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

March 21, 2011

Mr. Paul Freeman
Site Vice President
c/o Mr. Michael O'Keefe
NextEra energy Seabrook, LLC
P.O. Box 300
Seabrook, NH 03874

SUBJECT: AUDIT REPORT REGARDING THE SEABROOK STATION LICENSE RENEWAL APPLICATION (TAC NUMBER ME4028)

Dear Mr. Freeman:

By letter dated May 25, 2010, NextEra Energy Seabrook, LLC submitted an application pursuant to Title 10 of the *Code of Federal Regulations* Part 54, to renew the operating licenses for Seabrook Station, Unit 1, for review by the U.S. Nuclear Regulatory Commission (NRC or the staff). On October 22, 2010, the staff completed the on-site audit of aging management programs. The audit report is enclosed.

If you have any questions, please contact me by telephone at 301-415-1427 or by e-mail at richard.plasse@nrc.gov.

Sincerely,

Richard A. Plasse, Project Manager
Projects Branch 2
Division of License Renewal
Office of Nuclear Reactor Regulation

Docket No. 50-443

Enclosure:
As stated

cc w/encl: Listserv

U.S. NUCLEAR REGULATORY COMMISSION
OFFICE OF NUCLEAR REACTOR REGULATION, DIVISION OF LICENSE RENEWAL
AUDIT REPORT REGARDING THE SEABROOK STATION
LICENSE RENEWAL APPLICATION

Docket No:	50-443
License No:	NPF-86
Licensee:	NextEra Energy Seabrook, LLC
Facility:	Seabrook Station Unit 1
Location:	Seabrook, NH
Dates:	October 12-15, 2010 October 18-22, 2010
Reviewers:	R. Plasse, Project Manager, Division of License Renewal (DLR) A. Hiser, Sr. Engineer, DLR D. Pelton, Branch Chief, DLR R. Auluck, Branch Chief, DLR A. Sheikh, Sr. Structural Engineer, DLR B. Lehman, Structural Engineer, DLR C. Doutt, Sr. Electrical Engineer, DLR D. Nguyen, Electrical Engineer, DLR S. Rhow, Electrical Engineer, DLR B. Fu, Mechanical Engineer, DLR S. Min, Sr. Materials Engineer, DLR M. Kichline, Engineer, DLR B. Keighley, Engineer, DLR C. Hunt, Materials Engineer, Division of Component Integrity (DCI) A. Obodoako, Materials Engineer, DCI D. Alley, Sr. Materials Engineer, DCI K. Axler, Consultant, Center for Nuclear Waste Regulatory Analyses (CNWRA) T. Mintz, CNWRA Y. Pan, CNWRA O. Chopra, Consultant, Argonne National Laboratory (ANL) B. Oland, Consultant, Oak Ridge National Laboratory (ORNL) D. Naus, Consultant, ORNL
Approved By:	Rajender C. Auluck, Chief Aging Management of Structures, Electrical and Systems Branch Division of License Renewal

ENCLOSURE

Approved By Cont'd: David L. Pelton, Chief
Aging Management of Plant Systems Branch
Division of License Renewal

Antonio F. Dias, Chief
Aging Management of Reactor Systems and Guidance Update Branch
Division of License Renewal

Introduction

A nine-day audit was conducted by the Nuclear Regulatory Commission (NRC or the staff) at the Seabrook Station, Unit 1, in Seabrook, New Hampshire, on October 12-15, 2010, and October 18-22, 2010. The purpose of this audit was to examine NextEra Energy Seabrook, LLC (the applicant), aging management programs (AMPs) and related documentation for Seabrook and to verify the applicant's claim of consistency with the corresponding Generic Aging Lessons Learned (GALL) Report (NUREG-1801, Rev. 1) AMPs. As described in the GALL Report, the NRC staff's evaluation of the adequacy of each generic AMP is based on its review of the following 10 program elements in each AMP: 1) scope of program; 2) preventative actions; 3) parameters monitored or inspected; 4) detection of aging effects; 5) monitoring and trending; 6) acceptance criteria; 7) corrective actions; 8) confirmation process; 9) administrative controls; and 10) operating experience.

Exceptions to the GALL Report AMP elements will be evaluated separately as part of the staff's review of the Seabrook license renewal application (LRA) and documented in the staff's Safety Evaluation Report (SER).

The Standard Review Plan for Review of License Renewal Applications for Nuclear Power Plants (NUREG-1800, Rev. 1) (SPR-LR), provides the staff guidance for reviewing a LRA. The SRP-LR allows an applicant to reference in its LRA, the AMPs described in the GALL Report. By referencing the GALL Report AMPs, the applicant concludes that its AMPs correspond to those AMPs which are reviewed and approved in the GALL Report and that no further staff review is required. If an applicant credits an AMP for being consistent with a GALL Report program, it is incumbent on the applicant to ensure that the plant program contains all of the elements of the referenced GALL Report program. The applicant's determination should be documented in an auditable form and maintained on-site.

During this audit, the staff audited AMP elements 1-6, and 10 (scope of program, preventative actions, parameters monitored or inspected, detection of aging effects, monitoring and trending, acceptance criteria, and operating experience). These elements of the applicant's AMPs which were claimed to be consistent with the GALL Report were audited against the related elements of the associated AMP described in the GALL Report, unless otherwise indicated in this audit report. Elements 7-9 (corrective actions, confirmation process, and administrative controls), were audited during the Scoping and Screening Methodology audit conducted on March 15-18, 2010, and are evaluated separately. The staff audited all AMPs that the applicant stated were consistent with the GALL Report AMPs. If an applicant took credit for a program in the GALL Report, the staff verified that the plant program contains all the elements of the referenced GALL Report program. As part of the audit, an independent search of the applicant's plant-specific operating experience database was conducted to determine the adequacy of the

LRA and to provide the staff team members with relevant and appropriate operating experience, and the associated corrective actions performed. During the audit, the staff conducted a random sampling of applicant's components for verification of the applicant's method of scoping and screening to support the license renewal application and the resulting components and systems scoped into the applicant's aging management review. The staff also performed a verification of the materials and environment information in the Seabrook LRA. The staff performed an on-site material and environment verification of a random sample of components, by walkdowns and review of Seabrook reference materials.

In performing this audit, the staff examined the applicant's LRA, program bases documents and related references, interviewed various applicant representatives, and conducted walkdowns of several plant areas. In total, 37 AMPs were reviewed and several breakout (discussion) sessions with applicant representatives were conducted. This report documents the staff's activities during this audit.

LRA AMP B.2.1.1, ASME Section XI Inservice Inspection, Subsections IWB, IWC, and IWD

In the LRA, the applicant states that AMP B.2.1.1, "ASME Section XI Inservice Inspection, Subsections IWB, IWC, and IWD," is an existing program that is consistent with the program elements in GALL AMP XI.M1, "ASME Section XI Inservice Inspection, Subsection IWB, IWC, and IWD." To verify this claim of consistency, the staff audited the LRA AMP. This audit report considers program elements 1-6 (scope, preventive actions, parameters monitored or inspected, detection of aging effects, monitoring and trending, and acceptance criteria) and 10 (operating experience) and the description of the program as contained in the UFSAR Supplement. Program elements 7-9 (corrective actions, confirmation process, and administrative controls) are audited as part of the scoping and screening methodology audit. Issues identified but not resolved in this report are addressed in the SER.

During its audit, the staff interviewed the applicant's staff, and reviewed onsite documentation provided by the applicant. The staff also conducted an independent database search of the applicant's operating experience database using the keywords: "degradation," "weld," and "cracking."

The table below lists the documents that were reviewed by the staff and were found relevant to the audit. These documents were provided by the applicant or were identified in the staff's search of the applicant's operating experience database.

Relevant Documents Reviewed

Document	Title	Revision / Date
1. LRAP-M001	Aging Management Program Basis Document – ASME Section XI Inservice Inspection Subsection IWB, IWC, and IWD	Revision 1 04/27/2010
2. SIIR	Seabrook Station Reference Manual, Inservice Inspection Reference	Revision 11 08/10/2009
3. LER 91-010-00	Reactor Coolant System unidentified Leakage	No Revision 08/23/1991

Document	Title	Revision / Date
4. 96-008	Evaluation of Cryofit Couplings in OR04	No Date
5. 91-31	NHY CROFIT Coupling Verification Program	No Revision 09/20/1991
6.Spec No.9763-006-248-83	Specification for Cryogenic Couplings For Public Service Company of New Hampshire Seabrook Station	No Revision 11/14/1983
7. CR 08-05680	PZR Delta Safety Nozzle Weld Overlay with unacceptable flaws	No Revision 04/13/2008
8. CR 08-06080	PZR Charlie Safety Nozzle Weld Overlay with unacceptable flaws	No Revision 04/17/2008
9. CR 08-06188	PZR Alpha Safety Nozzle Weld Overlay with unacceptable flaws	No Revision 04/19/2008

During the audit of program elements 1-6, the staff found that:

elements 1, 2, 3, 5, and 6 (scope of program, preventive actions, parameters monitored or inspected, monitoring and trending, and acceptance criteria) of the LRA AMP were consistent with the corresponding elements of the GALL Report AMP; and

sufficient information was not available to determine whether element 4 (detection of aging effects) of the LRA AMP were consistent with the corresponding elements of the GALL Report AMP.

In order to obtain the information necessary to verify whether the LRA program element number 4 are consistent with the corresponding elements of the GALL Report AMP, the staff will consider issuing an RAI for the following subject:

In element 4 of the LRA AMP, it states that the applicant is currently including applicable portions of the categories B-F and B-J in its Risk Informed Inservice Inspection Program. In the GALL Report AMP, it recommends the use of American Society of Mechanical Engineers (ASME) Section XI Table IWB-2500-1 to determine the examination of Category B-F and B-J welds. It is not clear to the staff that these statements are consistent because the approval of the risk-informed methodology cannot be assumed for the subsequent intervals.

During the audit of program element 10 (operating experience), the staff found that:

the operating experience provided by the applicant and identified by the staff's independent database search is bounded by industry operating experience (i.e., no previously unknown aging effects were identified by the applicant or the staff);

the operating experience provided by the applicant and identified by the staff's independent database search is sufficient to allow the staff to verify that the LRA AMP, as implemented by the applicant, is sufficient to detect and manage aging effects during the period of extended operation; and

the operating experience in the LRA AMP was not strictly sufficient, but sufficient information was available to allow the staff to determine the AMP would manage aging effects during the period of extended operation. During the audit, it was identified that leaks had been occurring in cryofit couplings due to hydrogen embrittlement. Many of the couplings had been replaced, but some still remained in lower temperature regions. The staff reviewed onsite documentation of hydrogen levels in these couplings to determine that the hydrogen level was not increasing with time, and would not be a concern during the period of extended operation.

The staff also identified many flaws found in pressurizer weld overlays. It was determined during the audit that these overlay flaws were fabrication flaws and did not develop during power operations. In addition, these flaws were part of the inspection activities.

The staff also audited the description of the LRA AMP provided in the UFSAR Supplement. The staff found this description to be consistent with the description provided in the SRP-LR and, therefore, acceptable.

Based on this audit, the staff:

verified that most of the LRA program elements 1-6 are consistent with the corresponding program elements in the GALL Report while identifying certain aspects of LRA program elements 1-6 for which additional information or additional evaluation is required before consistency can be determined;

verified that the operating experience is sufficient to indicate that the LRA AMP, as implemented by the applicant, is sufficient to detect and manage; and

verified that the description provided in the UFSAR Supplement is an adequate description of the program.

LRA AMP B.2.1.2, Water Chemistry

In the LRA, the applicant states that AMP B.2.1.2, “Water Chemistry,” is an existing program that is consistent with the program elements in GALL AMP XI.M2, “Water Chemistry.” To verify this claim of consistency, the staff audited the LRA AMP. This audit report considers program elements 1-6 (scope, preventive actions, parameters monitored or inspected, detection of aging effects, monitoring and trending, and acceptance criteria) and 10 (operating experience) and the description of the program as contained in the UFSAR Supplement. Program elements 7-9 (corrective actions, confirmation process, and administrative controls) are audited as part of the scoping and screening methodology audit. Issues identified but not resolved in this report are addressed in the SER.

During its audit, the staff interviewed the applicant’s staff, and reviewed onsite documentation provided by the applicant. The staff also conducted an independent database search of the applicant’s operating experience database using the keywords: “corrosion,” “degradation,” “chloride,” “sulfate,” and “dissolved oxygen.”

The table below lists the documents which were reviewed by the staff and were found relevant to the audit. These documents were provided by the applicant or were identified in the staff's search of the applicant's operating experience database.

Relevant Documents Reviewed

Document	Title	Revision / Date
1. LRAP – M002	Aging Management Program Basis Document – Water Chemistry	Revision 1 04/26/2010
2. CP 3.1	Primary Chemistry Control Program	Revision 31 No date
3. CP 3.2	Secondary Chemistry Control Program	Revision 31 No date
4. EPRI 1014986	Pressurized Water Reactor Primary Water Chemistry Guidelines	Revision 6 12/2007
5. EPRI 1016555	Pressurized Water Reactor Secondary Water Chemistry Guidelines	Revision 7 2/2009
6. CR 07-15493	CST Specific Conductivity was determined to meet action initiation value	12/05/2007
7. CR 07-02531	CST Specific Conductivity was determined to be high and out of specification	02/14/2007
8. CR 05-12035	CST Specific Conductivity was determined to be high and out of specification	10/05/2005

The staff conducted its audit of LRA program elements 1-6 based on the contents of the existing program as modified by the proposed enhancements.

During its audit the staff found that:

> elements 2, 3, 4, and 6 (preventive actions, parameters monitored/inspected, detection of aging effects, and acceptance criteria) of the LRA AMP were consistent with the corresponding elements of the GALL Report AMP;
>
> element 1 (scope of program) of the LRA AMP was not consistent with the corresponding element of the GALL Report AMP but information was available to allow the staff to determine that this element of the LRA AMP corresponds to elements of the GALL Report AMP; and
>
> sufficient information was not available to determine whether element 5 (monitoring and trending) of the LRA AMP was consistent with the corresponding elements of the GALL Report AMP.

The basis for the staff's determination that element 1 (scope of program) of the LRA AMP corresponds to GALL Report AMP is:

> The GALL Report XI.M2, "Water Chemistry," program element 1, "scope of program," states that this program manages loss of material or cracking. The applicant's Water Chemistry Program states in the scope of program element that it will manage loss of

material, cracking, and reduction of heat transfer. After a review of the applicant's Aging Management Program Basis Document for Water Chemistry, it was clarified that the applicant's Water Chemistry Program was going to also be used to manage reduction of heat transfer through managing the system chemistries.

In order to obtain the information necessary to verify whether the LRA program element 1 and element 5 are consistent with the corresponding elements of the GALL Report AMP, the staff will issue RAIs for the following subjects:

In element 1 of the LRA AMP it states that its program specifies the frequency of sampling. This document also stated that routine primary and secondary system sampling frequencies are specified in station procedures in accordance with EPRI water chemistry guidelines. The applicant further stated that its Primary Chemistry Control Program document states that the Water Chemistry Program contains guidance on increasing sampling frequency to address an abnormal chemistry condition. In the GALL Report AMP it states that whenever corrective actions are taken to address an abnormal chemistry condition, increased sampling is utilized to verify the effectiveness of these actions. The staff reviewed the applicant's chemistry guidelines and could not identify any statements that indicated under abnormal chemistry conditions the sampling frequency should be increased. It is not clear if the applicant's water chemistry program had procedures to increase the sampling frequency under abnormal chemistry conditions.

During the audit of program element 10 (operating experience), the staff found that:

the operating experience provided by the applicant and identified by the staff's independent database search is bounded by industry operating experience (i.e., no previously unknown aging effects were identified by the applicant or the staff);

the operating experience provided by the applicant and identified by the staff's independent database search is not sufficient to allow the staff to verify that the LRA AMP, as implemented by the applicant, is sufficient to detect and manage aging effects during the period of extended operation.

In order to obtain the information necessary to verify whether the applicant's operating experience supports the sufficiency of the LRA AMP, the staff will issue RAIs for the following subjects:

A staff review of past operating experience identified a reoccurring condition in the condensate storage tank (CST) where the specific conductivity is high and out of specification. This type of occurrence was observed in 2005 (CR 05-12035), early 2007 (CR 07-02531), and late 2007 (CR 07-15493). It was not clear to the staff if the applicant has evaluated these incidents to determine if the cause of these conductivity spikes were related and if enhancements were incorporated into its Water Chemistry Program to reduce the occurrence of any future CST conductivity excursions.

The staff also audited the description of the LRA AMP provided in the UFSAR Supplement. Staff found this description to be consistent with the description provided in the SRP-LR and, therefore, acceptable.

Based on this audit, the staff:

verified that LRA program elements 2, 3, 4, and 6 are consistent with the corresponding program elements in the GALL Report while identifying certain aspects of LRA program elements 1, 5, and 10 for which additional information or additional evaluation is required before consistency can be determined;

identified that additional information regarding scope of program, monitoring and trending, and operating experience is required before an indication regarding the sufficiency of the LRA AMP, as implemented by the applicant, to detect and manage aging can be reached; and

verified that the description provided in the UFSAR Supplement is an adequate description of the program.

