



RADIOACTIVE WASTE MANAGEMENT IN MEXICO

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Abstract

This paper describes the radioactive waste management in Mexico, particularly the activities that the National Institute of Nuclear Research (NINR) is undertaking in this field. Classification and annual generation of radioactive waste, together with practices and facilities relating to the management of radioactive waste are addressed. The respective national legal framework and policy are outlined.

1. INTRODUCTION

The radioactive waste is originated from the use of the nuclear and radioactive materials in research institutions and companies dedicated to investigation and applications of the nuclear techniques in Mexico. In addition to the generation of electricity by means of nuclear energy in the Nuclear Power Center (NPC), which is operated by the Federal Commission of Electricity, there are other applications for the ionizing radiation in the fields of agriculture, industry, and medicine in this country. The institutions and companies that make apply nuclear technology require licenses, authorizations and permissions granted by the Health Secretary and the National Commission of Nuclear Safety and Safeguards (NCNSS). There are around 1,200 licenses granted by the NCNSS for possession and use of radioactive material in the country. Approximately 100 of them relate to X-ray facilities, 200 to nuclear medicine, 200 to industrial plants, 400 to radioimmunoassay laboratories and the remainder to institutions of superior education and research. The main objective of this work is to present a description of the radioactive waste management in Mexico, particularly the activities that the National Institute of Nuclear Research (NINR) is doing in this field.

2. CLASSIFICATION

According to the Mexican official standard NOM-004-NUCL-1994 [1], the radioactive wastes are classified as follows: low level (classes A, B and C), intermediate level, high level, mixed level, and uranium and thorium tailings. The nuclear and radioactive facilities classify the waste based on isotopes, specific activity, volume and chemical composition, according to the Mexican General Regulation of Radiological Safety (MGRRS) [2]. Based on the license of each installation and on the MGRRS, an installation can release radioactive waste as long as the limits established in the Mexican official standard NOM-006-NUCL-1994 [3] are not exceeded.

3. ANNUAL GENERATION

The NPC are generating between 92 and 102 spent fuels every year and they are stored in the irradiated fuel pools that are located in the secondary containment of each reactor. The storage capacity of these pools is for the useful life of this nuclear power plants [4]. In the TRIGA Mark III research reactor, an average of 5 spent fuels are annually generated and they are stored in the reactor pool and they will be given back to the supplier for its final disposal in the country of origin [4]. The nuclear fuel disposal in Mexico is a long-term subject. Up to the international level, its reprocessing or definitive storage will have access to many technologies when the fuel is declared waste. The NPC is annually generating an average of 381 m³ of low level waste, which are temporarily confined in 3

warehouses in the NPC [4]. The Radioactive Waste Department at NINR receives annually an average of 15 m³ of solid waste and 200 spent sealed sources from institutions and companies through the country. Both are classified as low level waste. Also the NINR collects 5 m³ of organic liquid waste every year where most of them are mixed waste. At the present time, uranium and thorium tailings are not generated, because mining or benefit activities for these elements are not made in this country.

4. MANAGEMENT OF RADIOACTIVE WASTE

According to the Prescribed Law of Article 27 of the Mexican Constitution on Nuclear Matter [5], the Energy Secretary (ES) has to its position the storage, transportation and disposal of nuclear fuels and radioactive waste whatever their origin is. The same Law grants to the NCNSS the authority to review, evaluate and authorize the bases for: a) the location, design, construction, operation, *modification, cease of operations, definitive close and decommissioning of nuclear and radioactive facilities*; b) all issues relative to the manufacture, use, handling, storage, reprocessing and transportation of nuclear fuels and materials, radioactive materials and equipment that contain them; c) processing, preparation, releasing, and storage of radioactive waste; and d) any disposal that of them becomes, as well as to send, to renew, to replace, to modify, to suspend and to revoke the permissions and licenses required for the nuclear and radioactive facilities. The ES, through the NCNSS, has been publishing the technical standards, which are contained in the MGRRS for the radioactive waste management. The radioactive waste management in Mexico is a regulated activity and includes actions for their volume reduction, segregation, collection, transportation, preparation, immobilization, temporary storage and definitive storage.

