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NUCLEAR ENERGY INSTITUTE

May 26, 2016

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Washington, DC 20555-0001

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Subject: Supplemental Guidance to the Draft NUREG-2191, "Generic Aging Lessons Learned for Subsequent License Renewal (GALL-SLR) Report," Volumes I and II and Draft NUREG-2192, "Standard Review Plan for Review of Subsequent License Renewal Applications for Nuclear Power Plants" (SRP-SLR); Docket ID: NRC-2015-0251

Project Number: 689

Dear Ms. Bladey:

The U.S. Nuclear Regulatory Commission (NRC) requested public comment on the supplemental guidance to the draft NUREG-2191, "Generic Aging Lessons Learned for Subsequent License Renewal (GALL-SLR) Report," Volumes I and II and draft NUREG-2192, "Standard Review Plan for Review of Subsequent License Renewal Applications for Nuclear Power Plants" (SRP-SLR). Industry comments received on the supplemental license renewal guidance are to be addressed along with comments received on the draft versions of NUREG-2191 and NUREG-2192 and incorporated into the final versions of NUREG-2191 and NUREG-2192.

The purpose of this letter is to provide integrated industry comments on the subject supplemental license renewal guidance documents. Preliminary industry comments were presented at the April 26, 2016, meeting. Detailed industry comments are presented in the attachment.

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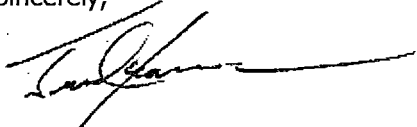
Add= B. Brady (BMB1)

S. Bloom (SDB1)

Ms. Cindy K. Bladey
May 26, 2016
Page 2

We appreciate the opportunity to comment on the supplemental license renewal guidance documents and respectfully request that you incorporate industry comments as recommended in the attachment. If you have any questions or require additional information, please contact me.

Sincerely,

A handwritten signature in black ink, appearing to read "Jerud E. Hanson", with a long horizontal flourish extending to the right.

Jerud E. Hanson

Attachment

c: Ms. Jane E. Marshall, NRR/DLR, NRC
Mr. Steven D. Bloom, NRR/DLR/RSRG, NRC

Consolidated Industry LR-SRP and GALL Supplement Comments

Supplement Section A – Selective Leaching of Ductile Iron			
#	Location of Change	Description of Change	Justification for Change
1	Supplement A.iii.c XI.M33 element 4	<p>Selective leaching of ductile iron: Consider revising the first paragraph after the inspection and examination bullets to say:</p> <p>“One-time and periodic inspections are conducted of a representative sample of each population. A population is defined as the same material and environment combination. <u>If the initial examinations confirm selective leaching and an evaluation of sample results does not indicate a loss of structural integrity in the subsequent period of extended operation, gray cast iron and ductile iron may be treated as a single sample population. The majority of the combined sample population must be grey iron samples.</u> Opportunistic inspections are conducted whenever components are opened, or buried or submerged surfaces are exposed.”</p>	As noted in the references cited, the mechanism is similar in both forms of the iron, but is expected to be more prevalent in gray cast iron.
2	AMP XI.M33 Element 10 Operating Experience Appendix D pg. D-6	<p>Recommend not citing INPO OE sources in AMP element 10. If not deleted, the following comments apply:</p> <p>In paragraph h, revise first sentence to read, “During review of INPO-compiled industry OE in August 2014, the staff noted that a licensee identified graphitic corrosion on buried ductile iron piping.”</p> <p>Delete the last sentence that reads “The leak was repaired using a Mueller clamp and a modification is currently being considered to improve long-term reliability.”</p>	<p>INPO information sources should not be made publically available consistent with INPO information sharing agreements.</p> <p>Grammatical correction. A review does not note.</p> <p>The word “currently” is probably incorrect at this date. More importantly, the sentence is unnecessary to characterize the loss of material that was observed for this item.</p>

Supplement Section B - Cracking Due to Stress Corrosion Cracking and Intergranular Stress Corrosion Cracking

#	Location of Change	Description of Change	Justification for Change
3	Supplement B.ii.b and B.ii.d 3.2-1 item 54 3.3-1 item 110 3.2.2.2.9 3.2.3.2.9 3.3.2.2.9 3.3.3.2.9 XI.M7 element 1	Delete Table 3.2-1 item 54, Table 3.3-1 item 110. Also delete associated further evaluations, AMR lines, and references to XI.M7 BWR Stress Corrosion Cracking in SLR-SRP Table 3.2-2 and Table 3.3.2. Change the threshold temperature for applicability of BWR SCC back to 93C (200F).	Only two GALL rows link to these SRP rows, and both are specific to BWR components, with recommendation to use the XI.M7 BWR Stress Corrosion Cracking program. That program is based on implementation of BWRVIP-75 program which provides inspections to meet the NRC defined criteria in GL 88-01 and its technical basis NUREG-0313, Rev 2. BWRVIP was revised and approved by NRC. The weld classifications apply to piping in a reactor coolant environment. To avoid confusion with other BWR ESF and Auxiliary Systems piping in non-reactor coolant environments, delete Table 3.2-1 item 54, Table 3.3-1 item 110. Also delete the associated further evaluations, AMR lines, and references to XI.M7 BWR Stress Corrosion Cracking in SLR-SRP Table 3.2-2 and Table 3.3.2.

Supplement Section C - Changes to Further Evaluation (FE), AMP XI.M29, AMP XI.M36, and AMR Line Items to Address Cracking and Loss of Material for Aluminum and Stainless Steel Components

#	Location of Change	Description of Change	Justification for Change
4	Supplement C.ii.b. (pg. 5 last paragraph) SRP 3.2.2.2.13 SRP 3.3.2.2.13 SRP 3.4.2.2.10	This paragraph includes a sentence that summarizes the staff's conclusion regarding loss of material for aluminum components. The staff concluded that a one-time inspection of aluminum components prior to entry in the subsequent period of extended operation coupled with a search of plant-specific OE related to loss of material of aluminum components would provide sufficient input to determine whether periodic inspections should be conducted. This should be changed to just rely on OE review to determine whether OTI is adequate to manage loss of material.	Combining OE review and OTI introduces a lot of questions regarding how to present the aging management review results in the LRA. A simpler yet effective approach is to rely only on OE to determine if the OTI is appropriate. If no adverse OE, then OTI is the AMP. If adverse OE is identified, then a periodic AMP is warranted. This is a more straightforward way to describe the evaluation. If OE points the applicant to the OTI AMP and the OTI AMP finds aging effects, then a periodic AMP is instituted in accordance with the established corrective actions of the OTI AMP.

