

LICENSING ASPECTS REGARDING THE RBMN PROJECT

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ABSTRACT

The licensing process of a waste disposal facility is a complex and demanding undertaking. It proceeds in phases, starting with the site selection and ending many decades later, when the radionuclides decayed and no longer offer possible hazard. That is one of the reasons why the licensing process for the Brazilian repository for low and intermediate level radioactive waste (RBMN Project) is a challenge for all the technicians involved. Besides that, the only national experience associated to this subject arose after a radiological accident in the State of Goiás, in 1987. Two different institutions are involved in this licensing process: IBAMA, for environmental licensing, and CNEN, for nuclear licensing. Both of them will evaluate the possible impacts caused by the waste disposal, so it is essential to avoid conflicts and duplications of activities. The RBMN project has different teams for each main activity, and one of them is the Licensing group. This team has been planning the licensing activities for the repository, studying the legal framework and estimating costs and execution time for each step. This paper presents the status of the licensing activities regarding to the RBMN project done by the CNEN staff.

1. INTRODUCTION

The nuclear sector in Brazil faces many challenges, for example a small number of qualified technicians and the retirement of many of them in the last years. However, experiences all around the world show that the public acceptance of the nuclear energy is perhaps the biggest obstacle that the sector needs to transpose [1].

Previous experiences showed that in many countries, such as South Africa, Hungary and Lithuania, studies that considered only the technical aspects of the nuclear energy and, neglected the social ones, faced a huge opposition of the society and failed. As example, when the Lithuanian government decided to build a nuclear waste storage facility near to the borders of Belarus and Latvia, these countries did not agree and threatened to construct other enterprises considered dangerous, for instance chemical industries, also close to that geographic region. Some IAEA (International Atomic Energy Agency) experts had to interfere in order to solve the conflict, and finally the facility was built in Stabatiške [2].

The most important Brazilian experience related to disposal facilities is the repository built in the municipality of Abadia de Goiás – Goiás State (Figure 1). It was constructed to receive only the waste generated due to the 1987's radiological accident. The situation was unusual,

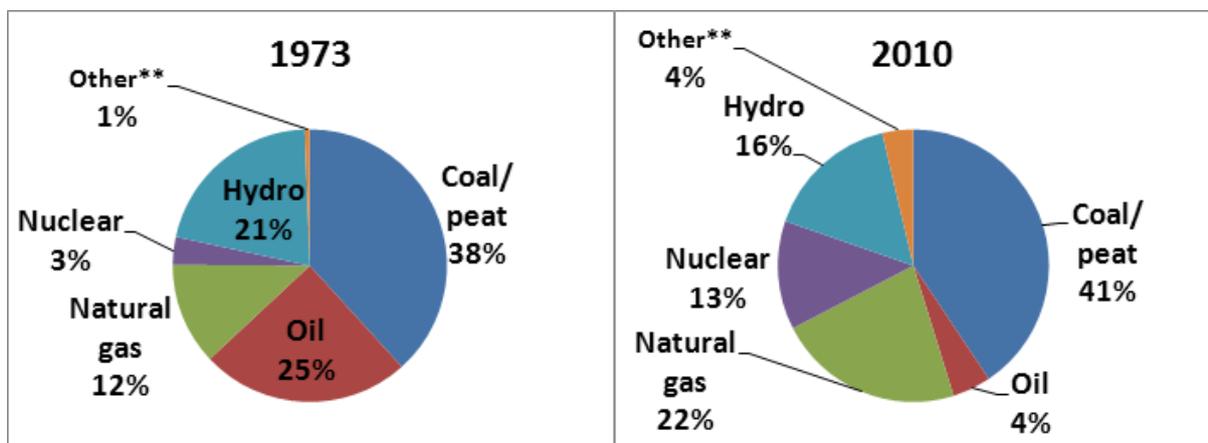
since urgent decisions had to be made due to the accident. Even though, CNEN (National Commission of Nuclear Energy), IBAMA (Brazilian Institute of the Environment and of the Renewable Natural Resources) and other institutions spent great efforts to provide the licenses for the operation of the disposal facility.

