POLICY ISSUE
(Notation Vote)

November 14, 2022 SECY-22-0098

FOR: The Commissioners

FROM: Daniel H. Dorman
Executive Director for Operations

SUBJECT: RULEMAKING OPTIONS FOR REVISING SECURITY REQUIREMENTS FOR FACILITIES STORING SPENT NUCLEAR FUEL AND HIGH-LEVEL RADIOACTIVE WASTE

PURPOSE:

This paper responds to Staff Requirements Memorandum (SRM)-SECY-19-0100, "Staff Requirements—SECY-19-0100—Discontinuation of Rulemaking—Independent Spent Fuel Storage Installation Security Requirements," dated August 4, 2021 (Agencywide Documents Access and Management System Accession No. ML21217A045). The U.S. Nuclear Regulatory Commission (NRC) staff is giving options for a potential rulemaking associated with security requirements for facilities providing interim storage for spent nuclear fuel (SNF) and high-level radioactive waste (HLW).

SUMMARY:

In 2007, the staff recommended to the Commission that the NRC pursue a rulemaking to develop new security requirements for facilities providing interim storage for SNF and HLW. Since that time, the staff's perspectives on the considerations that formed the basis for the recommended rulemaking have evolved. This evolution in perspectives has been driven by additional research assessing the consequences of malevolent acts against these facilities, extensive stakeholder engagement on the technical approach, changes in the regulatory environment for these facilities, and the staff's licensing and oversight experience. Considering

CONTACT: Johari A. Moore, NSIR/DPCP
301-287-3787

these factors, the staff has concluded that the previously identified basis for pursuing rulemaking no longer exists. The current regulatory framework, including the additional requirements in the post-9/11 security orders, provides reasonable assurance of adequate protection of public health and safety for facilities providing interim storage for SNF and HLW. Based on its assessment of the factors provided in this paper, the staff recommends that the Commission discontinue the rulemaking.

BACKGROUND:

This rulemaking has a complex history, beginning almost 2 decades ago with security assessments performed by the NRC between 2003 and 2005 for independent spent fuel storage installations (ISFSIs) and the staff's review of spent fuel vulnerability assessment reports (SFVARs). Enclosure 2 of this paper provides the history and evolution of this rulemaking and provides context for the staff's recommendation. A summary of the ISFSI security regulatory framework is provided in Enclosure 3.

Enclosure 4 provides an update on the status of a petition for rulemaking (PRM-72-6), dated November 24, 2008 (ML083470148), related to this rulemaking. The petition for rulemaking requested that the NRC amend its interim dry cask storage requirements to require that ISFSIs be fortified against attack. The staff is considering PRM-72-6 as part of this rulemaking activity. This paper does not provide the staff's decision on the request. The staff will communicate its decision to the Commission after receiving the Commission's direction on this paper.

DISCUSSION:

The staff identified four options in response to SRM-SECY-19-0100. The rulemaking options presented in this paper are informed by the staff's reconsideration of the appropriate technical approach for the rulemaking and perspectives gained both before and after the postponement of the rulemaking in 2015. Options 1 and 2 would maintain the current regulatory framework with no changes, while Options 3 and 4 would propose a different approach to regulating security for ISFSIs.

Technical Approach

In SECY-07-0148, "Independent Spent Fuel Storage Installation Security Requirements for Radiological Sabotage," dated August 28, 2007 (ML062860177, nonpublic; ML080030050, redacted), the staff proposed updating the security requirements for ISFSIs using a "dose-based approach." Under the dose-based approach, licensees would use release fraction values (i.e., quantities of radionuclides released in specific security events) provided by the NRC to calculate the dose consequences of the specified security events. Licensees who could not meet the 0.05-sievert (5 rem) dose limit would be required to consider options such as expanding the controlled area boundary of their facility, increasing the size of the facility (including potentially purchasing additional land), using engineered security barriers or features to prevent a specific security scenario, shifting the protective strategy to deny adversaries access to the ISFSI to prevent a specific security scenario from succeeding, or closing the ISFSI and shipping the SNF to another location. In SRM-SECY-07-0148, dated December 18, 2007 (ML073530119), the Commission approved the staff's recommendation to pursue a rulemaking to "develop new, risk-informed, performance-based security requirements applicable to all ISFSI licensees to enhance existing security requirements" using the dose-based approach.

