

NRR-PMDAPEm Resource

From: Dave Lochbaum <DLochbaum@ucsusa.org>
Sent: Friday, February 12, 2016 10:14 AM
To: Lamb, John
Cc: Grinnell, Debbie; sgavutis@gmail.com; Banic, Merrilee; Mensah, Tanya; Newport, Christopher
Subject: [External_Sender] Comments for February 16, 2016, pre-PRB call with C-10 regarding Seabrook 2.206 petition
Attachments: 20160216-sb-ucs-comments-c-10-petition.pdf

Hello Mr. Lamb:

I have been working with Debbie Grinnell and C-10 on the 2.206 petition they submitted regarding concrete issues at Seabrook. Debbie invited me to participate as an expert in the pre-PRB call scheduled for February 16, 2016.

Attached are the comments I intend to review during that call. I do not plan to read the comments, but to refer to them during the call. I provide them in advance to give the NRC staff the chance to review the referenced documents and ask any clarifying questions about my points.

Thanks,

Dave Lochbaum

Director, Nuclear Safety Project

UCS

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Comments on the 2.206 Petition by C-10 by the Union of Concerned Scientists

What the Petition Seeks

C-10 2.206 Petition dated December 22, 2015:

“This petition calls for the NRC to issue an order to the Seabrook licensee requiring immediate implementation and enforcement of ACI 349.3R and ASTM C 856-11 code standards requiring core sampling, and petrographic testing for the mechanical properties of tensile strength, Poisson’s ratio, modulus of elasticity, and compressive strength—specifically for walls of the Containment Building and Spent Fuel Pool at Seabrook Station.”

- ACI 349.3R 2nd Edition, January 2002, “Evaluation of Existing Nuclear Safety-Related Concrete Structures”
- ASTM C856-14, “Standard Practice for Petrographic Examination of Hardened Concrete” has superceded ASTM C856-11

UCS Point: C-10 petitioned the NRC to require that codes and standards developed by industry consensus panels to apply to managing concrete aging at Seabrook. C-10 is not seeking an unattainable, unreasonable, or unpractical action. On the contrary, C-10 is merely seeking the adoption of the codes and standards that almost certainly would already be within the current licensing basis for Seabrook had they been issued prior to the issuances of the construction permit and original operating license for Seabrook.

NRC Finds ACI 349.3R More Than Acceptable

NUREG-1801, Rev 2, Generic Aging Lessons Learned (GALL) Report dated December 2010 (ML103490041):

- Page XI S2-2: “IWL-2510 specifies that concrete surfaces are examined for conditions indicative of degradation, such as those defined in ACI 201.1R and ACI 349.3R.”
- Page XIS2-3: “The acceptance criteria are qualitative; guidance is provided in IWL-2510, which references ACI 201.1R and ACI 349.3R for identification of concrete degradation.”
- Page XI S6-1: “The structures monitoring program consists of periodic visual inspections by personnel qualified to monitor structures and components for applicable aging effects, such as those described in the American Concrete Institute Standards (ACI) 349.3R, ACI 201.1R, and American National Standards Institute/American Society of Civil Engineers Standard (ANSI/ASCE) 11.”
- Page XI S6-2: “Parameters monitored or inspected are commensurate with industry codes, standards, and guidelines and also consider industry and plant-specific operating experience. ACI 349.3R and ANSI/ASCE 11 provide an acceptable basis for selection of parameters to be monitored or inspected for concrete and steel structural elements and for steel liners, joints, coatings, and waterproofing membranes (if applicable).”
- Page XI S6-3: “The structures monitoring program calls for inspection results to be evaluated by qualified engineering personnel based on acceptance criteria selected for each structure/aging effect to ensure that the need for corrective actions is identified before loss of intended functions.