LRA AMP B.2.1.3, Reactor Head Closure Studs

In the LRA, the applicant states that AMP B.2.1.3, "Reactor Head Closure Studs," is an existing program with exception that is consistent with the program elements in GALL AMP XI.M3, "Reactor Head Closure Studs." To verify this claim of consistency, the staff audited the LRA AMP. This audit report considers program elements 1-6 (scope of program, preventive actions, parameters monitored or inspected, detection of aging effects, monitoring and trending, and acceptance criteria) and 10 (operating experience) and the description of the program as contained in the UFSAR Supplement. Program elements 7-9 (corrective actions, confirmation process, and administrative controls) are audited as part of the scoping and screening methodology audit. This audit report does not consider the sufficiency of exceptions. Issues identified but not resolved in this report are addressed in the SER.

The first exception affects LRA program element 4 (detection of aging effects). In the GALL Report AMP, this program element recommends that components are examined and tested as specified in ASTM Table IWB-2500-1. Examination category B-G-1 for pressure-retaining bolting greater than 2 in. diameter in reactor vessels specifies volumetric examination of studs in place, from the top of the nut to the bottom of the flange hole, and surface and volumetric examination of studs when removed. Alternatively, this program element in the LRA states that the reactor closure head studs are removed from the reactor vessel during each refueling outage. ASME Section XI Inservice Inspections are performed with the studs removed and consist of a volumetric examination only as allowed by ASME Code Case N-307-3 and the current version of the ASME Section XI Code.

During its audit, the staff interviewed the applicant's staff and reviewed onsite documentation provided by the applicant. The staff also conducted an independent search of the applicant's operating experience database using keywords: "closure stud," "cracking," and "loss of material."

The table below lists the documents which were reviewed by the staff and were found relevant to the audit. These documents were provided by the applicant or were identified in the staff's search of the applicant's operating experience database.

Relevant Documents Reviewed

Document	Title	Revision / Date
1. LRAP-M003	Aging Management Program Basis Document for Reactor Head Closure Studs	Revision 1 4/27/2010
2. DCR 99-0037	PlasmaBond Coating for the Reactor Vessel Studs and Steam Generator Primary Manway Studs	Revision 1 10/11/2010
3. Work Order 96C0793	Stuck Reactor Head Closure Stud	No Revision 8/16/1996
4. CR 02-06863	Reactor Vessel Studs Hard to Remove	No Revision 5/7/2002
5. CR 05-05377	Elongation out of Specification	No Revision 4/21/2005

The staff conducted its audit of LRA program elements 1-6 based on the contents of the existing program as modified by the proposed enhancements. Aspects of program element 4 (detection of aging effects) of the LRA AMP associated with the exception were not evaluated during this audit. Aspects of these program elements that are not associated with the exception were evaluated and are described below.

During the audit, the staff found that:

> elements 1, 3, 5, and 6 (scope of program, parameters monitored or inspected, monitoring and trending, and acceptance criteria) of the LRA AMP were consistent with the corresponding elements of the GALL Report AMP;
>
> portions of elements 2 and 4 (preventive actions and detection of aging effects) of the LRA AMP were not strictly consistent with the corresponding elements of the GALL Report AMP but sufficient information was available to allow the staff to determine that this element of the LRA AMP is equivalent to the corresponding elements of the GALL Report AMP; and
>
> sufficient information was not available to determine whether portions of element 2 (preventive actions) of the LRA AMP was consistent with the corresponding element of the GALL Report AMP.

The basis for the staff's determination that elements 2 and 4 (preventive actions and detection of aging effects) of the LRA AMP are equivalent to the corresponding GALL Report AMP is:

> The preventative actions program element of GALL AMP XI.M3, "Reactor Head Closure Studs," addresses using manganese phosphate or other acceptable surface treatments and stable lubricants. The operating experience described in LRA Section B.2.1.3 indicates that one reactor head closure stud was stuck due to galling during Refueling

Outage 5 in 1997. LRA Section B.2.1.3 also indicates that after its observation of the galling issue the applicant applied an anti-galling coating on the reactor head closure studs to prevent galling. Review of the applicant's reactor head closure studs program basis document indicates that the PlasmaBond coating, which the applicant selected, was qualified for use on reactor head closure studs to reduce galling and control friction.

The staff also reviewed the applicant's design change report "PlasmaBond Coating for the Reactor Vessel Studs and Steam Generator Primary Manway Studs." The evaluation from the design change report concluded that PlasmaBond is an acceptable treatment process for use on the reactor head closure studs. This treatment has been proven to effectively reduce galling and control friction. In addition, the coating process does not affect the base metal properties such as yield strength, hardness or elasticity, and therefore all existing installation and examination requirements remain unchanged.

The detection of aging effects program element of GALL AMP XI.M3, "Reactor Head Closure Studs," states that the extent and schedule of the inspection and test techniques prescribed by the program are designed to maintain structural integrity and ensure that aging effects will be discovered and repaired before the loss of intended function of the component. Operating experience No. 3 in LRA Section B.2.1.3 addresses the final post-tensioned elongation values of reactor head studs. The reactor head stud No. 30 was found out of specification during Refueling Outage 10 in 2005. LRA Section B.2.1.3 states that an engineering evaluation was performed and that the preload induced by post tensioning was below the designed range but was adequate to carry the reactor vessel pressure design loads. During the audit, the applicant also indicated that the out of specification condition was a one-time, operational occurrence and was not associated with aging of reactor head closure studs.

In order to obtain the information necessary to verify whether portions of the LRA program element number 2 is consistent with the corresponding element of the GALL Report AMP, the staff will consider issuing RAIs for the following subjects:

In element 2 of the LRA AMP, it states that the Seabrook reactor head closure studs are manufactured from SA-540, Class 3, Grade B24 material. The maximum tensile strength of the material is less than 170 ksi. In the GALL Report AMP, it references the guidance outlined in RG 1.65. RG 1.65, Rev. 1, issued in April 2010, includes using bolting material for closure studs that has a measured yield strength less than 150 ksi, which is resistant to stress corrosion cracking. It is not clear to the staff that these statements are consistent because the LRA AMP does not include the preventive action using stud materials with a measured yield strength level less than 150 ksi.

In element 2 of the LRA AMP, it states that discoloration was reported on some of the reactor head closure studs and that the discoloration was due to the lubricant used for stud removal and was considered not an indication of stud degradation. In the GALL Report AMP, it includes using manganese phosphate or other acceptable surface treatments and stable lubricants to prevent degradation due to corrosion. It is not clear to the staff that these statements are consistent because the lubricant used for stud

removal may potentially cause aging effects due to corrosion and may not be stable at operating temperatures.

During the audit of program element 10 (operating experience), the staff found that:

the operating experience provided by the applicant and identified by the staff's independent database search is bounded by industry operating experience (i.e., no previously unknown aging effects were identified by the applicant or the staff); and

the operating experience provided by the applicant and identified by the staff's independent database search is sufficient to allow the staff to verify that the LRA AMP, as implemented by the applicant, is sufficient to detect and manage aging effects during the period of extended operation.

The staff also audited the description of the LRA AMP provided in the UFSAR Supplement. The staff found this description to be consistent with the description provided in the SRP-LR and, therefore, acceptable.

Based on this audit, the staff:

verified that most of the LRA program elements 1-6 are consistent with the corresponding program elements in the GALL Report while identifying certain aspects of LRA program elements 1-6 for which additional information or additional evaluation is required before consistency can be determined;

verified that the operating experience is sufficient to indicate that the LRA AMP, as implemented by the applicant, is sufficient to detect and manage aging; and

verified that the description provided in the UFSAR Supplement is an adequate description of the program.

LRA AMP B.2.1.4, Boric Acid Corrosion

In the LRA, the applicant states that AMP B.2.1.4, "Boric Acid Corrosion," is an existing program that is consistent with the program elements in GALL AMP XI.M10 "Boric Acid Corrosion." To verify this claim of consistency, the staff audited the LRA AMP. This audit report considers program elements 1-6 (scope, preventive actions, parameters monitored or inspected, detection of aging effects, monitoring and trending, and acceptance criteria) and 10 (operating experience) and the description of the program as contained in the UFSAR Supplement. Program elements 7-9 (corrective actions, confirmation process, and administrative controls) are audited as part of the scoping and screening methodology audit. Issues identified but not resolved in this report are addressed in the SER.

During its audit, the staff interviewed the applicant's staff, and reviewed onsite documentation provided by the applicant. The staff also conducted an independent database search of the applicant's operating experience database using the keywords: "cracking," "degradation," "boric acid," "corrosion," "degradation," "rust," and "pitting."

The table below lists the documents which were reviewed by the staff and were found relevant to the audit. These documents were provided by the applicant or were identified in the staff's search of the applicant's operating experience database.

Relevant Documents Reviewed

Document	Title	Revision / Date
1. Aging Management Program Basis Document	Aging Management Program Basis Document Boric Acid Corrosion	Revision 1 04/26/2010
2. MA 10.3	Seabrook Station Administrative Procedure Boric Ac id Control Program	Revision 5 Not dated
3. CR08-14404	Condition Report	No Rev. No. 09/27/2010
4. MS0599.54	Seabrook Station Mechanical Maintenance Procedure	Rev.1 Not dated
5. CR08-00846	Condition Report	No Rev. No. 01/18/2008
6. EX1801.01.006	Seabrook Station Engineering Procedure Containment Leakage Reduction Program Surveillance	Rev. 7, Chg.3 Not dated
7. CR03-08473	Condition Report	No Rev. No. 10/6/2003
8. EDI 30560	Engineering Department Instructions Boric Acid Evaluations	Rev.0, Chg. 3 Not dated

During the audit of program elements 1-6, the staff found that:

> Elements 1-6 (scope, preventive actions, parameters monitored or inspected, detection of aging effects, monitoring and trending, and acceptance criteria) of the LRA AMP were consistent with the corresponding elements of the GALL Report AMP.

During the audit of program element 10 (operating experience), the staff found that:

> the operating experience provided by the applicant and identified by the staff's independent database search is bounded by industry operating experience (i.e., no previously unknown aging effects were identified by the applicant or the staff); and
>
> the operating experience provided by the applicant and identified by the staff's independent database search is sufficient to allow the staff to verify that the LRA AMP, as implemented by the applicant, is sufficient to detect and manage aging effects during the period of extended operation.

The staff also audited the description of the LRA AMP provided in the UFSAR Supplement. The staff found this description to be consistent with the description provided in the SRP-LR and, therefore, acceptable.

Based on this audit, the staff:

verified that LRA program elements 1-6 are consistent with corresponding program elements in the GALL Report AMP;

verified that the operating experience is sufficient to indicate that the LRA AMP, as implemented by the applicant, is sufficient to detect and manage aging; and

verified that the description provided in the UFSAR Supplement is an adequate description of the program.

LRA AMP B.2.1.5, Nickel-Alloy Penetration Nozzles Welded to the Upper Reactor Vessel Closure Heads of Pressurized Water Reactors

In the LRA, the applicant states that AMP B.2.1.5, "Nickel-Alloy Penetration Nozzles Welded to the Upper Reactor Vessel Closure Heads of Pressurized Water Reactors," is an existing program that is consistent with the program elements in GALL AMP XI.M11A, "Nickel-Alloy Penetration Nozzles Welded to the Upper Reactor Vessel Closure Heads of Pressurized Water Reactors (PWRS Only)." To verify this claim of consistency, the staff audited the LRA AMP. This audit report considers program elements 1-6 (scope, preventive actions, parameters monitored or inspected, detection of aging effects, monitoring and trending, and acceptance criteria) and 10 (operating experience) and the description of the program as contained in the UFSAR Supplement. Program elements 7-9 (corrective actions, confirmation process, and administrative controls) are audited as part of the scoping and screening methodology audit. Issues identified but not resolved in this report are addressed in the SER.

During its audit, the staff interviewed the applicant's staff, and reviewed onsite documentation provided by the applicant. The staff also conducted an independent database search of the applicant's operating experience database using various combinations of the keywords: "nickel," "alloys," "cracking," "PWSCC," "600," "82," "182," "weld," and "overlay."

The table below lists the documents which were reviewed by the staff and were found relevant to the audit. These documents were provided by the applicant or were identified in the staff's search of the applicant's operating experience database.

Relevant Documents Reviewed

Document	Title	Revision / Date
1.	RCS Materials Degradation Management Reference (SASR)	Revision 07 01/25/2010
2. NRC Order EA-03-009	Interim Inspection Requirements for Reactor Pressure Vessel Heads at Pressurized Water Reactors	02/11/2003
3. NRC Order EA-03-009 Rev 1	Interim Inspection Requirements for Reactor Pressure Vessel Heads at Pressurized Water Reactors (Rev 1)	02/20/2004
4. FLP letter to NRC	Answer to Order EA-03-009	02/28/2003

Document	Title	Revision / Date
5. FPL letter to NRC	Summary of Reactor Pressure Vessel Head Inspections	12/18/2003
6. FPL letter to NRC	Answer to Revised Order EA-03-009	03/10/2004
7. FPL letter to NRC	Answer to Revised Order EA 03-009	05/30/2006
8. NRC letter to FPL	Relaxation of First Revised Order EA-03-009	09/27/2006
9. FPL letter to NRC	NRC Order EA-03-009 Inspection Results	01/04/2007
10.	Seabrook Reactor Vessel Head Effective Degradation Years (EDY) and Re-Inspection Years (RIY)	
11. N-729-1	ASME Boiler and Pressure Vessel Code, Code Case, Alternative Examination Requirements for PWR Reactor Vessel Upper Heads with Nozzles Having Pressure-Retaining Partial-Penetration Welds Section XI, Division 1	03/28/2006
12. MA 6.2	Seabrook Administrative Procedure Seabrook ASME Section XI Repair and Replacement Program	Revision 06
13. Condition Report 03-08473	Indication of Boron on Head	10/6/2003
14. Condition Report 06-12607	Canopy Seal Weld Inspection	10/15/2006
15. Apparent Cause Condition Report 03-08473	Boric Acid Found on Reactor Vessel Head	
16. Condition Report 03-09022	Canopy weld leak on nozzle #20	10/14/2003
17. Condition Report 05-04500	Problems in canopy seal weld project (clamps installed)	04/05/2005
18. Condition Report 06-14042	Inadequate VT-2 exam	11/02/2006
19. Apparent Cause for CR 06-14042	Inadequate VT-2 System Leakage Examination of Reactor Vessel Head	

During the audit of program elements 1-6, the staff found that:

> elements 1-6 (scope of program, preventive actions, parameters monitored/inspected, detection of aging effects, monitoring and trending, and acceptance criteria) of the LRA AMP were consistent with the corresponding elements of the GALL Report AMP.

During the audit of program element 10 (operating experience), the staff found that:

> the operating experience provided by the applicant and identified by the staff's independent database search is bounded by industry operating experience (i.e., no previously unknown aging effects were identified by the applicant or the staff); and

the operating experience provided by the applicant and identified by the staff's independent database search is sufficient to allow the staff to verify that the LRA AMP, as implemented by the applicant, is sufficient to detect and manage aging effects during the period of extended operation.

The staff also audited the description of the LRA AMP provided in the UFSAR Supplement. The staff found this description to be consistent with the description provided in the SRP-LR and, therefore, acceptable.

Based on this audit, the staff:

verified that LRA program elements 1-6 are consistent with corresponding program elements in the GALL Report AMP;

verified that the operating experience is sufficient to indicate that the LRA AMP, as implemented by the applicant, is sufficient to detect and manage aging; and

verified that the description provided in the UFSAR Supplement is an adequate description of the program.

LRA AMP B.2.1.8, Flow-Accelerated Corrosion

In the LRA, the applicant states that AMP B.2.1.8, "Flow-Accelerated Corrosion" is an existing program that is consistent with the program elements in GALL AMP XI.M17, "Flow-Accelerated Corrosion." To verify this claim of consistency, the staff audited the LRA AMP. This audit report considers program elements 1-6 (scope of program, preventive actions, parameters monitored or inspected, detection of aging effects, monitoring and trending, and acceptance criteria) and 10 (operating experience) and the description of the program as contained in the UFSAR Supplement. Program elements 7-9 (corrective actions, confirmation process, and administrative controls) are audited as part of the scoping and screening methodology audit. Issues identified but not resolved in this report are addressed in the SER.

During its audit, the staff interviewed the applicant's staff and reviewed onsite documentation provided by the applicant. The staff also conducted an independent database search of the applicant's operating experience database using the keywords: "flow accelerated," "cavitation," and "erosion."

The table below lists the documents which were reviewed by the staff and were found relevant to the audit. These documents were provided by the applicant or were identified in the staff's search of the applicant's operating experience database.

Relevant Documents Reviewed

Document	Title	Revision / Date
1. LRAP-M017	Aging Management Program Basis Document for Flow Accelerated Corrosion	Revision 1 04/26/2010

Document	Title	Revision / Date
2. CSI-NDE-06-054	Input to 2006 Seabrook Flow Accelerated Corrosion Self-Assessment	No Revision 09/14/2006
3. FACR	Flow Accelerated Corrosion Reference Manual	Revision 0 2000
4. 01DCR010	Flow Accelerated Corrosion Program – Large Bore Piping	No Revision 2001
5. CR 02-06563	Heater Shell Wall Thickness Below Code Minimum	No Revision 05/06/2002
6. EC 2549	Flow Accelerated Corrosion Program, Piping Replacement OR13	No Revision 2009

During the audit of program elements 1-6, the staff found that:

elements 1, 2, 4, 5, and 6 (scope of program, preventive actions, detection of aging effects, monitoring and trending, and acceptance criteria) of the LRA AMP were consistent with the corresponding elements of the GALL Report AMP; and

sufficient information was not available to determine whether element 3 (parameters monitored or inspected) of the LRA AMP was consistent with the corresponding element of the GALL Report AMP.

