

Current Regulatory Situation of Long Term Interim Storage of Radioactive Waste in Argentina

Muñiz, C.; Alvarez, D.E. and Bossio, M.C.

Presentado en: 8th International Symposium: Release of Radioactive Materials,
Requirements for Exemption and Clearance.
Hamburgo, Alemania, 7 al 10 de octubre de 2013

CURRENT REGULATORY SITUATION OF LONG TERM INTERIM STORAGE OF RADIOACTIVE WASTE IN ARGENTINA

Muñiz, C.; Alvarez, D.E. and Bossio, M.C.

Nuclear Regulatory Authority
Argentina

ABSTRACT

The Argentine Nuclear Power Program is currently expanding, as a result, a large amount of radioactive waste will be generated. The National present situation related to management of radioactive waste shows a delay in the availability of final disposal sites, which is a concern for the Argentine Nuclear Regulatory Authority (ARN), as it leads to interim storage for periods beyond design bases. Nowadays, ARN is developing specific guidelines showing safety criteria associated with storage of radioactive waste following the IAEA Safety Standards. These regulations will also include specific safety criteria associated with long term storage. In addition to periodical controls in existing storage facilities, specific inspections were performed owing to the fact that the operational periods will be extended to verify their radiological safety and require their improvement as necessary.

INTRODUCTION

Pacific uses and applications of nuclear energy in Argentina begun in 1950, year in which the National Atomic Energy Commission (CNEA) was created. In 1994 the CNEA was reorganized through the National Decree N° 1.540/94, creating the National Nuclear Regulation Entity (ENREN) as the authority empowered to control the activities related with nuclear uses. In addition, "Nucleoeléctrica Argentina S.A" (NA-SA) the responsible entity for the operation of NPP's, was created.

In the year 1997, the ENREN was changed to the Nuclear Regulatory Authority (ARN) by National Act N° 24.804, empowering the ARN to regulate and supervise the nuclear activity in all matters related to radiological and nuclear safety, physical protection and safeguards.

The National Act N° 25.018 "Radioactive Waste Regime" established in 1998, assigns CNEA the responsibility for the management of the radioactive waste generated in the nuclear facilities of Argentina through the National Radioactive Waste Management Program (PNGRR). In this context, the PNGRR has to develop the Strategic Plan for Radioactive Waste Management, in which the commitments that the National Government must assume for the safety of Spent Fuel Management and Radioactive Waste Management are outlined, ensuring public health, the protection of the environment and the rights of future generations.

As consequence of this regulatory framework, the PNGRR is the responsible entity for the design, construction, operation and closure of a radioactive waste repository. In this paper a brief description of the current situation regarding the storage of radioactive waste is addressed, as well as the ARN's position in this issue.

CURRENT SITUATION

The current Argentinian Nuclear Power Program includes two on load PHWR in operation "Atucha I" (CNA) NPP (357 MWe) -of a unique design- which is in operation since 1974, and "Embalse" NPP -a typical CANDU 600- which started operation in 1984 and will be facing a life extension for 20 more years in the upcoming months. A third Nuclear power plant, Atucha II (745 MWe) with a similar design of CNA is currently under construction and could start operating during 2013. Moreover, there are negotiations to build the fourth and the fifth nuclear power plants in the next years. These NPP's are operated by "Nucleoeléctrica Argentina S.A" (NA-SA).

In addition, in Argentina there are 3 Research Reactors operated by the CNEA: the RA-3 of 10 MW, the RA-6 of 1 MW and RA-1 of 40 KW. A project for a 4th research reactor, the RA-10, which will replace the RA-3 when it comes to its end of life, is currently under development.

A major project is also being developed by CNEA, which consists in a national prototype small reactor (CAREM) of 25 MWe.

All these nuclear facilities generate radioactive wastes which can be classified, in conformity with IAEA safety standards [1], according to its activity and half life into: exempt waste, very short lived waste, very low level waste, low level waste, intermediate level waste, high level waste.

