

## **NEW RADIOACTIVE WASTE MANAGEMENT FACILITY IN ROMANIA**

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### **ABSTRACT**

Romania has a single nuclear power plant (NPP) located at the Cernavoda site. This NPP is CANDU 6, a Canadian type reactor design. At present, one single unit of the five that are planned for is in operation, and a second plant is under construction. The plant is owned and operated by Nuclearelectrica National Company (SNN). The currently operating NPP has only the initial pretreatment step in its waste management system. As it is described in specific documents of the International Atomic Energy (IAEA) documents, this pretreatment consists of collection, segregation, decontamination (if appropriate), precompaction and a period of on-site interim storage.

SNN has established a policy for the long-term management of its own waste. This includes the identification of a destination for the wastes in accordance with legal requirements and proven technologies, which will be acceptable to the regulatory body. For short-lived low and intermediate level wastes, a near surface disposal facility is being considered. For high-level wastes (mainly spent fuel), and long-lived low and intermediate level wastes, interim storage followed by geological disposal represents the most suitable option at this time. The top management of SNN has reviewed its strategy and established the target objectives for implementing its policy on medium term. For the next three years, priority will be given to constructing an independent spent fuel dry storage facility at the Cernavoda NPP site. Based on the selection process being followed in Romania, the supplier of the dry storage technology will be announced in early 2001.

This paper will present some aspects concerning future developments in radioactive waste management at the NPP site and the principal aspects of licensing the spent fuel dry storage facility by the Romanian safety and environmental authorities.

### **INTRODUCTION**

Nuclearelectrica National Company (SNN), under the responsibility of the Romanian Ministry of Industry and Trade, is the owner of the Nuclear Power Plant (NPP) located at the Cernavoda site. At present, only one of the five CANDU 6- reactors in construction on Cernavoda site is in operation. It produces more than 10% of the national electricity demand. The Romanian Government made public its commitment to continue the construction of a second unit, which is about 40% completed.

In Romania the largest producer of radioactive wastes is the nuclear power plant. According to the basic national laws on nuclear safety and environmental protection, SNN is responsible for management of its radioactive waste. In this respect, the company developed a radioactive waste management policy, which incorporates the practice in the country of the plant supplier (Canada) and the recommendations of International Atomic Energy Agency (IAEA) and the European Commission (EC). The policy established objectives and targets in accordance with the status of Cernavoda NPP project. For the short term, the priority of the radioactive waste management policy is to extend the spent

fuel storage capacity using the dry storage technology. The supplier of the dry storage technology will be announced early in 2001 based on a bidding process. In the absence of a specific national regulatory framework, the nuclear safety and environmental licensing processes of the spent fuel dry storage facility will follow the United States' Nuclear Regulatory Commission (NRC) approach and other European Union (EU) regulations.

## **EVOLUTION OF THE REGULATORY FRAMEWORK**

In the centrally planned economy of Romania[1] during the communist era, all aspects of nuclear activities were the responsibility of the state with no clear separation between regulating and implementing functions. The nuclear law dealt with general principles, referring mainly to the nuclear power plants and did not deal with radioactive waste or decommissioning. After 1990, once the "iron curtain" installed by the communism was removed, the regulatory systems were renewed by the new socio-political system. Reform of the Romanian society included the establishment of national institutions and the regulatory structure.

Two national authorities have the main responsibilities for regulating, licensing or performing institutional control in nuclear activities including radioactive waste management: the Ministry of Waters, Forests and Environmental Protection (MAPPM) and the National Commission for Nuclear Activities Control (CNCAN). The institutional reform will include also the settlement of a new organization in-charge with radioactive waste management in the country. Romania is a candidate country for acceptance into the European Union (EU). The harmonization of national legislation with EU legislation is one condition in that direction.

The basic laws already passed or reviewed by the Parliament refer to the general principles of nuclear safety and environmental protection applicable to all nuclear practices including radioactive wastes and spent fuel management. Thus, according to Law 137/1995 the environmental protection authorities conduct the licensing processes and issue environmental agreements and licenses. The agreement is required for any new investment and the license is required for the commissioning and operation of any new facility. There are central and local environmental authorities; the central authority being represented by MAPPM itself. The nuclear power plant and radioactive waste disposal facilities are licensed by the central authority, and the radioactive waste storage including spent fuel storage facilities are licensed by the local environmental authorities (called Environmental Protection Agencies). The licensing procedure is described by the Order 127/1996 issued by MAPPM. This order asks for an environmental impact study having a similar content to those required by the European Union legislation. Public debate is also required before issue of both environmental agreement and license.

