

July 23, 2013

MEMORANDUM TO: Mirela Gavrilas, Branch Chief
Corrosion and Metallurgy Branch
Division of Engineering
Office of Nuclear Regulatory Research

FROM: John P. Burke, Senior Engineer */RA/*
Corrosion and Metallurgy Branch
Division of Engineering
Office of Nuclear Regulatory Research

SUBJECT: SUMMARY OF THE CATEGORY 2 PUBLIC MEETING WITH
INDUSTRY REPRESENTATIVES TO DISCUSS DRAFT
INTERIUM STAFF GUIDANCE FOR SERVICE LEVEL III
PROTECTIVE COATINGS

A category 2 public meeting was held on July 9, 2013 between the U.S. Nuclear Regulatory Commission (NRC) staff and representatives from interested industry groups such as Nuclear Energy Institute (NEI) and ASTM International (ASTM) and licensees. The purpose of the meeting was to discuss the draft License Renewal Interim Staff Guidance (LR-ISG) for Coating Service Level III Protective Coatings; which is tracked by the agency as Draft LR-ISG-2012-02, and archived in the Agencywide Documents Access and Management System (ADAMS) at ML12291A920. A list of the meeting participants is attached as Enclosure 1. A notice of request for public comment on the draft LR-ISG-2012-02 "Aging Management of Internal Surfaces, Service Level III and Other Coatings, Atmospheric Storage Tanks, and Corrosion under Insulation" was published in the *Federal Register* on April 12, 2013. The public was asked to submit comments by June 16, 2013. To stimulate public comments, the Division of License Renewal (DLR) held a public meeting on May 23, 2013. One of the items discussed was the relatively large scope of the Draft LR-ISG relative to other LR-ISGs. Industry representatives recommended that the NRC staff hold a separate meeting just to discuss the aging management recommendations related to "Service Level III and Other" coatings. The July 9, 2013 meeting was in response to that recommendation. The May 23, 2013 meeting summary is archived in ADAMS at ML13149A401.

Prior to the June 9, 2013 meeting, the agenda was annotated with potential talking points by industry and staff participants to stimulate discussions. These talking points are attached to this meeting summary as Enclosure 2.

CONTACT: John Burke, RES/DE/CMB
301-251-7628

The following summarizes key participant contributions during the meeting.

1. Opening Comments

David Pelton, Acting Deputy Director, Division of License Renewal, opened the meeting by welcoming the attendees and expressing appreciation for the collaborative holistic review of the draft LR-ISG.

2. Inspection Frequency of Coatings Categorized as Coating Service Level (CSL) III or Other

Draft LR-ISG-2012-02 noted that the inspection frequency is two years for coatings with a greater than 20 years installed age. Industry participants noted that coating failure can be related to problems with design, installation problems, mechanical wear (opening/closing), but that they have not seen coating failure related to aging. Industry participants expressed concern that such frequent inspection could cause mechanical damage from unbolting and re-bolting access ways. Typical locations for CSL III coatings were said to include diesel fuel oil storage tanks, raw water systems, and reactor grade water storage tanks.

Industry participants suggested that the ASTM Standard D7167, "Standard Guide for Establishing Procedures to Monitor the Performance of Safety-Related Coating Service Level III Lining Systems in an Operating Nuclear Power Plant," can be modified by incorporating Table 8.1 "Condition Assessment Application and Frequency" from the EPRI guidelines (Plant Support Engineering: Guidelines on Nuclear Safety-Related Coatings, Rev. 2, 1019157). Currently ASTM D7167 states:

6.1 Frequency of in-service lining inspection monitoring shall be determined by the owner/operator.

6.2 Inspection frequency should be based on the impact of lining failures on plant safety, potential problems identified during prior inspections, known service life history, availability and accessibility of the linings, considerations with respect to satisfying "as low as reasonably achievable" (ALARA) objectives, and outage schedules. In many cases, lining condition assessments can be performed in conjunction with other routine maintenance performed on the lined equipment (for example, tank inspections and Generic Letter 89-13 heat exchanger inspections).

