

EVOLUTION OF NUCLEAR SECURITY REGULATORY ACTIVITIES IN BRAZIL

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ABSTRACT

The changing of the world scenario in the last 15 years has increased worldwide the concerns about overall security and, as a consequence, about the nuclear and radioactive material as well as their associated facilities. Considering the new situation, in February 2004, the Brazilian National Nuclear Energy Commission (CNEN), decided to create the Nuclear Security Office. This Office is under the Coordination of Nuclear Safeguards and Security, in the Directorate for Safety, Security and Safeguards (Regulatory Directorate). Before that, security regulation issues were dealt in a decentralized manner, within that Directorate, by different licensing groups in specific areas (power reactors, fuel cycle facilities, radioactive facilities, transport of nuclear material, etc.). This decision was made in order to allow a coordinated approach on the subject, to strengthen the regulation in nuclear/radioactive security, and to provide support to management in the definition of institutional security policies. The CNEN Security Office develops its work based in the CNEN Physical Protection Regulation for Nuclear Operational Units - NE-2.01, 1996, the Convention on the Physical Protection of Nuclear Material and the IAEA Nuclear Security Series. This paper aims at presenting the activities developed and the achievements obtained by this new CNEN office, as well as identifying the issues and directions for future efforts.

1. INTRODUCTION

The September 2001 terrorist attack in the United States has naturally led to the re-evaluation of security in every industrial sector, including nuclear power. The awareness of a much broader threat picture prompted the strategically reconsideration of the ways and means through which radioactive materials may be dispersed for the purpose of causing harm to persons, property and the environment.

The security risks and vulnerabilities showed the need to better control nuclear material and radiological sources, protect nuclear and radioactive facilities and strengthen border controls.

In view of the changing of the world scenario, the Directorate for Safety, Security and Safeguards (DRS) from the Brazilian National Nuclear Energy Commission (CNEN) perceived that the issues related to Nuclear Security could no longer be dealt with in an individualized manner by each specific safety licensing area of this Directorate. As a consequence, the DRS supported the creation of the Nuclear Security Office (In Portuguese, Grupo de Proteção Física - GPF), subordinated to the Safeguards Coordination (CSG), which became Safeguards and Security Coordination (COSAP). The official administrative act that created GPF was the Information Bulletin CNEN N. 03, March 1st, 2004.

2. BACKGROUND

The post-9/11 period presented new security challenges, with the need to strengthen the physical protection (PP) of nuclear and radioactive materials and associated facilities, including transport. Threat perceptions include the potential terrorist use of an improvised nuclear explosive device, the use of a radiological dispersal device (RDD) and attacks against nuclear and radioactive facilities, i.e. sabotage.

In March 2002, the IAEA Board of Governors approved a Plan of Activities for Protection Against Nuclear Terrorism and assigned the highest priority to its coherent and effective implementation. At the core of the Plan was the assessment of States' needs for improved nuclear security.

In 2003, a report from a group of experts containing a number of proposals to strengthen the Convention on the Physical Protection of Nuclear Material (CPPNM) was submitted to the IAEA Director General. Those proposals resulted in the amendment to the CPPNM (2005).

In April 2004, the UN Security Council adopted UN Security Council Resolution 1540 (UNSCR 1540), establishing binding obligations on all UN Member States to take and enforce effective measures against the proliferation of Weapons of Mass Destruction (WMD), their means of delivery and related materials. It obliges all States to adopt and enforce appropriate effective laws which prohibit non-State actors to manufacture, acquire, possess, develop, transport, transfer or use nuclear weapons, in particular for terrorist purposes, and to establish domestic controls to prevent the proliferation of nuclear weapons, including the establishment of appropriate controls over related material. To this end, States are obliged to implement a variety of measures including: physical protection measures; border controls; measures to detect, deter, prevent and combat illicit trafficking; and import and export control measures.

In Brazil, before February 2004, each specific safety licensing area (power and research reactors, nuclear fuel cycle facilities, industrial and medical radioactive facilities, etc) of DRS (the regulatory directorate of CNEN) was responsible for licensing the facilities under its control in terms of nuclear security. The awareness of the need to strengthen the security in view of the IAEA recommendations to the States and as a proactive action to the UNSCR 1540 that was about to be adopted, the DRS decided to create the Nuclear Security Office (GPF) in February 2004.

