

## DEVELOPMENT MODEL TO PUBLIC HEARING FOR ENVIRONMENTAL LICENSING OF NUCLEAR FACILITIES

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### ABSTRACT

The use of nuclear technology has always been a matter of concern from an environmental point of view. Although disputed, the generation of electricity in nuclear reactors was considered a source of clean emission in relation to emission of gases responsible for the greenhouse effect. In Brazil, nuclear activities are regulated and supervised by the Brazilian Commission of Nuclear Energy – “CNEN”. Environmental issues associated with nuclear activities are described by CONAMA, and the developments in this area are licensed by IBAMA, regardless of obtaining nuclear licenses issued by CNEN. Obtaining environmental licenses (prior, installation and operation) depends initially on preparing the Environmental Impact Study – “EIS” and the Environmental Impact Report – “EIR”, consisting of a presentation of EIS in language accessible to all. EIR is forwarded to bodies and entities with some connection to the enterprise, to be manifested with IBAMA about the relevance of its content. This information serves as a resource for Public Hearings, which are meetings organized by entrepreneurs, conducted by IBAMA, and rely on public participation, can be considered as a licensing step. Public Hearings are subject to subjectivity, and the model proposed in this research becomes more objective ill-defined, difficult to understand actions for the entrepreneur.

### 1. INTRODUCTION

According to Tavares (2012), the first nuclear reactor has started to be constructed in November 1942, under the stands of the athletic stadium of Chicago University, under leadership of the Italian physicist Enrico Fermi. In Brazil the first reactor constructed was IEA-R1, in former Instituto de Energia Atômica – IEA, currently Instituto de Pesquisas Energéticas e Nucleares – IPEN/CNEN, located in the Universidade de São Paulo campus, there were subsequently TRIGA (Training, Research, Isotopes production, General Atomics), Mark-1 from the Instituto de Pesquisas Radioativas – IPR (currently CDTN), located in the Universidade Federal de Minas Gerais campus (Pampulha) in Belo Horizonte, and in Universidade Federal do Rio de Janeiro campus, in Ilha do Fundão, the ARGONAUTA. In

1988, IPEN/MB-01 went into operation, which was the first nuclear reactor genuinely Brazilian nuclear reactor, result of a partnership between the Navy of Brazil and IPEN.

The Brazilian nuclear program has started in 1969, when the Government acquired the Angra I power plant from *Westinghouse* (EUA), and installed in Angra dos Reis in the Itaorna beach.

In 1975, an agreement was signed with Germany, which provided for the construction of eight power plants. Currently, Angra II and Angra III were built, and the latter has not been opened yet. Between 1970 and 1990 the construction of nuclear power plants was presented as an alternative method to the use of fossil fuels to generate electricity.

One should also take into account that nuclear radiation has applications in various sectors, such as: restoration of art works, electric power generation, ship propulsion, diagnosis and treatment of several diseases, particularly cancer of nature ones.

In 1959, the Instituto de Energia Atômica was producing radioisotopes for medical, industrial and research use. In modern medicine, exempt the use of radiopharmaceuticals in the diagnosis and treatment becomes almost impossible. Radiopharmaceuticals can be defined as substrates which contain a radioactive atom in its structure, and can be regarded as vectors that have certain specificity for an organ or physiological or pathophysiological function (ARAÚJO, E. *et al.*, 2008, p.1).

In 2010 the Brazilian Federal Government started the construction of the Brazilian Multipurpose Reactor (“RMB”), to be installed on land donated by the Navy of Brazil to the Brazilian Nuclear Energy Commission, in the Aramar Experimental Center in Iperó - São Paulo, whose goal is to provide a strategic infrastructure for the development of activities of the nuclear sector in areas of social applications, electric power generation, and marine propulsion (OBADIA, 2010).

It is noteworthy that some activities such as ports and terminals ore, oil and chemicals, oil pipelines, gas pipelines, mineral pipelines, trunk collectors and outfalls of sewage, fossil fuel extraction, ore extraction, landfills, power generation plants, nuclear and airport facilities are causing environmental impact, as defined by Article 2 of Resolution No. 1 of 1986 (CONAMA 001/86), and as activities capable of modifying the environment, they require legal licensing, as well as depend on the EIS (Environmental Impact Study) and EIR (Environmental Impact Report) (BARBIERI, 2004), and they shall be licensed for the major inspection agency, IBAMA.

