Should the Regulatory Guidance Supporting the Performance-based ISFSI Security Regulations Recommended Under Policy Issue 3 Be Bounded by the (Power Reactor) Adversary Characteristics That Support the DBT for Radiological Sabotage? (Policy Issue 4)

Summary

In Policy Issue 3 (see Enclosure 3 to this paper)[1] the staff recommended development of risk-informed, performance-based security regulations that would apply to all independent spent fuel storage installations (ISFSIs) (i.e., both general-license ISFSIs and collocated and non-collocated specific-license ISFSIs), in lieu of applying the design basis threat (DBT) for radiological sabotage under 10 CFR 73.1.[2] The staff also recommended developing a regulatory guidance document supporting these new regulations which would be specific to ISFSIs. This guidance document would be controlled as safeguards or classified information, as appropriate, and would enable ISFSI licensees to perform an analysis of their facilities as described in Policy Issues 1 and 2 (see Enclosures 1 and 2 to this paper).[3] [4]

The regulations currently exempt general-license ISFSIs from some elements of the DBT for radiological sabotage (e.g., waterborne vehicle bomb assault), thereby setting a precedent for requiring ISFSI licensees and power reactor licensees to defend against different adversary capabilities, even though these facilities are collocated. Since no specific regulatory guidance supporting the DBT for radiological sabotage has yet been developed for any ISFSIs, the staff would need to develop guidance for use by both general- and specific-license ISFSIs when demonstrating compliance with the performance-based regulations recommended under Policy Issue 3. This guidance would likely be controlled as Safeguards Information or as classified information. The current adversary characteristics associated with the DBT for radiological sabotage are focused on power reactors. Therefore, the staff is seeking Commission direction on whether the ISFSI security scenarios should be bounded by the adversary characteristics associated with the DBT for radiological sabotage (as applied to operating power reactors). The staff has identified three options for Policy Issue 4:

[1] Enclosure 3, “Should the Design-Basis Threat for Radiological Sabotage Be Applied Consistently to All Independent Spent Fuel Storage Installations (Not Just to General Licensees)? (Policy Issue 3).”

[2] Title 10 of the *Code of Federal Regulations* (CFR) 73.1, "Purpose and scope."

[3] Enclosure 1, "Should a Radiological Acceptance Criterion for Security Scenarios Be Applied Consistently To All Independent Spent Fuel Storage Installations? (Policy Issue 1)."

[4] Enclosure 2, "Should the dose limits for acts of radiological sabotage (if any are established under Policy Issue 1) be the same as the dose limits for design-basis accidents? (Policy Issue 2)."

1. Develop ISFSI regulatory guidance that would be bounded by the adversary characteristics regulatory guidance supporting the DBT for radiological sabotage associated with power reactors. (The ISFSI guidance would be consistent with the power reactor guidance.)

2. Develop ISFSI regulatory guidance that would not be bounded by the adversary characteristics regulatory guidance supporting the DBT for radiological sabotage associated with power reactors. (The ISFSI guidance document may include capabilities for which ISFSIs may be vulnerable, but for which power reactors are not.)

3. Develop ISFSI regulatory guidance that would be a combination of Options 1 and 2, depending on the location of the ISFSI. (ISFSIs located away from any power reactors or collocated with a decommissioning power reactor would follow Option 2. ISFSIs collocated with an operating power reactor would follow Option 1 or Option 2, as follows.)

    (a) For collocated ISFSIs (located inside of an operating power reactor's protected area only) the regulatory guidance would be consistent with Option 1. (All other ISFSIs would follow Option 2.); or

    (b) For collocated ISFSIs (located either inside or outside of an operating power reactor's protected area) the regulatory guidance would be consistent with Option 1. (All other ISFSIs would follow Option 2.)

The staff recommends Option 1. This option is consistent with past security requirements for general-license ISFSIs, which were subject to some, but not all, elements of the DBT for radiological sabotage. Overall, this option provides consistent security requirements for protection against radiological sabotage for all ISFSIs, regardless of license type or location. Additionally, this option provides consistency between the scope of the adversary capabilities that both power reactor licensees and ISFSI licensees are required to defend against.

The staff is recommending this option based upon the direction previously provided by the Commission in SRM-SECY-05-0218 on the nature and scope of the adversary characteristics associated with the DBT for radiological sabotage (as applied to operating power reactors).[5] Specifically, options 2 and 3 contemplate ISFSI-specific guidance that is not bounded by the current adversary characteristics regulatory guidance supporting the DBT for radiological sabotage (as applied to operating power reactors).