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The criteria are derived from design bases codes and standards that include ACI 349.3R, ACI 318, ANSI/ASCE 11, or the relevant AISC specifications, as applicable, and consider industry and plant operating experience. The criteria are directed at the identification and evaluation of degradation that may affect the ability of the structure or component to perform its intended function. Applicants who are not committed to ACI 349.3R and elect to use plant-specific criteria for concrete structures should describe the criteria and provide a technical basis for deviations from those in ACI 349.3R.”

- Page XI S7-3: “Quantitative acceptance criteria to evaluate the need for corrective actions are not specified in NRC RG 1.127. However, the “Evaluation Criteria” provided in Chapter 5 of ACI 349.3R provide acceptance criteria (including quantitative criteria) for determining the adequacy of observed aging effects and specifies criteria for further evaluation.”

Draft NUREG-2191 Vol. 2, Generic Aging Lessons Learned for Subsequent License Renewal (GALL-SLR) Report (ML15348A153):

- Page XI.M20-2 lines 19-21: “If concrete piping is being managed, American Concrete Institute (ACI) 349.3R provides an acceptable basis for parameters monitored or inspected.”
- Page XI.M20-2 lines 39-40: “For concrete components, the qualifications of personnel performing inspections and evaluations are specified in ACR 349.3R.”
- Page XI.S2-2 lines 13-15: “IWL-2510 specifies that concrete surfaces are examined for conditions indicative of degradation, such as those defined in American Concrete Institute (ACI) 201.1R and ACI 349.3R.”
- Page XI.S2-3 lines 20-23: “IWL-3000 provides acceptance criteria for concrete containments. In addition, this program includes quantitative acceptance criteria for concrete surfaces based on the Evaluation Criteria provided in Chapter 5 of ACR 349.3R.”
- Page XI.S6-1 lines 10-21: “The structures monitoring program consists primarily of periodic and visual inspections by personnel qualified to monitor structures and components (SCs), including protective coatings, for applicable aging effects from degradation mechanisms, such as those described in the American Concrete Institute (ACI) Standards 349.3R, ACR 201.1R ... Identified aging effects are evaluated by qualified personnel using criteria derived from industry codes and standards contained in the plant current licensing bases, including ACI 349.3R ...”.
- Page XI.S6-2 lines 23-25: “ACR 349.3R and SEI/ASCE 11 provide an acceptable basis for selection of parameters to be monitored or inspected for concrete and steel structural elements and for steel liners, joints, coatings, and waterproofing membranes (if applicable).”
- Page XI.S6-3 lines 24-25: “Qualifications of inspection and evaluation personnel specified in ACI 349.3R are acceptable for inspection of concrete structures.”
- Page XI.S6-4 lines 19-22: “For concrete, the quantitative acceptance criteria of ACI 349.3R are acceptable. Applicants who are not committed to ACI 349.3R and elect to use plant-specific criteria for concrete structures should describe the criteria and provide a technical basis for deviations from those in ACR 349.3R.”

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UCS Point: The NRC treats ACI 349.R as the “gold standard” for aging management of concrete structures at U.S. nuclear power plants. C-10 only requests that NRC make its endorsed “gold standard” applicable to aging management of concrete structures at Seabrook.

International Community Things U.S. is Applying ACI 349.3R

IAEA NP-T-3.5, “Ageing Management of Concrete Structures in Nuclear Power Plants,” January 2016

- Page 109: “Staff tasked with performing inspections need to be trained and qualified as appropriate for tasks they are to perform [326]. Examples of requirements for inspection personnel are in ACI 349.3R and ASME Section XI Subsection IWL.”
- Page 117: “Visual inspection is generally the first step in an inspection programme. It is performed in accordance with applicable codes, standards, specifications and procedures (e.g. ASME Section XI Subsection IWL, ACI 349.3 [241], CSA N287.7 [249]).”
- Page 202: “Crack width criteria contained in ACI349.3R are being utilized by the US nuclear power industry.”

UCS Point: Rather than merely developing a “gold standard” for aging management of concrete structures at U.S. nuclear power plants, the international community thinks that the “gold standard” is actually being used.

