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March 25, 2015

Ms. Annette Vietti-Cook
Secretary
U.S. Nuclear Regulatory Commission
Washington, DC 20555-0001
ATTN: Rulemakings and Adjudications Staff

Subject: Comments on Petition for Rulemaking: Improved Identification Techniques Against Alkali-Silica Reaction (ASR) Concrete Degradation at Nuclear Power Plants (Docket No. PRM-50-109; NRC-2014-0257)

Project Number: 689

On behalf of the nuclear energy industry, the Nuclear Energy Institute (NEI)¹ appreciates the opportunity to provide comments on the Petition for Rulemaking: "Improved Identification Techniques Against Alkali-Silica Reaction Concrete Degradation at Nuclear Power Plants" and respectfully requests that you review industry comments as noted in the attachment. The industry does not believe that rulemaking is necessary to resolve the issues related to inspecting concrete for ASR degradation. The following specific comments outline the basis for this position:

1. The mechanisms that contribute to ASR susceptibility have been identified and the industry is already taking appropriate actions. The issue is recorded in the Institute of Nuclear Power Operations (INPO) Operating Experience (OE) system. As a result, licensees have evaluated their stations for susceptibility to ASR, and if identified, applied the applicable codes and standards, as well as other engineering solutions, as remedies. The NRC issued Information Notice 2011-020, which provides very detailed information on the ASR mechanism. In response, licensees have taken appropriate actions to update their Structures Monitoring program, improve procedures, and informed responsible individuals concerning examination for conditions that could potentially indicate the presence of ASR. As a specific example, a licensee's corporate structures monitoring procedure, which is applicable to all of its nuclear facilities, was updated in response to Seabrook OE on ASR.

¹ The Nuclear Energy Institute (NEI) is the organization responsible for establishing unified industry policy on matters affecting the nuclear energy industry, including the regulatory aspects of generic operational and technical issues. NEI's members include all entities licensed to operate commercial nuclear power plants in the United States, nuclear plant designers, major architect/engineering firms, fuel cycle facilities, nuclear materials licensees, and other organizations and entities involved in the nuclear energy industry.

The licensee added NRC IN 2011-20 and ACI 221.1R as references, and added the following language to the Examination Criteria for Concrete Elements: "Evidence of Alkali Silica Reaction (ASR) – ASR can be identified as a likely cause of degradation by the unique 'craze,' 'map' or 'patterned' cracking and the presence of an alkali-silica gel. However, ASR induced degradation can only be confirmed by optical microscopy as part of petrographic examination of core samples. See Ref 6.24 and 6.25. If ASR is suspected, additional testing shall be performed," where Reference 6.24 and 6.25 are the NRC IN 2011-20 and ACI 221.1R respectively. In addition, the following definition was incorporated into the procedure: "ALKALI-SILICA REACTION (ASR) ASR is one type of alkali-aggregate reaction that can degrade concrete structures. ASR is a slow chemical process in which alkalis, usually predominantly from the cement, react with certain reactive types of silica (e.g., chert, quartzite, opal, and strained quartz crystals) in the aggregate when moisture is present. This reaction produces an alkali-silica gel that can absorb water and expand to cause micro-cracking of the concrete. Excessive expansion of the gel can lead to significant cracking, which can change the mechanical properties of the concrete. In order for ASR to occur, three conditions must be present: a sufficient amount of reactive silica in the aggregate, adequate alkali content in the cement paste, and sufficient moisture." Licensees and the industry are aware of the issue and are taking adequate measures. Therefore, a rulemaking to require all licensees comply with ACI 349.3R and ASTM C856-11 in order to identify potential ASR degradation and perform core boring and petrographic examination necessary to confirm ASR, is unnecessary.

2. There are ample existing regulatory requirements to ensure that appropriate attention is given to potentially degraded concrete. Licensees are already obligated by 10 CFR 50, Appendix B, to identify and correct conditions adverse to quality. As noted in Information Notice 2011-020, "In 10 CFR 50.65, 'Requirements for Monitoring the Effectiveness of Maintenance at Nuclear Power Plants' (the maintenance rule), the NRC requires that licensees monitor the performance or condition of structures, systems, and components (SCCs) against licensee-established goals in a manner sufficient to provide reasonable assurance that such SSCs are capable of fulfilling their intended function. The regulations in 10 CFR 50.65 require that these goals be established commensurate with safety and, where practical, take into account industry-wide operating experience." Aging management programs required as part of license renewal under 10 CFR 54 (License Renewal) also are established to detect concrete degradation mechanisms such as ASR. Rulemaking to address one specific concrete degradation mechanism is an unnecessary regulatory activity.

Both the NRC and the industry continue to grapple with the need to reduce the cumulative impacts of NRC regulatory actions and process changes, duplicative or inconsistent requirements and guidance, and certain industry-driven activities and practices. Industry efforts in this area are driven by the need to ensure that attention and resources remain focused on safe, reliable facility operation and that any changes to NRC requirements and guidance result in improved safety and efficiency. Against this background, we ask the NRC to consider that there is not a compelling need for rulemaking in this instance.

