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Risk–Based Approach for Security Management

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Nuclear security addresses two specific global concerns: (1) the initiation of unacceptable radiological consequences through the intentional, malicious dispersal of nuclear and/or other radioactive materials; and (2) the theft of nuclear and/or other radioactive materials with the intent to construct a weapon of mass destruction. Thus, nuclear security provides, at once, a vital complement to both nuclear safety and nuclear safeguards. Nuclear security is a necessary component of these global programs to ensure that the benefits of nuclear and radioactive materials are preserved for society by protecting against adversary-induced unacceptable consequences.

Currently, the international community places significant emphasis on a robust nuclear security regime. This can be seen by the large number of international instruments highlighting the State's obligations and responsibilities with respect to nuclear security; the availability of international conferences and training courses focused on nuclear security; the popularity of IAEA nuclear security missions and guidance documents; and the number of donor States investing significant capital and resources to assist global strengthening of nuclear security. For those not intimately involved with nuclear security, the basis for this emphasis may not be obvious.

This presentation will provide a background of what led to this emphasis and describe how nuclear security is implemented to help ensure that the societal benefits of nuclear and radioactive materials are preserved.

The euphoria that accompanied the "Atoms for Peace"initiative of the 1950's and early 60's obscured any nuclear security considerations. Research reactors were designed and constructed to optimize their intended operations. However, beginning in the 70's, concerns about security began to arise due to changes in the global threat environment. In 1972, in response to activities of several militant groups around the world and highlighted by the events of the Munich Olympics, the Director General of the IAEA invited security experts from a few Member States to develop the first international security recommendations. The document, "Physical Protection of Nuclear Material"was soon published by the IAEA. This was the first international nuclear security document, but it only dealt with theft of nuclear material (and hence, proliferation concerns). Not long afterward, a revised and more inclusive security document, INFCIRC 225, was published (1975). This was followed by the development of the International Convention on the Physical Protection of Nuclear Materials and Nuclear Facilities in 1980.

Subsequent events, such as truck bomb attacks to buildings, suicide bombers, and nuclear material trafficking events in the early 1990's, led to steady increases in the attention given to nuclear security and in particular to DBTs, insiders, and sabotage. The attacks of September 11, 2001 prompted the development of several international nuclear security instruments, an even greater emphasis on nuclear security at the IAEA, concerns of security for radioactive materials, and greatly increased support from donor States for security assistance.

Paralleling these events and their associated response by the international community, the concepts and approaches to nuclear security were steadily improved. The result of this steady improvement is a mature, structured, and systematic approach to nuclear security. This approach includes the security responsibilities and coordination of both State bodies and operator organizations under a nuclear security regime. It considers the contribution of technical and administrative measures to achieve the fundamental security functions of detection, delay, and response in an integrated and balanced manner that serves to both deter and prevent theft and sabotage. It advocates a graded-approach philosophy, whereby more attractive targets are afforded more robust security. It provides a validated performance-based methodology to enable operators and State authorities to assess the effectiveness of the security system against credible adversary threats, thereby providing confidence that the security system is adequate.

This systematic, performance-based approach lends itself to establishing risk-informed security levels for a research reactor. The potential security risks posed by the research reactor facility can be assessed by understanding: (1) the potential radiological consequences of intentional, malicious acts, (2) the ease with which the consequences can be intentionally initiated, and (3) the safety system effectiveness in mitigating these consequences, and (4) the security system effectiveness in preventing or complicating the ease of initiation. Once understood, the risks can be "managed"by increasing or decreasing the nuclear security system effectiveness. By modifying the features of the nuclear security system and measuring the changes in estimated

risk, a nuclear security system can be identified that optimizes the many parameters that impact the “ideal” security system. These parameters are: (1) the risk posed by security threats, (2) the costs of installing and operating a nuclear security system to adequately mitigate these risks, and (3) the operational impacts of specific security measures.
This risk informed approach to nuclear security has evolved over this period of increasing threats, and has been adopted by the international community.

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