UNITED STATES
NUCLEAR REGULATORY COMMISSION
REGION IV
1600 E. LAMAR BLVD
ARLINGTON TX 76011-4511

March 31, 2017

Mr. Michael R. Chisum
Site Vice President
Entergy Operations, Inc.
17265 River Road
Killona, LA 70057-0751

SUBJECT: WATERFORD STEAM ELECTRIC STATION, UNIT 3 – NRC LICENSE RENEWAL INSPECTION REPORT 05000382/2017007

Dear Mr. Chisum:

On February 16, 2017, a U.S. Nuclear Regulatory Commission (NRC) team completed the onsite portion of an inspection of your application for license renewal for the Waterford Steam Electric Station, Unit 3. The team discussed the inspection results with you and other members of your staff.

This inspection examined activities that supported the application for a renewed license for the Waterford Steam Electric Station, Unit 3. The inspection addressed your processes for scoping and screening structures, systems, and components to select equipment subject to an aging management review. Further, the inspection addressed the development and implementation of aging management programs to support continued plant operation into the 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 structures, systems, and components to verify license renewal boundaries and to observe any effects of equipment aging. These NRC inspection activities constitute one of several inputs into the NRC review process for license renewal applications.

The team concluded that your staff appropriately implemented the scoping and screening of nonsafety-related structures, systems, and components that could affect safety-related structures, systems, and components as required in 10 CFR 54.4(a)(2). The team concluded that your staff conducted an appropriate review of the materials and environments, and established appropriate aging management programs as described in the license renewal application and as supplemented through your responses to requests for additional information from the NRC. The team concluded that your staff maintained the documentation supporting the application in an auditable and retrievable form.

Based on the samples reviewed by the team the inspection results support a conclusion of reasonable assurance that actions have been identified and have been or will be taken to manage the effects of aging in the structures, systems, and components identified in your application, and that the intended functions of these structures, systems, and components will be maintained in the period of extended operation.

In accordance with 10 CFR 2.390 of the NRC's “Rules of Practice,” a copy of this letter, and its enclosure, will be available electronically for public inspection in the NRC Public Document Room or from the Publicly Available Records component of NRC’s document system (ADAMS). ADAMS is accessible from the NRC Web site at http://www.nrc.gov/reading-rm/adams.html (the Public Electronic Reading Room).

Sincerely,

/RA John Mateychick Acting for/

Gregory E. Werner, Chief
Engineering Branch 2
Division of Reactor Safety

Docket No. 50-382
License No. NPF-38

Enclosure:
Inspection Report 05000382/2017007
w/Attachments:
1. Supplemental Information
2. License Renewal Inspection Document Request

cc: Electronic Distribution

U.S. NUCLEAR REGULATORY COMMISSION
REGION IV

Docket:	05000382
License:	NPF-38
Report:	05000382/2017007
Applicant:	Entergy Operations, Inc.
Facility:	Waterford Steam Electric Station, Unit 3
Location:	17265 River Road Killona, LA 70057
Dates:	January 30 through February 16, 2017
Team Lead:	S. Graves, Senior Reactor Inspector, Engineering Branch 2
Inspectors:	G. Pick, Senior Reactor Inspector W. Sifre, Senior Reactor Inspector J. Melfi, Project Engineer I. Anchondo, Reactor Inspector
Approved By:	Gregory E. Werner Chief, Engineering Branch 2 Division of Reactor Safety

Enclosure

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SUMMARY

IR 05000382/2017007; 01/30/2017 – 02/16/2017; Waterford Steam Electric Station, Unit 3; Scoping of Nonsafety-Related Systems Affecting Safety-Related Systems and Review of License Renewal Aging Management Programs.

NRC inspectors from Region IV performed onsite inspections of the applicant's license renewal activities. The team performed the evaluations in accordance with Manual Chapter 2516, "Policy and Guidance for the License Renewal Inspection Programs," and Inspection Procedure 71002, "License Renewal Inspection." The team did not identify any findings as defined in NRC Manual Chapter 0612.

The team concluded the applicant adequately performed screening and scoping of nonsafety-related structures, systems, and components as required in 10 CFR 54.4(a)(2). The team concluded that the applicant conducted an appropriate review of the materials and environments and established appropriate aging management programs as described in the license renewal application and as supplemented through responses to requests for additional information from the NRC. The team concluded that the applicant provided the documentation that supported the application and inspection process in an auditable and retrievable form.

Based on the samples reviewed by the team the inspection results support a conclusion of reasonable assurance that actions have been identified and have been or will be taken to manage the effects of aging in the structures, systems, and components identified in your application and that the intended functions of these structures, systems, and components will be maintained in the period of extended operation.

A. NRC-Identified Findings and Self-Revealing Findings

None

B. Licensee-Identified Violations

None

REPORT DETAILS

4. OTHER ACTIVITIES (OA)

4OA5 Other - License Renewal

a. Inspection Scope (IP 71002)

This inspection was performed to evaluate the thoroughness and accuracy of the applicant's scoping and screening of nonsafety-related structures, systems, and components (SSC), as required in 10 CFR 54.4(a)(2). Also, the team evaluated whether aging management programs will be capable of managing identified aging effects in an appropriate manner.

In order to evaluate scoping activities, the team selected a number of SSCs for review to evaluate whether the methodology used by the applicant appropriately addressed the nonsafety-related systems affecting the safety functions of a structure, system, or component within the scope of license renewal.

The team selected a sample of 23 of the 41 aging management programs developed by the applicant to verify the adequacy of the applicant's guidance, implementation activities, and documentation. The team evaluated the programs to determine whether the applicant would appropriately manage the effects of aging and to verify that the applicant would maintain the safety functions of the SSCs during the period of extended operation. The team evaluated the applicant's review and consideration of industry and plant-specific operating experience related to aging effects.

The team reviewed supporting documentation and interviewed applicant personnel to confirm the accuracy of the license renewal application conclusions. For a sample of plant structures and systems, the team walked down accessible portions of the systems to observe aging effects. During the plant walkdowns, the team reviewed the material condition of the SSCs.

b.1 Evaluation of Scoping of Nonsafety-Related Structures, Systems, and Components

For scoping of nonsafety-related SSCs affecting safety-related SSCs, as required by 10 CFR 54.4(a)(2), the team reviewed the applicant's program guidance and scoping results. The team assessed the thoroughness and accuracy of the methods used to identify the SSCs required to be within the scope of the license renewal application. The team verified that the applicant had established procedures consistent with the NRC-endorsed guidance contained in Nuclear Energy Institute 95-10, "Industry Guideline for Implementing the Requirements of 10 CFR Part 54 – The License Renewal Rule," Revision 6, Appendix F, Sections 3, 4, and 5. The team assessed whether the applicant evaluated (1) nonsafety-related SSCs within the scope of the current licensing basis, (2) nonsafety-related SSCs directly connected to safety-related SSCs, and (3) nonsafety-related SSCs not directly connected but spatially near safety-related SSCs.

The team reviewed the license renewal drawings listed in the appendix. The applicant had color coded the drawings to indicate in-scope systems and components required by 10 CFR 54.4(a)(1), (a)(2), and (a)(3). The team interviewed personnel, reviewed

program documents, and independently walked down numerous areas within the plant. The areas walked down included:

- Reactor auxiliary building
- Fuel handling building
- Diesel generator rooms
- Turbine building and upper deck
- Diesel generator fuel oil storage tank A area
- Wet and dry cooling towers
- Firewater pump house and tanks
- Yard fire main
- Portions of the electrical distribution system associated with station blackout recovery

For SSCs selected because of potential spatial interactions, where failure of nonsafety-related components could adversely affect adjacent safety-related components, the team determined that the applicant accurately categorized the in-plant configuration within the license renewal documents. The team determined the personnel involved in the process were knowledgeable and appropriately trained.

For SSCs selected because of potential structural interaction (seismic design of safety-related components potentially affected by nonsafety-related components), the team determined that the applicant accurately identified and categorized the structural boundaries within the program documents. Based on in-plant walkdowns and on independent sampling of the isometric drawings (identified by an asterisk (*) in the appendix) and the seismic boundary determinations, the team determined that the applicant appropriately identified the seismic design boundaries and correctly included the applicable components within the license renewal scope.

On June 27, 2016, the NRC issued a license amendment authorizing the transition of the applicant's fire protection program to a risk informed, performance-based program based on the 2001 Edition of National Fire Protection Association (NFPA) Standard 805, "Performance-Based Standard for Fire Protection for Light Water Reactor Electric Generation Plants." The applicant had transitioned their fire protection program in accordance with Amendment 248 of the facility operating license. In a response to a request for information letter (W3F1-2017-0002), dated January 16, 2017, the applicant identified they would update their License Renewal Application to reflect this change. The team reviewed the applicant's scoping of systems affected by this change, and reviewed a sample of aging management programs affected by this change.

In summary, the team concluded that the applicant had implemented an acceptable method of scoping nonsafety-related SSCs and that this method resulted in appropriate scoping determinations for the samples reviewed.

b.2 Evaluation of New Aging Management Programs

The team reviewed 7 of the 13 new aging management programs to determine whether the applicant had established appropriate actions or had actions planned to manage the effects of aging as specified in NUREG-1801, “Generic Aging Lessons Learned (GALL) Report,” Revision 2 (the GALL Report). The team independently reviewed site-specific operating experience to determine whether there were any aging effects for the systems and components within the scope of these programs that had not been identified when considering applicable industry operating experience.

The team selected in-scope SSCs to assess how the applicant maintained plant equipment material conditions under existing programs and to visually observe examples of nonsafety-related equipment determined to be within scope because of the proximity to safety-related equipment and the potential for failure as a result of aging effects.

.1 B.1.3 Buried and Underground Piping and Tanks Inspection (XI.M41)

The applicant established this new aging management program, consistent with the GALL Report, as modified by LR-ISG-2011-03, “Changes to the Generic Aging Lessons Learned (GALL) Report Revision 2 Aging Management Program XI.M41, “Buried and Underground Piping and Tanks,”” to manage the loss of material, cracking or changes in material properties resulting from general corrosion, and loss of material on external surfaces of buried and underground limited access components. The program specified prevention, mitigation, and inspection activities, including external coatings, quality of backfill, cathodic protection and periodic inspections. The applicant included all in-scope underground piping and components of carbon steel, gray cast iron, polymers, cementitious and concrete materials. This program is credited for plant drains, the emergency generator system, component cooling and auxiliary component cooling water systems, and the fire water system.

The applicant identified that they would manage the effects of aging through visual inspection either during opportunistic excavations for other maintenance or during planned excavations. The inspections will evaluate the condition of the external surfaces, the backfill, and protective coatings and wrappings of steel, stainless steel, and copper alloy on buried and underground components. The applicant will perform one excavation of each material type once every 10 years, beginning in the 10-year period prior to the period of extended operation.

The team reviewed the aging management program evaluation report, implementing procedures, and corrective action documents. The team also reviewed plant specific operating experience, cathodic protection system evaluation reports, and cathodic protection system surveys. The team interviewed engineers responsible for the buried pipe and coating programs and the cathodic protection systems.

The team concluded that the applicant had performed appropriate evaluations of the piping conditions and considered pertinent industry experience and plant operating history to determine the effects of aging on buried piping and tanks. The team concluded that, if implemented as described, the applicant developed guidance that would appropriately identify and address aging effects during the period of extended operation.

.2 B.1.4 Coating Integrity (XI.M42)

The applicant established this new aging management program, consistent with the GALL Report, as modified by LR-ISG-2013-01, "Aging Management of Loss of Coating or Lining Integrity for Internal Coatings/Linings on In-Scope Piping, Piping Components, Heat Exchangers and Tanks," with exception, to manage aging effects where loss of coating or lining integrity could impact the component's current licensing basis intended functions. The applicant will perform periodic visual inspections of components with coated surfaces in environments of raw water, treated water, lubricating oil or fuel oil. For coated surfaces that do not meet the acceptance criteria, physical testing will be performed. The training and qualification of individuals must meet the standards endorsed in Regulatory Guide 1.54, "Service Level I, II, and III Protective Coatings Applied to Nuclear Power Plants." The applicant will implement this program within the 10-year period prior to entering the period of extended operation.

The applicant requested an exception for this aging management program.

Exception
For the Detection of Aging Effects element, the applicant proposed performing a one-time inspection of the internal coating of the 11-foot diameter carbon steel circulating water piping. The piping is in-service while the plant operates and provides the source to fill the wet cooling tower basin. The coal-tar coating, if it detached, would flow to the condenser water box affecting power generation but not any safety functions.

The team identified no concerns with this exception.

The team reviewed the license renewal application and the aging management program evaluation report. The team discussed the program with the responsible staff.

For the Coating Integrity program, the team concluded that the applicant had performed appropriate evaluations and considered pertinent industry experience to determine the in-scope components and systems. The team concluded that, if implemented as described, the applicant developed guidance that would appropriately identify and address aging effects during the period of extended operation.

.3 B.1.20 Metal Enclosed Bus Inspection (XI.E4)

The applicant established this new aging management program, consistent with the GALL Report, to manage aging of the electrical bus bar bolted connections, bus bar insulation and insulators, bus enclosure assemblies (internal and external), and elastomers. The program scope included safety-related 4.16kV metal enclosed bus sections between switchgear 3A3-S, 3AB3-S, and 3B3-S and the safety-related 480V metal enclosed bus sections between switchgear 3A31-S, 3AB31-S, and 3B31-S.

The program will inspect a sample of accessible bus bolted connections for increased connection resistance. Bus insulation or insulators will be visually inspected for signs of aging caused by thermal/thermoxidative degradation of organics/thermoplastics, radiation-induced oxidation, moisture/debris intrusion, or ohmic heating, as indicated by embrittlement, cracking, chipping, melting, discoloration, or swelling, which may indicate

overheating or aging degradation. A combination of visual inspections and quantitative measurements such as thermography will be performed, as required. Internal bus supports or insulators will be visually inspected for structural integrity and signs of cracking.

Enclosure assembly external surfaces will be visually inspected for evidence of loss of material caused by general, pitting, and crevice corrosion. Accessible elastomers (e.g., gaskets, boots, and sealants) will be inspected for changes in material properties (elastomer degradation) including surface cracking, crazing, scuffing, dimensional changes (e.g., ”ballooning” and ”necking”), shrinkage, discoloration, hardening, and loss of strength at least once every 10 years. Enclosure assembly internal surfaces will be visually inspected for evidence of loss of material. Internal portions of the enclosure assemblies will also be inspected for cracks, corrosion, foreign debris, excessive dust buildup, and evidence of water intrusion.

