

POLICY ISSUE NOTATION VOTE

July 6, 2005

SECY-05-0120

FOR: The Commissioners

FROM: Luis A. Reyes
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SUBJECT: SECURITY DESIGN EXPECTATIONS FOR NEW REACTOR LICENSING
ACTIVITIES

PURPOSE:

Obtain Commission approval to:

1. Revise the Commission Policy Statement on the Regulation of Advanced Nuclear Power Plants to explicitly encourage enhanced security.
2. Develop guidance for security assessments and target set analysis to be performed for new and next-generation reactor designs.
3. Conduct rulemaking to require applicants to submit a security assessment and target set analysis, and to waive the requirement for a rulemaking plan for this rulemaking.
4. Establish security performance standards for Generation IV and other future reactor concepts as part of the technology-neutral framework.

SUMMARY:

The staff proposes that the Commission modify the Commission Policy Statement on the Regulation of Advanced Nuclear Power Plants to explicitly encourage applicants and prospective applicants to consider security at an earlier stage in their design. The staff believes that it is appropriate to establish additional policy expectations to address security as a guiding design principle in order to achieve a more robust and effective security posture.

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The staff proposes to develop guidance to implement the expectations set forth in the policy statement to guide decisions for designs in the regulatory approval process and serve as the implementing guidance for the rulemaking effort, if rulemaking is undertaken.

The staff proposes to initiate rulemaking to Title 10 of the Code of Federal Regulations (10 CFR) Parts 50 and 52 requiring applicants to submit a security assessment and target set analysis. The benefits of this rulemaking are that nuclear plant designers would analyze and establish, at an earlier stage, security design aspects such that there would be an improvement in overall facility design resulting in a more robust and effective security posture, and less reliance on operational security programs. For Generation IV reactors and other future reactor concepts, the staff would establish security performance standards for integrating security into the design as a design criterion. This effort will be performed in conjunction with the Technology-Neutral Framework.

If approved, the implementation of these actions would apply to all approval and licensing processes described in 10 CFR Parts 50 and 52.

BACKGROUND:

In SECY-03-0157, "Security Design Requirements for New Reactor Licensing Activities," the staff presented four options to the Commission for establishing security requirements for new reactors. The staff recommended that the Commission select Option 2, which was predicated on the concept that new reactors would be expected to provide the same level of protection as operating power reactors by incorporating security-related design and siting features at the design certification (DC), early site permit (ESP), and combined license (COL) review phases.

In the SRM on SECY-03-0157, the Commission approved the staff's recommendation in Option 2 to seek ways to codify as generically applicable requirements the appropriate provisions from security orders related to the DBT for the design and licensing of future reactors. The Commission also stated that the staff should continue to follow the guidance in the SRM on SECY-03-0083, "Staff Approach for Addressing Louisiana Energy Services and U.S. Enrichment Corporation Gas Centrifuge Facility Security Issues," dated July 2, 2003, for handling licensing applications unless and until the security orders are codified in the Nuclear Regulatory Commission (NRC) regulations.

Current Commission guidance (SRM-COMSECY-04-0047) has emphasized completing the revised DBT rulemaking activities. Thus, it is timely to revisit the SRM on SECY-03-0157 and the SRM on SECY-03-0083 to assess its impact on future Part 52 applicants and on the development of the Technology-Neutral Framework (discussed in SECY-05-0006, "Second Status Paper on the Staff's Proposed Regulatory Structure for New Plant Licensing and Update on Policy Issues Related to New Plant Licensing," dated January 7, 2005).

Since the events of September 11, 2001, the NRC has assessed threats, vulnerabilities, and mitigative strategies for reactors and has required upgrades of physical security measures at the Nation's 103 operating reactors. The NRC is currently processing security clearances for selected employees of applicants and prospective applicants so that they may be granted access to classified threat and vulnerability information. The staff considers it prudent to provide expectations and guidance that applicants and prospective applicants use this

information early in the design stage to identify potential mitigative measures and/or design features.

Lastly, for future reactor concepts, DOE and the National Nuclear Security Administration (NNSA) jointly fund the Proliferation Resistance and Physical Protection (PR&PP) expert group. The mission of the PR&PP expert group is to develop a systematic method that will evaluate and compare proliferation resistance and physical protection of Generation IV nuclear energy systems. The NRC is an observer on the expert group. The group's insights are expected to be helpful in establishing the security performance standards for Generation IV nuclear energy systems.

DISCUSSION:

The NRC's strategic plan identifies goals to ensure protection of public health and safety and the environment, and to ensure the secure use and management of radioactive materials. One of the strategies employed to meet these goals is the use of relevant intelligence information and security assessments to determine realistic and practical security requirements and mitigation measures. In implementing the strategies, the NRC staff will continue to assure the validity of the DBT, complete the assessments of security and mitigation strategies at licensed facilities, and revise requirements for additional protection where needed.

