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CURRENT STATUS OF THE NEAR SURFACE REPOSITORY IN ROMANIA

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Abstract

The radioactive waste management at the Cernavoda NPP is based on collection, pretreatment and storage of all solid wastes. The disposal of operational and decommissioning wastes has been evaluated, based on the results of a research and development programme. A near surface disposal facility was selected and a siting process was implemented. The status of this project and its prospective are discussed in the paper.

1. DISPOSAL OF RADIOACTIVE WASTE IN ROMANIA

Starting with 1996 Romania became the 30th country operating a nuclear power plant. In 1998, the Cernavoda Unit 1, equipped with a CANDU – 6 reactor, supplied about 9 % of the Romania's electricity demand. In Romania, the total amount of radioactive waste produced since the nuclear activities started in the 50's is small when compared with the amount of toxic waste, and very small when compared with the solid waste of all types. According to the Romanian Atomic Act, the Law 111/1996, the radioactive waste resulting from the use of radioactive materials in industry, medicine, agriculture and research should be safely managed and disposed of in a way which must ensure the public and environment protection, now and in the future. Up to this moment, there is no a coherent waste management policy in Romania. The waste management is covered by the Institute of Nuclear Physics and Engineering for the L/ILW institutional wastes and by the utility for operational wastes. A national repository dedicated to the institutional low and intermediate level waste is in operation since 1985. The repository, situated at Baita in the west part of the country, was originally an exploration drift with several galleries at an open pit mine for uranium, which was exhausted in 1985. Mining was carried out by conventional techniques to ensure access and ventilation in the disposal galleries. The present capacity is 21,000 standard containers (200 litter drums) and is 25% full. The operator of the repository sustains that this capacity could be extended up to 150,000-200,000 containers. The facility was subject to IAEA-WAMAP and RAPAT missions, which recommended upgrading to improve safety and environmental protection. Currently, an investment planning is implemented regarding the in situ tightening of the already deposited containers, construction of geomembranes and up grading of final access route. The Cernavoda Nuclear Power Plant (NPP), in operation since 1996, was designed with facilities for collection, pretreatment and temporary storage of all types of operational radioactive waste which meets the requirements of international agreed standards for public and environment protection. Since 1992, the utility financed an R&D program in order to cope with the legal provisions regarding the disposal of radioactive wastes. This program was focused on the long-term management of radioactive waste [1]. The technical and economical studies entered upon within this program indicated that Baita repository is not a real solution for the disposal of fuel cycle radioactive waste, at least for the following reasons:

- high cost, in financial and safety terms, due to the long distance from the NPP to the repository (about 800 km);
- high disposal costs;
- it is better to build a new facility based on the present proven technologies than to upgrade an "old" facility with safety deficiencies;
- predictable local public opposition due to the extension of the tourism in the area;

Based on the results of R&D programme the utility considered as the best option the construction of a new near surface repository at the NPP site. The new repository will be designed according to the multibarrier concept, using as reference design the El Cabril repository in Spain. The new repository will accommodate all L/ILW produced at Cernavoda NPP as well as the wastes resulted from the decommissioning of power reactors.

2. THE SITING OF THE NEW REPOSITORY

The siting of a new repository is a difficult and complex task. Recognizing this difficulty, the utility financed an R&D program which aimed at selecting an acceptable site according the IAEA Safety Guides (111 – G – 3.1) [2]. The siting process started with the area survey stage. The region of interest was Dobrogea, the district including the NPP site (Figure1.). It is an old historical region with available data for geological zoning and a semiarid climate, suitable for siting a repository. An "ideal" site was the target of the investigations made by geologists. Almost 40 potential sites in Dobrogea region were evaluated. The screening phase reduced the number of candidates to two sites: Cernavoda at 2.5 km from NPP and Saligny situated in the exclusion zone of the NPP. The criteria for geology, tectonics, seismic, surface processes and protection of the environment were considered at that stage [3]. In fact, due to the vicinity of the two candidate sites, the geological characteristics are similar. An important moment of the siting process was the year 1996 when significant data were available for the radioactive waste inventory assessed on COG data, and for the conceptual design of the disposal facility. Even if the Cernavoda site seemed to have better geological characteristics, the social, economical and public acceptance factors prevailed for choosing the Saligny site as the favorite. This is an approach also recommended by IAEA Safety Standard 111 – G – 3.1 that notice " the clear aim must remain to find an acceptable solution with sufficient safety reserves instead a single ' best' solution". The main geological characteristics are the presence of a green schist fundament covered by prequaternary sediments. The quaternary deposits cover the whole area and have two components: a loess layer of 40-45 meters and an impermeable red clay layer of 10-15 meters. It is true that not all the site characteristics are favorable. At the surface the site consists of a silty loess layer, the natural bearing capacity is not satisfactory and the erosion potential is increased. A compacted process to improve the geotechnical performance of the loess layer was considered and an on site tests provided good results (Figure 2). An IAEA expert mission recommended the extension of the area of the compacted layer and the monitorization of its behavior. They also recommended upgrading the safety assessments, as the preliminary safety assessment used simple models and very conservative data. The experts agreed that Saligny site along with a proper design would provide radiological protection in compliance with national requirements and international standards. At the end of 1998, the available data enabled the owner of the power plant to submit a preliminary safety assessment for the siting license to the Regulatory Body.