In order to obtain the information necessary to verify whether the LRA program element number 3 is consistent with the corresponding element of the GALL Report AMP, the staff will consider issuing an RAI for the following subject:

In element 3 of the LRA AMP, it states that valves, orifices, equipment nozzles, and other like components that cannot be inspected completely with ultrasonic testing techniques due to their shape and thickness are evaluated based on the wear of piping located immediately downstream. In the GALL Report AMP, it states that the effects of flow-accelerated corrosion on the intended function of piping and components are monitored by measuring wall thickness. It is not clear to the staff that these statements are consistent because if significant wear is detected in piping located immediately downstream, how will wall thinning be determined for the valves, orifices, equipment nozzles, and other like components that cannot be inspected completely with ultrasonic testing techniques due to their shape and thickness?

During the audit of program element 10 (operating experience), the staff found that:

the operating experience provided by the applicant and identified by the staff's independent database search is bounded by industry operating experience (i.e., no previously unknown aging effects were identified by the applicant or the staff); and

the operating experience provided by the applicant and identified by the staff's independent database search is sufficient to allow the staff to verify that the LRA AMP, as implemented by the applicant, is sufficient to detect and manage aging effects during the period of extended operation.

The staff also audited the description of the LRA AMP provided in the UFSAR Supplement. The staff found this description to be consistent with the description provided in the SRP-LR and, therefore, acceptable.

Based on this audit, the staff:

verified that most of the LRA program elements 1-6 are consistent with the corresponding program elements in the GALL Report while identifying certain aspects of LRA program elements 1-6 for which additional information or additional evaluation is required before consistency can be determined;

verified that the operating experience is sufficient to indicate that the LRA AMP, as implemented by the applicant, is sufficient to detect and manage aging; and

verified that the description provided in the UFSAR Supplement is an adequate description of the program.

LRA AMP B.2.1.9, Bolting Integrity

In the LRA, the applicant states that AMP B.2.1.9, "Bolting Integrity," is an existing program that is consistent with the program elements in GALL AMP XI.M18, "Bolting Integrity." To verify this claim of consistency, the staff audited the LRA AMP. This audit report considers program elements 1-6 (scope, preventive actions, parameters monitored or inspected, detection of aging effects, monitoring and trending, and acceptance criteria) and 10 (operating experience) and the description of the program as contained in the UFSAR Supplement. Program elements 7-9 (corrective actions, confirmation process, and administrative controls) are audited as part of the scoping and screening methodology audit. Issues identified but not resolved in this report are addressed in the SER.

During its audit, the staff interviewed the applicant's staff, and reviewed onsite documentation provided by the applicant. The staff also conducted an independent database search of the applicant's operating experience database using the keywords: "bolt," "cracking," "degradation," and "corrosion."

The table below lists the documents which were reviewed by the staff and were found relevant to the audit. These documents were provided by the applicant or were identified in the staff's search of the applicant's operating experience database.

Relevant Documents Reviewed

Document	Title	Revision / Date
1. LRAP-M018	Aging Management Program Basis Document Bolting Integrity	Revision 1 05/04/2010
2. EPRI NP-5769	Degradation and Failure of Bolting in Nuclear Power Plants Volume 1	No Rev. 04/1988 (no day or month specified)

Document	Title	Revision / Date
3. EPRI NP-5067	Good Bolting Practices Volume 1 Large Bolt Manual	No Rev. 1997 (no month specified)
4. CR96-20228	Condition Report	No Rev. 12/21/1992
5. CR02-16095	Condition Report	No Rev. 05/30/2003
6. LER 92-26	Licensee Event Report, Bolting Failures in Xomox Tufline	No Rev. 02/12/1993

During the audit of program elements 1-6, the staff found that:

> Elements 2, 3, 4, 5, and 6 (preventive actions, parameters monitored/inspected, detection of aging effects, monitoring and trending, and acceptance criteria) of the LRA AMP were consistent with the corresponding elements of the GALL Report AMP; and
>
> sufficient information was not available to determine whether element 1 (scope of program) of the LRA AMP was consistent with the corresponding element of the GALL Report AMP.

In order to obtain the information necessary to verify whether the LRA program element number 1 is consistent with the corresponding element of the GALL Report AMP, the staff will consider issuing RAIs for the following subjects:

> In element 1 of the LRA AMP, it states that inspection of bolted closures in conjunction with the Inservice Inspection Program and External Surfaces Monitoring Program will detect the aging effects and leakage at joints by visual inspection methods. In the GALL Report AMP, it states that visual inspection of bolting for safety-related pressure retaining components is acceptable, however, it is not clear to the staff that these statements are consistent because the External Surfaces Monitoring Program includes submerged bolts and bolts in wet environments for which visual inspections are not feasible.

During the audit of program element 10 (operating experience), the staff found that:

> the operating experience provided by the applicant and identified by the staff's independent database search is bounded by industry operating experience (i.e., no previously unknown aging effects were identified by the applicant or the staff); and
>
> the operating experience provided by the applicant and identified by the staff's independent database search is sufficient to allow the staff to verify that the LRA AMP, as implemented by the applicant, is sufficient to detect and manage aging effects during the period of extended operation.

The staff also audited the description of the LRA AMP provided in the UFSAR Supplement. The staff found this description to be consistent with the description provided in the SRP-LR and, therefore, acceptable.

Based on this audit, the staff:

verified that most of the LRA program elements 1-6 are consistent with the corresponding program elements in the GALL Report while identifying certain aspects of LRA program elements 1-6 for which additional information or additional evaluation is required before consistency can be determined;

verified that the operating experience is sufficient to indicate that the LRA AMP, as implemented by the applicant, is sufficient to detect and manage aging; and

verified that the description provided in the UFSAR Supplement is an adequate description of the program.

LRA AMP B.2.1.10, Steam Generator Tube Integrity

In the LRA, the applicant states that AMP B.2.1.10, "Steam Generator Tube Integrity," is an existing program with an exception that is consistent with the program elements in GALL AMP XI.M19, "Steam Generator Tube Integrity." To verify this claim of consistency, the staff audited the LRA AMP. This audit report considers program elements 1-6 (scope of program, Preventive actions, parameters monitored or inspected, detection of aging effects, monitoring and trending, and acceptance criteria) and 10 (operating experience) and the description of the program as contained in the UFSAR Supplement. Program elements 7-9 (corrective actions, confirmation process, and administrative controls) are audited as part of the scoping and screening methodology audit. Issues identified but not resolved in this report are addressed in the SER.

The first exception affects LRA program element 1 (scope of program). In the GALL Report AMP, this program element recommends the use of NEI 97-06, "Steam Generator Program Guidelines," Revision 1. Alternatively, this program element in the LRA states that the Seabrook Station Steam Generator Tube Integrity Program is based on NEI 97-06, Revision 2. The applicant further states that Revision 2 did not reduce the functional requirements of Revision 1 and that it is technically consistent with Technical Specification Task Force Traveler TSTF-449, "Steam Generator Tube Integrity and Associated Technical Specifications," which has been reviewed and approved by NRC staff.

During its audit, the staff interviewed the applicant's staff, and reviewed onsite documentation provided by the applicant. The staff also conducted an independent search of the applicant's operating experience database using keywords: "wear," "stress," and "cracking."

The table below lists the documents which were reviewed by the staff and were found relevant to the audit. These documents were provided by the applicant or were identified in the staff's search of the applicant's operating experience database.

Relevant Documents Reviewed

Document	Title	Revision / Date
1.	Steam Generator Management Reference Manual	
2. Document ID Number	Seabrook Station Technical Specification 3/4 4.5 "Steam Generators"	
3.	Seabrook Station License Amendment 115	
4. NYN-98047	Seabrook Station 90-Day Response to Generic Letter 97-06	
5. EE-09-11	Steam Generator Degradation Assessment for Seabrook OR13 Refueling Outage	October 2009
6. L-2006-042	FPL's 30 day response to GL 2006-01	
7. CR 02-08166	Outside Diameter Stress Corrosion Cracking (ODSCCC) in the D S/G Tubes	
8. CR 08-05751	Foreign Objects in the B SG	
9. AR 00208108	Axial ODSCC in the C SG Hot Leg	
10. OR013	Steam Generator Tube Inservice Inspection Report	
11. EPRI Report 1013706	PWR Steam Generator Examination Guidelines	
12. EPRI Report TR 1008219	PWR Primary to Secondary Leak Guidelines	
13. EPRI Report TR 1002884	PWR Primary Water Chemistry Guidelines	
14. EPRI Report TR 1008224	PWR Secondary Water Chemistry Guidelines	
15. EPRI Report 1012987	Steam Generator Tube Integrity Assessment Guidelines	

The staff conducted its audit of LRA program elements 1-6 based on the contents of the existing program as modified by the proposed enhancements. Aspects of these program elements that are not associated with the exception were evaluated and are described below.

During the audit, the staff found that elements 1-6 (scope of program, preventative actions, parameters monitored or inspected, detection of aging effects, monitoring and trending, and acceptance criteria) of the LRA AMP were consistent with the corresponding elements of the GALL Report AMP.

During the audit of program element 10 (operating experience), the staff found that the operating experience provided by the applicant and identified by the staff's independent database search is bounded by industry operating experience (i.e., no previously unknown aging effects were identified by the applicant or the staff). In addition, the operating experience provided by the applicant and identified by the staff's independent database search is sufficient to allow the staff to verify that the LRA AMP, as implemented by the applicant, is sufficient to detect and manage aging effects during the period of extended operation.

In order to obtain additional information necessary to verify whether the applicant's operating experience supports the sufficiency of the LRA AMP, the staff will consider issuing two RAIs for the following subjects:

> Unless the NRC has approved a redefinition of the pressure boundary in which the tube-to-tubesheet weld is no longer included, the staff considers that the effectiveness of the primary water chemistry program should be verified to ensure PWSCC cracking is not occurring.
>
> From foreign operating experience in SGs with a similar design to that of Seabrook, extensive cracking due to PWSCC has been identified in SG divider plate assemblies made with Alloy 600, even with proper primary water chemistry. The staff notes that the water chemistry program alone may not be effective in managing the aging effect of cracking due to PWSCC in SG divider plate assemblies.

The staff also audited the description of the LRA AMP provided in the UFSAR Supplement. The staff found this description to be consistent with the description provided in the SRP-LR and, therefore, acceptable.

Based on this audit, the staff:

> verified that LRA program elements 1-6 are consistent with the corresponding program elements in the GALL Report AMP;
>
> identified that additional information regarding the operating experience is required before an indication regarding the sufficiency of the LRA AMP, as implemented by the applicant, to detect and manage aging can be reached; and
>
> verified that the description provided in the UFSAR Supplement is an adequate description of the program.

LRA AMP B2.1.11, Open-Cycle Cooling Water System

In the LRA, the applicant states that AMP B.2.1.11, "Open-Cycle Cooling Water System," is an existing program with an exception that is consistent with the program elements in GALL AMP XI.M20, "Open-Cycle Cooling Water System." To verify this claim of consistency, the staff audited the LRA AMP. This audit report considers program elements 1-6 (scope, preventive actions, parameters monitored or inspected, detection of aging effects, monitoring and trending, and acceptance criteria) and 10 (operating experience) and the description of the program as contained in the UFSAR Supplement. Program elements 7-9 (corrective actions, confirmation process, and administrative controls) are audited as part of the scoping and screening methodology audit. This audit report does not consider the sufficiency of exceptions. Issues identified but not resolved in this report are addressed in the SER.

The first exception affects LRA program element 2 (preventive actions). In the GALL Report AMP, this program element recommends to construct system components of appropriate material and line or coat the components to protect the underlying metal surface from

aggressive environments. Alternatively, this program element in the LRA states, that the components in open-cycle cooling water systems include both lined and unlined piping as part of the design.

During its audit, the staff conducted walkdowns, interviewed the applicant's staff, and reviewed onsite documentation provided by the applicant. The staff also conducted an independent search of the applicant's operating experience database using keywords: "microbiological," "erosion," and "biofoul."

The table below lists the documents which were reviewed by the staff and were found relevant to the audit. These documents were provided by the applicant or were identified in the staff's search of the applicant's operating experience database.

Relevant Documents Reviewed

Document	Title	Revision / Date
1. LRAP-M020	Aging Management Program Basis Document for the Open-Cycle Cooling Water System	Revision 1 04/26/2010
2. NRC GL 89-13	Service Water System Problems Affecting Safety-Related Equipment	No Revision 07/18/1989
3. NYN-90037	Response to Generic Letter 89-13	No Revision 02/09/2990
4. NYN-90176	Supplement Response to Generic Letter 89-13	No Revision 09/24/1990
5. NYN-91169	Supplemental Response to Generic Letter 89-13 and 90-04	No Revision 11/19/1991
6. CR 06-00896	Through Wall Leak Discovered on the "D" Service Water pmp Discharge Line Piping.	No Revision 01/25/2006

The staff conducted its audit of LRA program elements 1-6 based on the contents of the existing program as modified by the proposed enhancements. Aspects of program element 2 (preventive actions) of the LRA AMP associated with the exception were not evaluated during this audit. Aspects of these program elements that are not associated with the exception were evaluated and are described below.

During the audit, the staff found that:

elements 3, 4, 5, and 6 (Parameters monitored or inspected, detection of aging effects, monitoring and trending, Acceptance criteria) of the LRA AMP were consistent with the corresponding elements of the GALL Report AMP; and

element 2 (preventive actions) of the LRA AMP were not strictly consistent with the corresponding elements of the GALL Report AMP but sufficient information was available to allow the staff to determine that this element of the LRA AMP is equivalent to the corresponding elements of the GALL Report AMP; and sufficient information was not available to determine whether element 1 (scope of program) of the LRA AMP was consistent with the corresponding elements of the GALL Report AMP.

The basis for the staff's determination that element 2 (preventive actions) of the LRA AMP are equivalent to the corresponding GALL Report AMP is:

> The GALL Report states that the program system components are constructed of appropriate materials and lined or coated to protect the underlying metal surfaces from being exposed to aggressive cooling water environments. The applicant's basis document states that it uses unlined and lined piping and the use of unlined piping is considered an exception. The applicant provided the types of materials that are used in the unlined pipe, which showed the low susceptibility of these materials to aging in saltwater environment.

In order to obtain the information necessary to verify whether the LRA program element number 1 is consistent with the corresponding elements of the GALL Report AMP, the staff will consider issuing RAIs for the following subjects:

> In element 1 of the LRA AMP, the applicant states that this program will manage hardening and loss of strength due to elastomer degradation. During onsite discussions, the applicant stated that the management of hardening and loss of strength due to elastomer degradation would be managed by visual inspections. It is not clear to the staff that visual inspections alone can detect hardening of elastomeric material.

During the audit of program element 10 (operating experience), the staff found that:

> the operating experience provided by the applicant and identified by the staff's independent database search is bounded by industry operating experience (i.e., no previously unknown aging effects were identified by the applicant or the staff); and
>
> the operating experience provided by the applicant and identified by the staff's independent database search is sufficient to allow the staff to verify that the LRA AMP, as implemented by the applicant, is sufficient to detect and manage aging effects during the period of extended operation.

In addition, staff reviewed past operating experience and identified wall thinning near elbows that showed discoloration. A review of the operating experience indicated that the applicant used discoloration as evidence for wall thinning and that this visual inspection technique is identifying the loss of material.

The staff also audited the description of the LRA AMP provided in the UFSAR Supplement. The staff found this description to be consistent with the description provided in the SRP-LR and, therefore, acceptable.

Based on this audit, the staff:

> verified that most of the LRA program elements 1-6 are consistent with the corresponding program elements in the GALL Report while identifying certain aspects of LRA program elements 1-6 for which additional information or additional evaluation is required before consistency can be determined;

verified that the operating experience is sufficient to indicate that the LRA AMP, as implemented by the applicant, is sufficient to detect and manage aging; and

verified that the description provided in the UFSAR Supplement is an adequate description of the program.

LRA AMP B.2.1.12, Closed-Cycle Cooling Water System

In LRA Section B.2.1.12, "Closed-Cycle Cooling Water System", the applicant states that the AMP is an existing program with an enhancement and exceptions that is consistent with the program elements in GALL AMP XI.M21, "Closed-Cycle Cooling Water System." To verify this claim of consistency, the staff audited the LRA AMP. This audit report considers program elements 1-6 (scope, preventive actions, parameters monitored or inspected, detection of aging effects, monitoring and trending, and acceptance criteria) and 10 (operating experience) and the description of the program as contained in the UFSAR Supplement. Program elements 7-9 (corrective actions, confirmation process, and administrative controls) are audited as part of the scoping and screening methodology audit. This audit report does not consider the sufficiency of exceptions. Issues identified but not resolved in this report are addressed in the SER.

The enhancement affects AMP element 4 (detection of aging effects). This enhancement expands on the existing program element by adding visual inspection for cracking, loss of material, and fouling in the primary component cooling water system, thermal barrier cooling water system, diesel generator jacket water cooling system, fire pump diesel engine coolant system, and the control building air handling coolant system when these systems are opened for maintenance. The applicant committed to implement this enhancement prior to the period of extended operation, as stated in LRA Table A.3.

