

U.S. Nuclear Regulatory Commission Efforts to Improve the Safety-Security Interface

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Abstract. Improving the interface between safety and security and utilizing synergies is critical to efficient and effective regulation of nuclear and radioactive materials and associated facilities. The United States Nuclear Regulatory Commission is implementing a number of efforts in rulemaking, licensing and inspection to recognize, establish and improve this interface. The United States Nuclear Regulatory Commission has been working multilaterally with the IAEA and bilaterally with our international partners to promote this concept.

1. Introduction

The United States Nuclear Regulatory Commission (USNRC) is an independent regulatory agency created to enable the nation to safely use radioactive materials for beneficial civilian purposes while ensuring that people and the environment are protected. The USNRC regulates commercial nuclear power plants and other uses of radioactive materials, such as in nuclear medicine and industrial practices, through rules, licensing, inspection and enforcement of these requirements. Over the last five years, we have taken measurable steps to improve the safety-security interface through improvements to our regulatory framework including revising our reactor oversight framework, development of specific regulations and guidance documents, and incorporating safety-security interface considerations in our regulatory processes.

2. Regulatory Framework

Safety and security have always been the primary pillars of USNRC's regulatory programs. However, in the current heightened threat environment, there has been a renewed focus on security, and the USNRC has issued enhanced security requirements through the issuances of Security Advisories and Orders to those licensees who possess and utilize nuclear materials and radioactive sources and associated facilities. Regulatory authorities, whether regulating safety and/or security, share a common purpose of protecting public health and safety. In today's environment, with a greater emphasis on security-related matters, it is even more vital that safety and security activities are closely intertwined, and it is critical that consideration of these activities must be integrated so as not to diminish or adversely impact either safety or security. While many safety and security activities complement each other or are synergistic, there remain potential areas of conflict. It is then imperative that mechanisms must be established to resolve these conflicts so as to optimize performance.

The importance of both safety and security in an equal and balanced manner within USNRC's regulatory framework is clearly evident in our mission and strategic goals. USNRC's mission is to license and regulate the Nation's civilian use of byproduct, source, and special nuclear materials to ensure adequate protection of public health and safety, promote the common defense and security, and protect the environment. We have just two strategic goals, a safety goal (Ensure adequate protection of public health and safety and the environment) and a security goal (Ensure adequate protection in the secure use and

management of radioactive materials). Our mission statement and strategic goals establish a firm foundation for our regulatory framework that stresses the importance of maintaining both safety and security. Our regulatory framework is comprised of regulations, licensing, and oversight which includes inspection and enforcement. We have taken measurable steps to improve the safety-security interface in each of these areas.

3. Regulation and Licensing

In conjunction with improvements to its Regulatory Oversight Programs, USNRC is implementing a number of additional efforts to promote safety and security interfaces. In December 2005, USNRC published Information Notice 2005-33, "Managing the Safety/Security Interface." Information Notices are a USNRC generic communication vehicle and are issued to provide significant recently identified information about safety, security, or environmental issues. Licensees receiving the Information Notice are expected to review the information for applicability to their facilities and consider actions, as appropriate, to avoid similar problems. USNRC staff had become aware of instances in which actions taken by operations, maintenance or security personnel at our licensed facilities were not promptly and effectively communicated to likely potentially affected organizations and had the potential to result in adverse effects on plant safety or security. Some examples included placement of security barriers that diminished access to fire suppression equipment, placement of scaffolding during maintenance activities that affected security lines of fire, and staging temporary equipment within security isolation zones. USNRC was already considering these issues as part of a rulemaking, but felt it was important to highlight these issues to licensees in an expedited manner. The Information Notice urged licensees to more explicitly consider safety-security interface issues and take appropriate actions so as not to degrade either safety or security of the facility.

In 2006, USNRC published a proposed rule [1] to amend 10 CFR Part 73, "Physical Protection of Plants and Materials," to enhance security at nuclear power plants. As part of the rulemaking process, the proposed rule is published for stakeholder comments. The stakeholder comments and the draft final rule language have been reviewed and approved by the Commission. Currently, this rule should be issued soon. Once implemented, these requirements will serve as a significant advancement in fostering an improved safety-security interface.