3. STORAGE OR DISPOSAL

The Cernavoda NPP operates facilities 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 large metallic items are stored in concrete holes of a special concrete structure belonging to the SRWIF. The design capacity of the SRWIF is for 18 years/reactor. The spent resins are stored in two concrete vaults located in the service building. Each storage vault has a capacity of about 200 m^3, 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. Except the storage of the organic liquids and flammable solid waste, enough storage capacity is provided on the NPP site for all types of radioactive waste. According to some opinions, a new disposal facility for these types of waste does not seem to be an urgent task within the next 10 years. This controversial issue has to be carefully considered. The practice of the early conditioning, especially of the solid waste and spent resins, is largely used in

FIG.1. Area survey stage. Dobrogea area. Geological map. (1: 1,000,000)

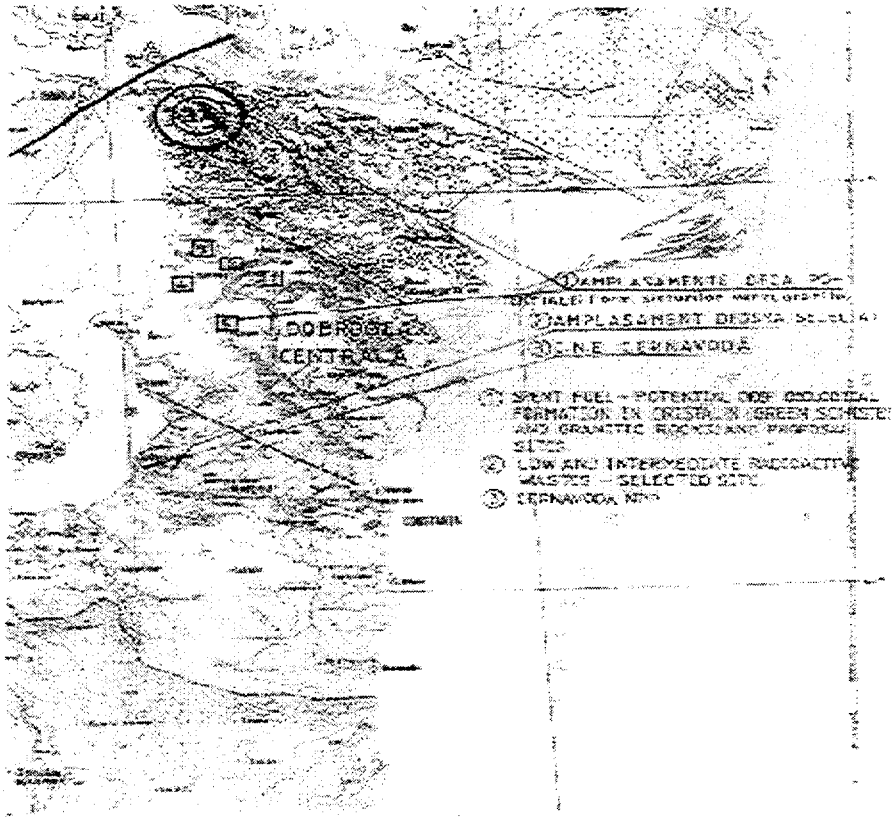
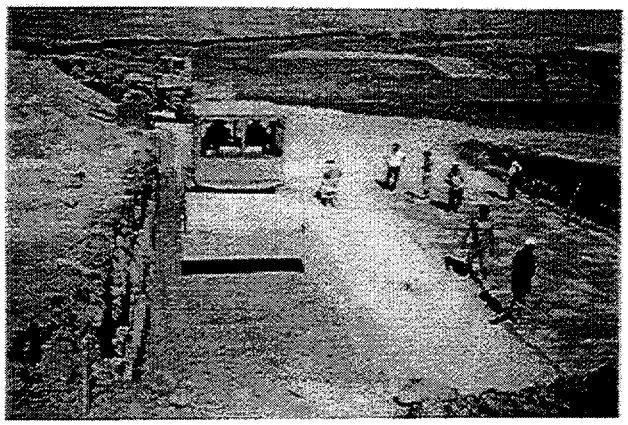
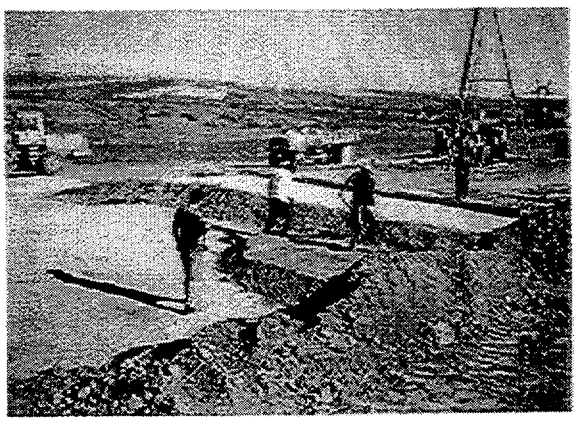