Before the postponement of the rulemaking in 2015, the staff conducted stakeholder outreach activities. Some industry stakeholders frequently stated that the dose-based approach was unnecessarily burdensome and required the use of classified and complicated formulas to determine potential radioactive material releases. These stakeholders also said either that the SFVAR information was overly conservative and based too heavily on analysis rather than experimentation, or that it did not adequately characterize the information needed to perform the assessments. Additionally, the Union of Concerned Scientists commented that the dose-based approach could allow licensees to adjust the required data entries to achieve an acceptable dose level. To address these views, the staff contracted with Sandia National Laboratories (SNL) to develop the unclassified report SAND2013-0533, "Analysis of Dose Consequences Arising from the Release of Spent Nuclear Fuel from Dry Storage Casks," issued January 2013 (ML13297A320). The staff also conducted an internal review of existing studies, reports, and data on SNF cask vulnerabilities and potential releases.

On January 7–10, 2013, the staff conducted proof-of-concept explosive and thermal attack tests on SNF storage cask surrogates under a contract with SNL. On March 7, 2013, the conclusions of the testing were presented in a classified meeting attended by more than 50 stakeholders having appropriate security clearances and a need-to-know determination.

Testing conclusions revealed that certain scenarios would not enable a successful breach of a storage cask, but that a release was possible in other scenarios. As discussed in SECY-07-0148, the staff had previously determined that "the potential [for certain malevolent acts] to breach a cask's containment boundary does not necessarily indicate that the 0.05-sievert (5 rem) dose limit would be exceeded at the ISFSI's controlled area boundary, or that the licensee is unable to protect the ISFSI against the DBT [design-basis threat] for radiological sabotage." The staff described that a potential release of radioactive materials would be of limited duration, rather than being a continuous release. However, for the more complex task of assessing exposure to a hypothetical member of the public in these scenarios, the staff determined that additional research was needed to validate assumptions and reduce uncertainties associated with the atmospheric transport and resultant dose calculations.

SNL provided additional research results in a January 2018 report titled "Quantification of the Release of Spent Nuclear Fuel from Dry Casks during Security Related Scenarios" (nonpublic, safeguards information).[1] In January 2022, to support development of this paper, subject-matter experts (SMEs) in the Office of Nuclear Security and Incident Response (NSIR) and the Office of Nuclear Material Safety and Safeguards independently reviewed the 2018 SNL report to determine whether it identified any potential vulnerabilities that warranted further enhancements of ISFSI security. The SMEs' findings are documented in "Technical Review of SAND2018-04418, 'Quantification of the Release of Spent Nuclear Fuel from Dry Casks during Security Related Scenarios,'" dated May 13, 2022 (ML22175A026, nonpublic). The SMEs determined that the study does not provide a basis for enhancing ISFSI security at NRC-licensed facilities because "the simplifying assumptions used in the analyses combined with the conservative and non-representative values do not adequately characterize or provide an accurate estimate of release fractions for an ISFSI related sabotage event." As an example of the overly conservative nature of the analysis, it does not include required storage design components that would inhibit or prevent a radioactive release, such as the concrete overpack.

[1] Controlled by staff in the Office of Nuclear Security and Incident Response and available for Commission review upon request.

ISFSI Security Regulatory Environment

In SECY-07-0148, the staff raised concerns about the clarity and consistency of the NRC's regulatory requirements for security at ISFSIs. In the draft regulatory basis, "Draft Technical Basis for a Rulemaking to Revise the Security Requirements for Facilities Storing Spent Nuclear Fuel and High-Level Radioactive Waste," Revision 1, dated December 16, 2009 (ML093280743), the staff stated that the existing ISFSI security regulations were "unnecessarily complex" and "difficult for the NRC staff, licensees, applicants, and other stakeholders to understand and apply." In developing this paper, the staff has reconsidered and no longer has these concerns due to the perspective gained from licensing and regulatory activities for ISFSIs conducted since 2009. The staff's experience shows that ISFSI applicants and licensees have successfully applied for and constructed ISFSIs under both the general- and specific-license provisions of Title 10 of the *Code of Federal Regulations* (10 CFR) Part 72, "Licensing Requirements for the Independent Storage of Spent Nuclear Fuel, High-Level Radioactive Waste, and Reactor-Related Greater than Class C Waste." In addition to the proposal to require all ISFSI licensees to develop a security program using the dose-based approach, the 2009 draft regulatory basis proposed to increase consistency by incorporating lessons learned from prior ISFSI security inspections, the force-on-force assessment results from power reactor sites that were applicable to ISFSIs, and the final rulemaking on power reactor security. However, in its reevaluation, the staff has identified that currently there is not a sufficient basis for imposing new security requirements to increase regulatory clarity or consistency.