The applicant will perform inspections before the period of extended operation, and at least once every 10 years, unless visual inspections are used as the only method to inspect accessible bolted connections. If the applicant uses only visual inspection methods for accessible bolted connection inspection, the inspection will be completed prior to the period of extended operation and at least once every five years thereafter. This method is consistent with the alternative method described in the GALL Report.

The team reviewed applicable license renewal program basis documents, aging management program evaluation report, existing maintenance procedures, plant specific operating experience, and preventive maintenance requirements. The team interviewed license renewal project personnel and the responsible plant and design engineers. The team walked down all the in-scope metal enclosed buses.

The team concluded that for the Metal Enclosed Bus Inspection program, the applicant had performed appropriate evaluations and considered pertinent industry experience and plant operating history to determine the effects of aging for the metal enclosed buses. The team concluded that, if implemented as described, the applicant developed guidance that would appropriately identify and address aging effects during the period of extended operation.

.4 <u>B.1.24 Non-EQ Inaccessible Power Cables (≥ 400 V) (XI.E3)</u>

The applicant established this new aging management program, consistent with the GALL Report, with exception, to manage the effects of reduced insulation resistance on inaccessible power cables (greater than or equal to 400 V) exposed to adverse localized environments caused by significant moisture. The applicant had no in-scope safety-related cables installed below grade.

The applicant requested an exception for this aging management program.

Exception
For the Preventive Actions element, the applicant cannot prevent the 480V electric driven fire pump (FP MPMP0002) and the electric driven jockey fire pump cables from being exposed to significant moisture even with increased inspection frequency. Periodic manhole inspections will be performed to minimize this exposure, but the inspection frequency cannot be increased to prevent these cables from being exposed to significant moisture.

The applicant took this exception to the Preventive Actions element because of environmental conditions surrounding the in-scope cables. The applicant could not prevent the in-scope 480V electric-driven fire pump cables and the electric-driven jockey fire pump cables from being exposed to significant moisture resulting from site elevation. The manholes and duct banks housing these cables are continuously submerged above the cable support assemblies from ground water penetration since the site elevation is below river elevation. As a result the applicant had chosen to perform annual inspections of the cables and cable support assemblies. A review of site historical operating experience identified only one medium-voltage cable failure and that failure was not attributable to moisture intrusion.

The team held numerous discussions with the applicant about their efforts to mitigate the in-scope cables exposure to submergence and their current and proposed process for inspections. The applicant opened and dewatered an in-scope manhole for the team to inspect and observe the as-found conditions of the cables, cable support assemblies and the structural condition of the cable vault and ducting. The applicant had planned to use the site's maintenance program and existing model work orders to perform visual inspections of the in-scope cables and cable support assemblies. After reviewing existing work orders and the open manhole conditions, the applicant identified that enhancements to their work orders and inspection process for the cables and manholes would be appropriate. As part of their aging management program, the applicant was developing a cable reliability program using Procedure EN-DC-346, "Cable Reliability Program," Revision 6, and guidance from several industry guidance documents, including Electric Power Research Institute (EPRI) TR-1020804, "Aging Management Development Guidance AC and DC Low-Voltage Power Cable Systems for Nuclear Power Plants," to improve their cable management process. The in-scope cabling had ethylene propylene rubber (EPR) insulation with jacketing of black heavy-duty chlorosulphonated polyethylene for low moisture absorption. The cables were designed for underground and aboveground applications in wet or dry locations and direct burial. The applicant stated the in-scope cables did not have splices.

The program specified annual manhole inspections to assess whether cables and cable support assemblies are intact. The applicant discussed the enhancements to the work order process for the in-scope cables that will significantly improve the visual inspection process. In addition, the applicant will electrically test the inaccessible power cabling prior to entering the period of extended operation and once every six years thereafter. The program stated the testing will be a proven test for detecting deterioration of the insulation system caused by wetting or submergence, such as Dielectric Loss (Dissipation Factor/Power Factor), AC Voltage Withstand, Partial Discharge, Step Voltage, Time Domain Reflectometry, Insulation Resistance and Polarization Index, Line Resonance Analysis, or other state-of-the-art testing at the time the test is performed.

The program will trend and track the results for condition monitoring, and the applicant will use the Structures Monitoring program for inspection and management of the cable vault structures. After discussions and review, the team had no significant concerns with the exception and concluded the licensee could provide reasonable assurance that the aging effects for the in-scope cables would be appropriately managed through the enhanced inspection and testing program.

The team reviewed applicable license renewal program basis documents, aging management program evaluation report, program procedures, and records for completed maintenance activities. In addition, the team reviewed condition records from the corrective action database for relevant plant operating experience documents. The team interviewed plant personnel and reviewed maintenance work orders, manhole inspection results, and records regarding water removed from manholes.

The team concluded that for the Non-EQ Inaccessible Power Cables program, the applicant had performed appropriate evaluations and considered pertinent industry experience and plant operating history to determine the effects of aging for inaccessible cables. The team concluded that, if implemented as described, the applicant developed guidance that would appropriately identify and address aging effects during the period of extended operation.

.5 B.1.26 Non-EQ Insulated Cables and Connections (XI.E1)

The applicant established this new aging management program, consistent with the GALL Report, to manage the aging of insulated cables and connections exposed to adverse localized environments caused by heat, radiation, or moisture. The monitored aging effects included cable and connection jacket surface anomalies, such as embrittlement, discoloration, cracking, melting, swelling, or surface contamination. The program population will consist of all accessible cables and connections such that the program sample will represent, with reasonable assurance, all cables (accessible and inaccessible) and connections in adverse localized environments.

The applicant planned to monitor the aging effects through periodic visual inspections. The program acceptance criteria established that accessible cables and connections were to be free from unacceptable visual indications of surface anomalies. The applicant defined an unacceptable indication as a noted condition or situation that, if left unmanaged, could lead to a loss of intended function. The applicant will complete the first inspection sample of these components prior to entering the period of extended operation and once every 10 years thereafter.

The team reviewed relevant license renewal program basis documents, aging management review documents, procedures, plant specific operating experience, and preventive maintenance requirements. The team interviewed the license renewal project personnel and walked down a sample of accessible areas within the plant where cable trays and exposed cables were installed in adverse localized environments. The applicant identified that EPRI TR 109619, “Guideline for Management of Adverse Localized Environments,” dated June 1999 will be used as guidance in performing the inspections.

The team concluded that for the Non-EQ Insulated Cables and Connections program, the applicant performed appropriate evaluations and considered pertinent industry experience and plant operating history to determine the effects of aging for cables and

connections exposed to adverse localized environments. The team concluded that, if implemented as described, the applicant developed guidance that would appropriately identify and address aging effects during the period of extended operation.

.6 B.1.28 One-Time Inspection (XI.M32)

The applicant established this new aging management program, consistent with the GALL Report, to manage the aging of components for loss of material, cracking, and reduction of heat transfer internal to plant systems. The applicant will conduct these one-time inspections to identify and characterize the material conditions in representative low-flow and stagnant areas of plant piping and components addressed by the Water Chemistry Control – Primary and Secondary program, the Diesel Fuel Monitoring the Oil Analysis programs, the circulating water concrete intake piping internals, and the reactor vessel flange leak detection line. The planned visual and volumetric inspections would provide direct evidence that no loss of material resulting from corrosion in treated liquid environments was present. The applicant will implement this program within the 10 year period prior to entering the period of extended operation.

The team reviewed the license renewal application and the aging management program evaluation report. The applicant proposed an acceptable method to select their sample population (20 percent of the sample population up to a maximum of 25 components) and specified that the sampling would occur for each set of common material and environment combinations.

For the One Time Inspection program, the team concluded that the applicant had performed appropriate evaluations and considered pertinent industry experience and plant operating history to determine the effects of aging in the affected systems. The team concluded that, if implemented as described, the applicant developed guidance that would appropriately identify and address aging effects during the period of extended operation.

.7 B.1.35 Selective Leaching (XI.M33)

The applicant established this new aging management program, consistent with the GALL Report, to manage the aging of components subject to selective leaching of materials. The affected components included material made of gray cast iron and copper alloy with greater than 15 percent nickel (i.e., bronze or brass) exposed to raw water, treated water, and ground water that may lead to selective leaching. The program will include a one-time visual inspection and mechanical testing of a sample of components with metallurgical properties susceptible to selective leaching to demonstrate the absence of this aging effect, or to implement an aging management program if a loss of material has occurred.

The team reviewed the license renewal application, the aging management program evaluation report, and the list of components subject to selective leaching. The majority of the components consisted of gray cast iron piping and valves in the fire protection system. The team discussed the program evaluations and planned activities with the responsible staff.

For the Selective Leaching program the team concluded that the applicant had performed appropriate evaluations and considered pertinent industry experience and plant operating history to determine the effect of aging in components and systems

subject to this mechanism. The team concluded that, if implemented as described, the applicant developed guidance would appropriately identify and address aging effects during the period of extended operation.

b.3 Evaluation of Existing Aging Management Programs

The team reviewed 16 of the 28 existing programs credited with aging management to determine whether the applicant had taken or planned to take appropriate actions to manage the effects of aging as described in the GALL Report and any related License Renewal Interim Staff Guidance (LR-ISG).

The team reviewed site-specific operating experience to determine whether there were any aging effects for the systems and components within the scope of these programs that had not been identified from the applicant's review of industry operating experience.

The team evaluated whether the applicant implemented or planned to implement appropriate actions to manage the effects of aging. These programs had established procedures, records of past corrective actions, and previous operating experience related to applicable components. Some programs required enhancements and took exceptions (i.e., changes to program aspects that will be implemented prior to the period of extended operation) to be consistent with the GALL Report.

The team walked down selected in-scope SSCs to assess how the applicant maintained plant equipment under the current operating license; to observe examples of nonsafety- related equipment determined to be in-scope because of the proximity to safety-related equipment; and, to assess the potential for failures as a result of aging effects.

.1 B.1.1 Bolting Integrity (XI.M18)

This was an existing program, consistent with the GALL Report, after one exception and three enhancements, credited with managing aging of safety-related and nonsafety-related closure bolting for pressure retaining components. The program included the selection of bolting materials and use of lubricants and sealants consistent with guidance in EPRI NP-5769, "Degradation and Failure of Bolting in Nuclear Power Plants," and recommendations provided in NUREG-1339, "Resolution of Generic Safety Issue 29: Bolting Degradation or Failure in Nuclear Power Plants," to prevent or mitigate degradation and failure of safety-related bolting. The applicant selected bolting materials, lubricants, and sealants in accordance with industry guidance. In addition, the applicant established torque values and restricted the use of molybdenum disulfide as specified in industry guidelines and manufacturer recommendations. Maintenance practices and bolting replacement activities included proper gasket activation, preload, torqueing, and fit-up of bolting in accordance with manufacturer, vendor, or industry recommendations.

The applicant requested an exception for this aging management program.

Exception
For the Detection of Aging Effects element, identify that the applicant does not perform inspections of buried fire water system bolting as part of this program. Inspection of buried fire water system bolting is performed in accordance with the Buried and Underground Piping and Tanks Inspection Program.

The team had no significant concerns with the exception. The applicant identified that enhancements were necessary to ensure consistency with the GALL Report.

Enhancements
For the Scope of the Program element, revise procedures to include submerged pressure-retaining bolting. For the Parameters Monitored or Inspected element, revise procedures to monitor high-strength bolting locations for cracking. For the Detection of Aging Effects element, revise procedures to include volumetric examinations per ASME Code Section XI for high-strength bolting.

The team had no significant concerns with the enhancements.

The team reviewed license renewal program documents, the aging management program evaluation report, plant operating experience, implementing procedures, and corrective action documents.

The team concluded that for the Bolting Integrity program, the applicant had performed appropriate evaluations and considered pertinent industry experience and plant operating history to determine the effects of aging for pressure retaining bolting. The team concluded that, if implemented as described, including the enhancements and exception, the applicant provided guidance that would appropriately identify and address aging effects during the period of extended operation.

.2 B.1.5 Compressed Air Monitoring (XI.M24)

This was an existing program, consistent with the GALL Report after enhancement, credited with managing the loss of material in compressed air systems by periodically monitoring the system air for moisture and contaminants and by inspecting system internal surfaces. The applicant's air system quality was being maintained in accordance with manufacturer recommendations, EPRI guidelines, and ASME and ANSI specifications.

The applicant identified that enhancements were necessary to ensure consistency with the GALL Report.

Enhancements
For the Scope of the Program element, revise procedures to include the EDG starting air system.

Enhancements
For the Preventive Actions element, revise procedures to apply consideration of the guidance of ASME OM-S/G-1998 (Part 17); EPRI NP-7079; and EPRI TR-108147 to the limits specified for the air system contaminants. For Parameters Monitored or Inspected, Detection of Aging Effects, and Monitoring and Trending elements, revise procedures to include periodic and opportunistic visual inspections of accessible internal surfaces of system components including accumulators, flex hoses, and tubing of compressed air systems. Specify inspections at frequencies recommended in ASME OM-S/G-1998 (Part 17).

The team had no significant concerns with the enhancements.

The team reviewed the license renewal application, the NRC aging management program audit results, and the aging management program evaluation report. The team also reviewed the site strategic compressed air monitoring plans, operating experience evaluations, procedures, condition reports, and system health reports.

For the Compressed Air Monitoring program, the team concluded that the applicant had performed appropriate evaluations and considered pertinent industry experience and plant operating history to determine the effects of aging. The team concluded that, if implemented as described, including the enhancements, the applicant provided guidance that would appropriately identify and address aging effects during the period of extended operation.

.3 B.1.8 Diesel Fuel Monitoring (XI.M30)

This was an existing program, consistent with the GALL Report after enhancement, credited with managing aging effects resulting from general, pitting, crevice, and microbiological influenced corrosion on internal surfaces of the diesel fuel oil system tanks. The program managed aging effects by minimizing exposure to fuel oil contaminated with water and microbes. The components monitored by this program included the diesel generator fuel oil storage tanks, diesel generator fuel oil feed tanks, diesel-driven fire pump fuel tanks, and the auxiliary diesel generator fuel oil tank.

The applicant identified that enhancements were necessary to ensure consistency with the GALL Report.

Enhancements
For the Scope of the Program element, revise procedures to add the auxiliary diesel generator fuel oil tank and the diesel generator fuel oil feed tanks to the program. For both Parameters Monitored or Inspected and Monitoring and Trending elements, revise procedures to monitor and trend water content, sediment, particulates, and microbiological activity in the emergency diesel generator feed tanks, and auxiliary diesel generator fuel oil tank, and particulate and microbiological activity in high pressure fire pump (HPFP) fuel oil storage tank at least quarterly. For the Detection of Aging Effects element, revise procedures to:

- Include periodic multi-level sampling of in-scope tanks, and if the tank design features do not allow for multi-level sampling, the sampling methodology that includes a representative sample from the lowest point in the tank shall be used;

- Include a ten-year periodic cleaning and internal visual inspection of in-scope tanks. In the areas of any degradation identified during the internal inspection a volumetric inspection shall be performed. In the event an internal inspection cannot be performed due to design limitations, a volumetric examination shall be performed. These cleanings and internal inspections will be performed at least once during the 10-year period prior to the period of extended operation and at succeeding 10-year intervals.

