

DEVELOPMENT OF NUCLEAR SECURITY REGULATIONS IN PAKISTAN TO ADDRESS INTERNATIONAL OBLIGATIONS

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Abstract

The global nuclear security regime comprises of international instruments like CPPNM, United Nations resolutions and IAEA codes and standards. These instruments make States responsible for implementing nuclear security and development of domestic laws, regulations and institutions.

Pakistan is a responsible country and attaches highest importance towards global efforts to promote and strengthen nuclear safety and security internationally. Pakistan is party to all the important conventions related to nuclear safety and security that includes the Convention on the Physical Protection of Nuclear Material (CPPNM) and its 2005 Amendment, Convention on Nuclear Safety, Convention on Early Notification of a Nuclear Accident and Convention on Assistance in the Case of a Nuclear Accident or Radiological Emergency. In addition, Pakistan is also committed to implement UNSC resolutions 1373 (2001) and 1540 (2004) that address, among other things, the threat of nuclear terrorism and nuclear proliferation and is following Code of Conduct for the Safety and Security of Radioactive Sources along with its Supplementary Guidance on import and export of radioactive sources.

As a responsible nuclear state, Pakistan has incorporated the requirements of the above mentioned international instruments in the national legal and regulatory framework. Pakistan Nuclear regulatory Authority (PNRA) is empowered to issue and enforce regulations to ensure physical protection of nuclear and radiation facilities in the country. In this regard, the national regulations on Physical Protection of Nuclear Material(s) and Nuclear Installations (PAK/925) and Regulations on Security of Radioactive Sources (PAK/926) have been promulgated.

During the development of these regulations, State's obligations under international instruments were also considered along with the national legislative requirements, best practices adopted by international community, current evaluation of the threat, operational experience feedback etc.

This paper will describe the process followed by Pakistan for development of nuclear security regulations to address international obligations along with national requirements.

1. INTRODUCTION

The global nuclear security regime comprises of international instruments like Convention on Physical Protection of Nuclear Material as amended, relevant United Nations resolutions and IAEA codes and standards. These instruments require State parties to implement nuclear security obligations and develop domestic laws, regulations and institutions to govern nuclear security in the country. The state parties are also required to establish systems to prevent, detect, and respond to malicious acts involving nuclear or other radioactive materials & associated facilities. Adherence to these instruments and subsequent implementation of national legal and regulatory frameworks can contribute towards combating threat of nuclear terrorism and other malicious acts involving nuclear or other radioactive material and associated facilities or activities.

Pakistan is proactively participating and contributing in global efforts to promote and strengthen nuclear safety and security internationally. Pakistan is party to all the important conventions related to nuclear safety and security that includes the Convention on the Physical Protection of Nuclear Material (CPPNM) and its 2005 Amendment, Convention on Nuclear Safety, Convention on Early Notification of a Nuclear Accident and Convention on Assistance in the Case of a Nuclear Accident or Radiological Emergency. In addition, Pakistan is also committed to implement United Nations Security Council resolutions 1373 (2001) and 1540 (2004) that addresses, among other things, the threat of nuclear terrorism and nuclear proliferation and is also following Code of Conduct for the Safety and Security of Radioactive Sources along with its Supplementary Guidance on import and export of radioactive sources.

Pakistan has incorporated the requirements of the above mentioned international instruments in the national legal and regulatory framework. A comprehensive regulatory framework has been established to perform the regulatory functions related to nuclear safety, nuclear security and physical protection. This regulatory system is part of a robust Nuclear Security Regime (NSR) established at state level for prevention and detection of, and response to, theft, sabotage, unauthorized access, illegal transfer or other malicious acts involving nuclear material, other radioactive substances or their associated facilities. Pakistan Nuclear Regulatory Authority (PNRA) is empowered to issue and enforce regulations to ensure physical protection of nuclear and radiation facilities in the country. In this regard, the national regulations on Physical Protection of Nuclear Material(s) and Nuclear Installations (PAK/925) and the Regulations on Security of Radioactive Sources (PAK/926) have been promulgated. During the development of these regulations, State's obligations under international instruments were also considered along with the national legislative requirements, best practices adopted by international community, current evaluation of the threat, operational experience feedback etc.