However, in recommending Option 1, the staff acknowledges that uncertainty exists on whether additional weapons capabilities may pose a vulnerability to spent fuel storage casks. Specifically, the staff acknowledges that an adversary's use of certain types of explosive

[5] SRM-SECY-05-0218, "Semiannual Threat Environment Review," Classified (ADAMS No. not applicable), dated March 30, 2006. [Non-public]

attacks (using either manufactured or improvised devices)—which the Commission has required certain non-reactor licensees, but not ISFSIs, to defend against—may have the potential to breach some cask designs' confinement barrier and thus cause a radiological release that would exceed the 0.05-Sv (5-rem) dose limit at the ISFSI's controlled area boundary.[6] [7]

This uncertainty has only been partially assessed by staff, but would involve, for example, adversaries using explosives to create kinetic, shear, or hydrodynamic weapons effects. The staff has evaluated the use of explosives to create [redacted].[8] [redacted]—which the Commission considers as credible threats for certain non-power reactor licensees—have not been evaluated for ISFSIs. Because of differences between power reactor critical target sets and ISFSI cask designs, the use of explosives to create these weapons effects, by themselves, would not be expected to defeat a power reactor critical target set. [redacted]. Therefore, Option 1 would not resolve these uncertainties [redacted].

Should the Commission conclude that Option 2 or 3 is preferable to Option 1, the staff would recommend assessing additional threat and vulnerability information to support developing the ISFSI-specific regulatory guidance document. Staff would provide the results of the threat and vulnerability evaluation, and any recommendations, to the Commission for its review.

<u>Background</u>

Currently, no ISFSI-specific regulatory guidance has been developed to support either the DBT for radiological sabotage regulations of 10 CFR 73.1 or the ISFSI physical security regulations of 10 CFR 73.51 ("Requirements for the Physical Protection of Stored Spent Nuclear Fuel and High-level Radioactive Waste"). Consequently, the staff will need to develop regulatory guidance for use by ISFSI licensees when they demonstrate compliance with the risk-informed,

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[6] The dose criteria in 10 CFR 72.106, "Controlled area of an ISFSI or MRS," (0.05 Sievert (Sv) [5 rem] total effective dose equivalent; 0.15 Sv [15 rem] to the lens of the eye; 0.5 Sv [50 rem] as either the sum of the deep dose equivalent and any organ dose, or the shallow dose equivalent to the skin or any extremity) are hereinafter referred to as the 0.05-Sv (5-rem) dose limit.

[7] As discussed in Policy Issue 2, the staff would recommend a 0.05-Sv (5-rem) dose limit at the controlled area boundary and an additional verification of a 0.01-Sv (1-rem) dose limit at the site area boundary; hereinafter, called the 0.05-Sv (5-rem) dose limit.

[8] Enclosure 6, "Response to ISFSI Security Questions." [Non-public]

performance-based regulations recommended under Policy Issue 3 (see Enclosure 3 to this paper).

As discussed in Policy Issue 3, changes to the recent final DBT rule exempts ISFSIs from some elements of the current DBT for radiological sabotage (e.g., the waterborne vehicle bomb assault).[9] Thereby setting a precedent for requiring ISFSI and power reactor licensees to defend against different malevolent attacks. The existing adversary characteristics regulatory guidance supporting the DBT for radiological sabotage (developed as a regulatory guide for power reactors in conjunction with the final DBT rule) originated with the power reactor April 2003 DBT orders, and those orders were focused exclusively on power reactor facilities. Since ISFSI licensees were not included within the scope of the April 2003 DBT orders, no ISFSI-specific weaponry or adversary capabilities are included in the current adversary characteristics regulatory guidance document supporting the DBT for radiological sabotage.

In evaluating this policy issue, the staff does not consider that changes to the existing adversary characteristics supporting the DBT for radiological sabotage (as applied to power reactors) are warranted. Rather, the staff would focus on ISFSI-specific regulatory guidance supporting the risk-informed, performance-based regulations recommended under Policy Issue 3. Consequently, the staff is requesting Commission direction on whether the new, ISFSI-specific regulatory guidance should be consistent with the current "power reactor" adversary characteristics for the radiological sabotage DBT, or whether the guidance should also consider additional appropriate adversary capabilities or ISFSI vulnerabilities.