The first exception affects AMP elements 2, 5, and 6 (preventive actions, monitoring and trending, acceptance criteria). The GALL Report AMP recommends maintaining the system corrosion inhibitors within the specified limits of EPRI TR-107396. The LRA proposes to implement the guidance of EPRI TR-1007820, which is a later version than the GALL Report.

The second exception affects AMP elements 2, 5, and 6 (preventive actions, monitoring and trending, and acceptance criteria). The EPRI guidance cited in the GALL Report AMP specifies a maximum hydrazine level of 200 ppm in an all-ferrous environment. The LRA states it will use a maximum hydrazine level of 300 ppm in certain systems.

The third exception affects AMP elements 2 and 5 (preventive actions, monitoring and trending). The EPRI guidance cited in the GALL Report AMP specifies an action level 1 for sulfates at 150 ppb. The LRA states it will use a sulfate action level 1 of 500 ppb.

The fourth exception affects AMP program elements 3 and 5 (Parameters Monitored or Inspected, Monitoring and Trending). The EPRI guidance cited in the GALL Report AMP recommends monitoring hydrazine levels weekly. The LRA states that it will monitor hydrazine levels monthly.

The fifth exception affects AMP elements 3, 4, 5, and 6 (parameters monitored or inspected, detection of aging effects, monitoring and trending, and acceptance criteria). GALL AMP XI.M21 recommends monitoring for aging effects by conducting performance and functional testing. The LRA states that instead of using performance and functional testing, it uses visual inspections and corrosion coupon samples.

During its audit, the staff conducted walkdowns, interviewed the applicant's staff, and reviewed onsite documentation provided by the applicant. The staff also conducted an independent search of the applicant's operating experience database using keywords: "cavitation," "copper," and "corrosion."

The table below lists the documents which were reviewed by the staff and were found relevant to the audit. These documents were provided by the applicant or were identified in the staff's search of the applicant's operating experience database.

Relevant Documents Reviewed

Document	Title	Revision / Date
1. LRAP – M021	Aging Management Program Basis Document for the Closed-Cycle Cooling Water System	Revision 1 04/26/10
2. EPRI 1007820	Closed Cooling Water Chemistry Guideline	Revision 1 04/2004
3. CP 3.3	Miscellaneous System/Closed Cooling Water Systems Chemistry Control Program	Revision 19 No Date
4. CD0919.02	Corrosion Determination By Coupons	Rev. 9 Chg. 4 No Date
5. CN0944.01	Visual Inspection Format For Plant Components	Rev. 3 No Date
6. CHSTID	Evaluation of Sulfate Concentration in Thermal Barrier Closed Cooling Loop	No revision 12/03/2004
7. CR 05-04881	Eroded Flange Downstream of Valve	No Revision 04/15/2005
8. CR 03-01549	Erosion on piping Downstream of Valve	No Revision 02/20/2003
9. 00-0019	PCCW Flow Balancing Enhancements	Revision 19 No Date

The staff conducted its audit of LRA program elements 1-6 based on the contents of the existing program as modified by the proposed enhancements. Aspects of program elements 2-6 (preventive actions, parameters monitored or inspected, detection of aging effects, monitoring and trending, and acceptance criteria) of the LRA AMP associated with the exceptions were not evaluated during this audit. Aspects of these program elements that are not associated with the exceptions were evaluated and are described below.

During the audit, the staff found that:

elements 1, 4, and 5 (scope of program, detection of aging effects, and monitoring and trending) of the LRA AMP were consistent with the corresponding elements of the GALL Report AMP;

element 3 (parameters monitored or inspected) of the LRA AMP was not strictly consistent with the corresponding element of the GALL Report AMP but that sufficient information was available to allow the staff to determine that this element of the LRA AMP is equivalent to the corresponding element of the GALL Report AMP; and

sufficient information was not available to determine whether element 2 (preventive actions) and element 6 (acceptance criteria) of the LRA AMP were consistent with the corresponding element of the GALL Report AMP.

The basis for the staff's determination that element 3 (parameters monitored or inspected) of the LRA AMP is equivalent to the corresponding GALL Report AMP is:

A review of the hydrazine concentration measurements for the past few years in the thermal barrier system was determined to be consistent and stable, which shows that the monthly hydrazine measurements is appropriate to monitor hydrazine levels.

In order to obtain the information necessary to verify whether the LRA program elements 2 and 6 are consistent with the corresponding Elements 1-6 (scope, preventive actions, parameters monitored or inspected, detection of aging effects, monitoring and trending, and acceptance criteria) of the GALL Report AMP, the staff will consider issuing RAIs for the following subjects:

Regarding element 2, the EPRI Closed Cooling Water Chemistry Guideline cited in the GALL Report AMP has a pH action level 1 for glycol blended systems. However, the diesel generator cooling water jacket system, which is a glycol blended system, only contained a pH action level 2 and did not specify a pH action level 1.

Regarding element 6, the applicant states that it will rely upon corrosion coupons and internal visual inspections to verify the effectiveness of the corrosion inhibitor and/or the corrosion rates. However, the acceptance criteria that will be used to evaluate the results from the corrosion coupons or visual inspections were not provided.

During the audit of program element 10 (operating experience), the staff found that:

the operating experience provided by the applicant and identified by the staff's independent database search is bounded by industry operating experience (i.e., no previously unknown aging effects were identified by the applicant or the staff); and

the operating experience provided by the applicant and identified by the staff's independent database search is not sufficient to allow the staff to verify that the LRA AMP, as implemented by the applicant, is sufficient to detect and manage aging effects during the period of extended operation.

In order to obtain the information necessary to verify whether the applicant's operating experience supports the sufficiency of the LRA AMP, the staff will consider issuing an RAI for the following subject:

> A review of past operating experience indicated a recurring condition in the primary component cooling water system with loss of material in piping downstream of valves CC-V-444 (CR 05-04881) and CC-V-446 (CR 03-01549) apparently due to cavitation erosion from throttling. The applicant stated that it had conducted flow rebalancing to alleviate the concern. It was not clear to the staff how the applicant has re-evaluated these areas after flow rebalancing was conducted to determine whether loss of material due to cavitation erosion remains an issue in the primary component cooling water system.

The staff also audited the description of the LRA AMP provided in the UFSAR Supplement. The staff found this description to be consistent with the description provided in the SRP-LR and, therefore, acceptable.

Based on this audit, the staff:

> verified that most of the LRA program elements 1-6 are consistent with the corresponding program elements in the GALL Report while identifying certain aspects of LRA program elements 1-6 for which additional information or additional evaluation is required before consistency can be determined;
>
> identified that additional information regarding operating experience is required before an indication regarding the sufficiency of the LRA AMP, as implemented by the applicant, to detect and manage aging can be reached; and
>
> verified that the description provided in the UFSAR Supplement is an adequate description of the program.

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

In the LRA, the applicant states that AMP B.2.1.13, "Inspection of Overhead Heavy Load and Light Load (Related to Refueling) Handling Systems," is an existing program with enhancements that is consistent with the program elements in GALL AMP XI.M23, "Inspection of Overhead Heavy Load and Light Load (Related to Refueling) Handling Systems." To verify this claim of consistency, the staff audited the LRA AMP. This audit report considers program elements 1-6 (scope of program, preventive actions, parameters monitored or inspected, detection of aging effects, monitoring and trending, and acceptance criteria) and 10 (operating experience) and the description of the program as contained in the UFSAR Supplement. Program elements 7-9 (corrective actions, confirmation process, and administrative controls) are audited as part of the scoping and screening methodology audit.

The first enhancement affects LRA program elements 1 and 3 (scope of program and parameters monitored or inspected). This enhancement expands on the existing program

element by adding monitoring of general corrosion on the crane and trolley structural components and the effects of wear on the rails in the rail system.

The second enhancement affects LRA program elements 1 and 4 (scope of program and detection of aging effects). This enhancement expands on the existing program element by adding additional cranes related to the refueling handling system.

In Table A.3 of the LRA, the applicant committed to implement these enhancements prior to the period of extended operation.

During its audit, the staff interviewed the applicant's staff and reviewed onsite documentation provided by the applicant. The staff also conducted an independent search of the applicant's operating experience database using keywords: "crane" and "wear."

The table below lists the documents which were reviewed by the staff and were found relevant to the audit. These documents were provided by the applicant or were identified in the staff's search of the applicant's operating experience database.

Relevant Documents Reviewed

Document	Title	Revision / Date
1. LRAP-M023	Aging Management Program Basis Document for Inspection of Overhead Heavy Load and Light Load (Related to Refueling) Handling Systems	Revision 1 04/26/2010
2. NALS	Lifting Systems Manual	Revision 32 No Date
3. MN0534.08	Cask Handling Crane Inspection and PM	Revision 11 No Date
4. CR 04-00399	Bus Work Track Pitted from Excessive Corrosion	No Revision 01/07/2004
5. CR 97-10114	Potential Overhead Crane Overload	No Revision 05/01/1997
6. 97MMOD543	Trolley Replacement Cranes	No Revision 05/06/1997

The staff conducted its audit of LRA program elements 1-6 based on the contents of the existing program as modified by the proposed enhancements.

During the audit, the staff found that:

elements 1, 2, 4, 5, and 6 (scope of program, preventive actions, detection of aging effects, monitoring and trending, and acceptance criteria) of the LRA AMP were consistent with the corresponding elements of the GALL Report AMP; and

element 3 (parameters monitored or inspected) of the LRA AMP was not strictly consistent with the corresponding element of the GALL Report AMP but sufficient

information was available to allow the staff to determine that this element of the LRA AMP is equivalent to the corresponding elements of the GALL Report AMP.

The basis for the staff's determination that element 3 (parameters monitored or inspected) of the LRA AMP is equivalent to the corresponding GALL Report AMP is:

> The parameters monitored or inspected program element of GALL AMP XI.M23, "Overhead Heavy Load and Light Load (Related to Refueling) Handling Systems," states that this program evaluates the effectiveness of the maintenance monitoring program. The operating experience described in condition report CR 04-00399 indicated that the bus work track of the filter cask monorail hoist system was severely pitted from excessive corrosion. The staff reviewed the condition report and interviewed the applicant's staff, and found that during the inspection corrosion was not observed on the rails and structural components of the system. The applicant initiated a preventive maintenance work order and replaced the bus track with a corrosion-resistant material.
>
> The staff also reviewed usage of the in-scope cranes. The applicant stated that these cranes have their loads limited to those within their rated capacity through administrative procedures in the applicant's Lifting Systems Manual. The applicant also stated that degradation of the crane structure due to operational fatigue is not expected because of these procedural controls and the design basis, and therefore, usage of these systems is not recorded.

During the audit of program element 10 (operating experience), the staff found that:

> the operating experience provided by the applicant and identified by the staff's independent database search is bounded by industry operating experience (i.e., no previously unknown aging effects were identified by the applicant or the staff); and
>
> the operating experience provided by the applicant and identified by the staff's independent database search is sufficient to allow the staff to verify that the LRA AMP, as implemented by the applicant, is sufficient to detect and manage aging effects during the period of extended operation.

The staff also audited the description of the LRA AMP provided in the UFSAR Supplement. The staff found this description to be consistent with the description provided in the SRP-LR and, therefore, acceptable.

Based on this audit, the staff:

> verified that LRA program elements 1-6 are consistent with corresponding program elements in the GALL Report AMP;
>
> verified that the operating experience is sufficient to indicate that the LRA AMP, as implemented by the applicant, is sufficient to detect and manage aging; and
>
> verified that the description provided in the UFSAR Supplement is an adequate description of the program.

LRA AMP B.2.1.14, Compressed Air Monitoring

In the LRA, the applicant states that AMP B.2.1.14, "Compressed Air Monitoring," is an existing program with enhancements, which is consistent with the program elements in GALL AMP XI.M24, "Compressed Air Monitoring." To verify this claim of consistency, the staff audited the LRA AMP. This audit report considers program elements 1-6 (scope, preventive actions, parameters monitored or inspected, detection of aging effects, monitoring and trending, and acceptance criteria) and 10 (operating experience) and the description of the program as contained in the UFSAR Supplement. Program elements 7-9 (corrective actions, confirmation process, and administrative controls) are audited as part of the scoping and screening methodology audit.

The one enhancement affects LRA program elements 1, 2, 3, 4, and 6 (scope of program, preventive actions, parameters monitored/Inspected, and detection of aging effects). This enhancement expands on the existing program element by adding annual air quality tests for the diesel generator compressed air sub system. The air quality tests are to measure particulate contamination and oil vapor in the system.

In Table A.3 in the UFSAR Supplement of the LRA, the applicant committed to implement the enhancement prior to the period of extended operation.

During its audit, the staff conducted walkdowns, interviewed the applicant's staff, and reviewed onsite documentation provided by the applicant. The staff also conducted an independent search of the applicant's operating experience database using keywords: "compressed air," "pressurized air," "corrosion," "loss of material," and "rust."

The table below lists the documents which were reviewed by the staff and were found relevant to the audit. These documents were provided by the applicant or were identified in the staff's search of the applicant's operating experience database.

Relevant Documents Reviewed

Document	Title	Revision / Date
1. LRAP-M036	Aging Management Program Basis Document External Surfaces Monitoring	Revision 1 4/26/2010
2. PEG-01	Plant Engineering Guidelines Instructions for Developing and Revising Department Guidelines	Revision 4 Not Dated
3. PEG-10	Plant Engineering Guidelines System Walkdowns	Rev.16 Not Dated
4. PEG-30	Plant Engineering Group Instructions Performance Monitoring Guidelines	Rev. 7 Not Dated
5. Work Order 0643629	Work Order (service to air receiver as per NH State Inspection)	No Rev. No. 12/17/2006

The staff conducted its audit of LRA program elements 1-6 based on the contents of the existing program as modified by the proposed enhancements.

During the audit, the staff found that:

element 5 (monitoring and trending) of the LRA AMP was consistent with the corresponding elements of the GALL Report AMP;

elements 1-4 and 6 (scope, preventive actions, parameters monitored or inspected, detection of aging effects, and acceptance criteria) of the LRA AMP were not strictly consistent with the corresponding elements of the GALL Report AMP but sufficient information was available to allow the staff to determine that these elements of the LRA AMP are equivalent to the corresponding elements of the GALL Report AMP.

The basis for the staff's determination that elements 1-4 and 6 (scope, preventive actions, parameters monitored or inspected, detection of aging effects, and acceptance criteria) of the LRA AMP are equivalent to the corresponding GALL Report AMP is:

periodic air quality inspections are included in the applicant's program to verify that air quality is monitored for the airborne contaminants that could produced degradation of the system. The air quality is continuously surveyed for moisture, and scheduled inspections are conducted for volatile components and all airborne particulate contaminations. Those inspections are consistent with the recommendations in GALL AMP XI.M24, which states that the inspections must address oil, water, rust, dirt, and other contaminants in the compressed air system.

During the audit of program element 10 (operating experience), the staff found that:

the operating experience provided by the applicant and identified by the staff's independent database search is bounded by industry operating experience (i.e., no previously unknown aging effects were identified by the applicant or the staff); and

the operating experience provided by the applicant and identified by the staff's independent database search is sufficient to allow the staff to verify that the LRA AMP, as implemented by the applicant, is sufficient to detect and manage aging effects during the period of extended operation.

The staff also audited the description of the LRA AMP provided in the UFSAR Supplement. The staff found this description to be consistent with the description provided in the SRP-LR and, therefore, acceptable.

Based on this audit, the staff:

verified that LRA program elements 1-6 are consistent with corresponding program elements in the GALL Report AMP;

verified that the operating experience is sufficient to indicate that the LRA AMP, as implemented by the applicant, is sufficient to detect and manage aging; and

verified that the description provided in the UFSAR Supplement is an adequate description of the program.

LRA AMP B.2.1.15, Fire Protection

In the LRA, the applicant states that AMP B.2.1.15, "Fire Protection," is an existing program with enhancements that is consistent with the program elements in GALL AMP XI.M26, "Fire Protection." To verify this claim of consistency, the staff audited the LRA AMP. This audit report considers program elements 1-6 (scope of program, preventive actions, parameters monitored or inspected, detection of aging effects, monitoring and trending, and acceptance criteria) and 10 (operating experience) and the description of the program as contained in the UFSAR Supplement. Program elements 7-9 (corrective actions, confirmation process, and administrative controls) are audited as part of the scoping and screening methodology audit.

The first enhancement affects LRA program element 4 (detection of aging effects). This enhancement expands on the existing program element by adding visual inspection of penetration seals by a fire protection qualified inspector.

The second enhancement affects LRA program elements 3 and 4 (parameters monitored or inspected and detection of aging effects). This enhancement expands on the existing program element by adding additional age related degradation such as spalling and loss of material caused by freeze-thaw, chemical attack, and reaction with aggregates, and visual inspection of fire-rated exposed barrier walls, floors and ceilings by a fire protection qualified inspector.

The third enhancement affects LRA program element 4 (detection of aging effects). This enhancement expands on the existing program element by adding visual inspection of fire-rated doors by a fire protection qualified inspector.

In Table A.3 of the LRA, the applicant committed to implement these enhancements prior to the period of extended operation.