According to the Brazilian Federal Constitution of 1988, the environment is considered a good of all and must be protected by the public power and by the community for the present and future generations. The Constitution further states, in Article 225, that is the duty of the public power and the community to protect the environment, that is, this is the duty of everyone, that is, non-governmental organizations, trade unions, industries, merchants, farmers, Brazilian citizens and foreigners residing in the country, and the public power. The environment is, at the same time, a well and a duty of all (OLIVEIRA, 2007).

After the preparing of EIS/EIR, they should be available to the public and interested bodies to be made comments and subsequently conducting public hearings to discuss these reports

as provided in Resolution nº 9, 1987 (CONAMA 009/87). The license of the competent body will not be valid if the public hearing is not held.

Public hearings are organized meetings aiming to take and disseminate to the public information on EIR (Environmental Impact Report) and with the participation of people, authorities and environmental organizations or not which have an interest or responsibility in relation to those themes.

To carry out public hearings some important aspects are considered, such as the publication in the Official Gazette and the disclosure including local and regional newspapers. Representatives of the entrepreneur should be prepared for presentation on the project and the public hearing (ROTEIRO DE AUDIÊNCIA PÚBLICA, 2009).

## **2. ENVIRONMENTAL LICENSING**

In turn, the environmental licensing is the complex of steps that make up the administrative procedure, which aims to grant environmental license (FIORILLO, 2013, p.236).

Environmental licensing was regulated by the Union in 1981, by Law 6938 of August 31, 1981 - which provides for the Brazilian Environmental Policy ("PNMA"). Its article 10 states: "The construction, installation, application and operation of businesses and activities using environmental resources, effective or potentially polluting or likely in any way to cause environmental degradation will depend on prior licensing by the competent bodies" (IBAMA, 2013).

Cunha and Guerra (2012) state that the environmental license is one of the instruments required for the implementation of activities causing environmental impacts, is an early instrument of environmental control for activities modifying the environment.

By the environmental impact, it is understood "the changes in the physical, biotic and social environment resulting from ongoing or proposed human activities" (BARBIERI, 2004).

CONAMA Resolution 001/86 established criteria and guidelines for carrying out the Environmental Impact Assessment (EIA) and the preparation of the Environmental Impact Study (EIS) and its respective Environmental Impact Report (EIR), with possible access by the public through conducting public hearings (ROCHA, 2008).

The main guidelines for the environmental licensing execution are expressed in Law 6.938/81 and CONAMA Resolutions No. 001/86 and No. 237/97.

The Brazilian Institute of Environment and Renewable Natural Resources (IBAMA) is responsible for the licensing of projects and activities with significant environmental impact at national or regional level, designed to search, plow, produce, benefit, transport, store and dispose radioactive material, at any stage, or using nuclear energy in any of its forms and

applications, upon the opinion of the Brazilian Nuclear Energy Commission - CNEN (CONAMA, 2013).

## 2.1 Nuclear Licensing

In order to hold and/or establish any nuclear activity or nuclear, there is the need for nuclear and environmental licensing, which processes should be submitted respectively to both the Brazilian Nuclear Energy Commission (CNEN) and the Brazilian Institute of Environment and Natural Renewable Resources, IBAMA.

It is to be emphasized that the nuclear activity in the country is covered by the legislation as follows:

- **Brazilian Federative Republic Constitution of 1988:**

"Art. 21. It is responsibility of the Union:

.....  
....."

XXIII – to explore the services and nuclear facilities of any nature and exercise state monopoly over research, plow, enrichment and reprocessing, industrialization and trade in nuclear ores and derivatives, provided the following principles and conditions:

a) all nuclear activity within the national territory shall only be admitted for peaceful purposes and with the approval of the Brazilian Congress;

b) under regimen of permission, marketing and use of radioisotopes for research and medical, agricultural and industrial uses; (Writing presented by Constitutional Amendment No. 49, 2006)

c) under a permission regimen, the production, marketing and use of radioisotopes with half-life equal to or less than two hours are authorized; (Writing presented by Constitutional Amendment No. 49, 2006)

d) civil liability for nuclear damage regardless of fault; (Included by Constitutional Amendment No. 49, 2006).

..... "

"Art. 22. It is incumbent on the Union to legislate on:

.....  
....."

XXVI nuclear activities of any nature;

.....