3. STRUCTURE

The present simplified structure (as of January 2009) of the Brazilian National Nuclear Energy Commission (CNEN) emphasizing the structure of DRS (its regulatory directorate), including GPF, is demonstrated in Figure 1, as follows.

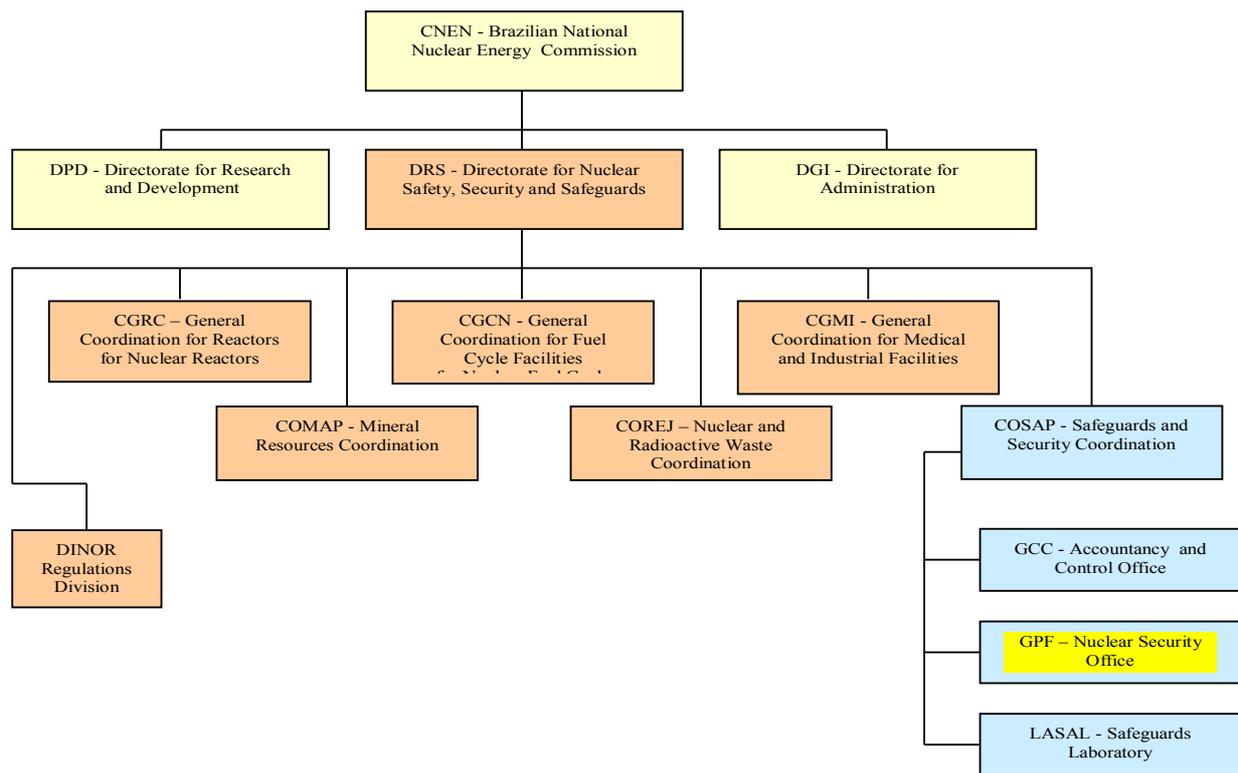


Figure 1. Present Structure of the Brazilian nuclear regulatory body

4. MAIN ATTRIBUTIONS AND OBJECTIVES OF GPF

1.