Current Activities:

The staff is now engaged in several rulemaking activities that will codify for future generic applications the additional security requirements imposed by order on operating reactors subsequent to September 11, 2001. As described in a memorandum dated November 16, 2004, "Planned Schedule for Completing the 10 CFR 73.1 Design Basis Threat and 10 CFR 73.55/Part 73 Appendix B Rulemakings," the staff sent to the Commission a proposed revision to 10 CFR 73.1 in June 2005 and plans to send to the Commission a proposed revision to 10 CFR 73.55 and related parts by June 2006. As these rulemakings are finalized, applicants for new power reactor operating licenses and combined licenses will be subject, by regulation, to the same enhanced security requirements as the currently operating fleet of reactors.

On September 13, 2004, the staff issued its final design approval for the Westinghouse AP1000 design, and on April 18, 2005, the proposed rule for this design was published in the *Federal Register* (70 FR 20062). Consistent with Commission direction, the staff provided Westinghouse the February 25, 2002, interim compensatory measures (ICMs) for power reactors and relevant portions of the April 29, 2003, revision of the DBT issued by orders to licensees of all operating reactors. Although the staff provided these requirements to Westinghouse, the AP1000 applicant deferred to the COL stage the development of the details regarding implementation of such requirements. The AP1000 was reviewed against the existing DBT in Part 73 (i.e., does not address the April 2003 DBT) and any new requirements will be addressed as a plant specific matter if the AP1000 is referenced in a construction permit and operating license, or COL. At that time, the staff would also determine whether rulemaking is necessary to modify the AP1000 design generically to address the revised DBT, subject to the requirements of § 52.63 (*viz.*, that a modification to the design is necessary to assure adequate protection of the public health and safety or the common defense and security).

The staff does not believe that it is necessary to modify the three existing DC rules to address the revised DBT, unless a DC rule is referenced. If one of those DC rules were referenced in an application, the Commission could issue an order to the applicant under § 52.63, requiring that the application address the revised DBT. In addition, the Commission could also institute a rulemaking at that time to modify the DC rule, under § 52.63.

Three ESP applications (Dominion—North Anna, Exelon—Clinton, and Entergy—Grand Gulf) are under review. The staff's approach for evaluating the adequacy of security-related requirements in each of these licensing reviews has been consistent with the process outlined in the SRM on SECY-03-0157.

The staff is currently engaged in dialogue with external stakeholders to develop an understanding of the detailed content of a potential COL application that meets the application content requirements of 10 CFR Part 52. With respect to security-related portions of an application, the industry has indicated it plans to update NEI 03-12, "Security Plan, Training and Qualification Plan, and Safeguards Contingency Plan" (generic security plan template to reflect the industry-wide security provisions that the staff approved as part of its review of security plans submitted by operating reactor licensees pursuant to the April 29, 2003, DBT Order).

As part of its 2004 review and approval of revised security plans for operating reactors, the staff approved those plan commitments that explicitly addressed the requirements of the February 25, 2002, Order that require consideration of measures to mitigate losses of large areas of the plant and large fires. As NRC continues to evaluate the measures the operating fleet has taken in this regard, security plans may evolve. Such enhancements to security plans would likely be incorporated into revisions to NEI 03-12, and, thus, would be part of an expected security plan submittal associated with a COL application.

Once the revised DBT rule goes into effect, Part 52 applicants will be required to address the revised DBT in their applications to the extent applicable for each of the processes. In addition, the change process for certified designs will be used to impose the revised DBT requirements to previously certified designs (there is no immediate need to modify a previously certified design, unless the design is referenced in a COL application). The revised DBT can be applied if the Commission determines that a modification is necessary to assure adequate protection of the public health and safety or the common defense and security.

Undertaking the foregoing process in connection with the revised DBT rulemaking is consistent with Commission expectations that advanced reactor designs will provide "at least the same degree of protection of the public and the environment that is required for the current generation light water reactors," as discussed in the Commission Policy Statement on the Regulation of Advanced Nuclear Power Plants.

Consistent with SECY-03-0157, Option 2, and until the following proposed actions can be implemented, the staff has developed a clearance process (personnel clearances as well as facility clearances) to facilitate the early sharing of security assessment insights with selected employees of applicants and prospective applicants, such as Westinghouse, General Electric, and Framatome, USA. The staff briefed representatives of Westinghouse and General Electric on May 26, 2005. The staff plans to provide current and prospective DC applicants security information so that they have an opportunity to incorporate strategies into their facility designs

that optimize security asset utilization while minimizing impacts on operational safety. This security information could be used by the applicants to perform target set analyses and security assessments.