During its audit, the staff conducted walkdowns, interviewed the applicant's staff, and reviewed onsite documentation provided by the applicant. The staff also conducted an independent search of the applicant's operating experience database using keywords: "cracking," "spalling," and "loss of material."

The table below lists the documents which were reviewed by the staff and were found relevant to the audit. These documents were provided by the applicant or were identified in the staff's search of the applicant's operating experience database.

Relevant Documents Reviewed

Document	Title	Revision / Date
1. LRAP-M026	Aging Management Program Basis Document for Fire Protection	Revision 1 04/22/2010
2. MX0599.01	18-Month Surveillance of Technical Requirements Fire-Rated Assembly Exposed Surfaces	Revision 4 June 2007
3. MX0599.02	18-Month Inspection of Technical Requirements Fire-Rated Assembly Penetration Seals	Revision 1 May 2008

Document	Title	Revision / Date
4. FPEE-2006-001	Evaluation of Thermal Characteristics of Two-Part Silicones	Revision 1 05/26/2006
5. DRR 92-061	Fire Rated Walls, Floors and Ceiling Assemblies	Revision 0 06/12/1992
6. QCP-103	Damming Depth and Penetration Seal Inspection	Revision 6 03/05/1986
7. CR 08-02630	Fire Door Difficult to Open	No Revision 02/21/2008
8. CR 03-03617	Fire Door Handle Broken	No Revision 04/22/2003
9. CR 02-14417	Degraded Seals in EFW Pump House	No Revision 10/12/2002
10. CR 02-13402	Diesel Driven Fire Pump Casing Vent Leakage	No Revision 09/13/2002

The staff conducted its audit of LRA program elements 1-6 based on the contents of the existing program as modified by the proposed enhancements.

During the audit, the staff found that:

> elements 1, 2, 3, 4, and 5 (scope of program, preventive actions, parameters monitored or inspected, detection of aging effects, and monitoring and trending) of the LRA AMP were consistent with the corresponding elements of the GALL Report AMP; and
>
> element 6 (acceptance criteria) of the LRA AMP was not strictly consistent with the corresponding element of the GALL Report AMP but sufficient information was available to allow the staff to determine that this element of the LRA AMP is equivalent to the corresponding element of the GALL Report AMP.

The basis for the staff's determination that element 6 (acceptance criteria) of the LRA AMP is equivalent to the corresponding GALL Report AMP is:

> The acceptance criteria program element of GALL AMP XI.M26, "Fire Protection," states that inspection results are acceptable if there are no visual separation of seals from walls and components, separation of layers of material, or ruptures or punctures of seals. The applicant's maintenance procedure MX0599.02 provides the inspection requirements for silicone foam and silicone elastomer. The acceptance criteria is no cracks or gaps in the seal surface greater than 3/16-in wide whose depth is greater than 50 percent of seal design depth and have not been caulked on one side. Procedure MX0599.02 also provides the inspection requirements for fire plugs. The acceptance criteria is no gouges with material loss in the exposed surface greater than 1/4-in deep, and cracks or gaps are acceptable provided they do not extend all the way through the fire plug. During the audit, the staff reviewed the document FPEE-2006-001, "Evaluation of Thermal Characteristics of Two-Part Silicones," from the silicone sealants vendor PCI-Promatec and clarified that gaps with depth up to 50 percent of the required seal depth and up to 3/16-in in width will not adversely impact the fire endurance

performance of the seal, based on the fire endurance test data from the vendor. The staff also reviewed the Bisco installation procedure QCP-103, "Damming Depth and Penetration Seal Inspection," and clarified that the fire plug with a 1/4-in gouge is capable of providing its design function as a 3-hour fire barrier.

With respect to allowable Pyrocrete opening size, the applicant's maintenance procedure MX0599.01 indicates that areas missing Pyrocrete greater than 6 in^2 will render the barrier non-functional, based on the amount of Pyrocrete that would be missing from a crack 1/16-in wide and 8-ft long. During the audit, the staff reviewed the applicant's document DRR 92-061, "Fire Rated Walls, Floors and Ceiling Assemblies," and found that the basis of the inspection requirements was provided from the fire barrier material vendor Pyrocrete Fireproofing. It has been clarified that Pyrocrete 241 used by the applicant as the fire barrier material has been tested with hairline cracks up to 1/16-in wide and passed the fire tests, which will not compromise its fire endurance performance.

During the audit of program element 10 (operating experience), the staff found that:

the operating experience provided by the applicant and identified by the staff's independent database search is bounded by industry operating experience (i.e., no previously unknown aging effects were identified by the applicant or the staff); and

the operating experience provided by the applicant and identified by the staff's independent database search is sufficient to allow the staff to verify that the LRA AMP, as implemented by the applicant, is sufficient to detect and manage aging effects during the period of extended operation.

The staff also audited the description of the LRA AMP provided in the UFSAR Supplement. The staff found this description to be consistent with the description provided in the SRP-LR and, therefore, acceptable.

Based on this audit, the staff:

verified that LRA program elements 1-6 are consistent with corresponding program elements in the GALL Report AMP;

verified that the operating experience is sufficient to indicate that the LRA AMP, as implemented by the applicant, is sufficient to detect and manage aging; and

verified that the description provided in the UFSAR Supplement is an adequate description of the program.

LRA AMP B.2.1.16, Fire Water System

In the LRA, the applicant states that AMP B.2.1.6, "Fire Water System," is an existing program with enhancements that is consistent with the program elements in GALL AMP XI.M27, "Fire Water System." To verify this claim of consistency, the staff audited the LRA AMP. This audit

report considers program elements 1-6 (scope, preventive actions, parameters monitored or inspected, detection of aging effects, monitoring and trending, and acceptance criteria) and 10 (operating experience) and the description of the program as contained in the UFSAR Supplement. Program elements 7-9 (corrective actions, confirmation process, and administrative controls) are audited as part of the scoping and screening methodology audit.

The first enhancement affects LRA program element 4 (detection of aging effects). This enhancement expands on the existing program element by adding NFPA 25 criteria for where sprinklers have been in place for 50 years, they will be replaced or representative samples from one or more sample areas will be submitted to a recognized testing laboratory for field service testing.

The second enhancement affects LRA program element 3 (parameters monitored or inspected). This enhancement expands on the existing program element by adding performance of flow testing of the fire water system in accordance with NFPA 25 guidelines.

The third enhancement affects LRA program element 4 (detection of aging effects). This enhancement expands on the existing program element by adding periodic visual inspections or volumetric inspections, as required, of the internal surface of the fire protection system upon each entry to the system for routine or corrective maintenance.

In Table A.3 of the LRA, the applicant committed to implement these enhancement either prior to the period of extended operation or within ten years of entering the period of extended operation.

During its audit, the staff conducted walkdowns, interviewed the applicant's staff, and reviewed onsite documentation provided by the applicant. The staff also conducted an independent search of the applicant's operating experience database using keywords: "corrosion," "piping," and "loss of material."

The table below lists the documents which were reviewed by the staff and were found relevant to the audit. These documents were provided by the applicant or were identified in the staff's search of the applicant's operating experience database.

Relevant Documents Reviewed

Document	Title	Revision / Date
1. LRAP - M027	Aging Management Program basis Document	Revision 1 04/22/10
2. NFPA 25	Standard for the Inspection, Testing, and Maintenance of Water-Based Fire Protection Systems	1998 Edition 08/09/1999
3. NFPA 25	Standard for the Inspection, Testing, and Maintenance of Water- Based Fire Protection Systems	2002 Edition 01/031/2002
4. SSTR	Seabrook Station Technical Requirements	Revision 106 No Date

Document	Title	Revision / Date
5. NFPA 15	Water Spray Fixed Systems for Fire Protection	1982 Edition 06/28/1982
6. NFPA 13	Sprinkler Systems	1983 Edition 02/12/1983
7. FP 3.1	Fire Protection Maintenance and Surveillance Testing	Revision 3 No Date
8. ON0443.54	Non-Safety Related Deluge and Sprinkler Systems 18 Month Inspection	Revision 4, Change8 No Date
9. OX0443.12	Fire Protection Dry Pipe and Sprinkler Systems 18 Month Inspection	Revision 6, Change 4 No Date
10. OS0443.66	Safety Related Spray and Sprinkler System 18 Month Flow and System Alarms Test	Revision 4, Change 9 No Date
11. OS0443.39	Wet Sprinkler Systems 18 Month Flow and Alarm Test	Revision 6, Change 18 No Date
12. ON0443.103	Deluge Or Sprinkler Flooding Valve Inspection/Maintenance	Revision 0, Change 12 No Date
13. OX0443.20	Yard Hydrant Semi-Annual Inspection and Functional Test	Revision 6, Change 6 No Date
14. OX0443.21	Yard Fire Hydrant Hose Houses Annual Hose Replacement and Gasket Inspection	Revision 6, Change 2 No Date

The staff conducted its audit of LRA program elements 1-6 based on the contents of the existing program as modified by the proposed enhancements.

During the audit, the staff found that:

elements 1, 2, and 6 (scope of program, Preventive actions, and Acceptance criteria) of the LRA AMP were consistent with the corresponding elements of the GALL Report AMP;

element 5 (Monitoring and trending) of the LRA AMP was not strictly consistent with the corresponding element of the GALL Report AMP but sufficient information was available to allow the staff to determine that this element of the LRA AMP is equivalent to the corresponding element of the GALL Report AMP; and

sufficient information was not available to determine whether elements 3 and 4 (Parameters monitored or inspected and Detection of aging effects) of the LRA AMP were consistent with the corresponding elements of the GALL Report AMP.

The basis for the staff's determination that element 5 (Monitoring and trending) of the LRA AMP is equivalent to the corresponding GALL Report AMP is:

> The GALL Report states that a sample of sprinkler heads is to be inspected every 12 months. However, the applicant's procedural documents state that visual inspections are conducted every 18 months. The staff reviewed the applicant's CLB and noted that the 18 month frequency is in accordance with the applicant's technical specifications, as documented in TR8-3.7.9.2, which was previously accepted by the NRC. The staff finds the applicant's 18 month frequency and element 5 of the LRA AMP acceptable because the frequency is in accordance with the applicant's CLB and the applicant has no operating experience to suggest the existing frequency is insufficient.

In order to obtain the information necessary to verify whether the LRA program element numbers 3 and 4 are consistent with the corresponding elements of the GALL Report AMP, the staff will consider issuing RAIs for the following subjects:

> In element 3 of the LRA AMP, it states Fire Water System Program will be enhanced to perform periodic visual inspection or volumetric inspection as required of the internal surface no earlier than 10 years before the period of extended operation. However, the LRA does not indicate that the visual inspection or volumetric inspection will be conducted prior to the period of extended operation. The GALL Report AMP states that the visual inspections are performed before the end of the current operating term and at plant-specific intervals thereafter during the period of extended operation. It is not clear to the staff that these statements are consistent because the applicant does not indicate when it plans to initiate the visual inspections.
>
> Element 4 of the LRA AMP did not provide any indication of how the inspections will be conducted on a representative number of locations on a reasonable periodicity. The GALL Report states that an alternative to non-intrusive testing, the plant maintenance process may include a visual inspection of the internal surface of the fire protection piping upon each entry to the system for routine or corrective maintenance, as long as it can be demonstrated that inspections are performed on a representative number of locations on a reasonable periodicity. It is not clear to the staff from the LRA documentation how the visual inspections that are part of the Fire Water System Program will be conducted on a representative number of locations on a reasonable basis.

During the audit of program element 10 (operating experience), the staff found that:

> the operating experience provided by the applicant and identified by the staff's independent database search is bounded by industry operating experience (i.e., no previously unknown aging effects were identified by the applicant or the staff); and
>
> the operating experience provided by the applicant and identified by the staff's independent database search is sufficient to allow the staff to verify that the LRA AMP, as implemented by the applicant, is sufficient to detect and manage aging effects during the period of extended operation.

The staff also audited the description of the LRA AMP provided in the UFSAR Supplement. The staff found that sufficient information was not available to determine whether the description provided in the UFSAR Supplement was an adequate description of the LRA AMP.

In order to obtain the information necessary to verify the sufficiency of the UFSAR Supplement program description, the staff will consider issuing RAIs for the following subject:

> The LRA states that the enhancement to include performance of periodic flow testing of the fire water system will be within 10 years of entering the period of extended operation. However, it is not clear to the staff if the enhancement will be conducted 10 years prior to or after the period of extended operation.
>
> The applicant's UFSAR Supplement states that the Fire Water System Program manages loss of material and reduction of heat transfer due to fouling of the Fire Water System components through detailed inspections via the Seabrook Station Surveillance Test Procedures. The SRP Table 3.3-2, "FSAR Supplement for Aging Management of Auxiliary Systems," states that the Fire Water System Program UFSAR Supplement should include periodic full flow flush tests and system performance testing to prevent corrosion due to biofouling. In addition, the SRP also states that portions of the fire protection system exposed to water should be visually inspectioned that are capable of evaluating (1) wall thickness to ensure against catastrophic failure and (2) the inner diameter of the piping as it applies to the design flow of the fire protection system. The applicant's UFSAR supplement for the Fire Water System Program does not indicate that periodic full flow flush tests and system performance testing are performed or that the visual inspections included in the program will be able to detect wall thickness and the inner diameter of the piping.

Based on this audit, the staff:

> verified that most of the LRA program elements 1-6 are consistent with the corresponding program elements in the GALL Report while identifying certain aspects of LRA program elements 1-6 for which additional information or additional evaluation is required before consistency can be determined;
>
> verified that the operating experience is sufficient to indicate that the LRA AMP, as implemented by the applicant, is sufficient to detect and manage aging; and
>
> identified a need for additional information regarding the adequacy of the program description in the UFSAR Supplement.

LRA AMP B.2.1.17, Aboveground Steel Tanks

In the LRA, the applicant states that AMP B.2.1.17, "Aboveground Steel Tanks," is an existing program with enhancements that is consistent with the program elements in GALL AMP XI.M29, "Aboveground Steel Tanks." To verify this claim of consistency, the staff audited the LRA AMP. This audit report considers program elements 1-6 (scope of program, preventive actions, parameters monitored or inspected, detection of aging effects, monitoring and trending, and acceptance criteria) and 10 (operating experience) and the description of the program as

contained in the UFSAR Supplement. Program elements 7-9 (corrective actions, confirmation process, and administrative controls) are audited as part of the scoping and screening methodology audit. Issues identified but not resolved in this report are addressed in the SER.

The first enhancement to this program affects LRA program elements 1, 3, 4, 5, and 6 (scope of program, parameters monitored or inspected, detection of aging effects, monitoring and trending, and acceptance criteria). This enhancement expands on the existing program element by adding (a) the fire protection fuel oil tanks, auxiliary boiler fuel oil storage tank, and fire protection water storage tanks as part of the scope of tanks; (b) paint flaking and drying, cracking, or missing sealant and caulking as examples of minor structural deficiencies; and (c) a requirement that discrepant conditions be reported through the applicant's corrective action program.

The second enhancement to this program affects LRA program elements 1, 3, 4, 5, and 6 (scope of program, parameters monitored or inspected, detection of aging effects, monitoring and trending, and acceptance criteria). This enhancement expands on the existing program element by adding the performance of an ultrasonic examination and evaluation of the internal bottom surface of the two fire protection water storage tanks within 10 years prior to the period of extended operation.

In Table A.3 of the LRA, the applicant committed to implement these enhancements prior to the period of extended operation.

During its audit, the staff conducted walkdowns, interviewed the applicant's staff, and reviewed onsite documentation provided by the applicant. The staff also conducted an independent search of the applicant's operating experience database using keywords: "steel," "tank," and "loss of material."

The table below lists the documents which were reviewed by the staff and were found relevant to the audit. These documents were provided by the applicant or were identified in the staff's search of the applicant's operating experience database.

Relevant Documents Reviewed

Document	Title	Revision / Date
1. LRAP-M029	Aging Management Program Basis Document for Aboveground Steel Tanks	Revision 1 04/26/2010
2. Work Order 93D3946	Sandblast and Paint Fire Protection Tank	No Revision 07/20/1993
3. Work Order 97C8308	Fire Protection Tank Coating Degradation	No Revision 09/23/1999
4. Work Order 01C3849	Inspection of Auxiliary Boiler Fuel Oil Storage Tank	No Revision 02/02/2001
5. Work Order 01A3794	Paint Chipping around Lower Tank Manway and Exposed Surface	No Revision 05/17/2001

The staff conducted its audit of LRA program elements 1-6 based on the contents of the existing program as modified by the proposed enhancements.

During the audit, the staff found that:

elements 2 and 3 (preventive actions and parameters monitored or inspected) of the LRA AMP were consistent with the corresponding elements of the GALL Report AMP; and

sufficient information was not available to determine whether elements 1, 4, 5, and 6 (scope of program, detection of aging effects, monitoring and trending, and acceptance criteria) of the LRA AMP were consistent with the corresponding elements of the GALL Report AMP.

In order to obtain the information necessary to verify whether the LRA program element numbers 1, 4, 5, and 6 are consistent with the corresponding elements of the GALL Report AMP, the staff will consider issuing RAIs for the following subjects:

In element 1 of the LRA AMP, it states that visual inspection of the external surface of the protective coatings on exterior surface of the in-scope tanks will be conducted in accordance with its Structural Monitoring Program. In the GALL Report AMP, it states that the program relies on periodic system walkdowns to monitor degradation of the protective paint or coating. It is not clear to the staff that these statements are consistent because a review of the applicant's Structural Monitoring Program did not identify that this inspection is covered.

