

Implementation of the Borehole Disposal System for safe and secure management of Disused Radioactive Sources in Ghana.

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The Government of Ghana, through Ghana Atomic Energy Commission (GAEC) is implementing the Borehole Disposal System (BDS) developed under an International Atomic Energy Agency (IAEA) Regional Technical Cooperation Project in South Africa, for disposal of Disused Sealed Radioactive Sources (DSRS) as an end-point management option.

Radioactive materials have been in use in Ghana for more than six decades, mostly in the form of Sealed Radioactive Sources (SRS) for sustainable development. They are being used for diagnostic and therapeutic procedures in medicine, measurement and processing techniques in industry, irradiation techniques for food preservation, sterilization of medical products, research and teaching.

The use of SRS generates Disused Sealed Radioactive Sources (DSRS) when they are no longer powerful enough for their intended purpose or when they fall out of use due to obsolescence of equipment or techniques. The DSRS require proper management to prevent any hazard to human health and the environment. Improper management of these beneficial devices have contributed to several incidents around the world that have resulted in serious injuries, death and extensive contamination of the environment. DSRS also present security concerns as the sources can be stolen and their radioactive materials used in radiological dispersion devices (dirty bombs) for acts of terrorism.

Very short-lived DSRS, i.e. those with half-lives of less than about one year, can usually be “decay stored” i.e. kept in storage for up to ten years until their activity has reached exemption levels when that can be disposed or recycled as non-radioactive waste. However long-term storage is required for long half-lives radionuclides such as Ra-226, which has a half-life of 1600 years.

Storage is an important radioactive waste management step, but long-term storage is not considered sustainable for hundreds to thousands of years and in many cases may represent a high-risk situation with regard to both the health hazard and the security threat posed by high activity long lived sealed sources due to resources – financial and technical - to support active management and, given societal instability. Clearly, DSRS need to be managed and disposed of carefully and in a safe and secure manner. The borehole disposal system potentially provides a cost effective, safe and secure disposal option, particularly for countries with small DSRS inventories, limited radioactive waste disposal capabilities, and infrastructural constraints.

The borehole disposal system (BDS), i.e. the disposal facility and the environment in which it is sited, entails the emplacement of conditioned DSRS in a relatively narrow diameter borehole, drilled to an intermediate depth and operated directly from the surface to provide safe and secure isolation of DSRS for thousands of years.

Safety and security measures have in common the aim of protecting human life and health, and the environment. Safety and security measures have therefore been designed and implemented in the BDS in an integrated manner so that security measures do not compromise safety and vice versa. The paper discusses the implementation of the BDS in Ghana as well as the safety and security features of the BDS.

State

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