Nowadays, Brazil is planning a new repository for low and intermediate level radioactive waste, a project called RBMN. The current scenario is quite different from that of the previous repository, seeing that the goal is the disposal of the nuclear waste generated either at nuclear power plants of Angra I and II or at future Brazilian nuclear power plants and disposal of radioactive waste from other applications.

This new scenario means a bigger variety of radionuclides to consider in the safety case (not only ^{137}Cs , such as the existing repository) and new logistical issues, like many possibilities of the site location, considering that new nuclear power plants could be built in any part of Brazil. This increasing on nuclear matrix is quite expectable in Brazil, as it has been occurring all over the world, as shown in Figure 2.



Figure 1: Repository of Abadia de Goiás [3]



**Other includes geothermal, solar, wind, heat, biofuels and waste.

Figure 2: 1973 and 2010 energy matrix shares [4]

Considering the issues involved on the licensing process of a disposal facility, this work intends to present the activities already done by the group responsible for the licensing aspects of the RBMN project. The main tasks included the evaluation of costs and deadlines and a review of the regulatory framework associated and the previous Reference Term for the environmental licensing submitted to IBAMA. This article might open a discussion with other countries that are planning or constructing a repository, or already have overcome issues that Brazil is going to face. In the other hand, it may be a reference for countries that have no experience at all in this matter.

2. EVALUATION OF THE LICENSING PROCESS

The nuclear activities in Brazil are submitted to a wide and detailed licensing process that involves CNEN and IBAMA. These institutions evaluate the eventual impacts that the nuclear activities cause on the workers, public and the environment, allowing them to grant or not the licenses and necessary authorizations to the facilities project, construction, operation and decommissioning. Also, they establish the demands to be accomplished by the enterprise/operator to minimize their negative impacts, as well as to maximize their positive impacts.

In Brazil, the legal framework determines that an enterprise that might represent a big environmental risk must be licensed in three stages. The environmental licenses are granted by the IBAMA, and the nuclear ones by the CNEN. The details of aspects of Nuclear and Environmental Licensing should consider the types, classification and initial segregation of the radioactive waste and the adopted treatments. Tables 2 and 3 present the main steps in the environmental and nuclear licensing processes.

The nuclear regulation for Radioactive Wastes Deposits has been reviewed and this paper presents the information from the new regulation, which is not yet formally published. The nuclear licensing process is divided in three phases, seeing that the repository will be under institutional control for 300 years. If it were possible to decommission the facility, it would be required a fourth step, the Decommissioning Authorization [5].

Table 2: Steps of the environmental licensing process by IBAMA [5]

	First phase	Second phase	Third phase
License needed	LP PREVIOUS LICENSE	LI INSTALLATION LICENSE	LO OPERATION LICENSE
Main documents required	TRE –Specific Reference Term EIA/RIMA – Study of Environmental Impact and Report of Environmental Impact	Executive project of the facility Demonstrate the execution of IBAMA demands on the previous license	Verification of the enterprise general conditions Demonstrate the execution of IBAMA demands on the previous license
Main action authorized	Approval of the site for the installation	Construction of the facility.	Operation of the facility.

Table 3: Steps of the nuclear licensing process by CNEN [6]

	First phase	Second phase	Third phase
Authorization needed	Site Approval	Construction Authorization	Operation Authorization
Main documents required	Site Report (named RL)	Preliminary Safety Analysis Report (named RPAS)	Final Safety Analysis Report (named RFAS)
Main action authorized	Approval of the site for the installation	Construction of the facility.	Operation of the facility.