This rule amends existing security regulations and adds new security requirements pertaining to both current and future nuclear power plants. This rule makes security requirements similar to those previously imposed by the Commission orders issued after the terrorist attacks of September 11, 2001, generically applicable. Additionally, this rule adds several new requirements developed as a result of insights gained from implementation of the security orders, reviews of site security plans, implementation of the enhanced security baseline inspection program, and USNRC evaluation of force-on-force exercises. The rule updates the USNRC's security regulatory framework for the licensing of new nuclear power plants.

One of the key new features of this rule is to add a regulatory requirement for a safety-security interface (10 CFR 73.58, "Safety/security interface requirements for nuclear power reactors"). These requirements mandate that licensees ensure that adequate programs for assessing, managing, and coordinating proposed changes and activities, are established such that adverse interfaces between safety and security are identified and appropriate compensatory or mitigative actions are taken to maintain both safety and security.

Specifically, the rule requires licensees to: 1) assess and manage the potential for adverse effects on safety and security, including the site emergency plan, before implementing changes to the plant configurations, facility conditions, or security, and 2) where potential adverse interactions are identified, licensees communicate them to appropriate licensee personnel and take compensatory and/or mitigative actions to maintain safety and security under applicable Commission regulations, requirements, and license conditions. The scope of changes to be assessed and managed must include planned and emergent activities, such as, but not limited to, physical modifications, procedural changes, changes to operator actions or security assignments, maintenance activities, system reconfiguration, access modification or restrictions, and changes to the security plan and its implementation.

Another new requirement in the rule is contained in 10 CFR Part 73.55(c)(7), “Security Implementing Procedures,” of 10 CFR 73.55, “Requirements for the Physical Protection of Licensed Activities in Nuclear Power Reactors against Radiological Sabotage,” requires licensees to review and update existing procedures to reference the requirements of the interface between safety and security as outlined in 10 CFR 73.58. These procedures should clearly define processes to ensure that a comprehensive and effective network of communications between the operations (safety) and security staffs is perpetuated at the facility. Also, 10 CFR 73.55(m) “Requirements for physical protection of licensed activities in nuclear power reactors against radiological sabotage,” requires licensees to ensure that the reviews and audits of its site physical protection program include activities involving the interface between safety and security.

As part of this effort, USNRC also developed draft guidance on safety-security interfaces at nuclear power plants, “Draft Regulatory Guide DG-5021, Managing the Safety/Security Interface” [2]. Regulatory Guides provides guidance to licensees and applicants on implementing specific parts of the NRC's regulations, techniques used by the NRC staff in evaluating specific problems or postulated accidents, and data needed by the staff in its review of applications for permits or licenses. Regulatory Guides provide guidance to licensees as one acceptable means to meet the rule requirements and provides more details regarding the requirements than is contained in the rule itself. The guidance states that licensee’s management controls and processes for the interface between safety and security should ensure that security is notified of potential changes to the characteristics of the site’s physical layout (including topographical changes); the configuration of facilities; structures, systems, and components; the site’s operational procedures; and day-to-day or planned activities. Licensees already had controls and processes to evaluate safety issues, but security was not always included. These integrated controls and processes will ensure that the security organization has the opportunity to review proposed changes and activities to identify potential adverse impacts on the functions and performance of the elements of its site physical protection program. Where physical and administrative changes are predominantly driven by operation or emergency planning, the licensee should address the potential impacts on the functions and performance of the elements of its site physical protection program in its review and assessment to prevent the inadvertent degradation of its capability to effectively implement its site physical protection program and site protective strategy. Activities of interest include, but are not limited to, operations, engineering, work control and planning, emergency preparedness, fire protection, chemical safety, industrial safety, environmental protection, and security.

