JAPAN LESSONS-LEARNED PROJECT DIRECTORATE

JLD-ISG-2012-03

Compliance with Order EA-12-051, Reliable Spent Fuel Pool Instrumentation

Interim Staff Guidance
Revision 0

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INTERIM STAFF GUIDANCE
JAPAN LESSONS-LEARNED PROJECT DIRECTORATE (JLD)
COMPLIANCE WITH ORDER EA-2012-051,
RELIABLE SPENT FUEL POOL INSTRUMENTATION
JLD-ISG-12-03

PURPOSE

This interim staff guidance (ISG) is being issued to describe methods acceptable to the NRC staff for complying with Order EA-12-051, *Order Modifying Licenses with Regard to Reliable Spent Fuel Pool Instrumentation (Effective Immediately)* (Order EA-12-051)(Reference A), issued March 12, 2012. This ISG endorses with exceptions and clarifications, the methodologies described in the industry guidance document, Nuclear Energy Institute (NEI) 12-02, *Industry Guidance for Compliance with NRC Order EA-12-051, "To Modify Licenses with Regard to Reliable Spent Fuel Pool Instrumentation*" (NEI 12-02), Revision 1, dated August 24, 2012 (Reference B). This ISG provides one acceptable approach for satisfying the requirements of Order EA-12-051. Licensees or construction permit (CP) holders for nuclear power reactors issued under Title 10 to the *Code of Federal Regulations* (10 CFR), Part 50 or Part 52, may use other methods for satisfying these requirements. The NRC staff will review such methods and determine their acceptability on a case-by-case basis.

The U.S. Nuclear Regulatory Commission (NRC, the Commission) issued Order EA-12-051 following the NRC staff's evaluation of the earthquake and tsunami, and resulting nuclear accident, at the Fukushima Dai-ichi nuclear power plant in March 2011. Order EA-12-051 requires all licensees and CP holders to provide safety enhancements in the form of reliable spent fuel pool instrumentation for beyond-design-basis external events. Order EA-12-051 also specified that the NRC staff would issue a final ISG in August 2012, to provide additional details of an acceptable approach for complying with Order EA-12-051.

BACKGROUND

Following the events at the Fukushima Dai-ichi nuclear power plant, the NRC established a senior-level agency task force referred to as the Near-Term Task Force (NTTF). The NTTF conducted a systematic and methodical review of the NRC regulations and processes and determined that the agency should make improvements in light of the events at Fukushima Dai-ichi.

As a result of this review, the NTTF developed a comprehensive set of recommendations, documented in SECY-11-0093, *Near-Term Report and Recommendations for Agency Actions Following the Events in Japan* (Reference D), dated July 12, 2011. These recommendations were modified by the NRC staff following interactions with stakeholders. Documentation of the NRC staff's efforts is contained in SECY-11-0124, *Recommended Actions To Be Taken Without Delay From the Near Term Task Force Report* (Reference E), dated September 9, 2011, and SECY-11-0137, *Prioritization of Recommended Actions To Be Taken in Response to Fukushima Lessons Learned* (Reference F), dated October 3, 2011. SECY-11-0124 and SECY-11-0137 established the NRC staff's prioritization of the recommendations.

As discussed in the staff requirements memorandum associated with SECY-12-0025, *Proposed Orders and Requests for Information in Response to Lessons Learned from Japan's March 11, 2011, Great Tohoku Earthquake and Tsunami* (Reference G), dated March 9, 2012, the Commission determined that the additional requirements in Order EA-12-051 represent "a substantial increase in the protection of public health and safety." Consequently, the Commission decided to administratively exempt this Order from applicable provisions of the Backfit Rule, 10 CFR Part 50, Section 109, and the issue finality requirements 10 CFR Part 52, *Licenses, Certifications, and Approvals for Nuclear Power Plants*.

Numerous public meetings were held to receive stakeholder input on the NTTF recommendation associated with enhanced spent fuel pool (SFP) instrumentation prior to issuance of Order EA-12-051. Following issuance of Order EA-12-051, several more public meetings were held with representatives from the NEI and other stakeholders to discuss the guidance for compliance with Order EA-12-051. See the References section for a list of the public meetings and the associated meeting summaries.

