[7590-01-P]

NUCLEAR REGULATORY COMMISSION

[NRC-2015-0048]

Compliance with Phase 2 of Order EA-13-109

AGENCY: Nuclear Regulatory Commission.

ACTION: Draft interim staff guidance; request for comment.

SUMMARY: The U.S. Nuclear Regulatory Commission (NRC) is issuing for public comment its Japan Lessons-Learned Division (JLD) draft interim staff guidance (ISG), "Compliance with Phase 2 of Order EA-13-109, Order Modifying Licenses with Regard to Reliable Hardened Containment Vents Capable of Operation under Severe Accident Conditions," (JLD-ISG-2015-01). This draft JLD-ISG would provide guidance and clarification to assist nuclear power reactor licensees identify measures needed to comply with Phase 2 requirements of the "Order Modifying Licenses with Regard to Reliable Hardened Containment Vents Capable of Operation Under Severe Accident Conditions," (Order EA-13-109) to have either a vent path from the containment drywell or a strategy that makes it unlikely that venting would be needed from the drywell before alternate reliable containment heat removal and pressure control is reestablished.

DATES: Submit comments by **[INSERT DATE 30 DAYS FROM DATE OF PUBLICATION IN THE *FEDERAL REGISTER*]**. Comments received after this date will be considered, if it is practical to do so, but the Commission is able to ensure consideration only for comments received before this date.

ADDRESSES: You may submit comment by any of the following methods (unless this document describes a different method for submitting comments on a specific subject):

- **Federal Rulemaking Web site:** Go to http://www.regulations.gov and search for Docket ID NRC-2015-0048. Address questions about NRC dockets to Carol Gallagher; telephone: 301-415-3463; e-mail: Carol.Gallagher@nrc.gov. For technical questions, contact the individual listed in the FOR FURTHER INFORMATION CONTACT section of this document.
- **Mail comments to:** Cindy Bladey, Office of Administration, Mail Stop: OWFN – 12-H08, U.S. Nuclear Regulatory Commission, Washington, DC 20555-0001.

For additional direction on obtaining information and submitting comments, see "Obtaining Information and Submitting Comments" in the SUPPLEMENTARY INFORMATION section of this document.

FOR FURTHER INFORMATION CONTACT: Rajender Auluck, Office of Nuclear Reactor Regulation, U.S. Nuclear Regulatory Commission, Washington, DC 20555-0001; telephone: 301-415-1025; e-mail: *Rajender.Auluck@nrc.gov*.

SUPPLEMENTARY INFORMATION:

I. Obtaining Information and Submitting Comments.

A. Obtaining Information

Please refer to Docket ID NRC-2015-0048 when contacting the NRC about the availability of information regarding this document. You may obtain publicly-available information related to this action by the following methods:

- **Federal Rulemaking Web site:** Go to http://www.regulations.gov and search for Docket ID NRC-2015-0048.

- **NRC's Agencywide Documents Access and Management System (ADAMS):** You may access publicly-available documents online in the NRC Library at http://www.nrc.gov/reading-rm/adams.html. To begin the search, select "ADAMS Public Documents" and then select "Begin Web-based ADAMS Search." For problems with ADAMS, please contact the NRC's Public Document Room (PDR) reference staff at 1-800-397-4209, 301-415-4737, or by e-mail to pdr.resource@nrc.gov. The ADAMS accession number for each document referenced in this notice (if that document is available in ADAMS) is provided the first time that a document is referenced. The draft JLD-ISG-2015-01 is available in ADAMS under Accession No. ML15051A143. The ISG for complying with Phase 1 requirements of the order (JLD-ISG-2013-02) was issued on November 14, 2013 (ADAMS Accession No. ML13304B836).

- **NRC's PDR:** You may examine and purchase copies of public documents at the NRC's PDR, Room O1-F21, One White Flint North, 11555 Rockville Pike, Rockville, Maryland 20852.

- **NRC's Interim Staff Guidance Web site:** JLD-ISG documents are also available online under the "Japan Lessons Learned" heading at http://www.nrc.gov/reading-rm/doc-collections/isg/japan-lessons-learned.html.

B. Submitting Comments

Please include Docket ID NRC-2015-0048 in the subject line of your comment submission, in order to ensure that the NRC is able to make your comment submission available to the public in this docket.