The main attributions of the GPF are:

- - Licensing operational units of the nuclear area¹ referring to the aspects of physical protection, according to the criteria established in the Brazilian nuclear/radioactive security regulation (CNEN-NE-2.01) and other applicable Brazilian nuclear/radioactive regulation;
- - Acting as point of contact to the MERCOSUL² and to the IAEA Illicit Trafficking Data Bases (ITDB);
- - Disseminating the Nuclear Security Culture to operators and to other Brazilian Public Security Institutions in charge of the response to malevolent acts involving nuclear and other radioactive materials and associated facilities, including transport (ex: Armed Forces, Federal Police, State Fire Brigades, State Military Police, etc.);
- - Acting as point of contact to the SIPRON³ for nuclear security issues.

¹ Operational units of the nuclear area= nuclear and radioactive facilities, in construction, operation, maintenance or decommission phases and transportation units of nuclear and radioactive materials.

² Common Trade Market of South Cone = Argentina, Brazil, Uruguay, Paraguay.

³ System for the Protection of the Brazilian Nuclear Program = Interministerial System congregating different governmental organizations directly or indirectly involved in the safety and security of the Brazilian Nuclear Program.

The main objectives of GPF's work are:

- To assure that Brazilian operational units of the nuclear area¹ establish Physical Protection Systems to:
 - Prevent, detect and response attacks or direct sabotage acts;
 - Prevent, detect and response theft of nuclear and other radioactive material that could be used for the purpose of constructing a nuclear explosive device or a RDD;
 - Prompt localize and recover diverted material.
- To prevent illicit trafficking events involving national nuclear or other radioactive material and sensitive material;
- To capacitate the Brazilian Public Security Institutions in Nuclear and Radiological Security matters.

All those attributions and objectives have the final goal to protect the workers, the general public, the environment and the property.

5. LEGAL FRAMEWORK

The legal framework of CNEN has been developed from responsibilities and attributions established by the Brazilian Federal Constitution (1988) and the specific national laws referring to the creation of CNEN (1956 and 1962). It's worth highlighting that the Brazilian Federal Constitution enforces that the use of nuclear energy in Brazil is strictly for peaceful applications.

These are the CNEN main regulations regarding operational units of the nuclear area¹, directly or indirectly related to nuclear security, taken into account by GPF in its licensing activities:

- Norma CNEN-NE-1.04: Licenciamento de Instalações Nucleares (revised 2002), CNEN regulation establishing requirements for nuclear facilities licensing;
- Norma CNEN-NE-6.02: Licenciamento de Instalações Radiativas (1998), CNEN regulation establishing requirements for radioactive facilities licensing;
- Normas CNEN-NE-5.01 and CNEN-NE-5.02: Transporte de Materiais Radioativos e Nucleares (1988 and 1986 respectively, both under revision), CNEN regulations establishing requirements for radioactive and nuclear material transportation;
- Norma CNEN NE 2.01: Proteção Física de Unidades Operacionais da Área Nuclear (1996, to be revised 2009), CNEN regulation establishing requirements for physical protection systems for Operational Units¹;

This regulation establishes that due to licensing purposes, an operational unit of the nuclear area¹ must have a Physical Protection System, which must be described in detail in a document named Physical Protection Plan.

The Regulation NE-2.01 presents different and important features in Physical Protection (PP) like the basic requirements, structure and contents of the PP Plan and the characteristics, rules and procedures for a PP System, like its main detection, delay and response features (sensors and alarms, physical barriers, security force), the rules for selection and training of security personnel, procedures for persons/ vehicles identification and inspection (access control) and procedures for emergency situations. This regulation also defines criteria for secure nuclear material transportation.

- IN-DRS-009: Ações de Resposta ao Tráfico de Material Nuclear e/ou Radioativo e de Bens Sensíveis (2006), CNEN normative instruction establishing actions for detection and response to illicit trafficking of nuclear and radioactive material.

Besides the previously mentioned regulations GPF also takes into consideration the following binding and non-binding international documents on nuclear security:

- Convention on the Physical Protection of Nuclear Material (CPPNM) (International Atomic Energy Agency/IAEA 1980, Amended 2005);

- UN Security Council Resolution 1540 (UNSCR 1540/2004);

- The Physical Protection of Nuclear Material and Nuclear Facilities (IAEA – INFCIRC/225/rev. 4 (Corrected), 1999);

- Code of Conduct on the Safety and Security of Radioactive Sources (IAEA, 2004);

- The IAEA Nuclear Security Series.