To facilitate an efficient assessment process, the licensee may choose to screen changes through predetermined questions that are specifically designed to identify potential conflicts

in an efficient yet adequately detailed assessment of a proposed change or activity. The licensee is responsible for ensuring that the screening process identifies and resolves conflicts before the conflict can have an adverse effect. The following are examples of questions that may be used for the screening of planned and emergent activities or changes:

- 1) Could the proposed change or activity decrease the reliability or availability of a security system to perform the intended functions?
- 2) Could the proposed change or activity increase the likelihood of malfunctions of security equipment or systems?
- 3) Could the proposed change or activity decrease the effectiveness of USNRC-approved security plans or invalidate the site protective strategy (e.g., communications, response timelines and pathways, equipment and systems (particularly target sets), or protected fighting positions and fields of fire)?
- 4) Could the proposed change or activity interfere with detection (i.e., interior and exterior sensors, zone of detection and field of view, alarm communications, or access control systems) and assessment functions?
- 5) Could the proposed change or activity increase response times of emergency or armed response personnel (e.g., manmade or natural and active or passive vehicle barriers, vehicle access control and channeling barriers, access delay systems, exterior (protected area) delay barriers, interior delay barriers (passive, active, or dispensable))?
- 6) Could the proposed change or activity increase the numbers of, change configurations of, or create a new target set(s) from those previously evaluated?
- 7) Could the proposed change or activity reduce adversary task times?
- 8) Could the proposed change or activity result in noncompliance with the USNRC's security regulations?

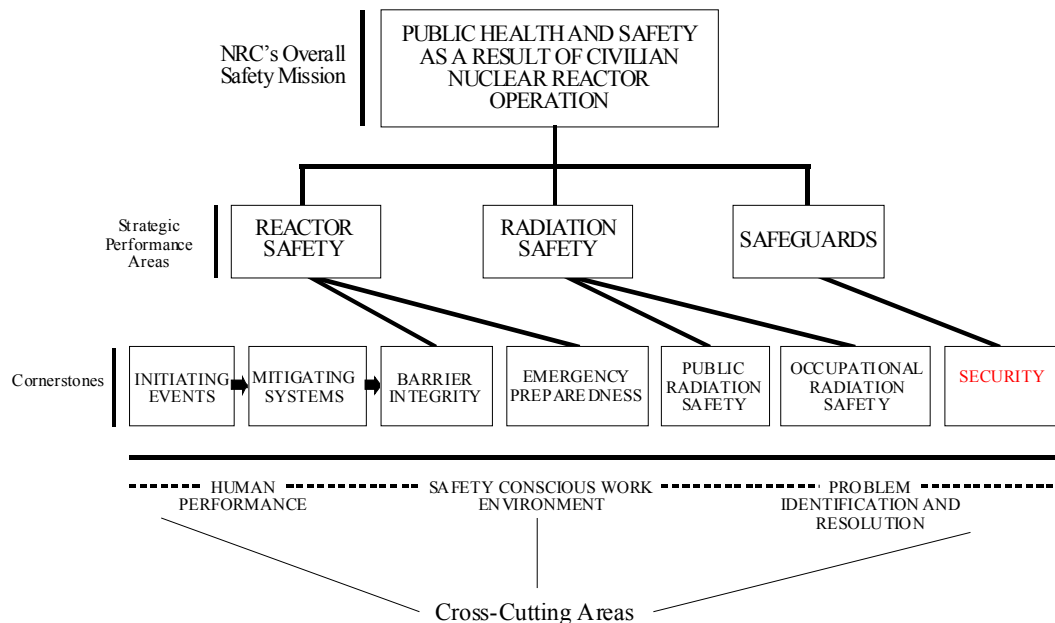
4. Regulatory Oversight

In the nuclear power plant arena starting in 1999, USNRC revised its Reactor Oversight Process [3] to establish a risk-informed baseline inspection program and to set documented risk-informed thresholds for licensee safety and security performance, below which increased USNRC interaction would be warranted. USNRC also established a significance determination process for inspection findings and integrated those with Performance Indicators in a timely manner to support overall assessment of licensee performance. This initiative indicates our efforts to integrate security into the overall oversight process better, thus enhancing safety-security interface internal to the USNRC's own approach in assessing licensee performance.

The regulatory framework for reactor oversight consists of three key strategic performance areas: reactor safety, radiation safety, and safeguards. Therefore, safety and security are integrated into our regulatory framework and treated with common importance. Within each strategic performance area are seven cornerstones that reflect the essential safety aspects of facility operation. These seven cornerstones include: initiating events, mitigating systems, barrier integrity, emergency preparedness, public radiation safety, occupational radiation safety, and security. Satisfactory licensee performance in the cornerstones provides reasonable assurance of safe facility operation and that the USNRC's safety and security missions are being accomplished. Each cornerstone contains inspection procedures and performance indicators to ensure that their objectives are being met. Safety-security interface issues are addressed in evaluating issues among the cornerstones and in the cross-cutting

areas of human performance, safety conscious work environment and problem identification and resolution.