The nuclear safety authority is represented by CNCAN organized under the Romanian Government. The basic nuclear safety law is Law 111/1996, which stipulates the licensing of nuclear installations, is issued in many steps: design, siting, construction, commissioning, operation and decommissioning. In general, any nuclear operator has to apply for a license in any important stage of a nuclear installation lifetime, including test operation, operation and maintenance, repair or refurbishment, preservation or decommissioning. A robust secondary legislation and formulation of management policies and programs must strengthen this new basic legislation. In this respect, CNCAN issued recently the Order 14/2000 approving the Fundamental Norm of Radiological

Safety. That norm establishes the requirements referring to the radiological safety of workers, public and environment and is harmonized with the European Directive 96/29/EURATOM. Currently, CNCAN continues [2] the process to review the existing national legal framework in the nuclear field against similar laws and regulations adopted by European Commission in the fields of nuclear safety, radiological protection, radioactive waste and spent fuel management, decommissioning of nuclear installations, civil liabilities, physical protection and safeguards. However, the specific requirements for licensing a spent fuel storage or disposal facility are still not available.

## **NEW RADIOACTIVE WASTE MANAGEMENT AT CERNAVODA NPP**

The Cernavoda NPP operates facilities [3] for the proper collection, pretreatment and storage of all low and intermediate radioactive wastes. The compactable and non-compactable radioactive wastes are packaged in stainless steel drums and stored in the concrete building of the Solid Radioactive Waste Intermediate Facility (SRWIF), located within the inner fence of the plant. The spent filters cartridges, spent filters and other large metallic items are stored in the holes of a special concrete structure belonging to the SRWIF. The design capacity of the SRWIF is for 18 years/reactor and it is planned to accommodate the waste from the second reactor, too. The spent resins are stored in two concrete vaults located in the service building. Each storage vault has a capacity of about 200 m<sup>3</sup>, together covering 15-20 years of the plant operation lifetime. The organic liquids and other types of radioactive waste packaged in stainless steel drums are stored on the service building basement. The spent fuel is stored in a pool with enough capacity for 8 years of operating the NPP (80% availability).

Taking into account the responsibility of its own waste management and the fact that the current NPP's waste management system addresses only the first step of the effective management - "the pretreatment", SNN established a long term policy for waste management. For implementing the policy on medium term, target objectives were established:

- a spent fuel dry storage facility, planned to be operational by the end of 2003;
- a near surface repository for low and intermediate level radioactive waste, planned to be operational by the end of this decade.

Thus, by the end of the next decade the Cernavoda nuclear site will include two CANDU reactors, an intermediate spent fuel storage facility and a LILW repository. The new projects will be implemented according to the international applicable standards. From the radiological protection point of view, each all-nuclear practice on the site will meet the requirements of CNCAN Fundamental Norm for Radiological Safety (harmonized with the EU Directive 96/29/EURATOM and International Commission of Radiological Protection recommendations).

The current radioactive waste management program of SNN covers those measures established to reach the following radioactive waste management objectives:

- to promote the new investment and construction of the spent fuel dry storage facility;
- to establish a methodology for the characterization of the raw radioactive wastes;
- to license the site of the future LILW repository. In the short term, the priority of the radioactive waste management program is represented by the construction of the

intermediate spent fuel dry storage facility

## **NUCLEAR AND ENVIRONMENTAL LICENSING OF THE NEW FACILITY**

The licensing of the intermediate spent fuel storage facility is based on the two basic laws no. 137/1995 for environmental protection and no. 111/1996 for Safe Deployment of Nuclear Activities. Because the specific requirements for nuclear licensing of the intermediate spent fuel dry storage have not been developed yet, CNCAN recommended the use of the following approach:

- the license will be issued in three steps: siting (based on the Preliminary Safety Assessment), construction (based on the Preliminary Safety Report) and commissioning (based on the Final Safety Report).
- the licensing process will be based on the Romanian laws and regulation supplemented with the US - NRC guides and regulations (10 CFR part 72, NRC Regulatory Guide 3.48 and NUREG 1567 and 1536)
- the recommended design guides for the interim dry storage facility are ANSI/ANS 57.9-1992 and CSA N 292.2.1996.