This paper will describe development of nuclear security regulations in Pakistan to address international obligations related to physical protection of nuclear materials and facilities. The paper is divided into four sections. First section provides overview of global nuclear security regime and identifies obligations arising from relevant international legal instruments. Second section of the paper describe Pakistan's Nuclear Security Regime (NSR) which includes legal basis, governing institutions as well as system and measures adopted to ensure nuclear security in the country. Third section presents evolution of regulatory framework and infrastructure for physical protection of nuclear material and facilities. Fourth section analyzes PNRA Regulations on physical protection of nuclear material and facilities.

2. INTERNATIONAL NUCLEAR SECURITY REGIME

The international legal instruments that constitute global nuclear security regime includes the Convention on the Physical Protection of Nuclear Material (CPPNM) and its 2005 amendment, the International Convention for the Suppression of Acts of Nuclear Terrorism (ICSANT), UN Security Council resolutions 1373 and 1540, and the Global Initiative to Combat Nuclear Terrorism (GICNT).

The Convention on the Physical Protection of Nuclear Material & its amendments is one the key international agreements in the area of nuclear security. The scope of this convention covers, the international transport, domestic use, storage and transport of nuclear material and nuclear facilities in use for peaceful purposes.

The IAEA has been playing pivotal role in ensuring nuclear security internationally and engaged in nuclear security activities since 1970s. In 1975, IAEA published recommendations and guidelines for the physical protection of nuclear material as IAEA document titles, Physical Protection of Nuclear Material (INFCIRC/225). The latest version of this document was published in 2011 as INFCIRC/225/Rev.5. IAEA recommendations published in this document are the international standards for the physical protection of nuclear material and facilities. The key international agreements that regulate issues of nuclear security are based on these IAEA guidelines as a reference for implementing physical security measures. According to INFCIRC/255/Rev.5, the objective of the nuclear security regime is "to protect persons, property, society, and environment from malicious acts involving nuclear material and other radioactive material". The goal of physical protection, which is an essential component of the nuclear security regime, is to protect against theft or other unauthorized removal of nuclear material, locate and recover missing nuclear material, protect material and facilities against sabotage, and mitigate and minimize the radiological consequences of sabotage.

In 2006, the IAEA started developing a series of publications known as Nuclear Security Guidelines to provide better guidance to the states in their work on implementing nuclear security measures. This series includes three categories of documents. First, Nuclear Security Fundamentals that contains basic principles for implementing nuclear security and provides a basis for recommendations. Second, Recommendations and

Implementing Guides that provides detailed guidance on specific nuclear security measures and their implementation. Third, Technical Guides that include reference manuals and training and service guides. Development of these documents is done in close cooperation with member states and with participation of technical experts.

Nuclear security is a process that requires constant revisions corresponding to the evolving threat perception of the state. Therefore, in order to remain effective, nuclear security regime needs to be sustained and updated with the evolving situation. The IAEA defines national nuclear security regime as a set of system that builds through the implementation of relevant international legal instruments, information protection, physical protection, material accounting and control, detection of and response to trafficking in such material, national response plans, and contingency measures. The agency also emphasizes upon the need to sustain nuclear security regime at national as well as the operational level.

3. PAKISTAN NUCLEAR SECURITY REGIME

Pakistan has well established nuclear security regime at national level. The essentials of nuclear security in Pakistan include an effective command and control system under the National Command Authority (NCA), rigorous regulatory regime, comprehensive export controls and extensive physical protection measures.

The Pakistan Atomic Energy Commission (PAEC) Ordinance (1965), Pakistan Customs Act-1969, Pakistan Nuclear Regulatory (PNRA) Ordinance (2001), Export Control Act (2004) and National Command Authority (NCA) Act (2010) provide the legislative foundation for nuclear energy business in Pakistan. Likewise institutions have been established to ensure implementation of these legislative frameworks. Pakistan Nuclear Regulatory Authority is the competent authority for regulating nuclear safety and radiation protection whereas Pakistan Atomic Energy Commission undertakes activities in the use and application of nuclear energy including research, development, education, etc. Pakistan's Centre of Excellence on Nuclear Security (PCENS) constitute as essential element of nuclear security regime. PCENS, the National Institute of Safety and Security (NISAS) and Pakistan Institute of Engineering and Applied Sciences (PIEAS), working together in harmony, are imparting training and education in various areas of nuclear security and physical protection.

System and measures are in place to ensure nuclear security and physical protection of nuclear material and facilities. PNRA regulations on "Physical protection of nuclear material and nuclear installations-PAK/925" which is based on IAEA's Nuclear Security Recommendations on Physical Protection of Nuclear Material and Nuclear Facilities (INFCIRC/225/Revision 5) is used as regulatory tool for assessing physical protection of Nuclear Power Plants. In addition, IAEA 'Code of Conduct on Safety and Security of Radioactive Sources' is the guideline for regulating safety and security of radioactive sources.