In element 4 of the LRA AMP, it states that visual inspection will be performed to detect drying, cracking, or missing sealant and caulking applied along the tank and ground interface. In the GALL Report AMP, it states that this program includes periodic system walkdowns to confirm that the paint, coating, sealant, and caulking are intact as an effective method to manage the effects of corrosion on the external surface of tanks. It is not clear to the staff that these statements are consistent because it is not clear how visual inspection is effective to detect aging effects of sealant and caulking.

In element 5 of the LRA AMP, it states in Enhancement 2 that the program will be enhanced to include the performance of ultrasonic testing examination of the internal tank bottom surface within 10 years prior to the period of extended operation. In the GALL Report AMP, it states that the effects of corrosion of the inaccessible external surface are detectable by ultrasonic testing thickness measurement of the tank bottom and are monitored and trended if significant material loss is detected. It is not clear to the staff that these statements are consistent because the LRA does not state whether the ultrasonic testing is a one-time measurement or periodic measurements.

In element 6 of the LRA AMP, it states in Enhancement 1 that the program is enhanced by adding paint flaking and drying, cracking, or missing sealant and caulking as examples of minor structural deficiencies. In the GALL Report AMP, it states that degradation consists of flaking or peeling of paint and coatings, and drying, cracking, or missing sealant and caulking. It is not clear to the staff that these statements are

consistent because the LRA does not define the meaning of the term “minor structural deficiencies.”

During the audit of program element 10 (operating experience), the staff found that:

the operating experience provided by the applicant and identified by the staff’s independent database search is bounded by industry operating experience (i.e., no previously unknown aging effects were identified by the applicant or the staff); and

the operating experience provided by the applicant and identified by the staff’s independent database search is sufficient to allow the staff to verify that the LRA AMP, as implemented by the applicant, is sufficient to detect and manage aging effects during the period of extended operation.

The staff also audited the description of the LRA AMP provided in the UFSAR Supplement. The staff found that sufficient information was not available to determine whether the description provided in the UFSAR Supplement was an adequate description of the LRA AMP.

In order to obtain the information necessary to verify the sufficiency of the UFSAR Supplement program description, the staff will consider issuing RAIs for the following subjects:

The LRA states that the enhancement to include performance of an ultrasonic inspection and evaluation of the internal bottom surface of the two fire protection water storage tanks will be within 10 years prior to entering the period of extended operation. However, it is not clear to the staff if the enhancement will be conducted ten years prior to or after the period of extended operation.

Standard Review Plan Table 3.3-2 includes a commitment for sealant and caulking inspections in the Aboveground Steel Tanks Program for aging management of the auxiliary systems. LRA Section A.2.1.17 states that visual inspection of protective coatings to ensure that the exterior surfaces of the tanks remain protected. However, the applicant’s UFSAR Supplement does not include a commitment for sealant and caulking inspections in the Aboveground Steel Tanks Program.

Based on this audit, the staff:

verified that most of the LRA program elements 1-6 are consistent with the corresponding program elements in the GALL Report while identifying certain aspects of LRA program elements 1-6 for which additional information or additional evaluation is required before consistency can be determined;

verified that the operating experience is sufficient to indicate that the LRA AMP, as implemented by the applicant, is sufficient to detect and manage aging; and

identified a need for additional information regarding the adequacy of the program description in the UFSAR Supplement.

LRA AMP B.2.1.18, Fuel Oil Chemistry

In the LRA, the applicant states that AMP B.2.1.18, "Fuel Oil Chemistry," is an existing program with enhancements and exceptions that is consistent with the program elements in GALL AMP XI.M30, "Fuel Oil Chemistry." To verify this claim of consistency, the staff audited the LRA AMP. This audit report considers program elements 1-6 (scope, preventive actions, parameters monitored or inspected, detection of aging effects, monitoring and trending, and acceptance criteria) and 10 (operating experience) and the description of the program as contained in the UFSAR Supplement. Program elements 7-9 (corrective actions, confirmation process, and administrative controls) are audited as part of the scoping and screening methodology audit. This audit report does not consider the sufficiency of exceptions. Issues identified but not resolved in this report are addressed in the SER.

The first enhancement affects LRA program element 1 (scope of program), element 2 (preventive actions), element 3 (parameters monitored/inspected) and element 5 (monitoring and trending). This enhancement expands on the existing program elements by adding a revision to the Fuel Oil Chemistry Program to include requirements to:

a. Sample and analyze new fuel deliveries including testing for biodiesel prior to offloading to the auxiliary boiler fuel oil storage tank.

b. Periodically sample stored fuel in the Auxiliary Boiler Fuel Oil Storage Tank.

The second enhancement affects LRA element 2 (preventive actions). This enhancement expands upon existing program elements by adding a revision to include a requirement to check for the presence of water in the auxiliary boiler fuel oil storage tank at least once per quarter and to remove water as necessary.

The third enhancement affects LRA program element 1 (scope of program), element 2 (preventive actions), element 3 (parameters monitored/inspected), and element 5 (monitoring and trending). This enhancement expands on the existing program elements by adding a revision to require draining, cleaning and inspection of the diesel fire pump fuel oil day tanks on a frequency of at least once every 10 years.

The fourth enhancement affects LRA program element 2 (preventive actions) and element 4 (detecting of aging effects). This enhancement expands on the existing program elements by adding a revision to include ultrasonic thickness measurement of the tank bottom during the 10-year draining, cleaning and inspection of the Diesel Generator fuel oil storage tanks, Diesel Generator fuel oil day tanks, diesel fire pump fuel oil day tanks and auxiliary boiler fuel oil storage tank.

In B.2.1.18 of the LRA, the applicant committed to implement these enhancements prior to the period of extended operation.

The first exception affects LRA program element 2. In the GALL Report AMP, this program element recommends maintaining the quality of fuel oil by additions of biocides to minimize biological activity, stabilizers to prevent biological breakdown of the diesel fuel, and corrosion inhibitors to mitigate corrosion. Alternatively, this program element in the LRA states, that

Seabrook Station does not use stabilizers or corrosion inhibitors in the diesel fuel oil. Biocide is regularly added only to the Diesel Generator fuel oil storage tanks.

The second exception affects LRA program element 3 and 6. In the GALL Report AMP, this program element recommends the use of ASTM Standards D1796 and D2709 for determination of water and sediment contamination in diesel fuel. For determination of particulates, *modified* ASTMD2276, Method A, is used. The modification consists of using a filter with a pore size of 3.0 μm, instead of 0.8 μm. Alternatively, this program element in the LRA states, the Fuel Oil Chemistry Program does not use modified ASTM D2276, "Standard test Method for Particulate Contaminant in Aviation Fuel by Line Sampling," method A to sample for particulates.

The third exception affects LRA program element 3 and 6. In the GALL Report AMP, these program elements recommend the use of the ASTM Standards D1796 and D2709 for determination of water and sediment contamination in diesel fuel. Alternatively, these program elements in the LRA state that Seabrook Station does not use ASTM D1796, "Standard Test Method for Water and Sediment in Fuel Oils by the Centrifuge Method (Laboratory Procedure)," for determination of water and sediment in diesel fuel due to the type of fuel.

During its audit, the staff conducted a walkdown, interviewed the applicant's staff, and reviewed onsite documentation provided by the applicant. The staff also conducted an independent search of the applicant's operating experience database using keywords: "diesel fuel oil" and "fuel oil chemistry."

The table below lists the documents which were reviewed by the staff and were found relevant to the audit. These documents were provided by the applicant or were identified in the staff's search of the applicant's operating experience database.

Relevant Documents Reviewed

Document	Title	Revision / Date
1. LRAP-M030	Fuel Oil Chemistry	Revision 1
2. Seabrook Station Technical Requirements, Program 5.1	Diesel Fuel Oil Testing Program	SSTR Revision 104
3. Seabrook Station Chemistry Manual, CP 3.3	Miscellaneous Systems/Closed Cooling Water Systems Chemistry Control Program	Revision 19
4. Seabrook Station Technical Requirement 7	Fire Suppression Water System	SSTR Revision 109
5. CX0901.21	Fire Pump Diesel Fuel Storage Tank Surveillance	Revision 9
6. CX0901.22	Diesel generator Fuel Oil Tank Surveillance	Revision 15

Document	Title	Revision / Date
7. CS0924.04	Fuel Oil Sampling	Revision 20
8. CS0924.05	Clear and Bright Test of Light Fuel Oil	Revision 8 Chg. 01
9. CS0924.06	Total Particulate Contamination in Emergency Diesel Fuel Oil	Revision 6 Chg. 4
10. CS0924.11	Water and Sediment in Distillate Fuels by Centrifuge	Revision 2 Chg. 5
11. CR 00-12075	Seabrook Station Condition Report (Sample taken from the B diesel Generator Fuel Oil Storage Tank yielded 11.8 mg/L particulate.)	04/09/2010

The staff conducted its audit of LRA program elements 1-6 based on the contents of the existing program as modified by the proposed enhancements. Aspects of these program elements that are not associated with the exception(s) were evaluated and are described below.

During the audit, the staff found that:

> elements 4 and 5 (detection of aging effects and monitoring and trending) of the LRA AMP were consistent with the corresponding elements of the GALL Report AMP;
>
> sufficient information was not available to determine whether element 1 (scope of program) of the LRA AMP was consistent with the corresponding element of the GALL Report AMP; and
>
> elements 2, 3 and 6 (preventative actions, parameters monitored or inspected, and acceptance criteria) of the LRA AMP were not strictly consistent with the corresponding elements of the GALL Report AMP but sufficient information was available to allow the staff to determine that these element(s) of the LRA AMP are equivalent to the corresponding elements of the GALL Report AMP.

The basis for the staff's determination that element 2 (preventative Actions) of the LRA AMP is equivalent to the corresponding GALL Report AMP is:

> Monthly testing for and removal of water and the purchase of quality fuel oil negates the need for stabilizers or corrosion inhibitors. Seabrook Station operating experience has shown this to be an acceptable alternative based on favorable sample results. New fuel oil is sampled from the delivery tanker per ASTM D4057 guidelines and the sample is verified to meet the requirements of applicable ASTM standards prior to offloading to the applicable storage tank. The program manages the aging effects of the components by maintaining fuel oil chemistry, removing any accumulated water, and cleaning and inspecting the tanks. These fuel oil storage tanks are periodically drained and inspected. The fuel oil is used and topped off often enough to negate the need for stabilizers or corrosion inhibitors.

The basis for the staff's determination that element 3 and 6 (Preventative actions, parameters monitored/inspected and acceptance criteria) of the LRA AMP are equivalent to the corresponding GALL Report AMP is:

> Seabrook Station uses the non-modified ASTM D2276 which uses a filter pore size of 0.8 μm verses the 3.0 μm as used by the Modified ASTM D2276, method A. The smaller pore size retains smaller particles and is a conservative practice since the analysis for particulates is based on the total weight of particulates captured.
>
> Seabrook Station uses the ASTM Standard D4176, "Standard Test Method for Free Water and Particulate Contamination in Distillate Fuels (Visual Inspection Procedures)," as well as ASTM D2709, "Standard Test Method for Water and Sediment in Middle Distillate Fuels by Centrifuge," for determination of water and sediment contamination in diesel fuel as specified by Seabrook Station Technical Requirements. ASTM Standard D2709 is for testing of middle distillate fuels and ASTM Standard D1796 is for fuel oils. Both are standards for laboratory testing for water and sediment. By contrast, Seabrook Station uses ASTM Standard D4176 to perform a Clear and Bright Test of Light Fuel Oil and only ASTM Standard D2709 is used for determination of water and sediment contamination as part of a lab test. The clear and bright test can be performed in the field as well as in the lab and is an acceptable first screening to determine quality of the fuel oil. Seabrook Station has determined that using one lab test to analyze for water and particulate coupled with the field clear and bright test provides an acceptable approach for detecting water and particulates in the delivered Diesel Generator Fuel Oil. The staff finds this acceptable since both are acceptable standards in determination of water and sediment in fuel oil.

In order to obtain the information necessary to verify whether the LRA program element number 1 is consistent with the corresponding element of the GALL Report AMP, the staff will consider issuing RAIs for the following subjects:

In element 1 of the LRA AMP it states:

> The LRA AMP B.2.1.18 on Fuel Oil Chemistry states ASTM D2276, D2709 and D4057 are used in accordance with the GALL Report. The applicant's Technical Requirement Program 5.1, "Diesel Fuel Oil Testing Program," which provides controls for the required testing of both new fuel oil and stored fuel oil, references the use of ASTM D4057-81 and D2709-82 for the sampling of new fuel and ASTM D2276-06 and D4057-81 for the sampling of stored fuel.

In the XI.M30 Fuel Oil Chemistry of the GALL Report AMP, it states:

> **Scope of program:** The program is focused on managing the conditions that cause general, pitting, and microbiologically-influenced corrosion (MIC) of the diesel fuel tank internal surfaces in accordance with the plant's technical specifications (i.e., NUREG-1430, NUREG-1431, NUREG-1432, NUREG-1433) on fuel oil purity and the guidelines of ASTM Standards D1796, D2276, D2709, D6217, and D4057.

> ASTM Standards D2276-00, D2709-96 and D4057-95 are referenced at the end of Section XI.M30.
>
> It is not clear to the staff that these statements are consistent because Seabrook Station's Technical Requirement 5.1, which governs the plant procedures used by the program, references different revisions of ASTM D4057, D2709 and D2276 than are listed in the GALL Report.

During the audit of program element 10 (operating experience), the staff found that:

> the operating experience provided by the applicant and identified by the staff's independent database search is bounded by industry operating experience (i.e., no previously unknown aging effects were identified by the applicant or the staff); and
>
> the operating experience provided by the applicant and identified by the staff's independent database search is sufficient to allow the staff to verify that the LRA AMP, as implemented by the applicant, is sufficient to detect and manage aging effects during the period of extended operation.

The staff also audited the description of the LRA AMP provided in the UFSAR Supplement. The staff found that sufficient information was not available to determine whether the description provided in the UFSAR Supplement was an adequate description of the LRA AMP.

In order to obtain the information necessary to verify the sufficiency of the UFSAR Supplement program description, the staff will consider issuing RAIs for the following subjects:

UFSAR Supplement description contained in the SRP-LR, Table 3.3-2, "FSAR Supplement for Aging Management of Auxiliary Systems," provides an acceptable program description which includes the specific ASTM Standards to be used for the monitoring and controlling of fuel oil contamination to maintain fuel oil quality.

The LRA Section A.2.1.18, "Fuel Oil Chemistry," does not specify the specific ASTM Standards to be used, it states:

> …New fuel oil is sampled and verified to meet the requirements of applicable American Society for Testing and Materials (ASTM) standards prior to offloading to the storage tanks. The program monitors fuel oil quality and the levels of water in the fuel oil which may cause the loss of material of the tank internal surfaces. The program monitors water and sediment contamination in diesel fuel…

Specifying the ASTM Standards to be used ensures that there is an adequate description of the critical elements of the Fuel Oil Chemistry Aging Management Program to provide assurance that the program will be properly executed during the period of extended operations.

Based on this audit, the staff:

verified that most of the LRA program elements 1-6 are consistent with the corresponding program elements in the GALL Report while identifying certain aspects of LRA program elements 1-6 for which additional information or additional evaluation is required before consistency can be determined;

verified that the operating experience is sufficient to indicate that the LRA AMP, as implemented by the applicant, is sufficient to detect and manage aging; and

identified a need for additional information regarding the adequacy of the program description in the UFSAR Supplement.

LRA AMP B.2.1.20, One-Time Inspection

In the LRA, the applicant states that AMP B.2.1.20, "One-Time Inspection," is a new program that is consistent with the program elements in GALL AMP XI.M32, "One-Time Inspection." The applicant committed to implementing this program within 10 years of entering the period of extended operation in LRA Section A.3. To verify this claim of consistency, the staff audited the LRA AMP. This audit report considers program elements 1-6 (scope, preventive actions, parameters monitored or inspected, detection of aging effects, monitoring and trending, and acceptance criteria) and 10 (operating experience) and the description of the program as contained in the UFSAR Supplement. Program elements 7-9 (corrective actions, confirmation process, and administrative controls) are audited as part of the scoping and screening methodology audit. Issues identified but not resolved in this report are addressed in the SER.

During its audit, the staff conducted walkdowns, interviewed the applicant's staff, and reviewed onsite documentation provided by the applicant. The staff also conducted an independent search of the applicant's operating experience database using keywords: "bolt," "cable," "detection," "degradation," "piping," "loss of material," and "biofoil."

The table below lists the documents which were reviewed by the staff and were found relevant to the audit. These documents were provided by the applicant or were identified in the staff's search of the applicant's operating experience database.

Relevant Documents Reviewed

Document	Title	Revision / Date
1. LRAP-M032	Aging Management Program Basis Document One-Time Inspection	Revision 1 04/27/2010
2. LRAP-M002	Aging Management Program Basis Document Water Chemistry	Revision 1 04/26/2010
3. CR00-10871	Condition Report	No Rev. No. 10/19/2000
4. CR02-15177	Condition Report	No Rev. No. 10/31/2002

During the audit of program elements 1-6, the staff found that:

> elements 1, 2, 5, and 6 (scope, preventive actions, monitoring and trending, and acceptance criteria) of the LRA AMP were consistent with the corresponding elements of the GALL Report AMP.