NRC's security assessment and mitigative measure identification activities for operating reactors are still ongoing, and the results of completed activities are documented in various reports. Pertinent information from these efforts would need to be collected, analyzed, and summarized to provide useful security design insights for prospective applicants. The generic insights from these activities can likely be used to enhance the safety and security margins of new reactor designs.

Future Activities:

Security activities for reactors have focused on ensuring the security of the operating nuclear power plants. Industry interest in licensing new nuclear power plants continues to increase. The first COL application for a new nuclear power plant could be submitted as early as 2007. Given the high level of interest in new reactor licensing, the staff believes that actions should be initiated to establish security design expectations as an explicit and early consideration in the design and licensing of new reactor facilities.

Proposed Actions:

Accordingly, the staff proposes the following actions:

1. Revise the Commission Policy Statement on the Regulation of Advanced Nuclear Power Plants (59 FR 45461; July 12, 1994) to explicitly encourage design and construction of new reactors that result in enhanced security. The policy statement would be revised to describe the Commission's expectations regarding the insights applicants can derive through the development of security assessments and target set analyses, and how these insights would be considered and applied to the design and construction of new and next-generation reactors.

Evaluation of Proposed Action 1:

A primary objective of the Commission Policy Statement on the Regulation of Advanced Nuclear Power Plants is to provide all interested parties, including the public, with Commission views on the desired characteristics of advanced reactor designs which would enhance stability and predictability in the licensing and regulation of advanced reactors. As discussed in the Commission Policy Statement on the Regulation of Advanced Nuclear Power Plants, "...The Commission expects that advanced reactors will provide enhanced margins of safety and/or utilize simplified, inherent, passive, or other innovative means to accomplish their safety functions." However, the policy does not explicitly address security expectations for new plant designs. Accordingly, the staff believes it would be beneficial to revise the advanced reactor policy statement to include Commission views on the desired security design characteristics of new and next-generation nuclear power plants. Revising the policy statement would encourage new plant designers to consider security early in the design stage, instead of postponing consideration of the security requirements for the construction stage. Early consideration of design-related security issues is expected to be

cost-beneficial because it would reduce reliance on operational security programs to ensure the security of new reactors.

Though target set analyses are conducted now as part of NRC's force-on-force evaluations at operating facilities, staff guidance relative to the use of this tool as envisioned in Option 2 of SECY-03-0157 has not yet been fully developed.

The staff would expect to complete the work on Proposed Action 1 by the end of FY 2007.

Alternatively, the Commission could issue in a short period of time (3-6 months) either a short policy statement on security for advanced reactors setting forth the Commission's expectations in this regard, with post-promulgation opportunity for public comment. This approach would facilitate earlier communication with near-term applicants.

2. Concurrent with the revision of the policy statement, the staff will engage industry stakeholders to develop the expectations and the desired characteristics and attributes for the security design of new and next-generation reactors, and to develop guidance for security assessments and target set analysis to be performed for new and next-generation reactor designs.

Evaluation of Proposed Action 2:

The guidance document would implement the expectations set forth in the revised Policy Statement. It would also provide criteria for the NRC to use in evaluating decisions for designs that are in the regulatory approval process prior to completion of the rulemaking proposed below. As designs will be at different stages of the regulatory approval process (e.g., DC, COL), the staff will consider the level of completeness of the design in assessing the ability of an applicant to incorporate design features. Applicants and prospective applicants would be requested to identify and describe design features or built-in capabilities that would substantially improve a reactor design's ability to cope with or mitigate potential consequences of loss of large portions of the plant due to explosions or fires. This is consistent with the Commission's Policy Statement on Severe Accidents regarding "The issues of both insider and outsider sabotage threats will be carefully analyzed and, to the extent practicable, will be emphasized as special consideration in the design and in the operating procedures developed for new plants." The NRC would have to provide a basis for imposing any additional requirements on a case-by-case basis pending promulgation of a new rule. Last, the guidance would serve as implementing guidance for the rulemaking, if undertaken.

The staff would expect to complete the work on Proposed Action 2 by the end of FY 2007.

3. Codify requirements in Title 10 of the Code of Federal Regulations (10 CFR) Parts 50 and 52 requiring applicants to submit a security assessment and target set analysis. To expedite this rulemaking, the staff recommends that a rulemaking plan not be developed.