Supplement Section C - Changes to Further Evaluation (FE), AMP XI.M29, AMP XI.M36, and AMR Line Items to Address Cracking and Loss of Material for Aluminum and Stainless Steel Components

5	Supplement C.ii.b. (pg. 6 first full paragraph)	Change "Therefore, loss of material would not need to be age managed for the internal surfaces." to "Therefore, loss of material would not be an aging effect requiring management for the internal surfaces."	If this sentence is retained, then it should be restructured to remove "age managed." This term is undefined and should not be used in technical writing.
6	Supplement C.iii.a 3.2-1 item 4 3.2-1 item 99 3.2-1 item 106 3.2-1 item 107 3.2-1 item 113 3.3-1 item 6 3.3-1 item 217 3.3-1 item 222 3.3-1 item 228 3.3-1 item 232 3.4-1 item 3 3.4-1 item 95 3.4-1 item 98 3.4-1 item 103 GALL rows V.B.EP-107 V.C.EP-107 V.D1.E-449 V.D1.EP-107 V.D2.E-449 V.D2.EP-107 V.E.E-442 V.E.E-450 V.E.E-456 VII.C1.AP-221 VII.C2.AP-221	(Loss of material and SCC for SS components): For loss of material of stainless steel in air environments, the SRP recommends either management with an ongoing program (as listed in the applicable GALL/SRP table rows) or confirmation of the absence of the aging effect by a review of site OE and a One-Time Inspection. Consider adding 'or AMP XI.M32, "One-Time Inspection"' to the applicable GALL/SRP rows.	Loss of material and SCC for stainless steel components: Industry does not concur that LOM and SCC of stainless steel within indoor air environments need to be managed to provide reasonable assurance that these components will continue to perform their intended functions through the subsequent PEO. However, specifying a one-time inspection of external surfaces to confirm the absence of these effects is an effective way to provide reasonable assurance that the affected components will continue to perform their intended functions. Since the staff has determined a review of site operating experience and a One-Time Inspection are acceptable means to confirm the absence of aging effects such that periodic aging management is not needed, specifying the option of using the M32 One-Time Inspection program in the recommended AMP column in applicable GALL/SRP rows will permit assignment of note A instead of Note E in the Table 2s. This treatment appears to be appropriate, as this assignment is consistent with the SRP Further Evaluation recommendation. Confirmation of site OE review results can be specified in the SLRA text for the Further Evaluation topics.

Supplement Section C - Changes to Further Evaluation (FE), AMP XI.M29, AMP XI.M36, and AMR Line Items to Address Cracking and Loss of Material for Aluminum and Stainless Steel Components

	VII.C3.A-757 VII.C3.AP-221 VII.D.AP-221 VII.E1.AP-221 VII.E4.AP-221 VII.E5.A-757 VII.F1.AP-221 VII.F2.AP-221 VII.F4.AP-221 VII.G.A-746 VII.G.AP-221 VII.H1.A-757 VII.H1.AP-221 VII.H2.AP-221 VII.I.A-751 VII.I.A-761 VIII.A.SP-127 VIII.B1.SP-127 VIII.B2.SP-127 VIII.C.SP-127 VIII.D1.SP-127 VIII.D2.SP-127 VIII.E.S-446 VIII.E.SP-127 VIII.F.SP-127 VIII.G.S-446 VIII.G.SP-127 VIII.H.S-443 VIII.H.S-451		
7	Supplement C.iii.a Stainless steel SRP 3.1.2.2.20	(Loss of material and SCC for SS components): Consider revising the third paragraph as follows: The internal surfaces of SS components do not need to be	The deleted text addresses actions to be taken based on the results of the One-Time Inspections, which will not be known until long after the SLRA submittal. Since

Supplement Section C - Changes to Further Evaluation (FE), AMP XI.M29, AMP XI.M36, and AMR Line Items to Address Cracking and Loss of Material for Aluminum and Stainless Steel Components

	<p>3.2.2.2.2 3.3.2.2.4 3.4.2.2.3</p> <p>Aluminum SRP 3.2.2.2.13 3.3.2.2.13 3.4.2.2.10</p>	<p>inspected if: (a) the review of plant-specific OE does not reveal a history of pitting or crevice corrosion; and (b) inspection results for external surfaces demonstrate that the aging effect is not applicable. Inspection results associated with the periodic introduction of either moisture or halides from secondary sources may be treated as a separate population of components. In the environment of air-indoor controlled, pitting and crevice corrosion is only expected to occur as the result of secondary source of moisture or halides. Inspections focus on the most susceptible locations.</p>	<p>identification of aging effects during One-Time Inspections drives corrective actions, including long-term AMP revision/development, specifying this action should not be necessary. If this additional action is deemed essential, it should be added to the XI.M32 program elements rather than detailed within this Further Evaluation topic.</p> <p>Similar changes should be made to the corresponding FE sections for aluminum, which are worded similarly.</p>
8	<p>Supplement C.iii.a Stainless steel LOM 3.1.2.2.20 3.2.2.2.2 3.3.2.2.4 3.4.2.2.3</p>	<p>See recommended editorial changes recommended in Attachment 2. Changes shown in underline or strikethrough to text in further evaluation 3.1.2.2.20. Changes similar for other further evaluations cited.</p>	<p>Editorial changes to improve clarity and consistency with License Renewal guidance.</p>
9	<p>Supplement C.iii.b GALL XI.M42 SRP Tables 3.2-1, 56 3.2-1, 105 3.2-1, 111 3.3-1, 223 3.3-1, 227 3.3-1, 234 3.4-1, 94 3.4-1, 97 3.4-1 item 113</p> <p>GALL AMR rows V.F.EP-3 V.D1.E-448 V.D2.E-448 V.E.E-454</p>	<p>(Loss of material for aluminum alloy components): Revise the applicable GALL/SRP rows to specify the applicable programs as recommended in the Feb 29, 2016 Industry comments, Attachment 2, comment #5, and include 'or AMR XI.M42, "Internal Coatings/Linings for In Scope Piping, Piping Components, Heat Exchangers, and Tanks," instead of a plant-specific program.</p> <p>Enhance/revise AMP XI.M42 to address management of external surface coatings in air environments.</p>	<p>Topic b provides an alternative to conducting inspections for loss of material by verifying coating integrity in accordance with AMP XI.M42. Unless the AMP is specified in the applicable GALL/SRP rows, its assignment would require use of note E whether or not the recommendation is present in the FE text. Therefore, without the AMP recommendation in the GALL and SRP AMR rows, this added text does not help enhance GALL consistency or review efficiency.</p> <p>Additionally, the XI.M42 AMP specifies applicability to internal surfaces only. If GALL/SRP recommends its use for external surfaces, the XI.M42 AMP text should specify applicability to external surfaces as recommended in the associated further evaluations without enhancement of the AMP.</p>

Supplement Section C - Changes to Further Evaluation (FE), AMP XI.M29, AMP XI.M36, and AMR Line Items to Address Cracking and Loss of Material for Aluminum and Stainless Steel Components

	VII.I.A-752 VII.C3.A-756 VII.E5.A-756 VII.H1.A-756 VII.J.A-763 VIII.H.S-442 VIII.E.S-445 VIII.G.S-445 VIII.I.S-461		
10	Supplement C.iii.c SRP 3.2.2.2.10 SRP 3.3.2.2.10 SRP 3.4.2.2.7	<p>SCC of aluminum alloy components Revise further evaluations 3.2.2.2.10, 3.3.2.2.10, and 3.4.2.2.7 to include evaluation of plant-specific conditions to determine if an aggressive environment exists for specific alloys and requires aging management. In addition to operating experience, specific considerations include:</p> <ul style="list-style-type: none"> • Potential for atmospheric contaminants • Proximity of aggressive water leakage sources • Proximity of non-metallic insulation not consistent with Regulatory Guide 1.36 • Components that operate at or above ambient temperature • Repairs that introduce stress or change in material characteristics. <p>Changes should be inserted in the fifth paragraph after the second sentence. See yellow highlighted markup in Attachment 1.</p>	<p>Indoor air is not normally expected to support cracking of aluminum unless complicated by the considerations listed in the revised FE text. For components that operate at or above ambient temperature, indoor air environments do not normally support cracking of susceptible alloys. Absence of cracking in (non-wetted) indoor air is consistent with EPRI 1010639 (Mechanical Tools), which specifies that in addition to a susceptible alloy, cracking of aluminum is applicable when the external surface is buried or exposed to a concentration of contaminants, or is exposed to an aggressive environment in outdoor locations.</p> <p>Previously approved GALL aging management recommendations did not define indoor air as an aggressive environment for aluminum. Changes to aging evaluations, such as the determination that a specific material-environment combination is now susceptible to an aging effect, where it was not previously expected, should be driven by OE. Confirmation that a specific material-environment is not aggressive by review of the listed considerations via OE review should provide reasonable assurance of the applicable components' continued function.</p>
11	Supplement C.iii.d AMP XI.M29 and AMP XI.M36	(Changes to AMP XI.M29 and AMP XI.M36): No comments, industry concurs with these changes.	
12	Supplement C.iii.e	(Changes to AMR line items): Restore (or add) specific program recommendations to GALL and SRP AMR rows	FE text makes it clear that the staff expects these aging effects to be managed by a GALL AMP, but there are no

