

Industry Feedback on the Proposed Changes to Structural Portions of Subsequent License Renewal Guidance (SLR GALL)

We appreciate the opportunity to understand the current thinking of the NRC Structural SLR Expert Panel and proposed changes to the structural AMPs for SLR GALL.

Generic Comments:

1. We agree with the proposal to address technical issues such as irradiation of concrete and aggregate reactivity as further evaluations with use of a plant specific AMP where required. This approach provides flexibility for a plant-specific evaluation and incorporation of applicable research/operating experience by the licensee.
2. In general, we believe that current aging management activities in place for the first PEO are sufficient for Structural AMPs. We do not believe that any new aging management activities are required to be implemented prior to SLR. We have not seen any significant changes in the rate of degradation due to aging effects and mechanisms and believe that existing aging management programs are sufficient for the second license renewal. Any additional proposed activities should be based on both a solid technical basis, as well as sufficient operating experience support.
3. Information in the April 8 presentation slides generally used the word “Clarify”, when in fact a number of the items addressed appear to be “new” or “changes”. Clear identification of new and changed items was sometimes difficult to determine given the level of information presented.
4. The proposed AMP changes include certain prescribed actions or corrective actions. Our concern is that such prescribed actions may “lock” the plant into inappropriate, impractical, or unnecessary actions.

Examples:

- AMP XI.S1, Element 3 – For liner bulges, supplemental volumetric and visual examinations as well as additional analysis is required. The verbal presentation stated a requirement for examination, including volumetric, and an analysis was required to be performed to determine acceptable bulge sizes.
- AMP XI.S5, Element 4 – Masonry Wall inspection frequency change - for unreinforced 3 year inspection frequency vs standard 5 years for structures monitoring.
- AMPs XI.S6, Element 3 and 4; and XI.S7, Element 4 – Quantitative groundwater sampling (quantifying the water infiltration and performing chemistry analysis and evaluation for groundwater intrusion, and requirement to address seasonal variations).
- AMPs XI.S6, Element 4 – If groundwater is aggressive, then periodic excavation and examination of exterior concrete is not to exceed 5 years.
- AMP XI.S6, Element 5 – New baseline required for structures monitoring.

5. Certain proposed changes are over and above what is endorsed and required by code and industry standards, without an apparent basis. Changes to the ASME Code should be justified and incorporated using established processes. GALL Rev 2 Chapter 1 describes a process to ensure that the GALL report conclusions will remain valid when future editions of the ASME Code are incorporated into the NRC regulations by the 10 CFR 50.55a rulemaking. In addition, changes to regulatory requirements such as Regulatory Guides, should also be justified and incorporated using established processes. If considered appropriate to recommend or require activities beyond the Code and Regulatory Guides, and Regulations, then a technical basis and sufficient supporting Operating Experience should be available.

Examples:

- AMP X.S1, Elements 5 and 6 – Requiring creation of and comparison to a PLL line for tendons over and above endorsed IWL and RG 1.35.1 requirements and guidance.
 - AMP XI.S1, Element 3 – Liner Bulges – It was not in the slides, but the verbal presentation addressed liner bulge examination including volumetric and analysis to determine acceptable bulge sizes.
 - AMP XI.S1, Element 4 – New supplemental volumetric examination of metal shell or liners inaccessible from one side and susceptible to corrosion.
 - AMP XI.S3, Element 3 – Requiring examination of 100% of all bolts for all IWF supports.
 - AMP XI.S3, Element 4 – Requiring an increased examination sample of IWF supports of an additional 5% over what the ASME Section XI, Subsection IWF code and 10 CFR 50.55a regulation requires.
6. We recommend the SLR GALL address previous comments made on Structural Bolting (See previous SLR technical industry input forms) regarding need for consistent wording across structural AMPs. It should be made clear that, for example, standard structural high strength bolts such as ASTM A325 and F1852 and also ASTM A490 bolts are excluded from volumetric examinations or SCC considerations as previously justified based on previously referenced AISC and other technical reports and as addressed in NUREG 1950 and other portions of NUREG 1800 and 1801 Rev. 2. During the meeting, a comment was made that bolting requirements were going to be made consistent between programs. We believe that current aging management programs for structural elements have been sufficient to manage the aging effects for bolting and that recent interpretations of the GALL rev 2 changes (i.e. relative to ASTM A490 bolts and SCC for IWF applications) are unnecessarily burdensome. We are unaware of any OE suggesting that such additional aging effects are applicable for structures and component supports.

