

A Proposed Computer Based Information System; Sealed Radioactive Sources Licensing

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ABSTRACT

Nowadays nuclear energy and applications has gained a great interest. Consequently, the nuclear security became a hot spot. The IAEA define the nuclear security as the prevention of, detection of, and response to, criminal or intentional unauthorized acts involving or directed at nuclear material, other radioactive material, associated facilities, or associated activities. Herein, all radioactive sources shall be subjected to instructions, serious regulations and laws. In order to implement these functions, it is necessary to establish an appropriate information system to the regulatory body. This system shall depend on modern technology to perform the work in more accurate and comprehensive manner. This paper introduces a software package for sealed radioactive sources licensing according to IAEA standards as a part of NRRA Data Bank (DB), which is a national database system that organize regulatory and scientific information in NRRA. The implemented software speeding up the licensing process as will as documentation of the, information concerns sources type, storage area, workers, personnel equipment for dose measurement, and number of sources used. The experimental results verify the software reliability.

Keywords: *Sealed Sources, Information System, DataBank.*

1. INTRODUCTION

The main tasks of the regulatory authority are; establishing regulations, licensing, reviewing, inspection and surveillance during operation of nuclear and radiological installations. For that purpose it is essential to know the physical nature and the surrounding environment of these installations. The information systems in the databank has been proposed to collect all information needed to perform an organized works [1]. Figure 1 listed the different parts of information systems.

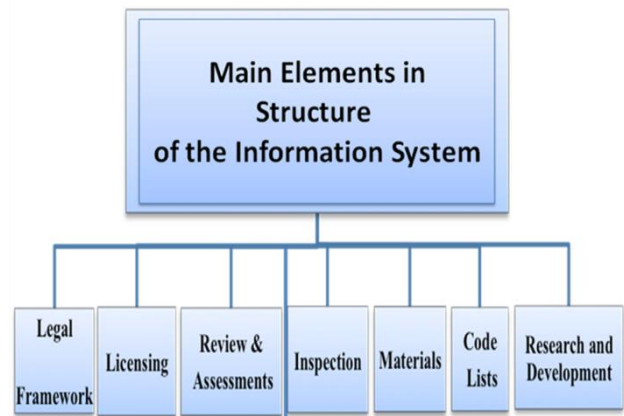


Fig. 1. Main Elements in the Structure of DB [1].

A sealed source is a radioactive material (SRS) that is permanently sealed in a capsule or closely bounded in a solid form. The capsule or material of a SRS should be strong enough to maintain tightness under the conditions of use and wear for which the source was designed, also under foreseeable mishaps [2]. Sealed radioactive sources are used in various applications such as medicine, agriculture, industry, transportation, construction, geology, mining, research, etc.

The international atomic energy agency (IAEA) defined the radioactive material as a part of nuclear security that shall be controlled by the NRA. Hereby, it is necessary to establish an appropriate computer based information system for SRS licensing. This system shall depend as a part NRA databank to perform the task in more accurate and comprehensive manner. Figure 1 listed the different parts of DB.

In order to reduce both the risk of accidents and the risk that such sources could become an instrument of misuse, data base package has presented. This package provides complete information about the SRS such as who import it, , why, when , and where it stored or movedetc. this package facilitate the RB to license

every step in the whole SRS licensing process with high convenience. By applying the software package, the authority could preventing the loss or theft of sealed radioactive sources.

2. PACKAGE DATA BASE

License software package, follow-up and control of radioactive materials enclosed consist of two main sections, namely:

2.1 Input Data

It consists of complete data on radioactive material specifications, purpose of using, number of sources used, this activity and specific activity of the isotope, including the data are facilities on used these materials are liked (specifications buildings and location of nearby buildings and specifications of place and associated equipment for these materials). In addition to the previous, the package has the data of those responsible for utilization management and officials radiation protection and qualified individuals to handle these materials and the development of models use requirements security of radioactive materials. As data is entered the inspection team and the existing regulatory inspections can follow up on the availability of licensing conditions and requirements in terms of trading places match of the required specifications and also the availability of radiation protection requirements.

2.2 Output Reports

It is the printed reports in all its forms required and it aims to support the full information and data required to facilitate the regulatory works of establishing regulations, licensing, reviewing, inspection and research and development.

3. DATA ENTRIES

3.1 Source Information

This program allows user to insert, modify, delete and review data from the source information record. The source information record consists of many items as shown in Figure 2 [3].