Following issuance of this Order, the NRC staff prepared a draft ISG (Reference H) to provide guidance for licensee submittals in response to Order EA-12-051. This document was used to facilitate discussions during the public meetings with NEI members and stakeholders. The NEI staff indicated that they planned to develop a separate guidance document incorporating the guidance provided in the staff's document, and would submit this to the NRC staff for consideration.

By letter dated May 11, 2012, the NEI submitted NEI 12-02, *Industry Guidance for Compliance with NRC Order EA-12-051, "To Modify Licenses with Regard to Reliable Spent Fuel Pool Instrumentation*," Revision B (NEI 12-02, Revision B)(Reference I), and requested NRC endorsement. The NRC staff reviewed this guidance document and proposed to endorse NEI 12-02, Revision B, with exceptions and clarifications, on May 31, 2012, in JLD-ISG-2012-03, *Compliance with Order EA-12-051, Reliable Spent Fuel Pool Instrumentation*, draft ISG, Revision 0 for public comment (Reference J).

Following issuance of the draft ISG, the staff held several public meetings to discuss the clarifications and exceptions (Reference L). By letter dated July 5, 2012, the NEI submitted a revised guidance document, NEI 12-02, Revision 0 (Reference L), and requested NRC endorsement. Additionally, several public comments were received on the draft ISG, and the staff evaluated the comments and modified the guidance, as appropriate. The staff's responses to the comments are found in *NRC Responses to Public Comments* issued August 29, 2012 (Reference M). By letter dated August 24, 2012, the NEI submitted a revised guidance document, NEI 12-02, Revision 1, and requested NRC endorsement.

As specified in Order EA-12-051, the NRC staff is issuing this final ISG to provide details on an acceptable approach for complying with Order EA-12-051 requirements.

RATIONALE

Order EA-12-051 requires that licensees and CP holders install reliable means of remotely monitoring wide-range SFP levels to support effective prioritization of event mitigation and recovery actions in the event of a beyond-design-basis external event. The SFP level instrumentation currently at nuclear power plants in the United States is typically narrow range and, therefore, only capable of monitoring normal and slightly off-normal conditions. The staff's review of the events at Fukushima Dai-ichi has shown the benefits that can be derived from the availability of more diverse instrumentation. Reliable and available indication is essential to

ensure plant personnel can effectively prioritize emergency actions during and after extreme natural events.

APPLICABILITY

This ISG shall remain in effect until it has been superseded, withdrawn, or incorporated into a regulatory guide or the standard review plan.

GUIDANCE

This ISG is applicable to holders of power reactor operating licenses, construction permits, and combined licenses.

The NRC staff considers that the methodologies and guidance in conformance with the guidelines provided in NEI 12-02, Revision 1, subject to the clarifications and exceptions in Attachment 1 to this ISG, are an acceptable means of meeting the requirements of Order EA-12-051.

NEI 12-02, Revision 1 references other documents, but the NRC's endorsement of NEI 12-02, Revision 1 in this ISG should not be considered an endorsement of any of the referenced documents.

IMPLEMENTATION

Except in those cases in which a licensee or CP holder proposes an acceptable alternative method for complying with Order EA-12-051, the NRC staff will use the methods described in this ISG to evaluate licensee and CP holder compliance as presented in submittals required in Order EA-12-051.

BACKFITTING DISCUSSION

Licensees and CP holders may use the guidance in this document to demonstrate compliance with Order EA-12-051. Accordingly, the NRC staff issuance of this ISG is not considered backfitting, as defined in 10 CFR 50.109(a)(1), nor is it deemed to be in conflict with any of the issue finality provisions in 10 CFR Part 52.

FINAL RESOLUTION

The contents of this ISG will subsequently be incorporated into the standard review plan, and/or other guidance documents, as appropriate.