Discussion

Based upon the results of the ISFSI security assessments in SECY-06-0045,[10] [11] ■■■■■■■■■■■■ ■■■■■■■■■■■■■■■■■■■■■■■■■■■■■■ vulnerable to attacks using explosives to create certain types of weapons effects which would result in the penetration of some casks' confinement boundary. Staff notes that uncertainty exists on whether the use of these attacks would then create a radiological release from the ISFSI exceeding the 0.05-Sv (5-rem) dose limit at the licensee's controlled area boundary (as recommended under Policy Issues 1 and 2).

This uncertainty has only been partially assessed by staff, but would involve, for example, adversaries using explosives to create kinetic, shear, or hydrodynamic weapons effects against the cask confinement boundary and the spent nuclear fuel contents. The staff has evaluated

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[9] Final Rule - 10 CFR Part 73, "Design Basis Threat." Published in the *Federal Register* (72 FR 12705) on March 19, 2007.

[10] SECY-06-0045, “Results of Implementation of the Decisionmaking Framework for Materials and Research and Test Reactor Security Assessments,” ADAMS No. ML060340452, dated March 1, 2006.

[11] The staff notes that the consequence measures used in the ISFSI security assessments ■■■■■■■■■■■■■■■■■, consistent with the Commission's direction in SRM-SECY-04-0222, ADAMS No. ML050210288, dated January 19, 2005. [Non-public]

the use of explosives to create [redacted].

Accordingly, the principal question of this policy issue can be distilled into whether it is reasonable and appropriate for the Commission to require licensees to defend their ISFSI against an adversary using explosives in a different manner, or whether it is more appropriate to require licensees to only defend their ISFSI against weapons effects that are bounded by the (power reactor) adversary characteristics associated with the DBT for radiological sabotage. Of importance to this discussion is the fact that because of differences between power reactor critical target sets and ISFSI cask designs, the use of explosives to create these types of weapons effects, by themselves, would not be expected to defeat a power reactor critical target set. [redacted]. The release of this radioactive material may or may not result in a potential dose at the controlled area boundary exceeding the 0.05-Sv (5-rem) dose limit.

In analyzing this issue, a further question arises on whether a specific group of adversaries attacking a single site with different (i.e., multiple) licensed facilities can employ different capabilities to attack one facility or another (i.e., can a licensee with both an ISFSI and a power reactor on a single site be required to defend the ISFSI and the reactor against different adversary capabilities). Almost all (39 out of the existing 45) ISFSIs are collocated with a power reactor (whose status is either operating, undergoing decommissioning, or decommissioned). Eight of the ISFSIs are located at reactors that are undergoing, or have completed, decommissioning. For approximately half of the 39 collocated ISFSIs, the ISFSI is located within an operating power reactor's protected area. The remaining ISFSIs are located within a separate protected area within the reactor site's owner controlled area (i.e., the ISFSI's protected area is separate and distinct from the reactor's protected area).

In evaluating the question of differing adversary capabilities, the staff notes that any NRC regulatory guidance developed to support the proposed security regulations cannot in fact limit what actual tools, weapons, improvised devices, etc. an adversary could employ in an attack (i.e., regulatory guidance cannot practically control what a group of malevolent individuals will or will not do). Instead, this regulatory guidance, which would be controlled as Safeguards Information or classified information, clarifies what the NRC considers reasonable for licensees to defend against—in order to provide the requisite high assurance that public health and safety or the common defense and security will not be unacceptably affected by such an adversary attack.

Consequently, the staff considers differing regulatory guidance (between ISFSIs and power reactors) as an NRC security issue for which the Commission has not previously established a position. Additionally, the staff is not seeking under this policy paper to revise the regulatory guidance applicable to power reactors; but is only seeking Commission direction on whether the ISFSI regulatory guidance should be bounded by the adversary characteristics for the radiological sabotage DBT (as applied to operating power reactors). The staff has developed three options for the Commission's consideration.

Issue 4 Options

1. *Develop ISFSI regulatory guidance that would be bounded by the adversary characteristics regulatory guidance supporting the DBT for radiological sabotage associated with power reactors. (The ISFSI guidance would be consistent with the power reactor guidance.)*

   Under this option, staff would develop an ISFSI-specific regulatory guidance document that is consistent with the existing adversary characteristics guidance document used by power reactor licensees in applying the DBT for radiological sabotage. The ISFSI regulatory guidance would contain radiological sabotage scenarios (i.e., detailed information) enabling ISFSI licensees to perform assessments demonstrating compliance with the 0.05-Sv (5-rem) dose limit. The contents of the ISFSI guidance document would contain safeguards or classified information, as appropriate. The regulatory guidance developed for ISFSIs under this option would be bounded by the current (power reactor) adversary characteristics supporting the DBT for radiological sabotage. The guidance would not be informed by any additional potential vulnerabilities that may be applicable to ISFSIs, but not to power reactors.