Sole paragraph. A supplementary law may authorize the States to legislate on specific issues of the matters listed in this article. "

"Art. 225. Everyone has the right to an ecologically balanced environment, as well as of population common use and essential to a healthy quality of life, imposing to the Public Power and the community the duty to defend it and preserve it for present and future generations.

.....

IV according to the law, require the installation of works or activity potentially causing significant degradation of the environment, prior environmental impact study, which shall be made public; (Regulation)

.....

§ 2. Those who explore mineral resources shall be required to restore the degraded environment, in accordance with the technical solutions demanded by the competent public agency, as law.

§ 6 Power plants operating by nuclear reactor shall have their location defined in Federal Law, without which cannot be installed. "

According to the standard CNEN-NE-1:04 July 1991, the licensing of nuclear plants involves the following steps (INB, 2013):

- Local Approval: where CNEN approves the location, population distribution, access roads, physical environment characteristics, influence on the environment and possible accidents, preliminary program of environmental monitoring,
- Construction License (total or partial): for this license, data are needed on the preliminary schedule of work, deadlines for completion of the intended construction and documents such as the Safety Analysis Preliminary Report (RPAS) and the Preliminary Plan of Physical Protection.
- Authorization for Use of Nuclear Materials (AUMAN): this must be requested to CNEN, and shall be granted if requirements as the applicant is technically qualified to use nuclear material to nuclear material control procedures are met, proposed by the applicant in the Control Plan follow the Standard CNEN-NE-2.2 and additional conditions required by CNEN are met, in order to promote better control of nuclear material.
- Authorization for Initial Operation (AOI) and Authorization for Permanent Operation (AOP): this must be required in two steps; the first is relative to the initial operation and the second to the entry into operation permanently. The documents required to obtain the Authorization for Initial Operation (AOI) are the Final Safety Analysis Report (RFAS) and the Final Physical Protection Plan. Data required for obtaining the (AOP) refers to the desired operation term, supplement details relative to the applicant which were not included in RFAS, detailed report describing the development of activities in AOI phase, detailed report, presenting the results of tests performed during initial operation, Quality Assurance program and the demonstration that the construction of the installation is completely finished.

## 2.2 Licensing Phases

Environmental licensing is divided into three phases namely: preliminary license (PL), installation license (IL) and operation license (OL), where for prior license acquisition, there is need for discussion and analysis of the Impact Environmental Study (EIS) and its respective report, the EIR.

According to Barbieri (2004), all environmental licenses have an expiry date, and for each, preliminary license (PL), installation license (IL) and operation license (OL), there is a maximum and minimum deadline, as stated in the table below.

**Table 1.**Expiry dates of environmental licenses

Type of License	Maximum period	Minimum period
Preliminary license (PL)	5 years	Established by the environmental plan schedules. This may be extended provided that the maximum period is not passed.
Installation License (IL)	6 years	
Operating License (OL)	10 years	Minimum of 4 years or according to the environmental plans. Specific deadlines for enterprises subject to termination at shorter terms.

**Source:** Adapted from Barbieri, 2004.

Regardless of the required type of license, regimental deadline for the environmental body to manifest about the application is up to six months, except in the case of requirements instructed by EIS/EIR, when the term is up to 12 months. Regarding the revalidation requirements of OL, the regimental period is 90 days. Time spent by the entrepreneur to submit further information is not computed into these terms. (SEMAD, 2015).

### 2.2.1 EIS/EIR

The regulation process of environmental licensing initiated by CONAMA Resolution No. 001/86, which established general guidelines for the preparation of the Environmental Impact Study and the respective Environmental Impact Report - EIS/EIR in environmental licensing processes, also defining criteria for application. EIS/EIR constitutes an important means of implementation of a preventive policy, therefore is a subsidy document the environmental licensing process (CADERNO LICENCIAMENTO AMBIENTAL, 2009).

The Environmental Impact Study is one of the tools needed to characterize if the enterprise may be causing environmental impact, and this is the responsibility conceptualization of the licensing body (MACHADO, P., 2009).

### 2.2.2 Preliminary license

It is the first step of licensing where the licensing body evaluates the location and the area suggested for the installation of the project, observing municipal, state or federal plans for land use.

The preliminary license contains the basic requirements to be met in stages of location, installation and operation, which should guide the executive project (ARAÚJO, S., 2002).

### 2.2.2 Installation license

As provided in art. 8, II, of CONAMA Resolution 297/97 the installation license (IL), preceded by the preliminary license (PL), is one that "authorizes the installation of the project or activity according to the specifications of the approved plans, programs and projects including environmental control measures and other conditions..." (FIORILLO, 2013).

