



Proposal of a Database System for Accounting and Control of Materials Outside of the Regulatory Control (MORC) in Venezuela

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1. Abstract:

Following the guidelines of Document NSS-15: Recommendations of Nuclear Physical Security on Nuclear Materials and other Radioactive Materials Out of Regulatory Control, in paragraph 2.1 "The general objective of the nuclear security regime of a State is the protection of persons, goods, society and the environment of the harmful consequences of an event related to nuclear security "[1], therefore "States should establish, apply, maintain and sustain an effective and appropriate nuclear security regime to prevent and detect these events and respond to them. The nuclear physical safety regime covers nuclear and other radioactive materials, whether or not they are subject to regulatory control, related facilities and related activities throughout their useful life "[1], one of the applications that must be taken into account is the possibility of obtaining the greater control in the radioactive materials that are outside the Regulatory Control.

In Venezuela there are Cobalt 60 Units used in radiotherapy and brachytherapy equipment, Cesium 137, Ir 192 for brachytherapy, as well as industrial radioactive materials that must be monitored after their useful life. As some of these materials are being guarded by Research Centers such as the IVIC Institute of Scientific Research, there will be others that are not found in these authorized spaces but in vaults or basements of hospitals, factories, among others centers. Therefore, the Venezuelan Authorities that are in charge of nuclear and radiological instances have an important obligation in the control of these materials that become radioactive waste.

The proposal of a database of Materials that is Outside the Regulatory Control can provide a very direct scope to these materials to obtain, not only the address and contacts of the Radiological Safety Officers who protect the sources but also obtain the status of these. It is also important remote monitoring through periodic alerts, scheduling visits to these centers to ensure the information provided by officials and handling information from this type of sources in a much more comfortable way.

Adversaries always seek to obtain nuclear materials or other radioactive materials in facilities that have vulnerabilities or have little vigilance. Vulnerability assessment must be taken into account when taking information on all protected materials, risk assessment is taken by the probability of threats and vulnerability of the safeguarding space. The design of a database that obtains information on protected materials and those that are outside the regulatory control provides detailed information on the emergency that occurred.

2. Objectives:

The purpose of this system is to control radioactive materials: purchase, arrival of the source to customs, the journey made from customs to the place of management, its location and its disuse. In addition, it will have a registry of the companies, industries, hospitals and research centers that handle radioactive materials from both open and sealed sources, the storage states of the sources, the states of the detection devices (Detectors of area, cameras, alarms and emergency buttons), contact telephones of all persons belonging to these institutions, their functions, classification of management spaces and use of sources. Armor calculations, detection systems, security and waste status will also be taken into account.

The entire database will be completed between the Regulatory Authority and the final clients. Each source must include: calibration date, initial activity, lot number. Also, the MORC Control system must include Fire and police telephones to guarantee a timely response when presenting an emergency, theft or sabotage. The database can be obtained through e-mail connections, sending a format where the Radiation Protection Officer must complete all the information required for the Regulatory Authority to check it through the scheduled visits. This database system will only be managed by Nuclear Regulatory Authorities such as the Nuclear Energy and Sanitary Radiophysics Office and will be for Institutional use.

3. Database Design:

The Database starts with a main page that will show four options: the first is to introduce a radioactive source that is in shelter, the second option is to register a nuclear event or a radiological event, the third option is to observe the event log and sources and the fourth option is to observe the number of police, fire and army authorities cataloged by state and municipality.



Fig 1.- Main page of the Database.

When you select to enter a disused radioactive source, a new window will open where you can see various fields to save the information such as: Name of the Source which will have as reference, radioactive element, the lot number if you have it, Name of the company or public body that used the source, the calibration dates and the disuse date if they are owned, the address of the radioactive waste receipt which indicates: State, city, sector, street and number of house or building where the source is protected, as well as telephones of the Radiological Safety Officer who is in charge and his email. In the security aspect, the state of protection of the source and the level of vulnerability of the source will be indicated when knowing the security system: high level if the security systems to protect the source are limited, intermediate if the source in disuse counts with a system of physical barriers and security that allow only authorized personnel to enter to review the source and low vulnerability if it also has a remote video surveillance system, adding existing barriers and patrolling or periodic review by security and the Radiological Security Officer.

Fig 2.- Register a radioactive element in shelter

In the following option is the registration of a radiological emergency event which the fields are as follows: Date and detailed address where the event occurred, the radioactive material involved, assess whether it is a radiological material or nuclear material, activity of the source, the dose rate at 1 m, risk categorization and affected persons, will also indicate if the event occurred in a busy place, a government building, museum, in a massive event or in a food reservoir, the form of the radioactive material to which was designed: as an IND (Improvised Nuclear Device), RED (Radiological Dispersal Device), RDD (Radiological Dispersal Device) or just the radioactive source as a pollutant [3]. If more information on the consequences of the accident can be placed, more information about the event can be placed, such as the type of group that formulated the attack: international terrorist group, local or individual group, the reason for the attack: if it was due to labor inconvenience, political, racial, religious or other reasons.

Fig 3.- Registration of a radiological emergency event window

The third option of the Database program for the counting and control of material outside the Regulatory Control is to observe the saved record to review its content and to be able to edit if there is any news such as change of personnel or movement of disused sources to another place. In addition, in this space it issues temporary alerts to make reviews of the sources that are protected and request information from the Radiological Safety Officers on the status of the radiological sources. It also records the technical visits made by the regulatory body (In Venezuela there are Health Radiophysics for the Health Sector and the Atomic Energy Office of the Ministry of Popular Power for Electricity in the Industrial Sector).

The fourth option is the registration of emergency numbers for each state and municipality of firefighters, police, Civil Protection and National Guard of our country. This aspect is in the function to guarantee a timely response when presenting an emergency, sabotage or theft [2].



Fig 4.- DB model diagram

4. Scope:

The scope of the database has as a geographical limit the Venezuelan national territory, with possibilities to open the possibility to other countries that require this service. Also, the database program will be able to obtain design and function improvements with the passage of time, it will have an open source so that the community can make improvements before placing it in service in the government before to adjust to the needs of each entity [4].

The Database service will be private in the government entity, it will only work to make a summary of the protected sources and radiological events. The public and radiation protection personnel can obtain a summary of the information as long as the regulatory authorities are authorized to partially publish the results.

5. Conclusions:

This system promotes the ease that the personnel that make up the Regulatory Authority can access in a very simple way the information about the events that involve the sources Outside of the Regulatory Control, as well as identify the sources protected by their disuse in the industrial field or of health, it is possible to carry out with this system the collection and interpretation of data for reports related to radiological safety, nuclear safety and radiological protection, use of statistics to quantify the events and the relationship between the protected sources and radiological events.

6. Bibliography:

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