

Design and Operational Provisions for Security of Nuclear Installations in India

By
Fredric Lall



Topics Covered

- Introduction
- Updating Minimum Requirements of PPS (Physical Protection System)
- Requirements for Projects
- Requirements for Operating Plants and Fuel Cycle Facilities
- Conclusion



Introduction-NPPs in India

- 8 NPP Projects under consenting stage
- 17 NPPs are operating
- More Projects are expected in near future.



Introduction-Security Provisions

- Design and operational provisions for the Security of nuclear material and facilities in India have been significantly upgraded in recent past.
- Manual on security for NPPs issued covering PPS, training & certification of personnel, documentation and reporting.
- Minimum requirements of PPS for NPPs include;
 - ❖ Checking credentials of personnel,
 - ❖ Establishment of exclusion boundary, main plant boundary and operating island
 - ❖ Incorporation of delay elements, physical barriers
 - ❖ Establishment of Central Alarm Station (CAS)



Updating Minimum Requirements of PPS for Operating NPPs

Upgraded to include;

- Auxiliary CAS.
- Maintenance policy, dedicated maintenance group for PPS equipment.
- Standard operating procedures.
- Quality Assurance & Quality control.
- Security event reporting.
- Inclusion of distress alarm system to other important locations.
- Fail safe feature.
- Training of personnel, Licensing and certification of security system operator, plant operator & response force.
- Secured back-up power supply.
- Cable layout for PPS through diverse routes.



Requirements for Projects (1/9)

- Development of DBT
 - ❖ Emphasis on threat scenarios for nuclear material in use, storage or transport and sabotage of Nuclear Facilities
 - ❖ Guiding principles:
 - Defining unacceptable consequences
 - Identification of Vital/Inner areas
 - Characterization of Threats from Adversaries



Requirements for Projects (2/9)

➤ PPS requirements at different stages

❖ Siting

□ New Site with Single Unit

- Site characteristics in identification of DBT, location of MPB, Isolation Zone and for design of PPS
- Movement control of Personnel, Vehicles & Material

□ New Site with Multiple Units

- PPS requirements to be fulfilled and unit to be commissioned to be segregated before fuel loading



Requirements for Projects (3/9)

❖ Siting

□ Site with Operating Unit

- Extension of MPB
- Location of Labor Camp,
- Segregation Plan,
- Layout indicating the orientation of Operating Island,
- Location of Response Force (s),
- Movement of contractor workers and Equipment,
- Protection of service lines of operating NPP, passing through the proposed Site.



Requirements for Projects (4/9)

❖ Construction

Construction clearance can be given in three sub stages i.e. Excavation, First pour of Concrete and Major Equipment Erection.

□ Excavation

- Identification of vital/inner areas,
- Layout of equipment of safety and safety related systems,
- Details of construction labor colony*
- Emergency preparedness plan*
- Segregation Plan for movement of construction workers and materials*

*For Sites with Operating NPPs



Requirements for Projects (5/9)

❖ Construction

□ First Pour of Concrete

- PPS covering access control, detection, alarm and assessment, delay and physical barrier, communication, plant configuration, etc.
- Strength of Wall, Number of openings and Balanced Protection for CAS & Vital/Inner Areas,
- Ensure no routing of non-essential service lines through CAS, Vital/Inner Areas



Requirements for Projects (6/9)

❖ Construction

- ❑ Erection of Major Equipment
 - Security plan
 - Emergency plan
 - New Fuel Storage: Availability of access control and PPS requirements for New Fuel Storage Area.

❖ Commissioning

- ❑ Establishment of Operating Island,
- ❑ Commissioning reports of PPS



Requirements for Projects (7/9)

Operation

- ❑ Establishment of PPS,
- ❑ Training and licensing,
- ❑ Quality assurance,
- ❑ Surveillance requirements on PPS,
- ❑ Record maintenance and Documentation Control,
- ❑ Maintenance of Security Culture,
- ❑ Establishment of Security Organization,
- ❑ Audit and Inspections,
- ❑ Security Emergency Plan



Requirements for Projects (8/9)

➤ Vital Area Identification

- ❖ A structured approach, taking inputs from Safety Analysis Report, based on logic diagrams to identify location of critical components, sabotage to which may cause unacceptable consequences.
- ❖ Carried out methodically by Utility.
- ❖ Once identified, all the PPS requirements for Vital Area should be fulfilled.



Requirements for Projects (9/9)

➤ Interfaces

❖ Security & Safety Interface

- ❑ To ensure safety requirement do not jeopardise security and vice versa

❖ Interface between Plant management and Security Organization

- ❑ To cope with the security related emergencies in an effective and efficient safe manner.



Requirements for Operating Plants and Fuel Cycle Facilities (1/5)

➤ PPS Requirements

❖ Dedicated group

- ❑ Maintaining and reviewing security aspects
- ❑ Conduct of security awareness programs to enhance security culture.
- ❑ Review of fail safe design of PPS elements.
- ❑ Development of a standard concept of PPS that may be suitably modified for individual sites.
- ❑ Training of operating personnel and security personnel.



Requirements for Operating Plants and Fuel Cycle Facilities (2/5)

➤ Nuclear Security Event Reporting System

- ❖ Monitor the nuclear security status of nuclear facilities
- ❖ Nuclear security events may be associated with the system, structure, component of the facility, physical protection system (PPS) or administrative procedures for security.
- ❖ Graded approach for the events reportable to the Regulatory Body (RB): Nuclear Security Event (NSE) and Significant Nuclear Security Event (SNSE)
 - NSE
 - Events related to the first barrier and other administrative controls
 - Reported to RB in specified format within specified time by facility management after review by security review committee along with the comments of their apex committee on security



Requirements for Operating Plants and Fuel Cycle Facilities (3/5)

□ SNSE

- Any casualty related to security in any area within Exclusion Boundary.
- The nuclear security events related to operating Island, Inner area, vital area & CAS.
- Reported to RB in three stages within specified time
 - Prompt Notification (1st stage) - within short time
 - SNSE report (2nd Stage) – within specified time. Should include sufficient technical details and human factor data, Root Cause Analysis (RCA), Corrective actions (taken or/and planned), Lesson learned.
 - Final Report (3rd Stage)



Requirements for Operating Plants and Fuel Cycle Facilities (4/5)

- Storage and Use of Reports
 - Stored with confidentiality preferably in electronic form
 - To be analyzed on a trial basis before fixing the actual review frequency
 - Used to strengthen the PPS, security related administrative procedures and identification of new field of security concern



Requirements for Operating Plants and Fuel Cycle Facilities (5/5)

- Regulatory Inspection of Security Aspects
 - ❖ Checklist for Regulatory Inspection
 - ❖ Team for Regulatory Inspection
 - ❖ Frequency of Inspection



Conclusion

- Adequate security coverage exists for operating plant and projects with regards to Physical Protection.
- Continuous improvements based on experience and new developments.
- Further Guidelines being developed regarding
 - ❖ Interface between Security & Safety
 - ❖ Co-ordination between plant management and security organization.



Thank You