### 2.2.3 Operation license

This step is the license authorizing, after some checks that stated in the previous licenses, the beginning of activities and operation of pollution control equipment (BARBIERI, 2004; FIORILLO, 2013).

In order to adapt to licenses for certain specific needs, some agencies include other types of license. IBAMA created the Pre-Operation License for the test phase of pollution control equipment, license granted according to project characteristics.

Cunha and Guerra (2012) also list other technical documents that may be required to obtain license, such as the Environmental Control Plan (PCA), Environmental Control Report (RCA) and the Degraded Areas Recovery Plan (PRA), all relating to mineral extraction activities.

For activities that do not fit in mineral extraction, the legislation does not require these documents, however, some environmental bodies make use of them especially in places where there are already negative effects of projects previously installed.

## **3. PUBLIC HEARING**

CONAMA Resolution 009/87 provides for the holding of public hearings on the environmental licensing process, while CONAMA Resolution 01/86, cites in art. 1 that public hearings aim to expose to the interested parties the content of the product under analysis (EIS) and its referred EIR, settling questions and collecting from persons related criticism and suggestions (CONAMA, 2015).

According to Figueiredo (2007), the Constitution of 1988 allowed democracy to take place through the representatives of the people, the public interest, the community through public hearings, diffuse and not individual right based on Law 8666/93 art. 39, which regulates the Tenders and Contracts and which opened the doors to popular participation.

This same law, in art. 12 also indicates that the examination of the environmental impact is essential and cannot be neglected (MACHADO, P., 2009).

Other laws made mandatory to carry out the public hearings, as the Administrative Process Laws (Federal and from São Paulo No. 9784/99 art. 32 and 34 and 10177/98, art. 29 and 31, the Fiscal Responsibility Law (Complementary Law No. 101/2000, art. 9) and the City Statute (Law No. 10257/2001, art. 2, XIII), and Telecommunications and Electricity laws.

In public hearings, the public can give an opinion on the possible impact of the facilities, but most often, there is lack of clarification on the rights and on own environmental licensing process, where the effective participation comes at a time when the agreements reached between the bodies concerned has been effectively accomplished. (ZHOURI, 2004).

In the USA system, responsible for drafting the Environmental Impact Study (EIS), public confidence on this expertise is inadequate with regard to the unsolved problems of nuclear facilities, such as emergency evacuation, disabling the facilities and the final destination of waste. Public participation is necessary for the effective management on the risks (MACHADO, P., 2009).

Baptista (2006) states that the public hearing is characterized by public and personal debate between the Administration and citizens or organizations representing civil society on issues of prominent public and social interest, and has as function the exchange of information where intentions on the project are identified and discussed, avoiding misunderstandings for the approval and implementation of the project.

According to the State Environmental Institute - INEA (2013), the Brazilian Federal Laws empowers the states to set their own rules for conducting public hearings of environmental licensing. The conduct of the hearings are public events and open to the community and all government authorities, federal and state public prosecutors and other representatives of civil society (environmental NGOs, or from other areas) are invited to attend.

The State of São Paulo, since the Constitution, itself brings device on the subject. The § 2 of Article 192, repeating the rule contained in the Republic Constitution, provides that upon approval of the EIS/EIR, this shall be made public, adding that "perform public hearing will be guaranteed." (FINK, 1995, p. 62).

According to Barbieri (1995), procedures to make public the EIR (Environmental Impact Report) are enabling access to these copies to documentation centers, disclosing even the existence of this material, establish a period for comments of interested bodies and the realization of public hearings (mandatory in São Paulo) for discussion of this report.

By resolution of the CONSEMA (State Environmental Council) No. 34/2001, in São Paulo, all projects requiring the Environmental Impact Study (EIS) require at least one public hearing (SANCHEZ, 2010).



Rocha (2008) states that the public hearings, usually held before the preliminary license stage, may be convened when levels of conflict of interest are motivated by the high commitment of the environment related to the activity performed, however, the audiences have no decision character, but allow the public expression before closing the project and its implementation, as well as apply when there is need for corrections of already implemented facilities.

The dynamics of public hearings, time and period of duration may vary depending on where they are held, but generally have characteristics in common.

Environmental public hearings are formal events, called and conducted by a government entity, whose dynamics follows previously established rules, which aim to hold a public debate - open to all citizens - about a project and its impact. (SANCHEZ, 2010, p. 414).