The NRC cautions you not to include identifying or contact information that you do not want to be publicly disclosed in your comment submission. The NRC posts all comment submissions at http://www.regulations.gov as well as entering the comment submissions into ADAMS. The NRC does not routinely edit comment submissions to remove identifying or contact information.

If you are requesting or aggregating comments from other persons for submission to the NRC, then you should inform those persons not to include identifying or contact information that they do not want to be publicly disclosed in their comment submission. Your request should state that the NRC does not routinely edit comment submissions to remove such information before making the comment submissions available to the public or entering the comment submissions into ADAMS.

II. Background.

The NRC developed draft JLD-ISG-2015-01 to provide guidance and clarification to assist nuclear power reactor licensees with the identification of methods needed to comply with Phase 2 requirements in Order EA-13-109, “Order Modifying Licenses with Regard to Reliable Hardened Containment Vents Capable of Operation under Severe Accident Conditions” (ADAMS Accession No. ML13130A067). The draft ISG would not be a substitute for the requirements in Order EA-13-109, and compliance with the ISG would not be a requirement.

This ISG is being issued in draft form for public comment to involve the public in development of the implementing guidance.

The accident at the Fukushima Dai-ichi nuclear power station reinforced the importance of reliable operation of containment vents for boiling-water reactor (BWR) plants with Mark I and Mark II containments. As part of its response to the lessons learned from the accident, on March 12, 2012, the NRC issued Order EA-12-050 (ADAMS Accession No. ML12056A043) requiring licensees to upgrade or install a reliable hardened containment venting system (HCVS) for Mark I and Mark II containments. The requirements in Order EA-12-050 for licensees with BWR plants with Mark I and Mark II containments were intended to increase the reliability of containment venting to support decay heat removal from the reactor core and provide protection against over-pressurization of the primary containments. While developing the requirements for Order EA-12-050, the NRC acknowledged that questions remained about maintaining containment integrity and limiting the release of radioactive materials if licensees used the venting systems during severe accident conditions.

The NRC staff presented the Commission with options to address these issues in SECY-12-0157, “Consideration of Additional Requirements for Containment Venting Systems for Boiling Water Reactors with Mark I and Mark II Containments” (issued November 26, 2012, ADAMS Accession No. ML12325A704). The options presented in SECY-12-0157 included continuing with the implementation of Order EA-12-050 for reliable hardened vents (Option 1); requiring licensees to upgrade or replace the reliable hardened vents required by EA-12-050 with a containment venting system designed and installed to remain functional during severe accident conditions (Option 2); requiring licensees with BWR Mark I and Mark II containments to install an engineered filtered containment venting system intended to prevent the release of significant amounts of radioactive material following the dominant severe accident sequences

(Option 3); and pursuing development of requirements and technical acceptance criteria for performance-based confinement strategies (Option 4). The NRC staff provided an evaluation considering various quantitative analyses and qualitative factors related to the options and recommended the Commission approve Option 3 to require the installation of an engineered filtering system. One issue not specifically addressed within SECY-12-0157 was the importance of water addition to cool core debris as part of severe accident management for BWR's with Mark I and II containments. The NRC staff acknowledged in SECY-12-0157 that in the longer-term rulemaking associated with any of the options presented, the NRC could consider adding requirements for the capability of core debris cooling during severe accident scenarios.

In the staff requirements memorandum (SRM) for SECY-12-0157, dated March 19, 2013 (ADAMS Accession No. ML13078A017), the Commission directed the staff to: (1) issue a modification to Order EA-12-050 requiring BWR licensees with Mark I and Mark II containments to upgrade or replace the reliable hardened vents required by Order EA-12-050 with a containment venting system designed and installed to remain functional during severe accident conditions, and (2) develop a technical basis and rulemaking for filtering strategies with drywell filtration and severe accident management of BWR Mark I and II containments. The NRC subsequently issued Order EA-13-109 to define requirements and schedules for licensees for BWRs with Mark I and Mark II containments to install severe accident capable containment venting systems. The NRC staff also initiated development and evaluation of other possible regulatory actions identified in the Commission's SRM for SECY-12-0157, including the development of a technical basis in support of a Containment Protection and Release Reduction (CPRR) rulemaking.

