



# Improving the Technical Management of Nuclear Licensing Processes in Brazil: the Applicant's Role

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## 1. Introduction

The licensing process for a nuclear facility is a very complex activity, which requires a lot of time and a large amount of human and financial resources from both parties: the applicant and the regulatory authority. To save time and money during nuclear licensing processes and, consequently, accelerate the implementation of a Nuclear Power Plant (NPP) or a fuel cycle facility, some actions associated with the applicant's technical management can be applied. These actions aim to improve transparency, clarity and traceability of the information presented to the regulatory authority during the licensing process; as a result, efforts are saved on both sides and the process can evolve more effectively. This is particularly important nowadays, considering nuclear energy as one of the most important alternatives to promote energy transitions aimed at providing carbon-free energy. In order to take advantage of this window of opportunity to expand the application of nuclear energy, one of the points of attention shall be the licensing process, which needs to be more assertive. In this sense, the objective of this paper is to present and discuss some actions that can be adopted by the nuclear license applicant in Brazil to improve the technical management of the process, contributing to the overall quality of the licensing process.

## 2. Methodology

This paper considers the normative basis applied to nuclear licensing processes in Brazil. In this paper, it was considered that the steps to be followed for the applicant to obtain the licenses and authorizations are those presented in the CNEN NE 1.04 [1] standard, based on the requirement of Partial Construction Licenses and Authorizations for (Initial and Final) Operation, according to the construction and operation phases of the nuclear facility. The main aspects related to the technical management of the licensing process, from the applicant's point of view, are presented and discussed with a view to improve this process.

## 3. Results and Discussion

The experience arising from the technical management of different licensing processes, from the license applicant's point of view, shows that some topics are of particular interest and can be used to improve the quality of the licensing overall process. Some of these topics are presented and discussed below:

- the license applicant shall maintain in its organizational structure a technical area specifically dedicated to technical licensing activities: the overall licensing process for a nuclear facility

requires a high degree of internal organization from the applicant, in order to allow the licensing requirements to be met in each phase of the process. To this end, this technical area will be responsible for all management activities necessary for the development of the process, and it will also be responsible for coordinating the internal and external interfaces necessary for the development of the licensing process, including direct contact with the regulatory authority body. This technical area shall also include the Safety Analysis group, responsible for carrying out activities related to deterministic and probabilistic safety analysis, including consequence analysis, which will support the overall licensing process;

- the applicant shall agree with the regulatory authority the normative basis to be applied: this definition will guide the format and content of licensing documents, as well as provide a guide on the level of detail to be presented during the licensing process. Depending on the specificities of each facility, it may be interesting to discuss with the regulatory authority the possibility of mixing different normative and documentary bases, such as NRC [2, 3, 4] and IAEA [5] recommendations. This can be particularly important for First-Of-A-Kind (FOAK) facilities [6, 7];
- the applicant shall produce systemic documents to internally guide the preparation and processing of licensing documents: these systemic documents will define the format, content and responsibilities of the authors of each type of document, such as technical reports, safety analysis reports, plans and programs. Special importance shall be given to Preliminary and Final Safety Analysis Reports, which are the main licensing documents [1]. Considering that these documents contain a large amount of data and information, it is important to define, preferably in agreement with the regulatory authority, the methodology to be applied to control their review processes. Taking into account that these main licensing documents are in a process of continuous evolution, the traceability of the information needs to be known and maintained during all phases of the installation's life;
- the applicant shall define, in agreement with the regulatory authority, the priority of the activities to be carried out: this shall be based on the schedule and milestones for the development of the design, construction, commissioning, and operation of the facility. Considering that human and financial resources are limited on both sides (applicant and regulatory authority), it is essential to define priorities and present to the regulatory authority all the necessary information to meet the requirements of each phase. This will reduce the risk of breakages during the licensing process;
- the applicant shall implement a rigorous technical review process of the documents that will be submitted to the regulatory authority: the technical area in charge of the technical management of the licensing process shall internally define a review chain for licensing documents to ensure that the information are presented with the highest degree of clarity and confidence possible. For instance, technical reports that present answers to questions raised as demands by the regulatory authority shall be rigorously reviewed to certify that their content are accurately answering the open question. This will contribute to the assertiveness of the licensing process and avoid possible rework for applicant, as well as for the regulatory authority body;
- the applicant shall maintain contact with the regulatory authority during all stages of the licensing process: it is important that the applicant builds a relationship with the regulatory authority based on transparency and trust. To do this, the applicant shall work internally to control the organization and traceability of information, which will serve as the basis for the development of a robust licensing process. As part of this, it is extremely important that the

applicant meet the deadlines agreed with the regulatory authority to provide the licensing documents. Through this process, it will be possible to be closer to the regulatory authority and anticipate possible problems associated with the evolution of the licensing process;

- the applicant shall make efforts to dynamically solve open technical issues presented by the regulatory authority during the evolution of the licensing process: it is important for the applicant to have instruments that allow it to provide answers to the regulatory authority with the dynamics that the licensing process requires to avoid breakages during this process. In this context, specifically in Brazil, it is possible to save time by using the legal framework of science and technology to resolve technical issues, especially for facilities that are considered as FOAK [6, 7]; and
- the applicant's technical area in charge of the licensing process shall coordinate the internal interfaces connected to the licensing process: this coordination shall comprise training, preparation for regulatory inspections, and conducting activities to optimize the licensing process. One of the most important interfaces is with the quality assurance team, which is responsible for many activities that are fundamental to comply with the licensing requirements.

Some of the points discussed above require control of a large set of information, which depending on the complexity of the installation to be licensed involves a huge amount of data; in this context, it is recommended the development of a computational tool dedicated to supporting the licensing process. This tool can be integrated with other computational tools, such as the one used to control design documents. This action, despite the high degree of complexity, can be very powerful in improving the traceability of information throughout the licensing process.

#### **4. Conclusions**

Practical experience in nuclear licensing processes shows that many points can be improved in the technical management, from the point of view of the license applicant, to enhance the exchange of information with the regulatory authority and the overall quality of the licensing documents. All these activities are deeply linked to the degree of internal organization of the applicant; in this sense, the greater the degree of organization, the more effective the process will be. The main points of attention presented and discussed here denote that some of them are simple to implement and others are more complex, including managing different interfaces and developing a dedicated computational tool. To achieve the objective of improving transparency, clarity and traceability in the Licensing process in Brazil and making it more assertive, it is necessary for the applicant to work based on a continuous improvement process; this will be the basis for building a more assertive nuclear licensing process, saving efforts and time.

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