The team had no significant concerns with the enhancements.

The team reviewed the aging management program evaluation report, relevant condition reports, chemical analysis reports, and implementing procedures, 10-year data summaries and performance graphs for each of the in-scope tanks to determine the quality and history of fuel conditions and the most recent 10-year cleaning and inspection activities for the diesel generator fuel oil storage tanks. The team interviewed plant personnel and walked down the train A diesel generator fuel oil feed tank and fuel oil storage tank, the diesel-driven fire pump fuel tanks, and the auxiliary diesel generator fuel oil tank. Because of the low sulfur content in diesel fuel oil and the corresponding lower energy content, the applicant was implementing a modification that added an additional diesel generator fuel oil storage tank for each safety-related train. The team confirmed that the design ensured that the new tanks would also be sampled when taking routine samples required by technical specifications. The design of the new tanks allowed personnel to take fuel oil samples at different elevations within the tanks.

The team concluded that for the Diesel Fuel Monitoring program, the applicant had performed appropriate evaluations and considered pertinent industry experience and plant operating history to determine the effects of aging on internal surfaces of the diesel fuel oil tanks. The team concluded that, if implemented as described including the enhancements, the applicant provided guidance that would appropriately identify and address aging effects during the period of extended operation.

.4 <u>B.1.10 External Surfaces Monitoring (XI.M36)</u>

This was an existing program, consistent with the GALL Report as modified by LR-ISG-2011-03, “Changes to the Generic Lessons Learned (GALL) Report Revision 2 Aging Management Program XI.M41, “Buried and Underground Piping and Tanks,”” and LR-ISG-2012-02, “Aging Management of Internal Surfaces, Fire Water Systems, Atmospheric Storage Tanks, and Corrosion under Insulation,” after enhancement, credited with managing aging effects of loss of material, cracking, and change in material properties to external plant surfaces. The program used periodic inspections and walkdowns to monitor for material degradation and leakage, including coatings and insulation degradation, and loss of material. The program included confirmation of the integrity of coated surfaces as a means to effectively manage the effects of corrosion on metallic surfaces. Accessible mechanical components are inspected at least once per refueling cycle; inaccessible mechanical components or areas that have limited access caused by safety, security, or other considerations will be inspected when plant conditions permit, but at a frequency that will ensure the component’s intended function is maintained. When required by the ASME Code, inspections are conducted in

accordance with the code requirements. In the absence of such requirements, plant-specific visual inspections are performed of metallic surfaces using procedures implemented by inspectors qualified through plant programs. Component surfaces that are insulated and in an environment of condensation and insulated outdoor components are periodically inspected at such intervals that would ensure the component's intended function.

The applicant identified that several enhancements were necessary to ensure consistency with the GALL Report as modified by LR-ISG-2011-03.

Enhancements
For the Detection of Aging Effects element, revise procedures to: • Include instructions to perform a 100 percent visual inspection of accessible polymeric component surfaces. The visual inspection should identify indicators of loss of material caused by wear to include dimensional change, surface cracking, crazing, scuffing, and for flexible polymeric materials with internal reinforcement, the exposure of reinforcing fibers, mesh, or underlying metal. In addition, 10 percent of the available flexible polymeric surface area should be physically manipulated to augment the visual inspection to confirm the absence of hardening and loss of strength; • Conduct representative inspections during each 10-year period of insulated surfaces of each material type (e.g., steel, stainless steel, copper alloy, aluminum) in an air-outdoor or condensation environments; • Remove insulation in order to perform a visual inspection of a representative sample of insulated indoor component surfaces in an environment of condensation and outdoor component surfaces. The inspections shall include a minimum of 20 percent of the in-scope piping length for each material type (e.g., steel, stainless steel, copper alloy, aluminum), or for components with a configuration which does not conform to a 1- foot axial length determination, 20 percent of the surface area. Alternatively, insulation can be removed and a minimum of 25 inspections performed that can be a combination of 1-foot axial length sections and individual components for each material type; • Include inspection locations based on the likelihood of corrosion under insulation; • Allow subsequent inspections to consist of an examination of the exterior surface of the insulation for indications of damage to the jacketing or protective outer layer of the insulation, if no loss of material caused by general, pitting or crevice corrosion, beyond that which could have been present during initial construction and no evidence of cracking is identified after the initial inspection; • Ensure that if the external visual inspections of the insulation reveal damage to the exterior surface of the insulation or there is evidence of water intrusion through the insulation, periodic inspections under the insulation will continue at such intervals that would ensure the component's intended function;

Enhancements
• Provide guidance that removal of tightly adhering insulation that is impermeable to moisture is not required unless there is evidence of damage to the moisture barrier. However, the entire population of in-scope accessible piping component surfaces that have tightly adhering insulation will be visually inspected for damage to the moisture barrier with the same frequency as for other types of insulation inspections. These inspections will not be credited towards the inspection quantities for other types of insulation. For the Acceptance Criteria element, include the following criteria: • Stainless steel should have a clean and shiny surface with no discoloration; • Other metals should not have any abnormal surface indications; • Flexible polymeric materials should have a uniform surface texture and color with no cracks and no unanticipated dimensional change, no abnormal surface with the material in an as new condition with respect to hardness, flexibility, physical dimensions, and color; • Rigid polymeric materials should have no erosion, cracking, checking or chalking.

The team had no significant concerns with the enhancements.

The team reviewed the license renewal application, the NRC aging management program audit results, aging management program evaluation report, and program procedures. The team also reviewed site strategic external surfaces monitoring plans; operating experience evaluations, procedures, and external surfaces related condition reports. The team interviewed personnel and walked down areas of the plant containing in-scope external surfaces.

For the External Surface Monitoring program, the team concluded that the applicant had performed appropriate evaluations and considered pertinent industry experience and plant operating history to determine the effects of aging. The team concluded that, if implemented as described including the enhancements, the applicant provided guidance that would appropriately identify and address aging effects during the period of extended operation.

.5 B.1.11 Fatigue Monitoring (X.M1)

This was identified as an existing program, consistent with the GALL Report after enhancement, credited with ensuring that fatigue usage remains within allowable limits for those components identified as having a fatigue Time-Limited Aging Analysis (TLAA). The applicant implemented the program consistent with NUREG/CR-6260, “Application of NUREG/CR-5999 Interim Fatigue Curves to Selected Nuclear Power Plant Components,” and NUREG/CR-6909, “Effects of LWR Coolant Environments on the Fatigue Life of Reactor Materials.”

The applicant implemented the objectives of the program by: (1) tracking the number of critical thermal and pressure transients for selected components; (2) verifying that the

severity of monitored transients are bounded by the design transient definitions for which they are classified; and (3) assessing the impact of the reactor coolant environment on a sample set of critical components including those from NUREG/CR-6260 and those components identified to be more limiting than the components specified in NUREG/CR- 6260. The applicant's program provided for trending to ensure that the fatigue usage factor remains below the design limit during the period of extended operation.

The applicant identified that enhancements were necessary to ensure consistency with the GALL Report.

Enhancements
For the Scope of the Program element, revise procedures to: • Monitor and track additional critical thermal and pressure transients for components that have been identified to have a TLAA including those high-energy line break locations with a cumulative usage factor (CUF) of greater than 0.1; • Develop a set of fatigue usage calculations that consider the effects of the reactor water environment on a sample of reactor coolant system components. This sample shall include the locations identified in NUREG/CR-6260 and additional plant-specific component locations in the reactor coolant pressure boundary if they are found to be more limiting than those considered in NUREG/CR-6260; For the Detection of Aging Effects element, revise procedures to provide updates of the fatigue usage calculations on an as-needed basis if an allowable cycle limit is approached or in a case where a transient definition has been changed, unanticipated new thermal events are discovered, or the geometry of components have been modified.

The team had no significant concerns with the enhancements.

The team reviewed the aging management program evaluation report, plant fatigue transient reviews, condition reports, and summaries of associated plant and industry operating experience. The team also reviewed the Procedure PE-002-003, "Fatigue Monitoring Program," Revision 5, which established a thermal and pressure transient and fatigue monitoring program. In addition, the team reviewed calculation 1400394.302, "Waterford-3 Plant Fatigue Transient Review," Revision 0, which established the set of plant transient events that needed to be tracked from plant start-up through April 5, 2014, and interviewed plant personnel.

The team concluded that for the Fatigue Monitoring program, the applicant had performed appropriate evaluations and considered pertinent industry experience and plant operating history to determine the plant transient events that are required to be tracked under this program. The team concluded that, if implemented as described including the enhancements, the applicant provided guidance that would appropriately identify and address aging effects during the period of extended operation.

.6 B.1.12 Fire Protection (XI.M26)

This was an existing program, consistent with the GALL Report after enhancement, credited with managing aging effects for penetration seals, fire barrier walls, ceilings, floors, other fire resistance materials that serve an intended fire barrier function, and all fire-rated doors that perform a fire barrier function. The applicant planned to manage the effects of aging through visual inspections and functional testing. The applicant visually inspected 10 percent of each type of fire-rated penetration seal every 18 months, and visually inspected fire barrier walls, ceilings, and floors, including coatings and wraps at least once every refueling cycle examining for any signs of aging such as cracking, spalling, and loss of material. Fire doors are visually inspected and are functionally tested every 18 months in accordance with surveillance requirements. Where fire damper housings were in duct work, they are included in the HVAC systems program. In-wall fire damper housings are included in structural aging management reviews.

The applicant does not have Halon or CO_2 fire suppression systems. Freeze-thaw is not significant as the station is located in a temperate weather area, identified by ASTM C 33-90, "Standard Specification for Concrete Aggregates," and concrete structures and components are designed and constructed in accordance with ACI-318, "Building Code Requirements for Structural Concrete" requirements.

The applicant identified that enhancements were necessary to ensure consistency with the GALL Report.

Enhancements
For the Detection of Aging Effects element, revise procedures to: • Include an inspection of fire barrier walls, ceilings, and floors for any signs of degradation such as spalling or loss of material caused by chemical attack, or reaction with aggregates at least once every refueling cycle; • Inspect fire-rated doors for any degradation of door surfaces at least once per refueling cycle; • Ensure fire barrier seals are inspected by personnel qualified in accordance with appropriate NFPA standards; For the Acceptance Criteria element, revise procedures to provide the following acceptance criteria: • No significant indications of concrete spalling, and loss of material of fire barrier walls, ceilings, and floors and in other fire barrier materials; • No surface degradation of fire doors.

The team identified no significant concerns with the enhancements.

On June 27, 2016, the NRC issued a license amendment authorizing the transition of the applicant's fire protection program to a risk informed, performance-based program based on the 2001 Edition of National Fire Protection Association (NFPA) Standard 805,

"Performance-Based Standard for Fire Protection for Light Water Reactor Electric Generation Plants." The applicant had transitioned their fire protection program in accordance with Amendment 248 of the facility operating license. The team reviewed program documents associated with the approved fire protection program.

The team reviewed the scoping drawings, implementing procedures, program enhancements including procedure markups to implement the enhancements, completed surveillance tests, work orders, plant operating experience, and corrective action documents. The team interviewed fire protection personnel, and walked down a sample of fire barriers and equipment to observe the material condition of the barriers and to assess the effectiveness of the existing program.

The team concluded that for the Fire Protection program, the applicant had performed appropriate evaluations and considered pertinent industry experience and plant operating history to determine the effects of aging in the affected systems. The team concluded that, if implemented as described including the enhancements, the applicant provided guidance that would appropriately identify and address aging effects during the period of extended operation.

.7 B.1.13 Fire Water System (XI.M27)

This was an existing program, consistent with the GALL Report as modified by LR-ISG-2012-02, "Aging Management of Internal Surfaces, Fire Water Systems, Atmospheric Storage Tanks, and Corrosion under Insulation," after enhancement and exception, credited with managing loss of material, flow blockage caused by fouling, and loss of coating integrity for in-scope long-lived, passive, water-based fire suppression system components using periodic flow testing and visual inspections in accordance with the 2011 edition of NFPA 25, "Standard for the Inspection, Testing, and Maintenance of Water-Based Fire Protection Systems." The program is credited with managing loss of material in systems including dry-pipe systems downstream of manual isolation valves or deluge valves which may not drain correctly or allow water to collect in piping sections.

System flow testing, including that of underground headers, hose stations, main drains, and selected inspector test valves are performed to ensure the system maintains its intended function. Fire suppression water system parameters monitored during periodic flow testing are fire pump discharge pressure, pressure at fire hydrants and local areas being tested (e.g., local static and flow pressure at main drain valves being opened for testing). Fire water system pressure is continuously monitored such that a loss of pressure is immediately detected and corrective action is initiated. When visual inspections are used to detect loss of material and fouling, the inspection technique used will be capable of detecting surface irregularities that could indicate wall loss caused by corrosion, corrosion product deposition, and flow blockage caused by fouling.

The applicant requested exceptions for this aging management program. The applicant modified several previously identified exceptions in a subsequent responses to NRC Request for Information correspondence.

Exceptions
For the Detection of Aging Effects element: • NFPA 25, Section 5.2.1 specifies annual sprinkler inspections. The applicant performs the sprinkler inspections every refueling cycle; • NFPA 25, Section 6.3.1 specifies flow testing every five years at the hydraulically most remote hose connections of each zone of an automatic standpipe system to verify the water supply still provides the design pressure at the required flow. The applicant performs main header flow testing in the main headers that supply the standpipe system to verify the water supply provides the design pressure and required flow; • NFPA 25, Section 13.2.5 specifies annual main drain tests at each water based system riser to determine if there is a change in the condition of the water piping and control valves. The applicant performs the main drain tests every refueling cycle; • NFPA 25, Section 14.2 specifies performing an internal inspection of the wet and dry fire water piping at least every five years. The applicant performs full flow testing of the piping downstream of the deluge valves for transformers, but does not perform an internal inspection on the dry piping downstream of the deluge valves for the transformers; • NFPA 25, Section 9.2.7.1 specifies an evaluation of interior tank coatings in accordance with the adhesion test of ASTM D 3359, Standard Test Methods for Measuring Adhesion by Tape Test, generally referred to as the "cross-hatch test." The applicant inspects the tank interior coating for damage, chips, blisters, peeling, pinholes, rust, or any local or general failure of the coating every five years. In addition, the applicant performs ultrasonic thickness checks or mechanical measurements of any identified corroded areas. The applicant does not apply the cross-hatch test; • NFPA 25, Section 13.4.3.2.3 requires preaction valves to be trip tested every three years with the control valve fully open. The applicant trip tests the preaction valves with the manual isolation valve closed.