During the audit of program element 10 (operating experience), the staff found that:

> the operating experience identified by the staff's independent database search and supplemented by the applicant is bounded by industry operating experience (i.e., no previously unknown aging effects were identified by the applicant or the staff); and
>
> the operating experience identified by the staff's independent database search and supplemented by the applicant is sufficient to allow the staff to verify that the LRA AMP, as implemented by the applicant, is sufficient to detect and manage aging effects during the period of extended operation.

In order to obtain the information necessary to verify whether the LRA program element numbers 3 and 4 are consistent with the corresponding elements of the GALL Report AMP, the staff will consider issuing RAIs for the following subjects:

> In element 3 of the LRA AMP, it states One-Time Inspection Program will be implemented within ten years of entering the period of extended operation. In the GALL Report, it states that the program should be implemented prior to the period of extended operation. It is not clear to the staff that these statements are consistent because of the way the applicant has indicated when it plans to initiate the program.

Based on this audit, the staff:

> verified that LRA program elements 1, 2, 5, and 6 are consistent with corresponding program elements in the GALL Report AMP;
>
> verified that the operating experience is sufficient to indicate that the LRA AMP, as implemented by the applicant, is sufficient to detect and manage aging; and
>
> identified a need for additional information regarding the adequacy of the program description in the UFSAR Supplement.

LRA AMP B.2.1.21, Selective Leaching of Materials

In the LRA, the applicant states that AMP B.2.1.21, "Selective Leaching of Materials," is a new program with exception that is consistent with the program elements in GALL AMP XI.M33, "Selective Leaching of Materials." To verify this claim of consistency, the staff audited the LRA AMP. This audit report considers program elements 1-6 (scope of program, preventive actions, parameters monitored or inspected, detection of aging effects, monitoring and trending, and acceptance criteria) and 10 (operating experience) and the description of the program as contained in the UFSAR Supplement. Program elements 7-9 (corrective actions, confirmation

process, and administrative controls) are audited as part of the scoping and screening methodology audit. This audit report does not consider the sufficiency of exceptions. Issues identified but not resolved in this report are addressed in the SER.

The first exception affects LRA program element 4 (detection of aging effects). In the GALL Report AMP, this program element recommends that one acceptable procedure is to visually inspect the susceptible components closely and conduct Brinell hardness testing on the inside surfaces of the selected set of components to determine if selective leaching has occurred. Alternatively, this program element in the LRA states, the applicant will utilize visual inspections and mechanical examination techniques, including Brinell hardness testing or other mechanical examination techniques such as scraping, chipping or other types of hardness testing, or additional examination methods that become available to the nuclear industry, to determine if selective leaching is occurring on the surfaces of a selected set of components.

During its audit, the staff interviewed the applicant's staff and reviewed onsite documentation provided by the applicant. The staff also conducted an independent search of the applicant's operating experience database using keywords: "leach" and "zinc."

The table below lists the documents which were reviewed by the staff and were found relevant to the audit. These documents were provided by the applicant or were identified in the staff's search of the applicant's operating experience database.

Relevant Documents Reviewed

Document	Title	Revision / Date
1. LRAP-M033	Aging Management Program Basis Document for Selective Leaching of Materials	Revision 1 04/26/2010
2. CR 98-00804	Aluminum Bronze Fittings Leakage	No Revision 01/07/1998
3. CR 02-17027	Aluminum Bronze Plug Valve Weepage	No Revision 12/30/2002
4. CR 07-14158	Aluminum Bronze Valves Replacement	No Revision 11/05/2007

The staff conducted its audit of LRA program elements 1-6 based on the contents of the existing program without considering aspects of program element 4 (detection of aging effects) of the LRA AMP which are associated with the exception. Aspects of these elements not associated with the exception were evaluated and are described below.

During the audit, the staff found that:

elements 1, 2, 5, and 6 (scope of program, preventive actions, monitoring and trending, and acceptance criteria) of the LRA AMP were consistent with the corresponding elements of the GALL Report AMP; and

sufficient information was not available to determine whether elements 3 and 4 (parameters monitored or inspected and detection of aging effects) of the LRA AMP were consistent with the corresponding elements of the GALL Report AMP.

In order to obtain the information necessary to verify whether the LRA program element numbers 3 and 4 are consistent with the corresponding elements of the GALL Report AMP, the staff will consider issuing an RAI for the following subject:

> In element 1 of the LRA AMP, it states that if it is determined that selective leaching is occurring, then an engineering evaluation will be initiated to determine acceptability of the affected components for continued service. Follow-up of unacceptable inspection findings will include an expansion of the inspection sample size and location. The LRA AMP also states that Seabrook Station has experienced instances of de-aluminization of aluminum bronze components having an internal environment of raw sea water. In elements 3 and 4 of the GALL Report AMP, it recommends the initiation of an engineering evaluation to determine the acceptability of the affected components and a possible expansion of the inspection sample size and location if selective leaching has occurred. It is not clear to the staff that these statements are consistent because the LRA AMP does not describe how expansion of the inspection sample sizes and locations being implemented.

During the audit of program element 10 (operating experience), the staff found that:

> the operating experience provided by the applicant and identified by the staff's independent database search is bounded by industry operating experience (i.e., no previously unknown aging effects were identified by the applicant or the staff); and
>
> the operating experience provided by the applicant and identified by the staff's independent database search is sufficient to allow the staff to verify that the LRA AMP, as implemented by the applicant, is sufficient to detect and manage aging effects during the period of extended operation.

The staff also audited the description of the LRA AMP provided in the UFSAR Supplement. The staff found that sufficient information was not available to determine whether the description provided in the UFSAR Supplement was an adequate description of the LRA AMP.

In order to obtain the information necessary to verify the sufficiency of the UFSAR Supplement program description, the staff will consider issuing an RAI for the following subject:

> The LRA states that the Selective Leaching of Materials Program will be implemented within 5 years of entering the period of extended operation. However, it is not clear to the staff if the program will be implemented 5 years prior to or after the period of extended operation.

Based on this audit, the staff:

> verified that most of the LRA program elements 1-6 are consistent with the corresponding program elements in the GALL Report while identifying certain aspects of LRA program elements 1-6 for which additional information or additional evaluation is required before consistency can be determined;

verified that the operating experience is sufficient to indicate that the LRA AMP, as implemented by the applicant, is sufficient to detect and manage aging; and

identified a need for additional information regarding the adequacy of the program description in the UFSAR Supplement.

LRA AMP B.2.1.22, Buried Piping and Tanks Inspection

In the LRA, the applicant states that AMP B.2.1.22, "Buried Piping and Tanks Inspection," is a new program with exception that is consistent with the program elements in GALL AMP XI.M34, "Buried Piping and Tanks Inspection." However, during the audit, the applicant committed to revise AMP B.2.1.22 as a supplement to the LRA due to the fact that there have been a number of recent industry events involving leakage from buried or underground piping. In developing this program, the applicant will evaluate the impact that these recent industry events have on AMP B.2.1.22 and will revise the program accordingly.

This audit report does not include a determination as to whether elements 1, 2, 3, 4, 5, and 6 (scope of program, preventive actions, parameters monitored or inspected, detection of aging effects, monitoring and trending, and acceptance criteria) of the LRA AMP are consistent with the corresponding elements of the GALL Report. The staff will make such a determination following the completion of its review of the revised version of AMP B.2.1.22.

During its audit, the staff interviewed the applicant's staff and reviewed onsite documentation provided by the applicant. The staff also conducted an independent search of the applicant's operating experience database using keywords: "buried," "piping," "coating," and "wrap."

The table below lists the documents which were reviewed by the staff and were found relevant to the audit. These documents were provided by the applicant or were identified in the staff's search of the applicant's operating experience database.

Relevant Documents Reviewed

Document	Title	Revision / Date
1. LRAP-M034	Aging Management Program Basis Document for Buried Piping and Tanks Inspection	Revision 1 04/26/2010
2. CR 00-12832	Auxiliary Boiler Buried Fuel Supply Line Leakage	No Revision 11/14/2000
3. CR 01-02389	Oil Drops Coming from Ground around Fuel Oil Pumps	No Revision 03/13/2001
4. CR 06-01342	Upgrading of Underground Oil Piping to Double Wall Piping with Interstitial Space for Monitoring	No Revision 02/06/2006
5. CR 08-13173	External Coating Damage of Fire Protection Piping	No Revision 09/23/2008

During the audit, the staff performed a review of available operating experience related to this program. However, this audit report does not include a determination as to whether program element 10 (operating experience) has been adequately addressed. The staff will make such a

determination following the completion of its review of the revised version of AMP B.2.1.22, as discussed above.

This audit report does not include a determination as to whether the description provided in the UFSAR Supplement was an adequate description of the LRA AMP. The staff will make such a determination following the completion of its review of the revised version of AMP B.2.1.22, as discussed above.

Based on the fact that during the breakout sessions, the applicant stated that it would re-write LRA AMP B.2.1.22, the staff evaluation of this AMP is deferred to the review of the revised AMP. As such:

> this audit report does not include a determination as to whether elements 1, 2, 3, 4, 5, and 6 (scope of program, preventive actions, parameters monitored or inspected, detection of aging effects, monitoring and trending, and acceptance criteria) of the LRA AMP are consistent with the corresponding elements of the GALL Report. The staff will make such a determination following the completion of its review of the revised version of AMP B.2.1.22 to be submitted by the applicant as a supplement to the LRA;
>
> this audit report does not include a determination as to whether program element 10 (operating experience) has been adequately addressed. The staff will make such a determination following the completion of its review of the revised version of AMP B.2.1.22; and
>
> this audit report does not include a determination as to whether the description provided in the UFSAR Supplement was an adequate description of the LRA AMP. The staff will make such a determination following the completion of its review of the revised version of AMP B.2.1.22.

LRA AMP B.2.1.23, One-Time Inspection of ASME Code Class 1 Small Bore Piping

In the LRA, the applicant states that AMP B.2.1.23, "One-Time Inspection of ASME Code Class 1 Small Bore Piping," is a new program with an exception that is consistent with the program elements in GALL AMP XI.M35, "One-Time Inspection of ASME Code Class 1 Small Bore Piping." To verify this claim of consistency, the staff audited the LRA AMP. This audit report considers program elements 1-6 (scope, preventive actions, parameters monitored or inspected, detection of aging effects, monitoring and trending, and acceptance criteria) and 10 (operating experience) and the description of the program as contained in the UFSAR Supplement. Program elements 7-9 (corrective actions, confirmation process, and administrative controls) are audited as part of the scoping and screening methodology audit. This audit report does not consider the sufficiency of exceptions. Issues identified but not resolved in this report are addressed in the SER.

The first exception affects LRA program element 1 (scope of program). In the GALL Report AMP, this program element recommends using the guidance in EPRI Report 1000701, "Interim Thermal Fatigue Management Guideline (MRP-24)," to identify piping susceptibility to potential effects of thermal stratification or turbulent penetration. Alternatively, this program element in

the LRA states that instead of the guidance in MRP-24, it will use the guidance found in EPRI Report 1011955, "Materials Reliability Program: Management of Thermal Fatigue in Normally Stagnant Non-Isolable Reactor Coolant System Branch Lines (MRP-146)," and the supplemental guidance issued in EPRI Report 1018330, "Materials Reliability Program: Management of Thermal Fatigue in Normally Stagnant Non-Isolable Reactor Coolant System Branch Lines - Supplemental Guidance (MRP-146S)."

During its audit, the staff interviewed the applicant's staff and reviewed onsite documentation provided by the applicant. The staff also conducted an independent search of the applicant's operating experience database using keywords: "weld," "cracking," and "socket."

The table below lists the documents which were reviewed by the staff and were found relevant to the audit. These documents were provided by the applicant or were identified in the staff's search of the applicant's operating experience database.

Relevant Documents Reviewed

Document	Title	Revision / Date
1. LRAP-M035	Aging Management Program Basis Document for One-Time Inspection of ASME Code Class 1 Small Bore Piping	Revision 1 04/27/10
2. SIIR	Inservice Inspection Reference	Revision 11 08/10/09
3. EPRI 1011955	Materials Reliability Program: Management of Thermal Fatigue in Normally Stagnant Non-Isolable Reactor Coolant System Branch Lines (MRP-146)	No Revision 06/2005
4. EPRI 1018330	Materials Reliability Program: Management of Thermal Fatigue in Normally Stagnant Non-Isolable Reactor Coolant System Branch Lines – Supplemental Guidance (MRP-146S)	No Revision 01/2009
5. MDQ-TE-308	Westinghouse Proprietary Class 2 Stress Report of Bottom Mounted Instrumentation Thimble Guide Tubing	Revision 2 07/20/1983
6. EE-07-002	Management of Thermal Fatigue in Normally Stagnant Non-Isolable Reactor Coolant System Branch Lines (MRP-146)	Revision 1 No Date

The staff conducted its audit of LRA program elements 1-6 based on the contents of the existing program without considering aspects of program element 1 (scope of program) of the LRA AMP which are associated with the exception. Aspects of these elements not associated with the exception were evaluated and are described below.

During the audit, the staff found that:

elements 1 through 4 and 6 (scope of program, preventive actions, parameters monitored/inspected, detection of aging effects, and acceptance criteria) of the LRA AMP were consistent with the corresponding elements of the GALL Report AMP; and

sufficient information was not available to determine whether element 5 (Monitoring and trending) of the LRA AMP was consistent with the corresponding element of the GALL Report AMP.

In order to obtain the information necessary to verify whether the LRA program element number 5 is consistent with the corresponding elements of the GALL Report AMP, the staff will consider issuing an RAI for the following subject:

In element 5 of the LRA AMP, it states that it will inspect for cracking in ASME Code Class 1 small-bore piping using available volumetric examination techniques. The applicant's program also states that if non-destructive volumetric examination techniques have not been qualified, Seabrook Station will have the option to remove the weld for destructive examination. The applicant stated during the onsite audit that it will inspect 10% of the butt welds and 10% of the socket welds. In addition, the applicant stated that it may not inspect certain welds based on inaccessibility or high radiation exposure. The GALL Report states that a one-time volumetric inspection is an acceptable method for confirming the absence of cracking of ASME Code Class 1 small-bore piping. The GALL Report states that the inspection of small-bore piping should be performed at a sufficient number of locations to assure an adequate sample. The GALL Report further states that this number, or sample size, will be based on susceptibility, inspectability, dose considerations, operating experience, and limiting locations of the total population of ASME Code Class 1 small-bore piping locations. The GALL Report states that MRP-146 provides guidelines for identifying piping susceptible to one subset of cracking, including thermal stratification or turbulent penetrations. It is not clear to the staff if the applicant will either conduct an acceptable volumetric inspection or plan to do destructive examination. It appears from the wording in the basis document that if an acceptable volumetric exam is not available before the period of extended operation, that the applicant will have a choice to do destructive exams. In addition, it appears to the staff that the applicant proposes to inspect weld locations that are susceptible based on SCC and cyclical loading, but the sampling methodology for the inspection was not presented. The number of for socket welds to be inspected is also not clear to the staff.

During the audit of program element 10 (operating experience), the staff found that:

the operating experience provided by the applicant and identified by the staff's independent database search is bounded by industry operating experience (i.e., no previously unknown aging effects were identified by the applicant or the staff);

the operating experience provided by the applicant and identified by the staff's independent database search is sufficient to allow the staff to verify that the LRA AMP, as implemented by the applicant, is sufficient to detect and manage aging effects during the period of extended operation; and

the operating experience in the LRA AMP was not strictly sufficient, but sufficient information was available to allow the staff to determine the AMP would manage aging effects during the period of extended operation. During the review, the staff identified a reject-able linear indication in the tow of a weld on a 2" inlet line to the chemical and

volume control system piping. Through discussions with the applicant, this was later identified as a Class 2 piping and not included in the scope for this program.

The staff also audited the description of the LRA AMP provided in the UFSAR Supplement. The staff found this description to be consistent with the description provided in the SRP-LR and, therefore, acceptable.

Based on this audit, the staff:

verified that most of the LRA program elements 1-6 are consistent with the corresponding program elements in the GALL Report while identifying certain aspects of LRA program elements 1-6 for which additional information or additional evaluation is required before consistency can be determined;

verified that the operating experience is sufficient to indicate that the LRA AMP, as implemented by the applicant, is sufficient to detect and manage aging; and

verified that the description provided in the UFSAR Supplement is an adequate description of the program.

LRA AMP B.2.1.24, External Surfaces Monitoring

In the LRA, the applicant states that AMP B.2.1.24, "External Surfaces Monitoring," is an existing program with an enhancement and exceptions that is consistent with the program elements in GALL AMP XI.M36, "External Surfaces Monitoring." To verify this claim of consistency, the staff audited the LRA AMP. This audit report considers program elements 1-6 (scope, preventive actions, parameters monitored or inspected, detection of aging effects, monitoring and trending, and acceptance criteria) and 10 (operating experience) and the description of the program as contained in the UFSAR Supplement. Program elements 7-9 (corrective actions, confirmation process, and administrative controls) are audited as part of the scoping and screening methodology audit. This audit report does not consider the sufficiency of exceptions. Issues identified but not resolved in this report are addressed in the SER.
The first enhancement affects LRA program elements 1, 3, 5, and 6 (scope of program, parameters monitored or inspected, monitoring and trending, and acceptance criteria). This enhancement expands on the existing program element by adding procedures that will be enhanced to more specifically address the scope of the program, relevant degradation mechanisms and effects of interest, the refueling outage inspection frequency, the inspections of opportunity for possible corrosion under insulation, the training requirements for inspectors, and the required periodic reviews to determine program effectiveness.

