



UNITED STATES  
NUCLEAR REGULATORY COMMISSION  
WASHINGTON, D.C. 20555-0001

February 25, 2015

Mr. Jason Remer  
Nuclear Energy Institute  
1201 F. St, NW  
Suite 1100  
Washington, DC 20004-1218

SUBJECT: ACTION ITEMS FROM THE NOVEMBER 19, 2014, AND DECEMBER 4, 2014,  
PUBLIC MEETINGS RELATED TO THE GUIDANCE FOR THE SUBSEQUENT  
LICENSE RENEWAL PERIOD

Dear Mr. Remer:

The U.S. Nuclear Regulatory Commission (NRC) staff held public meetings to discuss proposed changes to the programs for managing the aging of equipment during a subsequent period of extended operation (i.e., for operation from 60 to 80 years). On November 19, 2014, the staff discussed proposed changes to the aging management programs (AMPs) for electrical equipment. On December 4, 2014, at the quarterly public meeting with the Nuclear Energy Institute (NEI), they discussed issues related to both current and subsequent license renewal. In this letter, the staff is responding to three action items from those two meetings.

During the meeting of November 19, 2014, the NRC staff mentioned that the proposed electrical AMPs in the Generic Aging Lessons Learned for Subsequent License Renewal (GALL-SLR) Report would be referencing a number of industry produced reports. NRC staff asked NEI and the nuclear power industry to review the proposed list of references to assure that NRC is using the latest version of these documents and that the documents do not contain proprietary information. The NRC staff had an action item to provide the proposed list of references to industry for their review. Enclosure 1 to this letter provides the proposed references for the electrical AMPs. The NRC staff has highlighted the references we would like updated.

A second action item from that meeting was an action for the staff to determine whether the International Atomic Energy Agency's International Generic Ageing Lessons Learned (IGALL) reports are publicly available. The IGALL has not been issued in final form but drafts are available publicly at <http://gnssn.iaea.org/NSNI/PoS/IGALL/SitePages/Home.aspx>.

The third action item was for NRC staff to provide a list of mechanical AMPs that the staff considered as having significant changes from the AMPs recommended for current license renewal. Enclosure 2 provides a list of the proposed aging management programs and equipment recommended for further evaluation for subsequent license renewal that the staff considered as having significant changes. NEI and industry may wish to request that the NRC hold public meetings on some of these programs.

-2-

If you have any questions, please contact Bennett Brady of my staff by telephone at 301-415-2981 or by e-mail at [Bennett.Brady@nrc.gov](mailto:Bennett.Brady@nrc.gov).

Sincerely,

*/RA/*

Christopher G. Miller, Director  
Division of License Renewal  
Office of Nuclear Reactor Regulation

Enclosures  
As stated

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If you have any questions, please contact Bennett Brady of my staff by telephone at 301-415-2981 or by e-mail at [Bennett.Brady@nrc.gov](mailto:Bennett.Brady@nrc.gov).

Sincerely,

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Christopher G. Miller, Director  
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Enclosures  
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**PROPOSED REFENCES FOR THE GENERIC AGING LESSONS LEARNED FOR  
SUBSEQUENT LICENSE RENEWAL (GALL-SLR) REPORT FOR ELECTRICAL AGING  
MANAGEMENT PROGRAMS (AMPS)**

**GALL-SLR Report AMP X.E1**

**References:**

- 10 CFR Part 50, Appendix B, *Quality Assurance Criteria for Nuclear Power Plants*, Office of the Federal Register, National Archives and Records Administration, 2013.
- 10 CFR 50.49, *Environmental Qualification of Electrical Equipment Important to Safety for Nuclear Power Plants*, Office of the Federal Register, National Archives and Records Administration, 2013.
- 10 CFR 54.21, *Contents of Application—Technical Information*, Office of the Federal Register, National Archives and Records Administration, 2013.
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- NRC Regulatory Guide 1.89, Rev. 1, *Environmental Qualification of Certain Electric Equipment Important to Safety for Nuclear Power Plants*, U.S. Nuclear Regulatory Commission, June 1984.
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- NUREG-0588, *Interim Staff Position on Environmental Qualification of Safety-Related Electrical Equipment*, U.S. Nuclear Regulatory Commission, July 1981.
- NS-G-2.12, "Ageing Management for Nuclear Power Plants," International Atomic Energy Agency, IAEA, Vienna.
- IAEA D-NP-T.3.6, "Guideline for Qualification and Ageing Management of I&C Cables in Current and Future NPGS," International Atomic Energy Agency, IAEA, Vienna.
- IAEA TECDOC1188, "Assessment and management of ageing of major nuclear power plant components important to safety: In-containment instrumentation and control cables," International Atomic Energy Agency, IAEA, Vienna.
- Final Report, NEA/CSNI/R (2010)15, "Technical Basis for Commendable Practices on Ageing Management - SCC and Cable Ageing Project (SCAP) Final Report," April 2011.
- Regulatory Guide 1.211, "Qualification of Safety-Related Cables and Field Splices for Nuclear Power Plants," United States Nuclear Regulatory Commission, Washington, DC, April 2009.
- Regulatory Guide 1.100, "Seismic Qualification of Electrical and Active Mechanical Equipment and Functional Qualification of Active Mechanical Equipment for Nuclear Power Plants," United States Nuclear Regulatory Commission, Washington, DC, September 3003 Revision 3 Regulatory Guide 1.218, "Condition-Monitoring Techniques for Electric Cables Used in Nuclear Power Plants," United States Nuclear Regulatory Commission, Washington, DC, April 2012.
- NUREG/CR-7000, "Essential Elements of an Electric Cable Condition Monitoring Program," U.S. Nuclear Regulatory Commission Washington, DC, January 2010.