The team noted that several exceptions were taken to the annual testing periodicity recommendations in Table 4a of LR-ISG-2012-02, because access for some inspections is feasible only during refueling outages. This exception is allowed by LR-ISG-2012-02. The team had no significant concerns with the exceptions.

The applicant identified that several enhancements were necessary to ensure consistency with the GALL Report as modified by LR-ISG-2012-02.

Enhancements
For the Detection of Aging Effects element, revise procedures to:

Enhancements
• Inspect for loss of fluid in the glass bulb heat responsive elements; • Perform an inspection of each building's wet pipe fire water system every five years by opening a flushing connection at the end of one main and by removing a sprinkler toward the end of one branch line to allow for inspection of the interior for evidence of loss of material and the presence of foreign organic or inorganic material that could result in flow obstructions or blockage of a sprinkler head. The inspection method used shall be capable of detecting surface irregularities that could indicate wall loss below nominal pipe wall thickness caused by corrosion, corrosion product deposition, and flow blockage caused by fouling. Ensure procedures require a follow-up volumetric wall thickness evaluation where irregularities are detected; • Perform an internal inspection every five years for evidence of loss of material and the presence of foreign organic or inorganic material that could result in flow obstructions or blockage of a sprinkler head of the dry piping downstream of preaction valves. The inspection shall be performed by opening a flushing connection, removing the most remote sprinkler head, and using a method capable of detecting surface irregularities that could indicate wall loss below nominal pipe wall thickness caused by corrosion, corrosion product deposition, and flow blockage caused by fouling; • Perform preaction valve trip testing every three years with the manual isolation valve closed; • Perform an inspection of the nozzles associated with the charcoal filters for loss of material and foreign or organic material when the charcoal is replaced; • Inspect the interior of the fire water tanks in accordance with NFPA 25 (2011 Edition) Sections 9.2.6 and 9.2.7 including sub-steps; • Remove strainers every 5 years and after each actuation to clean and inspect for damage and corroded parts; • Specify that sprinkler heads are tested or replaced in accordance with NFPA-25 (2011 Edition), Section 5.3.1; • Conduct a flow test or flush sufficient to detect potential flow blockage, or conduct a visual inspection of 100 percent of the internal surface of piping segments that cannot be drained or piping segments that allow water to collect in each 5-year interval, beginning 5 years prior to the period of extended operation; • Perform volumetric wall thickness inspections of 20 percent of the length of piping segments that cannot be drained or piping segments that allow water to collect each 5-year interval of the period of extended operation. Measurement points shall be obtained to the extent that each potential degraded condition can be identified (e.g., general corrosion, microbiologically-induced corrosion). The 20 percent of piping that is inspected in each 5-year interval is in different locations than previously inspected piping;

Enhancements
• Perform a blockage evaluation if the flowing pressure decreases by more than 10 percent from the original main drain test or previous main drain tests; • Trip test with flow the deluge valve systems for the main turbine lube oil tank and main feedwater pumps at least once every 18 months. If obstructions are found the system shall be cleaned and retested; • Open and close hydrant valves slowly while performing flow tests to prevent surges in the system. The program shall also require full opening of the hydrant valve; • Verify the hydrants drain within 60 minutes after flushing or flow testing; • Perform vacuum box testing on the bottom of the tank to identify leaks, or in the event the bottom of the fire water tank is uneven, the station will perform a suitable NDE technique rather than vacuum box testing to identify leaks; • Ensure training and qualification of individuals performing the evaluation of fire water storage tank coating degradation is in accordance with ASTM International standards endorsed in Regulatory Guide 1.54, including limitations, if any, identified in Regulatory Guide 1.54 on a particular standard; • Perform wet sponge and dry film testing on the coating applied to the interior of the fire water tanks; • Ensure a fire water tank is not returned to service after identifying interior coating blistering, delamination or peeling unless there are only a few small intact blisters surrounded by coating bonded to the substrate as determined by a qualified coating specialist, or the following actions are performed: (1) any blistering in excess of a few small intact blisters that are not growing in size or number, or blistering not completely surrounded by coating bonded to the substrate is removed; (2) any delaminated or peeled coating is removed; (3) the exposed underlying coating is verified to be securely bonded to the substrate as determined by an adhesion test endorsed by Regulatory Guide 1.54 at a minimum of three locations; (4) the outermost coating is feathered and the remaining outermost coating is determined to be securely bonded to the coating below via an adhesion test endorsed by Regulatory Guide 1.54 at a minimum of three locations adjacent to the defective area; (5) ultrasonic testing is performed where there is evidence of pitting or corrosion to ensure the tank meets minimum wall thickness requirements; (6) an evaluation is performed to ensure downstream flow blockage is not a concern; and (7) a follow-up inspection is scheduled to be performed within two years and every two years after that until the coating is repaired, replaced, or removed; • Determine the extent of coating defects on the interior of the fire water tanks by using one or more of the following methods when conditions such as cracking, peeling, blistering, delamination, rust, or flaking are identified during visual examination: (1) lightly tapping and scraping the coating to determine the coating integrity; (2) dry film thickness measurements at random locations to determine

Enhancements
overall thickness of the coating; (3) wet-sponge testing or dry film testing to identify holidays in the coating; (4) adhesion testing in accordance with ASTM D3359, ASTM D4541, or equivalent testing endorsed by Regulatory Guide 1.54 at a minimum of three locations; (5) ultrasonic testing where there is evidence of pitting or corrosion to determine if the tank thickness meets the minimum thickness criteria; For the Acceptance Criteria element, include criteria for: • Fire water tanks' interior coating that include: (1) indications of peeling and delamination are not acceptable; (2) blisters are evaluated by a coatings specialist qualified in accordance with an ASTM International standard endorsed in RG 1.54 including staff limitations associated with use of a particular standard; (3) blisters should be limited to a few intact small blisters that are completely surrounded by sound coating/lining bonded to the substrate. Blister size and frequency should not be increasing between inspections (e.g., reference ASTM D714-02, "Standard Test Method for Evaluating Degree of Blistering of Paints"); (4) indications such as cracking, flaking, and rusting are to be evaluated by a coatings specialist qualified in accordance with an ASTM International standard endorsed in RG 1.54 including staff limitations associated with use of a particular standard; As applicable, wall thickness measurements, projected to the next inspection, meet design minimum wall requirements; (5) when conducting adhesion testing, results meet or exceed the degree of adhesion recommended in plant-specific design requirements specific to the coating/lining and substrate; • No abnormal debris (i.e., no corrosion products that could impede flow or cause downstream components to become clogged). Any signs of abnormal corrosion or blockage will be removed, its source and extent of condition determined and corrected, and entered into the corrective action program. For the Corrective Action element, revise procedures to: • Specify replacement of any sprinkler heads that show signs of leakage, excessive loading, corrosion, or loss of fluid in the glass bulb heat responsive element; • Perform an obstruction evaluation if any of the following conditions exist: (1) there is an obstructive discharge of material during routine flow tests; (2) an inspector's test valve is clogged during routine testing; (3) foreign materials are identified during internal inspections; (4) sprinkler heads are found clogged during removal or testing; (5) pin hole leaks are identified in fire water piping; (6) after an extended fire water system shutdown (greater than one year); (7) there is a 50 percent increase in time it takes for water to flow out the inspector test valve after the associated dry valve is tripped when compared to the original acceptance criteria or last test. • Evaluate for microbiologically-induced corrosion if tubercles or slime are identified during any internal inspections of fire water piping.

The enhancements included revisions to program procedures to ensure compliance with applicable sections of Table 4a of LR-ISG-2012-02, “Fire Water System Inspection and Testing Recommendations.” The applicant revised several of the originally identified enhancements in subsequent responses to NRC Request for Information correspondence. The team identified no significant concerns related to the enhancements.

The team verified that the applicant performed the following types of specific activities, as required by their Technical Requirements Manual in accordance with applicable NFPA codes: (1) fire water supply piping flush tests, including cycling testable valves in the flow path; (2) hydrostatic testing, flushing to remove debris, and visually inspecting yard fire hydrants and associated hoses; and (3) visually inspecting spray and sprinkler headers for signs of degradation and blockage.

The team reviewed license renewal documents, the aging management program evaluation report, implementing procedures, program enhancements including recent procedure revisions, plant operating experience, corrective action documents, completed work orders, and surveillance tests. The team interviewed plant personnel and walked down fire water system equipment, including the fire pumps, fire water storage tanks, and associated piping. On June 27, 2016, the NRC issued a license amendment authorizing the transition of the applicant’s fire protection program to a risk informed, performance-based program based on the 2001 Edition of NFPA Standard 805, “Performance-Based Standard for Fire Protection for Light Water Reactor Electric Generation Plants.” The applicant had transitioned their fire protection program in accordance with Amendment 248 of the facility operating license. The team reviewed program documents associated with the approved fire protection program.

The team concluded that for the Fire Water System program, the applicant had performed appropriate evaluations and considered pertinent industry experience and plant operating history to determine the effects of aging in the affected systems. The team concluded that, if implemented as described including the enhancements and exceptions, the applicant provided guidance that would appropriately identify and address aging effects during the period of extended operation.

.8 <u>B.1.14 Flow-Accelerated Corrosion (XI.M17)</u>

This was an existing program, consistent with the GALL Report after enhancement, credited with maintaining the structural integrity of carbon steel piping and valve bodies containing two-phase and single-phase fluids. The applicant implemented the program consistent with EPRI NSAC-202L, “Recommendations for an Effective Flow Accelerated Corrosion Program,” Revisions 2 and 3.

The applicant implemented the objectives of the program by: (1) performing an analysis to determine systems susceptible to flow accelerated corrosion; (2) conducting appropriate analysis to predict wall thinning; (3) performing wall thickness measurements based on wall thinning predictions and operating experience; and (4) evaluating measurement results to determine the remaining service life and the need for replacement or repair of components. The team determined the applicant used procedures and methods in the flow accelerated corrosion program consistent with their commitments to Bulletin 87-01, “Thinning of Pipe Wall in Nuclear Power Plants,” and Generic Letter 89-08, “Erosion/Corrosion Induced Pipe Wall Thinning.”

The applicant identified that enhancements were necessary to ensure consistency with the GALL Report.

Enhancements
For the Scope of Program, Detection of Aging Effects, and Monitoring and Trending elements, revise procedures to: • Manage wall thinning caused by erosion mechanisms from cavitation, flashing, liquid droplet impingement, and solid particle impingement; • Include susceptible locations based on the extent of condition reviews in response to plant specific and/or industry guidance and operating experience; • Ensure piping and components replaced with flow accelerated corrosion resistant material and subject to erosive conditions are not excluded from inspections; • Include the need for continued wall thickness measurements of replaced piping until the effectiveness of the corrective action is assured. For the Corrective Action element, revise procedures to evaluate wall thinning caused by erosion from cavitation, flashing, liquid droplet impingement, and solid particle impingement when determining a replacement type of material.

The team had no significant concerns with the enhancements.

The team reviewed the aging management program evaluation report, implementing procedures, program health reports, condition reports, and summaries of associated plant and industry operating experience. In addition, the team discussed program development in response to NRC generic communications, program implementation, and self-assessment results with engineers and license renewal staff.

The team concluded that for the Flow-Accelerated Corrosion program, the applicant had performed appropriate evaluations and had considered pertinent industry experience and plant operating history to determine the effects of aging on carbon steel piping and valves. The team concluded that, if implemented as described including the enhancements, the applicant provided guidance that would appropriately identify and address aging effects during the period of extended operation.

.9 <u>B.1.17 Inspection of Overhead Heavy Load and Light Load (Related to Refueling) Handling Systems (XI.M23)</u>

This was an existing program, consistent with the GALL Report after enhancement, credited with managing the loss of material resulting from corrosion and rail wear for all cranes, trolley, and hoist structural components, fuel handling equipment, and rails. The cranes and hoists in the scope of the program are:

- Reactor containment building polar crane
- Reactor containment building auxiliary (pedestal) crane

- Fuel handling building bridge crane
- Nonsafety-related jib cranes
- Boom crane and monorails located in the reactor building, turbine building, auxiliary facilities, and yard structures.

The team determined the applicant established inspection requirements consistent with the guidance contained in NUREG 0612, "Control of Heavy Loads at Nuclear Power Plants," for heavy load handling systems that can directly or indirectly cause a release of radioactive material, applicable industry standards (i.e., Crane Manufacturers Association of America Specification 70) for other cranes within the scope of license renewal, and applicable OSHA regulations (29 CFR Volume XVII, Section 1910.179). The team determined that the applicant included the specific inspection requirements in preventative maintenance basis documents.

The applicant identified enhancements were necessary to ensure consistency with the GALL Report.

Enhancements
For the Parameters Monitored element, revise procedures to specify monitoring of crane rails for loss of material caused by wear, monitoring structural components of the bridge, trolley and hoists for deformation, cracking and loss of material caused by corrosion and monitor structural connections for loose or missing bolts, nuts, pins, or rivets and any other conditions indicative of loss of bolting integrity. For the Detection of Aging Effects element, revise procedures to specify inspection frequency in accordance with ASME B30.2 or other appropriate standard in the ASME B30 series. Infrequently used cranes and hoists will be inspected prior to use. Bolted connections will be visually inspected for loose or missing bolts, nuts, pins, or rivets at the same frequency as crane rails and structural components. For the Acceptance Criteria element, revise procedures to require that significant loss of material caused by wear of crane rails and any sign of loss of bolting integrity will be evaluated in accordance with ASME B30.2 or other appropriate standard in the ASME B30 series; For the Corrective Action element, revise procedures to specify that maintenance and repair activities will utilize the guidance provided in ASME B30.2 or other appropriate standard in the ASME B30 series.

The team had no significant concerns with the enhancements.

The team reviewed license renewal program basis documents, aging management review documents, existing procedures and surveillances, and surveillance results. In addition, the team searched the applicant's corrective action database for relevant condition reports. The team walked down accessible cranes and trolleys, interviewed maintenance personnel and engineers, and reviewed completed crane maintenance work orders.

For the Inspection of Overhead Heavy Load and Light Load (Related to Refueling) Handling Systems program, the team concluded that the applicant had performed appropriate evaluations and considered pertinent industry experience and plant operating history to determine the effects of aging on crane rails, trolleys and hoist structural components. The team concluded that, if implemented as described including the enhancements, the applicant provided guidance that would appropriately identify and address aging effects during the period of extended operation.