3. REGULATORY FRAMEWORK REVIEW

The regulatory framework was collected, taking into account the federal and state legislation. Considering the location of the existing nuclear plants in Brazil, as well the most developed region in the country, the regulatory framework of three states were investigated: Minas Gerais (MG), Rio de Janeiro (RJ) and São Paulo (SP). It is valid to emphasize that the research was split in eight different areas of interest, as shown in Table 4. CNEN is the institution that regulates the nuclear field in Brazil and IBAMA is the Brazilian main federal regulator for environmental aspects.

It is important to mention that Brazilian legislation is quite complex, so more than a thousand official documents were consulted. This paper presents only a brief summary of the main subjects of the laws collected.

4. EVALUATION OF COSTS AND DEADLINES

In order to guide the project management, a schedule of costs and duration of the tasks was developed, based on previous experiences from other countries [7, 8], studies done by the technicians from the Eletronuclear - utility responsible for the operation of the two nuclear power plants in Brazil [9] and on personal experience of the CNEN staff involved in the process. Tables 5 and 6 present the schedule constructed with these preliminary studies, respectively for environmental and nuclear licensing.

Table 4: Areas of the regulatory framework review and its main observations and groups of laws.

Area	Main observations	Main regulators/legislators or groups of laws involved
Selection of sites for radioactive waste disposal	The most specific regulation on this matter is the CNEN Regulation [10].	Federal Constitution, Federal laws ¹ , CNEN Regulation and State laws ¹
Concepts and standards for preservation of protected areas	See note 2	Federal Constitution, Federal and State laws ¹
"Ecological economic zoning" (or similar ones, such as regional development plans)	The research emphasized the allocation and use of public and private areas for agrarian reform and protection of indigenous lands	Federal Constitution Federal laws ¹ State laws ¹
Protection and/or preservation of geological monuments, species and relevant habitats archaeological/paleontological sites, historic landscape and cultural heritage, geomorphological features, waters (surface and underground, recharge areas, etc.) and of the land.	The appropriate regulators will be consulted directly by IBAMA inside the environmental licensing process.	Federal laws ¹ State laws ¹
Compensation rules for states and/or municipalities due to the implantation of radioactive waste storage in their geopolitical boundaries;		Federal laws ¹ State laws ¹ IBAMA ³ Procedures
Preparation of the Environmental Impact Study and the legal aspects in participatory processes and public hearings.	The study will be presented to the federal regulator, but state and municipal laws must be observed. The state and municipalities will be consulted directly by the federal regulator.	Federal Constitution Federal laws ¹ IBAMA Procedures State laws ¹
Comparison between national and international legislation related to radioactive waste storage, disposal and transport	This is a collection of international agreements and IAEA Publications related to disposal facilities	Some agreements and IAEA Recommendations became law in Brazil.
Transport of dangerous cargo	The transport will be an important matter to take the waste from the generator to the repository. The emphasis of the research was on the transport of radioactive materials, including safety, packaging and storage issues, and speed limits in the case of road transport.	CNEN [11], Ministry of Transports , ANTT – National Agency of Terrestrial Transports, DNIT – National Department of Terrestrial Infrastructure, PRF – Federal Road Police, DER – Roads Department.

1- The word “laws” in this table is used to indicate any official document issued by the government that determines obligations to be attended.

2- Brazil has the following kinds of protected areas: A - Integral Protection Units: Ecological Stations, Biological Reserves, National Parks, State Parks, Natural Monuments, Wildlife Refuges, and similar ones; B - Sustainable Use Units: Environmental Protection Areas, Areas of Ecological Interest; Forests; Extractive Reserves, Wildlife Reserves; Sustainable Development Reserves; Private Reserves of Natural Heritage, and similar ones; C - Other ratings, such as Areas of Permanent Preservation, Areas of Legal Reserves and similar ones.

Table 5: Environmental licensing: estimated costs and deadlines.