4.1. Practices for radioactive waste management

A great number of laboratories of the health field have the radioactive waste fulfilling the limits established in Mexican official standards NOM-006-NUCL-1994 and NOM-028-NUCL-1996 [3,6]. The NPC has to their position the radioactive waste management generated in the operation of its two nuclear power units. The NINR received authorization from the ES for collection, transportation, preparation, processing, immobilization and storage of radioactive waste from institutions and companies through the country, with exception of the NPC.

4.2. Radioactive waste management at the NINR

The NINR is collecting and transporting radioactive waste and has specific authorization of the NCNSS, according to the requirements established in the MGRRS. The processing activities, that include segregation, preparation and immobilization of the radioactive waste, are carried out in the plant of processing for radioactive waste, which is located in the Nuclear Center of NINR, where the waste undergo the processing adapted for different material types.

- a) The solid waste are compacted and packed in steel drums of 200 liters.
- b) The liquid wastes are prepared by evaporation or precipitation and cemented in drums of the same type as for solid waste.
- c) The biological waste are treated first to deactivate them biologically, and are then compacted and packed in drums.
- d) The spent sealed radioactive sources are immobilized in their own containers or in drums.

The prepared solid waste and drums or the containers with the spent sources are transferred to the Center for Storage of Radioactive Waste (CSRW) for their confinement in the warehouses under the process used for CSRW's inventory.

5. CENTER FOR STORAGE OF RADIOACTIVE WASTE

The NINR operates the CSRW according to the license granted by the NCNSS, that authorizes the temporary storage of radioactive waste. The CSRW is located in the Municipality of Temascalapa, about 30 km from Mexico City on an area of 164,000 m².

5.1. Description of the CSRW

The CSRW counts on 3 warehouses for radioactive waste, offices building, meteorological station and monitoring house. The warehouses count on lighting system and systems for the physical protection of the stored material, such as interconnected locks to alarms, smoke detectors and extinguishers. Additionally, there is a zone of five trenches of 190 meters in length with different depths from 1.5 to 2.5 meters. These trenches were used until 1989, the year in which the practice to bury the bulks with radioactive waste were suspended, to fulfill the indications of the NCNSS according to the evolution of the applicable regulations. The CSRW does not make any operation such as preparation or processing of radioactive waste. It solely pursues activities of storage and this is the reason why transmissions of smoke or effluents of any nature do not occur. The CSRW counts on a programme for quality assurance in order to assure that the administrative and technical processes fulfill the applicable regulations. The entrance into this installation is regulated by a plan of physical safety which establishes the access requirements according to the MGRRS.

5.2. Radiological safety for the CSRW

The CSRW counts with a handbook of radiological safety procedures, which includes the actions and processes required for the registry and control of the stored radioactive material, use of the equipment and radiation measurers, as well as for the conventional and specialized maintenance and for the physical safety of the facility. As far as the radiological safety is concerned, the Radiological Protection Department of the NINR and the NCNSS make inspections and periodic monitoring for verifying the fulfillment of the CSRW operation conditions according to the license granted to the NINR.

6. NATIONAL POLICY FOR RADIOACTIVE WASTE MANAGEMENT

In March 1999 a group of specialists from different national institutions, co-ordinated by the ES, processed a proposal of national policy for radioactive waste management in order to have the technical and normative bases for the national planning in this matter. This task is under continuous progress with the help of the International Atomic Energy Agency. The NCNSS has published the technical standards NOM-022/1-NUCL-1996 to NOM-022/3-NUCL-1996 [7-9], where the requirements for near surface disposal facility for the low-level radioactive waste are set down. The requirements include the criteria for the site selection, design, construction, operation, closing, post-closing and institutional control of one facility. Also, the Mexican official standard NOM-019-NUCL-1995 [10] establishes the requirements for packages of low level radioactive waste for near surface disposal facility. The ES, through the NPC and the NINR, has begun studies for establishing the technical bases for site selection, construction and operation of a center for the final disposal of radioactive waste in Mexico.

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