2

Hermawan Puji Yuwana
BAPETEN (Nuclear Energy Regulatory Agency of Indonesia)

BACKGROUND

Indonesian Tin Industry compared to global*(2019)

- Tin production= 78,000 tons or equivalent with 22% global value
- Tin reserves= 800,000 tons of metal or equivalent with 23% global value

By-products of Tin Production

- Tailings
- Tin Slag

Radioactivity from by-products

- Activity concentrations are dominated by radionuclides from U and Th decay series
- The results of activity concentration varied between sources of by-products

Tin Slag 2

1. by-product after the smelting & refining process
2. Increasing linearly & proportional to the production
3. Identification and characterization of typical of tin slag 2
4. Sampling and measurement
5. The activity concentration from sample showed value ^{226}Ra, ^{228}Ra, & ^{228}Th > 1 Bq/g
6. Currently, tin slag is piled or stored

OBJECTIVE

To identify regulatory oversight in supporting the application of circular economy principles in the management of by-product minerals such as tin slag 2

DISCUSSION

Regulator

Multi regulators: Ministry of Energy and Mineral Resources, Ministry of Environment and Forestry, Ministry of Industry, Nuclear Energy Regulatory Agency (BAPETEN)

Regulation

1. Some regulations issued by the regulator, require harmonization
2. There are no technical criteria or procedures for reuse

Industry

1. Until now there has been no tin slag reuse industry
2. Tin slag extraction technology used on an industrial scale

Material

1. Tin slag contains radioactive material
2. Can expose radiation exposure & give dose to workers and/or public
3. The quantity is a lot and just piling up
4. Potential release into the environment

Challenges in managing MIR to be effective and efficient

The transformation from a linear economy to a circular economy does not only speak from a technical aspect. Non-technical aspects like regulatory framework also affect the transformation process.

BAPETEN Regulation

BAPETEN Regulation No. 16 of 2013 are sufficient to provide an initial description and the concept of reusing by-products. However, in Government Regulation No. 52 of 2022 is limited to taking uranium and thorium as raw materials in the nuclear fuel cycle.

Ministry of Energy and Mineral Resources Regulation

Rare earth elements (REE) can be extracted from tin slag 2 Rare earth elements (REE) are classified as metallic minerals. In current studies, the extraction of several REE metals from tin slag 2 has also been carried out.

Ministry of Environment and Forestry

By-products including tin slag 2 with activity concentrations of less than 1 Bq/gram are known as hazardous material containing radioactive and clearly states that it can be used as raw material, raw material substitution, energy source substitution, and other uses.

Detailed requirements and criteria for the reuse of tin slag by-products with an activity concentration of > 1 Bq/gram need to be considered

CONCLUSION

The results of the identification show several existing regulations in Indonesia explicitly and implicitly regulate the provisions of the circular economy concept

International Conference on the Safety of Radioactive Waste Management, Decommissioning, Environmental Protection and Remediation: Ensuring Safety and Enabling Sustainability
6 – 10 November 2023