One benefit of the postponement of the ISFSI security rulemaking in 2015 was that it allowed the staff time to focus on the decommissioning rulemaking. On March 3, 2022, the NRC published the decommissioning proposed rule, "Regulatory Improvements for Production and Utilization Facilities Transitioning to Decommissioning" (ML22019A128), in the *Federal Register* for public comment (87 FR 12254). The decommissioning final rule is scheduled to be published in May 2024. Specifically with respect to ISFSIs, the decommissioning proposed rule would provide an option for a licensee to protect a general-license ISFSI under the physical security requirements for a specific-license ISFSI once all spent fuel has been moved to dry storage. The staff included this option for ISFSI licensees in the decommissioning proposed rule to address concerns about regulatory clarity and consistency that were part of the basis for the ISFSI security rulemaking. The staff anticipates that, if the proposed provision is incorporated into the regulations through a final decommissioning rule, the rule would increase consistency between the security programs at general- and specific-license ISFSIs that are not collocated with an operating reactor, and it would also reduce the need to review requests for exemptions and alternative measures for general-license ISFSIs during decommissioning.

In developing options for this paper, the staff also assessed the current and reasonably foreseeable future regulatory considerations for SNF and HLW storage. The staff has not identified any new considerations that should be included in this paper as a basis for new rulemaking options in this area. In a separate effort, the staff is developing a response to SRM-SECY-19-0095, "Staff Requirements—SECY-19-0095—Discontinuation of Rulemaking—Enhanced Security of Special Nuclear Material," dated August 4, 2021 (ML21217A065). That paper may consider using material attractiveness to establish security requirements for the protection of special nuclear material (SNM), including the SNM contained in SNF. The staff's response to SRM-SECY-19-0095 could address the topic of incorporating SNF, including SNF in dry storage, within the scope of the SNM rulemaking. Commission direction to the staff in response to the staff's paper on the SNM rulemaking could affect the NRC's future approach to applying security requirements at facilities that store SNF and HLW.

Consideration of Public Input

This paper is informed by stakeholder feedback on the draft regulatory basis, as well as feedback received during subsequent meetings with stakeholders on the SFVAR information described above. Additionally, on May 24, 2022, the staff held a public meeting to discuss the options in this paper and the criteria the staff would use to evaluate the options. The staff has prepared a summary of this meeting (ML22147A109). During the meeting, the staff again heard concerns about the dose-based approach, as well as views both supporting and challenging the conclusions of the security assessments. The staff also heard feedback on the benefits of codifying the post-9/11 security orders within the scope of a more comprehensive rulemaking and concerns about the time required to reassess alternative technical approaches and to process facility and personnel clearances to allow stakeholders to discuss classified information with the staff. Stakeholders generally supported the range of options presented in this paper and did not propose any additional options for staff consideration.

OPTIONS:

The staff identified four options in response to the Commission's direction to provide a full range of options and recommends Option 1 (to discontinue rulemaking).

Option 1: Discontinue the rulemaking to revise security requirements for facilities storing SNF and HLW.

