November 12, 2009

MEMORANDUM TO: Edwin M. Hackett, Executive Director
Advisory Committee on Reactor Safeguards
Advisory Committee on Nuclear Waste and Materials

James E. Lyons, Chairman
The Committee to Review Generic Requirements

FROM: William F. Burton, Chief ***/RA/***
Rulemaking and Guidance Development Branch
Division of New Reactor Licensing
Office of New Reactors

SUBJECT: TRANSMITTAL OF PROPOSED INTERIM STAFF GUIDANCE DC/COL-ISG-019, "REVIEW OF EVALUATION TO ADDRESS GAS ACCUMULATION ISSUES IN SAFETY RELATED SYSTEMS"

The purpose of this memorandum is to transmit the Proposed Interim Staff Guidance (ISG) DC/COL-ISG-019, "Review of Evaluation to Address Gas Accumulation Issues in Safety Related Systems" to the Advisory Committee on Reactor Safeguards (ACRS) and the Committee to Review Generic Requirements (CRGR) for information.

The U.S. Nuclear Regulatory Commission is issuing its ISG DC/COL-ISG-019 for comments from stakeholders and transmitting in parallel to ACRS and CRGR for information.

Enclosure:
As stated

CONTACT: Ram Subbaratnam, NRO/DNRL
301-415-1478

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**Nuclear Regulatory Commission**

**Office of New Reactors; Proposed Interim Staff Guidance**

**Review of Evaluation to Address Gas Accumulation Issues in Safety Related Systems**

**NRC-2009-0494**

**AGENCY**: Nuclear Regulatory Commission (NRC).

**ACTION**: Solicitation of public comment.

**SUMMARY**: The NRC staff is soliciting public comment on its proposed Interim Staff Guidance (ISG) DC/COL-ISG-019 (Agencywide Documents Access and Management System (ADAMS) Accession No. ML092360375). The purpose of this ISG is to clarify the NRC staff guidance to address issues of gas accumulation in safety related systems. This ISG revises and updates the guidance provided to the staff in Standard Review Plan (SRP) Sections 5.4.7, "Residual Heat Removal System," 6.3 "Emergency Core Cooling System," and 6.5.2 "Containment Spray System" of NUREG-0800, "Standard Review Plan for the Review of Safety Analysis Reports for Nuclear Power Plants," March 2007. The NRC staff issues DC/COL-ISGs to facilitate timely implementation of current staff guidance and to facilitate activities associated with review of applications for design certifications and combined licenses by the Office of New Reactors. The NRC staff intends to incorporate the final approved DC/COL-ISG-019 into the next revision of the SRP and related guidance documents.

**DATES**: Comments must be filed no later than 30 days from the date of publication of this notice 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 on or before this date.

**ADDRESSES**: You may submit comments by any one of the following methods. Please include Docket ID **NRC-2009-0494** in the subject line of your comments. Comments submitted in writing or in electronic form will be posted on the NRC website and on the Federal rulemaking website Regulations.gov. Because your comments will not be edited to remove any identifying or contact information, the NRC cautions you against including any information in your submission that you do not want to be publicly disclosed.

The NRC requests that any party soliciting or aggregating comments received from other persons for submission to the NRC inform those persons that the NRC will not edit their comments to remove any identifying or contact information, and therefore, they should not include any information in their comments that they do not want publicly disclosed.

**Federal Rulemaking Website:** Go to http://www.regulations.gov and search for documents filed under Docket ID **NRC-2009-0494.** Address questions about NRC dockets to Carol Gallagher 301-492-3668; e-mail Carol.Gallagher@nrc.gov.

**Mail comments to:** Michael T. Lesar, Chief, Rulemaking and Directives Branch (RDB), Division of Administrative Services, Office of Administration, Mail Stop: TWB-05-B01M, U.S. Nuclear Regulatory Commission, Washington, DC 20555-0001, or by fax to RDB at (301) 492-3446.

