Growth of the National Inventory of Sealed Radioactive Sources in Tanzania

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INTRODUCTION

In Tanzania the use of Sealed Radioactive Sources was realized after establishment of radiotherapy department at Ocean Road Cancer Institute for cancer treatment, as well as the inauguration of the insectary of the tsetse mass-rearing facility in Tanga for the Tsetse Eradication Project using SIT.

From this time, the use of Sealed Radioactive Sources in the country has gained momentum due to the increase of the activities requires employing this technology. Research and Medical applications, water quality, Industrial radiography and gauging applications, are among others.

The increase in number of the road construction projects, mining activities and the discovery of natural gas in the Southern deep sea of Tanzania, recently has contributed much to boost the integer of the Sealed Radioactive Sources imported to the country for gauging and well logging purposes.

REGULATORY CONTROL

Tanzania Atomic Energy Commission (TAEC) (Fig 4) was established as the regulatory body on 1st July, 2004, replacing the previous National Radiation Commission (NRC). The regulatory body which is the official government body responsible for all atomic energy matters in Tanzania was established by the Tanzania Atomic Energy Act No. 7 of 2003. The main functions and responsibilities of the Commission (TAEC) are:

- Be responsible for all matters relating to the safe and peaceful use of atomic energy and nuclear technology including radioactive materials and radiation devices.
- Establish and operationalize or implement a system for the control and authorization through registration and licensing;
- Carry out regulatory inspections and ensure that corrective actions are taken if unsafe or potentially unsafe conditions are detected;

MATERIAL AND METHODS

Tanzania Atomic Energy Commission (TAEC), the Official Government body for Atomic Energy matters in the country carried out the countrywide inventory of the sealed radioactive sources which has been updated regularly through different tools including Regulatory Authorization Information System (RAIS), excel sheet and a record books.

In a recent years, it has been witnessed the booming of National Inventory of Sealed Radioactive Sources due to the increase of nuclear applications technology in the country.

The importation licenses issued by the Regulatory Authority as from 2017, indicated significance increases of the Radioactive Sources in the Country (Fig 3). The foreign Companies invested on Oil and Gas Exploration projects in the Eastern and Southern shore of Tanzania has increased the demand of using the radioactive sources for Oil well logging. The number has increased gradually as the year goes up since 2017. Regulatory Inspection conducted regularly considering the risk category of the radiation sources has also aid the Commission to discover new the sources which were not under regulatory control.

THE CHALLENGES OF DISUSED RADIOACTIVE SOURCES

Tanzania is operating a Central Radioactive waste Management Facility (CRWMF) (Fig 1) where by a number of Disused Sealed Radioactive Sources with long and short half-lives are stored. The inventory (Fig 5) of DSRS is update regularly by using RAIS and other available tools. The availability of this facility paved the way to better radioactive waste management regime in the country. Disused/spent radioactive sources, which were stored at the "Temporary Radioactive Waste Storage Facility", and also other spent sources removed from the public domain were safely transferred to the central storage facility in 2005 and some were conditioned for their safe and long term in 2009 (Fig 2). However, the final disposal solution of the available disused sources is still a challenge to the country. Borehole Disposal Concept might be the best solution since the repository requires limited land area and has a low probability of human intrusion.

Fig 1: Central Radioactive Waste Management Facility

Fig 2. Handling, Conditioning and Storage of Spent Sealed Radioactive Sources

Regulatory Inspection and Authorization

"Regulatory inspection" is defined in GS-R-1 as: "An examination, observation, measurement or test undertaken by or on behalf of the regulatory body to assess structures, systems, components and materials, as well as operational activities, processes, procedures 3 and personnel competence". Although this definition was perhaps developed for nuclear regulatory activities, this definition can also be applied generally to radiation safety.

Regulatory inspection and enforcement activities conducted by TAEC cover all areas of regulatory responsibility. The TAEC regulatory body conduct inspections to satisfy itself that the operator is in compliance with the condition set out, for example, in the Tanzanian Atomic Energy regulations.

Regulatory Inspection

The inspection programme is provided in Part II, Section 6.1(h) and Part IX, Section 59.1 of the Atomic Energy Act. A key component of a successful inspection programme is establishing inspection priorities and frequencies. The regulatory Inspections in TAEC are arranged in such a way that, it takes into consideration the risk category of radiation sources (graded approach) as follows:

- High -risk: once per year
- Medium-risk: once per two years;
- Low-risk: once per 3-5 years.

TAEC carries out pre-authorization inspection as a verification mechanism for all new authorization applications.

Authorization ..

The requirements for authorization of the possession and use of radioactive sources has been established in the Atomic Energy Act (Part III, Sections 16-23) and the Atomic Energy Regulations (Regulations 16-19) [6,7].

In accordance with the Act, authorization of Sealed Radioactive Sources shall be carried out through registration and licensing, although currently authorization is issued in the form of licensing. The special application forms for authorization to import/export and possession and use of Sealed Radioactive Sources are available in TAEC website. All non-exempt sources are required to be licensed..

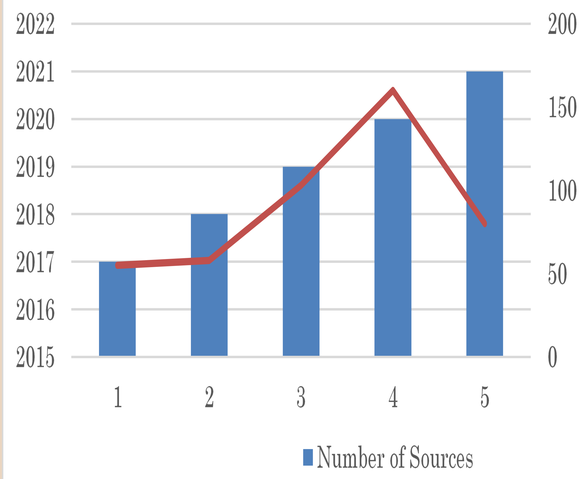

Fig 3:Sealed Radioactive Sources imported as from 2017

Fig 4: Tanzania Atomic Energy Commission (TAEC), URT Regulatory Authority

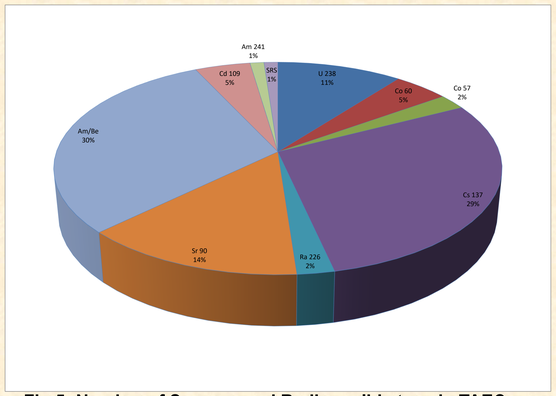

Fig 5: Number of Sources and Radionuclide type in TAEC (CRWMF)