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1/10/2014
79FR1904
(1)

Cindy Bladey,
Chief, Rules, Announcements, and Directives Branch,
Office of Administration,
Mail Stop: 3WFN, 06– 44M,
U.S. Nuclear Regulatory Commission,
Washington, DC 20555– 0001.

Subject: Aging Management of Loss of Coating Integrity for Internal Service Level III (Augmented) Coatings

References:
1. Federal Register / Vol. 79, No. 7 / Friday, January 10, 2014 / Notices
2. LR-ISG-2013-01

Dear Ms. Bladey:

I have reviewed the reference documents and offer my comments in the attached.

My comments consist of three primary categories:
1. Consistency of terminology usage
2. Time dependency of coating failure, and
3. Definitions

Thank you for the opportunity to comment and consideration of my comments.

Daniel L. Cox

Attachment

cc: David Scott, Project Manager, BOPC, Electric Power Research Institute

Section	Paragraph	Page	ISG Wording	Comment	Suggested Change
Discussion		1	"... GALL Report and SRP-LR should be revised to incorporate recommendations related to managing ***loss of coating integrity*** due to blistering, cracking, flaking, peeling, or physical damage of Service Level III (augmented) coatings."	***loss of coating integrity*** should be consistently used	***loss of coating integrity*** has two parts, failed coating and degraded coating: Use ***failed coating*** when referring to detachment or disbondment. This is consistent with the concern in Coatings Service Level I, where debris generation is the major concern. Use ***degraded coating*** when referring to all other related coating anomalies, such as blistering, cracking, flaking, peeling, or physical damage.
Background	I. a.	1	OE indicates that ***degraded coatings*** have resulted in unanticipated or accelerated corrosion of the base metal and degraded performance of downstream equipment (e.g., heat exchangers).	***degraded coating*** should be consistently used	See above
OE Examples	II. a.	2 & 3	Failure to install coatings with the correct installation prerequisites is not always immediately observable. There are three critical stages where failures due to improper installation (e.g., installation techniques, coating not appropriate to application) typically become evident: i. ***Immediate failure.*** Coating failures typically occur as the system is being returned to service. ii. ***First time thermal cycling.*** These failures become evident when a complete thermal cycle occurs resulting in the thermal movement of the substrate. Examples include a tank internal coating after it has been exposed to a winter-summer cycle, and heat-up and cool-down of a heat exchanger. If the coating was not installed properly, the substrate movement can result in a breakdown of the adhesion of the coating to the substrate. iii. ***Two to three refueling outage intervals.***	Coating degradation leading to failure to generate debris or result in loss of corrosion protection can take much longer. It can state with a crack, allowing localized corrosion, resulting in blistering, pealing and delamination. The subsequent paragraphs address failures and degradation that occurred in time frames well beyond 3 refueling cycles. This can result to unnecessary confusion.	In order to ensure a clear understanding of ***the issue this needs to be addressed in a new sub-paragraph iv.*** ***I suggest something to the effect:*** *iv. Coating failures due to selection or installation deficiencies typically occur very early in the coatings life (< 3 refueling cycles). However, loss of coating integrity can occur later in coating life due to the effects of operating environment (e.g., turbulence and erosion), physical damage, or ultimately aging.*
Industry Guidance on degraded coatings	III.a. and III.b.	4 &5	a. The Electric Power Research Institute (EPRI) has provided the following guidance on the effect of loss of coating integrity in EPRI TR-103403, "Service Water Corrosion and Deposition Sourcebook," which states: ***All of these barrier linings possess some degree of permeability to water and ions; hence their protective capabilities are not perfect.*** . . b. EPRI 1010059, "Service Water Piping Guideline," states: ***All coatings exhibit some degree of permeability to water, so they provide a barrier that is effective but less than 100% effective in keeping the environment away from the metallic pressure boundary. . .*** ***Permeability will be a function of the coating type and the coating thickness. Coating life, where life is defined as the time period during which the coating is nearly 100% effective at protecting the metal from corrosion, will typically be less than the life of the component (less than 40 years).. . .***	Though it is true all coatings have ***some*** permeability, immersion coatings are designed with very low permeability. There is evidence that many immersion coatings, if properly applied and tested (holiday), the service life can extend well beyond 40 years.	For clarity, I suggest a statement be made that even though some coatings cn last beyond 40 years, this still does not rule out the need for periodic assessment and the frequency should be based on coating condition and performance.