Specific Structural AMP Comments and Concerns:

- X.S1, Elements 5 and 6; and TLAA 4.5 and 4.7 Sections – Comparison of individual tendon lift off forces to individual tendon PLL values and MRV is required by the IWL code. The recommendation for creation of a PLL line and comparison of the group trend lines to a PLL line is not required by code and the value of such a comparison is not

readily apparent. Once we are in SLR, the calculated rate of prestress loss is very small and may be less than the ability to effectively measure the loss of prestress. Given that the construction of the lines is based on a bilinear function that is meant to approximate a phenomenon that can be considered to follow a diffusion equation, i.e., a curve that asymptotically approaches zero change, and the vast majority of prestress losses occur in the first 5 years, the crossing of PLL and regression analysis trending lines between 60-80 years is much less important than projecting the regression analysis trend line versus the MRV line, as is required by the Code. We agree that a comparison to the PLL is very important early in plant life, but consider that such PLL comparison is not as important once we are in years 60-80 where the loss of prestress is approaching zero. In addition, addressing tendon prestress and or PLL aspects in both TLAA sections 4.5 and 4.7 would seem to be inefficient.

- XI.S1, Element 3 – Liner Bulges – We believe that a distinction should be made between blistering of coatings due to corrosion and bulges due to differential thermal expansion between the concrete and the liner. The verbal presentation addressed bulge inspection including volumetric and an analysis to determine acceptable bulge sizes. Detection and measurement of small bulges on a curved surface may be impractical or difficult. The liner bulges due to differential thermal expansion or initial shrinkage were often addressed during original plant licensing correspondence for initial plant operation. These bulges are a result of original design choices and not a result of aging. We are unaware of any OE showing that these liner bulges are the result of aging or result in an unacceptable condition. In addition, the recurring Appendix J type A tests verify the containment integrity. If liner bulges are believed to be a concern, resolution of the concern should consider a one-time activity to document again that it does not affect an intended function and is not an aging concern for SLR. However, we agree that coating blisters should be examined to determine if there are liner material losses.
- XI.S1, Element 4 – Supplemental examinations of bellows for cracking is not always possible or feasible. Appendix J testing between the plies of 2 ply bellows is often part of the original configuration. LLRTs of bellow assemblies, not just between the plies, is often not possible because the configuration is not suitable. We agree that supplemental surface examinations or additional type B Appendix J testing should not be required if there are CLB fatigue analyses. We agree that surface examinations of stainless steel penetration sleeves, closure heads, and dissimilar metal welds should not be required where a CLB fatigue analysis exists and where visual examinations are supplemented by Appendix J Type A testing.
- XI.S1, Element 4 – Supplemental volumetric in areas of metal shell or liner that are inaccessible from one side and susceptible to corrosion. Comment: This is not required by code or regulation. The potential concern with corrosion on the inaccessible side of liners, against concrete, was addressed during original plant licensing and determined not to be an issue. There is no OE across our nuclear fleet for corrosion on the backside of the liners except where latent construction defects left organic material. Many sites have taken UT measurements and verified that corrosion on the backside of the liners has not been an applicable aging mechanism. Given the age of the plants that will be in SLR, it can be concluded that the potential latent construction defects (i.e. organic material left against a liner) are no longer a concern because the defects would have resulted in observable degradation by the time of SLR. The current ISI plans already

require an evaluation to determine if there are susceptible areas to accelerated corrosion.

- XI.S1, Element 10 – The addition to consider through-wall corrosion from possible foreign objects embedded in concrete is not necessary. See comment above for XI.S1 Element 3 relative to OE on organic material left against a liner during construction.
- XI.S2, Element 5; XI.S6 and other Structural AMPs – Recommendations such as photography to record and track aging effects, and quantitative measurements for all parameters, differ from the IWL code and Structures Monitoring requirements. If implemented prescriptively, for 100% of all surfaces such measurement and photographic recording may be overly burdensome, and unnecessarily complicate record keeping. Currently, measurements are made and recorded based on a recording criteria or threshold, and photographs are taken of conditions of more potential significance as determined by the responsible engineer. This comment also applies to XI.S6 and other structural AMPs.
- XI.S2, Element 10 – Regarding delamination of concrete, it was stated at the meeting that this might be resolved through the repair program. This plant specific OE was due to an event and is not related to long-term aging. A primary contributing factor was a lack of conventional reinforcement during original design of the subject plant. This lack of conventional reinforcement is not common or applicable to other plants. It is not clear how long term aging management would address this concern.
- XI.S3, Element 3 – Requiring 100% visual inspection of all IWF bolts appears to be an unnecessary burden. This is potentially a very large program change if we have to document these examinations for each individual support. The current IWF program is based upon a sampling approach and it has been sufficient to prevent significant degradation of supports and a loss of intended function. If considered necessary, this new requirements should be limited to large equipment component supports, such as to Class 1 component supports for PWRs where there are no load paths that would carry loads in case of a support failure. If considered necessary, we recommend clarifying that a general visual examination is needed for 100% of the bolts, and not a VT-1 or VT-3 qualified and documented examination.
- XI.S3, Element 4 – Sample size increase of 5% for IWF supports over and above endorsed regulatory and ASME Section XI Code requirements appears to be a significant and unnecessary increase in examination scope. We believe the existing aging management program based on the ASME Code is adequate for both license renewal and second license renewal.
- XI.S4, Element 1 – Recommend deleting the requirement in AMP XI.S4 element 1 to identify other SLR AMPs for components that are not managed for aging by AMP XI.S4. GALL identifies one acceptable way to manage aging. GALL identifies AMPs other than Appendix J to manage the aging of pressure boundaries. NUREG-1801 Chapter V.C identifies aging management programs for mechanical containment isolation components. The introduction to NUREG-1801 Chapter V.C notes that containment isolation valves for in-scope systems are addressed in the appropriate Section in IV, VII and VIII. The redundant listing of the mechanical containment isolation component

AMPs by the Appendix J AMP would be redundant and unnecessary. Use of the process to identify redundant program testing/examination coverages was not intended by NEI 95-10 or 10 CFR 54.