6.3 Inspection frequencies may change based on the assessment findings. Should two or more consecutive inspections indicate satisfactory conditions, then frequencies of future inspections can be adjusted accordingly.

Staff and industry attendees explored the concept of a baseline inspection that would precede the period of extended operation (PEO); any future inspection periodicity would be determined subsequently. The staff discussed the different categories that could be defined as linings (such as thin organic films, thick polymeric materials, metallic materials, cementitious) and a potential modification to Table 4a "Inspection Intervals for Coatings" in LR-ISG-2012-02 to reflect the difference between types of coatings. One industry participant suggestion was that the new AMP should have material-specific tables as found in GALL AMP XI-M41 "Buried and Underground Piping and Tanks."

Action Item #1: The ASTM D33 committee representative committed to update the definition of coating categories beyond polymeric to include cementitious and metallic materials. Currently, ASTM D4538-05, Standard Terminology Relating to Protective Coating and Lining Work for Power Generation Facilities defines a coating system as “polymeric protective film consisting of one or more coats, applied in a predetermined order by prescribed methods.”

Action Item #2: Industry representatives will investigate the availability of manufacturers expected service life data for coating materials and provide that information to the staff. Coating inspection frequencies could be linked to a coating manufacturer’s expected service life, if available.

3. Scope of Inspection (i.e., 100 percent or sampling)

At present, draft AMP XI.M 42 Element 4 “Detection of Aging Effects” in LR-ISG-2012-02 states:
The inspection scope includes all coating surfaces except those captured between interlocking surfaces (e.g., flanges). For areas not readily accessible for direct inspection, such as small pipelines, heat exchangers, and other equipment, consideration is given to the use of remote or robotic inspection tools.

Various options were discussed regarding the scope of inspections. An example is the minimum 25% coverage required if a buried tank is inspected from the external surface, as stated in AMP XI.M41. Other examples are the opportunistic inspections in which the coating is visually inspected whenever it becomes accessible for any reason. Industry participants noted that coatings serve a secondary function and thus do not warrant greater inspection frequency/scope than the underlying protected components. The staff has not reached a conclusion on this issue but is willing to review industry proposals. Meeting participants agreed that there needed to be better clarity on inspection sampling regimes for different components because the floor, walls, and roof of a tank could experience different degradation environments.

Action Item #3: Industry participants will provide written guidelines on inspecting different areas of components, taking into account unique orientation and configuration. This written guideline would probably lead to a revision to ASTM D7167.

4. Qualification of Inspection Personnel

At present, draft AMP XI.M 42 Element 4 “Detection of Aging Effects” in LR-ISG-2012-02 states:
The training and qualification of individuals involved in coating inspections is conducted in accordance with an ASTM International standard endorsed in NRC Regulatory Guide (RG) 1.54 including staff guidance associated with a particular standard.

RG 1.54 references ASTM D 7167-05 Section 9 and the following two other qualification related-standards as appropriate for certifying inspectors and nuclear coating specialists:

- ASTM D 7108-05, “Standard Guide for Establishing Qualifications for a Nuclear Coatings Specialist,”
- ASTM D 5163-08, “Standard Guide for Establishing a Program for Condition Assessment of Coating Service Level I Coating Systems in Nuclear Power Plants.”

Meeting participants agreed that no changes are needed in this area of the draft LR-ISG.

5. Inspection Techniques (visual, NDE, etc.)

Industry participants consider visual inspections for condition monitoring adequate. All participants agreed that no other methods exist for the non-destructive examination of coatings. As stated in EPRI TR-103403, "Service Water Corrosion and Deposition Sourcebook," coatings will almost always contain small flaws ("holidays") where local anodic conditions can occur. ASTM D5162 - 08 "Standard Practice for Discontinuity (Holiday) Testing of Nonconductive Protective Coating on Metallic Substrates" describes one method for conducting holiday testing of coatings that is often used on new applications of tank linings. However, industry participants stressed that the ASTM D5162 - 08 method can damage the coating and is therefore not appropriate for inspection of in-service coatings to determine discontinuities.