Order EA-13-109, in addition to requiring a reliable HCVS to assist in preventing core damage when heat removal capability is lost (the purpose of EA-12-050), will ensure that venting functions are also available during severe accident conditions. Severe accident

conditions include the elevated temperatures, pressures, radiation levels, and combustible gas concentrations, such as hydrogen and carbon monoxide, associated with accidents involving extensive core damage, including accidents involving a breach of the reactor vessel by molten core debris. The safety improvements to Mark I and Mark II containment venting systems required by Order EA-13-109 increase confidence in licensees' ability to maintain the containment function following core damage events. Although venting the containment during severe accident conditions could result in the release of radioactive materials, venting could also prevent containment structural failures and gross penetration leakage due to overpressurization that would hamper accident management (e.g., continuing efforts to cool core debris) and ultimately result in larger, uncontrolled releases of radioactive material.

In recognition of the relative importance of venting capabilities from the wetwell and drywell, a phased approach to implementation is being used to minimize delays in implementing the requirements originally imposed by Order EA-12-050. Phase 1 involves upgrading the venting capabilities from the containment wetwell to provide reliable, severe accident capable hardened vents to assist in preventing core damage and, if necessary, to provide venting capability during severe accident conditions. Phase 2 involves providing additional protection during severe accident conditions through installation of a reliable, severe accident capable drywell vent system or the development of a reliable containment venting strategy that makes it unlikely that a licensee would need to vent from the containment drywell during severe accident conditions. For implementation of Phase 1 order requirements, the NRC issued JLD-ISG-2013-02 on November 14, 2013 (78 FR 70356), which endorsed, with clarifications, the methodologies described in the industry guidance document Nuclear Energy Institute (NEI) 13-02, Rev. 0 (ADAMS Accession No. ML13316A853). As required by the order, licensees submitted their site-specific overall integrated plans by June 30, 2014. The NRC is currently reviewing these plans and expects to complete those reviews by June 2015.

The focus of this ISG is to provide guidance for Phase 2 requirements of the order. Some proposed approaches to implement Phase 2 requirements of the order include the addition of water to the drywell during severe accident conditions. Evaluations performed by the NRC and industry in conjunction with the CPRR rulemaking show that water addition during severe accident conditions provides benefits that include reducing temperatures and cooling molten core debris. In SECY-12-0157, the NRC discussed various risk assessments by the NRC and industry that have concluded that adding water to the drywell reduces the likelihood of release of radioactive materials for those severe accident scenarios that involve fuel melting through the reactor vessel. The water added to the drywell cools the molten fuel and can arrest the melting fuel's progression and reduce the likelihood of a loss of the containment function through liner melt-through, containment over-pressurization failure, and containment over-temperature failure. In addition to the benefits associated with containment protection, recent technical evaluations performed by both the industry and the NRC indicate that including the capability of timely severe accident water addition (SAWA) results in a substantially lower drywell temperature for consideration in designing the drywell vent. Therefore, SAWA will facilitate implementation of Phase 2 of Order EA-13-109 by establishing the design conditions for a drywell vent and supporting severe accident water management (SAWM) for licensees choosing to pursue that option as a strategy that makes it unlikely that a licensee would need to vent from the drywell.

On December 10, 2014, NEI submitted NEI 13-02, "Industry Guidance for Compliance with Order EA-13-109," Rev. 0E2 (ADAMS Accession No. ML1434A374) to assist nuclear power licensees with the identification of measures needed to comply with the requirements of Order EA-13-109 regarding reliable hardened containment vents capable of operation under severe accident conditions. The NEI document includes guidance for implementing order requirements for both Phase 1 and Phase 2, including the industry's proposed approach to use

the SAWA and SAWM strategies to control the water levels in the suppression pool and maintain capabilities to address over-pressure conditions without a severe accident drywell vent. As described in the draft ISG, some issues remain the subject of ongoing discussions as part of finalizing the guidance. These include: (1) availability of power and functional requirements for the SAWA-related installed and portable equipment, (2) duration of time for preservation of the wetwell vent for the SAWM strategy, and (3) alternate control of containment conditions during recovery from the severe accident. The NRC intends to continue discussions with stakeholders prior to finalizing the ISG for Phase 2 of the order and endorsing, with clarifications and exceptions if necessary, the methodologies described in the industry guidance document NEI 13-02, Rev. 0E2.

Dated at Rockville, Maryland, this 2nd day of March 2015.

For the Nuclear Regulatory Commission.

Jack R. Davis, Director,
Japan Lessons-Learned Division,
Office of Nuclear Reactor Regulation.

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