- XI.S5, Element 4 –The additional requirement to inspect unreinforced and unbraced masonry walls every 3 years rather than the standard structures monitoring frequency of 5 years appears to be an unnecessary change. Any additional requirements for unbraced and unreinforced walls, if considered necessary, should be limited to locations inside of seismic class 1 designed structures. We agree that these types of walls are less ductile, but if the walls are in structures that are not seismically designed, there is no overall impact.
- XI.S6, Elements 3 and 4 – The addition of monitoring through-wall leakage of groundwater for volume and chemistry is not feasible in cases of slight seepage, or for cases of leakage from multiple sources either closely or widely spaced, or in cases of intermittent leakage. The recommendation for seasonal quarterly or semi-annual evaluations, corrective actions, and non-destructive examinations for ground water infiltration is too prescriptive on a generic basis and would not be necessary or effective, except in very extreme cases of chemical attack, which have not been seen except around leaks at chemical tanks that are addressed as part of CAP. See also generic comment 3 above on prescribed corrective actions. We are not aware of any OE where the groundwater in-leakage has resulted in age related degradation that has resulted in a loss of intended function. The related requirement for evaluation of leaching for significance and whether it has resulted in an increase in porosity and permeability sufficient to cause a structurally significant loss of strength already exists in GALL. In addition there is a similar requirement for evaluation of the effect of aggressive groundwater. It is not clear what aging management benefit or acceptance criteria could be associated with a measure of leakage quantity or seasonal variations in quantity or water chemistry.
- XI.S6, Element 3 – the statements regarding paint/coating mention monitoring for signs of substrate distress but the parenthetical phrase appears also to address coating condition. Recommend clarifying that coating associated with structures are not managed for aging unless inside the containment.
- XI.S6, Element 4 – The addition of a recommendation for focused inspection of inaccessible concrete exposed to aggressive groundwater (or as stated at the meeting – excavation and examination of such concrete) not to exceed every 5 years is another example of a prescriptive action that may be unnecessarily burdensome and appears to remove engineering flexibility from the licensee. Other alternatives, such as core boring, examination of other submerged concrete surfaces exposed to similar or more aggressive ground water, or analysis should also be considered. OE does not reflect the need for the new requirement to make inaccessible concrete accessible for inspection when exposed to aggressive groundwater. At the meeting, a parallel was made to the buried pipe programs for justification. We feel that due to the different performance requirements for buried pipes, which are not supposed to leak, and the OE where buried pipes have leaked, the buried pipe program is not an applicable model for buried structural concrete.

- XI.S6, Element 5 – Plants have performed a Structures Monitoring baseline as required by the Maintenance Rule and associated documents. Recommending or requiring a new baseline prior to the period of SLR is unnecessary.
- XI.S7, Element 1– The new requirement to include protective coatings should clarify that the monitoring is for the steel not for the coating condition itself.
- XI.S7, Element 4 – The requirement for frequency of raw water and ground water chemistry evaluation to identify seasonal variation is unnecessarily prescriptive. See also previous comments groundwater monitoring addressed for XI.S6 Elements 3 and 4 discussed above.
- New Plant Specific AMP Aggregate Reactivity – Threshold for requiring a Plant Specific AMP should be clearly identified as when it is confirmed that AAR or ASR is both present and structurally significant. Aging management activities such as core boring and petrographic examinations would be required, if appropriate, based on observed conditions and an evaluation of structural significance. Guidance for standards and acceptance criteria should be provided so that consistent responses across the industry can be developed. In addition, to a plant specific AMP, one-time activities should be permitted to justify that ASR is no longer a significant concern during SLR since the plants will already be 60 years old.
- New Plant Specific AMP for Irradiated Concrete – Threshold for requiring such a Plant Specific AMP should be clear and should consider latest DOE and EPRI research. We agree that this issue is best resolved through a further evaluation.

Efficiency Recommendations:

- Combine XI.S6 (Structures Monitoring) and XI.S5 Masonry Walls Aging Management Programs.
- Combine XI.S2 (IWL) and X.S1 (Concrete Containment Tendon Prestress) Aging Management Programs.
- Address XI.M23 (Overhead Handling Systems) rail wear with XI.S6 (Structures Monitoring) and abbreviate or eliminate the Overhead Handling Systems Aging Management Program.
- Combine GALL Sections III A1 through A5 and A7 through A9.
- Reduce the number of GALL line items associated with concrete and steel.