FIG. 2. Stabilization of the loessoid soils. Experimental area.





many countries. It was proven that higher cost in economical and dose terms were involved when the raw wastes are temporarily stored, waiting for future treatment and/or conditioning. In our case the Regulatory Body imposed the use of stainless steel drums for the temporary storage of raw solid wastes. On the other hand, the extended storage of raw wastes allows the radioactivity to decay and as a consequence, to lower the cost of treatment and disposal. For low and intermediate level operational wastes, the "wait and see" approach does not seem to be the best solution because the treatment, conditioning and disposal technologies are commercially available at competitive costs. In addition, the extended storage of raw wastes could induce increased costs of waste management due to the potential future public opposition. As concerns the high level wastes and spent fuel, the "wait and see" strategy seems to be the only sound approach for small countries. In this case, the disposal technology is not commercially available and the cost is high. For this reason, we have under development a project to extend the storage capacity at the power plant, using the dry storage technology. The recycling – disposal controversy is to be considered especially for decommissioning wastes. The Romanian society is more and more concentrating its attention on the concept of sustainable development. We will have to convince the public that we manage our radioactive waste in a safe manner without undue burdens on the future generation. The present legal framework in our country foresees only the public consultation in the licensing process of disposal facilities. In the future, we expect that the public will be directly involved in the decision making process for radioactive waste management.

4. CURRENT STATUS

According to the Romanian Atomic Act (Law 111/1996) the responsibility for radioactive waste management rests with the waste generator. In July 1998, the Romanian Electricity Authority was restructured and the nuclear power sector became "Nuclearelectrica" National Company. The radioactive waste management policy of our company established as the first priority the extension of the spent fuel storage capacity using dry storage technology. At the same time, the Regulatory Body suggested a national agency with responsibilities for the long-term radioactive waste management. But, any measure taken to keep an organization responsible for disposal of radioactive waste has to be preceded at least by legal previsions dealing with the transfer of radioactive waste management obligation [4]. These administrative measures postponed the implementation of the new surface disposal facility on Saligny site. Even so, the project is strongly supported by the Regulatory Body. Within the framework of a PHARE project, the waste acceptance criteria for the Saligny near surface repository were successfully developed [5]. With this occasion, the characterization of raw waste was identified as a priority of the radioactive waste management in Romania.

5. CONCLUSION

The disposal of the operational waste is a major step of the radioactive waste management strategy. The project of the near surface repository was proposed, based on an R & D program implemented since 1992. The siting process was successfully implemented based on IAEA guidelines. The project was postponed due to organizational problems and financial restraints. Over last two years, progress was made in the field of waste acceptance criteria for this new repository within the framework of a PHARE project.

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