Section	Paragraph	Page	ISG Wording	Comment	Suggested Change
Definition of Service Level III (augmented) Coatings	V.	5 & 6	***Definition of Service Level III (augmented) coating*** a. All coatings applied to the internal surfaces of an in-scope component are in the scope of this LR-ISG if its degradation could prevent satisfactory accomplishment of any of the functions identified under 10 CFR 54.4(a)(1), (a)(2), or (a)(3). Service Level III (augmented) coatings are those: i. used in areas outside the reactor containment whose failure could adversely affect the safety function of a safety-related SSC, or ii. applied to the internal surfaces of in-scope components and whose failure could prevent satisfactory accomplishment of any of the functions identified under 10 CFR 54.4(a)(3) (e.g., fire protection, station blackout).	Definition of Service Levels need to be different between ***Safety Related*** and ***Non-Safety Related*** coatings. SSCs identified under 10 CFR 54.4(a)(1) and (a)(2) are classified as ***Safety Related***. SSCs identified under 10 CFR 54.4(a)(3) are classified as ***Non-Safety Related***. *It should be noted that the original definitions of Coatings Service Level I, II, and III were developed to address the COATING, and what affect the COATING would have if it failed, NOT what effect the LACK OF COATING would have, i.e., corrosion.*	Leave the current definition of Coatings Service Level III as defined in ASTM D4538 as is, and use ASTM definition proposed new defitinion of Coatings Service Level LR. My proposed revision to that definition is: *Coating Service Level LR -- coatings include those applied to the internal surfaces of structures, systems, and components (SSC) identified in 10 CFR 54.4(a)(3) whose loss of coating integrity through failure (debris generation) or degradation (blistering, cracking, flaking, peeling, holidays, or physical damage) could prevent satisfactory accomplishment of any of the SSC intended functions. These coatings are not considered nuclear safety-related.*
Definition of Service Level III (augmented) Coatings	V.e.i.	8	A coating was installed to refurbish plant drains that drain water from a room during a fire event. ***If the coating degrades and blocks flow in the line, a fire water sprinkler discharge could flood the room and result in an in-scope component's intended function(s) not being maintained.*** Many plants have designated portions of their plant drain systems as in-scope to ensure that the functions described in 10 CFR 54.4(a)(3) are successfully accomplished. For example, in relation to portions of its plant drain system, an applicant stated, "[i]t also meets 10 CFR 54.4(a)(3) because it is relied upon in safety analyses or plant evaluations to perform a function that demonstrates compliance with the Commission's regulations for Fire Protection (10 CFR 50.48)."	Floor drains can clog by other than coating failure. If the drains are other than stainless steel, such as normal ductile iron, corrosion products can clog, as well as other debris. In addition, this type of event could conceivably impact 10CFR54.4(a)(1) and (a)(2) components as well, if the drains were, for example, in the Auxiliary Feedwater Pump Room.	Having the floor drains in the scope of this ISG can overlook the other clogging mechanisms. This should be in the scope of the structures ISG.
Appendix B	GALL Report Section IX.C, Coating	B-4	Coatings include inorganic (e.g., zinc-based) or organic (e.g., elastomeric or polymeric) coatings, ***linings (e.g., rubber, cementitious)***, and concrete surfacers designed to adhere to a component to protect its surface. Service Level I and Service Level III (augmented) coatings are included.	linings (e.g., rubber, cementitious) are not contained within the ASTM D33 committee Standard D4538 for Coating System or Lining definition: ***coating system, n*** —polymeric protective film consisting of one or more coats, applied in a predetermined order by prescribed methods. ***lining, n*** —particular type of coating intended for protection of substrates from corrosion as a result of continuous or intermittent fluid immersion.	Rubber linings are covered by ASTM D7602-11. There is, however, no ASTM D33 standard for Cementitious lining materials. To minimize confusion of terms, e.g., coatings and linings, ***rubber and cementitious lining materials should have their own definition separate from coatings and linings.*** These materials are typically NOT past of the coatings program, and may take special training and qualifications for proper assessment of performance.

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Appendix B	GALL Report Section IX.E, Loss of Coating Integrity	B-5	Loss of coating integrity is the disbondment of a coating from its substrate. For Service Level I and Service Level III (augmented) coatings, loss of coating integrity can be due to a variety of aging mechanisms such as blistering, cracking, flaking, peeling, or physical damage. Where the aging mechanism results in exposure of the base material, unanticipated or accelerated corrosion of the base material can occur. Where the aging mechanism results in the coating not remaining adhered to the substrate, the coating can become debris that could prevent an in-scope component from satisfactorily accomplishing any of its functions identified under 10 CFR 54.4(a)(1), (a)(2), or (a)(3) (e.g., reduction in flow, drop in pressure, reduction in heat transfer).	This term is not defined in any industry standard, and is inconsistent with the intent of ***failed coating*** used in the definition of Coatings Service Level I, where disbondment results in debris generation is the major concern. ***Loss of coating integrity*** is **NOT** only the disbondment of a coating from its substrate. It **IS** also the loss of film integrity, such ad blisters, cracks, holidays, etc. It may be the appropriate term for Coatings Service Level III, where both debris generation and pressure boundary corrosion is a concern.	***loss of coating integrity*** has two parts, failed coating and degraded coating: Use ***failed coating*** when referring to detachment or disbondment. This is consistent with the concern in Coatings Service Level I, where debris generation is the major concern. Use ***degraded coating*** when referring to all other related coating anomalies, such as blistering, cracking, flaking, peeling, or physical damage. ***The term may better be defined as:*** ***Loss of coating integrity*** - *The failure of a coating where disbondment results in debris generation, or coating degradation where blistering, cracking, flaking, peeling, holidays or physical damage has compromised the corrosion protection properties.*