ATTACHMENT

Guidance for Reliable Spent Fuel Pool Instrumentation

REFERENCES

A. NRC Order EA-12-051, *Order Modifying Licenses with Regard to Reliable Spent Fuel Pool Instrumentation (Effective Immediately),* issued March 12, 2012 (Agencywide Documents Access and Management System (ADAMS) Accession No. ML12056A044)

B. NEI 12-02, *Industry Guidance for Compliance with NRC Order EA-12-051, "To Modify Licenses with Regard to Reliable Spent Fuel Pool Instrumentation*," Revision 1, dated August 24, 2012 (ADAMS Accession No. ML122400399)

C. Federal Register, Volume 77, No. 53, *Order Modifying Licenses with Regard to Reliable spent Fuel Pool Instrumentation (Effective Immediately)*, March 19, 2012, (77 FR 16082)

D. SECY 11-0093, *Near-Term Report and Recommendations for Agency Actions Following the Events in Japan*, dated July 19, 2011 (ADAMS Accession No. ML112310021)

E. SECY 11-0124, *Recommended Actions To Be Taken Without Delay From the Near Term Task Force Report*, dated September 9, 2011 (ADAMS Accession No. ML11245A127)

F. SECY 11-0137, *Prioritization of Recommended Actions To Be Taken in Response to Fukushima Lessons Learned*, dated October 3, 2011 (ADAMS Accession No. ML11269A204)

G. SECY 12-0025, *Proposed Orders and Requests for Information in Response to Lessons Learned from Japan's March 11, 2011, Great Tohoku Earthquake and Tsunami*, February 17, 2012 (ADAMS Accession No. ML12039A103)

H. NRC-Proposed Draft Interim Staff Guidance for Compliance with Order EA-12-051, "Reliable Spent Fuel Pool Instrumentation," April 26, 2012 (ADAMS Accession No. ML12144A088)

I. NEI 12-02, *Industry Guidance for Compliance with NRC Order EA-12-051, "To Modify Licenses with Regard to Reliable Spent Fuel Pool Instrumentation*," Revision B, dated May 11, 2012 (ADAMS Accession No. ML12135A414)

J. JLD-ISG-2012-03, *Compliance with Order EA-12-051, Reliable Spent Fuel Pool Instrumentation*, DRAFT Interim Staff Guidance, Revision 0, for public comment, dated May 31, 2012 (ADAMS Accession No. ML12144A323)

K. Public Meetings:
December 1, 2011 (ADAMS Accession No. ML11341A160)
December 15, 2011 (ADAMS Accession No. ML11356A061)
January 13, 2012 (ADAMS Accession No. ML11362A202)
January 19, 2012 (ADAMS Accession No. ML11361A043)
March 29, 2012 (ADAMS Accession No. ML12073A077)
April 10, 2012 (ADAMS Accession No. ML12082A028)
April 18, 2012 (ADAMS Accession No. ML12093A409)
May 1, 2012 (ADAMS Accession No. ML12142A009)
June 20, 2012 ACRS subcommittee presentation transcript (ADAMS Accession No. ML121850321)
July 11, 2012 ACRS full committee presentation (ADAMS Accession No. ML12213A606)

June 21, 2012 (ADAMS Accession No. ML12177A026)
July 25, 2012 Conference Call (ADAMS Accession No. ML12227A481)
August 14, 2012 (ADAMS Accession No. ML12223A058)
August 20, 2012 (ADAMS Accession No. ML12240A002)
August 23, 2012 (ADAMS Accession No. ML12240A040)

L. NEI 12-02, *Industry Guidance for Compliance with NRC Order EA-12-051, "To Modify Licenses with Regard to Reliable Spent Fuel Pool Instrumentation*," Revision 0, dated July 5, 2012 (ADAMS Accession No. ML121910388)

M. *NRC Responses to Public Comments: Japan Lessons Learned Project Directorate Interim Staff Guidance JLD-ISG-2012-03: Compliance with Order EA-12-051, Order Modifying Licenses with Regard to Reliable Spent Fuel Pool Instrumentation*, dated August 29, 2012 (ADAMS Accession No. ML12221A319)