Likewise, GPF also considers the following international instruments not directly related to Nuclear Security, for instance, the Convention on Nuclear Safety, the Convention on the Early Notification of a Nuclear Accident, the Convention on Assistance in the Case of a Nuclear Accident or Radiological Emergency and the Joint Convention on the Safety of Spent Fuel Management and on the Safety of Radioactive Waste Management.

6. OVERVIEW OF THE BRAZILIAN NUCLEAR PROGRAM

The GPF work covers the following main Brazilian facilities:

- 2 Nuclear power plants (NPPs) in operation and 1 under construction (PWR design);
- 3 Enrichment installations (Laboratory, Pilot and Industrial plants);
- 1 Industrial reconversion plant;
- 1 Industrial fuel fabrication plant;
- 1 Conversion pilot plant (under construction);
- 3 Mining and concentration facilities (1 in operation, 1 preoperational stage and 1 in decommissioning stage);
- 5 Research reactors (1 under planning);
- 6 Nuclear material storage facilities;
- 6 Research Institutes;
- Approximately 3500 industrial and medical radioactive facilities.

5. WORKING STRATEGIES

Regarding the assessment of physical protection features in DRS licensing process for the Brazilian operational units of the nuclear area¹, the GPF works in a matrix way rendering services to the different Coordinations of this Directorate.

It's important to mention that according to the Brazilian licensing process established by the CNEN Regulations NE-1.04 and NE-6.02, the physical protection requirements must be taken into consideration by the operators since the early construction stage of the nuclear and radioactive facilities.

In general terms, the PP licensing process is constituted by 2 different complementary phases: the PP documentation (plan and procedures) assessment, in order to evaluate their compliance with the criteria established by the CNEN Regulation NE-2.01, followed by regulatory field inspections/audits to verify if the measures described in those documents are really being implemented. Both phases are carried out during the construction as well as operational stages of the facilities.

By the time the GPF was created (2004), most of the previously mentioned facilities were already in operation and with their licensing process going on. Therefore, the approach chosen was to prioritise the nuclear facilities over the radioactive ones. An initial round of regulatory inspections of the power reactors, fuel cycle facilities and nuclear material storage facilities was carried out with the aim to establish a broad picture of the status of the physical protection systems and their documentation at that time, and also to provide an understanding of what needed to be done over a period of time. All non-conformities and regulatory requirements detected during those initial and subsequent follow up annual inspections were registered as Inspection Reports which facilitated PP improvements implemented by the operators along the last four years.

Nowadays, the Brazilian nuclear facilities have PP plans in compliance with CNEN regulation NE-2.01 and they are under an annual routine program of PP regulatory inspections/audits established by the GPF, in order to verify if these PP plans and related procedures are being effectively implemented.

In relation to the radioactive facilities, whenever there is a request for authorization (new facility) or for renewal of authorization (facility already in operation) the GPF plays its role in the evaluation of the physical protection aspects, assessing documentation and making field inspections.

Regarding the transportation of nuclear material, GPF has established that before each transport operation a Physical Protection Transport Plan must be submitted for assessment in order to evaluate its compliance with the CNEN Regulation NE-2.01 (before the creation of GPF, these security aspects in transport were dealt together with safety aspects, for instance: radiological and fire protection). The approval of the PP Transport Plan is one of the requirements for the emission of the ATM (Nuclear Material Transfer Authorization) by the Nuclear Material Accountancy and Control Office.

To better implement these working strategies and also considering that all PP documentation exchanged by operators and the GPF are confidential, GPF also established and developed a process for standardization and control of documentation.

In parallel with these working strategies GPF realized that security culture should be disseminated to CNEN, to Brazilian operators and to other Brazilian organizations involved with nuclear and radiological security. To reach this objective a PP training events were conducted by GPF in the last five years.