Supplement Section C - Changes to Further Evaluation (FE), AMP XI.M29, AMP XI.M36, and AMR Line Items to Address Cracking and Loss of Material for Aluminum and Stainless Steel Components

<p>3.1-1 items NNN</p> <p>3.2-1 item 4</p> <p>3.2-1 item 7</p> <p>3.2-1 item 42</p> <p>3.2-1 item 48</p> <p>3.2-1 item 56</p> <p>3.2-1 item NN</p> <p>3.2-1 item 100</p> <p>3.2-1 item 101</p> <p>3.2-1 item NN</p> <p>3.2-1 item 80</p> <p>3.2-1 item 99</p> <p>3.2-1 item 100</p> <p>3.2-1 item 101</p> <p>3.2-1 item 102</p> <p>3.2-1 item 103</p> <p>3.2-1 item 105</p> <p>3.2-1 item 106</p> <p>3.2-1 item 107</p> <p>3.2-1 item 108</p> <p>3.2-1 item 109</p> <p>3.2-1 item 110</p> <p>3.2-1 item 111</p> <p>3.2-1 item 112</p> <p>3.2-1 item NN</p> <p>3.3-1 item 4</p> <p>3.3-1 item 6</p> <p>3.3-1 item 94</p> <p>3.3-1 item NNN (multiple)</p> <p>3.3-1 item 146</p> <p>3.3-1 item 186</p>	<p>for loss of material and cracking of stainless steel and aluminum alloys that recommend further evaluation.</p>	<p>GALL/SRP AMR rows to cite with Note A. The program recommendations for multiple GALL and SRP AMR rows have been changed from a specific program recommendation to "Plant-specific aging management program." Notable examples include Table 3.2-1 items 105 and 106, which recommend management of loss of material for <u>tanks within the scope of AMP XI.M29</u> by a plant-specific program. The associated FE text lists the GALL programs that are considered acceptable for management of the aging effects (the same programs that were removed from the AMR rows). Removal of the program recommendations from the AMR lines will require use of Note E in the Table 2s. This presentation results in less GALL consistency (fewer Notes "A") and additional review burden, as reviewers need to evaluate the acceptability of Note E program assignments. When the SRP FE text recommends the use of specific GALL programs, then there should be GALL/SRP AMR line items that recommend those programs specifically. Inclusion of specific program recommendations in the AMR rows does not relieve applicants of providing explanation within the FE section that describes the various applications and OE reviews, so there is no reason that specific programs cannot be specified in the AMR lines when Further Evaluation is applicable.</p> <p>If necessary for AMR row efficiency, consider listing multiple acceptable program recommendations within a single line item, rather than specifying a plant-specific program.</p> <p>Also note that the replacement of specific program recommendations with "Plant-specific program" has resulted in multiple redundant rows, which previously recommended specific (different) programs.</p>
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**Supplement Section C - Changes to Further Evaluation (FE), AMP XI.M29, AMP XI.M36, and AMR Line Items to
Address Cracking and Loss of Material for Aluminum and Stainless Steel Components**

3.3-1 item 189		
3.3-1 item 192		
3.3-1 item 205		
3.3-1 item 221		
3.3-1 item 222		
3.3-1 item 223		
3.3-1 item 225		
3.3-1 item 227		
3.3-1 item 228		
3.3-1 item 231		
3.3-1 item 232		
3.3-1 item 233		
3.3-1 item 234		
3.3-1 item NN		
3.4-1 item 2		
3.4-1 item 3		
3.4-1 item 35		
3.4-1 item NNN		
3.4-1 item 74		
3.4-1 item 93		
3.4-1 item 94		
3.4-1 item 95		
3.4-1 item 97		
3.4-1 item 98		
3.4-1 item 100		
3.4-1 item 102		
3.4-1 item 103		
3.4-1 item 104		
3.4-1 item 109		
3.4-1 item 110		
3.4-1 item 111		
3.4-1 item 112		

Supplement Section C - Changes to Further Evaluation (FE), AMP XI.M29, AMP XI.M36, and AMR Line Items to Address Cracking and Loss of Material for Aluminum and Stainless Steel Components

	3.4-1 item NN		
13	SRP 3.2.2.9 pg. A-5 SRP 3.2.3.2.9 pg. A-10 SRP 3.3.2.2.9 pg. A-13 SRP 3.3.3.2.9 pg. A-14	Replace “dead-legs and other piping locations with stagnant flow” with “stagnant piping locations, such as dead legs,”.	Stagnant flow is an oxymoron. Stagnant by definition means having no flow. Literally “stagnant flow” means “flow with no flow.”
14	SRP 3.2.2.2.10 pg. A-5 SRP 3.2.3.2.10 Pg. A-10	Change “acceptance criteria for this further evaluation is being provided for demonstrating” to “following are criteria for demonstrating”.	Acceptance criteria has a specific meaning and dedicated program element in NUREG-1801. The more general term “criteria” is more appropriate for this discussion.
15	SRP 3.2.2.2.10 (top of page A-6)	Delete the sentence “This further evaluation item is applicable unless it is demonstrated by the applicant that one of the two necessary conditions discussed below is absent.”	This discussion must be applicable because it defines the two necessary conditions that determine whether it is applicable.
16	SRP 3.2.2.2.10 pg. A-6 SRP 3.2.3.2.10 Pg. A-10	Simplify and clarify by changing “If the material that a component is constructed of is not susceptible to SCC then” to “If the component material is not susceptible to SCC, then.”	The phrase “the component material” is a simpler and well understood way of saying “the material that a component is constructed of”. Also, needed a comma before “then.”
17	SRP 3.2.2.2.10 pg. A-6	In the paragraph beginning with “Susceptible Material,” delete “providing guidance based on alloy composition will not always successfully protect against SCC in aluminum alloys. The” and replace with “the”.	Deleted section is unnecessary. Providing guidance will NEVER protect against SCC. Measures consistent with such guidance must be put in place to provide such protection.
18	SRP 3.2.2.2.10 pg. A-6	Delete “The material is evaluated to verify that it is not susceptible to SCC and that the basis used to make the determination is technically substantiated.”	It appears that the material has already been evaluated and the list of material here is the result of that evaluation. It is unclear from this discussion that some type of further evaluation is necessary. The discussion of technically substantiating the basis used to make the determination is also unclear. It appears from the list provided that the staff has made the determination that these materials are susceptible. One reading of this is that the applicant is expected to technically substantiate the basis for the staff's determination.
19	SRP 3.2.2.2.10 pg. A-6 SRP 3.2.3.2.10 Pg. A-11	Change “If the environment that an aluminum alloy is exposed to” to “If the environment to which aluminum alloy is exposed”.	Editorial correction.
20	SRP 3.2.2.2.10 pg. A-6 SRP 3.2.3.2.10	Change “will not occur and the aging effect is not applicable.” to “is not an aging effect requiring	Aging effect applicability is not a concept espoused in the license renewal rule. The phrase “aging effect requiring

Supplement Section C - Changes to Further Evaluation (FE), AMP XI.M29, AMP XI.M36, and AMR Line Items to Address Cracking and Loss of Material for Aluminum and Stainless Steel Components