Under this option, the staff would discontinue the Commission-directed rulemaking to "develop new, risk-informed, performance-based security requirements applicable to all ISFSI licensees to enhance existing security requirements" using a dose-based approach. The staff would not modify the current ISFSI security regulations to address the SFVAR information. The staff would not introduce provisions to increase regulatory clarity or consistency or codify the post-9/11 security orders. Current ISFSI licensees would maintain the post-9/11 security orders. The NRC would continue to address security considerations for new ISFSI license applicants on a case-by-case basis. However, there is currently no pre-application engagement underway, or new ISFSI license applicants expected in the near term. By discontinuing the rulemaking, the staff would not need to (1) validate the SFVAR information; (2) process industry and other external stakeholder security clearances to facilitate the sharing of classified information; (3) develop adversary characteristics or security scenarios for ISFSIs; (4) develop release fractions for SNF storage casks; or (5) develop guidance documents to support the dose assessments. Licensees would not be subject to new requirements to perform dose assessments or make site modifications (e.g., expanding the controlled area boundary of their facility).

The staff finds that the existing security requirements for ISFSIs, together with the additional requirements in the post-9/11 security orders, provide reasonable assurance of adequate protection of public health and safety regardless of the ISFSI license type or location. Staff experience shows that the staff, licensees, applicants, and other stakeholders have been able to understand and apply the existing ISFSI security requirements, and the staff has successfully addressed the appropriate security considerations for new license applicants on a case-by-case basis. Furthermore, proposed regulatory changes in the decommissioning rulemaking could increase the clarity and consistency of methods for complying with the requirements.

Given these considerations, the staff recommends discontinuing the rulemaking.

Option 2: Proceed with the ISFSI security requirements rulemaking with the exclusive scope of codifying the requirements of the post-9/11 security orders.

Under this option, the staff would codify the post-9/11 security orders issued to ISFSI licensees. The existing licensees have already implemented the post-9/11 security orders, which provide adequate protection of public health and safety and the common defense and security. Because the substance of the security requirements would remain unchanged, codifying the post-9/11 security orders would not further improve public health and safety or the common defense and security. Also, not all of the order requirements could be codified in public regulations, which would require orders to remain in place for the non-public requirements. The staff has determined that a rulemaking to codify the post-9/11 security orders would not be cost justified.

Given these considerations, the staff does not recommend this option.

Option 3: Proceed with the Commission-directed rulemaking to develop new risk-informed and performance-based requirements for ISFSI security, implementing a dose-based approach, as approved in SRM-SECY-07-0148.

Under this option, the staff would continue the 2007 Commission-directed rulemaking to "develop new, risk-informed, performance-based security requirements applicable to all ISFSI licensees to enhance existing security requirements" using a dose-based approach. The staff would also codify the non-sensitive portions of the post-9/11 security orders. This rulemaking would change the ISFSI security requirements from the current framework to a dose-based approach that would apply to both general- and specific-license ISFSIs.

To proceed with this option, the staff would need to perform further analyses to develop a workable methodology to calculate the release fraction values necessary to enable licensees to calculate the dose consequences of identified security scenarios, as well as a methodology for conducting the assessments. However, if the staff continues the technical approach from the January 2018 report SAND2018-04418, wherein required storage design components that perform ISFSI safety functions (overpacks) that could also inhibit or prevent a radiological release are not included in the evaluation, it is unclear whether such analyses would meaningfully improve the results. Therefore, in implementing the dose-based approach, the NRC would likely have to accept that the methodology would have inherent uncertainty because it would rely on conservative assumptions and analyses (i.e., the methodology would likely overestimate dose consequences).

Furthermore, in addition to the challenges in developing the methodology, the dose-based approach would be burdensome to implement for both the NRC and licensees. In SECY-07-0148, the staff stated that licensees would need to staff a multidisciplinary team with engineering, health physics, and security expertise to support implementation of the dose-based approach; moreover, they would need to perform dose assessments both after the final rule is effective, and again for each newly loaded cask. Accordingly, on an ongoing basis, the NRC staff would need to review licensees' analyses for each of the dozens of ISFSIs (a substantial increase since 2007) to verify compliance with the 0.05-sievert (5 rem) dose limit criterion. As described in Enclosure 1 of SECY-07-0148, the results of the staff's analysis might cause the licensee to consider different approaches to its physical protection plan or protective strategy; the staff would then need to re-perform the review. This process might need to be repeated several times as the licensee evaluates options, since the licensee would not have all the information developed during the staff evaluations.