Public hearings should be organized meetings aiming to take and disseminate to the public information on EIR (Environmental Impact Report) and seeking the participation of people, authorities and environmental organizations or those having no interests or responsibilities in relation to themes namely, i.e., on the implementation of potentially polluting activities and causing environmental degradation.

In the case of a same project, more the one audience can be carried out while the EIR (Environmental Impact Report) does not comply with the requirements of the competent bodies, as well as the license of competent body will not be valid if public hearing is not performed. (SANCHEZ, 2010).

In case of nuclear facilities, IBAMA has as standard to require the implementation of public hearing regardless of requirement (INB, 2013).

### **3.1 Public hearing script**

CONAMA Resolution 009/87 determines that copies of the Environmental Impact Study (EIS) and Environmental Impact Report (EIR) should be available to the public and other interested parties up to 15 days prior to the public hearing. After delivery, the environmental body will release them in announcement and will be announced by the local press in order that stakeholders convene the public hearing within a period of 45 calendar days (ROCHA, 2008).

The article 2 of CONAMA Resolution 001/86 provides that the Environment body will promote a public hearing whenever it deems necessary, when requested by civil authority, the Public Ministry, or by 50 or more people.

According to Fink (1995), after receiving the application, the environmental body will designate the date and location (accessible to interested parties). When hearing is open, directed by the licensing authority, there will be an objective exposure of the project, followed by the Environmental Impact Report (EIR) and discussions. After, short minutes of

the public hearing will be drawn up, accompanied by all documents that have been delivered and that will serve to analysis and approval or not of the licensing agency.

These hearings are scheduled preferably at night to access a greater number of participants and can last many hours, not exceeding the period of one day. Participants may manifest orally and present documents, and in each audience, which can be recorded, one minute are formulated with the interventions of the public and presented documents (SANCHEZ, 2010).

Art. 5 of Resolution 009/87 states that "the minutes(s) of public hearing(s) and its annexes will be the basis, along with the EIR, for the analysis and the final opinion of the licensor regarding the approval or not of the project (MACHADO, P., 2009, p. 263).

The following below shows the steps of organizing public hearings in accordance with CONSEMA (State Environmental Council) No. 34/2001 in the State of São Paulo.

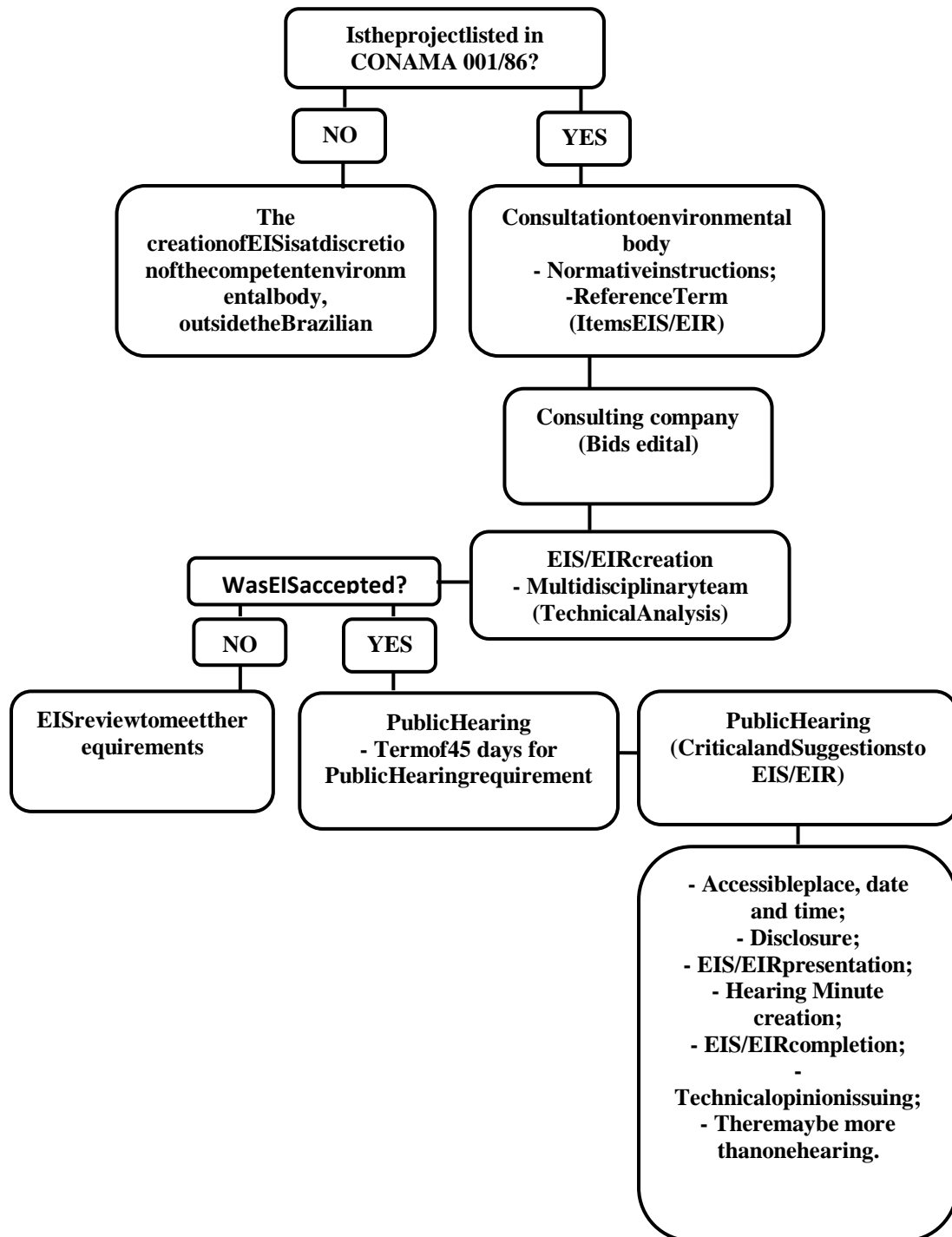
**Table 2.** Rules for conducting public hearings in São Paulo.