6. ACHIEVEMENTS

The GPF is approaching the completion of its fifth year after its creation. The most important achievements of GPF include:

- The enforcement of the requirements established by CNEN regulation NE 2.01 for licensing the operational units of the nuclear area¹;
- Increased awareness among operators of the need for a comprehensive approach covering prevention, detection and response to possible malevolent acts against operational units of nuclear area¹;
- A stronger representation of CNEN and Brazil in the national, regional and international scenario in the scope of nuclear security and in the prevention, detection and response to illicit trafficking;
- Centralization and coordination of activities related to illicit trafficking of nuclear/ radioactive material at national (Normative Instruction CNEN), regional (MERCOSUL) and international (ITDB contact point) levels;
- Improvement of training activities through the organization of national courses as well as broad (CNEN, operators and other Brazilian organizations) participation in national, regional and international courses, helping strengthening the nuclear security culture concept.
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7. RESULTS (2004-2008)

By the end of 2008 the Brazilian nuclear facilities had their PP Plans updated submitted for approval (most of them have already been approved). These Plans describe the PP Systems implemented according to the requirements established by CNEN NE 2.01 and have the objective to detect, delay and respond to malevolent acts.

GPF has conducted 33 security inspections (announced and unannounced) missions (approximately 260 person.day) and has assessed 40 PP Plans and PP Transport Plans (approximately 320 person.day).

With the cooperation of IAEA and US DOE, GPF organized 4 national training courses in nuclear security. About 160 persons from CNEN, operators, Brazilian security organizations and Brazilian Intelligence Agency were trained.

GPF personnel participated as lecturers to disseminate nuclear security in 13 national training events organized by Brazilian security organizations (mainly Federal Police, State Polices and Brazilian National Secretary for Public Security) and the Brazilian Intelligence Agency. Two GPF members participated as lecturers in 2 IAEA regional training courses in nuclear security.

Regarding illicit trafficking, GPF developed for the MERCOSUL, especially for customs officers and other security organizations involved with borders control, an unattended course containing basic information on radiological protection, detection of radioactive/nuclear material, emergency procedures and a broad sources catalogue (including sources packages and characteristics) for easy visual identification.

In 2006/2007, the GPF actively participated in the radiological security of the Pan American and Para Pan American Games by planning, training, coordinating and performing activities of prevention, detection and response to possible malevolent acts involving nuclear/radioactive material.

8. DIRECTIONS FOR THE FUTURE

One of the priorities for the GPF is the revision of the CNEN regulation NE-2.01, especially the requirements applicable to radioactive materials, its transportation and associated facilities.

Another priority is to increase the physical protection licensing efforts for the existing industrial and medical radioactive facilities (including transportation), due to their nature and large number of them.

In relation to the nuclear facilities, the GPF intends to carry out a new round of regulatory inspections with the objective to verify the effectiveness of the already established PP systems (performance based approach).

It is fundamental to increase the cooperation with other Brazilian public organizations to improve the capability to prevent, detect and respond to malevolent acts involving nuclear and other radioactive materials, including illicit trafficking.

Regarding Mercosul², the GPF intends to strengthen its participation in the issues related to illicit trafficking of nuclear and radioactive material, developing a common procedure for controlling the borders of member states.

GPF must be prepared for the expansion of the Brazilian Nuclear Program, including construction of new nuclear power reactors as well as other nuclear fuel cycle facilities, since security-related responsibilities will increase expressively.

The identification of specific training needs and the organization of training activities for CNEN inspectors, operators and Brazilian public security organizations will continue to demand efforts.

9. CONCLUSIONS

Nuclear security in Brazil has evolved substantially during the past 5 years, and although improvements are still needed, the results obtained in the licensing of operational units of the nuclear area demonstrated that the premises and the strategies adopted by GPF were adequately chosen.

It is recognized that strengthening nuclear security requires the effective use of resources through needs assessment, prioritisation and coordination. The dissemination of the security culture plays an important role in this context.

Compared to five years ago, the GPF is now better prepared to fulfil its regulatory attributions due to a detailed knowledge about the security situation of the Brazilian nuclear area and the productive interaction established with operators.

GPF also recognizes the relevant efforts of the IAEA in the development of nuclear security and that a holistic and synergic approach should be aimed: safeguards (non proliferation), security (prevention of malevolent acts) and safety (prevention of technical accidents).

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