GUIDANCE FOR RELIABLE SPENT FUEL POOL INSTRUMENTATION

Introduction

The U.S. Nuclear Regulatory Commission staff has determined that, with the exceptions listed below, conformance with the guidance in Nuclear Energy Institute (NEI) 12-02, *Industry Guidance for Compliance with NRC Order EA-12-051, "To Modify Licenses with Regard to Reliable Spent Fuel Pool Instrumentation"* (NEI 12-02), Revision 1, is an acceptable method for use in satisfying the requirements in Order EA-12-051 regarding reliable spent fuel pool instrumentation. Licensees and construction permit (CP) holders may use methods other than those provided in NEI 12-02, Revision 1, to meet the requirements of Order EA-12-051. The staff will review such methods and determine their acceptability on a case-by-case basis. Except in those cases in which a licensee or CP holder proposes an acceptable alternative method for complying with Order EA-12-051, the NRC staff will use the methods described in this interim staff guidance (ISG) to evaluate licensee and CP holder compliance as presented in submittals required in Order EA-12-051.

Section 3. Instrumentation Design Features

Staff Position: NEI 12-02, Revision 1, Section 3, provides an acceptable methodology for reliable spent fuel pool instrumentation with the following clarifications and exceptions specific to Section 3.4 Qualification:

Guidance

The second bullet under subheading "Guidance" states that instrument channel reliability shall be demonstrated for the "effects of shock and vibration on instrument channel components used during any applicable event for only installed components." To comply with the intent of the order, the NRC staff position is that such reliability demonstration applies to the "effects of shock and vibration on instrument channel components used during and following any applicable event for installed components."

Guidance

The paragraph after the third bullet under subheading "Guidance" states that the "[s]election of instrument channel components should consider ease and simplicity of design and replacement after the event" and that readily available commercial components shall be considered. The NRC staff position is that commercial components may be considered, but that licensees may choose to utilize augmented quality components, up to and including the quality and capability of components typically used in safety-related applications.

Guidance

The instrument channel reliability shall be demonstrated via an appropriate combination of design, analyses, operating experience, and/or testing of channel components for the effects of shock and vibration on all instrument channel components, rather than only installed components. This exception is necessary because the guidelines do not otherwise specify that portable instrument channel components be designed as hand-held portable devices or similarly rugged components. This clarification removes potential confusion regarding the extent of design basis shock and vibration loadings that are different from the design basis seismic loadings.

Regardless of plant design basis, components of the instrument channels should be qualified for shock and vibration using one or more of the following methods:

- components are supplied by manufacturers using commercial quality programs (such as ISO9001, “Quality management systems - Requirements”) with shock and vibration requirements included in the purchase specification at levels commensurate with portable hand-held device or transportation applications;
- components have a substantial history of operational reliability in environments with significant shock and vibration loading, such as portable hand-held device or transportation applications; or
- components are inherently resistant to shock and vibration loadings, such as cables.

Seismic

The first bullet under the section “Seismic” makes a provision for “instrument channel components… supplied by manufacturers with commercial quality programs… with seismic requirements… and commercial design and testing for operation in environments where significant seismic effects are common.” It is the NRC staff position that the guidance in this clause does not adequately address seismic levels and frequencies seen at the installation location or methods for demonstration. Demonstration of seismic motion consistent with that of existing design basis loads at the installed location is adequate. Quality programs are addressed in Appendix A-1 of NEI 12-02, Revision 1.

Seismic

The second bullet under the section “Seismic” makes a provision for demonstrating adequacy of design and installation to account for seismic effects which includes “substantial history of operational reliability in environments with significant vibration.” Typically, vibration is an effect that occurs at higher frequency and lower amplitude than that of seismic motion. It is the NRC staff position that seismic design and installation adequacy cannot be reasonably demonstrated solely through operational history of performance of components when subjected to vibration, but that the effects of low frequency, high acceleration need to be included in any demonstration of seismic design adequacy. This clause is not appropriate without stating that such a vibration design envelope shall be inclusive of the effects of seismic motion imparted to the components proposed at the location of the proposed installation.

Seismic

The third bullet under the section “Seismic” lists four methods of demonstrating reliability. It is the NRC staff position that the adequacy of seismic design and installation should be demonstrated based on the guidance in Sections 7, 8, 9, and 10 of IEEE Standard 344-2004, “IEEE Recommended Practice for Seismic Qualification of Class 1E Equipment for Nuclear Power Generating Stations,” or a substantially similar industrial standard.