The NRC ADAMS provides text and image files of NRC's public documents. These documents may be accessed through the NRC's Public Electronic Reading Room on the Internet at http://www.nrc.gov/reading-rm/adams.html. Persons who do not have access to ADAMS or who encounter problems in accessing the documents located in ADAMS should contact the NRC Public Document Room reference staff at 1-800-397-4209, 301-415-4737, or by e-mail at PDR.Resource@nrc.gov.

**FOR FURTHER INFORMATION CONTACT**: Mr. Joseph E. Donoghue, Chief, Reactor Systems, Nuclear Performance and Code Review Branch, Division of Safety Systems & Risk Assessment, U.S. Nuclear Regulatory Commission, Washington, DC, 20555-0001; telephone 301-415-1193 or e-mail at joseph.donoghue@nrc.gov.

**SUPPLEMENTARY INFORMATION**: The agency posts its issued staff guidance in the agency external web page (http://www.nrc.gov/reading-rm/doc-collections/isg/).

The NRC staff is issuing this notice to solicit public comments on the proposed DC/COL-ISG-019. After the NRC staff considers any public comments, it will make a determination regarding the proposed DC/COL-ISG-019.

Dated at Rockville, Maryland, this 3RD day of November 2009.

For the Nuclear Regulatory Commission,

***/RA/***

William F. Burton, Branch Chief
Rulemaking and Guidance Development Branch
Division of New Reactor Licensing
Office of New Reactors

**Proposed Interim Staff Guidance**
**Review of Evaluation to Address Gas**
**Accumulation Issues in Safety Related Systems**
**DC/COL-ISG-019**

## Purpose

The purpose of this interim staff guidance (ISG) is to clarify the U.S. Nuclear Regulatory Commission (NRC) staff guidance to address issues of gas accumulation in safety related systems. This ISG revises and updates the guidance previously provided in the cited Standard Review Plan (SRP) sections below related to the subject of gas accumulation in Safety Related Systems.

## Background

Instances of gas accumulation in safety related systems have occurred since the beginning of commercial nuclear power plant operation. The NRC has issued a number of Information Notices and Generic Letters (GL) on the subject. In January 2008, the NRC staff issued GL 2008-01 to comprehensively address gas accumulation issues in operating reactors. Prior to that, in March 2007, the NRC revised SRP Sections 5.4.7, "Residual Heat Removal System," 6.3, "Emergency Core Cooling System," and 6.5.2, "Containment Spray System." The SRP revisions included limited mention of gas accumulation concerns but did not include specific concerns to the extent covered in GL 2008-01 (Reference 7). These include sources of gas, gas accumulation locations, determination of gas quantities, water hammer and acceptable gas quantity, pump operation and acceptable gas quantity and control of gas. In reviewing the current applications for certified designs and combined licenses (COL) filed under Title 10 of the *Code of Federal Regulations*, Part 52 (10 CFR Part 52), the NRC staff finds that the March 2007 SRP staff guidance does not provide sufficient guidance to adequately evaluate applicants' treatment of gas accumulation issues as above. This ISG is being issued to revise and update the March 2007 guidance to address these concerns.

## Issue

Gas accumulation in safety related nuclear power plant systems has been known to cause water hammer, gas binding in pumps, and inadvertent relief valve actuation that may damage pumps, valves, piping, and supports and may lead to loss of system operability. SRP Sections 5.4.7, 6.3 and 6.5.2 do not provide sufficient guidance to ensure that the gas accumulation concerns raised in GL 2008-01 are adequately addressed in applications for certified designs or COLs filed under 10 CFR Part 52.

## Rationale

The NRC staff finds the current guidance insufficient to review certified design and COL applicants' treatment of the gas accumulation concerns raised in GL 2008-01. In order to ensure compliance with Appendix A and Appendix B to 10 CFR Part 50, the following areas have been identified as needing additional guidance:

1. Potential Gas Accumulation Locations & Intrusion Mechanisms
2. Pipe and Instrumentation Drawing (P&ID) and Isometric Drawing Confirmation
3. Surveillance and Venting Procedures

**Proposed Staff Guidance**

In the near term, the NRC staff should apply this ISG for the review of certified design and COL applications. This ISG contains three major review areas including: 1) potential gas accumulation locations & intrusion mechanisms, 2) P&ID and isometric drawing confirmation and 3) surveillance and venting procedures. The guidance below describes general review criteria to be used in the review of design certification (DC)/COL applications to address the gas accumulation issue.