Step	Duration	Estimated Cost
Complete Environmental licensing	1095 days	Bigger than R\$ 5.800.000,00
Pre operational program of environmental monitoring, including: <ul style="list-style-type: none"> • Analysis of the waters, air, soils, local flora and fauna • Radiometric survey • Anthropic environment survey 	365 days	R\$ 4.000.000,00
Previous license – LP: <ul style="list-style-type: none"> • Preparation of IBAMA reference term • EIA/RIMA elaboration, including to hire the consultant and elaboration of the studies; • Official public audiences 	510 days	R\$ 1.400.000,00
Installation license – LI: <ul style="list-style-type: none"> • Requirement and analysis of the documentation for the LI. 	240 days	The main cost will be the elaboration of the Executive Project
Operating license – LO: <ul style="list-style-type: none"> • Requirement and analysis of the documentation for the LO. 	300 days	R\$ 400.000,00

The estimation of the deadlines is very variable. It depends on the quality of the environmental studies and on the requirements specified by the regulator. According to Brazilian legislation, the characteristics of the enterprise and its activities will define the duration of the licensing process analysis performed by the regulator. In the case of this repository, the regulator has 12 months to require further information. The requirements must be attended by the enterprise in about 4 months, but this span of time might be discussed between the regulator and the enterprise [12]. The process for public acceptance of the repository may also extend the licensing duration.

Thus, the total duration of the environmental licensing process was estimated in three years. This is the duration for the first three licensing steps; after that, the operational license will be periodically renewed. It is important to address that this duration will depend also on the constructing time for the repository, since the Operating License will be required only when the repository is almost ready to be commissioned.

The estimative of the deadlines is not very optimistic, seeing that the nuclear licensing for a repository is a complex task. As an example, El Cabril, the Spanish surface repository for low and intermediate level waste, took seven years from the beginning of the studies for site location to the beginning of the operation (1986 to 1993). [13]

Table 6: Nuclear licensing: estimated costs and deadlines.

Step	Duration	Estimated Cost
Complete Nuclear licensing	1845 days	Bigger than R\$ 5.000.000,00
Site Approval <ul style="list-style-type: none">• Hiring services for obtaining CARL and preparing RL (site report)• Delivery and analysis of RL	920 days	R\$ 1.000.000,00
Construction Authorization <ul style="list-style-type: none">• Hiring services for the Preliminary Safety Analysis Report (named RPAS)• Delivery and analysis of the report	650 days	R\$ 2.000.000,00
Operation Authorization <ul style="list-style-type: none">• Hiring services for the Safety Analysis Report (named RPAS)• Delivery and analysis of the report	365 days	R\$ 2.000.000,00

5. REFERENCE TERM

The reference term is a document created to guide the elaboration of the environmental studies. It is normally prepared by the regulator, but in some specific cases, the regulator might require a first draft of the reference term from the entrepreneur.

The legislation is not specific about the reference term. It mentions general requirements and the concept of the environmental study, called EIA. Among the regulatory framework consulted, the main documents regarding this study are the Law 6938/81 [14], the Resolutions 001/86 [15] and 237/97 [12], from CONAMA (National Council for Environment - a governmental federal council) and the Normative Instruction from IBAMA 184/2008 [16].

The reference term must cover the environmental diagnosis and complete description of the environmental resources and their interactions, considering the environment in the geographic, biological and socio-economical aspects. The study also analyzes the environmental impacts and its magnitudes. After this analysis, the environmental study must provide information about the measures that will be taken to minimize or avoid the described impacts.

6. CONCLUSIONS

The licensing process for a low and intermediate level radioactive waste disposal facility is a new challenge in Brazil. The environmental legislation and nuclear regulatory framework will have to be attended in the steps of the planning, construction and operation.

New matters will appear as times goes by, and the most important ability, besides the technical knowledge, will be the skills to adapt to new situations. The public acceptance will be an essential issue. To facilitate this dialog with the public, all the process must be conducted with extreme transparency and confidence.

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