Why Hasn't ACI 349 Already Been Applied?

NUREG/CR-7153, Vol. 4, “Expanded Materials Degradation Assessment (EMDA),” October 2014 (ML14279A430):

Page 7: “Current requirements for nuclear safety-related concrete structures, other than concrete reactor vessels and concrete containments, are also based on ACI 318 but have incorporated modifications to accommodate the unique performance requirements of NPPs. These requirements were developed by ACI Committee 349 and were first published in October 1976 [5]. This code has been endorsed by the NRC as providing an adequate basis for complying with the general design criteria for structures other than reactor vessels and containments [6]. Reference [7] provides additional information on the design of seismic Category I structures that are required to remain functional if the Safe Shutdown Earthquake (SSE) occurs (Appendix S to 10 CFR Part 50, Earthquake Engineering Criteria for Nuclear Power Plants). Current requirements for concrete reactor vessels and concrete containments were developed by ACI Committee 359 and were first published in 1977 [8]. Supplemental load combination criteria are presented in Sect. 3.8.1 of the NRC *Regulatory Standard Review Plan* [9]. However, since all but one of the construction permits for existing NPPs have been issued prior to 1978, it is unlikely that endorsed versions of either ACI 349 or ACI 359 were used in the design of many of the concrete structures at these plants.” [underlining by UCS]

UCS Point: The codes and standards sought by C-10 have not yet been applied at Seabrook because they did not exist when Seabrook was originally licensed.

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“Assuring Concrete Performance: Chemical Degradation Processes & Service Life Modeling,” Presentation during NRC’s Office of Research Seminar series on June 21, 2011, by Kenneth Snyder, National Institute of Standards and Technology (NIST) (slides not publicly available until requested by UCS via FOIA-2015-0308 and now publicly available in ADAMS at ML160221A288)

- Slide 6 lists Standards Development Organizations Relevant to Concrete in Nuclear Applications—only two are provided: ASTM and ACI
- Slide 32 lists two standards for petrographic examination of concrete in nuclear applications—ASTM C295 and ASTM C856. (UCS Note: ASTM C295 covers aggregates while ASTM C856 covers hardened concrete. ASTM C856 is the one applicable to Seabrook’s current situation.)

UCS Point: C856 is clearly the appropriate standard to apply to petrographic examination of hardened concrete at Seabrook.

Should NRC Require ACI 349.3R and ASTM C856?

§ 50.100 Revocation, suspension, modification of licenses, permits, and approvals for cause.

“A license, permit, or standard design approval under parts 50 or 52 of this chapter may be revoked, suspended, or modified, in whole or in part, for any material false statement in the application or in the supplemental or other statement of fact required of the applicant; or because of conditions revealed by the application or statement of fact of any report, record, inspection, or other means which would warrant the Commission to refuse to grant a license, permit, or approval on an original application (other than those relating to §§ 50.51, 50.42(a), and 50.43(b)); or for failure to manufacture a reactor, or construct or operate a facility in accordance with the terms of the permit or license, provided, however, that failure to make timely completion of the proposed construction or alteration of a facility under a construction permit under part 50 of this chapter or a combined license under part 52 of this chapter shall be governed by the provisions of § 50.55(b); or for violation of, or failure to observe, any of the terms and provisions of the act, regulations, license, permit, approval, or order of the Commission.” [underlining by UCS]

UCS Point: It is clear from NUREG-1801 and NUREG-2191 that NRC considers ACI 349.3R to be the “gold standard” for aging management of concrete structures and uses its criteria when evaluating whether applicants for license renewal have adequate programs. Absent a showing that programs conform to ACI 349.3R or are as good as it, it seems equally clear that NRC would not likely renew the operating license. Hence, this provides sufficient basis to invoke the provisions in 10 CFR 50.100 to grant C-10’s petition and require the Seabrook licensee to conform to the codes and standards.

Comments prepared by:

David Lochbaum
Director, Nuclear Safety Project