The use of a high voltage holiday tester on previously exposed coatings has to be carefully considered because of possible spark-through, which will damage an otherwise sound coating. Although a low voltage tester can be used without damaging the coating, it may also produce erroneous results. Deposits present on the surface can cause erroneous indications or current leakage can occur across the surface of the coating because of contamination. The industry participants' input was that if there are holidays in the coating film, it will be obvious during visual inspection because there will be rust stains from them.

Industry participants further discussed an adhesion inspection method given in ASTM D 6677-07, "Standard Test Method for Evaluating Adhesion by Knife." This is a destructive qualitative test to determine relative adhesion values. The usefulness of this technique depends on the experience, and consistency in use, of the individual practitioner.

As part of the discussion of coating inspection techniques, ASTM/ industry representatives emphasized that a condition assessment is not the same as a coating inspection. The coating inspection could be performed by an individual certified to ANSI N45.2.6, "Qualifications of Inspection, Examination, and Testing Personnel for Nuclear Power Plants" or equivalent. However, the subsequent evaluation of inspection findings is conducted by a nuclear coatings subject matter expert qualified in accordance with ASTM D 7108-05, "Standard Guide for Establishing Qualifications for a Nuclear Coatings Specialist."

6. Should There Be Unique Requirements/Recommendations for Cementitious Materials or Galvanized Coatings

Draft LR-ISG-2012-02 (ML12291A920), pg. 9, noted that:

the term coating includes inorganic (e.g., zinc-based) or organic (e.g., elastomeric or polymeric) coatings, linings (e.g., rubber, cementitious), and concrete surfacers that are designed to adhere to a component to protect its surface. Service Level I, Service Level III and Other coatings are included. "Other" coatings include those whose failure could prevent satisfactory accomplishment of any of the functions identified under 10 CFR 54.4(a)(3), which states that all systems, structures, and components relied on in safety analyses or plant evaluations to perform a function that demonstrates compliance with the listed regulated events within the scope of license renewal.

The industry and staff participants thought that it would be helpful to create a table in the proposed AMP XI.M42 that defines separate criteria and inspection frequencies using the

approach in the NUREG-1801, AMP XI.M41 tabulations. It was noted that content of the lined component should be considered as a parameter. Zinc-coated (galvanized) steel is subject to accelerated degradation from ultra-low-sulfur diesel (ULSD) fuel oil. As stated in Information Notice 2006-22 "New Ultra-Sulfur Diesel Fuel Oil Could Adversely Impact Diesel Engine Performance" (ADAMS ML062710079) both copper and zinc are incompatible with ULSD because both are oxidative catalysts that will accelerate the formation of sediments, gels, and soaps (ASTM D975, Appendix X2.7.2). As stated in RG 1.137, "Fuel Oil Systems for Emergency Power Supplies," Rev. 2, June 2013, any qualification of coatings should be done for the expected range of fuel sulfur content.

Action Item #4: Industry representatives will investigate if there are other industry standards appropriate for cementitious and galvanized coatings condition monitoring such as those developed by the American Water Works Association for pipe lines.

7. Industry Actions to Revise Consensus Standards

Industry participants stated that the existing definition of CSL III that appears in ASTM and NRC guidance documents, can be modified to cover the protective coatings on systems, structures, and components in the scope of license renewal in accordance with 10CFR 54.4(a)(3) such as Station Blackout and Fire Protection equipment. The ASTM D33 committee chairman stated that his committee is willing to work with the staff and modify the CSL III definitions in the appropriate standards, as needed, to address the concerns expressed by the staff. The new wording will be reviewed during the annual ASTM meeting scheduled for January 2014.

Action Item #5: ASTM D33 committee representatives have committed to voluntarily include cementitious materials and galvanized coatings in the ASTM standards as types of CSL III coatings. Further modification of the definition to include coatings that are used on systems, structures, and components within the scope of license renewal by 10CFR 54.4(a)(3) are beyond the scope of the current action.

