UNITED STATES
NUCLEAR REGULATORY COMMISSION
REGION III
2443 WARRENVILLE RD. SUITE 210
LISLE, IL 60532-4352

November 7, 2014

Mr. Michael J. Pacilio
Senior VP, Exelon Generation Co., LLC
President and CNO, Exelon Nuclear
4300 Winfield Road
Warrenville, IL 60555

SUBJECT: BRAIDWOOD STATION, UNITS 1 AND 2 – NRC LICENSE RENEWAL SCOPING, SCREENING, AND AGING MANAGEMENT INSPECTION REPORT 05000456/2014009; 05000457/2014009.

Dear Mr. Pacilio:

On November 5, 2014, the U.S. Nuclear Regulatory Commission (NRC) completed a license renewal inspection at your Braidwood Station, Units 1 and 2. The enclosed report documents the inspection results, which were discussed on November 5, 2014, with members of your staff.

The purpose of this inspection was to examine activities that support the license renewal application for Braidwood Station, Units 1 and 2. The inspection addressed the processes of scoping and screening plant equipment to select equipment subject to an aging management review, and development and implementation of Aging Management Programs to support a period of extended operation. As part of the inspection, the NRC examined procedures and representative records, interviewed personnel, and visually examined accessible portions of various systems, structures, and components to verify license renewal boundaries and to observe any equipment aging effects.

The team concluded the scoping, screening, and existing aging management license renewal activities, were generally conducted as described in the Braidwood Station, Units 1 and 2, license renewal application and, as supplemented through your responses to requests for additional information from the NRC. The team also concluded the documentation supporting the application was generally in an auditable and retrievable form. In addition, the team concluded the implementation of the proposed Aging Management Programs, as described in the license renewal application with the proposed enhancements and, as supplemented through your responses to NRC requests for additional information and inspection observations, should provide reasonable assurance the intended functions of vital plant systems, structures, and components will be maintained through the period of extended operation.

In accordance with Title 10, *Code of Federal Regulations* (CFR), Section 2.390 of the NRC's "Rules of Practice," a copy of this letter, its enclosure, and your response (if any), will be available electronically for public inspection in the NRC Public Document Room or from the Publicly Available Records System (PARS) component of NRC's Agencywide Documents Access and Management System (ADAMS), accessible from the NRC Web site at http://www.nrc.gov/reading-rm/adams.html (the Public Electronic Reading Room).

Sincerely,

/RA/

Ann Marie Stone, Chief
Engineering Branch 2
Division of Reactor Safety

Docket Nos. 50-456; 50-457
License Nos. NPF–72; NPF–77

Enclosure:
Inspection Report 05000456/2014009;
05000457/2014009
w/Attachments: Supplemental Information
and Exit Meeting Presentation Slides

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U.S. NUCLEAR REGULATORY COMMISSION

REGION III

Docket Nos:	50-456; 50-457
License Nos:	NPF-72; NPF-77
Report No:	05000456/2014009; 05000457/2014009
Licensee:	Exelon Generation Company, LLC
Facility:	Braidwood Station, Units 1 and 2
Location:	Braceville, IL
Dates:	September 15 through November 5, 2014
Inspectors:	N. Féliz Adorno, Senior Reactor Inspector (Lead) J. Neurauter, Senior Reactor Inspector M. Jones, Reactor Inspector V. Meghani, Reactor Inspector I. Hafeez, Reactor Inspector
Observer:	R. Elliot, Reactor Inspector
Approved by:	Ann Marie Stone, Chief Engineering Branch 2 Division of Reactor Safety

Enclosure

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SUMMARY OF FINDINGS

Inspection Report (IR) 05000456/2014009; 05000457/2014009; 09/15/2014 – 11/05/2014; Braidwood Station, Units 1 and 2; License Renewal Inspection

This inspection of the applicant's license renewal scoping, screening, and aging management processes was performed by five inspectors based in the Region III office. The team applied NRC Inspection Manual Chapter 2516 and NRC Inspection Procedure 71002 as guidance for performing this inspection. All violations of NRC requirements are dispositioned in accordance with the NRC's Enforcement Policy dated July 9, 2013. The NRC's program for overseeing the safe operation of commercial nuclear power reactors is described in NUREG-1649, "Reactor Oversight Process" Revision 5, dated February 2014. No findings as defined in NRC Inspection Manual Chapter 0612 were identified.

A. NRC-Identified and Self-Revealing Findings

No findings of significance were identified

B. Licensee-Identified Violations

No violations of significance were identified.

REPORT DETAILS

1. INSPECTION SCOPE

This inspection was conducted by NRC Region III inspectors. The inspection was performed in accordance with NRC Inspection Manual Chapter 2516 and NRC Inspection Procedure (IP) 71002, "License Renewal Inspection," dated November 23, 2011.

This inspection looked at both the applicant's scoping and screening methodology and Aging Management Programs, as described in the applicant's license renewal application (LRA) titled "Application for Renewed Operating Licenses," dated May 29, 2013, (ADAMS Accession No. ML13155A387), and as described in subsequent applicant's revised correspondences to the NRC.

The team also reviewed the five regulated events specified for inclusion in 10 CFR 54.4(a)(3) including, environmental qualification (EQ), pressurized thermal shock, station blackout, fire protection (FP), and anticipated transient without scram (ATWS). The team reviewed license renewal (LR) boundary drawings, the LRA, scoping and screening reports, and the Updated Final Safety Analysis Report (UFSAR). Based on the reviewed documentation, the team concluded the applicant had performed scoping and screening for the regulated events in accordance with the methodology described in the LRA and the rule.

The Attachments to this report list the documents reviewed and the acronyms used.

2. VISUAL OBSERVATION OF PLANT EQUIPMENT

During this inspection, the team performed walkdowns of portions of plant systems, structures, and components (SSCs). These walkdowns were intended to determine the acceptability of the scope boundaries, to observe the current condition of the SSCs, and to assess the likelihood that a proposed Aging Management Program (AMP) would successfully manage the associated aging effects. Specifically, the team conducted walkdowns of accessible portions of:

- Unit 1 containment spray pumps, caustic tank, and accessible portion of piping;
- Units 1 and 2 safety-related service water components located at the pump rooms including strainers, pumps, and piping components;
- Units 0, 1, and 2 component cooling water heat exchangers, pumps, and nearby piping;
- Control room chillers;
- Units 1A and 2A residual heat removal system suction line;
- 345kV switchyard, relay house;
- Unit 2 station auxiliary transformers;
- Outside metal enclosed buses;

- Unit 1A emergency diesel generators;
- Engineered safety features switchgear room;
- Auxiliary Building upper and lower cable spreading rooms;
- Fire protection pumps, piping, discharge nozzles, halon and carbon dioxide tanks, sprinklers, and hose stations located at the auxiliary building and lake screen house;
- Unit 1A safety injection components located at the pump room;
- Auxiliary building main steam line radiation monitors;
- Control room ventilation intake radiation monitors;
- Feed water pumps;
- Units 1 and 2 ATWS panels;
- Main generator exciter house, stator water cooling system, and hydrogen seal oil system;
- Inaccessible power cables in manholes 1D, 1E, 1F, 1G, 1H, 1J, 1K, and 1N;
- Bottle gas storage area;
- River screen house;
- Feedwater pumps and attached piping pressure retaining bolting;
- Turbine building overhead crane;
- One snubber support on Unit 2 main steam and safety injection piping systems;
- Auxiliary building areas susceptible to water intrusion;
- Turbine building areas susceptible to water intrusion;
- Unit 1 tendon tunnel areas susceptible to water intrusion;
- Unit 1 containment exterior structural steel;
- Auxiliary building bolting and fasteners at elevation 426 general area for cable tray, conduit, and ventilation duct splices, component supports, baseplates, structural beam connections, and cable tray supports; and
- Masonry walls sample in auxiliary building and turbine building.

Specific comments on the walkdown results are presented in the sections below.

3. REVIEW OF SCOPING AND SCREENING METHODOLOGY

In order to assess the applicant's scoping and screening methodology, the team reviewed a sample of non-safety-related SSCs that the applicant determined were not within the scope of LR in accordance with 10 CFR 54.4(a)(2). Specifically, the team reviewed applicable documents, interviewed applicant staff, and conducted walkdowns of the following sample of SSCs:

.1 Cathodic Protection System

The cathodic protection (CP) system is a normally operating system credited to mitigate loss of material by controlling soil conditions, by maintaining CP system availability and effectiveness values in accordance with National Association of Corrosion Engineers (NACE) guidelines. The licensee detailed their plan to use a cathodic protection system in accordance with NACE guidelines in letter titled "Response to NRC Request for Additional Information, Set 2, dated December 13, 2013, related to the Braidwood Station, Units 1 and 2 and Byron Station, Units 1 and 2 License Renewal Application," dated January 13, 2014, (ADAMS Accession No. ML14013A293). The applicant excluded the cathodic protection system from the scope of LR because it did not perform a safety-related function, was not required for a regulated event, and did not potentially impact the safety function of another system.

The team reviewed scoping and screening documents, cathodic protection system ground maps, system availability and effectiveness data, and buried piping inspection results. In addition, the team interviewed personnel responsible for the system and conducted a walkdown of the above ground portions of the cathodic protection system test locations. Based on the reviewed portions of the system, the team concluded the applicant had performed scoping and screening for the cathodic protection system in accordance with the methodology described in the LRA and the rule.

.2 Main Generator and Auxiliaries System

The main generator and auxiliaries system was normally operating and converts the main turbine mechanical energy into electrical energy for distribution. It consists of the main generator, main generator excitation system, a portion of the turbine lube oil system which includes the seal oil system, generator gas system which includes the hydrogen and carbon dioxide systems, stator water cooling, and the isophase-bus system. The applicant excluded the main generator and auxiliaries system from the scope of LR because it did not perform a safety-related function, was not required for a regulated event, and did not potentially impact the safety function of another SSC.

The team reviewed the LR boundary drawings, the LRA, scoping and screening reports, and the UFSAR. In addition, the team interviewed personnel responsible for the system and conducted a walkdown of accessible portions of the main generator, stator water cooling system, hydrogen seal-oil system, and main generator exciter house. Based on the reviewed portions of the system, the team concluded the applicant had performed scoping and screening for the main generator and auxiliaries system in accordance with the methodology described in the LRA and the rule.

.3 Miscellaneous Not-In Scope Structures

The miscellaneous not-in scope structures are non-safety-related and provide support, shelter, and protection for non-safety-related SSCs that do not perform an intended function for LR. These non-safety-related structures are also separated from safety-related SSCs such that their failure would not impact a safety-related function. The applicant excluded the miscellaneous not-in scope structures from the scope of LR because it did not perform a safety-related function, was not required for a regulated event, and did not potentially impact the safety function of another SSC.

The team reviewed the LR boundary drawings, the application, and the UFSAR and interviewed responsible applicant staff. In addition, the team walked down accessible portions of the bottle gas storage area and the river screen house to verify that a failure of the structures would not potentially impact the safety function of another SSC. Based on the portions of structures reviewed, the team concluded the applicant had performed scoping and screening for the miscellaneous not-in scope structures in accordance with the methodology described in the LRA and the rule.

4. REVIEW OF AGING MANAGEMENT PROGRAMS

The team assessed the current implementation of existing programs, credited by the proposed AMPs, to verify they were consistent with the applicant's description contained in the LRA and associated correspondence with the NRC. In addition, the team reviewed a sample of existing activities associated with these programs to verify they provide reasonable assurance the aging effects will be managed for the period of extended operation consistent with the licensing basis. In addition, for those programs where the applicant had indicated the intent to be consistent with NUREG-1801, "Generic Aging Lessons Learned (GALL) Report," the team verified the applicant's program included the GALL attributes. For those programs which the applicant indicated were new or being enhanced, the team verified commitments existed and were sufficient to support future implementation. For those programs the applicant indicated were going to take exception to the GALL, the team reviewed the exceptions against the GALL recommendations and evaluated the acceptability of the applicant's proposal.

The team also conducted walkdowns of selected in-scope SSCs to assess how plant equipment was maintained under the current operating license and to visually observe examples of non-safety-related equipment determined to be in scope due to their potential interaction with safety-related equipment and their potential for failure due to aging effects.

.1 American Society of Mechanical Engineers (ASME) Section XI In-Service Inspection (ISI), Subsections IWB, IWC, and IWD (B.2.1.1)

The ASME Section XI ISI, Sub-Sections IWB, IWC, and IWD AMP is an existing program intended to manage the aging effects of cracking, loss of fracture toughness, and loss of material in Class 1, 2, and 3 piping and components exposed to air with borated water leakage, reactor coolant, reactor coolant and neutron flux, treated borated water, steam, and treated water environments. This program relies on periodic visual, surface, and volumetric examination, and leakage testing of Class 1, 2, and 3 pressure-retaining components including welds, pump casings, valve bodies, integral attachments, and pressure-retaining bolting. These activities are implemented in accordance with the requirements identified in the ASME Code Section XI, Subsections IWB, IWC, and IWD.