	Pg. A-11	management.”	management” is more consistent with the rule.
21	SRP 3.2.2.2.10 pg. A-6	Change “atmospheric air” to “air.”	Atmospheric air is simply air. This change should be made throughout the GALL report and SRP.
22	SRP 3.2.2.2.10 pg. A-6	In paragraph on “Aggressive Environment,” consider deleting “generally.”	If “generally” is retained, the discussion should explain the conditions when the stated consideration does not apply.
23	SRP 3.2.2.2.10 pg. A-6	Change “such as outdoor air, raw water, waste water, and condensation” to “such as, raw water, waste water, condensation and outdoor air.”	This put the order of the examples in the same order as the preceding aqueous solutions and air to better facilitate understanding of the sentence.
24	SRP 3.2.2.2.10 pg. A-6 SRP 3.2.3.2.10 Pg. A-12	In many locations the SRP refers to acceptable methods to manage aging effects. For example, the last paragraph on this page begins with, “GALL-SLR Report AMP XI.M29, “Outdoor and Large Atmospheric Metallic Storage Tanks,” is an acceptable method to manage cracking of aluminum due to SCC in tanks.” Consider revising to say “GALL-SLR Report AMP XI.M29, “Outdoor and Large Atmospheric Metallic Storage Tanks,” describes an acceptable program to manage cracking due to SCC of aluminum tanks.”	It is clearer and more correct to say that a program is acceptable to manage aging effects rather than saying that a GALL section is an acceptable method. Also, it is clearer to say “cracking due to SCC of aluminum tanks” rather than “cracking of aluminum due to SCC in tanks.” This change should be made throughout in places where a material is inserted between the aging effect and its causal mechanism. Cracking due to SCC is the aging effect; not cracking of aluminum due to SCC.
25	SRP 3.2.2.2.10 pg. A-7	In last line of the page, change “to manage the aging effect of loss of material” to “to manage loss of material.”	Loss of material is defined as an aging effect. There is no need to say “the aging effect of loss of material.” The phrase “the aging effect of” should be deleted throughout the GALL-SLR report and the SRP-SLR. Doing so will make the affected sentences shorter, clearer and more easily read and understood
26	SRP 3.2.3.2.10 pg. A-11	In last sentence change “stress raiser” to “stress risers.”	Stress riser is the more common term, and it should be plural because the rest of the sentence refers to pits and defects.
27	SRP 3.2.3.2.10 pg. A-12	First paragraph uses the text “...determining if the aging effect of cracking due to SCC is applicable and requires aging management include:...”. Recommend changing to “...determining if cracking due to SCC requires management includes...”.	The phrase “the aging effect of” is unnecessary. Using “requires management” is more consistent with terminology of the license renewal rule than “is applicable and requires aging management.” The subject of the sentence is “documentation” which is singular. Therefore, “include” should be “includes” and the colon is unnecessary extraneous punctuation.

Supplement Section C - Changes to Further Evaluation (FE), AMP XI.M29, AMP XI.M36, and AMR Line Items to Address Cracking and Loss of Material for Aluminum and Stainless Steel Components			
28	SRP 3.2.3.2.10 pg. A-12	Second paragraph begins with "If it is determined that the aging effect of cracking due to SCC is applicable the reviewer is to evaluate the applicants proposed AMP to ensure that the effects of aging on components are...". This should be changed to "If it is determined that cracking due to SCC requires management, the reviewer is to evaluate the applicants proposed AMP to ensure that cracking is...".	Added comma after applicable to correct grammar. The discussion should be specific to cracking due to SCC rather than evaluating the AMP to ensure that aging effects in general are managed.
29	SRP 3.2.3.2.13 pg. A-12	The discussion of evaluation of plant-specific OE refers to "includes the most recent ten years of operation." Recommend changing to "includes OE from a recent 10-year period of operation."	This won't necessarily be the most recent ten years of operation due to the time necessary to review and publish the LRA after completion of the OE review.
30	SRP 3.3.2.2.9 pg. A-13	The phrase "piping, piping components" should be changed to "piping and piping components."	Grammatical correction. The wording is correct in Section 3.2.2.2.9.
31	Table 3.1-1 pg. B-2 3 rd and 4 th lines	References to "air-dry internal" should be just "air-dry." Other references to internal or external environments should also be removed.	The environment is evaluated whether it is an internal or external environment. The material does not care whether it's internal or external as long as the environment is the same.
32	3.2.1-69 and 3.2.1-NN Page B-5	Revise the GALL-SLR item column for SLR-SRP item 3.2.1-NNN on Appendix B page B-5 to specify V.E.E-NNN.	On Appendix B page B-5, GALL-SLR item column for SLR-SRP item 3.2.1-NNN and SLR-SRP item 3.2.1-69 both reference the same GALL-SLR line of V.E.E-403. The new SLR-SRP line item is different than 3.2.1-69 and requires a further evaluation. SLR-SRP item 3.2.1-NNN should reference a new GALL-SRP line number of V.E.E-NNN.
33	3.3-1 item 225 Pg. B-22	Revise the GALL-SLR item column in SLR-SRP Table 3.3-1 item 225 to delete VII.I.A-762 and replace with VII.I.A-754.	GALL-SLR AMR line VII.I.A-762 is applicable to insulated aluminum piping/tanks and is aligned with SLR-SRP Table 3.3-1 item 233. GALL-SLR AMR line VII.I.A-754 is applicable to aluminum tanks in an outdoor air environment and is aligned to SLR-SRP item 225.
34	3.4-1 item NNN Pg. B-35 aluminum piping line	Delete "No" in the Further Evaluation Recommended column for Table 3.4-1 new item for aluminum piping, piping components, tanks exposed to raw water, waste water on page B-35 of the GALL-SLR Supplement.	Further Evaluation Recommended column should specify "Yes" for SLR-SRP Section 3.4.2.2-10 for Table 3.4-1 new item for aluminum piping, piping components, tanks exposed to raw water, waste water
35	3.4-1 item NNN Pg. B-35 elastomer seals managed by M36	Revise the Table 3.4-1 GALL-SLR item column to specify "VIII.H.SP-NNN" for elastomer seals, piping, piping components exposed to air that are managed by XI.M36 on	To be consistent with other Table 3.4-1 GALL-SLR line item references, the GALL-SLR item for elastomer seals, piping, piping components exposed to air that are managed

Supplement Section C - Changes to Further Evaluation (FE), AMP XI.M29, AMP XI.M36, and AMR Line Items to Address Cracking and Loss of Material for Aluminum and Stainless Steel Components			
		page B-35 of the GALL-SLR Supplement.	by XI.M36 should be revised to read as, "VIII.H.SP-NNN" after the following corrections: - Capitalize the "H" - Replace the "E" with "SP" or "S"
36	3.4-1 item NN Pg. B-35 elastomer seals managed by M38	Revise the Table 3.4-1 GALL-SLR item column to specify the following for elastomer seals, piping, piping components exposed to air that are managed by XI.M38 on page B-35 of the GALL-SLR Supplement. VIII.D1.SP-NNN VIII.D2.SP-NNN VIII.E.SP-NNN VIII.G.SP-NNN	To be consistent with other Table 3.4-1 GALL-SLR line item references, the GALL-SLR item for elastomer seals, piping, piping components exposed to air that are managed by XI.M38 should be revised as follows: - Replace the "V" with "VIII" for Steam and Power Conversions Systems - Replace the "E" with "SP" or "S" - Replace the "G1" with "G"
37	Table of definitions Pg. B-36	New definition of ductile iron includes the statement "Most steel has less than about 1.2 percent by weight carbon, while cast irons typically have between 2.5 to 4 percent." This should be changed to provide the carbon content of ductile iron.	Since the definition is for ductile iron, the discussion should give the values for ductile iron; not cast iron.
38	Table of definitions Pg. B-36	Definition of ductile iron includes the phrase "resulting in increased mechanical properties." This should be clarified.	The phrase "increased mechanical properties" is vague. I'm not sure that all mechanical properties are increased or that it is a good thing in all cases. "Improved" seems like it might be a better word choice than "increased." Also should consider specifying the properties that are increased or improved.
39	Table of definitions Pg. B-36	In entry for "Steel," delete phrase at the end of the first sentence that says, "even though the rates of aging may vary."	The rate of aging is 365 days per year. It does not vary.
40	AMP XI.M29 Detection of Aging Effects, p. C-1	Revised sentence should be corrected. Revise to say, "When an aging effect requires management, periodic inspections are conducted. During each 10-year period of the subsequent period of extended operation, remove a minimum of either 25 1-square foot sections or 20 percent of the tank insulation and perform inspection of the exposed exterior surface of the tank."	Revision created a run-on sentence that did not adequately describe the recommended inspection approach.
41	AMP XI.M29 Detection of Aging Effects, p. C-1	Revise heading of third column of Table XI.M29-1 to "Aging effect requiring management."	As indicated in table of abbreviations on page xix of GALL-SLR Volume 2, the correct term is aging effect requiring management, not aging effect required aging management.

