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SAFETY AND SECURITY INTERFACES DURING LIFETIME OF A NUCLEAR POWER PLANT – NATIONAL EXPERIENCE

Nuclear Safety is defined as "the achievement of proper operating conditions, prevention of accidents or mitigation of accident consequences, resulting in protection of workers, the public and the environment from undue radiation hazards"while Nuclear Security is defined as "the 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".
Nuclear safety and nuclear security have same fundamental goal i.e. to protect the public, the property and the environment from harmful effects of radiations. Nuclear safety is meant for protection of incidents/accidents resulting in radiological releases due to human error, component failure, natural disasters etc. while nuclear security aims to protect malevolent human actions/attacks resulting in radiological releases. Although safety and security have common goals but both have different approaches and culture. A synergic approach for safety and security, throughout the lifetime of a nuclear facility/nuclear power plant, will augment the effectiveness of the common goal associated with nuclear safety and nuclear security.

This paper is intended to highlight the National experiences towards safety and security interfaces during lifetime of a Nuclear Power Plant. The paper covers the following areas of National experiences towards safety and security interfaces during the lifetime of a nuclear power plant:

- Identification of areas where nuclear safety and security share similarities;
- Identification of areas where nuclear safety and security differ;
- Identification of safety concepts, criteria, and operational practices which enhances protection;
- Integration of safety and security measures such that implementation of one does not compromise the other;
- Awareness of safety and security synergy;

Nuclear safety and security share similarities in various areas including design, construction, operation and other associated activities. For example; the containment building at a nuclear power plant serves to prevent a significant release of radioactive material to the environment in the event of an accident, while simultaneously providing a robust structure that protects the reactor from a terrorist attack. One more example is design of physical protection upgrades of Karachi Nuclear Power Plant (KANUPP); under the umbrella of IAEA-Pakistan Nuclear Security Cooperation Program. The design was prepared jointly by safety and security teams of KANUPP. The design of physical protection upgrades of KANUPP enhances the security of KANUPP along with following safety provisions:

- Easy access for emergency services
- Emergency exits
- Emergency evacuation routs

The areas where nuclear safety and security differs includes information sharing. As an example, safety requires information sharing on free and for all basis while security emphasizes on need to know principle. Safety establishes wide outreach for communication channels while security emphasizes on secure network.

Nuclear installations are designed by applying the defence in depth principle for both safety and security. Certain design criteria imposed for safety purposes may serve to reinforce security. As an example, the single failure criterion applied to safety systems requires the nuclear installation to be designed with a sufficient level of redundancy and/or diversification to ensure that safety functions are maintained. Single failure criterion demands that safety be maintained even if one set of equipment in the system fails. This design feature is helpful for security purposes as well. The redundancy in safety design also serves as security layers against adversaries'actions i.e. by application of this criterion, adversaries'must compromise several safety layers in order to cause a radiological release. To improve synergy between safety and security, following actions are also implemented at nuclear power plants;

- Plant Operations Review Committee
- Work planning and control Committee
- Design control and configuration management

- Quality assurance and audit

Nuclear safety and security must not be pitted against each other and one should not have ascendancy over the other. It is very difficult to envisage merging safety and security into a single entity; they must however coexist and reinforce each other mutually.

Keywords: *Nuclear Safety, Nuclear Security, Synergy, Theft, Sabotage, Karachi Nuclear Power Plant (KANUPP).*

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