.10 B.1.19 Masonry Wall (XI.S5)

This was an existing program, consistent with the GALL Report after enhancement, credited with managing cracking of masonry walls, as well as degradation of the structural steel restraint systems of the masonry walls. This program contained inspection guidelines and listed attributes that caused aging of masonry walls, which were monitored during structural inspections, as well as established examination criteria, evaluation requirements, and acceptance criteria. The applicant included reinforced masonry walls in proximity to safety-related components within the scope of the program if the wall could collapse and damage the components or removable walls stacked to allow equipment removal. The team discussed the program with cognizant engineers and walked down and examined accessible masonry block walls including structural steel supports to assess their condition.

The applicant identified enhancements were necessary to ensure consistency with the GALL Report.

Enhancements
For the Scope of Program element, revise procedures to ensure masonry walls located within in-scope structures are included in the scope of the Masonry Wall Program. For the Parameters Monitored or Inspected element, revise procedures to include monitoring gaps between the structural steel supports and masonry walls that could potentially affect wall qualification. For the Detection of Aging Effects element, revise procedures to specify that masonry walls will be inspected at least once every five years, with provisions for more frequent inspections in areas where significant aging effects are observed to ensure there is no loss of intended function between inspections. For the Acceptance Criteria element, revise procedures to include acceptance criteria for masonry wall inspections that ensure observed aging effects (cracking, loss of material or gaps between the structural steel supports and masonry walls) do not invalidate the wall's evaluation basis or impact its intended function.

The team had no significant concerns with the enhancements.

The team reviewed license renewal documents, the aging management program evaluation report, plant procedures, corrective action documents, and prior inspection results. The team searched the corrective action database for relevant corrective action program documents. The team walked down in-scope masonry walls, and interviewed plant personnel.

The team concluded that for the Masonry Wall program, the applicant had performed appropriate evaluations and considered pertinent industry experience and plant operating history to determine the effects of aging for the masonry walls and their structural supports. The team concluded that, if implemented as described including the enhancements, the applicant provided guidance that would appropriately identify and address aging effects during the period of extended operation.

.11 B.1.21 Neutron-Absorbing Material Monitoring (XI.M40)

This was an existing program, consistent with the GALL Report after enhancement, credited with ensuring that degradation of neutron absorbing material used in the spent fuel pool that could compromise the criticality analysis will be detected. The applicant implemented the program consistent with the provisions established by 10 CFR 50.68(b)(4).

The applicant implemented the objectives of the program by performing periodic coupon inspection and testing to assure that the effects of aging do not cause degradation that impacts the required five-percent sub-criticality margin. The program monitors for loss of material, reduction in neutron absorbing capacity, and changes in dimension such as blisters, pits, and bulges that could result in a loss of neutron absorbing capability.

The applicant identified an enhancement was necessary to ensure consistency with the GALL Report.

Enhancement
For the Monitoring and Trending element, revise procedures to compare measurement results from periodic inspections to prior measurement results, and relate coupon measurement to the performance of the spent fuel neutron-absorber materials considering differences in exposure conditions, vented/non-vented test samples, spent fuel racks, etc. The enhancement also ensures the predicted Boron-10 areal density will be sufficient to maintain the subcritical conditions required by technical specifications until the next coupon test.

The team had no significant concerns with the enhancement.

The team reviewed the aging management program evaluation report, condition reports, and summaries of associated plant and industry operating experience. The team also reviewed Procedure NE-001-106, “SFSR Boral Surveillance Program,” Revision 5, which monitors the integrity and performance of Boral on a continuing basis.

The team concluded that for the Neutron-Absorbing Material Monitoring program, the applicant had performed appropriate inspections and testing, as well as considered pertinent industry experience and plant operating history to satisfy the provisions under 10 CFR 50.68(b)(4). The team concluded that, if implemented as described including the enhancement, the applicant provided guidance that would appropriately identify and address aging effects during the period of extended operation.

.12 B.1.27 Oil Analysis (XI.M39)

The Oil Analysis program was an existing program, consistent with the GALL Report, credited with maintaining oil systems free of contaminants (primarily water and

particulates), thereby preserving an environment that was not conducive to loss of material and reduction of heat transfer. The applicant performed sampling, analysis, and trending of results on the systems listed in the aging management program to provide an early indication of adverse equipment condition in the lube and hydraulic oil environments. The affected materials include aluminum, carbon and stainless steels, copper alloy, and gray cast iron.

During review of the components included in the oil analysis aging management program evaluation report, the team questioned what specific nonsafety-related components could impact safety-related systems. The applicant determined that they had mischaracterized nonsafety-related components identified during the team's review. Specifically, a tank had been included in the list of components, but the applicant subsequently determined the tank was abandoned-in-place and a section of tubing that contained air instead of lubricating oil was identified. The applicant documented this error in Condition Report 2017-00655, initiated actions to revise the aging management program evaluation report, and began processing a revision to their license renewal application.

The team reviewed the aging management program evaluation report, license renewal application, plant operating experience, implementing procedures, condition reports, and 10-year trend graphs of the parameter monitored by the oil analysis for the in-scope components. The team interviewed plant personnel responsible who implemented the lubrication oil analysis program.

For the Oil Analysis program, the team concluded that the applicant had performed appropriate evaluations and considered pertinent industry experience and plant operating history to determine the effects of aging on aluminum, carbon and stainless steels, copper alloy, and gray cast iron internal pipe and component surfaces. The team concluded that, if implemented as described, the applicant provided guidance that would appropriately identify and address aging effects during the period of extended operation.

.13 B.1.31 Protective Coating Monitoring and Maintenance (XI.S8)

This was an existing program, consistent with the GALL Report after enhancement, credited with managing loss of coating integrity of Service Level I coatings inside containment. The program included visual inspections of accessible coatings that covered steel and concrete surfaces inside containment (e.g., steel liner, steel shell, supports, concrete surfaces, and penetrations).

The applicant identified an enhancement was necessary to ensure consistency with the GALL Report.

Enhancement
For the Detection of Aging Effects element, revise plant procedures to specify visual inspections of coatings near sumps or screens associated with the Emergency Core Cooling System.

The team had no significant concerns with the enhancement.

The team reviewed license renewal documents, the aging management program evaluation report, implementing procedures, corrective action documents, plant operating experience, and inspection results. The team also searched the corrective action program database for relevant corrective action requests. The team interviewed the program owner and license renewal project personnel.

The team concluded that for the Protective Coating Monitoring and Maintenance program, the applicant had performed appropriate evaluations and considered pertinent industry experience and plant operating history to determine the effects of aging in the affected systems. The team concluded that, if implemented as described with the enhancement, the applicant provided guidance that would appropriately identify and address aging effects during the period of extended operation.

.14 B.1.36 Service Water Integrity (X1.M20)

This was an existing program, consistent with the GALL Report after enhancement, credited with managing aging effects resulting from material loss and reduction of heat transfer for components in, or cooled by, the Auxiliary Component Cooling Water systems. The applicant planned to manage the aging effects through surveillance tests and chemistry control techniques addressed by applicant commitments to Generic Letter 89-13, "Service Water System Problems Affecting Safety-Related Equipment," dated July 18, 1989.

The applicant identified that enhancements were necessary to ensure consistency with the GALL Report.

Enhancements
For the Preventive Actions element, revise procedures to: (1) flush redundant, infrequently flowed sections, and stagnant lines to ensure there is no blockage, and (2) inspect selected low flow or stagnant areas, and system low points such as drains. For the Parameters Monitored or Inspected and Detection of Aging Effects elements, revise procedures to monitor the auxiliary component cooling water basins for biological fouling by visual inspection as well as analysis of water for biological activity.

The team had no significant concerns with the enhancements.

The team reviewed the implementing procedures, self-assessments, chemistry data, heat exchanger heat transfer test trending data, pressure and flow data, and selected corrective actions. In addition, the team interviewed the program manager and walked down accessible portions of the auxiliary component cooling water system.

For the Service Water Integrity program, the team concluded that the applicant had performed appropriate evaluations and considered pertinent industry experience and plant operating history to determine the effects of aging in components cooled by the auxiliary component cooling water. The team concluded that, if implemented as described including the enhancements, the applicant provided guidance that would appropriately identify and address aging effects during the period of extended operation.

.15 B.1.38 Structures Monitoring (XI.S6)

This was an existing program, consistent with the GALL Report after enhancement, credited with managing aging effects associated with cracking, loss of bond, loss of material (spalling, scaling), cracking resulting from expansion, increase in porosity and permeability, loss of strength, and loss of form for concrete structures, steel, and structural supports, including the exterior of electrical duct manholes and vaults, masonry walls, and roofs. The current program was implemented consistent with the guidance of NUMARC 93-01, "Industry Guidelines for Monitoring the Effectiveness of Maintenance at Nuclear Power Plants," Revision 2, and Regulatory Guide 1.160, "Monitoring the Effectiveness of Maintenance at Nuclear Power Plants," Revision 2.

The structures and structural components in the program are inspected by qualified personnel. Concrete structures are inspected for indications of deterioration and distress, using guidelines in ACI 201.1R, "Guide for Making a Condition Survey of Existing Buildings" and ACI 349.3R, "Evaluation of Existing Nuclear Safety-Related Concrete Structures." Elastomers are monitored for hardening, shrinkage and a loss of sealing. Component supports will be inspected for loss of material, and reduction in anchor capacity caused by local concrete degradation. Exposed surfaces of bolting are monitored for loss of material, loose or missing nuts, missing bolts, or other indications of loss of preload. Implementing plant procedures are written to ensure that the selection of bolting material, installation torque or tension, and the use of lubricants and sealants is appropriate. The program includes preventive actions described in NUREG-1339, "Resolution of Generic Issue 29: Bolting Degradation or Failure in Nuclear Power Plants," and other industry standards to ensure structural bolting integrity includes proper specification of bolting material, lubricant, and installation torque. Exposed surfaces of bolting are monitored for loss of material, loose or missing nuts, and/or bolts.

Thread lubricants containing molybdenum disulfide are not used by the applicant so stress corrosion cracking of structural bolting associated with the use of this lubricant is not an aging mechanism concern in this program. In addition, the applicant had no operating history of bolting failures caused by stress corrosion cracking.

The program contains provisions for increased inspection frequency and trending of structures and components in accordance with 10 CFR 50.65 (a)(1), if the extent of degradation indicates that the structure or component may not meet its design basis.

The applicant identified that enhancements were necessary to ensure consistency with the GALL Report.

Enhancements
For the Scope of Program element, revise procedures to: • Add the following structures to the program: o Battery house 230kV switchyard o Control house 230kV switchyard o Fire pump house o Fire water storage tank foundations o Fuel oil storage tank foundation

Enhancements
o Manholes, handholes, and duct banks o Plant stack o Transformer and switchyard support structures and foundations • Include a list of structural components and commodities within the scope of license renewal to be monitored in the program; • Include periodic sampling and chemical analysis of ground water; For the Preventive Actions element, revise procedures to include the preventive actions for storage of ASTM A325, ASTM F1852, and/or ASTM A490 bolting from Section 2 of Research Council on Structural Connections publication "Specification for Structural Joints Using ASTM A325 or A490 Bolts." For the Parameters Monitored or Inspected element, revise procedures to include the following parameters: • For concrete structures, base inspections on quantitative requirements of industry codes, standards, and guidelines and consideration of industry and plant-specific operating experience. • For concrete structures and components include: (1) loss of material; (2) loss of bond; (3) increase in porosity and permeability; (4) loss of strength; and (5) reduction in concrete anchor capacity caused by local concrete degradation. • For chemical analysis of ground water, monitor pH, chlorides, and sulfates. • Include the following components to be monitored for the associated parameters: (1) Anchor bolts (nuts and bolts) for loss of material; and (2) loose or missing nuts and/or bolts; • Elastomeric vibration isolators and structural sealants for cracking, loss of material, loss of sealing and change in material properties (e.g., hardening); For the Detection of Aging Effects element, revise procedures to include the following: • Visual inspection of elastomeric material should be supplemented by feel or touch to detect hardening if performance of intended function of the elastomeric material is suspect. Include instructions to augment the visual examination of elastomeric material with physical manipulation of at least ten percent of available surface area. • Structures will be inspected at least once every five years with provisions for more frequent inspections of structures and components categorized as (a)(1) in accordance with 10 CFR 50.65. • Submerged structures will be inspected at least once every five years.

Enhancements
• Sampling and chemical analysis of ground water at least once every five years. The program owner will review the results and evaluate any anomalies and perform trending of the results.

The team had no significant concerns with the enhancements.

The team reviewed license renewal documents, the aging management program evaluation report, existing procedures, and corrective action program documents. The team searched the corrective action database for relevant condition records. The team interviewed cognizant engineers who conducted the structural inspections and walked down the structures.

The team concluded that for the Structures Monitoring program, the applicant had performed appropriate evaluations and considered pertinent industry experience and plant operating history to determine the effects of aging in the affected systems. The team concluded that, if implemented as described including the enhancements, the applicant provided guidance that would appropriately identify and address aging effects during the period of extended operation.

.16 B.1.40 Water Chemistry Control - Closed Treated Water Systems (XI.M21A)

This was an existing program, consistent with the GALL Report as modified by LR-ISG-2012-02, “Aging Management of Internal Surfaces, Fire Water Systems, Atmospheric Storage Tanks, and Corrosion under Insulation,” after enhancement, credited with managing aging effects of loss of material, cracking, and reduction in heat transfer for components in closed-cycle cooling water systems.

The systems within the scope of this program included the diesel generator jacket water, component cooling water, auxiliary component cooling water, and chilled water heating, ventilation and air conditioning subsystems that serviced the switchgear ventilation and the mechanical auxiliary building. The program included monitoring and control of corrosion inhibitor and chemistry parameters consistent with the guidance of EPRI 1007820, “Closed Cooling Water Chemistry Guideline,” April 2004. The applicant maintained water chemistry by adding a molybdate corrosion inhibitor, biocides and pH chemicals.

The applicant identified that enhancements were necessary to ensure consistency with the GALL Report as modified by LR-ISG-2012-02.

Enhancements
For the Scope of Program element, revise procedures to include high pressure fire water diesel pump jacket water system. For the Parameters Monitored or Inspected element, revise procedures to specify specific water chemistry parameters monitored and the acceptable range of values for these parameters are in accordance with EPRI 1007820, industry guidance, or vendor recommendations.

