United States Department of Energy
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International Nuclear Security (INS)

Management of the Interface between Safety and Security for Research Reactors: IAEA TECDOC-1801

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BACKGROUND

- Safety and security have the same objective of protecting the public, society, and the environment
- However, their measures often conflict with each other

SAFETY AND SECURITY OBJECTIVES, FUNDAMENTALS AND CONCEPTS

- SAFETY AND SECURITY OBJECTIVES
  - Protect people, society, and the environment
  - Acceptable consequences should be the same for both safety and security
- SAFETY AND SECURITY FUNDAMENTALS
  - Legal and regulatory frameworks
  - Responsibilities for addressing safety and security measures to counter the threats/accident initiators at a research reactor fall to the license holder
  - Operators have to prevent or mitigate nuclear security or radiation incidents/accidents by using defense-in-depth which provides multiple layers protection
  - A strong safety culture and a strong security culture at the research reactor facility are indispensable

SAFETY AND SECURITY OBJECTIVES, FUNDAMENTALS AND CONCEPTS

- PREVENTION OF SAFETY OR SECURITY EVENTS – DEFENCE-IN-DEPTH
  - Safety and security both base defense-in-depth on providing multiple layers of protection
  - Safety
    - Preventing deviations from normal operation
    - Controlling deviations from operational states
    - Controlling accidents within the design basis
    - Mitigating accidents and ensuring confinement of radioactive materials
    - Mitigating the logical conradiosequences of radioactive releases
  - Security
    - Detecting a potential malicious act
    - Delaying the adversary for a sufficient period to allow for appropriate response, if necessary through external support
    - Responding to and neutralising an attack
- GRADED APPROACH

SAFETY AND SECURITY OBJECTIVES, FUNDAMENTALS AND CONCEPTS

- GRADED APPROACH
  - Safety requirements and security recommendations have to be applied in a way that is commensurate with the potential hazards of the facility
  - Factors for safety include research reactor power and source term, fuel design and handling, amount, enrichment, and form of fissile materials, the presence of high-pressure or high-energy piping, quality of confinement, inventory of radioactive material of the facility, and proximity to population
  - Security considers many of these with the addition of the categorizing nuclear and other radioactive material into protection levels depending on their attractiveness to an adversary and establishing a graded approach to sabotage by defining unacceptable radiological consequences

SAFETY AND SECURITY OBJECTIVES, FUNDAMENTALS AND CONCEPTS

- SAFETY ANALYSIS
  - Provides the technical basis demonstrating that a research reactor facility can be operated safely in accordance with regulatory requirements and within the legal framework of the State and is based on the analysis of a set of postulated initiating events that have been considered in the reactor design
- THREAT ASSESSMENT AND SECURITY PLAN
  - The threat assessment is an evaluation of the threats based on available intelligence, law enforcement and open-source information that describes the motivation, intention and capabilities of potential adversaries
  - The design, evaluation, implementation and maintenance of the facility security system are described in the facility security plan and approved by the regulatory body
- SAFETY AND SECURITY MEASURES
  - Safety measures and security measures must be designed and implemented such that security measures do not adversely impact safety and safety measures do not adversely impact security

- # ISSUES AND CHALLENGES IN THE INTERFACE BETWEEN SAFETY AND SECURITY OF RESEARCH REACTORS
  - FEATURES OF RESEARCH REACTORS AFFECTING THE SAFETY AND SECURITY INTERFACE
    - Negative Impacts
      - Relatively short operating, refueling and maintenance cycles, often with many changes in facility security configuration
      - Many operating modes for different purposes
      - Access to the reactor hall by a wide variety of people with varying trustworthiness
      - Means to manually adjust core reactivity and geometry
      - Many different parties having a a variety of interests in utilization of the facility
    - Positive Impacts
      - High reliability and redundancy of safety systems
      - Passive safety features
      - Access control measures

- **ISSUES AND CHALLENGES IN THE INTERFACE BETWEEN SAFETY AND SECURITY OF RESEARCH REACTORS**
  - SIMILARITIES AND DIFFERENCES BETWEEN SAFETY AND SECURITY OF RESEARCH REACTORS
    - Strong focus on safety
    - Additional security concerns at research reactor
    - Safety and security both necessary, but neither sufficient on their own
  - CHALLENGES TO THE SAFETY–SECURITY INTERFACE
    - Security not generally an element of the original design
    - Changes in operations and facility layout
    - The need to protect security-related information, while at the same time to share safety-related information

- **GENERAL CONSIDERATIONS IN THE SAFETY–SECURITY INTERFACE FOR RESEARCH REACTORS**
  - RESPONSIBILITIES FOR SAFETY AND SECURITY
    - Role of the State
    - Role of the regulatory body
    - Role of the operating organization
  - LEADERSHIP AND MANAGEMENT OF SAFETY AND SECURITY
    - Integrated management system
    - Safety culture and security culture

- **GENERAL CONSIDERATIONS IN THE SAFETY–SECURITY INTERFACE FOR RESEARCH REACTORS**
  - OPTIMIZATION OF PROTECTION
    - All radiation risks must be identified and assessed on a continuing basis, with a focus on evolving technologies
  - OPERATING PROCEDURES
    - Impacts of operating procedures and their modifications on both safety and security
  - PREPAREDNESS AND RESPONSE

- **GENERAL CONSIDERATIONS IN THE SAFETY–SECURITY INTERFACE FOR RESEARCH REACTORS**
  - TRAINING OF PERSONNEL
  - ASSESSMENT OF THE INTERFACE BETWEEN SAFETY AND SECURITY
    - Periodic safety and security reviews
    - Self-Assessment, continuous improvement and feedback from operating experience

- **MANAGEMENT OF THE INTERFACE BETWEEN SAFETY AND SECURITY DURING ALL PHASES OF RESEARCH REACTOR LIFETIME**
  - SITING
  - DESIGN
  - CONSTRUCTION
  - OPERATION
  - UTILIZATION AND MODIFICATION
  - DECOMMISSIONING
  - EXTENDED SHUTDOWN

Questions

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