Since the beginnings of nuclear uses, the radioactive wastes generated in Argentina were sent to the AGE facility. The AGE is a radioactive waste management site, operated by the PNGRR which includes the following facilities:

- Two final disposal trenches for solid radioactive waste (closed).
- Two underground silos for the disposal of structural solid waste and disused sealed sources (closed).
- Three trenches for very low level radioactive liquid waste disposal (closed).
- Facilities for treatment, conditioning and storage.
- Deposits for temporary storage of radioactive sources and wastes.

Since 1994, due to the article 28 of the Buenos Aires Constitution the radioactive waste generated outside Buenos Aires was forbidden to enter the province. This means that it could not enter in the AGE. As a result, Embalse had to store on site the radioactive waste while waiting for the final disposal site. The same happened with the research reactor RA-6.

In 1999, the PNGRR decided to stop the disposal of drums containing radioactive solid waste in the trenches of AGE. As consequence, Atucha I started to store the operational radioactive wastes generated in deposits inside the NPP site. The only radioactive waste that is still received by the AGE comes from the fuel nuclear fabrication plant, Mo-99 production plant, research centers, Research Reactor RA-3, and nuclear medicine centers.

The current storage facilities for radioactive waste in Argentina consist of:

- 3 storage facilities for radioactive waste in the Age: the "Interim Storage Deposit for Spent Sources and Radioactive Waste" (DAIFRR); the "Long Term Storage Deposit" (DAP) and the "Handling Yard and Stowage of Items" (PMEB).

- 2 facilities for low level waste storage in Atucha I NPP: “Interim Deposit of Radioactive Waste Drums I” (DATRR-I) and the Interim Deposit of Radioactive Waste Drums II” (DATRR I). There is also a storage system for mechanical filters from the reactor’s primary circuit and a storage system for exhausted ionic resin beds.
- 2 storages facilities for solid radioactive waste in Embalse NPP: “Deposit N°3” and “Deposit N°4”. There is also an exhausted resin storage tank.

The total volume of radioactive waste stored according to the 4th Argentinean National Report “Joint Convention on the Safety of Spent Fuel Management and on the Safety of Radioactive Waste Management” [2] is presented in the table below:

Facility	Total low level waste volume
AGE	938,6 m ³
Atucha I NPP	503,6 m ³
Embalse NPP	954.4 m ³

It’s important to stress out that with Embalse life extension a significant volume of radioactive waste will be produced. However, the NPP is currently designing new facilities to manage with these wastes.

According to the 4th Argentinean National Report “Joint Convention on the Safety of Spent Fuel Management and on the Safety of Radioactive Waste Management” [2], the country should have the definition of the site for the repository for very low level, low level and intermediate level waste by the year 2023. Its construction should be foreseen in such way to start operation in 2030. This situation leads to interim storage for longer periods of time.

Even though, the ARN continuously verifies the safety and security of the radioactive waste storage facilities, it is currently developing specific guidance including the main radiological safety issues for adequate long term storage. These guidelines take into account the IAEA Safety Standards and other international references [3, 4]. In the following section the main safety issues regarding radioactive waste storage are addressed.

GUIDANCE REGARDING SAFETY STORAGE OF RADIOACTIVE WASTE

The ARN is working in the establishment of requirements that could be applied, once approved by the Director’s Board, to any storage facility in the country using a graded approach depending of the type of radioactive waste, volume and radiological inventory.

- Radioactive waste storage facilities should be designed and operated in such way that the radiological safety requirements for workers, public and the environment are guarantee according to the ARN’s Safety Standards (AR.10.1.1. and AR 10.12.1).
- The responsible entity of a radioactive waste storage facility should develop safety assessments, taking into account the maximum radioactive inventory, for the design, construction, operation and decommissioning phases.