Enhancements
For the Detection of Aging Effects element, revise procedures to: • Inspect accessible components whenever a closed treated water system boundary is opened. Ensure that a representative sample of piping and components is inspected at a frequency of at least every ten years. These inspections will be conducted in accordance with applicable ASME Code requirements, industry standards, or other plant-specific inspection guidance by qualified personnel using procedures that are capable of detecting corrosion, fouling, or cracking. If visual examination identifies adverse conditions, additional examinations, including ultrasonic testing, are conducted; • Define a representative sample as 20 percent of the population (defined as components having the same material, environment, and aging effect combination) with a maximum of 25 components. Components inspected will be those with the highest likelihood of corrosion, fouling, or cracking; • Perform treated water sampling and analysis of the closed treated water systems per industry standards and in no case greater than quarterly unless justified with an additional analysis. For the Acceptance Criteria element, revise procedures to: • Specify specific water chemistry parameters monitored and the acceptable range of values for these parameters are in accordance with EPRI 1007820, industry guidance, or vendor recommendations; • Provide acceptance criteria for inspections. Ensure system components meet system design requirements, such as minimum wall thickness.

The team had no significant concerns with the enhancements.

The team reviewed the implementing procedures and chemistry data for the monitored systems. The team walked down a sample of heat exchangers and pumps cooled by closed cooling water systems and interviewed a system engineer. From a review of the data, the team determined that the applicant appropriately monitored for both loss of heat transfer and loss of material for the in-scope systems.

The team concluded that for the Water Chemistry Control - Closed Treated Water Systems program, the applicant had performed appropriate evaluations and considered pertinent industry experience and plant operating history to determine the effects of aging in the affected systems. The team concluded that, if implemented as described including the enhancements, the applicant provided guidance that would appropriately identify and address aging effects during the period of extended operation.

b.4 System Reviews

The team performed an in-depth review of structures that were identified as potentially susceptible to Alkali-Silica reaction. The team made this selection based on the location of Waterford Steam Electric Station, surrounding industrial facilities, and the proximity of

the Mississippi river. The team did not identify any significant indications of alkali-silica reaction in the sample of structures reviewed by the team.

c. Overall Conclusion

Overall, based on the samples reviewed by the team, the inspection results supported a conclusion that there is reasonable assurance that actions have been identified and have been taken or will be taken to manage the effects of aging in the SSCs identified in the license renewal application and that the intended functions of these SSCs will be maintained in the period of extended operation.

4OA6 Meetings, Including Exit

Exit Meeting Summary

The team presented the inspection results to Mr. M. Chisum, Site Vice President, and other members of the licensee staff during an exit meeting conducted on February 16, 2017. The applicant acknowledged the NRC inspection observations. The team returned all proprietary information reviewed during this inspection.

SUPPLEMENTAL INFORMATION

Applicant Personnel

A. Harris	Regulatory Assurance
B. Briner	System Engineer
C. Pickering	Engineering Supervisor
C. Tara	System Engineer
C. Zenon	System Engineer
D. Garretson	System Engineer
D. Marse	Senior Chemistry Specialist
D. Viener	Design Engineer
D. Williams	System Engineer
E. Begley	Predictive Maintenance Engineer
J. Hoss	Design Engineer
J. Jung	System Engineer
J. Lanci	System Engineer
L. Milster	License Renewal Coordinator
L. Murray	License Renewal Project Manager
M. Besse	Design Engineer
M. Chisum	Site Vice President
M. Groome	System Engineer
M. Provensal	Mechanical Design Engineer
M. Sandusky	Project Coordinator
P. Linger	System Engineer
P. Prejean	Senior Chemistry Specialist
R. Porter	Supervisor, Design Engineer
R. Tran	Design Engineer
S. Brown	Project Coordinator
S. Nelson	Fire Marshall
S. Picard	Civil Design Engineer
T. House	System Engineer

Entergy Services, Inc. License Renewal Corporate Team

A. Cox	Consultant
D. Lach	Project Manager
D. Wootten	Consultant
H. Rideout	Senior License Renewal Engineer
K. Ehren	Consultant

M. Spinelli	Senior License Renewal Engineer
R. Rucker	Consultant

NRC Personnel

F. Ramirez	Senior Resident Inspector
C. Speer	Resident Inspector

TABLES OF DOCUMENTS REVIEWED

General

Fleet Administrative Procedures

Number	Title	Revision
EN-FAP-LR-001	License Renewal Project Overview	9
EN-FAP-LR-003	System and Structure Scoping for License Renewal	3
EN-FAP-LR-004	Mechanical System Screening and Aging Management Reviews	8
EN-FAP-LR-005	Electrical System Scoping, Screening and Aging Management Reviews	6
EN-FAP-LR-006	Structural Screening and Aging Management Reviews	7
EN-FAP-LR-012	Operating Experience Review for License Renewal	5
EN-FAP-LR-012 Attachment 7.5	OE-AMP Effectiveness Review Process	5

Letters/Correspondence

Number	Title	Date
W3F1-2016-0063	Responses to Request for Additional Information Set 1 Regarding the License Renewal Application for Waterford Steam Electric Station, Unit 3	October 13, 2016
W3F1-2016-0069	Responses to Request for Additional Information Set 2 Regarding the License Renewal Application for Waterford Steam Electric Station, Unit 3	November 10, 2016
W3F1-2016-0070	Responses to Request for Additional Information Set 3 Regarding the License Renewal Application for Waterford Steam Electric Station, Unit 3	December 12, 2016
W3F1-2016-0071	Responses to Request for Additional Information Set 4 Regarding the License Renewal Application for Waterford Steam Electric Station, Unit 3	January 9, 2017

Letters/Correspondence

Number	Title	Date
W3F1-2016-0074	Responses to Request for Additional Information Set 5 Regarding the License Renewal Application for Waterford Steam Electric Station, Unit 3	December 7, 2016
W3F1-2016-0075	Responses to Request for Additional Information Set 6 Regarding the License Renewal Application for Waterford Steam Electric Station, Unit 3	December 7, 2016
W3F1-2016-0077	Responses to Request for Additional Information Set 7 Regarding the License Renewal Application for Waterford Steam Electric Station, Unit 3	December 15, 2016
W3F1-2017-0002	Responses to Request for Additional Information Sets 8 and 9 Regarding the License Renewal Application for Waterford Steam Electric Station, Unit 3	January 16, 2017
W3F1-2017-0003	Responses to Request for Additional Information Set 10 Regarding the License Renewal Application for Waterford Steam Electric Station, Unit 3	January 19, 2017
W3F1-2017-0005	Responses to Request for Additional Information Set 11 Regarding the License Renewal Application for Waterford Steam Electric Station, Unit 3	February 1,2017
ML020920464	NRC letter to NEI, Staff guidance on scoping of equipment relied on to meet the requirements of the Station Blackout (SBO) Rule (10 CFR 50.63) for license renewal (10 CFR 54.4(a)(3)), (ISG-02)	April 1, 2002

License Renewal

Number	Title	Revision/Date
W3F1-2016-0012	License Renewal Application, Waterford Steam Electric Station, Unit 3	March 23, 2016
NUREG-1801	Generic Aging Lessons Learned (GALL)	2
NEI 95-10	Industry Guideline for Implementing the Requirements of 10 CFR Part 54 - The license Renewal Rule	6

Miscellaneous

Number	Title	Date
	Nuclear Plant Operating Agreement for Waterford III Nuclear Power Plant - Amended and Restated	January 29, 2016

Miscellaneous

Number	Title	Date
WLP-ESPC-ENG_WALKDOWNS	Issue Resolution Walkdowns	July 28, 2015
LO-WLO-2016-0055	License Renewal Pre-NRC Inspection	December 12, 2016

Operating Experience

Number	Title	Revision
WF3-EP-14-00002	Operating Experience Review Results – AERM	0
WF3-EP-14-00003	Operating Experience Review Results – Aging Management Program Effectiveness	0

Project Documents

Number	Title	Date
WF3-EE-14-00001	Electrical Screening and Aging Management Review	February 1, 2016
WF3-EE-14-00001	Electrical Screening and Aging Management Review	February 14, 2017
WF3-EP-14-00009	Aging Management Program Evaluation Results - Electrical	February 1, 2016

Procedures

Number	Title	Revision
EN-LI-102	Corrective Action Program	28
EN-LI-121	Trending and Performance Review Process	17

Scoping

Calculation

Number	Title	Revision
	Safety-Related Design Calculation C-CE-4	5
IAA48	Foot Print Loads Safety-Related Hanger Calculation	

Condition Report

2017-00241

Drawings

Number	Title	Revision
LRA-G285	Main One Line Diagram	0

Drawings

Number	Title	Revision
G285	Main One Line Diagram	19
L006S01	Waterford 3 230kV SW Station One line Diagram In-Service	9
B430-V24.1	Instrument Installation Details	8
G152, sheet 4*	Flow Diagram – Instrument Air System, Reactor Auxiliary Building EL. 4.00' & 7.00'	0
G152, sheet 9*	Flow Diagram – Instrument Air System, Miscellaneous Building	0
G153, sheet 4*	Flow Diagram – Feedwater, Condensate & Air Evacuation Systems	0
G160, sheet 1	Flow Diagram – Component Closed Cooling Water Systems	0
G160, sheet 2	Flow Diagram – Component Closed Cooling Water Systems	0
G160, sheet 3	Flow Diagram – Component Closed Cooling Water Systems	0
G160, sheet 4	Flow Diagram – Component Closed Cooling Water Systems	0
G160, sheet 5	Flow Diagram – Component Closed Cooling Water Systems	0
G160, sheet 6*	Flow Diagram – Component Closed Cooling Water Systems	0
G161, sheet 1	Flow Diagram – Fire, Make-up & Domestic Water Systems	0
G161, sheet 2*	Flow Diagram – Fire, Make-up & Domestic Water Systems	0
G161, sheet 3*	Flow Diagram – Fire, Make-up & Domestic Water Systems	0
G161, sheet 5	Flow Diagram – Fire, Make-up & Domestic Water Systems	0
G164, sheet 1*	Flow Diagram – Miscellaneous Reactor Auxiliary Systems	0
G166, sheet 1*	Flow Diagram – N2, H2, and CO2 Systems	0
G166, sheet 2*	Flow Diagram – N2, H2, and CO2 Systems	0
G167, sheet 1	Flow Diagram – Safety Injection Systems	0
G167, sheet 2	Flow Diagram – Safety Injection Systems	0
G167, sheet 3	Flow Diagram – Safety Injection Systems	0
G167, sheet 4	Flow Diagram – Safety Injection Systems	0
G168, sheet 1	Flow Diagram – Chemical and Volume Control Systems	0
G168, sheet 2	Flow Diagram – Chemical and Volume Control Systems	0

Drawings

Number	Title	Revision
G168, sheet 3	Flow Diagram – Chemical and Volume Control Systems	0
G169, sheet 1	Flow Diagram – Fuel Pool Systems	0
G172, sheet 1	Flow Diagram – Reactor Coolant System	0
G179, sheet 1	Flow Diagram – Reactor Coolant Pump Seals	0
ISO-4305-8643	CW-ISO-IC-892	2
ISO E3029LW3IA7	Instrument Air	10
ISO V8.20-1001-2	Chemical Feed	3
ISO V8.20-1001-4	Chemical Feed	3

License Renewal

Number	Title	Revision
WF3-EP-14-00001	System and Structural Scoping Results	0
WF3-ME-14-00026	Aging Management Review of Nonsafety-Related Systems and Components Affecting Safety-Related Systems	1

Miscellaneous

Title	Date
Photographs - Waterford-3 230-kV Switchyard Station Blackout Recovery Components	August, 2014

Procedures

Number	Title	Revision
OP-902-005	Emergency Operating Procedure – Station Blackout Recovery Procedure	020
OP-902-009, Attachment 12-A	Electrical Restoration: Energize 1A(B) and 2A(B) from Off-Site Power	315

NEW PROGRAMS

B.1.3 Buried and Underground Piping and Tanks (XI.M41)

License Renewal

Number	Title	Revision
WF3-EP-14-00003	Operating Experience Review Results - Aging Management Program Effectiveness	0

License Renewal

Number	Title	Revision
WF3-EP-14-00007	Aging Management Program Evaluation Results – Non-Class 1 Mechanical	0

Miscellaneous

Number	Title	Revision/Date
LR-ISG-2011-03	Changes to the Generic Aging Lessons Learned (GALL) Report Revision 2 Aging Management Program XI.M41, "Buried and Underground Piping and Tanks"	2
NACE SP0169-2007	Control of External Corrosion on Underground or Submerged Metallic Piping Systems	March 15, 2007
Report No. 1000002.400	APEC Native Survey and CP Testing Waterford Steam Electric Station – WSES Entergy Corporation Inspection Dates: October 2010 & June 2012	0

Operating Experience

Title

Buried Piping 2nd QTR 2013 Semi-Annual Health Report

B.1.4 Coating Integrity (XI.M42)

License Renewal

Number	Title	Revision
LR-ISG-2013-01	Aging Management of Loss of Coating or Lining Integrity for Internal Coatings/Linings on In-Scope Piping, Piping Components, Heat Exchangers, and Tanks	
WF3-ME-14-00030	License Renewal Topical Report on Coating Integrity	0
WF3-EP-14-00003	Operating Experience Review Results – Aging Management Program Effectiveness	0
WF3-EP-14-00007	Aging Management Program Evaluation Results Non-Class 1 – Coating Integrity	1

B.1.20 Metal Enclosed Bus Inspection (XI.E4)

Drawings

Number	Title	Revision
1564-8891	Armor-Clad Busway, 1600A	4

Drawings

Number	Title	Revision
1564-8892	Metal-Enclosed Bus Duct, 5kV 1200A	

Procedure

Number	Title	Revision
EN-DC-349	Metal Enclosed Bus Inspection Procedure	3

Project Document

Number	Title	Date
WF3-EP-14-00009, Section 3.1	Aging Management Program Evaluation Results - Electrical	February 1, 2016

Vendor Documents

Number	Title	Revision
TD-G080.0735	General Electric Important Instructions for Armor-Clad Indoor Feeder Busway, GEH-2636	0
TD-C012.0035	Calvert Switch and Bus Support, Class A, Indoor	0
TD-C012.0025	Calvert Field Service Manual	0
TD-C012.0045	Calvert Minimum Air Clearance Phase Rigid Bus	0

Work Orders

00120374 52195668 00121064 00183173

B.1.24 Non-EQ Inaccessible Power Cables (≥ 400V) Program (XI.E3)

Condition Report

2017-00961*

*Written as a result of this inspection

Drawing

Number	Title	Revision
G349	Yard Duct Runs and Outdoor Lighting	20

Letters

Number	Title	Date
W3F1-2007-0065	Response to NRC RAI on GL 2007-01, "Inaccessible or Underground Power Cable Failures that Disable Accident Mitigation Systems or Cause Plant Transients."	December 18, 2007

Letters

Number	Title	Date
W3F1-2007-0017	Response to Generic Letter 2007-01 Waterford Steam Electric Station, Unit 3 (Waterford 3)	May 3, 2007

