August 24, 2010

MEMORANDUM TO: Timothy J. Kobetz, Chief
Reactor Inspection Branch
Division of Inspection and Regional Support
Office of Nuclear Reactor Regulation

FROM: Aron Lewin, Reactor Operations Engineer ***/RA/***
Reactor Inspection Branch
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SUBJECT: DOCUMENTS RECEIVED VIA E-MAIL ON AUGUST 21, 2010 FROM NUCLEAR ENERGY INSTITUTE RELATED TO NRC EFFORT TO REVISE NUREG-1022, REVISION 2.

The Nuclear Regulatory Commission (NRC) currently has plans to draft a Revision 3 to NUREG-1022, "Event Reporting Guidelines 10 CFR 50.72 and 50.73." On August 21, 2010, the Nuclear Energy Institute (NEI), provided information via e-mail to be considered by the staff. The information received is enclosed to this memorandum.

Enclosure:
NEI SSFF Systems within Scope

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301-415-2259

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NEI NUREG 1022 Team Position Paper
Safety System Functional Failures – Systems, Structures, and Components within Scope

Systems, Structures or Components (SSC) within Scope

The SSC within the scope of the rule are limited to those credited in the plant's accident analysis of record to perform one of the four safety functions (A) through (D) specified in the rule. It is not determined by the phrases "safety related," "important to safety," or "ESF

Basis

The current reporting requirements were based on the guidance of Regulatory Guide (RG) 1.16, *"Reporting of Operating Information – Appendix A Technical Specifications."* In the last version, Revision 4, Section 2.a, the reporting requirement was presented in part as the following:

> (5) Failure or malfunction of one or more components which prevents or could prevent, by itself, the fulfillment of the functional requirements of system(s) **used to cope with accidents analyzed in the SAR**. The following are examples:

NRC Generic Letter (GL) 83-43, *"Reporting Requirements of 10 CFR Part 50, Sections 50.72 and 50.73, and Standard Technical Specifications,"* directed the removal of the Technical Specification reporting requirements based on the RG at the individual facilities due to the issuance of the new 10CFR 50.72 and 73 reporting requirements. This GL also provided (as an enclosure) the associated Statements of Consideration to the industry for the new reporting requirements (**48FR39039 -48FR39046 corresponding to 10 CFR 50.72 and 48FR33850-48FR33860 for 10 CFR 50.73**) to add in the industries' understanding of the requirements. For the purpose of this discussion, the requirements in 50.72 and 50.73 in the original version and the current version are essentially the same.

> 50.73(a)(2)(v) Any event or condition that could have **prevented the fulfillment of the safety function of structures or systems** that are needed to:
>
> > (A) Shut down the reactor and maintain it in a safe shutdown condition;
> > (B) Remove residual heat;
> > (C) Control the release of radioactive material; or
> > (D) Mitigate the consequences of an accident."
> >
> > 50.73(a)(2)(vi) Events covered in paragraph (a)(2)(v) of this section may include one or more procedural errors, equipment failures, and/or discovery of design, analysis, fabrication, construction, and/or procedural inadequacies. However, individual component failures need not be reported pursuant to paragraph (a)(2)(v) of this section if redundant equipment in the same system was operable and available to perform the **required safety function**.

As discussed previously, GL 83-43 provided the associated Statements of Consideration to the industry for the new reporting requirements to add in the industries' understanding of the requirements. These Statements of Consideration provide insights into the meaning of the words used in the regulation. Selected excerpts from the Statements of Consideration (as presented in the Federal Register Notice) are shown below to clearly illustrate that the intention for the scope of SSCs to be reported under the reporting requirements of 10 CFR 50.72(b)(2)(iii) and 10 CFR 50.73(a)(2)(v) was focused on SSCs that were credited in the licensee's safety

analysis and their ability to perform the safety functions listed in sections (A) through (D) of the rules.

48FR33854

…
The intent of this paragraph is to capture those events where there would have been a failure of a safety system to properly complete a safety function, regardless of when the failures were discovered or whether the system was needed at the time.

This paragraph is also based on the assumption that safety-related systems and structures are intended to mitigate the consequences of an accident. While 50.73[a)(2)(iv) of this final rule applies to actual actuations of an ESF, 50.73(a)(2)(v) of this final rule covers an event or condition where redundant structures, components, or trains of a safety system could have failed to perform their intended function because of one or more personnel errors, including procedure violations; equipment failures: or design, analysis, fabrication, construction, or procedural deficiencies. The event must be reported regardless of the situation or condition that caused the structure or systems to be unavailable, and regardless of whether or not an alternate safety system could have been used to perform the safety function (High Pressure Core Cooling failed, but feed-and-bleed or Low Pressure Core Cooling were available to provide the safety function of core cooling).