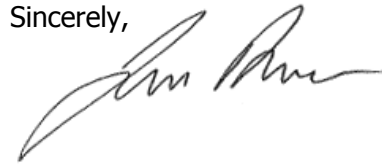
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Note that most of the attached comments provide additional technical clarification or corrections to the petition for rulemaking proposed by C-10 and provide background details for the industry position. If you have any questions or require additional information, please contact me.

Sincerely,

A handwritten signature in black ink, appearing to read "Jason Remer", written in a cursive style.

Jason Remer

Attachment

c: NRC Document Control Desk

**Comments on Petition for Rulemaking
 "Improved Identification Techniques Against Alkali-Silica Reaction Concrete Degradation at Nuclear Power Plants"
 Docket No. PRM-50-109; NRC-2014-0257**

ID	Section, Page, and Line #	Comment	Proposed Resolution
1	Section III.1., Page 1; Section IV, Page 3, second paragraph; and Section V, Page 4, first para.	<p><i>Petition for Rulemaking states: "Require that all licensees comply with ACI 349.3R"</i></p> <p><i>The petitioner indicates that ACI 349.3R is a code or standard that is endorsed by the NRC based on ADAMS ML 112241029.</i></p> <p>ACI 349.3R is not a code or standard as the Petitioner implies. The document is a report written by a technical committee within the American Concrete Institute (ACI). Although reports by ACI are reviewed and approved by the committee consensus process, they have not been vetted through a standardization process which involves public comments and additional internal reviews within ACI. Such was not done for ACI 349.3R. ACI 349.3R is a guidance document, written in non-mandatory language. It is not appropriate for a regulatory agency to invoke guidance document recommendations as regulatory requirements, since not all recommendations in this guidance document will apply in all applications. Licensees should be allowed to decide which recommendations from this document will be most effective for their respective concrete inspection programs. Other assessment standards and documents may be more appropriate for conditions at a particular plant site such as ASCE Standard SEI/ASCE 11-99, Guideline for Structural Condition Assessment of Existing Buildings, ACI 201.1R, ACI 207.3R, ACI 209R, and ACI 224.1R.</p> <p><i>The Petitioner states that the NRC has endorsed ACI 349.3R based on ML112241029. A review of ML112241029 indicates that the NRC has not explicitly endorsed ACI 349.3R. The NRC merely refers to ACI 349.3R as a document that provides additional discussion on the topic of ASR.</i></p> <p>ACI 349.3R references ASTM C 856, but does not require core boring or petrographic examination. Visual inspection is the primary method for concrete inspection under ACI 349.3R, supplemented by non-destructive examination, and invasive examination and testing if deemed necessary by engineering. These methods are consistent with current structures monitoring practice at nuclear stations, as well as non-nuclear concrete applications. Additional, non-destructive examinations, and invasive measures (such as core boring and physical testing of cores or petrographic analysis) have been initiated when called for by engineering.</p> <p>NUREG 1801 already identifies ACI 349.3R as an acceptable guidance document for aging management of structures, and specifically cites certain portions such as Chapter 5 for evaluation criteria, but notes that use of plant specific criteria may also be justified.</p> <p>Therefore, it is inappropriate for the NRC to require licensees to follow all aspects of the ACI 349.3R non-mandatory committee report.</p>	<p>A new regulation requiring that all licensees comply with the ACI 349 Committee report of recommendations for "Evaluation of Existing Nuclear Safety-Related Concrete Structures" ACI 349.3R is not necessary.</p>

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2	Section III.2., Page 1	<p>Petition for Rulemaking states: <i>"Require that all licensees comply with ASTM C 856-11"</i></p> <p>ASTM C856 "Standard Practice for Petrographic Examination of Hardened Concrete", is a testing standard that provides the techniques and procedures to be followed when performing a petrographic examination of hardened concrete. It does not specify when, where, or at what frequency, core boring or subsequent petrographic examination should be performed. A qualified engineer must make those determinations based on an evaluation of the condition, configuration, material, environment, and history of the structure in question. This evaluation must also consider industry operating experience, such as the issues at Seabrook. Rulemaking does not need to extend to the level of specifying compliance with a particular ASTM standard for petrographic examination. If core boring and petrographic examinations are judged appropriate based upon the observed conditions, it naturally follows that ASTM C856 is considered as a standard for performing the petrographic examinations. The decision to core bore a concrete member and perform additional examinations should be evaluated on a case-by-case basis, and should only be performed when and where a qualified engineer has determined that it is appropriate.</p>	<p>A new regulation requiring that all licensees comply with ASTM C 856-11 is not appropriate.</p>