License Renewal

Number	Title	Revision
WF3-EE-14-00001, Section 4.1	Electrical Screening and Aging Management Review	1
WF3-EE-14-00001, Attachment 11	WF3 Technical Evaluation of Aging Management Activities for the Non-EQ Underground Power Cable (≥400V) Circuits Subject to Aging Management Review	2
WF3-EP-14-00009, Section 3.3	Aging Management Program Evaluation Results - Electrical	1

Miscellaneous

Number	Title	Date
	Photographs - dewatered manhole MH-M329	February 2017
EPRI TR-1020804	Plant Support Engineering: Aging Management Program Development Guidance for AC and DC Low-Voltage Power Cable Systems for Nuclear Power Plants	June 2010

Procedure

Number	Title	Revision
EN-DC-346	Cable Reliability Program	6

Work Orders

00352718 00466126 52605139

B.1.26 Non-EQ Insulated Cables and Connections (XI.E1)

Condition Report

2008-01841

License Renewal

Number	Title	Revision
WF3-EP-14-00009, Section 3.5	Aging Management Program Evaluation Results – Electrical – Non-EQ Insulated Cables and Connections Program	1

Miscellaneous

Number	Title	Date
EPRI TR-109619	Guideline for the Management of Adverse Localized Equipment Environments	June 1999

Procedure

Number	Title	Revision
EN-DC-348	Non-EQ Insulated Cables and Connections Inspection	5

B.1.28 One-Time Inspection (XI.M32)

License Renewal

Number	Title	Revision
WF3-EP14-00007	Aging Management Program Evaluation Results Non-Class 1 – Selective Leaching	0

B.1.35 Selective Leaching (XI.M33)

License Renewal

Number	Title	Revision
	License Renewal Information System Selective Leaching Program Component List	
WF3-EP14-00007	Aging Management Program Evaluation Results Non-Class 1 – Selective Leaching	0

EXISTING PROGRAMS

B.1.1 Bolting Integrity (XI.M18)

Condition Reports

2014-05715	2015-07280	2015-09258	2015-09262	2015-09264
2015-9278	2016-00168	2016-00277	2016-03103	2016-04690
2016-04694	2016-04843	2016-04844	2016-06651	2016-06655

License Renewal

Number	Title	Revision
WF3-EP-14-00006	Bolting Integrity (Section 4.1)	0

Miscellaneous

Number	Title	Revision
CEP-UPT-0100	Underground Piping and Tanks Inspection and Monitoring	4
SEP-UIP-WF3	Underground Components Inspection Plan	3

Miscellaneous

Number	Title	Revision
NP-5769	Degradation and Failure of Bolting in Nuclear Power Plants (Research Project 2520-7)	1
UNT-005-007	Plant Lubrication Program	304

Procedure

Number	Title	Revision
EN-MA-145	Maintenance Standard for Torque Application	8

B.1.5 Compressed Air Monitoring (XI.M24)

Condition Reports

2013-02290	2014-00021	2014-02354	2014-01061

License Renewal

Number	Title	Revision
WF3-EP-14-00007	Aging Management Program Evaluation Results – Non-Class 1 Mechanical – Compressed Air Monitoring	0

Procedures

Number	Title	Revision
CE-002-032	Maintaining Instrument Air System	305
CE-001-004	Periodic Analysis Scheduling Program	315

B.1.8 Diesel Fuel Monitoring (XI.M30)

Drawings

Number	Title	Revision/Date
5817-446-R2	Auxiliary Diesel Generator Day Oil Tank Outline	September 5, 1978
1564-2525	12’-6” Diesel Oil Storage Tank – A & B General Plan	4
1564-2526	12’-6” Diesel Oil Storage Tank – Shell Details	5
1564-2527	12’-6” Diesel Oil Storage Tank – Bottom and Anchor Ring Layout	2
1564-2528	12’-6” Diesel Oil Storage Tank – Roof Details	1
1564-4559	48” O.D. * 6’-6” Tangential Line Diesel Oil Storage Feed Tanks	3

License Renewal

Number	Title	Revision
	License Renewal Information System Diesel Fuel Monitoring Program Component List	
WF3-EP14-00003	Operating Experience Review Results – Aging Management Program Effectiveness	0
WF3-EP14-00007	Aging Management Program Evaluation Results Non-Class 1 – Diesel Fuel Monitoring	1

Miscellaneous

Title

10-year graphs of water/sediment and particulates for diesel Fuel Oil Storage Tank A and Tank B, diesel Day Tank A and diesel Day Tank B

Fuel Oil Storage Tanks A and B Diesel Fuel Oil Analysis Reports dated April 22 and July 6, 2016

Procedures

Number	Title	Revision
CE-001-004	Periodic Analysis Scheduling Program	315
CE-002-030	Maintaining Diesel Fuel Oil	27
CE-003-608	Determination of Biologicals in Diesel Fuel	3
EN-LI-121	Trending and Performance Review Process	17
MM-003-019	Diesel Generator Fuel Oil Storage Tank Inspection	10

Work Orders

00244684 52648830 00400699 00293713 52651825 00401851

B.1.10 External Surfaces Monitoring (XI.M36)

Calculations

Number	Title	Revision/Date
ECM06-002	Insulation Removal Limits – Piping Inspections in Safeguards Pump Room, SDC HX Room and Wing Area	1
LOU 1564.101	Heat, Antisweat and Process Heating Insulation for Nuclear and Non-Nuclear Piping and Equipment	January 15, 1985
SEP-ISI-104	Program Section for ASME Section XI, Division 1 Inservice Inspection Program	2

Condition Reports

2011-07651 2014-05520 2014-04930 2013-05270

2005-04705	2013-01420	2005-03983	2015-00463

License Renewal:

Number	Title	Revision
WF3-EP-14-00007	Aging Management Program Evaluation Results – Non-Class 1 Mechanical – External Surface Monitoring	0

Procedures

Number	Title	Revision
EN-DC-178	System Walkdowns	7
EN-LI-121	Trending and Performance Review Process	17
PMC-004-004	Maintenance / Installation of Thermal Insulation	5

B.1.11 Fatigue Monitoring (XI.M1)

Calculation

Number	Title	Revision
CN-RIDA-09-38	Design Reconciliation of Waterford 3 Reactor Vessel Internals for Operation at 3716 MWt with Replacement Steam Generator	0

Condition Reports

2004-01751	2015-00044

License Renewal

Number	Title	Revision
WF3-EP-14-00006	Fatigue Monitoring Program (Section 4.2)	0
WF3-EP-14-00004	TLAA and Exemption Evaluation Results	0
WF3-EP-14-00005	TLAA – Mechanical Fatigue	0
WF3-ME-15-00001	Survey of Design Transients for Thermal Cycle Counting – 1300394.301	0
WF3-ME-15-00002	Plant Transient Analysis for Waterford – Plant Startup through 4/5/2014 - 1400394.302	0

Procedures

Number	Title	Revision
PE-002-003	Fatigue Monitoring Program Coordinator	5

B.1.12 Fire Protection (XI.M26)

Condition Report

2015-00405

License Renewal

Number	Title	Revision
WF3-EP-14-00007, Section 4.6	Aging Management Program Evaluation Results Non-Class 1 Mechanical – Fire Protection	1

Miscellaneous

Number	Title	Date
Q4-2016	Program Health Report – Fire Protection	2016
Q3-2016	Program Health Report – Fire Protection	2016
NFPA 25	Standard for the Inspection, Testing, and Maintenance of Water-Based Fire Protection Systems	2011

Procedures

Number	Title	Revision
ME-003-006	Fire Barrier Penetration Seals	306
ME-003-006	Fire Barrier Penetration Seals	310
ME-003-007	Fire Wrap Barriers	15
ME-003-007	Fire Wrap Barriers	17
ME-003-009	Fire Rated Walls, Floors, and Ceilings	302
ME-003-009	Fire Rated Walls, Floors, and Ceilings	306
PS-015 111 (PMC-003-006)	Fire Door Surveillance	301
UNT-005-013	Fire Protection Program	13
UNT-005-013	Fire Protection Program	14

Work Orders

00324922 00324921

B.1.13 Fire Water System (XI.M27)

Condition Reports

2011-00224 2012-00509 2014-00521 2016-06184 2017-00935* CR-HQN-2017-00241*

* Written as a result of this inspection

Drawings

Number	Title	Revision
G161, Sheet 1	Flow Diagram Fire, Make Up & Domestic Water Systems	0
G161, Sheet 2	Flow Diagram Fire, Make Up and Domestic Water Systems	0
G161, Sheet 3	Flow Diagram Fire, Make Up & Domestic Water Systems	0
G161, Sheet 5	Flow Diagram Fire, Make Up & Domestic Water Systems	0
G161, Sheet 6	Flow Diagram Fire, Make Up & Domestic Water Systems	0
G164, Sheet 3	Flow Diagram, Miscellaneous Reactor Auxiliary Systems	0
15641660	Fire Water Storage Tank A	2

License Renewal

Number	Title	Revision
WF3-EP-14-00007, Section 4.7	Aging Management Program Evaluation Results Non-Class 1 Mechanical – Fire Water System	1
WF3-ME-14-00010	Aging Management Review of the Fire Protection: Water System	1
LR-ISG-2012-02	Aging Management of Internal Surfaces, Fire Water Systems, Atmospheric Storage Tanks, and Corrosion under Insulation	

Miscellaneous

Number	Title	Date
NFPA 25	Standard for the Inspection, Testing, and Maintenance of Water-Based Fire Protection Systems	2011
Technical Requirements Manual 3/4.7.10	Fire Suppression Water Systems	
Q4-2016	Program Health Report – Fire Protection	
Q3-2016	Program Health Report – Fire Protection	
NRC Regulatory Guide 1.54	Service Level I, II, AND III Protective Coatings Applied to Nuclear Power Plants	October 2010

Procedures

Number	Title	Revision
MM-003-021	Sprinkler System Inspection (Safety Areas)	10
MM-003-021	Sprinkler System Inspection (Safety Areas)	12
MM-003-032	Maintenance Surveillance Procedure Diesel Fire Pump Engine Inspection	14

Procedures

Number	Title	Revision
MM-004-422	Sprinkler System Inspection (Nonsafety Areas)	8
MM-004-422	Sprinkler System Inspection (Nonsafety Areas)	10
MM-004-423	Yard Fire Hydrant Hose House Inspection and House Replacement	14
MM-004-423	Yard Fire Hydrant Hose House Inspection and House Replacement	17
MM-004-424	Building Fire Hose Station Inspection and Hose Replacement	304
MM-004-424	Building Fire Hose Station Inspection and Hose Replacement	307
MM-007-008	Fire Hose Hydrostatic Test	301
MM-007-008	Fire Hose Hydrostatic Test	308
OP-903-055	Fire Main Flush and Hydrant Inspection	11
OP-903-057	Fire Protection System Flow Test	18
OP-903-057	Fire Protection System Flow Test	21
OP-903-058	Fire Hose Station Valve Cycling Check	14
OP-903-059	Sprinkler System Functional Test	12
UNT-005-013	Fire Protection Program	13
UNT-005-013	Fire Protection Program	14

Work Orders

00232209	52681255	52517633	52283342	52487901	52732060	52610650
00232586	52727119	52606298	52321112	52489432	52508563	52603247

B.1.14 Flow Accelerated Corrosion (XI.M17)

Condition Reports

2013-01360	2014-02147	2014-04226

Calculation

Number	Title	Revision
030709-02	Flow Accelerated Corrosion CHECWORKS FAC Model	0

Engineering Change

Number	Title	Revision
35912	RF-18 Flow Accelerated Corrosion (FAC) project Tcrit Values	0
46350	RF-19 Flow Accelerated Corrosion (FAC) project Tcrit Values	0

License Renewal

Number	Title	Revision
WF3-EP-14-00006	Flow-Accelerated Corrosion (Section 4.8)	0

Miscellaneous

Number	Title	Revision/Date
	RFO-19 Flow Accelerated Corrosion Summary Report	0
	RFO-18 Flow Accelerated Corrosion Summary Report	0
	Program Health Report – Q2-2012	June 30, 2012
	Program Health Report – Q2-2013	June 30, 2013
	Program Health Report – Q2-2014	June 30, 2014
	Program Health Report – Q2-2015	June 30, 2015
LR-ISG-2012-01	Wall Thinning Due to Erosion Mechanisms	
	Waterford 3 FAC program System Susceptibility Evaluation (SSE)	October 26, 2014

Procedures

Number	Title	Revision
EN-DC-315	Flow Accelerated Corrosion Program	12
EN-LI-121	Trending and Performance Review Process	22
NSAC-202L	Recommendations for an Effective Flow-Accelerated Corrosion Program	3
EN-DC-315	Flow Accelerated Corrosion Program	12

B.1.17 Inspection of Overhead Heavy Load and Light Load (related to refueling) Handling Systems (XI.M23)

Condition Reports

2009-02108	2007-01250	2014-03161

2014-01628	2011-00215	2007-03574
2011-02935	2014-05435	LO-WLO-2004-00033

License Renewal

Number	Title	Revision
WF3-EP-14-00008	Waterford 3 License Renewal Project – Aging Management Program Evaluation Report Civil/Structural – Inspection of Overhead Heavy Load and Light Load (Related to Refueling) Handling Systems	1
WF3-CS-14-00001	WF3 License Renewal Project – Aging Management Review of the Reactor Building	1
WF3-CS-14-00003	WF3 License Renewal Project – Aging Management Review of the Turbine Building and Other Structures	1
WF3-EP-14-00003	WF3 License Renewal Project – Operating Experience Review Results – Aging Management Effectiveness Program	0

Miscellaneous

Title	Revision
Quality Assurance Program Manual	29

Procedures

Number	Title	Revision
MM-002-201	Containment Building Polar Crane PM	303
MM-004-401	Fuel Handling Building Crane PM	7
MM-004-870	Kranco Overhead Cranes PM	301
MM-004-877	Containment Building Auxiliary Pedestal Crane PM	302
MM-006-018	Miscellaneous Hoist Maintenance	7
MM-007-002	Crane and Hoist Inspection and Testing	9

B.1.19 Masonry Wall (XI.S5)

Condition Reports

2002-01613	2004-01281	2004-01293

Drawings

Number	Title	Revision
G-554	Reactor Auxiliary Building Floor Slab at El-4.00 Masonry	17
G-560, Sheet 2	Reactor Auxiliary Building Roof Slab at El +60.00 Masonry	11
G-599	Turbine Generator Pedestal Mat-Masonry	5

License Renewal

Number	Title	Revision
WF3-CS-14-00002	Aging Management Review of the Nuclear Plant Island Structure	1
WF3-CS-14-00003	Aging Management Review of the Turbine Building and Other Structures	1
WF3-EP-14-00003	Operating Experience Review Results – Aging Management Program Effectiveness	0
WF3-EP-14-00008	Operating Experience Review Results – Aging Management Program Evaluation Report Civil/Structural	1

