MODERNIZATION OF THE PHYSICAL PROTECTION SYSTEM OF IPEN-CNEN/SP

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Abstract. A general study of the physical protection system was carried out in order to review and to update the physical protection plan of the IPEN. Important alterations accomplished at the institute were considered in the study, as the installation of a cyclotron 30 MeV and the new operation conditions for the nuclear research reactor IEA-R1, that include the increase of its operation power from two to five megawatts and the establishment of the 72 hours weekly continuous operation.

1. INTRODUCTION

In 1980, a federal law defined the responsibilities and attributions for the physical protection of nuclear material and nuclear facilities, by establishing the Protection System of the Brazilian Nuclear Programme (SIPRON). As a member of the SIPRON, the Brazilian Nuclear Regulatory Authority (CNEN) is responsible for defining detailed rules and requirements for the physical protection by issuing regulations and guidelines.

In 1981, the CNEN issued the regulation CNEN-NE-2.01, "Physical Protection of Operational Units of the Nuclear Area" [1], reissued in 1996. In this regulation the CNEN established a system to define and to evaluate physical protection systems in order to ensure that the licensees provide appropriate levels of physical protection. By this regulation, in Brazil, the physical protection plans of nuclear facilities must be reviewed and updated every two years.

Following that regulation, an internal group (IGPP) was created at IPEN to study the physical protection plan and to evaluate if the actual system met the plan. Based on this study, a modernization programme of the physical protection system has been carried out.

2. THE STUDY

There are two research reactors at IPEN, the IEA-R1, open pool type of 5 MW, and the IPEN-MB/01, critical assembly of 100 W. There are also two cyclotrons of 28 and 30 MeV and many other facilities including those to produce the nuclear fuel for the research reactors. IPEN also produces 21 radioactive products for use in nuclear medicine that have been distributed, weekly, for more than 350 hospitals and clinics all around the country and also in some countries in Latin America. About 222 TBq of radioactive material are processed per year. IPEN is located in an area of 478 000 m^2 (101 850 m^2 built area of 107 constructions), where about 1300 employees work.

The IGPP started analysing the updated version of the radioactive material inventories, process descriptions and emergency plans of each facility. The results of the analysis were compared with those presented at the physical protection plan. Based on this study, in addition to the alterations accomplished at the institute, as the installation of the cyclotron 30 MeV, the construction of a new Radioactive Waste Treatment Unit and the new operation conditions of the IEA-R1, the IGPP redefined some vital and protected areas. The design basis threat was considered the same as in the plan.

The next step was to conduct site tours and interviews with facility personnel in order to evaluate, *in loco,* the conditions of the physical barriers and detection systems of inner and protected areas. During these tours the IGPP tested the communication systems used by the security force, as the extension phone lines that are located in each entrance area and the portable VHF radios used by the guards. The detection systems had their functionality tested as well as their assessment by the security force.

The IGPP consulted the facility personnel about the radioactive inventory and operational procedures. The performance of the security force personnel on the conventional procedures, as access control to the facilities, control of material flow, area monitoring and patrol were evaluated. The response for special situation procedures in the case of a physical protection emergency was verified by observing conduct of the guards in some protection procedures. The facts observed in these tours were registered in reports, as well as, suggestions given by the facility personnel.

Based on these facts, the IGPP analysed the performance of the physical protection system and detected some points that could be reinforced at inner and protected areas. The conclusions of this process, including the necessity of changing some vital and protected areas, were informed to the high administration by means of a consolidated report of the physical protection system of IPEN.

3. MODERNIZATION PROGRAMME

The high administration of IPEN, based on the study and suggestions from IGPP mentioned in the consolidated report of the physical protection system, decided to revitalize the whole physical protection system and not only to reinforce some points.

In order to elaborate a modernization programme of the physical protection system, using the results of the study as basis, it was created an internal committee (ICOM) composed of specialists in physical protection, nuclear safety, operation of reactors and engineering areas. The programme elaborated by the ICOM strengthens the physical protection system by applying the defence in depth concept [2]. At the same time, it attempts to provide a balanced protection in order to minimize the consequences for the failure of one component of the physical protection system.

The programme is comprehensive and includes diverse items as the periodic maintenance of physical barriers, as fences, in order to keep the level of opponent retard and the reinforcement of the radiological monitoring procedures at protected areas exits.

Some measures, which depend of small expenditures, as the purchasing of portable VHF radios to improve the security force communication by creating redundancy in the communication channels, have already been taken.

Others measures, which take advantage of existent resources in the institute, have been implemented, as the security force personnel training by the experts of the institute. The performance of the physical protection system largely depends on the security force personnel. For this reason, the modernization programme dedicates special attention to the training of these professionals. Emphasis has been given to the emergency procedures; because of the personnel action in those cases is considered an important point. The specific training on radio communication has also been reinforced.

The implementations of some points of the modernization programme are more expensive, as the creation of a central alarm station (CAS). The CAS is an installation that will provide continuous monitoring of the intrusion sensors and it will permit assessing the alarms through the signals received from the TV cameras installed all around the fences of protected areas and at strategic points of the inner area. The CAS is planned to be equipped with redundant communication means with the security and response forces and the high administration of the institution.

IPEN submitted a project to SIPRON to obtain budget to implement the CAS and other items of the modernization programme of the physical protection system. Experts from SIPRON have already visited the IPEN facilities to analyse the project.

REFERENCES

[1] COMISSÃO NACIONAL DE ENERGIA NUCLEAR, Proteção Física de Unidades Operacionais da Área Nuclear, CNEN-NE-2.01, CNEN, Rio De Janeiro, Brazil, (1981).

[2] ORGANISMO INTERNACIONAL DE ENERGIA ATOMICA, Protección Física de los Materiales Nucleares, Infcirc/225/Rev. 3, IAEA, Vienna, Austria, (1993).

QUESTIONS AND ANSWERS

R. Warren (USA): Was any integration of threat analysis or a DBT used as part of the review for upgrading physical security?

F. Suzuki (Brazil): Threat analysis was much discussed during the elaboration of the modernization programme but a DBT was not defined formally for the review.

V. Lapshyn (Ukraine): When you planned the PP system, did you consider the difference between the systems of a cyclotron and a reactor?

F. Suzuki: Yes, the cyclotrons and the reactor are in different protected areas. The cyclotrons' PP system is designed to prevent sabotage whereas the reactor's PP system is designed to prevent unauthorized removal of nuclear material as well.