This existing program will include an enhancement to perform a visual inspection of the accessible portions of the ASME Class 2 reactor vessel flange leakage monitoring tube every other refueling outage. This program, with the enhancement, is intended to be consistent with Revision 2 of NUREG-1801, Section XI.M1, "ASME Section XI ISI, Sub-Sections IWB, IWC, and IWD," without exceptions. In addition, the LRA program description was revised to identify additional components subject to examination under this program in applicant's letter to the NRC titled "Responses to NRC Requests for Additional Information, Set 29, dated June 4, 2014, related to the Byron Station, Units 1 and 2, and Braidwood Station, Units 1 and 2, License Renewal Application," dated June 18, 2014, (ADAMS Accession No. ML14169A026). Specifically, the applicant stated the control rod drive mechanism thermal sleeves are examined under an augmented ISI inspection program, which relies on ultrasonic testing of five thermal sleeves with the worst visual wear found to date. The plan is to obtain measured wear data points at the five designated thermal sleeve locations during three different refueling outages. The frequency for inspection of the reactor vessel head thermal sleeve for loss of material due to wear will be re-evaluated after the accumulation of the three data points on each of the five designated thermal sleeves. The three series of examinations will be performed before the period of extended operation. Subsequently, the required frequency for further inspections, if required, will be determined using the guidance provided in WCAP-16911-P, "Reactor Vessel Head Thermal Sleeve Wear Evaluation for Westinghouse Domestic Plants."

The team reviewed the LR Program basis documentation, responses to requests for additional information (RAIs), implementing procedures, ISI Program plans, NRC ISI baseline inspection reports, completed ISI records, LR boundary drawings for the residual heat removal system, ISI program health reports, and the LRA. The team also interviewed the responsible applicant staff and performed walkdowns of the Units 1A and 2A residual heat removal piping system at the auxiliary building. As a result of this review, the team identified the following observations:

- The program description contained in Appendix A, "Updated Final Safety Analysis Report Supplement," and Appendix B, "Aging Management Programs," of the LRA was not bounding. Specifically, their AMP description did not include existing inspections of small bore lines subject to thermal fatigue as described in MRP-146 "Management of Thermal Fatigue in Normally Stagnant Non-Isolable Reactor Coolant System Branch Lines," and a residual heat removal pipe segment susceptible to thermal fatigue cracking as identified in MRP-192 "Assessment of Residual Heat Removal Mixing Tee Thermal Fatigue in PWR Plants." The applicant captured this observation as license renewal change request (LRCR) Region-11 and LRCR Region-41, respectively, to revise the program description in LRA Appendices A and B to include these additional inspection activities.

- The program description contained in Appendix B did not identify this AMP will use 10 CFR 50.55a to impose additional limitations, modifications, and augmentations of ISI requirements beyond those stated in ASME Code, Section XI. The applicant captured this observation as LRCR Region-3 to revise the LRA program description.

The applicant incorporated these changes into the LRA in letter to the NRC titled "Response to NRC Request for Additional Information, Set 38, dated August 4, 2014; LRA changes from Office of Nuclear Reactor Regulations (NRR) Staff Feedback on July 30, 2014, telephone conversation (telecon); and, LRA changes from NRC Region III IP 71002 Inspection related to the Byron Station, Units 1 and 2, and Braidwood Station, Units 1 and 2,

License Renewal Application," dated August 29, 2014, (ADAMS Accession No. ML14241A527).

The team concluded the implementation of the ASME Section XI ISI, Sub-Sections IWB, IWC, and IWD AMP, as described in the LRA with the proposed enhancement and LRCR Region-3, Region-11, and Region-41 changes should provide reasonable assurance the aging effects will be managed, consistent with the license basis, for the period of extended operation.

.2 Water Chemistry (B.2.1.2)

The water chemistry AMP is an existing program intended to mitigate loss of material due to corrosion, cracking due to stress corrosion cracking, and heat transfer reduction due to fouling of systems exposed to reactor coolant, steam, treated borated water, and treated water. This program relies on monitoring and control of the chemical environment of the systems, which are within the scope of this program. This AMP is intended to be consistent with Revision 2 of NUREG-1801, Section XI.M2, “Water Chemistry," without exceptions or enhancements.

The team reviewed LR Program basis documentation, existing procedures and surveillance results, Corrective Action Program documents, LR boundary drawings, and the LRA. The team also interviewed responsible applicant staff and conducted walkdowns of the Unit 1 containment spray pumps, caustic tank, and accessible portions of piping. No significant concerns were identified during the walkdown.

The team concluded the implementation of the proposed water chemistry AMP, as described in the LRA, should provide reasonable assurance the aging effects will be managed for the period of extended operation consistent with the licensing basis.

.3 Reactor Head Closure Stud Bolting (B.2.1.3)

The reactor head closure stud bolting program is an existing program intended to manage the effects of material loss and cracking of the reactor head closure studs and associated reactor pressure vessel head flange threads, nuts, and washers exposed to air in a borated water leakage environment. This program is based on the examination and inspection requirements specified in ASME Code, Section XI, Subsection IWB, Table IWB-2500-1. In addition, it was based on the preventive measures described in NRC NUREG-1339, "Resolution of Generic Safety Issue 29: Bolting Degradation or Failure of Nuclear Power Plants," and NRC Regulatory Guide (RG) 1.65, “Materials and Inspection for Reactor Vessel Closure Studs.”

This program will include an enhancement to be consistent with Revision 2 of NUREG-1801, Section XI.M3, “Reactor Head Closure Stud Bolting,” with one exception as described in the LRA. Specifically, the Preventive Action Element of Revision 2 of NUREG-1801, Section XI.M3, stated that using bolting material for closure studs with actual measured yield strength less than 150 kips per square inch (ksi) can reduce the potential for stress corrosion cracking and intergranular stress corrosion cracking. The LRA includes a justification for taking exception to this preventive measure since site documentation indicated that some reactor head closure studs installed before commercial operation or used as replacements may have actual measured yield strength slightly greater than 150 ksi. This program will also be enhanced to revise the procurement requirements for

reactor head closure stud material to assure the maximum yield strength of replacement material is consistent with this preventive measure.

In addition, the LRA program description was revised to address the out-of-service Unit 2 reactor vessel flange stud at location 35 in the applicant's letter to the NRC titled "Updated Response to two NRC Requests for Additional Information from Set 1, dated October 7, 2013, related to the Braidwood Station, Units 1 and 2, and Byron Station, Units 1 and 2, License Renewal Application," dated December 19, 2013, (ADAMS Accession No. ML13354B749). In this letter, the applicant committed to repair the stud no later than 6 months before the period of extended operation, so that all 54 reactor head closure studs will be tensioned during the period of extended operation.

The team reviewed the LR Program basis documentation, aging management review documents, responses to requests for additional information (RAIs), implementing procedures, completed ISI records, certified material test reports, and the LRA. The team also interviewed the responsible applicant staff. The team was unable to observe the condition of reactor head closure stud bolting because they were inaccessible at the time of this inspection.

The team concluded the implementation of the reactor head closure stud bolting program, as described in the LRA with the proposed enhancement, should provide reasonable assurance the aging effects will be managed for the period of extended operation, consistent with the license basis.

.4 Cracking of Nickel-Alloy Components and Loss of Material Due to Boric Acid-Induced Corrosion in Reactor Coolant Pressure Boundary Components (B.2.1.5)

The cracking of nickel-alloy components and loss of material due to boric acid-induced corrosion in reactor coolant pressure boundary components AMP is an existing program intended to manage the effects of primary water stress corrosion cracking of nickel-alloy based components and associated welds, and boric acid-induced corrosion of susceptible components in the vicinity of nickel-alloy reactor coolant pressure boundary components exposed to reactor coolant or air with borated water leakage environments. It relies on periodic bare-metal visual, surface, and/or volumetric examinations of in-scope components and monitoring of reactor coolant pressure boundary leakage. As required by 10 CFR 50.55a, the AMP long-term inspection requirements are intended to be consistent with ASME, Section XI, Code Case N-722-1, "Additional Examinations for PWR Pressure Retaining Welds in Class 1 Components Fabricated with Alloy 600/82/182 Materials, Section XI, Division 1;" Code Case N-729-1, "Alternative Examination Requirements for PWR Reactor Vessel Upper Heads with Nozzles Having Pressure-Retaining Partial-Penetration Welds;" and Code Case N-770-1, "Alternative Examination Requirements and Acceptance Standards for Class 1 PWR Piping and Vessel Nozzle Butt Welds Fabricated with UNS N06082 or UNS W86182 Weld Filler Material With or Without Application of Listed Mitigation Activities."

This AMP is intended to be consistent with Revision 2 of NUREG-1801, Section XI.M11B, "Cracking of Nickle-Alloy Components and Loss of Material Due to Boric Acid-Induced Corrosion in Reactor Coolant Pressure Boundary Components Program," without exceptions and enhancements. In addition, the applicant plans to manage material loss of the control rod drive mechanism penetration nozzles due to thermal sleeve centering pad wear by analysis such that examinations will not be required during the period of extended operation in a letter to the NRC titled "Response to NRC Requests for Additional Information, Set 4,

dated December 12, 2013, related to the Braidwood Station, Units 1 and 2, and Byron Station, Units 1 and 2 License Renewal Application," dated January 13, 2014 (ADAM Accession No. ML14013A148). The applicant also expects to provide the analysis results to the NRC by the end of November 2014 and develop a volumetric examination method if the analysis concludes the acceptance criteria cannot be met in the letter to the NRC titled "Response to NRC Requests for Additional Information, Set 29, dated June 4, 2014, related to the Braidwood Station, Units 1 and 2, and Byron Station, Units 1 and 2, License Renewal Application," dated June 18, 2014 (ADAM Accession No. ML14169A026).

The team reviewed the LR Program basis documentation, aging management review documents, responses to RAIs, implementing procedures, and the LRA. The team also interviewed responsible applicant staff. The team was unable to observe the condition of the in-scope components because they were inaccessible at the time of this inspection.

The team concluded the implementation of the cracking of nickel-alloy components and loss of material due to boric acid-induced corrosion in reactor coolant pressure boundary components AMP, as described in the LRA, should provide reasonable assurance the aging effects will be managed for the period of extended operation, consistent with the license basis. This conclusion is conditional to the results of the pending wear analysis of the control rod drive mechanism penetration nozzles and the associated NRC staff review.

.5 Thermal Aging Embrittlement of Cast Austenitic Stainless Steel (CASS) (B.2.1.6)

The thermal aging embrittlement of cast austenitic stainless steel (CASS) AMP is a new program intended to manage the effect of thermal aging embrittlement on susceptible reactor coolant pressure boundary CASS components. This program will augment the ASME Code, Section XI, Subsection IWB program by monitoring the aging effect of loss of fracture toughness due to thermal aging embrittlement of ASME Code Class 1 CASS components with service conditions above 482 degrees Fahrenheit. The program will include a screening methodology to identify components potentially susceptible to thermal aging embrittlement and will rely on qualified visual inspections, qualified ultrasonic testing, or component-specific flaw tolerance evaluation in accordance with ASME Code, Section XI.

This AMP is intended to be consistent with Revision 2 NUREG-1801, Section XI.M12, "Thermal Aging Embrittlement of Cast Austenitic Stainless Steel (CASS)," without exceptions. At the time of this inspection, there were no components within the scope of this AMP because none of the installed ASME Class 1 components were susceptible to thermal aging embrittlement due to ferrite content or casting method. This conclusion was documented in a technical evaluation included in action request (AR) 1367641, Assignment 57. However, this evaluation recommended the creation of this new AMP in case susceptible components are added to the plant.

The team reviewed LR Program basis documentation, applicable RAI responses, implementing procedures, and the LRA. In addition, the team interviewed the responsible applicant staff. The team was unable to observe the condition of the in-scope components because they were inaccessible at the time of this inspection.

The team concluded that, if the proposed thermal aging embrittlement of CASS AMP is developed as described in the LRA, there should be reasonable assurance the aging effects will be managed, consistent with the licensing basis, for the period of extended operation.

.6 Bolting Integrity (B.2.1.9)

The bolting integrity AMP is an existing program intended to manage closure bolting on pressure retaining joints within the scope of LR for loss of preload, cracking, and loss of material due to corrosion. This program credits visual inspection of pressure retaining bolted joints in ASME Class 1, 2, and 3 systems for leakage and age-related degradation during system pressure tests performed in accordance with ASME Section XI. In addition, it credits volumetric, surface, and visual inspections of ASME Class 1, 2, and 3 bolts, nuts, washers, and associated bolting components performed in accordance with ASME Section XI, Subsections IWB, IWC, and IWD. The integrity of non-ASME (non-safety-related) pressure retaining bolted joints (in non-ASME Class 1, 2, 3 and MC systems) is monitored by detection of visible leakage, evidence of past leakage, or other age-related degradation during maintenance activities and walkdowns in plant areas that contain systems within scope of LR.

This existing program will include two enhancements as described in the LRA. These enhancements prohibit the use of lubricants containing molybdenum disulfide on pressure retaining bolted joints and prohibit the use of high strength bolting for pressure retaining bolted joints in portions of systems within the scope of this AMP. This program, with the enhancements, is intended to be consistent with Revision 2 of NUREG-1801, Section XI.M18, “Bolting Integrity," without exceptions.

The team reviewed LR Program basis documentation, existing procedures, responses to RAIs, visual examination of a sample of in-plant pressure retaining bolting, and the LRA. The team also interviewed responsible applicant staff and walked down a sample of pressure retaining bolting at the feedwater pumps and attached feedwater piping for evidence of visible or past leakage or other age-related degradation. No significant concerns were identified during the walkdown.

As a result of this review, the team identified the scope of this AMP, as described in the LRA, was incomplete. Specifically, the LRA scope descriptions in Appendices A and B scope description did not include non-pressure-retaining bolting associated with the integral reactor vessel head assembly and the traveling screens at lake screen house intake bays 1A and 2A. The applicant captured this observation as LRCR Region-38 and LRCR Region-101, and revised the LRA program description to include these additional components in a letter to the NRC titled “Response to NRC Request for Additional Information, Set 41, dated October 9, 2014; and, LRA changes resulting from NRC Region Ill IP-71002 Braidwood Inspection, both related to the Byron Station, Units 1 and 2, and Braidwood Station, Units 1 and 2, License Renewal Application," dated October 16, 2014, (ADAMS Accession No. ML14289A423).