Miscellaneous

Number	Title	Date
Information Notice No. 87-67	Lessons Learned from Regional Inspections of Licensee Actions in Response to IE Bulletin 80-1	December 31, 1987
IE Bulletin No. 80-11	Masonry Wall Design	May 8, 1980
Letter	D. W. Herrin to Files, W3P83-3187, IE Bulletin 80-11 Masonry Wall Design	September 19, 1983
EPRI Report 107933	Aging Assessment Field Guide	December 2003

Procedure

Number	Title	Revision
EN-DC-150	Condition Monitoring of Maintenance Rule Structures	6

B.1.21 Neutron-Absorbing Material Monitoring (XI.M40)

Drawing

Number	Title	Revision
G141	General Arrangement Fuel Handling Plans	23

License Renewal

Number	Title	Revision
WF3-EP-14-00006	Neutron-Absorbing Material Monitoring (Section 4.9)	0

Miscellaneous

Number	Title	Revision
NET-28083-001-01	Inspection and Testing of Waterford BORAL Surveillance Coupons	0

Miscellaneous

Number	Title	Revision
LR-ISG-2009-01	Aging Management of Spent Fuel Pool Neutron-Absorbing Materials Other Than Boraflex	
SNM-SFP-C21	Spent Fuel Pool Inventory Map Cycles 21	4

Procedure

Number	Title	Revision
NE-001-106	SFSR Boral Surveillance Program	5

B.1.27 Oil Analysis (XI.M39)

Drawings

Number	Title	Revision
G164, sheet 1	Flow Diagram – Miscellaneous Reactor Auxiliary Systems	0
1564-2044	Emergency Diesel Generator B, Oil Schematic and Notes	0

License Renewal

Number	Title	Revision
Table 3.3.2-15-17	Emergency Diesel Generator System Nonsafey-Related Components Affecting Safety-Related Systems Summary of Aging Management Evaluation	
WF3-EP14-00003	Operating Experience Review Results – Aging Management Program Effectiveness	0
WF3-EP14-00007	Aging Management Program Evaluation Results Non-Class 1 – Oil Analysis	0

Miscellaneous

Number	Title	Revision
	Condition Report 2017-00655	
	Information related to ISO cleanliness codes for lubricating oils	
	Lubrication Manual specification sheets for auxiliary feedwater pump, auxiliary component cooling water pump, and diesel generator	
	Lubrication oil laboratory test results for auxiliary feedwater pump and diesel generator	
SEP-LUB-WF3-001	Waterford 3 Lubrication Analysis & Monitoring Program Implementation	0
EPRI 1019518	Lubrication Guide	4

Procedures

Number	Title	Revision
EN-DC-310	Predictive Maintenance Program	7
EN-LI-121	Trending and Performance Review Process	17
UNT-005-007	Plant Lubrication Procedure	304

B.1.31 Protective Coating Monitoring and Maintenance (XI.S8)

Condition Reports

2003-03425 2006-04317 2011-02987 2013-01020 2014-02804

License Renewal

Number	Title	Revision
WF3-EP-14-00003	Waterford 3 License Renewal Project Aging Management Program Effectiveness	0
WF3-EP-14-00008	Waterford 3 License Renewal Project Aging Management Program Evaluation Report Civil/Structural	1
WF3-CS-14-00001	Waterford 3 License Renewal Project Aging Management Review of the Reactor Building	1

Miscellaneous

Number	Title	Revision/Date
EPRI Topical Report No. 1019157	Guideline on Nuclear Safety-Related Coatings, (Formerly TR-109937 and 1003102)	2
NRC IN 2011-20	Concrete Degradation by Alkali-Silica Reaction	November 18, 2011
GL 98-04	Potential for Degradation of the Emergency Core Cooling System and the Containment Spray System after a Loss-of-Coolant Accident because of Construction and Protective Coating Deficiencies and Foreign Material in Containment	
GL 2004-02	Potential Impact of Debris Blockage on Emergency Recirculation during Design Basis Accidents at Pressurized Water Reactors	July 14, 1998
GL 2004-02	Potential Impact of Debris Blockage on Emergency Recirculation during Design Basis Accidents at Pressurized Water Reactors	September 13, 2004
NRC Bulletin 96-03:	Potential Plugging of Emergency Core Cooling Suction Strainers by Debris in Boiling Water Reactors	May 6, 1996

Procedures

Number	Title	Revision
EN-DC-220	Safety-Related Coatings Program	2
EN-FAP-LR-006	Structural Screening and Aging Management Reviews	7
WF3-CS-14-00001	Aging Management Review of the Reactor Building	1
WF3-EP-14-00003	Operating Experience Review Results – Aging Management Program Effectiveness	0
NOECP-451	Conducting Engineering Inspection of Reactor Containment Building Protective Coatings	1

B.1.36 Service Water Integrity (XI.M20)

Calculation

Number	Title	Revision
SEP-HX-WF3-001	Generic Letter 89-13 Heat Exchanger Test Basis	0

Condition Reports

LO-WLO-2008-00043	2006-03340	2008-00669	2010-07206
LO-WLO-2006-0048	2008-04488	2008-04996	
CR-HQN-2007-0893	2007-02364	2011-15424	

License Renewal

Number	Title	Revision
WF3-EP-14-00007	WF3 License Renewal Project – Aging Management Program Evaluation Results – Non-Class 1 Mechanical – Service Water Integrity	0

Miscellaneous

Number	Title	Revision/Date
W3-DBD-4	Waterford SES Unit No.3 Design Basis Document – Component Cooling Water, Auxiliary Component Cooling Water	303
CTI Code ATC-105	Cooling Technology Institute – CTI Code Tower Standard Specifications – Acceptance Test Code for Water Cooling Towers	February 2000

Procedures

Number	Title	Revision
CE-002-003	Maintaining Auxiliary Component Cooling Water Chemistry	302
EN-DC-184	NRC Generic Letter 89-13 Service Water Program	3

Procedures

Number	Title	Revision
EN-DC-340	Microbiologically Induced Corrosion (MIC) Monitoring Program	3
EN-LI-121	Trending and Performance Review Process	17
PE-004-021	CCW Heat Exchanger Performance Test	4
UNT-006-032	Coating and Corrosion Program	1
PE-004-003	Wet Cooling Tower A(B) Thermal Performance Test	306

Work Orders

52514794 00451255-32

B.1.38 Structures Monitoring (XI.S6)

Condition Reports

2006-00755	2009-06945	2010-05582	2012-04684	2016-04481	2016-04484
2012-07645	2014-05375	2015-00947	2016-04480	2016-04482	

License Renewal

Number	Title	Revision
WF3-EP-14-00001	Waterford 3 License Renewal Project System and Structure Scoping Results Civil/Structural	0
WF3-EP-14-00003	Waterford 3 License Renewal Project Operating Experience Review Results – Aging Management Program Effectiveness	0
WF3-EP-14-00008	Waterford 3 License Renewal Project Aging Management Program Evaluation Report Civil/Structural	1

Operating Experiences

Number	Title	Revision
WF3-CS-14-00002	Aging Management Review of the Nuclear Plant Island Structure	1
WF3-CS-14-00003	Aging Management Review of the Turbine Building and Other Structures	1
WF3-CS-14-00004	Aging Management Review of Bulk Commodities	1
WF3-EP-14-00008	Aging Management Program Evaluation Report Civil/Structural	1

Procedures

Number	Title	Revision
EN-DC-150	Condition Monitoring of Maintenance Rule Structures	6
EN-DC-178	System Walkdowns	7
EN-MA-145	Maintenance Standard for Torque Applications	3
EN-FAP-LR-006	Structural Screening and Aging Management Reviews	7
LOU 1564.723	[Specification] Structural Steel Seismic I & II	16
UNT-006-032	Coating and Corrosion Program	0
W-CS-2003-001-00	Maintenance Rule Walkdown for Evaluation of Structures	0
WF3-CS-11-00001	Maintenance Rule Walkdown for Evaluation of Structures	0
WF3-CS-16-00006	Maintenance Rule Walkdown for Evaluation of Structures	0
B-288, Sh 3	Cable and Conduit List Installation Notes Sh.3	8
B-288, Sh 4	Cable and Conduit List Installation Notes Sh.4	18

Drawings

Number	Title	Revision
G-134	General Arrangement Reactor Auxiliary Bldg. Plan+46.00’	35
G-135	General Arrangement Reactor Auxiliary Bldg. Plan+21.00’	30
G-136	General Arrangement Reactor Auxiliary Bldg. Plan -4.00’	35
G-138, Sheet 1	General Arrangement Reactor Auxiliary Bldg. Section	20
G-144	General Arrangement Reactor Building Plan El. +21.00	31
G-145	General Arrangement Reactor Building Plan El. -4.00	33
G-146, Sheet 1	General Arrangement Reactor Building – Section	18
G-149, Sheet 4	General Arrangement Reactor Auxiliary Bldg. –Plans and Sections	25
G-164	Flow Diagram Containment Spray & Refueling Water Storage Pool	43
G-167	Flow Diagram Safety Injection System	20
G-317 S01, Sheet 1	Reactor Aux. Bldg.-EL+ 7.00’ Conduit, Trays & Grounding	14
G-554	Reactor Auxiliary Building Floor Slab at El-4.00 Masonry	17
G-560, Sheet 2	Reactor Auxiliary Building Roof Slab at El +60.00 Masonry	11
G-563, Sheet 2	Reactor Auxiliary Building Structural Layout	4
G-599	Turbine Generator Pedestal Mat-Masonry	5
G-763, Sheet 1	Floor Plans	20

License Renewal

Number	Title	Revision
WF3-EP-14-00003	Waterford 3 License Renewal Project Operating Experience Review Results – Aging Management Program Effectiveness	0
WF3-EP-14-00007	Waterford 3 License Renewal Project Non Class 1 Mechanical	0

Drawings

Number	Title	Revision
G-765, Sheet 3	Floor Plans	23
G-780	Turbine Area Column Schedules	7
G-793	Turbine Building Sections & Details	8
G-905	Reactor Auxiliary Building Refuel Pit Liner	2
G-905	Reactor Auxiliary Building Condensate Pool Liner	5
G-907	Reactor Auxiliary Bldg. Pool Liner Details	9

Miscellaneous

Number	Title	Date
Video	Video Inspection of CSP internals	
Video	Video Inspection of RWSP internals	
Letter	Sandiforth to Booth, Stainless Steel Conduit	April 26, 1977
EPRI Report 107933	Aging Assessment Field Guide	December 2003

B.1.40 Water Chemistry Control – Closed Treatment Water System (XI.M21A)

Condition Reports

2007-03514	2011-08166	2013-00724

Procedures

Number	Title	Revision
CE-001-004	Periodic Analysis Scheduling Program	315
CE-002-001	Maintaining Steam Generator Chemistry	308

Procedures

Number	Title	Revision
CE-002-002	Maintaining Condensate and Feedwater Chemistry	305
CE-002-005	Maintaining Makeup Demineralizer Chemistry	016
CE-002-006	Maintaining Reactor Coolant Chemistry	314
CE-002-007	Maintaining Component Cooling Water Chemistry	305
CE-002-008	Maintaining Condensate Storage Pool Chemistry	302
CE-002-009	Maintaining Boron Management System Chemistry	301
CE-002-010	Maintaining Safety Injection Tank Chemistry	17
CE-002-011	Maintaining Spent Fuel Pool Chemistry	10
CE-002-011	Maintaining Diesel Generator Jacket Cooling Water Chemistry	301
CE-002-013	Maintaining Essential Services Chill Water Chemistry	303
CE-002-020	Maintaining Primary Water Chemistry	13
CE-002-025	Maintaining Refueling Water Storage Pool Chemistry	14
CE-002-027	Maintaining Condensate Storage Tank and Demineralized Water Storage Tank	10
EN-CY-102	Laboratory Analytical Quality Control	5

License Renewal Inspection Document Request

Inspection Dates:	January 30, 2017, through February 16, 2017
Inspection Procedures:	IP 71002 "License Renewal Inspection"
Inspectors:	Sam Graves, Greg Pick, Wayne Sifre, Jim Melfi, Isaac Anchondo

1. License Renewal Application Development Instructions (station blackout, scoping and screening, aging management reviews, operating experience reviews)

· **Program/process documents for performing license renewal activities**
· **Corrective action program documents for license renewal and site specific**
· **Other specific technical review guidance documents (e.g., operating experience, station blackout)**
· **Assessments and self assessments of the aging management program and scoping and screening processes**

2. License Renewal Process Instructions (developing aging management review report, developing the aging management programs, working with the database)

3. Aging management programs – Currently, the team would like to review the following programs:

XI.M18 Bolting Integrity
XI.M41 Buried and Underground Piping
XI.M42 Coating Integrity
XI.M24 Compressed Air Monitoring
XI.M30 Diesel Fuel Monitoring
XI.M36 External Services Monitoring
X.M1 Fatigue Monitoring
XI.M26 Fire Protection
XI.M27 Fire Water System
XI.M17 Flow-Accelerated Corrosion (FAC) Program
XI.M23 Inspection of Overhead Heavy Load and Light Load (related to refueling) Handling Systems
XI.S5 Masonry Wall
XI.E4 Metal Enclosed Bus Inspection
XI.M40 Neutron-Absorbing Material Monitoring
XI.E3 Non EQ Inaccessible Power Cables (>400V)
XI.E1 Non-EQ Insulated Cables and Connections
XI.M39 Oil Analysis
XI.M32 One-Time Inspection
XI.S8 Protective Coating Monitoring and Maintenance
XI.M33 Selective Leaching
XI.M20 Service Water Integrity
XI.S6 Structure Monitoring
XI.M21A Water Chemistry Control – Closed Treated Water Systems

For the requested AMPs, please provide:
• Relevant 10 element information located in binders
• Documents referred to in the 10 element description
• Updated OE information since the applicant completed their review

• Relevant assessments and/or self-assessments completed for the program area being reviewed
• Select corrective action program key words to search and have the list provided so that corrective action documents could be selected for review
• Point of contacts and telephone numbers of program owners
• Information regarding whether the aging management reviews have been incorporated into plant processes

4. References specified in the aging management programs, aging management reviews, and scoping and screening processes

5. Copy of any license amendments subsequent to the original LRA submittal.

6. A minimum of 10 years of operating experience

7. Issued or draft procedures related to the aging management programs selected.

8. Single set of marked up license renewal drawings (hard copy); size 24 x 36

M. Chisum

WATERFORD STEAM ELECTRIC STATION, UNIT 3 – NRC LICENSE RENEWAL INSPECTION REPORT 05000382/2017007 – March 31, 2017

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