Supplement Section C - Changes to Further Evaluation (FE), AMP XI.M29, AMP XI.M36, and AMR Line Items to Address Cracking and Loss of Material for Aluminum and Stainless Steel Components

42	SRP 3.3.2.2.2 3.3.1 item 3 VII.E1.A-69	Change this further evaluation topic to read: "Cracking due to stress corrosion cracking (SCC) and cyclic loading could occur in stainless steel (SS) PWR nonregenerative heat exchanger components exposed to treated borated water greater than 60 °C [>140 °F] in the chemical and volume control system. The existing AMP on monitoring and control of primary water chemistry in PWRs manages the aging effects of cracking due to SCC. However, control of water chemistry does not preclude cracking due to SCC and cyclic loading. Therefore, the effectiveness of the water chemistry control program should be verified to ensure that cracking is not occurring. The GALL-SLR Report recommends that a plant-specific AMP be evaluated to verify the absence of cracking due to SCC and cyclic loading to ensure that these aging effects are managed adequately. An acceptable verification program is to include temperature and be confirmed by the XI.M32 <u>One-Time Inspection program</u> and radioactivity monitoring of the shell side water, and eddy current testing of tubes."	The proposed change is consistent with the aging management techniques recently approved by the staff in recent LRA SERs.
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Supplement Section D - New title for AMP XI.M29

#	Location of Change	Description of Change	Justification for Change
43		No comments. Industry concurs with program name change.	

Supplement Section E - Issuance of LR-ISG-2015-01

#	Location of Change	Description of Change	Justification for Change
44	LR-ISG-2015-01 pg. B-2, Element 2.e.iii pg. B-4, Element 3.d	Add "(high pH , bicarbonate environments only)" after steel in each of the referenced sections of LR-ISG-2015-01.	Clarification of the LR-ISG-2015-01 referenced sections is required to note that cracking of buried steel components occurs in high pH, bicarbonate environments.

Supplement Section F - Minor technical and editorial changes to AMR line items and AMPs

#	Location of Change	Description of Change	Justification for Change
45	3.1.1-134 IV.A1.R-450 IV.A2.R-450 IV.C1.R-450 IV.C2.R-450 IV.D1.R-450 IV.D2.R-450 3.2.1-87 V.E.E-422 3.3.1-182 VII.I.A-704 3.4.1-64 VIII.H.S-403	Do not remove the term “jacketed” from jacketed thermal insulation. Alternatively, specify “Non-metallic thermal insulation.”	It’s unclear what type of insulation was intended to be addressed by this change. Most insulation in nuclear plants is either jacketed, or mirror (metallic) insulation, although some blanket insulation may also be present. Industry recommends this specifying non-metallic thermal insulation for this AMR line consistent with Regulatory Guide 1.36, Non Metallic Thermal Insulation for Austenitic Stainless Steel”. Implementation of this change would imply that mirror (metallic) insulation is susceptible to reduced thermal insulation resistance due to moisture intrusion, which does not seem to be appropriate. Mirror (metallic) insulation primarily reduces radiant heat loss by layers of metal while jacketed insulation reduces convective heat transfer. Wetting should have little effect on mirror insulation effectiveness.
46	3.2.2.2.12 3.2.3.2.12	In addition to deletion of steel with stainless steel cladding, spent fuel storage racks, and sodium pentaborate, delete all references to stainless steel.	The only GALL/SRP rows that link to this further evaluation topic are for nickel alloy components only. No stainless steel components link here.
47	3.2.1-17 V.D2.EP-73	Do not delete stainless steel from 3.2.1-17. Also do not delete EP-17 which would delete V.D2.EP-17. Alternatively, make this change and change V.C.EP-63 and 3.2.1-18 to be applicable to “Piping and piping components.”	Water Chemistry and One-Time Inspection AMPs are appropriate recommendations for management of loss of material of stainless steel in treated water. This combination should not be deleted as it is the only generic piping row for this M/E/A/P in chapter V. Alternatively, change the component type for the only other similar MEAP row in chapter V.
48	3.2.1-18 V.C.EP-63 3.2.1-22	Instead of changing the program recommendation to “Plant-specific aging management program,” add ‘or AMP XI.M38, “Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components.”’	Industry strongly recommends against replacement of GALL program recommendations with plant-specific program when linking to a further evaluation topic in which specific GALL programs are recommended. This practice will result in reduced GALL consistency and reduced review efficiency due to the required use of Note E in the

Supplement Section F - Minor technical and editorial changes to AMR line items and AMPs			
			<p>Table 2s. Instead of specifying a plant-specific program, list the options that are recommended in the Further Evaluation text. This practice will not relieve applicants of the need to describe their assignments and justifications in the further evaluation section of the SLRA.</p> <p>Also see industry comments related to SRP 3.2.2.2.12.</p>
49	3.2.1-24	Do not add “fouling that leads to corrosion.”	<p>This proposed change seems at odds with the previously listed change to EP-113 that deleted “fouling that leads to corrosion” and adds “flow blockage due to fouling.” Applicants evaluate for aging effects, and AMPs manage aging effects. If the corrosion is a result of the flow blockage due to fouling, then aging management of flow blockage should also manage the fouling and associated corrosion. The mechanisms are only significant when they require specific AMP activities (e.g., selective leaching, FAC).</p>
50	3.2.1-38 GALL IX	Consider defining “air.”	<p>Some proposed changes to GALL rows have combined different air environments into “air.” GALL IX lists and defines 10 different air environments, but does not define “Air” by itself. If/when the definitions are updated, consider the industry input previously provided for air/gas environment names and definitions.</p>
51	3.2.1-54	Do not eliminate the further evaluation from this AMR line.	<p>This proposed change conflicts with Section B.ii.a of the supplement. Note that B.ii.a has a typo, in that 3.3.1-54 is referenced, but does not address the topic, and is not linked to V.D2.E-37. SRP 3.2.1-54 appears to be the row being addressed.</p>
52	3.2.1-68	<p>The change to add groundwater is not necessary.</p> <p>Delete stainless steel from the proposed change description.</p>	<p>Definition of soil in GALL IX.D includes groundwater. Also, based on the two GALL-SLR lines (V.D1.E-402 and V.D2.E-402) referenced by 3.2.1-68, the only applicable material identified is steel.</p>
53	3.2.1-83	Do not delete. Recommend adding “Air” to GALL Chapter IX definitions.	<p>3.2.1-83 is not overtaken by changes to 3.2.1-38. SRP 3.2.1-83 row applies only to BWRs, and is linked only from V.B.EP-59, which is within the Standby Gas Treatment System table. PWR applicants will not use V.B.EP-59/3.2.1-38, they need V.E.E-426/3.2.1-83.</p>
54	3.2.1-84	Do not delete. Recommend adding “Air” to GALL Chapter	<p>3.2.1-84 is not overtaken by changes to 3.2.1-43. SRP 3.2.1-84 row applies only to BWRs, and is linked only from</p>