Pakistan has equipped designated country's entry/exit points with radiation detection equipment to prevent illicit trafficking of nuclear and other radioactive materials. For detection and initial response to any nuclear security incidents, Pakistan is equipping its response organizations with radiation detection equipment. This has been done as a part of the national detection architecture. Similarly, for a response to nuclear security events, a Nuclear Emergency Management System (NEMS) has been put in place with Nuclear and Radiological Emergency Support Centre (NURESC) as the implementing arm of NEMS. In addition, to coordinate the response to nuclear accidents or radiological emergencies, both nationally and abroad, a National Radiation Emergency Coordination Centre (NRECC) has been established at PNRA HQs. NRECC is also focal point for Pakistan's obligations under CENNA and CACNARE.

4. EVOLUTION OF REGULATORY FRAMEWORK FOR NUCLEAR SECURITY AND PHYSICAL PROTECTION

Pakistan is committed to the objective of nuclear security and has been proactively engaged with the international community to promote nuclear safety and security in the country. Pakistan is party to Convention on the Physical Protection of Nuclear Material and its amendments. Fundamental principle C of the CPPNM Amended requires that all the Member States are responsible "for establishing and maintaining a legislative and regulatory framework to govern physical protection. This framework should provide for the establishment of applicable physical protection requirements and include a system of evaluation and licensing or other procedures to grant authorization. This framework should include a system of inspection of nuclear facilities and transport to verify compliance with applicable requirements and conditions of the license or other authorizing

document and to establish a means to enforce applicable requirements and conditions, including effective sanctions".

PNRA, the national nuclear regulator, has adopted a comprehensive regulatory framework to ensure that nuclear and other radioactive materials and all related facilities are secured in all places and during transport. This framework has genesis in history as Physical protection measures were part of Safety Analysis Report (SAR) of the Pakistan's first research reactor and its first nuclear power plant i.e. Karachi Nuclear Power Plant (KANUPP), which started commercial operations in 1965 and 1971 respectively. However, regulatory requirements were lacking for physical protection. Subsequently, in 1998, PAEC submitted physical security plan of CHASHNUP-1 to Pakistan Nuclear Regulatory Board (PNRB) as part of Final Safety Analysis Report (FSAR) before the grant of operation license. For the evaluation of Physical protection systems & measures proposed in the physical security plan of CHASHNUP-1 Regulation-70 "physical protection of nuclear material and nuclear facilities" was introduced in the PNSRP Regulations-1990. . INFCIRC/225/Rev.4 was adopted for the implementation of the Regulation-70. PNRA continued to ensure physical protection requirements at nuclear installations as per latest revisions of IAEA INFCIRC/225.

5. PNRA'S REGULATIONS ON PHYSICAL PROTECTION OF NUCLEAR MATERIAL AND FACILITY

Pakistan has established an independent and comprehensive nuclear regulatory infrastructure to ensure safety and physical protection of its nuclear facilities. Pakistan Nuclear Regulatory Authority was established in 2001 as an independent regulatory authority. Accordingly, PNRA has evolved a comprehensive regulatory framework as well as the organizational competence for effectively performing its tasks and functions. PNRA has developed comprehensive mechanism to ensure that appropriate measures for physical protection consistent with the latest international standard are in place.

Physical protection of nuclear material and nuclear facilities is one of the important aspects of over all nuclear security arrangement in Pakistan. As empowered by the Ordinance, PNRA has developed a detailed regulation on "Physical protection of nuclear material and nuclear installations-PAK/925". These regulations are consistent with the provisions of the CPPNM & its 2005 amendment and relevant international standards including IAEA recommendations published in the form of INFCIRC/225 Rev.5 for physical protection of nuclear materials and facilities. Before promulgation of PAK/925, PNRA had been using the INFCIRC/225 and USNRC regulations (10CFR73) for implementation of physical protection program at the facilities.

According to PAK/925, the objective of physical protection, which is an essential component of the nuclear security regime, is to protect against theft or other unauthorized removal of nuclear material, and protect material and facilities against sabotage. It covers all twelve (12) fundamental principles that were included in the Amendment to the Convention for the Protection of Nuclear Material.