REGULATORY FRAMEWORK



The objective of the security cornerstone is to provide assurance that the licensees' security system and material control and accounting program use a defense-in-depth approach and can protect against (1) the design basis threat if radiological sabotage from external and internal threats, and (2) the theft or loss of radiological materials.

The USNRC evaluates plant performance by analyzing two distinct inputs: inspection findings resulting from USNRC's inspection program and performance indicators (PIs) reported by the licensee (e.g., unplanned scrams, unplanned power changes, drill/exercise performance, alert and protected area security performance index). Safety and security inspections are evaluated using the same process to ensure consistency and promote safety-security interfaces. Thus, security performance deficiencies will affect a plant's overall performance rating.

Both PIs and inspection findings are evaluated and given a color designation based on their safety or security significance. Green inspection findings indicate a deficiency in licensee performance that has very low risk significance and therefore has little or no impact on safety or security. Green PIs represent acceptable performance in which cornerstone objectives are fully met and likewise have little or no impact on safety or security. Both Green inspection findings and PIs allow for licensee initiatives to correct performance issues before increased regulatory involvement is warranted. White, Yellow, or Red inspection findings or PIs each,

respectively, represent a greater degree of safety or security significance and therefore trigger increased regulatory attention.

The events of September 11, 2001 led to significant changes in the security programs at nuclear power plants. With the increased attention to security, we recognized that the maintenance of both plant security and safety requires coordination of activities. Such coordination is needed to ensure that actions taken to address security concerns do not adversely affect safety and that maintenance operations or engineering activities do not introduce security concerns. Therefore, USNRC has incorporated a safety-security interface evaluation in its inspection procedures. For example, facility status inspections are conducted to gather information about the overall security and safety posture at a nuclear power plant by both resident inspectors on a routine basis and by regional or headquarters inspectors during periodic security inspections. These inspections include general information on threat conditions, security force performance and security system operation. To achieve this inspectors walkdown the facility to stay current of facility status as well as identify unexpected security and safeguards conditions that may warrant additional inspection. Resident inspectors may tour the central and secondary alarm stations, may question on-duty security officers, attend licensee plan of the day, shift turnover, emergent work and corrective actions meetings to gather information on a variety of safety and security activities. This inspection is intended to specifically identify safety-security interface issues that require resolution or further consideration. Inspectors are encouraged to consider and, as appropriate, question the licensee regarding possible safety/security interface issues

5. Additional Efforts to Improve the Safety-Security Interface

Another example of where USNRC promoting strong linkages between safety and security is in the area of organizational culture. In 1989, USNRC issued a policy statement on conduct of operations that included safety culture considerations and began an effort in 2008 to revise this policy statement to expand its policy on safety culture to address the unique aspects of security and to ensure the resulting policy is applicable to all licensees and certificate holders. This effort is ongoing and included a stakeholder meeting with a wide range of power plant licensees, radioactive materials licensees, public and non-governmental organizations. Based on the stakeholder meeting, most participants supported a joint policy statement that addressed safety culture and security culture rather than separate policy statements. Stakeholders generally believed that to address security in a separate policy statement may only provide negative reinforcement that security is held to a different standard and that this would be an undesirable outcome. They expressed that the policy statement should recognize that security culture is one of several integrated parts of safety culture (i.e., there is no real distinction between cultures, and there is not a standalone radiation safety culture, a nuclear criticality safety culture, a fire safety culture, or an environmental protection culture). All of these programs are focused on safety for a particular discipline; the licensee safety culture is approached in an integrated manner across discipline boundaries.