   The principal advantages of this option are: (1) it conforms to the Commission's recent direction in SRM-SECY-05-0218 on the nature and scope of adversary characteristics that are applicable to power reactors, (2) it reduces regulatory confusion for licensees defending both an ISFSI and a power reactor at the same site by applying a single set of adversary characteristics, (3) it treats all ISFSIs the same, and (4) it requires less staff resources to develop a new, ISFSI-specific, vulnerability-informed, regulatory guidance document that is consistent with the power reactor regulatory guidance than to develop regulatory guidance that varies from the current power reactor regulatory guidance.

   The principal disadvantages of this option are: (1) uncertainties would remain regarding whether some ISFSIs are potentially vulnerable to exceeding the 0.05-Sv (5-rem) dose limit if subject to certain weapons effects that are not described in the power reactor guidance, and (2) differences in vulnerabilities between ISFSI cask designs and power reactor critical target set vulnerabilities would not be addressed. Instead this option would continue a "reactor-centric" approach, i.e., the adversary characteristics applied to ISFSIs would be the same as power reactors, whether or not ISFSIs had different vulnerabilities.

2. *Develop ISFSI regulatory guidance that would not be bounded by the adversary characteristics regulatory guidance supporting the DBT for radiological sabotage associated with power reactors. (The ISFSI guidance document may include capabilities for which ISFSIs may be vulnerable, but for which power reactors are not.)*

   Under this option, staff would develop an ISFSI-specific, risk-informed, regulatory guidance document for ISFSI licensees that may depart from the existing adversary characteristics guidance document used by power reactor licensees in applying the DBT for radiological sabotage. The ISFSI guidance would be informed by the power reactor adversary characteristics regulatory guidance; however, it may include additional adversary capabilities or particular ISFSI vulnerabilities, as appropriate. To support development of this guidance document, the staff would accomplish a risk-informed evaluation to (1) assess ■■■■■■■■■■■■■■■■■■■■■■■■■■ whether their confinement boundary is susceptible to certain weapons effects and (2) identify what weapons effects would be appropriate for an ISFSI licensee to defend against.

   As with Option 1, the ISFSI regulatory guidance would contain radiological sabotage scenarios (detailed information) enabling ISFSI licensees to accomplish the assessments demonstrating compliance with a 0.05-Sv (5-rem) dose limit under the risk-informed, performance-based regulations recommended in Policy Issue 3. The contents of the ISFSI guidance document would contain safeguards or classified information, as appropriate.

   The principal advantages of this option are: (1) uncertainties would be resolved regarding whether ■■■■■■■ ISFSIs are potentially vulnerable to certain weapons effects (i.e., Would a radiological release occur that could result in a dose exceeding the 0.05-Sv (5-rem) dose limit?), (2) all ISFSIs would be treated the same, and (3) differences between ISFSI cask vulnerabilities and power reactor critical target set vulnerabilities would be recognized and addressed.

   The principal disadvantages of this option are: (1) it would not conform to the Commission's direction in SRM-SECY-05-0180 on the nature and scope of adversary characteristics applicable to power reactors, (2) it may create the potential for regulatory confusion by requiring licensees to apply different protective strategies and protective measures in defending ISFSIs and power reactors at the same site (by defending against different weaponry), and (3) it would require additional staff resources to address vulnerabilities specific to ISFSI, rather than follow the current guidance for power reactors. However, the staff notes that some differences currently exist in what a power reactor licensee and an ISFSI licensee are required to defend against, e.g., the waterborne vehicle bomb assault.

3. *Develop ISFSI regulatory guidance that would be a combination of Option 1 and Option 2, depending on the location of the ISFSI. (ISFSIs located away from any power reactors or collocated with a decommissioning power reactor would follow Option 2. ISFSIs collocated with an operating power reactor would follow Option 1 or Option 2, as follows.)*

This option is a variant of Options 1 and 2 above, with the location of the ISFSI (with respect to an operating power reactor) being the determining factor. Under this option, ISFSIs that are located away from any power reactors would apply the regulatory guidance developed under Option 2 above. ISFSIs that are collocated with a decommissioning power reactor would also follow Option 2. ISFSIs that are collocated with an operating power reactor would apply Option 1 or 2 depending upon whether the ISFSI was located inside or outside of the power reactor's protected area. ISFSIs outside of the power reactor's protected area have their own separate protected area.