The team concluded the implementation of the Bolting Integrity AMP, as described in the LRA with the proposed enhancements and LRCR Region-38 and Region-101 changes should provide reasonable assurance the aging effects will be managed, consistent with the license basis, for the period of extended operation.

.7 Open-Cycle Cooling Water System (B.2.1.11)

The open-cycle cooling water system AMP is an existing program intended to manage heat exchangers and piping components in safety-related and non-safety-related systems exposed to a raw water environment for loss of material and reduction of heat transfer.

Program activities include tests, inspections, cleaning, and treatment with chemicals and biocide.

This existing program will include six enhancements as described in the applicant's letter to the NRC titled "Response to NRC Request for Additional Information, Set 28, dated May 29, 2014, related to the Byron Station, Units 1 and 2, and Braidwood Station, Units 1, and 2, License Renewal Application," dated June 30, 2014, (ADAMS Accession No. ML14181B145). These enhancements added requirements for inspections of coatings and non-safety-related service water system piping. This program, with the enhancements, is intended to be consistent with Revision 2 of NUREG-1801, Section XI.M20, "Open-Cycle Cooling Water System," without exceptions. The guidelines of Revision 2 of NUREG-1801, Section X1.M20, are based on the recommendations of Generic Letter (GL) 89-13, "Service Water System Problems Affecting Safety-Related Equipment."

The team reviewed LR Program basis documentation, existing procedures and surveillance results, Corrective Action Program documents, LR boundary drawings, and the LRA. The team also interviewed responsible applicant staff and conducted walkdowns of accessible portions of Units 1 and 2 safety-related service water components, including pumps, strainers, and piping components. As a result of this review, the team identified the following observations:

- The program description contained in Appendix A, "Updated Final Safety Analysis Report Supplement," and Appendix B, "Aging Management Programs," of the LRA was not bounding. Specifically, their AMP description was limited to safety-related components within the scope of GL 89-13 and non-safety-related service water piping. However, program basis document BB-PBD-AMP-XI.M20, "Open-Cycle Cooling Water System," and the associated implementing procedures included existing aging management activities of non-safety-related components outside of the scope of GL 89-13 other than non-safety-related service water piping that met LR scoping criteria, such as non-safety-related service water heat exchangers. The applicant captured this observation as LRCR Region-20 and revised the LRA program description to include these additional non-safety-related components in letter to the NRC titled "Response to NRC Request for Additional Information, Set 38, dated August 4, 2014; LRA changes from NRR Staff Feedback on July 30, 2014 telecon; and, LRA changes from NRC Region III IP 71002 Inspection, related to the Byron Station, Units 1 and 2, and Braidwood Station, Units 1 and 2, License Renewal Application," dated August 29, 2014 (ADAMS Accession No. ML14241A527).

- The current procedure guidance for wall loss extent of condition credited in the applicant's response to NRC RAI 3.0.3-2c was revised and the revision was inconsistent with this response. Specifically, the applicant stated an extent of condition would be performed if wall loss was greater than 50% or if remaining life was less than 2 years in accordance with their Raw Water Corrosion Program in letter titled "Response to NRC Request for Additional Information, Set 2, dated December 13, 2013, related to the Braidwood Station, Units 1 and 2 and Byron Station, Units 1 and 2 License Renewal Application," dated January 13, 2014, (ADAMS Accession No. ML14013A293). This response was based on Revision 5 of procedure ER-AA-5400-1001, "Raw Water Corrosion Program Guide." However, this procedure was revised twice since the RAI response resulting in the elimination of the remaining life criterion. In addition, Revision 7 of the procedure allowed 2 years or more to perform an extent of condition under certain circumstances. Thus, this procedure revision allowed extent of conditions

to be completed during a time schedule that exceeded calculated remaining life. That is, the extent of condition may not be performed in time to determine if similar conditions exist in other trains or nearby areas before failure if the calculated remaining life was less than 2 years. The applicant captured this observation as LRCR Region-95. At the time of this inspection, the applicant planned to use LRCR Region-95 to evaluate this procedure change and to revise procedure ER-AA-5400-1001 as necessary.

The team concluded the implementation of the proposed open-cycle cooling water system AMP, as described in the LRA with the proposed enhancements and LRCR Region-20 changes should provide reasonable assurance the aging effects will be managed for the period of extended operation consistent with the licensing basis.

.8 Closed Treated Water Systems (B.2.1.12)

The closed treated water system AMP is an existing program intended to manage heat exchangers, tanks, and piping components, exposed to a closed treated water environment, for loss of material, heat transfer reduction, and cracking. This program includes water treatment to minimize corrosion, chemical testing to ensure adequate water chemistry control, and inspections to detect corrosion and cracking.

This existing program will include an enhancement to verify the water chemistry control effectiveness by performing condition monitoring, including inspections at a maximum 10 year periodicity during the period of extended operation. This program, with the enhancement, is intended to be consistent with Revision 2 of NUREG-1801, Section XI.M21A, “Closed Treated Water Systems," without exceptions. In addition, this AMP is used to verify the effectiveness of the water chemistry AMP (i.e., B.2.1.2) in managing cracking for stainless steel non-regenerative heat exchangers exposed to treated borated water greater than 140 degrees Fahrenheit in the chemical and volume control system.

The team reviewed LR Program basis documentation, existing procedures and surveillance results, Corrective Action Program documents, LR boundary drawings, and the LRA. The team also interviewed responsible applicant staff and conducted walkdowns of the Units 0, 1, and 2 component cooling water heat exchangers, pumps, and portions of the associated piping. In addition, the team performed a walkdown of the control room chillers. No significant concerns were identified during the walkdown.

As a result of this review, the team noted existing procedures did not include instructions to opportunistically inspect in-scope SSCs for cracking, which was described as an existing activity in responses to RAI B.2.1.12-1 and RAI B.2.1.12-1a. These responses were communicated to the NRC in letters titled “Response to NRC Requests for Additional Information, Set 8, dated February 6, 2014, related to the Braidwood Station, Units 1 and 2 and Byron Station, Units 1 and 2 License Renewal Application,” dated February 27, 2014, (ADAMS Accession No. ML14058A667), and “Responses to NRC Requests for Additional Information, Set 24, dated May 19, 2014, related to Byron Station, Units 1 and 2, and Braidwood Station, Units 1 and 2, License Renewal Application,” dated June 9, 2014, (ADAMS Accession No. ML14160A871). Specifically, the applicant credited existing opportunistic inspections of components within the scope of this AMP whenever the system boundary was opened to detect corrosion and cracking. At the time of this inspection, this existing activity was governed by procedure MA-AA-716-008, "Foreign Material Exclusion Program." However, the team noted this procedure only included instructions to detect corrosion during the opportunistic inspections; the procedure did not include instructions to

detect cracking. As a result, the applicant initiated LRCR REGION-67 to revise this procedure to include guidance for crack detection.

The team concluded the implementation of the proposed closed treated water system AMP, as described in the LRA with the proposed enhancement, should provide reasonable assurance the aging effects will be managed for the period of extended operation consistent with the licensing basis.

.9 Inspection of Overhead Heavy Load and Light Load (Related to Refueling) Handling Systems (B.2.1.13)

The inspection of overhead heavy load and light load (related to refueling) handling systems AMP is an existing program intended to evaluate the effectiveness of maintenance monitoring activities for cranes and hoists within the scope of LR. This existing program credits visual inspections for loss of material on the structural components of the bridge, trolley, girders, bolting, and rails in the system and also manages loss of preload of associated bolted connections. For those cranes or hoists with associated time-limited aging analyses, the effects of past and future usage including the number and magnitude of lifts were evaluated in Section 4.7.2 of the LRA.

The existing program will include two enhancements as described in the LRA. Specifically, the program will include inspections of structural components and bolting for loss of material due to corrosion, rails for loss of material due to wear and corrosion, and bolted connections for evidence of loss of preload. In addition, the program will ensure periodic inspections are performed on all cranes, hoists, monorails, and rigging beams within the scope of LR, including those that are infrequently in use. This program, with the enhancements, is intended to be consistent with Revision 2 of NUREG-1801, Section XI.M23, “Inspection of Overhead Heavy Load and Light Load (Related to Refueling) Handling Systems,” without exceptions.

The team reviewed LR Program basis documentation, implementing procedures, documentation for a sample of crane periodic inspections, and the LRA. The team also interviewed responsible applicant staff and walked down a Turbine Building overhead crane for evidence of loss of material, cracking, or loose bolted connections. No significant concerns were identified during the walkdown.

The team concluded the implementation of the proposed Overhead Heavy Load and Light Load (Related to Refueling) Handling Systems AMP, as described in the LRA with the proposed enhancements, should provide reasonable assurance the aging effects will be managed for the period of extended operation consistent with the licensing basis.

.10 Fire Protection (B.2.1.15)

The fire protection AMP is an existing program intended to manage the aging effects of indoor air, air with borated water leakage, outdoor air, and condensation environments on fire barrier components such as fire doors, walls, ceilings, floors, penetration seals, dampers, insulation and wraps, and combustible fluid retaining berms and curbs. In addition, the program manages the aging effects of those environments to halon and low-pressure carbon dioxide fire suppression components such as tanks and piping elements. This existing program relies on visual inspections of fire dampers; fire barrier penetration seals; and fire barrier walls, ceilings, and floors. In addition, it relies on functional tests and visual inspections of fire doors and the associated closing mechanisms and latches.

The existing program will include three enhancements as described in the LRA. Specifically, the program will include visual inspections of the earthen berm enclosing the outdoor fuel oil storage tanks, provide additional inspection guidance to detect age-related degradation of fire barriers, and include visual inspections of halon and low-pressure carbon dioxide fire suppression system piping and components. This program, with the enhancements, is intended to be consistent with Revision 2 of NUREG-1801, Section XI.M26, “Fire Protection," without exceptions.

The team reviewed LR Program basis documentation, existing procedures and surveillance results, Corrective Action Program documents, LR boundary drawings, and the LRA. The team also interviewed responsible applicant staff and conducted walkdowns of the halon and carbon dioxide tanks, Unit 1 upper and lower cable spreading rooms, Unit 1A emergency diesel generator room, fire protection headers and discharge nozzles, and the earthen berm enclosing the outdoor fuel oil storage tanks. No significant concerns were identified during the walkdown.

The team concluded the implementation of the proposed Fire Water System AMP, as described in the LRA with the proposed enhancements, should provide reasonable assurance the aging effects will be managed for the period of extended operation consistent with the licensing basis.

.11 Fire Water System (B.2.1.16)

The fire water system AMP is an existing program intended to manage the effects of material loss of the water-based fire protection system and associated components exposed to outdoor air and raw water. Program activities include system pressure monitoring, system header flushing, buried ring header flow testing, pump performance testing, hydrant full flow flushing and full flow verification, sprinkler and deluge system flushing and flow testing, and hydrostatic testing.

The existing program will include 12 enhancements as described in the applicant’s letter to the NRC titled “Response to NRC Request for Additional Information, Set 38, dated August 4, 2014, LRA changes from NRR staff feedback during July 30, 2014, telecom, and, LRA changes from NRC Region III IP 71002 Inspection, related to the Byron Station, Units 1 and 2, and Braidwood Station, Units 1 and 2, License Renewal Application," dated August 29, 2014, (ADAMS Accession No. ML14241A527). These program enhancements are associated with, in part, microbiologically-induced corrosion control, and inspections and tests of coatings, sprinklers, deluge systems, tanks, and fire water piping. This program, with the enhancements, is intended to be consistent with Revision 2 of NUREG-1801, Section XI.M27, “Fire Water System," without exceptions.

The team reviewed LR Program basis documentation, existing procedures and surveillance results, Corrective Action Program documents, LR boundary drawings, and the LRA. The team also interviewed responsible applicant staff and conducted walkdowns of fire water components at the lake screen house, including pumps, piping, and traveling screens. In addition, the team performed walkdowns of sprinklers, hose stations, hydrants, and fire piping located in general areas of the auxiliary building.

As a result of this review, the team noted procedure 0BwOS FP-Y3, "Fire Protection System Ring Header Flush Surveillance," had not been verified to be effective for lifting and flushing accumulated sedimentation from the fire protection ring header. Specifically, the procedure did not require a minimum flow rate value necessary for an effective flushing; the applicant

had not evaluated if the configuration prescribed by the procedure would inherently achieve the minimum effective flushing flow rate. The applicant captured this observation as LRCR Region-43 and determined there was reasonable expectation that adequate flow velocities would be available based on the latest full flow test results. At the time of the inspection, LRCR Region-43 planned to verify the effectiveness of the procedure and to revise it as necessary.

The team concluded the implementation of the proposed fire water system AMP, as described in the LRA with the proposed enhancements, should provide reasonable assurance the aging effects will be managed for the period of extended operation consistent with the licensing basis.

.12 Aboveground Metallic Tanks (B.2.1.17)

The aboveground metallic tanks AMP is a new program intended to manage material loss and cracking on the external surfaces of aboveground metallic tanks that are supported on concrete or a 4-inch sand cushion above compacted backfill in soil, and exposed to outdoor air environments. At the time of this inspection, the aluminum condensate storage tanks (CSTs) were the only tanks identified as being within the scope of this program. This AMP will credit the protection provided to the non-coated CSTs by the cathodic protection system, roof flashing, insulation, corrosion-resistant properties of aluminum, sealants at the concrete/component interface, and insulation lagging with overlapping seams on the insulation. This new program will also rely on periodic visual inspections to detect degradation of the external surface of the insulation, flashing, caulking, roof, and accessible sealant. Sealant inspections will be augmented with physical manipulation to detect hardening and loss of strength. In addition, this AMP will require periodic visual inspections and liquid penetrant examinations of the tank external surfaces, and will include removal of selected tank insulation and lagging to allow for the inspection of external tank surfaces and exposed sealants.