Both safety culture and security culture share the same goal (i.e., the protection of people, society and the environment) and also share many key principles, such as questioning attitudes, continuous improvement, commitment, definition of responsibilities, definition and control of working practices, and organizational learning. However, differing views on issues such as risk management, trustworthiness and information sharing can exist between safety and security personnel. Through consideration of these differences in a culture statement, safety-security interfaces can be promoted. We expect to issue a revised policy statement

later this year. In the end, the revision to the culture policy statement will provide another mechanism to strengthen and reinforce safety-security interfaces.

As part of the process to develop and implement new security requirements, USNRC involves a broad range of stakeholders to ensure integrated and implementable solutions. Following September 11, 2001, USNRC underwent a comprehensive review of the security requirements and potential vulnerabilities of regulated facilities. Using a graded approach, we developed and issued additional security requirements to facilities possessing risk-significant materials. Some facilities such as nuclear power plants and fuel cycle facilities had well-established and robust safety and security requirements and physical protection capabilities. Other facilities such as industrial, medical and academic institutions had well-established and robust safety requirements but lacked robust security requirements to address new potential threats. Especially for these facilities, using a multidiscipline approach ensured that appropriate security measures were balanced with the need for physical protection of the risk-significant materials, the need to consider regulatory burden and the need for practices to use radioactive materials for their societal benefit. Thus, the safety and security considerations and safety-security interface issues were explicitly considered when these new requirements were developed. This same approach and philosophy is used in developing regulations through the rulemaking process.

To assure a consistent approach in how inspectors addressed the licensees' efforts to implement new security requirements, USNRC has established multi-discipline groups to review safety-security inspection findings of non-compliance with the enhanced security measures for nuclear power plants and radioactive material licensees. The Security Findings Review Panel (SFRP) reviews all security-related inspection findings for nuclear power plants and radioactive material licensees. The SFRP is composed of reactor safety, radioactive materials safety, security, legal and enforcement experts. A balanced review by this multidiscipline group ensures regulatory consistency and that safety-security interface issues are appropriately addressed. Similarly in the radioactive materials area, the Implementation of Increased Controls Working Group (IICWG) was formed to review inspection findings associated with the Increased Control Orders [4], which were issued to radioactive materials licensees possessing greater than IAEA Code of Conduct for the Safety and Security of Radioactive Sources [5] Category 2 quantities of material. The IICWG is composed of materials safety, security, legal and Agreement State representatives. Because the Increased Control orders were issued to radioactive materials licensees, who were primarily focused on safety, implementation of performance-based security measures resulted in a number of safety-security interface challenges. For example, following issuance of new security requirements, some radioactive materials licensees removed radioactive material postings to make storage areas of these materials less conspicuous and thus more secure. However, postings are an important part of radiological safety. The postings were returned and appropriate security measures were added to balance safety and security. As a result of the IICWG, safety and security issues such as these were addressed and resolved in an integrated and balanced way.

As with many countries, regulatory responsibility for various safety and security aspects involve multiple agencies in the United States. The U.S. government has established interface and coordination mechanisms to consider the interrelationship of security and safety issues such as the inter-agency Radiation Source Security and Protection Task Force and the Department of Homeland Security's Critical Infrastructure Nuclear Government Coordinating Council. For example in the radioactive material area, the USNRC, the

Domestic Nuclear Detection Office, and the National Nuclear Security Administration are working on security enhancements to certain self-shielding irradiators. The development and evaluation of these proposed security enhancements is being extensively coordinated with security specialists and safety reviewers to ensure that security modifications do not negatively affect safety aspects such as shielding and serviceability. This integrated effort has resulted in significant enhancements to security while not adversely affecting safety. The NRC supports U.S. intergovernmental agency involvement in IAEA efforts to develop guidance in the safety and security series that address the issue of safety-security interface.

6. Conclusion

NRC has taken measurable steps to define, institutionalize, and improve the safety-security interface through improvements to our regulatory framework, development of specific regulations and guidance documents, and incorporating safety-security interface considerations in regulatory processes. Without consideration and integration of safety and security issues, unintended consequences causing degradation of safety and/or security conditions will likely occur. The development of frameworks and mechanisms that promote and establish a robust safety-security interface is critical in today's environment.

REFERENCES

- [1] UNITED STATES NUCLEAR REGULATORY COMMISSION, Physical Protection of Plants and Materials, 10 Code of Federal Regulations, Part 73, Proposed Rule (2006).
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