Evaluation of Proposed Action 3:

The benefit of using target set analysis as a tool to optimize facility design from a security perspective is best accomplished prior to completion of the NRC design certification process or as early as possible for previously certified designs. 10 CFR 52.47(a)(2) requires that a DC application must contain a level of design information sufficient to enable the Commission to judge the applicant's proposed means of assuring that construction conforms to the design and to reach a final conclusion on all safety questions associated with the design before the certification is granted. The first-of-a-kind engineering (FOAKE) stage is the design stage in which most of the engineering and construction details are completed—details not needed for DC. Establishing a requirement that future applicants perform a design/plant-specific security assessment and target set analysis before or during the FOAKE stage will enable nuclear plant designers to analyze and establish, at an earlier stage, security design aspects of features such as mitigative equipment, physical barriers, and systems, including their capability, redundancy, and locations.

The staff notes that 10 CFR 52.47(a)(v) already requires that design specific probabilistic risk analyses (PRAs) be submitted with DC applications. Proposed Action 3 would require applicants to incorporate the insights of target set analyses (which are frequently derived from PRAs) into an overall facility design resulting in a more robust and effective security posture.

The staff would expect to complete the work on Proposed Action 3 by the end of FY 2009.

4. Establish security performance standards for integrating security into the design of Generation IV reactors and other future reactor concepts as a design criterion.

Although security (i.e., physical protection) is one of the protective strategies identified in the Draft Technology-Neutral Framework, the details of what needs to be done to accomplish this strategy have not been developed (see SECY-05-0006). Protective strategies are the safety fundamentals identified for nuclear power plant design, construction, and operation and provide the foundation for developing the technology-neutral requirements and regulations. To complete the technology-neutral framework, the physical protection strategy will have to be integrated with the safety strategy to ensure a coherent approach to the safety and security of non-light-water and Generation IV reactors. The performance standards to be established for security will be an integral part of the technology-neutral framework and the requirements to be developed for the design, construction, and operation of the next generation of reactors.

The staff would expect to complete this work concurrent with the completion of the technology-neutral framework. The schedule for its completion and anticipated staff sources will be provided in a subsequent status report on the technology-neutral framework.

Evaluation of Proposed Action 4:

The physical protection strategy of the technology-neutral framework impacts and depends on the other protective strategies affecting design, construction, and operation. Accordingly, performance standards to be established for security are an essential and integral part of

the framework as well as the resulting safety and security requirements that would be developed for the design, construction, and operation of the next generation of reactors.

The actions proposed in this paper for new reactors support the agency's security goal of establishing expectations that encourage the use of innovative security approaches at the reactor design or construction stage as is reasonably achievable. By setting expectations for future applicants as early as possible in the licensing process, the proposed actions will provide timely feedback to reactor designers and the staff on design-related security issues. Such early feedback is consistent with the intent of the Commission Policy Statement on the Regulation of Advanced Nuclear Power Plants, and is intended to improve the effectiveness, efficiency, and predictability of the review process. These actions will also ensure that the industry considers security appropriately when moving from previously certified designs to the FOAKE design stage, when submitting DC and COL applications, and when constructing new facilities. Early consideration of design-related security issues is expected to be cost-beneficial because it would reduce reliance on operational security programs to ensure the security of new reactors.

COMMITMENTS:

There are no additional commitments in this paper.

RECOMMENDATION

The staff recommends the Commission approve:

1. Revising the Commission Policy Statement on the Regulation of Advanced Nuclear Power Plants to explicitly encourage enhanced security.
2. Developing guidance for security assessments and target set analysis to be performed for new and next-generation reactor designs.
3. Conducting rulemaking to require applicants to submit a security assessment and target set analysis, and to waive the requirement for a rulemaking plan for this rulemaking.
4. Establishing security performance standards for Generation IV and other future reactor concepts as part of the technology-neutral framework.

RESOURCES:

The current FY 2006 budget does not include any resources for the recommendations outlined above. For proposed actions 1, 2, and 3, three additional FTEs are needed each year in FY 2006 through FY 2009, one each for NRR, NSIR, and RES; an additional fraction of an FTE is needed for OGC. In FY 2006, Actions 1, 2, and 3 resources would be provided if the additional \$20 million above the FY 2006 President's budget is provided by Congress in FY 2006. If additional funding is not provided in FY 2006, the resources would have to be considered through the planning budgeting and performance management (PBPM) process. For FY 2007, resources for Actions 1, 2, and 3 would be requested as part of the PBPM process. This could impact staff's work on new reactor licensing infrastructure development and pre-application

The Commissioners

-9-

reviews. The resource estimates to implement Action 4 will be provided in a subsequent status report on the technology-neutral framework.

COORDINATION:

The Office of the Chief Financial Officer has reviewed this paper for resource implications and has no objections. The Office of the General Counsel has no legal objection to this paper.

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