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		IX definitions.	V.BEP-58 (Standby Gas Treatment System). PWR applicants will not use V.B.EP-58/3.2.1-43. Additionally, the condensation environment is specified in 3.2.1-84 but not addressed in 3.2.1-43.
55	3.2.1-89 E-433	Even though steel is deleted from E-433 / 3.2.1-89, the line is not consistent with other GALL-SLR changes and further evaluations. No changes are recommended to E-46/3.2.1-39.	Recommend revising stainless steel, nickel alloy, copper alloy and aluminum in E-433 / 3.2.1-89 to be consistent with other GALL-SLR changes from external air environments.
56	3.2.1-95 3.3.1-206 3.4.1-88	Copper alloys with >8% aluminum in borated water leakage. Recommend deleting these SLR-SRP Table 1 items and associated AMPs.	The rationale that was used to justify no aging effects and no aging management requirements for aluminum in a borated water leakage environment would apply to copper alloys with any aluminum content. Therefore copper alloys with any aluminum content could be evaluated as copper alloys and apply existing SLR-SRP lines such as Table 3.2-1 item 58.
57	3.3.1-10	Do not add another environment of "any environment for cyclic loading" with applicability to only one aging effect. Instead, changing the environment to a single environment of "air."	No other GALL/SRP rows list specific M/E/A (for cracking) and then include "any environment" for a different aging effect. Cracking of bolting is addressed for most material/environment combinations. If the proposed revision is expected to fill a gap, consider making it a separate row. Implementation of specific environments for some aging effects and "any" environment for others within a single GALL/SRP row is difficult to implement using an aging management database.
58	3.3.1-12	Recommend changing the A-03 environment to air-indoor uncontrolled or air-outdoor, for consistency with 3.3.1-12.	Consistency with linked GALL rows. Changing the A-03 environment will make aging evaluation matches easier for many applicants that do not define an environment of air with steam or water leakage (leakage is considered an event, not an environment).
59	3.3.1-58	In addition to adding "condensation" to this AMR row, consider also adding "air-outdoor" to address CO ₂ piping from storage tanks that may be outside. Also, consider previous industry comments regarding air environments (delete air-moist).	Provide for aging management of fire protection CO ₂ /Halon systems in air-outdoor environments.
60	3.3.1-72 A-547	If Ductile iron is being added to A-02, AP-31, A-50 and A-51, consider also adding it to A-547 and A-724, which also link to 3.3.1-72	Consistent treatment for GALL rows that link to 3.3.1-72.

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	A-724		
61	3.3.1-89	The proposed change includes the addition of "steel" and "moist air (internal)" to AP-143 and deletion of VII.G.A-23. However, these changes appear to already be implemented in the draft NUREG-2191.	Many of the changes appear to already be implemented. Recommend deleting "for fire water system components" from the AMP column. See also comment on 3.3.1-220.
62	3.3.1-95	Proposed change includes deletion of AP-278 from linked GALL rows and creation of a new Table 1 entry for its MEAP "absent citing aluminum as an applicable material." Either leave AP-278 link as-is or delete "aluminum" from 3.3.1-95 applicability if a new Table 1 entry is created to address aluminum and link to AP-278.	3.3.1-95 currently includes aluminum, and the only linked GALL row that includes aluminum is AP-278.
63	3.3.1-96.4	Do not add air (external) as an environment to 96.4 or the new row.	Generic "air" environment does not lead to loss of material for stainless steel, aluminum and copper alloys. In the absence of a link to the further evaluation that provides for confirmation of the absence of loss of material, air should not be listed as an environment expected to result in loss of material for the stainless steel, copper alloy and aluminum. For example, ventilation heating coils made of these materials would not be expected to be wetted, not susceptible to loss of material.
64	3.3.1-97	Do not delete VII.G.AP-127 from this line item, or provide an alternate row for steel components in diesel fire pump lube oil system.	The proposed change separates the Reactor Coolant Pump oil collection system components from those in normal lube oil environment and creates a new row for them. VII.G.AP-127 corresponds to normal lube oil components, and is the only such row in VII.G (fire protection) and would likely be used to represent diesel fire pump lube oil subsystem components.
65	3.3.1-125	Proposed change is to add nickel alloy to GALL items associated with "piping, piping components, and heat exchangers." Suggest deleting "heat exchangers" from applicability.	There are no GALL rows that cite heat exchangers that link to 3.3.1-125.
66	3.3.1-215 3.3.1-218	Do not delete "condensation." If "Air-indoor" is to be used as a listed environment, consider including it in the definitions in GALL IX.D	Some applicants may use "condensation" to describe the internal air space of the tanks. Environment names used in SRP and GALL should be defined.
67	3.3.1-220	Proposed change (to add copper alloy to VII.H2.A-23) is	No change needed to establish the desired presentation. See

Supplement Section F - Minor technical and editorial changes to AMR line items and AMPs			
		currently implemented in SLR GALL.	also comment for 3.3.1-89.
68	3.4.1-13 VIII.B1.SP-74 VIII.D1.SP-74 VIII.F.SP-74 VIII.G.SP-74.	Do not add "BWR."	Only four GALL rows link to this item, and all are in PWR-specific system sections VIII.B1 (Main Steam – PWR), VIII.D1 (Feedwater – PWR), VIII.F (Steam Generator Blowdown – PWR) and VIII.G (Aux Feedwater – PWR). BWRs will not be citing these rows.
69	3.4.1-14 VIII.A.SP-71 VIII.B1.SP-71 VIII.B2.SP-160 VIII.B2.SP-73 VIII.C.SP-71 VIII.C.SP-73 VIII.D2.SP-73 VIII.E.SP-73 VIII.E.SP-78 VIII.F.SP-78	Do not delete "piping and piping components," "BWR" and "treated water."	The GALL rows listed at left all link to this SRP item. Eight rows are for piping components. Eight rows are applicable to BWRs. Six of the rows are for treated water.
70	3.4.1-18	Do not move VIII.E.SP-100 and VIII.G.SP-100 to 3.4.1-17, OR, implement the proposed change and change 3.4.1-17 to BWR/PWR.	SRP item 3.4.1-17 links to only one GALL row: VIII.F.SP-100, in the Steam Generator Blowdown section. This item is applicable to PWRs only. VIII E.SP-100 is applicable to BWRs and PWRs. It's not clear that implementing the proposed change provides any advantage or simplification, and would require also require revision of the applicability of 3.4.1-17 to include BWRs. Suggest no change for this item.
71	3.4.1-33	Do not delete soil and groundwater and delete S-440.	S-440 is for copper alloy >15% Zn in soil or groundwater. This item is not enveloped by 3.4.1-32, as that item only addresses gray cast iron.
72	3.3.1-72 (see page E-13)	This change is unnecessary because copper alloy lines currently exist in 3.3.1-72.	This change is not necessary because the copper alloy lines A-47 and A-66 (>15%Zn or .8%Al) currently exist in 3.3.1-72. Due to line 3.3.1-72 being identified on page E-13 for the GALL-SLR Supplement, the proposed changes require revision if they were intended for Table 3.4.1.

