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The first Repository for disposal of NORM waste in Malaysia

From 1982 to 1994, a licensed plant was operated to process monazite and xenotime ores to extract rare earth elements. NORM wastes with concentrations above background were recovered from the plant and stored at a long-term storage facility. From 2011 to 2014, the storage facility was decommissioned and all wastes were retrieved, stabilized and disposed of into a near-surface disposal facility built at the Repository. Prior commencing the project, appropriate work planning and project implementation were prepared and then evaluated by the regulators. This included the siting process, legal requirements, site assessments, licensing and permitting, procedural for waste recovery, treatment and disposal, radiation safety, occupational safety, environmental monitoring, reporting of final waste inventory and finally the closing of the Repository. About 15,000 cubic meters (m³) of NORM wastes were successfully disposed of. During the project, there were significant challenges in retrieving drums containing NORM wastes from storage bays, waste handling and processing, waste placement into disposal cells, radiation exposures against alpha-beta contamination, direct radiation (gamma) and radon (Rn220), and occupational health and safety. A comprehensive quality assurance program and radiological inventory were implemented to obtain radiological data and information particularly radioactivity concentration levels and waste volume starting from drum retrieval to waste placement until the closing of the disposal cells. A significant number of waste samples were collected and tested for radioactivity. Radiological impact assessments and dose modeling were prepared to estimate dose exposure to identified receptors with appropriate mitigation measures. During drum retrieval from storage bays, airborne contamination and radon exposures were the key concerns to workers. The air ventilation system was operated to provide a safe working environment in storage bays with real-time radon and airborne monitoring. Decontamination facilities were provided for personnel and equipment with specific release survey procedures to control and manage radioactive contamination. For worker safety, radiation surveillance was implemented inside and outside radiological work areas. Various types of radiation detectors and instruments were used including active and passive monitors, alpha-beta counter and gamma-spectroscopy instrument to measure the levels of external radiation, surface contamination, airborne particulates and radon, and thoron gas. In 2017, the project was successfully completed with no major incidents nor over-exposure to workers and the public. The Repository is now being maintained and monitored under the supervision of local and federal authorities.

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