This AMP is intended to be consistent with Revision 2 of NUREG-1801, Section XI.M29, “Aboveground Metallic Tanks,” with an exception to perform visual inspections at selected locations of the aluminum tank external surfaces as opposed to the entire external tank surface. In addition, the applicant’s letter to the NRC titled “Response to NRC Requests for Additional Information, Set 2, dated December 13, 2013, related to the Braidwood Station, Units 1 and 2 and Byron Station, Units 1 and 2 License Renewal Application,” dated January 13, 2014, (ADAMS Accession No. ML14013A293), revised this AMP, in part, to include one-time tank bottom ultrasonic inspections, to specify inspection sample and frequency, and to incorporate the cathodic protection availability and effectiveness criteria of License Renewal Interim Staff Guidance LR-ISG-2011-03, “Changes to the Generic Aging Lessons Learned (GALL) Report Revision 2 Aging Management Program XI.M4, ‘Buried and Underground Piping and Tanks.’”

The team reviewed LR Program basis documentation, drawings, tank photos, Corrective Action Program documents, and cathodic protection system availability and effectiveness data. The team also interviewed responsible applicant staff and conducted walkdowns of the in-scope CSTs and cathodic protection system rectifier and deep well probe locations. The team was unable to review the implementing documents associated with this new program because they were being developed at the time of this inspection.

The team concluded that, if the proposed above ground tank AMP is developed as described in the LRA, there should be reasonable assurance the aging effects will be managed, consistent with the licensing basis, for the period of extended operation.

.13 Reactor Vessel Surveillance (B.2.1.19)

The reactor vessel surveillance AMP is an existing program intended to manage the loss of fracture toughness due to neutron irradiation embrittlement of the ferritic reactor pressure vessel (RPV) beltline materials exposed to reactor coolant and neutron flux environments in accordance with the requirements of 10 CFR Part 50, Appendix H. The program evaluates neutron irradiation embrittlement in accordance with Revision 2 of RG 1.99, "Radiation Embrittlement of Reactor Vessel Materials." Program implementation included installation of six specimen capsules in each RPV before plant start-up. These capsules contained representative RPV material specimens, neutron dosimeters, and thermal monitors. All of the capsules have been withdrawn from the RPV. Three specimen capsules from each RPV were tested. The remaining untested capsules are currently stored in the spent fuel pool and will be tested as necessary in accordance with ASTM 185-82 as required by 10 CFR Part 50, Appendix H. In addition, RPV peak neutron fluence will be monitored during the period of extended operation using ex-core dosimetry.

This existing program will include two enhancements as described in applicant's letter to the NRC titled "Response to NRC Request for Additional Information, Set 37, dated July 7, 2014, related to the Braidwood Station, Units 1 and 2, and Byron Station, Units 1 and 2, License Renewal Application," dated July 28, 2014, (ADAM Accession No. ML14209A045). The first enhancement will implement operating restrictions to ensure plant operation under the conditions to which the surveillance capsules were exposed. The second enhancement will test one specimen capsule that has been irradiated to a neutron fluence of one to two times the projected peak neutron fluence at the end of the period of extended operation and will submit a summary technical report to the NRC for each reactor vessel within 1-year of the receipt of the renewed license. This existing program, with the enhancements, is intended to be consistent with Revision 2 of NUREG-1801, Section XI.M31, "Reactor Vessel Surveillance," without exceptions.

The team reviewed LR Program basis documentation, applicable RAI responses, implementing procedures, the LRA, and plant specific operating history documents. In addition, the team interviewed the responsible applicant staff. The team was unable to observe the condition of the in-scope components because they were inaccessible at the time of this inspection.

The team concluded the implementation of the reactor vessel surveillance AMP, as described in the LRA with the proposed enhancements, should provide reasonable assurance the aging effects will be managed for the period of extended operation, consistent with the licensing basis.

.14 One-Time Inspection (B.2.1.20)

The One-Time Inspection AMP is a new program intended to verify the effectiveness of the water chemistry, fuel oil chemistry, and lubricating oil analysis AMPs using one-time inspections of representative component samples. In addition, the program may trigger additional actions, depending on the one-time inspection results, to ensure the intended functions of affected components will be maintained during the period of extended

operation. This program is intended to be consistent with Revision 2 of NUREG-1801, Section XI.M32, “One-Time Inspection," without exceptions.

Although the team did not select the One-Time Inspection AMP as an inspection sample, the team confirmed Braidwood will not credit Byron's one-time inspection sample population. Specifically, the applicant stated in LRCR Region-23 that each site will develop separate one-time inspection sample basis documents which will include site-specific sample populations.

.15 Selective Leaching (B.2.1.21)

The selective leaching AMP is a new program intended to verify the absence of selective leaching to ensure the integrity of components that may be susceptible to this aging mechanism. These components include those made of gray cast iron and copper alloy (with greater than 15 percent zinc) and exposed to raw water, closed-cycle cooling water, or waste water. This AMP will include visual examination, supplemented by hardness measurement or other appropriate examination methods, of a representative component sample to determine if preferential removal of one of the alloying elements from a material in an aqueous environment was occurring.

This new program is intended to be consistent with Revision 2 of NUREG-1801, Section XI.M33, "Selective Leaching," without exceptions. In addition, the applicant’s AMP description stated that none of the in-scope components were made of aluminum bronze components with greater than 8 percent aluminum, which is a material susceptible to selective leaching, in any environment.

The team reviewed the associated AMP basis document, plant specific operating history documents including corrective action documents, scoping and screening reports, and the LRA. In addition, the team interviewed responsible applicant and site staff. The team was unable to review the implementing documents associated with this new program because they were being developed at the time of this inspection.

The team concluded that, if the proposed selective leaching AMP is developed as described in the LRA, there should be reasonable assurance the aging effects will be managed, consistent with the licensing basis, for the period of extended operation.

.16 Flux Thimble Tube Inspection (B.2.1.24)

The flux thimble tube inspection AMP is an existing program intended to manage flux thimble tubes exposed to a reactor coolant environment for material loss due to wear. This program relies on eddy current testing to periodically inspect the full lengths of all flux thimble tubes. Inspection frequency was based on previous test results to ensure the reactor coolant pressure boundary integrity was maintained. This AMP is intended to be consistent with Revision 2 of NUREG-1801, Section XI.M37, “Flux Thimble Tube Inspection,” without exceptions or enhancements.

The team reviewed LR Program basis documentation, applicable RAI responses, implementing procedures, the LRA, and inspection results. In addition, the team interviewed responsible applicant staff. .

This program implements the recommendations of NRC Bulletin 88-09, "Thimble Tube Thinning in Westinghouse Reactors." In response to Bulletin 88-09, the station adopted an

acceptance criterion of 60 percent maximum allowable wall loss. This limit was subsequently changed to allow repositioning at 60 percent wall loss and replacement or isolation at 80 percent wall loss based on the recommendations of WCAP-12866, "Bottom Mounted Instrumentation Flux Thimble Wear." The new acceptance criteria was discussed in applicant's letter to the NRC titled "Response to NRC Request for Additional Information, Set 24, dated May 19, 2014, related to the Byron Station, Units 1 and 2, and Braidwood Station, Units 1 and 2, License Renewal Application," dated June 9, 2014, (ADAMS Accession No. ML14160A871).

As a result of this review, the inspection team noted relevant information was not available to NRR staff during their review of this proposed AMP. Specifically, in response to RAI B.2.1.24-1, the applicant discussed the higher than anticipated wear rates and the failure to obtain data on a few tubes during the outage inspections between 2007 and 2012 for both units and stated that several corrective actions were being implemented, including increasing the inspection frequency to perform examinations every outage. This response was provided in applicant's letter to the NRC titled "Response to NRC Requests for Additional Information, Set 24, dated May 19, 2014, related to the Braidwood Station, Units 1 and 2, and Byron Station, Units 1 and 2, License Renewal Application," dated June 9, 2014, (ADAM Accession No. ML14160A871). The NRR staff closed the issue based on the applicant's response. However, the inspection team noted this response did not discuss the most recent outage data, indicating zero useable examinations for Unit 1 in September 2013 and seven for Unit 2 in May 2014. During this period, the program specified examinations of all 58 tubes at a frequency of every outage. The team discussed this information with NRR staff who issued RAI B.2.1.24-1a (ADAMS Accession No. ML14282A276) to follow up. The team also noted the applicant had captured the incomplete examinations in their Corrective Action Program as AR 01562268 and AR 01656294, and relied on evaluations for projected tube wear for determining the corrective actions.

The team concluded that, subject to the satisfactory resolution of RAI B.2.1.24-1a, implementation of the flux thimble tube inspection AMP, as describe in the LRA, should provide reasonable assurance the aging effects will be managed for the period of extended operation, consistent with the licensing basis.

.17 Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components (B.2.1.25)

The inspection of internal surfaces in miscellaneous piping and ducting components AMP is a new program intended to manage the aging of internal surfaces of piping, piping elements and piping components, ducting components, tanks, heat exchangers and other components exposed to air – indoor uncontrolled, diesel exhaust, condensation, raw water, treated water, and waste water environments. The program is credited to manage the aging effects of loss of material, reduction of heat transfer, and cracking for metallic components. This program also manages elastomeric components exposed to condensation, fuel oil, lubricating oil, and treated water environments to manage the aging effects of loss of material, hardening, and loss of strength. The program includes provisions for visual inspections of surfaces of components not managed under other Aging Management Programs, augmented by physical manipulation or pressurization to detect hardening or loss of strength of elastomers where appropriate.

This AMP is intended to be consistent with Revision 2 of NUREG-1801, Section XI.M38, "Internal Surfaces in Miscellaneous Piping and Ducting Components," without exceptions. In addition, the applicants letter to the titled "Response to NRC Requests for Additional

Information, Set 2, dated December 13, 2013, related to the Braidwood Station, Units 1 and 2 and Byron Station, Units 1 and 2 License Renewal Application," dated January 13, 2014, (ADAMS Accession No. ML14013A293), revised this AMP, in part, using the guidance provided in License Renewal Interim Staff Guidance, LR-ISG-2012-02, "Aging Management of Internal Surfaces, Fire Water Systems, Atmospheric Storage Tanks, and Corrosion Under Insulation," to ensure the Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components Aging Management Program conducts inspections on a representative sample of in-scope components by performing periodic inspections, as required, to supplement opportunistic inspections.

The team's review scope for this AMP included the AMP basis document, applicable NRC requests for additional information, implementing procedures, UFSAR changes proposed for the AMP. The team also interviewed responsible applicant staff and conducted a walkdown of metal enclosures surrounding RHR Sump Isolation valves. No significant concerns were identified during the walkdown.

Based upon the reviews completed and the applicant's proposed revision to the program and commitment, the team concluded the implementation of the Inspection of internal surfaces in miscellaneous piping and ducting components AMP should provide reasonable assurance the aging effects will be managed, consistent with the license basis.

.18 Buried and Underground Piping (B.2.1.28)

The buried and underground piping AMP is an existing program intended to manage the aging effects of material loss, cracking, and material property changes on the external surface of buried and underground piping. It credits preventive and mitigate measures, such external coatings, cathodic protection, and backfill quality. In addition, program activities include periodic inspections of polymeric materials, periodic effectiveness verification of the cathodic protection system, and periodic and opportunistic piping inspections.

This existing program will include nine enhancements as described in the LRA and as revised in applicant's letter to the NRC titled "Response to NRC Requests for Additional Information, Set 2, dated December 13, 2013, related to the Braidwood Station, Units 1 and 2 and Byron Station, Units 1 and 2 License Renewal Application," dated January 13, 2014, Accession No. ML14013A293). These program enhancements are associated with, in part, buried polymeric piping inspections, management of stainless steel component cracking, coating inspector qualifications, inspections and mitigation strategies of carbon steel condensate system piping, inspection quantity and frequency of buried and underground piping, extent of conditions, and cathodic protection effectiveness verification. Some of these enhancements are based on the planning categorization criteria of License Renewal Interim Staff Guidance LR-ISG-2011-03, "Changes to the Generic Aging Lessons Learned (GALL) Report Revision 2 Aging Management Program XI.M4, 'Buried and Underground Piping and Tanks.'" This AMP, with the enhancements, is intended to be consistent with Revision 2 of NUREG-1801, Section XI.M41, "Buried and Underground Piping and Tanks," with three exceptions described in the LRA. These exceptions are associated with the use of epoxy coatings, polymeric piping inspection schedule, and aging management of buried fire water piping.

The team reviewed LR Program basis documentation, existing procedures and surveillance results for the cathodic protection system, Corrective Action Program documents, and the LRA. The team also interviewed responsible applicant staff. The team was unable to

perform a walkdown of in-scope components because activities that would make them accessible did not occur at the time of this inspection.

The team concluded the implementation of the proposed buried and underground piping AMP, as described in the LRA with the proposed enhancements, should provide reasonable assurance the aging effects will be managed for the period of extended operation consistent with the licensing basis.