Since, Regulations (PAK/925) are the requirement level document for the operator (i.e. Licensee, shipper, receiver, carrier etc.), therefore, it only covers those fundamental principles that fall in the preview of operator of the facility. The salience of regulations includes:

The first fundamental principle establishes that a state is fully responsible for establishment, implementation and maintenance of a physical protection regime. It specifically holds state responsible for development of a regulatory and legislative framework to govern physical protection, for appointment of a competent authority to implement the framework, and for ensuring responsibility of license holders (operators or shippers) for implementing physical protection measures. These two principles are already implemented with the establishment of Physical protection regime and designation of PNRA as responsible to make rules & regulations related to the physical protection at nuclear installations in Pakistan.

Another important fundamental principle that guides the development of the physical protection regime, requires a state to use current evaluation of the threat as a basis for protection measures. This requires a state to conduct a threat assessment and, if necessary, to define a design-basis threat that would be used to develop specific measures to protect nuclear materials and facilities against unauthorized removal or sabotage. As per fundamental principles, to manage the risk associated with unauthorized removal of nuclear material or sabotage of nuclear facilities, the nuclear security regime should rely on a graded approach and defense in depth. The graded approach dictates that a state should provide a higher level of protection against the events that could result in more serious consequences. To facilitate implementation of this principle, PAK/925 provides categorization of nuclear material along with the recommended level of protection for each category.

A series of fundamental principles address the issue of sustainability of the nuclear security regime. These principles emphasize the importance of security culture, quality assurance and confidentiality of information that describes security measures.

Finally, there is a requirement of contingency plans that would be activated in the event of unauthorized removal of nuclear material or sabotage of a nuclear facility or material. These plans should be developed by all entities that deal with nuclear materials or operate nuclear facilities. These plans should be an integral part of the response plan developed by the state authority responsible for nuclear security.

Taken together, the fundamental principles provide a framework for development and implementation of specific nuclear security and physical protection measures. The "Regulations on Physical Protection of Nuclear Material and Nuclear Installations— (PAK/925)" provide detailed requirements for these measures.

The categorization of nuclear material suggested by the PAK/925 is consistent with the categorization provided in the Convention on the Physical Protection of Nuclear Material. The description of physical protection measures that are required for each category of material in the PAK/925 is also consistent with the requirements of the Physical Protection Convention, although it is much more detailed. PAK/925 describes requirements for limiting access to the material storage area, specific physical protection levels and requirements for contingency plans that should be applied for each category of material.

PAK/925 also includes requirements for protection of nuclear facilities from sabotage. These measures do not have corresponding requirements in the original Physical Protection Convention or in the amended version, although the Amendment requires states to protect their nuclear facilities and nuclear material against sabotage.

The PAK/925 contains requirements for measures against unauthorized removal of nuclear material during transport. These are in agreement with the obligations regarding protection of materials in international transport that are imposed on states by the Physical Protection Convention, but they provide a much more detailed description of the measures that the state and the shipper should undertake to provide adequate security of transported nuclear material and to protect it from sabotage. PAK/925 also describes requirements for measures to locate and recover nuclear material in case of an unauthorized removal or to mitigate consequences of sabotage.

The requirements of PAK/925 establish a strong basis for the design and implementation of an effective physical protection regime. Implementation and maintenance of these measures ensure compliance with the requirements of the Convention on the Physical Protection of Nuclear Material in its original form, which is currently in force, as well as with the Amendment to the Convention.

In short PAK/925 has three main contents (i) Physical Protection against Unauthorized Removal of Nuclear Material in Use and Storage, (ii) Physical Protection Measures against Sabotage of Nuclear Installations and Nuclear Material in Use and Storage and (iii) Physical Protection of Nuclear Material during Transport. It covers main areas like threat, security culture, safety and physical protection interface, defense in depth, graded approach, contingency plans, physical protection program, audit and review, maintenance, testing and sustainability program, protection of sensitive information, insider mitigation, protection of digital computers, communication systems and networks, evaluations, event reporting etc. IAEA INFCIRC/225/Rev.5 and related guidance has been considered in developing regulatory framework for physical protection in Pakistan.

6. CONCLUSION

Pakistan's national legal framework adequately covers international obligations and is consistent with the international best practices. Regulatory framework adopted by PNRA to ensure physical protection of nuclear material and facilities is in line with the requirements of IAEA INFCIRC/225/Rev.5. Furthermore, PNRA verifies implementation of the requirements stipulated in this regulation at national level and ensures that physical protection measures are in place at all the nuclear facilities and installations, and during transport of sensitive material to prevent incidents such as unauthorized removal of nuclear material and sabotage of nuclear material or facilities.

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