In Enclosure 1 of SECY-07-0148, the staff noted that most ISFSIs would likely meet the dose requirements for security events because of the type of fuel being loaded and because of the distance between the ISFSI and the controlled area boundary. Therefore, the dose-based approach would likely lead to only limited security benefits and would not be cost justified. Also, the staff continues to find that the existing security requirements for ISFSIs, together with the additional requirements in the post-9/11 security orders, provide reasonable assurance of adequate protection of public health and safety. With respect to the goal of increasing the clarity and consistency of the ISFSI security requirements, staff experience shows that these requirements have been successfully applied. Furthermore, the regulatory changes that have been proposed as part of the separate decommissioning rulemaking provide a vehicle to increase the clarity and consistency of the security requirements.

A rulemaking to revise security requirements under this option would likely constitute a backfit under 10 CFR 72.62 for existing ISFSI licensees. If the Commission directs the staff to undertake such rulemaking, backfitting will be evaluated as appropriate in the rulemaking process.

Given these considerations, the staff does not recommend this option.

Option 4: Perform a future reassessment to identify rulemaking options for alternatives to the dose-based approach.

Under this option, instead of proceeding with the rulemaking to implement the dose-based approach, the staff would perform a reassessment to identify alternative technical approaches for continuing the 2007 Commission-directed rulemaking to “develop new, risk-informed, performance-based security requirements applicable to all ISFSI licensees to enhance existing security requirements.” This reassessment would include examining whether to readdress policy issues previously evaluated in SECY-07-0148. The staff would perform further studies and analyses to validate the SFVAR information, to reduce uncertainties. Additionally, the staff would assess new or revised technical approaches for the rulemaking, as alternatives to the dose-based approach, and would continue to seek stakeholders’ opinions on their preferred approach. The staff would prepare a paper for the Commission assessing this new information and its implications and providing updated or revised recommendations on the rulemaking, including whether the rulemaking should include codification of the post-9/11 security orders. Option 4 would continue the staff’s efforts to follow the Commission direction to pursue a rulemaking revising security requirements for facilities storing SNF and HLW.

An alternative technical approach originally considered by the staff in SECY-07-0148 is to apply the DBT for radiological sabotage to all ISFSIs. This “DBT-based approach” could be considered in a reassessment. Like the dose-based approach, the DBT-based approach presented in SECY-07-0148 would require dose calculations; the staff considered either using a 0.05-sievert (5 rem) dose limit or increasing the dose limit to 0.25 sievert (25 rem). The staff also considered that a DBT-based approach could require the implementation of a protective strategy to prevent or impede attempted acts of radiological sabotage instead of requiring a dose calculation. Additional alternative technical approaches that the staff outlined in SECY-07-0148 but did not recommend include: (1) eliminating the radiological dose criterion and applying the current protective strategy, which includes the security orders, and (2) applying the dose limit at the site area boundary instead of at the controlled area boundary. The reassessment could evaluate any of these earlier approaches, new approaches, or both.

This paper does not present any alternative technical approaches for the rulemaking as options; instead, the staff presents for Commission consideration the option of conducting a future reassessment to identify alternative technical approaches. A reassessment would be consistent with Commission direction in SRM-SECY-10-0114, "Staff Requirements—SECY-10-0114—Recommendation to Extend the Proposed Rulemaking on Security Requirements for Facilities Storing Spent Nuclear Fuel and High-Level Radioactive Waste," dated November 16, 2010 (ML103210025), which states that the staff should perform an analysis before modifying the current direction of pursuing the dose-based approach. The staff did not perform the reassessment before developing this paper. Instead, the staff is presenting the reassessment as an option so that the Commission can weigh its merits against those of the other options presented here.

The staff's view is that the reassessment would be of limited benefit and would be unlikely to lead to new rulemaking options, in part because some of the technical approaches to be reassessed involve dose calculations using the same release-fraction methodology that has presented challenges under the dose-based approach. Additionally, a rulemaking to implement an alternative technical approach would still be aimed at the original goals of the 2007 Commission-directed ISFSI security rulemaking (i.e., to address the SFVAR information and to increase clarity and consistency). The staff has determined that there is currently not a sufficient basis for rulemaking in pursuit of these goals. Although, in some scenarios identified with the dose-based approach, a cask could be breached and a release could result, it does not necessarily follow that dose assessments performed using the release-fraction methodology would demonstrate that a 0.05-sievert (5 rem) dose limit would be exceeded. Nevertheless, in Enclosure 1 of SECY-07-0148, the staff determined that even based on the conservative analyses in the original security assessments, most ISFSIs would likely meet this dose limit. Therefore, a rulemaking implementing an alternative technical approach would likely have limited security benefit and would not be cost justified.