- The design and operation of the radioactive waste storage facility should guarantee the containment of the radioactive waste and allow their retrievability.
- The radioactive waste storage facilities should be design and operated in such way that the probability of contamination is kept to the minimum as reasonable achievable, using for example, impermeable coatings, containments, etc.
- The radioactive waste stored should be characterized, including alpha, beta and gamma emitters.
- The radioactive waste should be immobilized and the containment should be stable and resistant to deterioration. If it were necessary, shielding should be applied.
- The radioactive waste should be stored in such way that visual inspection can be performed.
- The design and operation of the storage facilities should take into account provisions for safety during normal operation as well as for low probability situations such as flooding, earthquakes, fires or other events. Radioactive waste storage facilities should count with security systems, such as, fences, video cameras, locks, as established in the ARN's standards.
- The design and operation of the storage facilities should be such that the maximum dose rate in contact with the external walls is 10 $\mu\text{Sv/h}$. In accesses, ventilation and cooling systems extra shielding may have to be considered in order to fulfill the dose criteria.
- The surface contamination level at a radioactive waste storage facility should be kept as low as reasonable as possible.
- If radioactive liquid waste were to be stored, they should count with drainage systems and equipment to detect possible leakages until their immobilization is fulfill.
- The radioactive waste that besides radioactive possess other hazards such as toxicity, inflammability, should be identified and stored in a different place than the rest of the radioactive wastes.
- The radioactive waste that could be cleared from regulatory control after a certain decay period should be stored at a recognizable sector from the rest of the radioactive waste.
- The responsible of the radioactive waste storage facility should count with the actualized mandatory documentation including the decommissioning plan.
- Records associated to the operation of the radioactive waste storage facility should be kept according to the implemented quality system. The perdurability of the records should be guarantee.
- Emergency procedures should be kept actualized and at reach of the personnel in charge of emergency situations. Storage Facilities should have appropriate technological devices of radiological protection according with the ARN requirements as ventilation, shielding, control leakages and control of temperature and humidity

SPECIFIC GUIDANCE FOR LONG TERM STORAGE:

Emphasis in the following requirements should be made for long term storage.

- Radioactive waste storage facilities should count with an identification system for the radioactive waste drums.
- Radioactive waste storage facilities should count with a record keeping system that guarantees the perdurability through time.
- Radioactive waste storage facilities should guarantee radiological safety and security during the storage period previous disposal.

- The responsible for the radioactive waste storage facility should demonstrate to the ARN that the integrity of the radioactive waste drums is kept during all the storage period.
- The licensee of the radioactive waste storage facility should present periodic radiological safety assessments to the ARN.

CONCLUSIONS

According to the 4th National Report “Joint Convention on the Safety of Spent Fuel Management and on the Safety of Radioactive Waste Management”, Argentina will be operating a repository for very low level, low level and intermediate level waste by the 2030. This situation leads to interim storage for longer periods of time. Moreover, given the nuclear power program that Argentina is facing, the volume of radioactive waste will increase in a significant quantity. Therefore, new storages will have to be constructed. In this context, a specific guideline is timely to favor the operators to manage with radiological safety and security. This guide should be guaranteed by establishing a series of requirements that assure these issues and also by continuous the periodical inspections from the ARN.

This guideline will be complying with the international recommendation standards and will be useful to verify the status of the facilities through the time.

REFERENCES

- [1] “Classification of Radioactive Waste”, General Safety Guide, GSG-, IAEA (2009).
- [2] “4th National Report presented at Joint Convention on the Safety of Spent Fuel Management and on the Safety of Radioactive Waste Management, IAEA (2012).
- [3] IAEA, Radioactive waste Storage. No. WS-G-6.1 – Vienna, 2009.
- [4] European Commission, Nuclear Safety and the Environment, Use of the existing building of the Püspökszilágy radioactive waste treatment and disposal facility for temporary storage of radioactive waste, EUR 19260, 2000.