.19 ASME Section XI, Subsection IWL (B.2.1.30)

The ASME Section XI, Subsection IWL AMP is an existing program intended to implement examination requirements of the ASME Boiler and Pressure Vessel Code, Section XI, Subsection IWL for Class CC Concrete Components of Light-Water Cooled Plants, as mandated by 10 CFR 50.55a. Its scope includes reinforced concrete and the unbonded post-tensioning system. The program relies on visual examinations and supplementary testing. These inspection methods along with the associated parameters and acceptance criteria are in accordance with ASME Section XI, Subsection IWL as approved by 10 CFR 50.55a. In addition, accessible concrete surfaces are visually examined to detect deterioration and distress such as defined in ACI 201.1R and ACI 349.3R, including loss of material, cracking, increase in porosity and permeability, and loss of bond in the air-outdoor and air-indoor (uncontrolled) environments. Concrete surfaces that exhibit deterioration and distress are subject to detailed visual examinations to determine the magnitude and extent of deterioration and distress. Concrete surfaces at the bearing plates for tendon anchorages are also subject to detailed visual examination. In addition, one tendon wire of each type, hoop dome and vertical, was examined for loss of material and subject to physical testing to determine yield strength, ultimate tensile strength, and elongation. Tendon corrosion protection medium was analyzed for alkalinity, water content, and soluble ion concentrations. Any free water contained in the anchorage end cap and free water which drains from tendons during the examination was documented and samples are analyzed for pH.

This existing program will include five enhancements as described in applicant's letter to the NRC titled "Updated Responses to NRC Set 14 Requests for Additional Information, related to the Braidwood Station, Units 1 and 2 and Byron Station, Units 1 and 2 License Renewal Application," dated July 8, 2014 (ADAM Accession No. ML14189A094). These program enhancements are associated with, in part, addition of augmented examination requirements after post-tensioning system repair or replacement activities, addition of tendon one-time inspections, implementation of a periodic tendon water monitoring and grease sampling program, explicitly require that areas of concrete deterioration and distress be recorded in accordance with the guidance provided in ACI 349.3R, and addition of quantitative acceptance criteria, based on the "Evaluation Criteria" provided in Chapter 5 of ACI 349.3R to augment the qualitative assessment of the responsible engineer. This AMP, with the enhancements, is intended to be consistent with Revision 2 of NUREG-1801, Section XI.S2, "ASME Section XI, Subsection IWL," without exceptions.

The team reviewed LR Program basis documentation, responses to RAIs, existing procedures and surveillance results for the concrete surfaces inspections and tendons inspections, LR drawings, Corrective Action Program documents, and the LRA. The team also interviewed responsible applicant staff and performed walkdowns of accessible portions of Units 1 and 2 containment structure and post tensioning systems, including containment concrete exterior surfaces, the Unit 1 upper and lower tendon grease cans and surrounding

concrete surfaces, the dome tendon grease cans and surrounding concrete surfaces, Unit 1 tendon tunnel, and the Unit 1 dome, dome coating, and drainage system.

As a result of this review, the team questioned if visual inspections of concrete surfaces will be conducted during the period of extended operation with methods and equipment that provide sufficient quantitative measurements to evaluate against the quantitative criteria in ACI 349.3R. Specifically, the visual inspections of concrete surfaces at the time of this inspection were taken at a distance with the use of a telescope, which is consistent with ASME Code Section XI, Subsection IWL. Specifically, sub-article IWL-2310 required that general visual examinations of concrete surfaces shall be performed, directly or remotely, in sufficient detail to identify areas of concrete deterioration and distress, such as described in ACI 201.1R and ACI 349.3R. However, this visual examination will be modified during the period of extended operation by Enhancement 5 of this AMP to "Include quantitative acceptance criteria, based on the "Evaluation Criteria" provided in Chapter 5 of ACI 349.3R, that will be used to augment the qualitative assessment of the Responsible Engineer." The team questioned if the described remote visual observation will be capable of providing quantitative measurements to evaluate against this quantitative criteria. The team discussed this observation with NRR staff who intends to issue RAI B.2.1.30-6 to verify sufficient visual resolution capability will be used during visual examinations of concrete surfaces of containment structures to detect and quantify forms of degradation for comparison against quantitative acceptance criteria based on Chapter 5 of ACI 349.3R.

The team concluded that, subject to satisfactory resolution of RAI B.2.1.30-6, implementation of the proposed ASME Section XI, Subsection IWL AMP, as described in the LRA with the proposed enhancements, should provide reasonable assurance the aging effects will be managed for the period of extended operation consistent with the licensing basis.

.20 ASME Section XI, Subsection IWF (B.2.1.31)

The ASME Section XI, Subsection IWF AMP is an existing program intended to manage ASME Section XI Class 1, 2, 3, and MC piping and component support members exposed to air-indoor uncontrolled, air-outdoor, air with borated water leakage, and treated borated water environments for signs of degradation such as loss of material, loss of mechanical function, and loss of pre-load. Bolting was also included with these component supports and inspected for loss of material and for loss of preload by inspecting for missing, detached, or loosened bolts and nuts. This program relies on periodic visual examinations.

As described in the LRA and related correspondence, the applicant indicated this existing program, with six enhancements, is intended to be consistent with Revision 2 of NUREG 1801, Section AMP XI.S3, "ASME Section XI, Subsection IWF," with two exceptions. The AMP as described in the LRA was enhanced to: (1) add metallic containment supports for the transfer tube in the refueling cavity in the containment structure and the refueling canal in the fuel handling building to the scope of the program; (2) provide guidance for proper specification of bolting material, lubricant and sealants, and installation torque or tension to prevent or mitigate degradation and failure of structural bolting; and (3) to provide procedural guidance regarding the selection of supports to be inspected on subsequent inspections, when a support was repaired in accordance with the Corrective Action Program. The two exceptions to NUREG-1801 are related to age management of bolting with actual yield strength greater than 150 kilo-pounds per square inch (ksi). As noted in the LRA, the originally installed reactor coolant pump and pressurizer hold-down bolts have

actual measured yield strength greater than 150 ksi. NUREG-1801 recommends using bolting with actual yield strength less than 150 ksi to mitigate the potential for stress corrosion cracking (SCC). The applicant provided justification for this exception in the LRA. In addition, the applicant concluded the current ASME Section XI, Subsection IWFProgram examination techniques, which include performing VT3 visual examinations, were appropriate for identifying SCC degradation of these bolts in the LRA. The NUREG-1801 recommends volumetric examination comparable, to that of ASME Code Section XI, Table IWB-2500-1, Examination Category BG-1, should be performed to detect cracking in addition to the VT-3 examination. The applicant provided justification for this exception to not perform volumetric examination in the LRA.

The NRC requested additional information from the applicant related to age management of bolting with actual measured yield strength greater than 150 ksi in RAIs B.2.1.31-1, B.2.1.31-2, B.2.1.31-3, and RAI B.2.1.31-1a. The applicant responded to RAIs B.2.1.31-1, B.2.1.31-2, and B.2.1.31-3 in letter "Response to NRC Requests for Additional Information, Set 13, dated February 7, 2014, related to the Braidwood Station, Units 1 and 2 and Byron Station, Units 1 and 2 License Renewal Application," dated March 4, 2014, (ADAM Accession No. ML14063A495), and to RAI B.2.1.31-1a in letter "Responses to NRC Requests for Additional Information, Set 30, dated May 22, 2014, related to the Byron Station, Units 1 and 2, and Braidwood Station, Units 1 and 2, License Renewal Application," dated June 16, 2014, (ADAM Accession No. ML14167A297). In these responses, the applicant: modified Enhancement 2 in LRA Section B.2.1.31 to revise the AMP implementing documents to (1) include guidance for bolting storage; (2) require an engineering evaluation to use bolting material with a yield strength of 150 ksi or greater; and (3) to prohibit use of lubricants that contain molybdenum on high strength bolting. The applicant added new Enhancement 4 to specify requirements for one-time volumetric examination on a sample of high strength bolting, and added new Enhancement 5 to revise implementing documents to specify requirements for periodic visual examinations to detect a corrosive environment that supports SSC potential. In addition, the applicant added Enhancement 6 to add the control rod drive mechanism seismic support assembly to the scope of the program to implement additional examinations in letter to the NRC titled "Response to NRC Request for Additional Information, Set 38, dated August 4, 2014, LRA changes from NRR Staff Feedback on July 30, 2014, telecom; and, LRA changes from NRC Region III IP 71002 Inspection, related to the Byron Station, Units 1 and 2, and Braidwood Station, Units 1 and 2, License Renewal Application," dated August 29, 2014, (ADAMS Accession No. ML14241A527).

The team reviewed LR Program basis documentation, applicable RAI responses, implementing procedures, and the LRA. In addition, the team interviewed the responsible applicant staff, walked down one snubber support on main steam system piping and one snubber support on safety injection system piping for evidence of loss of material or physical deformation, and verified the snubber hot and cold position settings were in conformance with the associated design drawings.

As a result of this review, the team identified the scope of this AMP, as described in the LRA, was incomplete. Specifically, the control rod drive mechanism lateral supports were not included within the program scope. The applicant captured this observation as LRCR Region-30 and revised the LRA Program description to include these additional components as AMP Enhancement 6 in a letter to the NRC titled "Response to NRC Request for Additional Information, Set 38, dated August 4, 2014; LRA changes from NRR Staff Feedback on July 30, 2014, telecon; and, LRA changes from NRC Region III IP 71002

Inspection, related to the Byron Station, Units 1 and 2, and Braidwood Station, Units 1 and 2, License Renewal Application," dated August 29, 2014, (ADAMS Accession No. ML14241A527).

The team concluded the implementation of the ASME Section XI, Subsection IWF AMP, as described in the LRA with the proposed enhancement and LRCR Region-30 changes should provide reasonable assurance the aging effects will be managed, consistent with the license basis, for the period of extended operation.

.21 Masonry Walls (B.2.1.33)

The masonry walls AMP is an existing program intended to manage masonry walls for loss of material and cracking and is implemented as part of the structures monitoring AMP (i.e., B.2.1.34). This AMP relies on inspection activities and was based on guidance provided in IE Bulletin 80-11, "Masonry Wall Design," and NRC Information Notice 87-67, "Lessons Learned from Regional Inspections of Licensee Actions in Response to IE Bulletin 80-11."

This existing program will include three enhancements as described in the LRA to expand its scope, provide additional inspection guidance, and require that personnel performing inspections and evaluations meet the qualifications described in ACI 349.3R. This existing program, with the enhancements, is intended to be consistent with Revision 2 of NUREG-1801, Section AMP XI.S5," Masonry Walls," without exceptions.

The team reviewed LR Program basis documentation, implementing procedures, a calculation that evaluated the effects of structural attachments to masonry walls, and the LRA. In addition, the team interviewed the responsible applicant staff and performed walkdowns of a sample of masonry walls in the auxiliary building, turbine building and lake screen house for visible evidence of degradation and cracks. No significant concerns were identified during the walkdown.

The team concluded the implementation of the masonry walls AMP, as described in the LRA with the proposed enhancements, should provide reasonable assurance the aging effects will be managed, consistent with the license basis, for the period of extended operation.

.22 Structures Monitoring (B.2.1.34)

The structures monitoring AMP is an existing program intended to implement the requirements of 10 CFR 50.65. This program was based on Revision 2 of NUMARC 93-01, "Industry Guideline for Monitoring the Effectiveness of Maintenance at Nuclear Power Plants," and Revision 2 of RG 1.160, "Monitoring the Effectiveness of Maintenance at Nuclear Power Plants." This program relies on periodic visual inspections and condition monitoring of concrete structures, steel components, elastomers, and masonry block walls. This program also includes elements of the masonry walls AMP (i.e., B.2.1.33).

This existing program will include 16 enhancements as described in the LRA and as revised in the applicant's letters to the NRC titled "Response to NRC Requests for Additional Information, Set 5, dated November 22, 2013, related to the Braidwood Station, Units 1 and 2 and Byron Station, Units 1 and 2 License Renewal Application," dated December 19, 2013, (ADAMS Accession No. ML13353A627); "Responses to NRC Requests for Additional Information, Set 14, dated March 18, 2014, related to the Braidwood Station, Units 1 and 2, and Byron Station, Units 1 and 2, License Renewal Application," dated April 17, 2014, (ADAMS Accession No. ML12107A027); and "Responses to NRC Requests for Additional

Information, Set 27, dated May 21, 2014, and Correction of Previously Submitted Information related to the Byron Station, Units 1 and 2, and Braidwood Station, Units 1 and 2, License Renewal Application," dated June 16, 2014, (ADAMS Accession No. ML14168A084). This existing program, with the enhancements, is intended to be consistent with Revision 2 of NUREG-1801, Section AMP XI.S6, "Structures Monitoring," without exceptions.

The team reviewed LR Program basis documentation, implementing procedures, applicable RAI responses, and the LRA. In addition, the team interviewed the responsible applicant staff and performed walkdowns for evidence of material loss or loose bolting for a sample of cable tray, conduit, and ventilation duct bolting, structural steel components and structural bolting; and walked down Auxiliary Building and tendon tunnel areas susceptible to ground water intrusion. No significant concerns were identified during the walkdown.

The team concluded the implementation of the Structures Monitoring AMP, as described in the LRA with the proposed enhancements, should provide reasonable assurance the aging effects will be managed, consistent with the license basis, for the period of extended operation.

.23 RG 1.127, Inspection of Water-Control Structures Associated with Nuclear Power Plants (B.2.1.35)

The RG 1.127, Inspection of Water-Control Structures Associated with Nuclear Power Plants AMP is an existing program intended to manage the aging effects of the essential service cooling pond and lake screen house structures associated with the emergency cooling water systems. This program includes reinforced concrete, structural steel, bolting, and miscellaneous steel components associated with the lake screen structures. This program relies on inspection and surveillances based on Revision 1 of RG 1.127.

This existing program will include 14 enhancements, which are described in the LRA. This AMP, with the enhancements, is intended to be consistent with Revision 2 of NUREG-1801, Section XI.S7, "RG 1.127, Inspection of Water-Control Structures Associated with Nuclear Power Plants," without exceptions.