The staff continues to find that the existing security requirements for ISFSIs, together with the additional requirements in the post-9/11 security orders, provide reasonable assurance of adequate protection of public health and safety. With respect to the goal of increasing the clarity and consistency of the ISFSI security requirements, staff experience shows that these requirements have been successfully applied. Moreover, the proposed regulatory changes in the decommissioning rulemaking, if implemented in a final rule, may increase clarity and consistency.

Given these considerations, the staff does not recommend this option.

ALTERNATE VIEW:

An NSIR staff member provided an alternate view that presents an additional option for Commission consideration as the recommended option. The additional option is an alternative technical approach for the rulemaking, under which the staff would codify the post-9/11 ISFSI security orders, apply the DBT for radiological sabotage to all ISFSIs, and remove the 0.05-sievert (5 rem) dose criterion. The alternate view recommends that the Commission approve this option on the basis that it is the only remaining viable technical approach for prompt rulemaking. Enclosure 5 provides the alternate view, and Enclosure 6 provides the staff's response.

COMMITMENT:

The staff will follow the NRC's process, described in 10 CFR 2.803, "Petition for rulemaking—NRC action," to resolve Request 11 of PRM-72-6, as described in Enclosure 4, after receiving the Commission's direction on this rulemaking activity.

RECOMMENDATION:

The staff recommends that the Commission approve discontinuation of the Commission-directed rulemaking in SRM-SECY-07-0148 to develop new risk-informed and performance-based security requirements for facilities storing SNF and HLW using a dose-based approach (Option 1). Further, if the Commission directs the staff to discontinue this rulemaking, the staff recommends that the Commission delegate authority to issue the *Federal Register* notice discontinuing the rulemaking to the Executive Director for Operations.

COST AND SCHEDULE CONSIDERATIONS:

Enclosure 1 provides the cost and schedule considerations for each option.

COORDINATION:

The Office of the General Counsel has reviewed this paper and has no legal objections.

Daniel H. Dorman

Digitally signed by Daniel H. Dorman
Date: 2022.11.14 21:03:55 -05'00'

Daniel H. Dorman
Executive Director
for Operations

Enclosures:
1. Cost and Schedule Considerations
2. Independent Spent Fuel Storage Installation Security Rulemaking History
3. Independent Spent Fuel Storage Installation Security Regulatory Framework
4. Petition for Rulemaking (PRM-72-6)
5. Alternate View
6. Staff's Response to Alternate View

SUBJECT: RULEMAKING OPTIONS FOR REVISING SECURITY REQUIREMENTS FOR FACILITIES STORING SPENT NUCLEAR FUEL AND HIGH-LEVEL RADIOACTIVE WASTE
DATED: November 14, 2022

ADAMS Accession No.: ML22243A143 (Package) **SRM-S19-0100-1**

OFFICE	NSIR/DPCP/MSB: PM	NSIR/DPCP/MSB: BC	NMSS/REFS/MRPB: BC	NMSS/REFS/RASB: BC
NAME	JMoore	DDavis	JShepherd	CBladey
DATE	7/26/22	8/2/22	8/4/22	7/29/22
OFFICE	NMSS/DFM/NARA: BC	NMSS/DFM: D	NSIR/DPCP: D	NMSS/REFS: D
NAME	MDiazMaldonado	SHelton	MSampson	CRegan
DATE	8/3/22	9/7/22	9/7/22	9/7/22
OFFICE	QTE	OGC	NMSS	NSIR
NAME	CRaynor	MZobler	JLubinski	MGavrilas
DATE	9/16/22	9/16/22	9/20/22	9/20/22
OFFICE	EDO			
NAME	DDorman			
DATE	11/14/22			

OFFICIAL RECORD COPY