HEARING ORGANIZATION	AGENT
Opening	Environmental Body (clarifications on the process)
Exposures on the project and EIR	Entrepreneur and company responsible for EIS creation
NGO's manifestations	30 minutes
Civil Society manifestations	05 minutes
Public manifestations	03 minutes
Public bodies manifestations	05 minutes
CONSEMA manifestation (Environmental Body)	05 minutes
Parliamentary manifestations	05 minutes
Municipal and state mayors and secretaries manifestations	05 minutes
Responses and comments	Company responsible for creation of EIS - 15 minutes Environmental Body – 10 minutes Entrepreneur – 05 minutes
Closing	Environmental Body

**Source:** Adapted from Sanchez, (2010).

In Quebec, Canada, there is no formal procedure for Environmental Impact Assessment, however, BAPE (*Bureau d'Audiences Publiques sur l'Environnement*), and independent body, was created in 1978 with function to promote public hearings and searching for alternatives more adapted to needs and expectative of the population (GAUTHIER, SIMARD e WAAUB, 2011).

The following table 1 shows the steps composing the Brazilian environmental licensing until perform public hearings.



**Figure 1:** Steps of the Environmental Licensing process in Brazil until the public hearing.

#### 4. CONCLUSIONS

Despite the existence of steps related to the Brazilian environmental licensing organization as the preparation of the Environmental Impact Study (EIS) and its respective Environmental

Impact Report (EIR) to perform, by the entrepreneur, public hearings, this process involves many difficulties on the requirements to be met to licensing bodies, particularly with regard to nuclear installations where extreme pressure is verified, since they fall under the responsibility of the Union.

As it is up to these bodies the power to license such facilities, often it is required so bureaucratic actions that they are beyond the ability of the entrepreneur. Simultaneously, the licensing body is not obliged to meet deadlines for issuing licenses, which may compromise the schedule of works, considering that the release of resources is most often linked to obtaining the necessary licenses. As example, we can mention the licensing of RMB (Brazilian Multipurpose Reactor), for which hearings were held in October 2013, and the preliminary license (PL) was granted in May 2015.

The development of a public hearing model for the licensing of nuclear facilities thus allows that more consistent steps are stipulated, ensuring greater agility with the deadlines, optimizing processes, so that the licenses are not denied if all legally required requirements for the proposed development are met, making more efficient the licensing process for nuclear facilities in Brazil.

Finally, while the environmental licensing body does not understand that the construction of equipment, such as RMB, is already a social-environmental compensation, as constitute a state action to meet the demands of Brazilian society in different areas, with emphasis on health, it will be difficult to move forward faster.

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