The team reviewed LR Program basis documentation, implementing procedures, a hydrographic survey of the essential service cooling pond, a diver inspection of a lake screen house forebay, corrective action reports for degradation identified at the Essential Service Cooling Pond dike, and the LRA. The team also interviewed responsible applicant staff and performed a walk down of accessible portions of the Lake Screen House for evidence of concrete degradation, structural steel loss of material, and loose structural bolting. No significant concerns were identified during the walkdown.

The team concluded the implementation of the proposed RG 1.127, Inspection of Water-Control Structures Associated with Nuclear Power Plants AMP, as described in the LRA with the proposed enhancements, should provide reasonable assurance the aging effects will be managed for the period of extended operation consistent with the licensing basis.

.24 Protective Coating Monitoring and Maintenance Program (B.2.1.36)

The Protective Coating Monitoring and Maintenance Program is an existing program intended to manage the aging of Service Level I coatings inside containment exposed to air with borated water leakage to ensure coating adhesion. Specifically, this program ensures

coatings remain adhered to the intended surfaces so as to not adversely affect the function of the emergency core cooling suction strainers. It addresses coating selection, application, inspection, and maintenance. In addition, it relies on visual examinations, condition assessments, and repair of coatings.

This existing program will include six enhancements, which are described in the LRA. These enhancements are associated with programmatic controls of inspections, personnel qualifications, incorporation of RG 1.54 Guidance and ASTM D 5163-08 requirements, coating inspections near emergency core cooling system sumps or screens, and instrumentation and equipment used during inspections. This AMP, with the enhancements, is intended to be consistent with Revision 2 of NUREG-1801, Section XI.S8, "Protective Coating Monitoring and Maintenance Program," without exceptions. The LRA described this AMP as comparable with Revision 2 of RG 1.54, "Quality Assurance Requirements for Protective Coatings Applied to Water-Cooled Nuclear Power Plants," which was identified as an acceptable method for developing this AMP by Section XI.S8 of NUREG-1801, Revision 2.

The team reviewed LR Program basis documentation, existing procedures and inspection results, Corrective Action Program documents, and the LRA. The team also interviewed responsible applicant staff. The team was unable to observe the condition of Service Level I coatings inside containment because both containments were inaccessible at the time of this inspection.

The team concluded the implementation of the proposed Protective Coating Monitoring and Maintenance Program, as described in the LRA with the proposed enhancements, should provide reasonable assurance the aging effects will be managed for the period of extended operation consistent with the licensing basis.

.25 Insulation Material for Electrical Cables and Connections Not Subject to 10 CFR 50.49 Environmental Qualification Requirements (B.2.1.37)

The Insulation Material for Electrical Cables and Connections Not Subject to 10 CFR 50.49 Environmental Qualification Requirements AMP is a new program intended to manage the aging effects of localized adverse environments to insulation materials used for non-EQ electrical cables and connections within the scope of LR. These adverse localized environments would be those locations where temperature, radiation, or moisture levels significantly exceed design ambient conditions. This AMP will rely on periodic visual inspections of accessible electrical cables and connections. In addition, it will rely on the discovery of unacceptable inspection results to determine the need for repairs, replacement, and extent of condition activities, including applicability to inaccessible cables and connections.

This new AMP is intended to be consistent with Revision 2 of NUREG-1801, Section XI.E1, "Electrical Cables and Connections Not Subject to 10 CFR 50.49 Environmental Qualification Requirements," without exceptions.

The team reviewed LR Program basis documentation, Corrective Action Program documents, and the LRA. In addition, the team interviewed responsible applicant staff and conducted walkdowns of the Auxiliary Building upper and lower cable spreading rooms. The team was unable to review the implementing documents associated with this new program because they were being developed at the time of this inspection.

The team concluded that, if the proposed Insulation Material for Electrical Cables and Connections Not Subject to 10 CFR 50.49 Environmental Qualification Requirements AMP is developed as described in the LRA, there should be reasonable assurance the aging effects will be managed, consistent with the licensing basis, for the period of extended operation.

.26 Insulation Material for Electrical Cables and Connections Not Subject to 10 CFR 50.49 Environmental Qualification Requirements Used in Instrumentation Circuits (B.2.1.38)

The Insulation Material for Electrical Cables and Connections Not Subject to 10 CFR 50.49 Environmental Qualification Requirements Used in Instrumentation Circuits AMP is a new program intended to manage the aging effects of localized adverse environments to insulation materials used for non-EQ cables and connections of instrumentation circuits with sensitive, high-voltage, low-level current signals. The adverse localized environments would be those locations where temperature, radiation, or moisture levels exceed design ambient conditions. The LRA, as revised by applicant's letter to the NRC titled "Response to NRC Request for Additional Information, Set 6, dated January 13, 2014, related to the Braidwood Station, Units 1 and 2, and Byron Station, Units 1 and 2, License Renewal Application," dated February 4, 2014, (ADAMS Accession No. ML14035A516), specifically identified some portions of the radiation monitoring and reactor protection systems to be included in the scope of this new AMP. This AMP will rely on calibration testing when the cables are part of a calibration circuit and cable testing when they are not part of a calibration circuit.

This new AMP is intended to be consistent with Revision 2 of NUREG-1801, Section XI.E2, "Electrical Cables and Connections Not Subject to 10 CFR 50.49 Environmental Qualification Requirements Used in Instrumentation Circuits," without exceptions.

The team reviewed LR Program basis documentation, Corrective Action Program documents, and the LRA. In addition, the team interviewed responsible applicant staff and conducted walkdowns of the main steam line radiation monitors located at the Auxiliary Building steam tunnel and the control room ventilation intake radiation monitors. No significant concerns were identified during the walkdown. The team was unable to review the implementing documents associated with this new program because they were being developed at the time of this inspection.

The team concluded that, if the proposed Insulation Material for Electrical Cables and Connections Not Subject to 10 CFR 50.49 Environmental Qualification Requirements Used in Instrumentation Circuits AMP is developed as described in the LRA, there should be reasonable assurance the aging effects will be managed, consistent with the licensing basis, for the period of extended operation.

.27 Inaccessible Power Cables Not Subject to 10 CFR 50.49 Environmental Qualification Requirements (B.2.1.39)

The Inaccessible Power Cables Not Subject to 10 CFR 50.49 Environmental Qualification Requirements AMP is a new program intended to manage non-EQ inaccessible or underground power cables (i.e., greater than or equal to 400V) exposed to significant moisture. This program defines significant moisture as periodic exposure to moisture that last more than a few days. This AMP will rely on cable tests to detect reduced insulation resistance and periodic actions to prevent inaccessible cables from being exposed to significant moisture. In addition, it will include manhole inspections to ensure cables are not wetted or submerged; assess the condition of cables, connections, and associated support

structures; and ensure proper operation of drainage or dewatering systems and associated alarms.

This new AMP is intended to be consistent with Revision 2 of NUREG-1801, Section XI.E3, "Inaccessible Power Cables Not Subject to 10 CFR 50.49 Environmental Qualification Requirements," without exceptions. The associated program description included in the LRA was revised by applicant's letter to the NRC titled "Response to NRC Requests for Additional Information, Set 9, dated January 22, 2014, related to the Braidwood Station, Units 1 and 2, and Byron Station, Units 1 and 2, License Renewal Application," dated February 19, 2014, (ADAMS Accession No. ML14051A154). Specifically, the AMP description was revised to include one or more proven tests for detecting reduced insulation resistance.

The team reviewed LR Program basis documentation, Corrective Action Program documents, and the LRA. In addition, the team interviewed responsible applicant staff. The team was unable to review the implementing documents associated with this new program because they were being developed at the time of this inspection. Also, none of the power cable portions within the scope of LR that were located in manholes were accessible during this inspection. However, the team conducted walkdowns of the 1D, 1E, 1F, 1G, 1H, 1J, 1K, and 1N manholes containing 4.16 kV cables, insulators, and splices outside the scope of LR as a representative sample.

As a result of this review, the team noted the currently implemented manhole inspection procedure will not be credited by this AMP and the new procedure had not been created yet. As a result, the team was unable to review the manhole inspection procedure that will be implemented during the period of extended operation. However, during a walkdown, the team noted the current manhole inspection procedure was not effective at detecting the presence of water at the cable conduits. Specifically, if water was not observed in the manhole from the ground level, the inspection acceptance criteria are considered satisfied. However, the inspector entered a manhole observed to be dry from the ground level and identified accumulated water inside of a conduit sleeve carrying a cable which was submerged. The applicant captured this condition in the Corrective Action Program as AR02383021 and determined the submerged cable did not represent a concern because it was a non-safety-related fiber optic cable. In addition, the applicant determined the manhole portion containing the power cable within the scope of LR was dry and past insulation test results associated with this power cable were satisfactory. The applicant also initiated LRCR Region-73 to ensure the new manhole inspection procedure to be credited by this AMP includes improved guidance to detect the presence of water at the cable conduits.

The team concluded that, if the proposed Inaccessible Power Cables Not Subject to 10 CFR 50.49 Environmental Qualification Requirements AMP is developed as described in the LRA, there should be reasonable assurance the aging effects will be managed, consistent with the licensing basis, for the period of extended operation.

.28 Metal Enclosed Bus (B.2.1.40)

The metal enclosed bus AMP is an existing program intended to manage age-related degradation of metal enclosed buses. This program relies on visual inspections of the internal portions of the bus enclosure assemblies, bus insulation, enclosure assembly elastomers, and internal insulating supports.

The existing program will include three enhancements as described in the LRA. Specifically, the program will inspect 20 percent of the accessible bolted connections with a maximum sample size of 25 for increased connection resistance using resistance measurements, specify maximum allowed bus connection resistance values, and inspect external surfaces of metal enclosed bus enclosure assemblies for material loss due to general, pitting, and crevice corrosion. This program, with the enhancements, is intended to be consistent with Revision 2 of NUREG-1801, Section XI.E4, “Metal Enclosed Bus," without exceptions.

The team reviewed LR Program basis documentation, program health reports, self-assessment reports, aging management review documents, existing procedures and surveillance results, Corrective Action Program documents, and the LRA. The team also interviewed responsible applicant staff and conducted a walkdown of the non-segregated 4160V phase bus between station offsite source auxiliary transformers and plant engineered safety features buses. No significant concerns were identified during the walkdown.

The team concluded the implementation of the proposed Metal Enclosed Bus AMP, as described in the LRA with the proposed enhancements, should provide reasonable assurance the aging effects will be managed, consistent with the licensing basis, for the period of extended operation.

.29 Electrical Cable Connections Not Subject to 10 CFR 50.49 Environmental Qualification Requirements (B.2.1.42)

The Electrical Cable Connections Not Subject to 10 CFR 50.49 Environmental Qualification Requirements AMP is a new program intended to provide reasonable assurance a periodic inspection program for non-EQ electrical cable connections was not required to ensure their intended functions will be maintained during the period of extended operation. This new AMP will rely on one-time tests of a representative sample of non-EQ electrical cable connections to verify either aging of non-EQ electrical cable connections was not occurring or that the existing preventive maintenance program was effective. These tests will be completed before the period of extended operation.

This new AMP is intended to be consistent with Revision 2 of NUREG-1801, Section XI.E6, “Electrical Cables Connections Not Subject to 10 CFR 50.49 Environmental Qualification Requirements,” without exceptions.

The team reviewed LR Program basis documentation, Corrective Action Program documents, and the LRA. In addition, the team interviewed responsible applicant staff. The team was unable to review the implementing documents associated with this new program because they were being developed at the time of this inspection.

The team concluded that, if the proposed Electrical Cable Connections Not Subject to 10 CFR 50.49 Environmental Qualification Requirements AMP is developed as described in the LRA, there should be reasonable assurance the aging effects will be managed, consistent with the licensing basis, for the period of extended operation.

.30 Fatigue Monitoring (B.3.1.1)

The Fatigue Monitoring AMP is an existing program intended to manage fatigue of the reactor coolant pressure boundary piping components, reactor vessel components, and other components exposed to air-indoor uncontrolled, air with borated water, condensation,

diesel exhaust, neutron flux, reactor coolant, treated water, treated borated water, and steam. Program activities include monitoring and tracking the actual number of operational transients to ensure the number of cycles used in design analysis was not exceeded and component cumulative usage factor was maintained below the allowable limit.

This existing program will include four enhancements as described in the applicant's letter to the NRC titled "Braidwood, Units 1 and 2, and Byron, Units 1 and 2, Response to NRC Requests for Additional Information, Set 4, dated December 12, 2013, Related to the License Renewal Application," dated January 13, 2014, (ADAMS Accession No. ML14013A148). These program enhancements are associated, in part, with cumulative fatigue damage effects of the reactor coolant environments on component life, monitoring and tracking of additional plant transients that are significant contributors to component fatigue usage, and increasing the program scope. This program, with the enhancements, is intended to be consistent with Revision 2 of NUREG 1801, Section X.M1, "Fatigue Monitoring," without exceptions.

The team reviewed LR Program basis documentation, existing procedures and surveillance results, Corrective Action Program documents, LR boundary drawings, and the LRA. The team also interviewed responsible applicant staff and conducted a walkdown of the accessible portions of Unit 1A and 2A residual heat removal suction lines. No significant concerns were identified during the walkdown.

The team concluded the implementation of the proposed Fatigue Monitoring AMP, as described in the LRA with the proposed enhancements, should provide reasonable assurance the aging effects will be managed, consistent with the licensing basis, for the period of extended operation.