8. Action Items

Five action items were identified above in the context of different discussions. The revised draft DLR-ISG will be re-issued for public comment later this year.

9. Public Participation

This meeting was noticed as a category 2 public meeting; however, no members of the public, other than industry representatives, were present.

Enclosures:

1. Participants List
2. Service Level III Coatings Public Meeting Discussion Items

approach in the NUREG-1801, AMP XI.M41 tabulations. It was noted that content of the lined component should be considered as a parameter. Zinc-coated (galvanized) steel is subject to accelerated degradation from ultra-low-sulfur diesel (ULSD) fuel oil. As stated in Information Notice 2006-22 "New Ultra-Sulfur Diesel Fuel Oil Could Adversely Impact Diesel Engine Performance" (ADAMS ML062710079) both copper and zinc are incompatible with ULSD because both are oxidative catalysts that will accelerate the formation of sediments, gels, and soaps (ASTM D975, Appendix X2.7.2). As stated in RG 1.137, "Fuel Oil Systems for Emergency Power Supplies," Rev. 2, June 2013, any qualification of coatings should be done for the expected range of fuel sulfur content.

Action Item #4: Industry representatives will investigate if there are other industry standards appropriate for cementitious and galvanized coatings condition monitoring such as those developed by the American Water Works Association for pipe lines.

7. Industry Actions to Revise Consensus Standards

Industry participants stated that the existing definition of CSL III that appears in ASTM and NRC guidance documents, can be modified to cover the protective coatings on systems, structures, and components in the scope of license renewal in accordance with 10CFR 54.4(a)(3) such as Station Blackout and Fire Protection equipment. The ASTM D33 committee chairman stated that his committee is willing to work with the staff and modify the CSL III definitions in the appropriate standards, as needed, to address the concerns expressed by the staff. The new wording will be reviewed during the annual ASTM meeting scheduled for January 2014.

Action Item #5: ASTM D33 committee representatives have committed to voluntarily include cementitious materials and galvanized coatings in the ASTM standards as types of CSL III coatings. Further modification of the definition to include coatings that are used on systems, structures, and components within the scope of license renewal by 10CFR 54.4(a)(3) are beyond the scope of the current action.

8. Action Items

Five action items were identified above in the context of different discussions. The revised draft DLR-ISG will be re-issued for public comment later this year.

9. Public Participation

This meeting was noticed as a category 2 public meeting; however, no members of the public, other than industry representatives, were present.

Enclosures:

1. Participants List
2. Service Level III Coatings Public Meeting Discussion Items

ADAMS Accession No.: ML13203A008

OFFICE	RES/DE/CMB	RES/DE/CMB
NAME	J. Burke	M. Gavrilas
DATE	07/23/13	07/23/13

OFFICIAL RECORD COPY

Enclosure 1 PARTICIPANTS LIST

**Meeting Between NRC Staff and Licensee and Industry Representatives to
Discuss Draft LR-ISG for Service Level III Protective Coatings**

July 9, 2013

<u>PARTICIPANT</u>	<u>AFFILIATION</u>
John Burke	U.S. Nuclear Regulatory Commission (NRC)
William Holston	NRC
Emma Wong	NRC
Greg Makar	NRC
David Alley	NRC
David Pelton	NRC
Amy Hull	NRC
Gary Alkire	Exelon
Bob Walcheski	Underwater Engineering Services Inc (UESI)
Andrew Taylor	Entergy
Albert Piha	Exelon
Allen Hiser	NRC
Kim Green	NRC
Aloysius Obodoako	NRC
Nicholas McMurray	NRC
Don Watson	Duke Energy/Corporate and EPRI/NUCC chairman
Garth Dolderer	Nextera Energy/FPL
Jon Cavallo	Underwater Engineering Services Inc. (UESI) & past ASTM D33 chairman
Keith Miller	Sargent & Lundy & ASTM D33 chairman
April Pulvirenti	NRC
Jason Remer	Nuclear Energy Institute (NEI)

M. Gavrilas

- 2 -

Participating by Phone

Larry Hinkle

FirstEnergy Nuclear Operation Company (FENOC)

