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**The Role and Responsibility of the National Regulator**

**of Radiation Sources and Materials in Saudi Arabia**

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**Abstract**

There are neither nuclear power reactors nor are there research reactors in Saudi Arabia. However, the country imports a lot of radioactive sources that are used in different fields such as medicine, hydrology, industry and research. Usage of radioactive material is governed by national and the IAEA regulations for the safe usage and transport of radioactive materials. KACST ( King Abdulaziz City for Science and Technology) is an independent scientific organization established in 1977. It is the national competent authority that sets the rules of transporting, using and disposing of radioactive sources in Saudi Arabia.. This paper discusses the role of KACST and other authorities in the country regarding the 1) licensing and evaluation of the importing and exporting applications of radioactive sources and/or devices in Saudi Arabia, 2) The regulatory framework of radiation protection in Saudi Arabia, 3) the management of radioactive wastes in Saudi Arabia.

**Introduction**

The Saudi Arabian government plays important roles in ensuring that radiation is responsibly managed to protect the public and the environment from the risks of exposure to ionizing radiation. The governmental sector includes KACST, ministry of interior, ministry of health, and customs.

The use of nuclear techniques in Saudi Arabia has begun in the seventieth of the past century when the oil companies operating in Saudi Arabia used radioactive sources for discovery of oil wells. KACST (King Abdulaziz City for Science and Technology) conducts technical activities in the field of atomic energy in addition to the responsibilities of radiation protection for all workers and public in various practices that require using radiation in medical, industrial, environmental, and research applications.

KACST has many responsibilities of radiation protection as well as safety and security of radioactive sources and nuclear materials which may include:

 Regulating and controlling the use of radiation sources and the protection against their hazards and setting the enforcing protective standards

 Preparing of the regulations

 Regulating practices (Issues authorizations)

 Establishing a database of all radioactive sources in the country

 Inspecting, following-up and controlling radiation sources and their uses.

 Supervising of radiation protection program for training and rehabilitation.

Preparing of an emergency plan to respond to radiological disasters on the national level.

There is an old cyclotron unit *CS-30* at Cyclotron and Radiopharmaceuticals Department, King Faisal Specialist Hospital and Research Center, Riyadh, Saudi Arabia. It became operational in 1983, and it is designed specifically for isotope production. The facility includes a cyclotron, five shielded hot cells, and separate laboratories for target preparation, radiopharmaceutical production, radioanalyses, quality control, and other support facilities.

**Management of Radioactive Waste in Saudi Arabia**

Saudi Arabia has radioactive wastes generated mostly from medical and industrial, applications. They are classified as low-level radioactive wastes with a small portion considered as an intermediate level wastes. The generated radioactive wastes are divided physically into two groups; liquid wastes and solid wastes. Solid wastes aredivided into two groups, compactable and non-compactable solid wastes. The non-compactable solid wastes are spent sealed sources, metals, etc. Thecompactable waste are clothes, gloves, etc. The medical radioactive wastes are generally classified as low level short lived sources. They represent more than 50% of radioisotope applications in Saudi Arabia.

Most industrial applications of radioactive sources in Saudi Arabia use basic forms of radioactive material such as sealed sources, luminous displays, radiographic testing, evaluation of plant performance, and improvement of products by irradiation. The spent sealed radioactive sources are one of the main sources of radioactive wastes in Saudi Arabia. These sealed sources consist of different isotopes such as Cs-137, Sr- 90, and C0-60…etc [1].

The increasing use of unsealed radionuclides in various applications**,** for diagnostics, therapy, industry, and research**,** requires safe management of radioactive wastes in order to keep the environment clean of any pollutants. Hospitals and other industrial companies dispose off a considerable amount of used low radioactive wastes in domestic sewage system[2]. The licensee is responsible and must ensure compliance with the regulations prepared by KACST.

**The regulatory framework of radiation protection**

**in Saudi Arabia:**

The national radiation protection regulations in Saudi Arabia have been in existence since 1988. They have been revised many times. They are based on the Basic Safety Standards (BSS) and Safety Series No. 115[3]. Within the regulatory framework, the regulatory body (KACST) takes the technical responsibilities to: supervise the safe use of isotopes and radioactive materials and/or devices due to the assessment of applications for licenses; to make recommendations on the issuing of licenses; to monitor compliance and to undertake inspections of licensed activities in order to confirm compliance with legislative requirements and to take any enforcement actions necessary to ensure compliance with safety of people and protection of the environment. KACST operates a national Early Warning and Environmental Radiation Monitoring Network (EW&ERMN) in Saudi Arabia through 23 monitoring stations distributed along the borders. The framework is applicable to a very wide range of , radiation facilities and sources including prescribed radiation facilities such as particle accelerators and irradiators and irradiators incorporating large amounts of sealed and unsealed radioactive sources.

**The evolution of using radioactive sources in Saudi Arabia**

In 1985, there were five facilities dealing with radioactive sources in the country. Now a days, the number of facilities is approximately 307 facilities. In Saudi Arabia, Some facilities use radioactive sources that do not exceed tens of milliCuries, while others use high activity radioactive sources that exceed two hundred thousand Curie. Moreover, some facilities use a limited number of radioactive sources while others use more than a hundred different radioactive sources. There are 65 types of radioactive sources used in Saudi Arabia. Some of facilities are private and some are governmental. Most radioactive sources in saudi Arabia are used in nuclear medicine. The percentage of sources, which returned to the country of origin, did not exceed 20% of the total imported sources[4]. Most sources used in nuclear medicine are unsealed sources and low half-life which can be easily dispersed and may be taken undue into the body. Some sources are considered as low-radiation waste which can be disposed off without putting them in a storage. High level radioactive sources built-in in measuring devices must be returned to the country of origin due to the absence of a specialized cemetery for spent radioactive sources in Saudi Arabia.

**Licensing and Evaluation of of Importing/Exporting Applications**

Needless to say that evaluation of importing and exporting applications of radioactive sources is extremely important due to the nature of radioactive sources which must be treated with extreme caution. Importing and exporting radioactive sources in Saudi Arabia is governed primarily by the competent authority. The regulations of the competent authority which form the basis for the competent authority import and export licensing are fully consistent with the International Atomic Energy Agency (IAEA) Code of Practice on the International Transboundary Movement of radioactive Material and the IAEA Code of Conduct on the safety and Security of radioactive Sources. The competent authority in Saudi Arabia conducts a technical study to importing or exporting application in order to approve it or refuse it. If the application meets the requirements of radiation protection in the country, the competent authority recommends the issuing of the license. If not, the competent authority sends it back to the applicant to rectify it.

Prior authorization is required for the use of radioactive sources. A license is granted by the competent authority upon written application. General conditions for granting a license as well as the licensing procedure are laid down in the regulations. The applicant shall provide the competent authority various information, depending on the nature and extent of the practice. These include:

**** a description of the user's organization defining responsibilities related to radiation protection and safety.

**** a full description of the imported or exported source(s) including type, intensity, number, and the name of the manufacturer.

**** purpose for using a radioactive source,

**** places where radioactive sources are employed,

**** protective and safety systems to be used,

**** systems for monitoring radiation exposure,

**** plans for rendering harmless disused sources and other radioactive waste,

**** any other information concerning arrangements ensuring radiation safety.

The name of a radiation safety officer responsible for the safe use of radiation shall be included in the description of organization. The officer shall have undergone radiation safety training, including a qualifying examination arranged by the competent authority. The curricula of such training is subject to approval by the competent authority. In addition of being qualified in this manner, a radiation safety officer shall have sufficient authority within the licensees organization for taking care of his/her duties.

**References**

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