While § 50.73(a)(2)(iv) of this final rule **applies to actual actuations of an ESF**, § 50.73(a)(2)(v) of this final rule **covers an event or condition where redundant structures, components, or trains of a safety system could have failed to perform their intended function** because of: one or more personnel errors, including procedure violations: equipment failures: or design, analysis, fabrication, construction, or procedural deficiencies.

The applicability of this paragraph includes those safety systems designed to mitigate the consequences of an accident (e.g., containment isolation, emergency filtration). Hence, minor operational events involving a specific component such as valve packing leaks, which could be considered a lack of control of radioactive material, should not be reported under this paragraph. System leaks or other similar events may, however, be reportable under other paragraphs.

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Interaction between systems particularly a safety system and a nonsafety system, is also included in this criterion. For example, the Commission is increasingly concerned about the effect of a loss or degradation of what had been assumed to be non-essential inputs to safety systems. Therefore, this paragraph also includes those cases where a service (e.g., heating, ventilation, and cooling) or input (e.g., compressed air) which is necessary for reliable or long-term operation of a safety system is lost or degraded. **Such loss or degradation is reportable if the proper fulfillment of the safety function is not cannot be assured. Failures that affect inputs or services to systems that have no safety function need not be reported.**

As illustrated by these excerpts, the language throughout the Statements of Consideration associated with the Final Rule for 10 CFR 50.73 (and similar wording in SOC for the corresponding sections of the SOC for 10 CFR 50.72) consistently make reference to the "safety functions" of SSCs as they relate to the ability to fulfill the functions in sections (A) through (D) of the rules.

The SOCs also repeat the phrase *"mitigate the consequences of an accident"* as it applies to the fulfillment of safety functions. While not explicitly stated in the SOC, the term "accident" is recognizable in regulations as those events classified as accidents in the design basis accident analyses for the plant. Regulatory Guide 1.70, "*Standard Format and Content of Safety Analysis Reports for Nuclear Power Plants (LWR Edition),"* Section 15, "Accident Analysis," provides valuable insight into what is generally understood when making reference to accidents. Typically (depending on the vintage of a specific plant), Chapter 15 of a licensee's Safety Analysis Report contains the required information describing various aspects of initiating events that are categorized as transients and accidents that are analyzed for that plant. The term "transient" is generally applied to a set of occurrences that are expected frequently or regularly in the course of power operation, refueling, maintenance, or maneuvering of the plant. Transients are accommodated with margin between any plant parameter and the value of that parameter which would require either automatic or manual protective action. By their nature, SSCs considered for handling transients would therefore not generally fall into the consideration for reporting under these criteria since they do not challenge plant safety margins.

Beyond "transients" are those occurrences or events that do require automatic or manual protective actions and are more challenging to the plant's safety margins. Those occurrences are referred to as "accidents." Chapter 15 of RG 1.70 provides guidance for categorizing such occurrences with respect to their anticipated frequency of occurrence.

> *"One of the items of information that should be discussed for each initiating event relates to its expected frequency of occurrence. Each initiating event within the eight major groups should be assigned to one of the following frequency groups:*
> ***1.** Incidents of moderate frequency,*
> *2. Infrequent incidents, or*
> *3. Limiting faults."*

Most plant's safety analysis reports categorize these events as Condition II (Incidents of moderate frequency), Condition III (Infrequent incidents) and Condition IV (Limiting faults). The accompanying safety analysis of record for these events contain assumptions for the SSCs that are relied upon to actuate (either automatically or manually) in response to the event. Chapter 6 of RG 1.70 refers to these SSCs as Engineered Safety Features (ESF).

> *"Engineered safety features are provided to mitigate the consequence of postulated accidents in spite of the fact that these accidents are very unlikely."*

The language in the SOCs that compares 10 CFR 50.73(a)(2)(iv) (ESF Actuations) to 10 CFR 50.73(a)(2)(v) (Safety System Functional Failures). This section strongly implies that the scope of SSCs in the Final Rule (at that time described as ESF, including Reactor Protection System) was closely aligned to the SSCs in the scope of 10 CFR 50.73(a)(2)(v). [Note: A subsequent

change to 10 CFR 50.73(a)(2)(iv) substituted the term “ESF” with a listing of SSCs for which NRC required reporting of actuations.]

It would appear that SSCs credited by the plant’s safety analysis for actuation as protective actions in response to Condition II, III and IV events would comprise those in the scope of the rules in so far as those SSCs impact the fulfillment of the safety functions listed in sections (A) through (D) of the rules.