Rigel Davis

STARS Alliance

Dan Cox

Structural Integrity Associates

Casey Muggleston

Exelon

Mo Dinger

Wolf Creek

Allen McCallister

FirstEnergy Nuclear Operation Company (FENOC)

Don Kosloff

FirstEnergy Nuclear Operation Company (FENOC)

Sarah Kovaleski

Ameren/Callaway

Jim Gavula

NRC

Enclosure 2

Service Level III Coatings Public Meeting Discussion Items

Prior to the meeting, the agenda included in the public meeting announcement was reviewed and possible talking points were developed by industry and staff participants to stimulate discussions. The following are the annotated talking points as distributed in advance of the meeting.

Basis for why degradation of coatings is within the scope of the existing 10CFR Part 54- NRC lead.

Industry recommends that the draft LR-ISG section dealing with CSL III and Other Coatings be split out and handled separately from the other items in the draft LR-ISG.

The staff agrees

Industry recommends that publication of the LR-ISG guidance related to CSL III and Other Coatings be delayed (with an appropriate milestone schedule committed to by Industry) to allow USNRC and Industry to produce a strong and meaningful consensus document. The same definitions should appear in USNRC, ASTM and other industry publications. [*Typical applications of SL III coatings are EDG fuel oil tanks, RWST, heat exchangers, service water pipe linings, etc.*]

For ASTM D-33, are new or revised standards required?

What changes are needed for ASTM D7167 "Standard Guide for Establishing Procedures To Monitor the Performance of Safety-Related Coating Service Level III Lining Systems in an Operating Nuclear Power Plant"?

Should discussion of D7167 in RG 1.54 be revised?

EPRI Guidelines – is new information required?

A clear definition of the term "coating" needs to be agreed upon by USNRC and Industry. Industry disagrees on including some product forms which are not clearly "coatings" from an aging standpoint i.e. some types of cementitious materials and hot-dip galvanizing.

Should there be unique recommendations in the GALL Report for coatings such as those manufactured from cementitious materials or galvanized coatings?

It appears to Industry that the existing definition of CSL III that appears in ASTM and USNRC documents, with little or no modification, will cover the 10CFR54.4 license extension scope criteria related to coatings related to Loss of Offsite Power and Fire Protection, etc. ASTM is prepared to modify the wording of the CSL III definition as required to cover the 10CFR54.4 concerns expressed by USNRC.

Frequency of coatings inspection categorized as CSL III or Other in the current draft LR-ISG, in the opinion of industry, could be scheduled on the basis of plant-specific performance history and related data collected and documented under plant AMP practices. Arbitrarily saying that all coatings over 20 years old should be examined every 2 years (=each fuel cycle) may either be warranted or too stringent, depending on documented past performance.

EPRI Guideline has recommended frequency in Table 8-1

RG 1.137 for Diesel Fuel Oil specifies 10 yr maximum

GL 89-13 implies 5 yr frequency for Service Water

Scope of inspection is a topic worth discussing. There are existing plant programs which provide statistically-defensible sampling techniques which have been previously reviewed and accepted by USNRC which appear to be appropriate.

Acceptable amount of sampling of installed SL III coatings (e.g., 100 percent, 90-90 certainty).

Appropriate intervals of inspections. Should they be coating age-based or not
Is there a generic "age" or service condition where the frequency or extent of inspections of coatings be increased

What are the minimum qualifications of inspection personnel?

Is visual inspection sufficient?

Alternative term to use in lieu of "Other" coatings. "Other coatings" would be coatings on SSC's covered under part 54.4—A3 category—SBO diesel, Fire Protection, ATWS, where coating failure would lead to loss of function.

Cement linings - are they considered coatings

1. Inspection methods - qualifications

- A. typical findings
- B. typical repairs
- C. recommended frequency
- D. field experience/historical data

2. Level III coatings -

- A. tanks
- B. piping
- C. components

Inspection methods - qualifications

- A. typical findings
- B. typical repairs
- C. field experience/historical data
- D. recommended frequency of inspections based on required repairs