

Emergency Response Measures for the Transportation and Packaging of Material Contaminated with Cs-137

In early 2024, the Department of Atomic Energy (Atom Malaysia) was informed by the Royal Malaysian Customs Department (RMCD) regarding the detention of five containers carrying zinc oxide intended for export. The Radiation Portal Monitoring (RPM) system installed at Pulau Pinang Port, located in northern Peninsular Malaysia, had been activated, indicating the possible presence of radioactive contamination in the zinc oxide contained within the shipment.

The First Responder Team (FRT) from the Northern Zone Office of Atom Malaysia was deployed to the port to evaluate the incident. Upon inspection, the team confirmed that all five containers were contaminated with Caesium-137 (Cs-137), with recorded dose rates ranging from 0.50 to 6.55 $\mu\text{Sv}/\text{hour}$. The container owner was instructed to return the containers to their premises under the supervision of the FRT. A subsequent inspection revealed that the containers held approximately 1,000 jumbo bags of zinc oxide suspected to be contaminated with Cs-137.

Due to a limited number of available FRT responders, the Secondary Responder Team (SRT) from Atom Malaysia's Headquarters located approximately 400 kilometres away was deployed to support the FRT in conducting further verification of the 1,000 jumbo bags of zinc oxide. Both teams carried out additional monitoring and verification of the jumbo bags, as well as assessments of the zinc oxide processing stages within the company's milling plant. The monitoring results confirmed that only 312 out of the 1,000 jumbo bags were fully contaminated with Cs-137. However, radiation measurements conducted at each stage of the processing equipment indicated levels below the permissible limits as stipulated under the Atomic Energy Licensing Act 1984 (Act 304), thus permitting the area to be classified as a 'Clean Area'.

All 312 jumbo bags of zinc oxide contaminated with Cs-137 were consolidated within designated warehouse, and a "Control Area" was demarcated to restrict public access and ensure their safety. In addition, staff from the Northern Zone Office will visit the warehouse every two weeks to monitor radiation levels and verify the presence of the contaminated zinc oxide.

To identify the source of the Cs-137 contamination, the company was asked to provide a list of suppliers for the processing raw material known as steel dust. Five supplier companies were identified, and one of them confirmed that its premises were contaminated with Cs-137. The contamination detected by Survey and Monitoring Team (SMT) starting from the consolidated scrap metal cart and extending to the ground near the furnace facility. It is suspected that the Cs-137 source was burned along with scrap metal in the furnace. The supplier company then was instructed to excavate the contaminated ground, discard the scrap metal cart and then dispose all of them at national radioactive waste management facility in Nuclear Malaysia Agency (Nuclear Malaysia). The steel dust supplier was also asked to provide a list of its scrap metal suppliers to enable Atom Malaysia together with Royal Malaysia Police (RMP) to investigate any further possibility remaining of Cs-137 sources.

As for the 312 jumbo bags of zinc oxide contaminated by Cs-137, they were transferred into several containers and drums by the company under the consultation and supervision of the Nuclear Malaysia and also Atom Malaysia, before being consolidated in the warehouse for long-term of storage until an appropriate radioactive waste disposal is built in future.

Country or International Organization

Instructions

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