ENCLOSURE 1

- IEEE Standard 1205-2000/Cor 1-2006, "IEEE Guide for Assessing, Monitoring, and Mitigating Aging Effects on Class 1E Equipment Used in Nuclear Power Generating Stations", Institute of Electrical and Electronics Engineers, New York, NY.
- EPRI Report 1003057, "Plant Support Engineering: License Renewal Electrical Handbook," Electric Power Research Institute, Palo Alto, CA, February 2007, Revision 1.
- JNES-SS-0903, The Final Report of the Project of "Assessment of Cable Aging for Nuclear Power Plants," Japan Nuclear Safety Organization Nuclear Energy Systems Safety Division, July 2009.

### **GALL-SLR Report AMP XI.E1**

#### **References:**

- 10 CFR Part 50, Appendix B, *Quality Assurance Criteria for Nuclear Power Plants*, Office of the Federal Register, National Archives and Records Administration, 2013.
- EPRI TR-109619, *Guideline for the Management of Adverse Localized Equipment Environments*, Electric Power Research Institute, Palo Alto, CA, June 1999.
- IEEE Standard 1205-2014, *IEEE Guide for Assessing, Monitoring, and Mitigating Aging Effects on Class 1E Equipment Used in Nuclear Power Generating Stations*.
- NUREG/CR-5643, *Insights Gained From Aging Research*, U.S. Nuclear Regulatory Commission, March 1992.
- SAND96-0344, *Aging Management Guideline for Commercial Nuclear Power Plants - Electrical Cable and Terminations*, prepared by Sandia National Laboratories for the U.S. Department of Energy, September 1996.
- NUREG/CR-7000, *Essential Elements of an Electric Cable Condition Monitoring Program*, January 2010.
- NRC Information Notice 2010-26, *Submerged Electrical Cables*, December 2, 2010.
- NRC Information Notice 2010-25, *Inadequate Electrical Connections*, November 17, 2010.
- Regulatory Guide 1.218, *Condition-Monitoring Techniques for Electric Cables Used In Nuclear Power Plants*, April 2012.
- IEEE 422-2012, *Guide for the Design and Installation of Cable Systems in Power Generating Stations*.
- IEEE 576-2000 *Recommended Practice for Installation, Termination, and Testing of Insulated Power Cable as Used in Industrial and Commercial Applications*.  
*10 CFR Part 50, Appendix B, Quality Assurance Criteria for Nuclear Power Plants*, Office of the Federal Register, National Archives and Records Administration, 2009.
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- IEEE Standard 1205-2014, *IEEE Guide for Assessing, Monitoring and Mitigating Aging Effects on Electrical Equipment Used in Nuclear Power Generating Stations and Other Nuclear Facilities*.
- NRC Information Notice 93-33: *Potential Deficiency of Certain Class 1E Instrumentation and Control Cables*, U.S. Nuclear Regulatory Commission, April 28, 1993.

- NUREG/CR-5643, *Insights Gained From Aging Research*, U.S. Nuclear Regulatory Commission, March 1992.
- NUREG/CR-5772, *Aging, Condition Monitoring and Loss-of-Coolant Accident (LOCA) Tests of Class IE Electrical Cables Vol. 1 and 2*, U.S. Nuclear Regulatory Commission, August 1992 and October 1992.
- NUREG/CR-5461, *Aging of Cables, Connections, and Electrical Penetrations Assemblies Used In Nuclear Power Plants*, U.S. Nuclear Regulatory Commission, July 1990.
- Regulatory Guide 1.218, *Condition Monitoring Techniques for Electric Cables Used in Nuclear Power Plants*, U.S. Nuclear Regulatory Commission April 2012.
- NUREG/CR-7000, *Essential Elements of an Electric Cable Condition Monitoring Program*, January 2010.
- SAND96-0344, *Aging Management Guideline for Commercial Nuclear Power Plants - Electrical Cable and Terminations*, prepared by Sandia National Laboratories for the U.S. Department of Energy, September 1996.