In order to shorten the licensing period of the dry storage technology, which will be selected in the bidding process, it should be proven at industrial scale and licensed at least in the country of the supplier.

As the new spent fuel dry storage will be built on the Cernavoda NPP's site (a licensed nuclear site) it is expected that the siting license will be obtained without any special problems.

The second step in the licensing process will be implemented with the technical assistance of the supplier. As part of delivery, the supplier is asked to provide a Preliminary Safety Report which complies with NRC Regulatory Guide 3.48 - Standard format and content for the safety analysis report for an independent spent fuel storage installation (Dry storage). With some additions, this document will be used to support our application for construction license issued by CNCAN.

The third step will be implemented also with technical assistance of the supplier. As the project will be implemented on a turnkey basis, the supplier will be involved in pre-operational tests, personnel training and commissioning of the facility. The application for the commissioning license will be supported with the Final Safety Report prepared with the technical assistance from the supplier.

In the licensing process, it is expected that difficulties may arise due to the very tight schedule (3 years) and the need to have a perfect synchronization with NPP operation (the plant modification can be done only during outages).

The environmental licensing will be implemented according to the Romanian Law 137/1995 for environmental protection. The environmental licensing procedure is described in the MAPPM Order 125/1996 and consists of the main steps:

- an environmental agreement for promoting the new investment;
- an environmental license for operation of the facility.

The environmental agreement is issued by the local Environmental Agency based on the project description, with the main information referring to the environmental impact, and the Environmental Impact Study (EIS), which meets the requirements of the national regulations. Referring to the content of EIS, the national legal requirements are harmonized with the specific EU Directive 97/11/EC on the assessment of the effects of certain public and private projects on the environment and are similar with specific American regulations. The EIS will be prepared with the technical assistance of the Supplier. A report on the EIS will be submitted to the local environmental authority for approval. The approved report is subject to a public debate. Public debate is the last step before the environmental authority's final decision and refers to any of the following: local announcement, mass-media publicity, public inquiry, as both the environmental authority and the applicant have previously agreed to. Not later than one month afterwards, the environmental authority takes the positive decision and announces it that has to issue the agreement if no other official appeal exists.

The local Environmental Agency also issues the environmental license. The procedure for issuing this license is similar with that for issuing the agreement, except that instead of EIS an environmental balance has to be prepared based on the MAPPM Order 184/1997 and a report on this document has to be approved by the environmental authority becoming subject to the public debate. The licensing procedure could last approximately nine months.

SNN expects that both licensing processes of the new spent storage facility conducted by the nuclear safety and environmental authorities will be difficult, at least for the reasons of tight schedule and absence of specific requirements for licensing this type of facilities. However, SNN will develop iterative processes with the different authorities, as a general approach being confident that the experience gained during the licensing processes for NPP, which was developed in similar conditions, is going to be a real advantage.

## **CONCLUSIONS**

In Romania, the single reactor of the CANDU-6 type has been in operation since December 1996 and a spent fuel dry storage facility is planned for commissioning by the end of 2003. The latter facility is part of a designed larger nuclear complex on NPP's site including two similar nuclear units, the spent fuel storage facility and a near surface disposal facility.

The supplier of the dry storage technology will be established based on a bidding process, earlier in 2001.

As the regulatory framework is under review or development in Romania, specific requirements for this type of technology are still not available, the applied requirements for licensing will be based on national laws and regulations but also on specific EU legislation and American regulations and standards, as the nuclear safety and environmental authorities have recommended.

Even the owner of the power plant, SNN, expects that the licensing processes will be difficult, and, based on its previous experience, it will develop iterative processes with the authorities being trusty that the licenses will be issued in a proper time schedule.

## **REFERENCES**

- [1] S. Webster, "Radioactive waste management in the European Union applicant countries," ENS – Topseal, 1999.
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- [3] V. Andrei et.al., "Radioactive waste management policy in Romania, WM2K, Tucson, 2000.