.31 Concrete Containment Tendon Pre-stress (B.3.1.2)

The Concrete Containment Tendon Prestress AMP is an existing program intended to monitor and manage the loss of tendon prestress in the concrete containment prestressing system during the current term and will continue through the period of extended operation. This existing program is predicated 2001 Edition, through the 2003 Addenda, of the ASME Boiler and Pressure Vessel Code, Subsection IWL criteria as supplemented by the requirements of 10 CFR 50.55a(b)(2)(viii). The program requires periodic inspection of a sample of tendons during each inspection interval to confirm individual and group tendon meets ASME Section IWL, acceptance criteria.

The program is consistent with the ten elements of Aging Management Program X.S1, "Concrete Containment Tendon Prestress," specified in NUREG-1801 with one enhancement to ensure that for each surveillance interval, the predicted lower-limit, minimum required value, and trending lines will be developed for the period of extended operation as part of the regression analysis for each tendon group.

The team reviewed LR Program basis documentation, existing procedures and surveillance results, Corrective Action Program documents, LR boundary drawings, and the LRA. The team also interviewed responsible applicant staff and conducted walkdowns of the Unit 1 and Unit 2 concrete containment horizontal, vertical and dome tendon anchorage locations and surrounding concrete. No significant concerns were identified during the walkdown.

The team concluded the implementation of the proposed Concrete Containment Tendon Prestress AMP, as described in the LRA with the proposed enhancement, should provide

reasonable assurance the aging effects will be managed through period of extended operation consistent with the licensing basis.

.32 Environmental Qualification of Electrical Components (B.3.1.3)

The Environmental Qualification of Electrical Components AMP is an existing program intended to demonstrate electrical components within the scope of 10 CFR 50.49 are qualified to perform their safety function in accident harsh environments after the effects of in-service aging. This existing program manages the aging effects of in-scope electrical components in accordance with 10 CFR 50.49 requirements.

This existing program will be enhanced to expand its scope to include mechanical environmental qualification components, as described in the applicant's letter to the NRC titled "Response to NRC Requests for Additional Information, Set 11, dated February 18, 2014, related to the Braidwood Station, Units 1 and 2 and Byron Station, Units 1 and 2 License Renewal Application," dated March 4, 2014, (ADAMS Accession No. ML14063A496). This program, with the enhancement, is intended to be consistent with Revision 2 of NUREG-1801, Section X.E1, "Environmental Qualification (EQ) of Electric Components," without exceptions.

The team reviewed LR Program basis documentation, program health reports, self-assessment reports, existing procedures and surveillance results, Corrective Action Program documents, aging management review documentation, and the LRA. The team also interviewed responsible applicant staff and conducted a walkdown of the motor-operated valves located at the Unit 1A safety injection pump room and the Unit 1 engineered safety features switchgear room. No significant concerns were identified during the walkdown.

The team concluded the implementation of the proposed Environmental Qualification of Electrical Components AMP, as described in the LRA with the proposed enhancement, should provide reasonable assurance the aging effects will be managed, consistent with the licensing basis, for the period of extended operation.

5. EXIT MEETING SUMMARY

On November 5, 2014, the team presented the inspection results to Ms. M. Marchionda and other members of the licensee staff. The applicant acknowledged the issues presented. The inspectors confirmed none of the potential report input discussed was considered proprietary.

The team noted that proprietary documents were reviewed during the course of the inspection. The applicant confirmed that all such proprietary documents were returned or the copies destroyed and that the likely content of the report would not involve the proprietary material.

ATTACHMENT: SUPPLEMENTAL INFORMATION

SUPPLEMENTAL INFORMATION

KEY POINTS OF CONTACT

Applicant Attendees

M. Kanavos, Braidwood Station Site Vice President
@# M. Marchionda, Plant Manager
@# J. Bashor, Engineering Director
@# A. Ferko, Operations Director
@# M. Abbas, Regulatory Assurance
@# J. Hufnagel, Senior Staff Engineer – License Renewal
@# D. Warfel, Engineering Manager – License Renewal
@# R. Wolen, Braidwood License Renewal Lead - Senior Staff Engineer
P. Boyle, Work Management Director
B. Spahr, Maintenance Director
@# C. Ingold, Chemistry Manager
@ T. Elam, Project Management Supervisor
@M. Gorga, Environmental Supervisor
@T. Fisk, Nuclear Oversight Assessment Team Lead
@# M. Gallagher, Vice President, License Renewal

NRC Attendees

A.M. Stone, Branch Chief
D. Betancourt, Resident Inspector, Braidwood

Attended an interim exit meeting at the site on September 26, 2014
@ Participated in a telephonic exit meeting on November 5, 2014

LIST OF ITEMS OPENED, CLOSED AND DISCUSSED

Opened, Closed, and Discussed

None

LIST OF DOCUMENTS REVIEWED

The following is a list of documents reviewed during the inspection. Inclusion on this list does not imply that the NRC team reviewed the documents in their entirety, but rather, that selected sections or portions of the documents were evaluated as part of the overall inspection effort. Inclusion of a document on this list does not imply NRC acceptance of the document or any part of it, unless this is stated in the body of the inspection report.

LICENSE RENEWAL DOCUMENTS

License Renewal Application

Letter from Michael P. Gallagher, Exelon Generation Company LLC (Exelon) to NRC Document Control Desk; Application for Renewed Operating Licenses - Byron and Braidwood Stations, Units 1 and 2; dated May 29, 2013

License Renewal Action Items (Written as a Result of the Inspection)

LRCR No. Region-3; 10 CFR 50.55a added to the AMP description; dated August 19, 2014
LRCR No. Region-11; MRP-146 added to AMP description; dated August 21, 2014
LRCR No. Region-20; Open-Cycle Cooling Water System Aging Management Program Scope; dated September 15, 2014
LRCR No. Region 38; IHA bolting added to AMP description; dated August 21, 2014
LRCR No. Region-41; MRP-192 added to AMP description; dated August 21, 2014
LRCR NO. Region-43; FP System Flushing Flow Velocity; dated September 22, 2014
LRCR NO. Region-57; Opportunistic Inspections – RAI 2.1.12-1a; dated September 18, 2014
LRCR NO. Region-95; ER-AA-5400-1001: Raw Water Corrosion Program EOC; dated September 24, 2014
LRCR No. Region-101; Non-Pressure retaining Bolting Managed by Bolting Integrity AMP; dated September 25, 2014

License Renewal Basis Documents

BB-PBD-AMP-X.E1; Environmental Qualification (EQ) of Electrical Components; Revision 1
BB-PBD-AMP-X.M1; Fatigue Monitoring; Revision 1
BB-PBD-AMP-X1.M1; ASME Section XI In-service Inspection, Subsections IWB, IWC, and IWD; Revision 1
BB-PBD-AMP-XI.M2; Water Chemistry; Revision 1
BB-PBD-AMP-XI.M18; Bolting Integrity; Revision 1
BB-PBD-AMP-XI.M20; Open-Cycle Cooling Water System; Revision 1
BB-PBD-AMP-XI.M21A; Closed Treated Water Systems; Revision 1
BB-PBD-AMP-XI.M23; Inspection of Overhead Heavy Load and Light Load (Related to Refueling) Handling Systems; Revision 1
BB-PBD-AMP-XI.M27; Fire Water System; Revision 1
BB-PBD-AMP-XI.S3; ASME Section XI, Subsection IWF; Revision 1
BB-PBD-AMP-XI.S6; Structures Monitoring; Revision 1
BB-PBD-AMP-XI.S7; RG 1.127, Inspection of Water-Control Structures Associated with Nuclear Power Plants; Revision 1
BB-SSBD-ATWS; Scoping and Screening Basis Document: Anticipated Transient Without Scram; Revision 1

License Renewal Drawings

LR-BRW-M-42; License Renewal Boundary Drawing Diagram of Essential Service Water; Revision 0
LR-BRW-M-43; License Renewal Boundary Drawing Diagram of Non-Essential Service Water; Revision 0
LR-BRW-M-46; License Renewal Boundary Drawing Containment Spray; Revision 0
LR-BRW-M-52; License Renewal Boundary Drawing Diagram of Fire Protection; Revision 0
LR-BRW-M-60; License Renewal Boundary Drawing Diagram of Reactor Coolant; Revision 0
LR-BRW-M-61, Sheets 1A, 1B, 2, 3, 4, 5, 6; License Renewal Boundary Diagram of Safety Injection Unit 1; Revision 0
LR-BRW -M-62, Sheet 1; License Renewal Boundary Diagram of Residual Heat Removal Unit 1; Revision 0
LR-BRW-M-64; License Renewal Boundary Drawing Diagram of Chemical and Volume Control and Boron Thermal Regen; Revision 0
LR-BRW-M-66; License Renewal Boundary Drawing Diagram of Component Cooling; Revision 0
LR-BRW-M-118; License Renewal Boundary Drawing Diagram of Control Room Chilled Water System; Revision 0
LR-BRW -M-137, Sheets 1, 2, 3, 4, 5, 6; License Renewal Boundary Diagram of Safety Injection Unit 2; Revision 0
LR BRW -M-138, Sheet 1; License Renewal Boundary Diagram of Residual Heat Removal Unit 2; Revision 0
LR-BRW-S-01A; License Renewal Boundary Drawing, Composite Site Plan; Revision 1

License Renewal Miscellaneous Documents

RS-13-274; Response to NRC Requests for Additional Information, Set 5; December 19, 2013
RS-14-002; Response to NRC Requests for Additional Information, Set 4; dated December 12, 2013
RS-14-003; Response to NRC Requests for Additional Information, Set 2; dated December 13, 2013
RS-14-051; Response to NRC Requests for Additional Information, Set 8; dated February 27, 2014
RS-14-052; Response to NRC Requests for Additional Information, Set 13; dated March 4, 2014
RS-14-097; Responses to NRC Requests for Additional Information, Set 14; April17, 2014
RS-14-143; Response to NRC Requests for Additional Information, Set 21, dated April 17, 2014
RS-14-150; Response to NRC Requests for Additional Information, Set 23; dated May 23, 2014
RS-14-165; Responses to NRC Requests for Additional Information, Set 24; dated June 9, 2014
RS-14-169; Response to NRC Requests for Additional Information, Set 27; dated June 16, 2014
RS-14-170; Responses to NRC Requests for Additional Information, Set 30; dated June 16, 2014
RS-14-175; Response to NRC Requests for Additional Information, Set 28, dated May 29, 2014
RS-14-176; Responses to NRC Requests for Additional Information, Set 29; dated June 18, 2014
RS-14-218; Responses to NRC Requests for Additional Information, Sets 33 and 34; dated July 18, 2014
RS-14-235; Response to NRC Request for Additional Information, Set 38, dated August 29, 2014
RS-14-293; Response to NRC Requests for Additional Information, Set 41; dated October 16, 2014
Service Water System, System and Structure Scoping Report; Revision 1

CURRENT PLANT DOCUMENTS

Actions Written as a Result of the Inspection

AR02383021; License Renewal Cable Vault Walkdown Results; dated September 18, 2014
AR02385154; LR ID, Enhancement to ASME IWL Exam Documentation; dated September 23, 2014
AR01695572; Reactor Surveillance Program 10CFR50 App H Requirements; dated August 22, 2014
AR02382399; CCP EOP Tags on Ground near Valve 1SI2018B; dated September 17, 2014
AR02385433; CST Insulation Needs Repair – 1CD01T; dated September 24, 2014
AR02385137; Plant Debris Discovered Next to the Base of the 1CD01T; dated September 23, 2014
AR02385487; Errors in Traveling Screen Spring Float Measurement; dated September 24, 2014
AR02382913; Unit 1 CS Spray Add Tank Berm Needs Cleaning; dated September 18, 2014
AR02383060; NRC Walkdown Identified Corrosion on Valve Bonnet and Studs; dated September 18, 2014
AR02385403; NRC License Renewal Walkdown Question; dated September 24, 2014
AR02383170; Corrosion Identified on 0A VC Chiller Evaporator Support; dated September 18, 2014
AR02383171; Corrosion Identified on 0B VC Chiller Evaporator Support; dated September 18, 2014

Calculations

Analysis 1100643.301; Flaw Tolerance Evaluation of Braidwood Station Unit 2 RHR Mixing Tee Weld; Revision 0 dated April 30, 2011
Calculation 16.2.3.46.17; Masonry Wall 3A-46; Revision 1

Corrective Action Documents

AR 00484945; Degraded Sealant/Isolation Gaps – Water Intrusion in MSIV rooms; dated April 30, 2006
AR 00536774; Potential Issues in Historical Cycle Counting Database; dated September 27, 2006
AR 00544850; ASME Support 2CV41016V (Recordable Indication, No Load); dated October 16, 2006
AR 00577811; PWST/PWMU TOC is greater than CY-AP-120-180 Rev 4 TOC Goal; dated January 11, 2007
AR 00850094; 0BwVS FP.7.1.T-1 Flawed Methodology and Acceptance Criteria; dated November 26, 2008
AR 00901376; MT Indications Identified during ISI Exam of 1MS-07-SW08; dated April 1, 2009
AR 00904273; 1MS01AB, MT Indications ID'D during Expanded ISI Scope Exam; dated April 7, 2009
AR 00904794; MT Indications on Expanded ISI Scope MS-05-PG3 and 4; dated April 8, 2009
AR 00905949; MT Indication Discovered during Exam of Expanded MS ISI Scope; April 10, 2009
AR 00952591; 2AF07030X (Loose Pipe Clamp, Repair, Expand Inspection Scope); August 12, 2009
AR 01043373; Conduit Support Missing 2 of 4 Mounting Bolts; dated March 16, 2010
AR 01106410; Eval Process for Forebay Inspection Results Needs Review; dated August 26, 2010