1. Potential Gas Accumulation Locations & Intrusion Mechanisms

   NRC staff shall evaluate whether the applicant has identified potential gas accumulation locations and intrusion mechanisms in safety related systems and described preventive measures for each. Typical potential gas accumulation locations may include, but are not limited to, local high points, pipe diameter changes and normally closed valves. Typical gas intrusion mechanisms may include, but are not limited to, water level monitoring instrumentation, valve leakage and sump strainers.

2. P&ID and Isometric Drawing Confirmation

   NRC staff shall verify that inspections, tests, analyses, and acceptance criteria (ITAAC) exist that require applicants to compare the as-built plant configuration to the P&ID and isometric drawings to confirm all potential gas accumulation areas have been properly identified and that appropriate prevention measures are in place. The applicant must address any discrepancies regarding potential gas accumulation areas that were not previously identified in the P&ID and isometric drawings.

3. Surveillance and Venting Procedures

   NRC staff shall confirm that applicants have surveillance and venting procedures that aim to prevent gas accumulation and minimize or eliminate gas whenever indentified. Procedures should also include a means to track and trend accumulated gas such that problem areas can be systematically indentified, monitored and corrected.

**Applicability**

This ISG is applicable to all DC and COL applications submitted under 10 CFR Part 52. It shall remain in effect until it has been superseded, withdrawn, or incorporated into revisions of the applicable SRP sections and Regulatory Guide 1.206.

**Backfit Discussion**

The requirements of Section 50.109 provide that a backfit analysis is not necessary for DC and COL applications currently under review[1].

**References**

1. Ruland, William H., "Preliminary Assessment of Responses to Generic Letter 2008-01, 'Managing Gas Accumulation in emergency Core Cooling, Decay Heat Removal, and Containment Spray Systems' and Future NRC Staff Review Plans," NRC letter to James H. Riley, Nuclear Energy Institute, Agencywide Documents Access and Management System (ADAMS) accession no. ML091390637, May 28, 2009.

2. Beaulieu, David P., "Forthcoming Meeting with the Nuclear Energy Institute (NEI) to Discuss NRC Generic Letter 2008-01, 'Managing Gas Accumulation in Emergency Core Cooling, Decay Heat Removal, and Containment Spray Systems,'" NRC Memorandum, ADAMS accession no. ML083250536, November 21, 2008.

3. "Revision 2 to NRC Staff Criteria for Gas Movement in Suction Lines and Pump Response to Gas," ADAMS accession no. ML090900136, March 26, 2009.

4. Preliminary Assessment of "Testing and Evaluation of Gas Transport to the Suction of ECCS Pumps," Westinghouse Electric Company LLC, WCAP-16631-NP, Revision 0, October 2006. (This document has not been provided to NRC on the docket. Referenced information is based on notes from reading the reference.)

5. Beaulieu, David P., "Summary of the September 4, 2008, Category 2 Public Meeting with the Nuclear Energy Institute to Discuss NRC Generic Letter 2008-01, 'Managing Gas Accumulation in Emergency Core Cooling, Decay Heat Removal, and Containment Spray Systems,'" NRC Memorandum, ADAMS accession no. ML082770088, October 6, 2008.

6. Wert, Leonard D., Jr., "Task Interface Agreement – Emergency Core Cooling System (ECCS) Voiding Relative to Compliance with Surveillance Requirements (SR) 3.5.1.1, 3.5.2.3, and 3.5.3.1 (TIA 2008-03)," NRC Memorandum from Director, Division of Reactor Projects, Region II, ADAMS accession no. ML082560209, October 21, 2008.

7. GL 2008-01, "Managing Gas Accumulation in Emergency Core Cooling, Decay Heat Removal and Containment Spray Systems," January 11, 2008.

[1] The AP1000 and advanced boiling-water reactor certified designs which are already closed, will not be deemed a backfit but may be required to address the issue under separate provisions.