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73	3.5.1-79 and the Generic soil, groundwater change	Consider that environment names in GALL/SRP should be consistent with the definitions in GALL-SLR IX.D. Recommend deleting groundwater in all soil/groundwater environment combinations.	There are 47 rows in GALL that use the defined terminology "Groundwater /soil," and 33 that use "Soil, groundwater." Recommend using an environment of "soil" because the GALL-SLR Chapter IX.D definition for soil includes consideration of groundwater.
74	Piping element	<p>To address the "Piping element" definition change, also consider the following:</p> <ul style="list-style-type: none"> a. Delete "piping elements," from the "Piping, piping components, piping elements, and tanks" definition in IX.B. Note that the inclusion of sight glasses should not be changed, as there may be polymer sight glasses that are not addressed by "piping elements." b. Delete "piping elements" from the definition of reactor coolant pressure boundary components. c. Delete "and piping elements," from Lubricating oil definition in IX.D, or add glass to the materials being discussed. d. Delete "and piping elements" from definition of "reduction in impact strength" in IX.E. e. Delete "and piping elements" from the definition of Cladding degradation in IX.F. f. Delete "and piping elements," from the first sentence of XI.M38 program description, and from the scope of program element. g. Delete "and piping elements" from the XI.M39 Scope of program. h. Delete "and piping elements" from the Table XI-01 Description of program for the XI.M12 program. i. Delete "and piping elements" from SRP Table 3.1.1-106. 	<ul style="list-style-type: none"> a. The "Piping, piping components and piping elements" component group will no longer appear, and piping elements is defined separately. b. It is unlikely that any reactor coolant pressure boundary components could be made of glass. c. Piping elements are made of glass, per new definition. d. Glass is not susceptible to reduction in impact strength. e. Definition is applicable to stainless steel cladding, not to glass. f. Since glass has no aging effects, it will not be managed by the XI.M38 program. g. Since glass has no aging effects, it will not be managed by the XI.M39 program. h. Since glass has no aging effects, it will not be managed by the XI.M12 program. i. Line item addresses nickel alloy components, not glass.
75	IV.E	Proposed change to "Hardening and loss of strength" definition may have been intended for the "Reduction in impact strength" definition instead.	The proposed change deletes the term "piping element," but that term is not present in the "Hardening and loss of strength" definition, but it is present in the "Reduction in impact strength" definition.
76	Table XI.M27-1	Revise the proposed to note to say "Where NFPA 25 or this table cite annual testing or inspections, testing and inspections can be conducted on a refueling outage interval	Loss of function due to other reasons should not impact frequency of inspections for age-related degradation.

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		if plant-specific OE has shown no loss of intended function of the in-scope SSC <u>due to age-related degradation.</u>	
77	XI.M27 acceptance criteria bullet (c)	Delete or reword such that applicants need not confirm that “no” loose fouling products remain. If not deleted, suggest “If loose fouling products have been identified, the affected piping has been cleaned or flushed.”	Acceptance criteria (c) should not be needed, since (a) requires that the system is able to maintain required pressure and flow rates. Applicants may be concerned with confirming that “no” fouling remains following cleaning or flushing. This standard may be impossible to meet. If system is able to deliver required flow and pressure, any remaining loose material does not affect function.
78	XI.M42 Detection of aging effects	The proposed change does not affect the meaning of the sentence. Revise to “If a baseline has not been previously established, between the 50th and 60th year of operation, Bbaseline coating/lining inspections occur in the 10-year period prior to the subsequent period of extended operation. Subsequent inspections...”	Some later SLR applicants will have implemented the XI.M42 program for the initial PEO. These applicants will have already established a baseline prior to their 40 th year of operation. Establishment of a new baseline should not be necessary for continued implementation of the program.

Supplement Section G - Response to certain initial feedback from the industry as presented at a public meeting on January 21, 2016

#	Location of Change	Description of Change	Justification for Change
79	M27 element 4b fouling (topics iii and iv in Section G)	See comment for AMP XI.M27 acceptance criteria bullet (c) regarding a minor wording change.	As noted in the comment for AMP XI.M27 acceptance criteria bullet (c), the industry concurs that efforts should be made to remove loose debris, but is concerned with the wording that implies that “no” such fouling products remain. Such a standard may be impossible to meet.

**Supplement Section G - Response to certain initial feedback from the industry as presented at a public meeting on
January 21, 2016**

80	M32 inspection for "Long-term loss of material" (Section G topic v)	Delete all long-term loss of material rows from GALL and SRP, and delete the inspections recommendations for this aging effect from XI.M32.	<p>The purpose of the One-Time Inspection program is to confirm the absence of, or insignificance of, aging effects. Loss of material in raw water and waste water is expected to occur. Existing GALL rows provide for management of loss of material due to general corrosion of steel in raw water and waste water environments with ongoing programs such as XI.M20 (Open-Cycle), XI.M27 (Fire Water) or XI.M38 (Inspection of Internal Surfaces). These programs provide for inspections that are capable of identifying loss of material due to general corrosion, as previously recommended in GALL R2, and in the SLR GALL. One-Time Inspections of components exposed to raw water would be expected to find some evidence of loss of material, and the disposition of these findings would be management with the already-credited AMPs above to provide reasonable assurance that degradation is addressed before loss of component function. Additionally, reviews for recurring internal corrosion in such systems would drive applicants to augment these programs or to implement plant-specific programs to provide additional assurance of component function. Potential augmented requirements specified in SRP 3.3.2.27 (for example) include volumetric inspections, or greater numbers of inspections, additional locations, additional trending and decision points.</p> <p>Loss of material for steel due to general corrosion in treated water environments is already adequately addressed by AMP XI.M2 and Water Chemistry and XI.M32 One-Time Inspection programs.</p> <p>Imposition of an additional wall thickness measurement by volumetric inspection presupposes that the previously approved visual inspections for general corrosion are, or have been, ineffective. Changes to aging management, such as the determination that a specific effect cannot be detected using previously approved methods, should be driven by OE. However, this new requirement for aging management seems to be driven by postulation of hypothetical inspection failures rather than by actual operating experience.</p>
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**Supplement Section G - Response to certain initial feedback from the industry as presented at a public meeting on
January 21, 2016**

81	XI.M42 baseline inspections, Topic vii	See comment above for XI.M42 Detection of aging effects.	As above, later applicants will be crediting the M42 program which was implemented for the initial PEO, will have established a baseline for the 40-60 period, and a new baseline should not be necessary.
82	Section G topic vii and Appendix E page E-20 XI.M42, detection of Aging Effects	Delete "between the 50 th and 60 th year of operation."	This is the same as the 10-year period prior to the subsequent period of extended operation. Baseline inspections can occur between the 30 th year (first license renewal) or 50 th year (subsequent license renewal) of operation depending on implementation of LR-ISG-2013-01 or GALL-SLR.

Attachment 1

Example Mark-ups Showing Changes to the LR-SRP

3.2.2.2.10 Cracking Due to Stress Corrosion Cracking in Aluminum Alloys

(Changes shown in yellow highlight)

SCC is a form of environmentally assisted cracking which is known to occur in high- and moderate-strength aluminum alloys. The three conditions necessary for SCC to occur in a component are a sustained tensile stress, aggressive environment and material with a susceptible microstructure. The aging effect of cracking due to SCC can be mitigated by eliminating one of the three necessary conditions. For the purposes of subsequent license renewal (SLR), acceptance criteria for this further evaluation is being provided for demonstrating that the specific material is not susceptible to SCC or an aggressive environment is not present.

~~The susceptibility of the material is to be established prior to evaluating the environment.~~ This further evaluation item is applicable unless it is demonstrated by the applicant that one of the two necessary conditions discussed below is absent.