As discussed in Option 1 above, almost all current ISFSI licensees are collocated with an operating power reactor. Approximately half of these collocated ISFSIs are physically located within their associated power reactor's protected area. The remainder of these collocated ISFSIs are located in their own separate protected area. This separate protected area is still located within the reactor site's owner controlled area. Consequently, and especially for ISFSIs located within the reactor protected area, the question of requiring the same licensee security organization to defend against different adversary capabilities for the ISFSI and the reactor is significant from both a regulatory confusion aspect and from a regulatory burden aspect. However, as noted above significant differences exist between ISFSI vulnerabilities and power reactor critical target set vulnerabilities that would support such a differing approach.

The principal advantage of this option is that it would minimize regulatory confusion between ISFSIs and power reactors. However, the principal disadvantage is that it would not treat all ISFSIs consistently.

This option would apply Option 2 to ISFSIs located away from any power reactor and to ISFSIs collocated with decommissioning power reactors. This option would apply Option 1 or Option 2 to ISFSIs collocated with an operating power reactor as follows:

(a) For collocated ISFSIs (located inside of an operating power reactor's protected area only) the regulatory guidance would be consistent with Option 1. (All other ISFSIs would follow Option 2.); or

This option would require ISFSIs residing in their own separate protected area (whether collocated with an operating power reactor, collocated with a decommissioning power reactor, or away from any power reactor) to apply the regulatory guidance of Option 2. This approach would address the potential ISFSI vulnerabilities of Option 2's guidance

for the greatest number of ISFSIs while minimizing regulatory confusion for operating power reactor licensees.

The principal advantage of this option is that it would minimize regulatory confusion for a number of operating power reactor licensees.

The principal disadvantage of this option is that it would not treat all ISFSIs the same.

(b) For collocated ISFSIs (located either inside or outside of an operating power reactor's protected area) the regulatory guidance would be consistent with Option 1. (All other ISFSIs would follow Option 2.)

This option would require ISFSIs collocated with an operating power reactor to apply guidance that is consistent the power reactor regulatory guidance. ISFSIs collocated with decommissioning power reactors and away from reactor ISFSIs would address potential vulnerabilities under Option 2's guidance.

The principal advantage of this option is that it would minimize regulatory confusion for a greater number of power reactor licensees than Option 3(a).

The principal disadvantage of this option is that it would not treat all ISFSIs the same. Another disadvantage is that a if a power reactor beginning decommissioning and applied for an exemption to reduce its security requirements, this would also affect the ISFSI's security program.

Overall, the staff's view is that Options 1 or 2 are preferable to Option 3 because the staff's goal in this rulemaking is to treat all ISFSIs consistently. This goal outweighs the disadvantage of potential regulatory confusion (i.e., the same licensee being subjected to differing regulatory guidance for their ISFSI and power reactor facilities). However, the recent final DBT rule applied different elements of the DBT to power reactors and to ISFSIs (e.g., waterborne vehicle bomb assaults are not applied to ISFSIs). Therefore, the existence of differing ISFSI and power reactor security requirements would not be inconsistent with current regulations and recent Commission policy choices.

Issue 4 Recommendation

The staff recommends Option 1, "Develop ISFSI regulatory guidance that would be bounded by the adversary characteristics regulatory guidance supporting the DBT for radiological sabotage associated with power reactors. (The ISFSI guidance would be consistent with the power reactor guidance.)" This option is most consistent with past security requirements for general-license ISFSIs, which were subject to some, but not all, elements of the radiological sabotage DBT. This option is most consistent with the Commission's direction in SRM-SECY-05-0218 on the nature and scope of adversary characteristics applicable to power reactors. This option provides consistent security requirements for protection against

radiological sabotage for all ISFSIs, regardless of license type or location. Additionally, this option provides consistency between the security requirements for protection against radiological sabotage for ISFSIs and the security requirements for reactors. Option 1 would also require less staff resources to implement.

Should the Commission conclude that Options 2 or 3 are preferable to Option 1 because of the current uncertainties, the staff would recommend assessing additional threat and vulnerability information to support developing the ISFSI-specific regulatory guidance document. Staff would provide the results of the threat and vulnerability evaluation, and any recommendations, to the Commission for its review. The staff resources necessary to complete such an evaluation are discussed in the Resources section of the main Commission paper.