This term “safety function” was also discussed (to a limited extent) in NUREG 1022 Revision 2 as follows:

> An LER is required for an event or condition that could have prevented the fulfillment of the **safety function** of structures and systems defined in the rules.
>
> **The term "safety function" refers to any of the four functions (A through D) listed in these reporting criteria that are required during any plant mode or accident situation as described or relied on in the plant safety analysis report or required by the regulations**.
>
> The following types of events or conditions generally are not reportable under these criteria:
>
> - **failures that affect inputs or services to systems that have no safety function (unless it could have prevented the performance of a safety function of an adjacent or interfacing system)**
> - **a failure of a system used only to warn the operator where no credit is taken for it in any safety analysis and it does not directly control any of the safety functions in the criteria**
> - a single stuck control rod that alone would not have prevented the fulfillment of a reactor shutdown
> - unrelated component failures in several different safety systems
>
> **The applicability of these criteria includes those safety systems designed to mitigate the consequences of an accident (e.g., containment isolation, emergency filtration). Hence, minor operational events involving a specific component such as valve packing leaks, which could be considered a lack of control of radioactive material, should not be reported under this paragraph these criteria.**

The question concerning the applicability of this reporting requirement to SSCs which are designed to fulfill one of the functions (A) through (D) of the rules but are not required by the accident analysis to perform one those functions was addressed in NRC memorandum from Suzanne C. Black to Geoffrey E. Grant titled *"Task Interface Agreement (TIA) 99-030 From Region III Regarding the Reportability Of Reactor Core Isolation Cooling (RCIC) System Failures"* dated March 15, 2001 (ADAMS Accession No. ML010740339) and subsequently

summarized in NRC Regulatory Issue Summary (RIS) 2001-14, *"Position on Reportability Requirements for Reactor Core Isolation Cooling System Failure."*

TIA 99-030, Task Interface Agreement (TIA) 99-30 from Region III Regarding the Reportability of Reactor Core Isolation Cooling (RCIC) System Failures (TAC NO. MA7367), March 15, 2001

> The central question is whether RCIC system failures are reportable (1) by virtue of the inclusion of RCIC in a plant's technical specifications, or (2) because RCIC performs a safety related accident mitigation function that may or may not be stated in the accident analysis of the Updated Final Safety Analysis Report (UFSAR).
>
> As indicated, the rules directly define the structures and systems for which reporting is required, without reference to labels such as "engineered safety feature [ESF]," "safety related," or "important to safety." That is, a system's failure or inoperability is reportable if the system is needed to: shut down the reactor and maintain it in a safe shutdown condition; remove residual heat; control the release of radioactive material; or mitigate the consequences of an accident. **It is clear that the RCIC system can perform some of these safety functions. The question is whether or not it is needed to perform any of them.**
>
> **Alternatively, however, one can consider that the term "needed" means only those systems for which the UFSAR explicitly claims credit to remove residual heat. An interpretation along these lines has been used by many BWR licensees since the rules were issued in 1983. This was the intent of the guidance and the NRC staff has accepted this approach for many years.**
>
> In view of the NRC's historical practice in implementing 10 CFR 50.72 and 10 CFR 50.73, we have reconsidered the position, and now conclude that **reporting of RCIC system failures is required by the relevant regulations for only those plants where the UFSAR explicitly claims credit for RCIC to remove residual heat.** By its nature, this interpretation rules out the implication that RCIC system failures are reportable simply by virtue of the inclusion of the RCIC system in a plant's technical specifications.
>
> **In the answer to the question about RCIC, the previous guidance in NUREG-1022, Revision 1, used the phrase "remove residual heat." This could be taken broadly since residual heat removal is what the RCIC system does. In Revision 2, we changed the phrase to read "mitigate a rod ejection accident." Our intent was to make the statement clearer and more specific, since we believe that rod ejection is the only UFSAR accident analysis where licensees have taken credit for RCIC.**
>
> **In the future, the Region should consider a licensee's reporting practice adequate if it meets that portion of the modified (i.e., current) guidance which indicates that RCIC failure is reportable if the plant's safety analysis considered RCIC as a system needed to mitigate a rod ejection accident.**

Summary

From the guidance discussed above, it is concluded that the set of SSCs that were intended to be the subject of the reporting requirements of 10 CFR 50.72(b)(2)(iii) and 10 CFR 50.73(a)(2)(v) was that set of SSCs that are credited by the plant's analysis of record to perform protective actions in response to Condition II, III and IV accidents insofar as they negatively impact the ability to fulfill the safety functions listed in (A) through (D) of the rules.

It is also important to reflect on the reason for reporting which is to ensure the NRC is informed in a timely manner of events they may need to take action as a result of or to be aware of for communications to the media.