Susceptible Material: If the material that a component is constructed of is not susceptible to SCC then the aging effect is not applicable. The microstructure of an aluminum alloy, of which alloy composition is only one factor, is what determines if the alloy is susceptible to SCC. Therefore, providing guidance based on alloy composition will not always successfully protect against SCC in aluminum alloys. The temper, condition, and product form of the alloy is considered when assessing if a material is susceptible to SCC. Aluminum alloys that are susceptible to SCC include:

- 2xxx series alloys in the F, W, O_x, T3_x, T4_x, or T6_x temper
- 5xxx series alloys with a magnesium content of 3.5 weight percent or greater
- 6xxx series alloys in the F temper
- 7xxx series alloys in the F, T5_x, or T6_x temper
- 2xx.x and 7xx.x series alloys
- 3xx.x series alloys that contain copper
- 5xx.x series alloys with a magnesium content of greater than 8 weight percent.

The material is evaluated to verify that it is not susceptible to SCC and that the basis used to make the determination is technically substantiated. Tempers have been specifically developed to improve the SCC resistance for some aluminum alloys. Aluminum alloy and temper combination which are not susceptible to SCC when used in piping, piping component, and tank applications include 1xxx series, 3xxx series, 6061-T6_x, and 5454-x.

Aggressive Environment [this paragraph was editorially placed in front of the following paragraph]: If the environment that an aluminum alloy is exposed to is not aggressive, such as dry gas, ~~controlled indoor air~~, or treated water, then cracking due to SCC will not occur and the aging effect is not applicable. Aggressive environments that are known to result in cracking of susceptible aluminum alloys due to SCC are aqueous solutions and

atmospheric air that contain halides (e.g., chloride). Determination that an aggressive environment exists includes consideration of the potential for atmospheric contaminants, proximity of aggressive water leakage sources, proximity of non-metallic insulation not consistent with Regulatory Guide 1.36, components that operate below ambient temperature, or repairs that introduce stress or change in material characteristics. If review of these considerations via plant-specific operating experience concludes that a specific environment is not aggressive towards a specific, potentially susceptible aluminum alloy and a one-time inspection performed by XI.M32, One-Time Inspection confirms the insignificance of SCC, then SCC of that alloy in that environment does not require management. Halide concentrations should generally be considered high enough to facilitate SCC of aluminum alloys in uncontrolled or untreated aqueous solutions and atmospheric air, such as outdoor air, raw water, waste water, and condensation, unless demonstrated otherwise. Additionally, in a controlled or uncontrolled indoor air environment, sufficient halide concentrations to cause SCC could be present due to leakage from nearby components (e.g., leakage from insulated flanged connections or valve packing). If an aluminum component is encapsulated in a secondary material, such as insulation or concrete, the composition of the encapsulating material is evaluated for halides. The environment that the aluminum alloy is exposed to is evaluated to verify that it is ~~either controlled or treated and~~ free of halides.

GALL-SLR Report AMP XI.M29, "Outdoor and Large Atmospheric Metallic Storage Tanks," is an acceptable method to manage cracking of aluminum due to SCC in tanks. GALL-SLR Report AMP XI.M36, "External Surfaces Monitoring of Mechanical Components," is an acceptable method to manage cracking of aluminum due to SCC in piping and piping components. GALL-SLR Report AMP XI.M41, "Buried and Underground Piping and Tanks," is an acceptable method to manage cracking of aluminum due to SCC in piping and tanks which are buried or underground. GALL-SLR Report AMP XI.M38, "Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components" is an acceptable method to manage cracking of aluminum due to SCC in components that are not included in other AMPs. Additional acceptance criteria are described in BTP RLSB-1 (Appendix A.1 of this SRP-SLR). An alternative strategy to demonstrating that an aggressive environment is not present is to isolate the aluminum alloy from the environment using a barrier to prevent SCC. Acceptable barriers include tightly adhering coatings that have been demonstrated to be impermeable to aqueous solutions and atmospheric air that contain halides. If a barrier coating is credited for isolating an aluminum alloy from a potentially aggressive environment, then the barrier coating is evaluated to verify that it is impervious to the plant-specific environment. GALL-SLR Report AMP XI.M42, "Internal Coatings/Linings for In-Scope Piping, Piping Components, Heat Exchangers, and Tanks," or equivalent program is an acceptable method to manage the integrity of a barrier coating for internal or external coatings.

Attachment 2

3.1.2.2.20 Loss of Material Due to Pitting and Crevice Corrosion in Stainless Steel Alloys

(Changes shown with underline and strikethrough)

~~Loss of material due to pitting and crevice corrosion could occur for indoor or outdoor SS piping, piping components, and tanks exposed any air environment when the component is: (a) uninsulated; (b) insulated; or (c) in the vicinity of insulated components. Loss of material due to pitting and crevice corrosion is known to can occur on stainless steel in environments containing sufficient halides (e.g., chlorides) and in which moisture is possible in the presence of moisture.~~

Insulated SS components exposed to air environments are susceptible to loss of material due to pitting or crevice corrosion if the insulation contains certain contaminants. Leakage of fluids through mechanical connections such as bolted flanges and valve packing can result in contaminants leaching onto the component surface or the surfaces of other components below the component. For outdoor insulated SS components, rain and changing weather conditions can result in moisture intrusion ~~of into~~ the insulation.

~~The Plant-specific OE and the condition of SS components are evaluated to determine if prolonged exposure to the plant-specific air environments are aggressive enough to result has resulted in pitting and or crevice corrosion after prolonged exposure. The aging effect of Loss of material due to pitting and crevice corrosion in is not an aging effect requiring management for SS components is not applicable and does not require management if: (a) the plant specific OE does not reveal a history of loss of material due to pitting or crevice corrosion; and (b) a one-time inspection demonstrates that the aging effect is not occurring or that loss of material due to pitting or crevice corrosion is occurring so slowly that it will not affect the intended function of the components during the subsequent period of extended operation. The applicant documents the results of the plant-specific OE review in the LRA.~~

The internal surfaces of SS components do not need to be inspected if: (a) the review of plant-specific OE does not reveal a history of pitting or crevice corrosion; and (b) inspection results for external surfaces demonstrate that the aging effect ~~is not applicable~~ does not require management. Inspection results associated with the periodic introduction of either moisture or halides from secondary sources may be treated as a separate population of components. In the environment of air-indoor controlled, pitting and crevice corrosion is only expected to occur as the result of ~~secondary a source of moisture or and~~ halides. Inspections focus on the most susceptible locations.

The GALL-SLR Report recommends ~~the further evaluation of SS piping and piping components exposed to an air environment to determine whether an AMP is needed to manage the aging effect of loss of material due to pitting and crevice corrosion is an aging effect requiring management~~. GALL-SLR Report AMP XI.M32, "One-Time Inspection," is an acceptable method to demonstrate that ~~the aging effect of loss of material due to pitting and crevice corrosion is not occurring at a rate that affects will affect~~ the intended function of the components. If loss of material due to pitting or crevice corrosion has occurred and is sufficient to potentially affect the intended function of an ~~SS SSC~~, GALL-SLR

Report AMP XI.M36, "External Surfaces Monitoring of Mechanical Components" is an acceptable ~~method~~ program to manage loss of material due to pitting ~~or~~ and crevice corrosion.

The applicant may establish that loss of material due to pitting and crevice corrosion is not ~~expected to occur~~ an aging effect requiring management by demonstrating that a barrier coating isolates the component from aggressive environments ~~is not present by isolating the component from the environment using a barrier coating~~. An acceptable barriers include s coatings that have been demonstrated to be impermeable to aqueous solutions and ~~atmospheric~~ air that contain halides. If a barrier coating is credited for isolating a component from a potentially aggressive environment, then the barrier coating is evaluated to verify that it is impervious to the plant-specific environment. GALL-SLR Report AMP XI.M42, "Internal Coatings/Linings for In-Scope Piping, Piping Components, Heat Exchangers, and Tanks," is an acceptable ~~method~~ program to manage the integrity of a barrier coating ~~for internal or external coatings~~.