

UNITED STATES  
NUCLEAR REGULATORY COMMISSION  
OFFICE OF NUCLEAR REACTOR REGULATION  
OFFICE OF NEW REACTORS  
WASHINGTON, DC 20555-0001

August 4, 2010

NRC INFORMATION NOTICE 2010-14:     CONTAINMENT CONCRETE SURFACE  
  CONDITION EXAMINATION FREQUENCY AND  
  ACCEPTANCE CRITERIA

**ADDRESSEES**

All holders of an operating license or construction permit for a nuclear power reactor issued under Title 10 of the *Code of Federal Regulations* (10 CFR) Part 50, "Domestic Licensing of Production and Utilization Facilities," except those who have permanently ceased operations and have certified that fuel has been permanently removed from the reactor vessel.

All holders of or applicants for standard design certification, standard design approval, or combined license issued under 10 CFR Part 52, "Licenses, Certifications, and Approvals for Nuclear Power Plants."

**PURPOSE**

The U.S. Nuclear Regulatory Commission (NRC) is issuing this information notice (IN) to inform addressees of recent issues identified by the NRC staff during license renewal application (LRA) review audits at different nuclear power plant sites concerning the containment concrete surface condition examination frequency and acceptance criteria. The NRC expects recipients to review the information for applicability to their facilities and consider actions, as appropriate, to avoid similar problems. The suggestions that appear in this IN are not NRC requirements; therefore, no specific action or written response is required.

**DESCRIPTION OF CIRCUMSTANCES**

During recent LRA audits, the NRC staff found that some nuclear plant licensees did not meet the requirements for containment concrete surface examinations specified in 10 CFR 50.55a, "Codes and Standards," dated August 8, 1996, and in Article IWL-2510, "Surface Examination," of Subsection IWL, "Requirements for Class CC Concrete Components of Light-Water-Cooled Power Plants," of Section XI, "Rules for Inservice Inspection of Nuclear Power Plant Components," of the American Society of Mechanical Engineers (ASME) Boiler and Pressure Vessel Code. Specifically, 10 CFR 50.55a incorporates, by reference, Subsection IWL, which requires periodic inservice inspections (ISIs) of containment concrete. Paragraph IWL-2410(a), as modified by 10 CFR 50.55a(g)(6)(ii)(B)(2) based on the final rulemaking of August 8, 1996, states, "Concrete shall be examined in accordance with IWL-2510...[at all operating nuclear power plants by September 9, 2001] and every 5 years thereafter." However, during recent LRA audits of some multiple-unit nuclear power plants, the NRC staff found that some licensees

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of pressurized-water reactor (PWR) plants have been performing the containment concrete condition surface examination every 10 years.

The NRC staff also found that the containment concrete surface degradation quantitative acceptance criteria used by the licensees for the ASME Section XI, Subsection IWL, aging management program (AMP) were significantly less stringent than the acceptance criteria specified in American Concrete Institute (ACI) 201.1, "Guide for Making a Condition Survey of Concrete in Service," and ACI 349.3R, "Evaluation of Existing Nuclear Safety-Related Concrete Structures." Article IWL-2510 recommends the use of ACI 201.1 and ACI 349.3R guidelines in developing site-specific inspection programs.

According to ACI 349.3R, concrete surfaces that are exposed and accessible for inspection and that have popouts and voids that are more than 2 inches, scaling of more than 0.75 inch in depth and 8 inches in diameter, and cracks larger than 0.04 inch in width are considered unacceptable and in need of further technical evaluation. However, during the LRA audit at some PWR plants, the NRC staff noted that the licensees' inspection criteria allow popouts of up to 4 inches, scaling of 3 inches in depth and 8 feet in diameter, and cracks of 0.4 inch in width without further technical evaluation or repair.

## **BACKGROUND**

NUREG-1801, "Generic Aging Lessons Learned (GALL) Report," Revision 1, Volume 2, "Tabulation of Results," issued September 2005, states that the evaluation of concrete containment in accordance with 10 CFR 50.55a and Subsection IWL is part of an AMP for license renewal. AMP XI.S2, "ASME Section XI, Subsection IWL," in the GALL Report states that Article IWL-2400 specifies the frequency of concrete inspection. In addition, AMP XI.S2 states that concrete acceptance criteria are qualitative and that guidance is provided in Article IWL-2510, which references ACI 201.1 for the identification of concrete degradation. Quantitative acceptance criteria based on the evaluation criteria provided in Chapter 5 of ACI 349.3R should also be used to augment the qualitative assessment of the responsible engineer.

## **DISCUSSION**

Concrete containments are required to be operable as specified in plant technical specifications to limit the leakage of fission product radioactivity from the containment to the environment and to resist design-basis loads such as seismic and internal pressure during an accident. The regulations at 10 CFR 50.55a and their modifications and limitations mandate the use of Subsection IWL to perform ISIs for reinforced and prestressed concrete containments (Class CC). The primary inspection method specified in Subsection IWL for concrete surface examination is visual examination.

The ISI plan established by licensees at some multiple-unit PWR sites specifies a concrete containment visual examination frequency of 10 years, which is two times the frequency (5 years) specified in Article IWL-2410 of Subsection IWL. This increase in ISI duration extends the period that concrete and steel reinforcement degradation can go undetected, allowing further progression until the degradation is corrected. In addition, licensees' use of concrete

surface degradation quantitative acceptance criteria that are significantly less stringent than the ACI 349.3R recommendations can result in the progression of degradation such that it may impact containment operability.

## **CONTACT**

This IN requires no specific action or written response. Please direct any questions about this matter to the technical contact listed below or to the appropriate Office of Nuclear Reactor Regulation (NRR) project manager.

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