AR 01151021; Review of Byron EACE for Actions at Braidwood (EOC); dated December 10, 2010
AR 01208120; NDE Indication Observed during MRP-192 Exam; dated April 26, 2011
AR 01213191; Need Craft Support/Perform UT of Weld 2RH-03-28; dated May 8, 2011
AR 01218755; EC384507 for Past Inoperability of the 2A AF Train; dated May 21, 2011
AR 01228586; 2FP248B Retard Chamber Drain Line Plugged; dated June 14, 2011
AR 01419805; Minor Wash-out, Pot-Hole Repairs, Braidwood Cooling Lake Dike; September 28, 2012
AR 01473720; FASA - Chemistry Review of Raw Water Performance; dated March 27, 2013
AR 01579770; Small Refrigerant Leak Found; dated November 1, 2013
AR 01579780; Small Refrigerant Leak Found; dated November 1, 2013
AR 01659136; Pinhole upstream of 1AF017A; dated May 12, 2014
AR 01672878; Lake Work: Repair Washouts and Slumps on the Lake Dike; dated June 18, 2014

Drawings

M-2MS01079S; Component Support, Revision B
M-2SI05002S; Component Support; Revision E
M-999, Sheet 3; Component Support Installation Guidelines; Revision F

Miscellaneous

Braidwood GL 89-13 Heat Exchanger Program ER-AA-340 Series 4th Quarter 2013; dated January 15, 2014
ISI Program Plan – Third Ten-Year Inspection Interval; Revision 0
NRC Inspection Report 05000456/2012003; 05000457/2012003 for Braidwood Station, Units 1 and 2; dated August 9, 2012
NRC Inspection Report 05000456/2012005; 05000457/2012005 for Braidwood Station, Units 1 and 2; dated February 7, 2013
NRC Inspection Report 05000456/2014003; 05000457/2014003 for Braidwood Station, Units 1 and 2; dated July 25, 2014
Program Health Report - ISI Program; 1st Tri-Annual 2014
Program Health Report - ISI Program; 4rth Quarter 2013
Review of Cycle Chemistry Braidwood Unit 2 Fuel Cycle 16; dated January 9, 2013
Wesdyne International Mixing Summary Report; Examination Area 2RH-03-28; dated April 27, 2011

Procedures

0BwOS FP.3.2.Q-1; Auxiliary Building Sprinkler Systems Inspectors Test Surveillance; Revision 14
0BwOS FP-A10; Fire Protection System Leakage Surveillance; Revision 2
0BwOS FP-AFT3; Charcoal Adsorber Filter 0VC02FA Manual Deluge System Nozzles Air Flow Test; Revision 3
0BwOS FP-Y3; Fire Protection System Ring Header Flush Surveillance; Revision 3
0BwOS SX-SA1; Essential Service Water - Fire Protection Systems Crosstie Flush; Revision 7
0BwVS FP.2.1.T-1; Fire Protection System Flow Test; Revision 3
BwMP 3300-091; Lake Screen House Diver Related Inspections; Revision 27
BwMS 1250-033; Turbine Building Traveling Bridge Crane Monthly/Yearly Inspection; Revision 2
BwMS 1250-035; Fuel Handling Building Overhead Monthly/Yearly Inspection; Revision 6

BwMS 1250-041; single Hoist, Overhead, and Jib Cranes, Infrequent Inspection; Revision 4
BwVP 850-7; Operational Transient Cycle Counting; Revision 5
BwVS 1000-1; Braidwood Cooling Lake Major Inspection; Revision 1
BwVS 1000-2; Minor Inspection Procedure, Braidwood Cooling Lake; Revision 3
BwVS 1000-3; Cooling Lake Slope Monitoring, Semi-Annual Surveillance; Revision 1
BwVS 900-28; Heat Transfer Test for Component Cooling Water Heat Exchanger 0CC01A; Revision 9
CC-AA-102; Design Input and Configuration Change Impact Screening; Revision 27
CY-AA-120-400; Closed Cooling Water Chemistry; Revision 15
CY-AA-120-4000; Closed Cooling Water Chemistry Strategic Plan; Revision 5
CY-AA-120-410; Circulating/Service Water Chemistry; Revision 3
CY-AA-120-4110; Raw Water Chemistry Strategic Plan; Revision 7
CY-AA-120-4110-F-01; Braidwood Raw Water Treatment and Control; Revision 0
CY-AP-120-100; Reactor Coolant System Chemistry; Revision 18
CY-AP-120-1000; Primary Strategic Water Chemistry Plan for Recirculating Steam Generator Plants; Revision 10
CY-AP-120-170; Refueling Water Storage Tank/Borated Water Storage Tank Chemistry; Revision 6
CY-AP-120-240; Condensate Storage Tank Chemistry; Revision 5
ER- AA-330-001; Section XI Pressure Testing; Revision 11
ER- AA-330-002; In-service Inspection of Section XI Welds and Components; Revision 10
ER- AA-335-015-2003; VT-2 Visual Examination in Accordance with ASME 2001 Edition, 2003 Addenda; Revision 0
ER-AA-330; Conduct of In-service Inspection Activities; Revision 10
ER-AA-330-003; In-service Inspection of Section XI Component Supports; Revision 8
ER-AA-330-004; Visual Examination of Snubbers; Revision 7ER-AA-340; GL 89-13 Program Implementing Procedure; Revision 7
ER-AA-330-009; ASME Section XI Repair/Replacement Program; Revision 008
ER-AA-335-016; VT-3 Visual Examination of Component Supports, Attachments and Interiors of Reactor Vessels; Revision 9
ER-AA-340-1001; GL 89-13 Program Implementing Instructional Guide; Revision 9
ER-AA-340-1002; Service Water Heat Exchanger Inspection Guide; Revision 5
ER-AA-450; Structures Monitoring; Revision 3
ER-AA-5400-1001; Raw Water Corrosion Program Guide; Revision 7
ER-AA-716-021; Lifting and Rigging Program; Revision 21ER- BR-450-1001; Braidwood Structures Monitoring Instructions; Revision 0ER-AA-470; Fatigue and Transient Monitoring Program; Revision 5
MA-AA-716-008; Foreign Material Exclusion Program; Revision 9
MA-AP-733-381; Polar Crane Monthly/Yearly Inspection; Revision 7
MA-MW-736-600; Torqueing and tightening of Bolted Connections; Revision 4ER- AP-4701; Guidance for MRP-146 and MRP-192 Implementation; Revision 0LR-AA-1213; Plant Design and Licensing Basis Change Review; Revision 0
NSWP-M-04; Pipe Support Installation and Inspection; Revision 2
PES-S-010; Fasteners; Revision 0

Self-Assessments

Braidwood Station 5-Year ISI Program FASA; dated August 24, 2011
FASA AT192886; FASA – Chemistry Alignment with EPRI Guidelines; dated June 8, 2014

Surveillances

Braidwood Lake Monitoring Program, Annual Field Surveillance Report, dated June 2014
ER- MW-450; A-364-3 (Unit 2, Auxiliary Building, EL 364'-0", Curved Wall Area); dated December 16, 2009
ER- MW-450; A-383-1 (Auxiliary Building, EL 383'-0", Areas 1 & 2 Except Diesel Oil Storage); dated January 27, 2010
ER- MW-450; A-401-2 (Auxiliary Building, EL 401'-0", Area 4) dated February 17, 2010
ER- MW-450; A-414-1 (Auxiliary Building, EL 414'-0", Area 5) dated February 14, 2011
ER-AA-450; Area L-570-1 (Lake Screen House, All Areas); dated May 24, 2011
PMID 41523-01 BwMP 3300-091 Lake Screen House Diver Inspections, 1A Bay
PMID 49798-01; Procedure BwVS 1000-3 Cooling Lake Slope Monitoring
PMID 49799-01; Procedure BwVSR 3.7.9.3 Cooling Lake Hydrographic Survey
PMID 49800-01; Procedure BwVS 1000-2 Minor Inspection, Braidwood Cooling Lake
PMID 51528-01 Procedure BwVS 1000-1 Major Inspection, Braidwood Cooling Lake

Work Orders

WO 00967028; MM-ASME Support 2CV41016V (Recordable Indication, No Load); dated November 7, 2006
WO 00909210 01; MM-2B/2C MSIV Room Clean / Repair / Paint Water Intrusion Damage/ October 29. 2009
WO 01011393; Cleaning and Inspect 1A CV Cubicle Cooler; dated September 9, 2009
WO 01070134; Thermal Performance Test of the U1 CCW Heat Exchanger; dated June 17, 2009
WO 01074932; Inspect and Clean 1B AF Pump Lube Oil Cooler; dated April 8, 2009
WO 01106376; 1DG01KA-X1 Inspect/Clean and ECT; dated June 26, 2009
WO 01261700; MM-2AF07030X Loose Pipe clamp Repair; dated October 19, 2009
WO 01178749; Fire Protection System Ring Header Flush 3 Year Surveillance; dated September 27, 2010
WO 01289063; Fire Protection System Flow Test; dated November 16, 2010
WO 00919076 01; MM-Degraded Sealant/Isol Gaps – Water Intrusion in MSIV Rooms; December 10, 2010
WO 01400008; Fuel handling Building Overhead Bridge Crane, Yearly Inspection; dated January 20, 2012
WO 01424442; Unit-1 Turbine Building Overhead Crane Yearly Inspection; dated February 15, 2012
WO 01365423; ECT and Inspection of CCW Heat Exchanger; dated April 9, 2012
WO 01393815; In-service Inspection of Welds and Components, Unit 1; dated May 15, 2012
WO 01395644; VT-2 Exam, Class 1 Components, Unit 1; dated May 15, 2012
WO 01395647; VT-2 Exam, Class 2 & 3 Components, Unit 1, dated May 15, 2012
WO 01466004; Lake Screen House Overhead Crane Annual Crane Inspection; dated July 3, 2012
WO 01466007-05; Traveling Screen Inspection during Operation; dated August 20, 2012
WO 01402495; Verify Pipe Wall Thickness 0SX02D-30"; dated August 30, 2012
WO 01353314; Traveling Screen Basket Bolt Torque Check; September 25, 2012
WO 01462834; Component 2RC-07-09 for MRP-146; dated October 18, 2112
WO 01431692; Unit-2 Containment Building Crane, Yearly Crane Inspection; dated October 27 2012
WO 01461086; VT-2 Exam, Class 1 Components, Unit 2; dated November 7, 2012
WO 01461087; VT-2 Exam, Class 2 & 3 Components, Unit 1, dated November 7, 2012
WO 01461448; In-service Inspection of Welds and Components, Unit 2; dated Nov 8, 2012

WO 01502574; Fire Hydrant Flush, Inspection, and Preventive Maintenance Annual; dated November 17, 2012
WO 01595714; U1 BwVP 850-7 Operational Transient Monitoring Program; dated December 19, 2012
WO 01424670; Capacity Verification Test for 0B Control Room Chiller; dated January 5, 2013
WO 1472079-01; B Control Room Chiller Condenser Inspection; dated January 9, 2013
WO 01602078; U2 BwVP 850-7 Operational Transient Monitoring Program; dated January 22, 2013
WO 01518753; Fire Protection System Leakage Surveillance; dated February 28, 2013
WO 01473613; Braidwood Cooling Lake Hydrographic Survey; dated March 4, 2013
WO 01574486-05; Traveling Screen Inspection during Operation; dated August 12, 2013
WO 01624239; Component 1RC-07-07-02 for MRP-146; dated September 10, 2013
WO 01517849; Verify Pipe Wall Thickness 1SXB7A-8"; dated September 13, 2013
WO 01573305; 1B Forebay, Diver Inspection and Screen Adjustment; dated September 24, 2013
WO 10013104; Component 1RC-07-10-01 MRP-146; dated April 22, 2012
WO 01553066; 0A MCR Chiller Capacity Verification Test; dated April 27, 2014
WO 01709833; Component 2RC-07-16 for MRP-146; dated May 4, 2014
WO 01501215; 1DG01KA-X1 Inspect/Clean and ECT; dated May 22, 2014
WO 01645560; Unit-1 Turbine Building Overhead Crane Yearly Inspection; dated July 22, 2014
WO 01753427; Unit-1 Turbine Building Overhead Crane Monthly Inspection; dated July 22, 2014
WO 01613567; Capacity Verification Test for the 0B Control Room Chiller; dated September 2, 2014

LIST OF ACRONYMS USED

ADAMS	Agencywide Documents Access and Management System
AMP	Aging Management Program
AR	Action Request
ASME	American Society of Mechanical Engineers
ATWS	Anticipated Transient Without Scram
CASS	Cast Austenitic Stainless Steel
CFR	Code of Federal Regulations
CST	Condensate Storage Tank
EPRI	Electric Power Research Institute
EQ	Environmental Qualification
FP	Fire Protection
GALL	Generic Aging Lessons Learned
GL	Generic Letter
IR	Inspection Report
ISI	In-Service Inspection
LR	License Renewal
LRA	License Renewal Application
LRCR	License Renewal Change Request
NRC	U.S. Nuclear Regulatory Commission
NRR	Office of Nuclear Reactor Regulations
NUMARC	Nuclear Management and Resources Council
PARS	Publicly Available Records System
PBD	Program Basis Document
RAI	Request for Additional Information
RG	Regulatory Guide
RPV	Reactor Pressure Vessel
SSC	Systems, Structures, and Components
telecon	Telephone Conversation
UFSAR	Updated Final Safety Analysis Report
WO	Work Order

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Sincerely,

/RA/

Ann Marie Stone, Chief
Engineering Branch 2
Division of Reactor Safety

Docket Nos. 50-456; 50-457
License Nos. NPF–72; NPF–77

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Inspection Report 05000456/2014009;
05000457/2014009
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and Exit Meeting Presentation Slides

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