

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

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Indonesian Tin Industry compared to global*(2019)



production= 78,000 tons or equivalent with 22% global value



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





Tailings

By-products of Tin Production



Tin Slag

Radioactivity from by-products

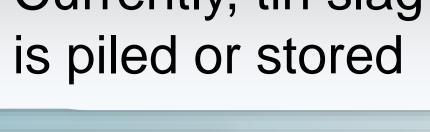


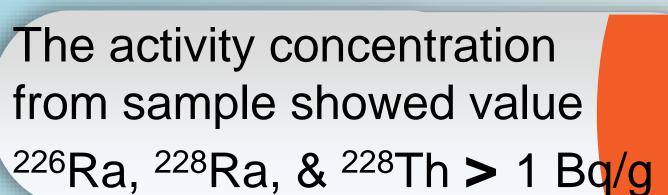
Activity concentrations are dominated by radionuclides from U and Th decay series

The results of activity concentration varied between sources of by-products



Currently, tin slag





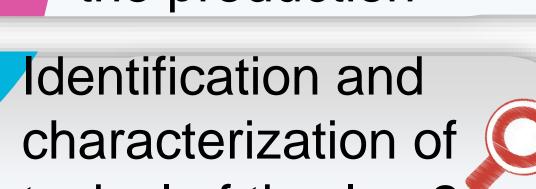


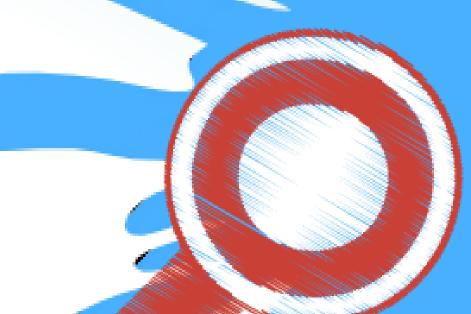
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Tin Slag 2

by-product after the smelting & refining process

Increasing linearly & proportional to the production





OBJECTIVE

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



Sampling and measurement



5

Regulator

Multi regulators:

and Mineral

Ministry of Energy

Resources, Ministry

of Environment and

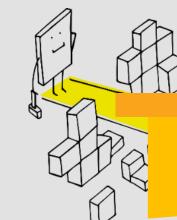
Forestry, Ministry of

Energy Regulatory

Agency (BAPETEN)

Industry, Nuclear

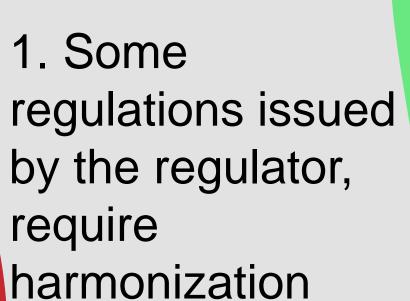
3 typical of tin slag 2



DISCUSSION



Regulation



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

managing MIR to be effective and efficient

Challenges in



The transformation from a linear economy to a economy does circular not only speak from a technical aspect. Nontechnical aspects like framework regulatory 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 with activity concentrations of less than 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 bywith products 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

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