## **GALL-SLR Report XI.E2**

### **References:**

- 10 CFR Part 50, Appendix B, *Quality Assurance Criteria for Nuclear Power Plants*, Office of the Federal Register, National Archives and Records Administration, 2013.
- EPRI TR-109619, *Guideline for the Management of Adverse Localized Equipment Environments*, Electric Power Research Institute, Palo Alto, CA, June 1999.
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- NRC Information Notice 93-33: *Potential Deficiency of Certain Class IE Instrumentation and Control Cables*, U.S. Nuclear Regulatory Commission, April 28, 1993.
- NUREG/CR-5643, *Insights Gained From Aging Research*, U.S. Nuclear Regulatory Commission, March 1992.
- NUREG/CR-5772, *Aging, Condition Monitoring and LOCA Tests of Class IE Electrical Cables Vol. 1 and 2*, U.S. Nuclear Regulatory Commission, August 1992 and October 1992.
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- Regulatory Guide 1.218, *Condition Monitoring Techniques for Electric Cables Used in Nuclear Power Plants*, U.S. Nuclear Regulatory Commission April 2012.
- NUREG/CR-7000, *Essential Elements of an Electric Cable Condition Monitoring Program*, January 2010.
- SAND96-0344, *Aging Management Guideline for Commercial Nuclear Power Plants - Electrical Cable and Terminations*, prepared by Sandia National Laboratories for the U.S. Department of Energy, September 1996.

## **GALL-SLR Report AMP XI.E3 a,b, and c**

### **References:**

- 10 CFR Part 50, Appendix B, *Quality Assurance Criteria for Nuclear Power Plants*, Office of the Federal Register, National Archives and Records Administration, 2013.
- Regulatory Guide 1.218, Rev. 0, *Condition Monitoring Techniques for Electric Cables Used in Nuclear Power Plants*, April 2012.
- EPRI TR-109619, *Guideline for the Management of Adverse Localized Equipment Environments*, Electric Power Research Institute, Palo Alto, CA, June 1999.
- IEEE Standard 1205-2000, *IEEE Guide for Assessing, Monitoring and Mitigating Aging Effects on Class 1E Equipment Used in Nuclear Power Generating Stations*.
- NRC Inspection Procedure, Attachment 71111.06, *Flood Protection Measures*, June 25, 2009.
- NRC Inspection Procedure, Attachment 71111.01, *Adverse Weather Protection*, April 8, 2009.
- NRC Information Notice 2002-12, *Submerged Safety-Related Electrical Cables*, March 21, 2002.
- NRC Information Notice 2010-26, *Submerged Electrical Cables*, December 2, 2010.
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- SAND96-0344, *Aging Management Guideline for Commercial Nuclear Power Plants - Electrical Cable and Terminations*, prepared by Sandia National Laboratories for the U.S. Department of Energy, September 1996.
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- IAEA Nuclear Energy Series, No. NP-T-3.6, *Assessing and Managing Cable Aging in Nuclear Power Plants*, 2012.
- EPRI TR-1013085 - *Plant Support Engineering: Advanced Diagnostics and Life Estimation of Extruded Dielectric Cable - Nonproprietary Results Related to Cross-Linked Polyethylene and Ethylene Propylene Rubber Insulated Shielded Cables*
- EPRI TR-1011871 *Continuous On-Line Partial Discharge Monitor for Medium-Voltage Cable Feasibility Study*
- EPRI TR-1011872, *Long-Term Laboratory Aging of Nuclear Plant Cables*
- EPRI TR-1011873 *Cable Polymer Aging and Condition Monitoring Research at Sandia National Laboratories Under the Nuclear Energy Plant Optimization (NEPO) Program*
- EPRI TR-1008211 *Initial Acceptance Criteria Concepts and Data for Assessing Longevity of Low-Voltage Cable Insulations and Jackets*
- EPRI TR-1003663 *Integrated Cable System Aging Management Guidance - Low-Voltage Cable*
- EPRI TR-1003317 - *Cable System Aging Management*