Fig. 2. Source Information Record

According to IAEA, the categorization of sealed sources concerning the operation of sources and storage processes of active and spent sources is based primarily on risk to human health as follows as shown in Figure 3 [5,6]:

- Category 1 (very high risk)
- Category 2 (high risk)
- Category 3 (moderate risk)
- Category 4 (low risk)
- Category 5 (very low risk)

CATEGORY	ACTIVITY RATIO (A/D)
1	$A/D \geq 1000$
2	$1000 > A/D \geq 10$
3	$10 > A/D \geq 1$
4	$1 > A/D \geq 0.01$
5	$0.01 > A/D$ and $A > \text{exempt}$

Fig. 3. Categorization of Sealed Sources.

Depending on this information, can calculate the source category and security section as shown in Figure 4.

Fig. 4. Calculation othe Source Class.

3.2 Facility Information

This program is able to manage information about facilities with different organizational structures [9]. The following window describes certain items as shown in Figure 5.

Site Permit for Facilities Used Sealed Sources

The Data of Facility :

Classification of Facility: Special Area_code: Alexandria Sector_code: Oil sector Facility_code: 222000001

License_type: Low License_No: App_code: Radiation Protection Expert: 234000014 Are there other branches required license? Yes No

safety culture processes? Facility Name Address Tel. Fax E-Mail Scientific Degree Responsible director Tel. E-Mail Legal officer Tel. E-Mail Type of activity

Data of Licenses dates

App_date	Preview date	Starts date	End date	Date of the first inspection

Save Modify Delete Query Print

Fig. 5. Facility Information

3.3 Inventory Information

Inventory site could be either in the same location or at others. They could have their own organizational structure such as their own director and radiation protection officer(s) [10]. The information structure is shown in Figure 6.

Data of License Stores

Facility_code Directors_code Address Store Lab code License_code License_Date Store_name Radiation Protection code Store Address Store Location according to Facility site Tel. Fax Total area of inventory Length Width High Number of well The well dimensions/ Length Width Depth The type of internal insurance The type of external insurance The wall type Type of air conditioning existence of crane Yes No Warning Sign Yes No Ceiling type

Sources Data

source_code	Source Name	Max. Number of Sources

Previous

Fig. 6. Inventory Information.

3.4 User Information

This window is used to enter the special data base of the user like name, scientific degree, license No. The user information is described as shown in Figure 7.

3-Data of employees and users of radiation sources

Facility_code	Operator_code	NAME	DEGREE	LICENS_TYPE	LICENS_NO	LICENS_DATE	LICENS_END

Previous

Fig. 7. User Information.

3.5 Associated Equipment

The history of associated equipment is recorded separately to keep track of these equipments in the working place. Many items are required to register the history of associated equipments as shown in Figure 8.

Data of Equipments for Radiographs and Personal Dosimetry

Facility_code Equipment_code Serial_No. Equipment_Name Operating voltage Equipment_Place Number of Equipment the type of the reading equipment Purpose of Use

The Data of Calibration

The Calibration Place Name The Calibration Certificate No. Date of the Last Calibration The Calibration Report The Calibration place address

Previous

Fig. 8. History of Associated Equipment

3.6 Source Amounts

This window is used to enter the special source amount exist in the facility and calculated the total radiation value for this source. The source amount information describing as shown in Figure 9.



Fig. 9. Sources Description.

3.7 Import Permit

This window consists of a data request for approval to import radioactive sources, such as: the facility code, the number and date of the request, health expert data, data sources and radiation strength and technical opinion in the possibility to import as shown in Figure 10.

Fig. 10. Import permit Description.

3.8 Sources Transfer

This window shows the facility information having the sources and facility information wanted the sources, also the data of car used in transfer, its driver, associated persons and the time to go, time to back and itinerary as described in Figure 11.

Fig. 11. Sources Transfer Description.

3.9 Re_export

This window shows the data number and date of request export, and other data such as: - company name and country of origin have, number and date of the policy _ the purpose of export _ No. source and container _ the radioactivity measurements of radiation on the surface of the container and a meter away from them as shown in the following form in Figure 12.

Fig. 12. Re-Export Data.

4. CONCLUSION

This technical document provides the data required various description of sealed sources required license. These data are formed basic safety standards relevant. These data can be improved according to the regulatory body point view after considering actual conditions and prevailing situations to fulfill all safety requirements.

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