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3	Section IV., Page 2	<p><i>Petition for Rulemaking discusses issues at Seabrook.</i></p> <p>Concrete issues or concerns at Seabrook were first visually identified; and then further investigations including invasive measures and petrographic examinations were initiated by Seabrook station engineering resulting in identification and confirmation of ASR. Additionally, no requirement exists to perform the core drilling or petrographic examinations completed by Seabrook to identify and confirm ASR. Therefore, a requirement that all licensees comply with ACI 349.3R and ASTM C-856-11 is unnecessary.</p> <p>The Seabrook revised Root Cause Evaluation determined that the presence of ASR was not identified until 2010 based on the existing knowledge that ASR was not credible due to the concrete mix design (ML 13151A328 Enclosure 1). However, since ASR has been identified at Seabrook, the nuclear industry is now well aware of the potential for ASR issues, both as a result of the standard nuclear industry practice of reviewing external operating experience, as well as, through the issuance of numerous documents and correspondence including NRC Information Notice 2011-20.</p> <p>NRC Information Notice 2011-20, "Concrete Degradation by Alkali-Silica Reaction" (ML112241029), instructs all plants to "review the information for applicability to their facilities and consider actions, as appropriate." Various utilities have informed their Structures Monitoring program, procedures, and responsible individuals concerning examination for conditions that could potentially indicate the presence of ASR in response to NRC Information Notice 2011-20. Therefore, rulemaking to require all licensees comply with the ACI committee report ACI 349.3R and ASTM C856-11 in order to identify potential ASR degradation and perform core boring and petrographic examination necessary to confirm ASR, is unnecessary.</p>	No changes to existing regulations are required.
4	Section IV., Page 3, 5th Paragraph	<p>Petition for Rulemaking states: ". . . <i>Workers identified significant cracking in the concrete wall of the shield building at the Davis-Besse nuclear plant . . .</i> "</p> <p>Cracking at Davis-Besse was a unique situation that resulted from a combination of design details, and sequencing of extreme weather events. It is addressed by the plant and the NRC through existing processes and has no bearing on the ASR issue.</p>	No changes to existing regulations are required.

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5	Section IV., Page 3, 6th Paragraph	<p>Petition for Rulemaking states: <i>"Visual inspections can only examine exterior surfaces. Many portions of concrete buildings simply cannot be visually inspected. The below grade portions, those regions most likely to be exposed to groundwater and thus most likely vulnerable to ASR, cannot be examined."</i></p> <p>Visual examinations also include interior building concrete surfaces which include interior surfaces of exterior below grade walls and floors exposed to groundwater and soil on the exterior face. Exterior portions of below grade concrete are evaluated based on examination results of opposing interior surfaces including nondestructive examination when appropriate, supplemented by opportunistic exterior inspections, evaluation of groundwater conditions, and may also include other plant specific program provisions. NUREG 1801 also addresses evaluation of inaccessible portions of concrete structures. Visual examinations of accessible concrete surfaces, because there are so many different concrete surfaces at the nuclear power plants, has been sufficient to identify degradation mechanisms that could also affect inaccessible areas.</p> <p>The use of visual examinations, monitoring and trending or mapping of active cracking, and/or use of other nondestructive examination methodologies should continue to be the primary method(s) for early detection of all degradation mechanisms in reinforced concrete members, including ASR. It is not reasonable to mandate core boring of reinforced concrete members given the low probability that ASR may be present, without undergoing a monitoring period of visual examination and use of nondestructive examination, as appropriate, first. While surface cracking may not readily correlate to ASR severity, other nondestructive examinations are available which can be applied provide information leading to early detection of degradation mechanisms before they become significant. Research continues to develop other nondestructive examination methods, monitoring equipment, and screening criteria to effectively identify those areas that might be most vulnerable to ASR. A period of visual and nondestructive examinations, if appropriate, can provide useful information about the potential for ASR at multiple locations of a member, as opposed to only discrete local information from a core bore. The use of core bores and physical testing of cores or petrographic examination should be used to confirm the existence or nonexistence of ASR, only after identification by a proven screening process, visual examination and other nondestructive examinations have indicated a high potential for ASR.</p>	No changes to existing regulations are required.

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<p>6</p>	<p>Section III, Page 1, and Section IV, Page 3, 4th Paragraph</p>	<p>On page 1, petition for Rulemaking states: "<i>C-10 petitions the requests to the NRC to revise applicable regulations to.</i>"</p> <p>On page 3, petition for Rulemaking states: "<i>If the NRC had required instead of merely encouraged compliance with existing codes and standards, C- 10 believes Seabrook's ASR concrete degradation would have been identified before it caused moderate to severe degradation in all Seabrook seismic category 1 structures.</i>"</p> <p>The current regulatory framework under 10CFR50.65 and Regulatory Guide 1.160 is sufficient to confirm that structures are capable of performing intended functions. As described in RG 1.160, section 1.2, 3rd paragraph, structures monitored under 10CFR50.65(a)(1) would continue to be monitored until the degradation and its cause have been corrected.</p> <p>The petition does not provide any additional regulatory requirements to the 10CFR50.65 requirements under (a)(1)-</p> <p><i>"...shall monitor the performance or condition of structures, systems, or components, against licensee-established goals, in a manner sufficient to provide reasonable assurance that these structures, systems, and components, as defined in paragraph (b) of this section, are capable of fulfilling their intended functions. These goals shall be established commensurate with safety and, where practical, take into account industrywide operating experience."</i></p> <p>The current rules are adequate to address ASR through inspections that verify that structures are capable of performing intended functions, considering industry operating experience.</p>	<p>No changes to existing regulations are required.</p>
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