## **GALL-SLR Report XI.E4**

### **References:**

- 10 CFR Part 50, Appendix B, *Quality Assurance criteria for Nuclear Power Plants*, Office of the Federal Register, National Archives and Records Administration, 2013.
- IEEE Standard 1205-2014, *IEEE Guide for Assessing, Monitoring and Mitigating Aging Effects on Electrical Equipment Used in Nuclear Power Generating Stations and Other Nuclear Facilities*.
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- NRC Information Notice 98-36, *Inadequate or Poorly Controlled, Nonsafety-Related Maintenance Activities Unnecessary Challenged Safety Systems*, September 18, 1998.
- NRC Information Notice 2000-14, *Non-Vital Bus Fault Leads to Fire and Loss of Offsite Power*, September 27, 2000.
- NRC Information Notice 2010-25, *Inadequate Electrical Connections*, November 17, 2010.
- *Electrical Connector Application Guidelines*, Electric Power Research Institute, Palo Alto, CA. December 2002, TR-100347
- SAND96-0344, *Aging Management Guideline for Commercial Nuclear Power Plants – Electrical Cable and Terminations*, prepared by Sandia National Laboratories for the U.S. Department of Energy, September 1996.
- International Atomic Energy Agency, *Ageing Management for Nuclear Power Plants*, Safety Guide No. NS-G-2.12, IAEA, Vienna.
- U.S. Nuclear Regulatory Commission. *Aging of Cables, Connections, and Electrical Penetration*
  - Assemblies Used in Nuclear Power Plants. NUREG/CR-5461, SAND89-2369, July 1990.
- *Cable System Management*. Electric Power Research Institute, Palo Alto, CA: 2002, TR-1003317.
- *Infrared Thermography Guide*. Electric Power Research Institute, Palo Alto, CA: 2002,
  - 1006534.
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- LER 2008-001-00, *Unit 2 Emergency Diesel Generators and Auxiliary Feedwater Pump Automatic Start Resulting from a loss of Offsite Power Due to a Failed Insulator Causing a Differential Phase Overcurrent*, March 25, 2006.

## **GALL-SLR Report XI.E5**

### **References:**

- 10 CFR Part 50, Appendix B, *Quality Assurance Criteria for Nuclear Power Plants*, Office of the Federal Register, National Archives and Records Administration, 2013.
- IEEE Standard 1205-2014, *IEEE Guide for Assessing, Monitoring, and Mitigating Aging Effects on Class 1E Equipment Used in Nuclear Power Generating Stations*.



- NRC Information Notice 86-87, *Loss of Offsite Power Upon an Automatic Bus Transfer*, October 10, 1986.
- NRC Information Notice 87-42, *Diesel Generator Fuse Contacts*, September 4, 1987.
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- NUREG-1760, *Aging Assessment of Safety-Related Fuses Used in Low- and Medium-Voltage Applications in Nuclear Power Plants*, May 31, 2002.
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- LER, 265-2002-002, *Manual Scram due to Reactor Level Transient as a Result of a Digital Feedwater Level Control System Design Error*, April 4, 2002.
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### **GALL-SLR Report AMP XI.E6**

#### **References:**

- 10 CFR Part 50, Appendix B, *Quality Assurance Criteria for Nuclear Power Plants*, Office of the Federal Register, National Archives and Records Administration, 2013.
- EPRI TR-104213 *Bolted Joint Maintenance & Application Guide*, Electric Power Research Institute, Palo Alto, CA, December 1995.
- EPRI TR-109619, *Guideline for the Management of Adverse Localized Equipment Environments*, Electric Power Research Institute, Palo Alto, CA, June 1999.
- EPRI TR-1003471, *Electrical Connector Application Guidelines*, Electric Power Research Institute, Palo Alto CA, December 2002.
- IEEE Standard 1205-2000, *IEEE Guide for Assessing, Monitoring and Mitigating Aging Effects on Class 1E Equipment Used in Nuclear Power Generating Stations*.
- Licensee Event Report 361 2007005, *San Onofre Unit 2, Loose Electrical Connection Results in Inoperable Pump Room Cooler*, U.S. Nuclear Regulatory Commission.
- Licensee Event Report 3612007006, *San Onofre Units 2 and 3, Loose Electrical Connection Results in One Train of Emergency Chilled Water (ECW) System Inoperable*, U.S. Nuclear Regulatory Commission.
- Licensee Event Report 3612008006, *San Onofre Unit 2, Loose Connection Bolting Results in Inoperable Battery and TS Violation*, U.S. Nuclear Regulatory Commission.
- NRC Information Notice 2010-25, *Inadequate Electrical Connections*, November 17, 2010.
- NRC Information Notice No. 98-21, *Potential Deficiency of Electrical Cable Connection Systems*, June 4, 1998.
- NEI White Paper, *GALL AMP XI.E6 (Electrical Cables)*, Nuclear Energy Institute, September 5, 2006. (ADAMS Accession Number ML062770105).
- NUREG/CR-5643, *Insights Gained From Aging Research*, U.S. Nuclear Regulatory Commission, March 1992.

- SAND96-0344, *Aging Management Guideline for Commercial Nuclear Power Plants – Electrical Cable and Terminations*, prepared by Sandia National Laboratories for the U.S. Department of Energy, September 1996.

Staff's Response to the NEI White Paper on Generic Aging Lessons Learned (GALL) Report Aging Management Program (AMP) XI.E6, *Electrical Cable Connections Not Subject to 10 CFR 50.49 Environmental Qualification Requirements*, U.S. Nuclear Regulatory Commission, March 16, 2007 (ADAMS Accession Number ML070400349).

### **GALL-SLR Report AMP XI.E7**

#### **References:**

- 10 CFR Part 50, Appendix B, *Quality Assurance Criteria for Nuclear Power Plants*, Office of the Federal Register, National Archives and Records Administration, 2013.
- EPRI TR-109619, *Guideline for the Management of Adverse Localized Equipment Environments*, Electric Power Research Institute, Palo Alto, CA, June 1999.
- IEEE Standard 1205-2000, *IEEE Guide for Assessing, Monitoring and Mitigating Aging Effects on Class 1E Equipment Used in Nuclear Power Generating Stations*.
- NUREG/CR-5643, *Insights Gained From Aging Research*, U.S. Nuclear Regulatory Commission, March 1992.
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- EPRI 1013475, *Plant Support Engineering: License Renewal Electrical Handbook. Revision 1*, Electric Power Research Institute, Palo Alto, CA. February 2007
- NRC Information Notice 93-95: Storm-Related Loss of Offsite Power Events Due to Salt Buildup on Switchyard Insulators.

#### **Additional**

#### **IAEA:**

- International Atomic Energy Agency (IAEA), *Assessment and Management of Ageing of Major Nuclear Power Plant Components Important to Safety: In-Containment Instrumentation and Control Cables*. TECDOC1188, IAEA, Vienna.
- Nuclear Energy Agency, *Technical Basis For Commendable Practices On Ageing Management - SCC And Cable Ageing Project (SCAP) Final Report*, NEA/CSNI/R (2010)15, April 2011, NEA.
- International Atomic Energy Agency, *Assessing and Managing Cable Ageing in Nuclear Power Plants*, IAEA Nuclear Energy Series No. D-NP-T.3.6, IAEA, Vienna.
- *Technical Basis for Commendable Practices on Ageing Management - SCC and Cable Ageing Project (SCAP) Final Report*, NEA/CSNI/R (2010)15, April 2011.

- IAEA Nuclear Energy Series No. D-NP-T.3.6, Assessing and Managing Cable Ageing in Nuclear Power Plants.
- IAEA Safety Standards, Aging Management in Nuclear Power Plants, Safety Guide No. NS-G-2.12, 2009.
- IAEA TECDOC Series, Approaches to Aging Management for Nuclear Power Plants, International Generic Lessons Learned (IGALL) Final Report, IAEA-TECDOC-1736, IAEA, Vienna, 2014.
- IAEA Safety Report Series, Aging Management for Nuclear Power Plants: International Generic Lessons Learned, IAEA, Vienna, Austria. 2014

## **MECHANICAL AGING MANAGEMENT PROGRAMS AND FURTHER EVALUATION ITEMS WITH POTENTIAL SIGNIFICANT CHANGES**

- X.M1 Cyclic Load Monitoring (formerly Fatigue Monitoring)
- XI.M6 BWR Control Rod Drive Return Line Nozzle is being retired (There will be a new further evaluation item to address SCC in BWR dead-leg piping)
- XI.M9 BWR Vessel Internals
- XI.M11B Cracking of Nickel Alloys
- XI.16A PWR Vessel Internals is being deleted and replaced with a further evaluation item
- XI.27 Fire Water System
- XI.M32 One-Time Inspection
- XI.M33 Selective Leaching
- XI.M41 Buried Piping
- New, X.M2 Fluence Monitoring
- We added a further evaluation to address polyvinyl chloride pipes exposed to outdoor air.
- We added a further evaluation to address aluminum tanks and components exposed to outdoor air.
- We revised further evaluation SRP Sections 3.2.2.2.6, 3.3.2.2.3, and 3.4.2.2.2 to address underground stainless steel components exposed to in-leakage in a vault due to precipitation or groundwater.