In Table A.3 in the UFSAR Supplement of the LRA, the applicant committed to implement these enhancement(s) prior to the period of extended operation.

The first exception affects LRA program element 1 (scope of program). In the GALL Report AMP, this program element recommends visual inspection of external surface of in-scope components and monitors external surfaces of steel components in systems. Alternatively, this program element in the LRA states that the program will include components made from

additional materials such as aluminum, cast austenitic stainless steel (CASS), copper alloy, copper alloy >15% Zn, elastomers, galvanized steel, gray cast iron, nickel alloy, and stainless steel.

The second of the two exceptions affects LRA program elements 1 and 4 (scope of program and detection of aging effects). In the GALL Report AMP, this program element recommends that this program be applied to identify the aging effects of loss of material, pitting, and crevice corrosion. Alternatively, this program element in the LRA states that the program will be used for the identification of the additional aging effects of hardening and loss of strength, reduction of heat transfer, and loss of material due to galvanic corrosion and wear.

During its audit, the staff conducted walkdowns, interviewed the applicant's staff, and reviewed onsite documentation provided by the applicant. The staff also conducted an independent search of the applicant's operating experience database using keywords: "corrosion," "rust," "piping," and "degradation."

The table below lists the documents which were reviewed by the staff and were found relevant to the audit. These documents were provided by the applicant or were identified in the staff's search of the applicant's operating experience database.

Relevant Documents Reviewed

Document	Title	Revision / Date
1. LRAP-M036	Aging Management Program Basis Document External Surfaces Monitoring	Revision 1 04/26/2010
2. PEG-10	Plant Engineering Guidelines	Revision 19 Not Dated
3. CR07-08036	Condition Report	No Rev. No. 06/14/2007
4. CR02-04200	Condition Report	No Rev. No. 03/28/2002
5. CR 585696	Prompt Operability Determination (POD)	Rev. 0 10/16/2010
6. CR99-12178	Condition Report	No Rev. No. 08/02/1999

The staff conducted its audit of LRA program elements 1-6 based on the contents of the existing program as modified by the proposed enhancements. Aspects of these program elements that are not associated with the exceptions were evaluated and are described below.

During the audit, the staff found that:

element 2 (preventive actions) of the LRA AMP was consistent with the corresponding element of the GALL Report AMP.

In order to obtain the information necessary to verify whether the LRA program element numbers 1, 3, 4, 5, and 6 are consistent with the corresponding elements of the GALL Report AMP, the staff will consider issuing RAIs for the following subject:

Regarding elements 1, 3, 4, 5 and 6 of the LRA AMP, it states that visual inspections and non-visual examinations such as tactile techniques will indentify hardening and loss of strength in the in-scope elastomers components. In GALL Report AMP, it states that visual inspection activities are recommended to inspect in-scope components. The staff reviewed the inspection methods of the LRA AMP and consider the use of tactile methods as appropriate and sufficient to augment the visual inspections for detection of aging effects for in-scope elastomers components. However, there are in-scope elastomer components that are inaccessible for physical contact as necessary to accomplish the tactile techniques of the inspections. Therefore, further information is required to assess whether the inspections of the LRA AMP are adequate for all the in-scope components.

During the audit of program element 10 (operating experience), the staff found that:

the operating experience provided by the applicant and identified by the staff's independent database search is bounded by industry operating experience (i.e., no previously unknown aging effects were identified by the applicant or the staff); and

the operating experience provided by the applicant and identified by the staff's independent database search is sufficient to allow the staff to verify that the LRA AMP, as implemented by the applicant, is sufficient to detect and manage aging effects during the period of extended operation.

The staff also audited the description of the LRA AMP provided in the UFSAR Supplement. The staff found this description to be consistent with the description provided in the SRP-LR and, therefore, acceptable.

Based on this audit, the staff:

verified that one of the LRA program elements 1-6 are consistent with the corresponding program elements in the GALL Report while identifying certain aspects of LRA program elements 1-6 for which additional information or additional evaluation is required before consistency can be determined;

verified that the operating experience is sufficient, as implemented by the applicant, to detect and manage aging or identified that additional information regarding operating experience is required before an indication regarding the sufficiency of the LRA AMP, as implemented by the applicant, to detect and manage aging can be reached; and

verified that the description provided in the UFSAR Supplement is an adequate description of the program or verified that the applicant has committed to modify the UFSAR Supplement so as to make the program description adequate.

LRA AMP B.2.1.25, Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components

In the LRA, the applicant states that AMP B.2.1.25, "Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components," is a new program with exceptions that is consistent with the program elements in GALL AMP XI.M38, "Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components." To verify this claim of consistency, the staff audited the LRA AMP. This audit report considers program elements 1-6 (scope, preventive actions, parameters monitored or inspected, detection of aging effects, monitoring and trending, and acceptance criteria) and 10 (operating experience) and the description of the program as contained in the UFSAR Supplement. Program elements 7-9 (corrective actions, confirmation process, and administrative controls) are audited as part of the scoping and screening methodology audit. This audit report does not consider the sufficiency of exceptions. Issues identified but not resolved in this report are addressed in the SER.

The first exception affects LRA program element 1 (scope of program). In the GALL Report AMP, this program element recommends this program to cover aging effects on internal surfaces of steel piping, piping elements, ducting, and components in an internal environment. Alternatively, this program element in the LRA states, that the program will be applied to components made of materials in addition to stainless steel. The additional in-scope materials are aluminum, cast austenitic stainless steel, copper alloys, elastomers, galvanized steel, gray cast iron, and nickel alloy.

The second of the two exceptions affects LRA program element 3 (parameters monitored/inspected). In the GALL Report AMP, this program element recommends that the inspections to monitor aging effects for components made from other materials having other aging effects, are identified as exceptions to the program. In the GALL Report AMP, this program element also states that the applicant should identify and justify the inspection technique used for detecting the aging effects of concern. Alternatively, this program element in the LRA states, that the program will include visual inspection to detect reduction of heat transfer due to fouling. The heat exchangers age managed under this program do not require precise determination of heat transfer capability, and a visual inspection of the heat exchanger internals will be able to determine whether or not the overall heat transfer function of the component is degraded.

During its audit, the staff conducted walkdowns, interviewed the applicant's staff, and reviewed onsite documentation provided by the applicant. The staff also conducted an independent search of the applicant's operating experience database using keywords: "fouling," "biofouling," "corrosion," "piping," and "degradation."

The table below lists the documents which were reviewed by the staff and were found relevant to the audit. These documents were provided by the applicant or were identified in the staff's search of the applicant's operating experience database.

Relevant Documents Reviewed

Document	Title	Revision / Date
1. LRAP-M038	Aging Management Program Basis Document Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components	Revision 1 04/26/2010
2. NAP-403	FPL Nuclear Division Nuclear Administrative Procedure Conduct of Maintenance	Revision 7 03/16/2009
3. CR01-07649	Condition Report	No Rev. No. 09/30/2010
4. CR00-03727	Condition Report	No Rev. No. 03/03/2000
5. PEG-10	Plant Engineering Guidelines	Rev. 19 Not Dated

The staff conducted its audit of LRA program elements 1-6 based on the contents of the existing program without considering aspects of program elements 1 and 3 (scope of program, and parameters monitored or inspected) of the LRA AMP which are associated with the exceptions. Aspects of these elements not associated with the exceptions were evaluated and are described below.

During the audit, the staff found that:

elements 2, 4, 5, and 6 (preventive actions, detection of aging effects, monitoring and trending, and acceptance criteria) of the LRA AMP were consistent with the corresponding elements of the GALL Report AMP; and

sufficient information was not available to determine whether elements 1 and 3 (scope of program, and parameters monitored/inspected) of the LRA AMP were consistent with the corresponding elements of the GALL Report AMP.

In order to obtain the information necessary to verify whether the LRA program element numbers 1 and 3 are consistent with the corresponding elements of the GALL Report AMP, the staff will consider issuing RAIs for the following subjects:

Regarding program element 1 and 3, the LRA states that the program will be used to detect hardening and loss of strength in components made from elastomers by visual examinations and non-visual examinations such as tactile techniques, which include scratching, bending, folding, stretching and pressing in conjunction with the visual examinations. In the GALL Report AMP, it states that for detection of aging effects, the applicant should justify the inspection technique used for detecting the aging effects of concern. It is not clear to the staff that these statements are consistent because there are instances of in-scope elastomeric components that are not accessible for physical manipulations.

Regarding program element 3, the LRA AMP states that visual inspection will monitor parameters such as corrosion, corrosion byproducts, coating degradation, discoloration on the surface, scale/deposits, pits and surface discontinuities." In the LRA AMP, it

further states that “the degree to which these conditions exist will be used to establish baseline acceptance criteria for future inspections.” In the GALL Report AMP, it states that the acceptance criteria are established in the maintenance and surveillance procedures or other established plant procedures. It is not clear to the staff that these statements are consistent because the LRA AMP did not provide adequate information on the process to be used for establishing new acceptance criteria based on the results of the inspections.

Regarding program element 3, the LRA states that a thin, light, even layer of oxidation provides protection against further corrosion. In the GALL Report AMP, it states that visible evidence of corrosion may indicate possible loss of materials. It is not clear to the staff that these statements are consistent because the statement in the LRA AMP concerning a layer of oxidation proving protection against further corrosion is not accurate for most of the in-scope materials.

During the audit of program element 10 (operating experience), the staff found that:

the operating experience provided by the applicant and identified by the staff’s independent database search is bounded by industry operating experience (i.e., no previously unknown aging effects were identified by the applicant or the staff); and

the operating experience provided by the applicant and identified by the staff’s independent database search is sufficient to allow the staff to verify that the LRA AMP, as implemented by the applicant, is sufficient to detect and manage aging effects during the period of extended operation.

The staff also audited the description of the LRA AMP provided in the UFSAR Supplement. The staff found this description to be consistent with the description provided in the SRP-LR and, therefore, acceptable.

Based on this audit, the staff:

verified that most of the LRA program elements 1-6 are consistent with the corresponding program elements in the GALL Report while identifying certain aspects of LRA program elements 1-6 for which additional information or additional evaluation is required before consistency can be determined;

verified that the operating experience is sufficient to indicate that the LRA AMP, as implemented by the applicant, is sufficient to detect and manage aging; and

verified that the description provided in the UFSAR Supplement is an adequate description of the program.

LRA AMP B.2.1.26, Lubricating Oil Analysis

In the LRA, the applicant states that AMP B.2.1.26, “Lubricating Oil Analysis,” is an existing program with an enhancement and an exception that is consistent with the program elements in

GALL AMP XI.M39, “Lubricating Oil Analysis Program.” To verify this claim of consistency, the staff audited the LRA AMP. This audit report considers program elements 1-6 (scope of program, preventive actions, parameters monitored or inspected, detection of aging effects, monitoring and trending, and acceptance criteria) and 10 (operating experience) and the description of the program as contained in the UFSAR Supplement. Program elements 7-9 (corrective actions, confirmation process, and administrative controls) are audited as part of the scoping and screening methodology audit. This audit report does not consider the sufficiency of exceptions. Issues identified but not resolved in this report are addressed in the SER.

The first enhancement affects LRA program elements 3 (parameters monitored or inspected) and 4 (detection of aging effects). This enhancement expands on the existing program elements by adding an attachment list that specifies the required equipment for the program, sampling frequency, discussion on the required periodic oil changes, and includes the associated lube oil analysis required.

The second enhancement affects LRA program element 4 (detection of aging effects). This enhancement expands on the existing program element by adding a requirement to sample the oil for the Switchyard SF_6 compressors and the Reactor Coolant pump oil collection tanks.

The third enhancement affects LRA program element 4 (detection of aging effects). This enhancement expands on the existing program element by adding a requirement to perform a one-time ultrasonic thickness measurement of the lower portion of the Reactor Coolant pump oil collection tanks prior to the period of extended operation.

In B.2.1.26 of the LRA, the applicant committed to implement these enhancements prior to the period of extended operation.

The first exception affects LRA program element 3 (parameters monitored or inspected). In the GALL Report AMP, this program element recommends the performance of flash point testing for components that do not have regular oil changes to determine whether the oil is suitable for continued use. Alternatively, this program element in the LRA states that Seabrook does not test samples for flash point in lubricating oil samples. Instead, the applicant stated that when there is a potential for lubricating oil contamination by fuel, Seabrook will test the samples for fuel dilution. The applicant further stated that testing for fuel dilution is equivalent to testing for flash point because either test will provide an indication of fuel in-leakage.

During its audit, the staff interviewed the applicant’s staff, and reviewed onsite documentation provided by the applicant. The staff also conducted an independent search of the applicant’s operating experience database using keywords: “oil,” “foul,” and “tank.”

The table below lists the documents which were reviewed by the staff and were found relevant to the audit. These documents were provided by the applicant or were identified in the staff’s search of the applicant’s operating experience database.

Relevant Documents Reviewed

Document	Title	Revision / Date
1. LRAP	M039 Aging Management Program Bases Document	Revision 1
2. PEG-57	Predictive Maintenance Monitored Equipment List (PMEL)	Revision 07
3. ES1807.020	Machinery Oil Analysis	Revision 00 Chg. 03
4. MA 9.3	Predictive Maintenance Program	Revision 00
5. SSMA	Maintenance Manual	Revision 139
6. 01-04204	Condition Report	
7. 02-08670	Condition Report	
8. 02-08671	Condition Report	
9. 02-04938	Condition Report	
10. 02-04952	Condition Report	
11. 04-05127	Condition Report	
12. 04-04346	Condition Report	
13. 05-07548	Condition Report	
14. 0418233	Work Order	
15. 2005-002-00	Licensee Event Report (LER)	
16. 2003-002-00	Licensee Event Report (LER)	

The staff conducted its audit of LRA program elements 1-6 based on the contents of the existing program as modified by the proposed enhancements. Aspects of these program elements that are not associated with the exception(s) were evaluated and are described below.

During the audit, the staff found that:

elements 1, 2, 4, 5 and 6 (scope of program, preventative actions, detection of aging effects, monitoring and trending, and acceptance criteria) of the LRA AMP were consistent with the corresponding elements of the GALL Report AMP; and

sufficient information was not available to determine whether element 3 (parameters monitored or inspected) of the LRA AMP was consistent with the corresponding element of the GALL Report AMP.

In order to obtain the information necessary to verify whether the LRA program element number 3 is consistent with the corresponding element of the GALL Report AMP, the staff will consider issuing RAIs for the following subjects:

In element 3 of the LRA AMP, it states Seabrook does not sample for flash point in lubricating oil samples. Instead, the applicant stated that when there is a potential for lubricating oil contamination by fuel, Seabrook will test the samples for fuel dilution. In the GALL Report AMP, it states that for components that do not have regular oil changes, tests for viscosity, neutralization number, and flash point may be used to determine lubricating oil suitability for continued use. It is not clear to the staff that these statements are consistent because the staff is uncertain as to the equivalency of the

method the applicant uses to test for fuel dilution and the GALL Report AMP recommended flash point testing.

During the audit of program element 10 (operating experience), the staff found that:

the operating experience provided by the applicant and identified by the staff's independent database search is bounded by industry operating experience (i.e., no previously unknown aging effects were identified by the applicant or the staff); and

the operating experience provided by the applicant and identified by the staff's independent database search is sufficient to allow the staff to verify that the LRA AMP, as implemented by the applicant, is sufficient to detect and manage aging effects during the period of extended operation.

The staff also audited the description of the LRA AMP provided in the UFSAR Supplement. The staff found this description to be consistent with the description provided in the SRP-LR and, therefore, acceptable.

Based on this audit, the staff:

verified that most of the LRA program elements 1-6 are consistent with the corresponding program elements in the GALL Report while identifying certain aspects of LRA program elements 1-6 for which additional information or additional evaluation is required before consistency can be determined;

verified that the operating experience is sufficient to indicate that the LRA AMP, as implemented by the applicant, is sufficient to detect and manage aging; and

verified that the description provided in the UFSAR Supplement is an adequate description of the program.

LRA AMP B2.1.27, ASME Section XI, Subsection IWE

In the LRA, the applicant states that AMP 2.1.27, "ASME Section XI, Subsection IWE," is an existing program that is consistent with the program elements in GALL AMP XI.S1, "ASME Section XI, Subsection IWE." To verify this claim of consistency, the staff audited the LRA AMP. This audit report considers program elements 1-6 (scope of program, preventive actions, parameters monitored or inspected, detection of aging effects, monitoring and trending, and acceptance criteria) and 10 (operating experience) and the description of the program as contained in the Section A.2.1.27 of the UFSAR Supplement contained in LRA Appendix A. Program elements 7-9 (corrective actions, confirmation process, and administrative controls) are audited as part of the scoping and screening methodology audit. Issues identified but not resolved in this report are addressed in the SER.

During its audit, the staff conducted walkdowns, interviewed the applicant's staff, and reviewed onsite documentation provided by the applicant. The staff also conducted an independent

database search of the applicant's operating experience database using the keywords: "containment structures," "IWE program," "liner corrosion."

The table below lists the documents which were reviewed by the staff and were found relevant to the audit. These documents were provided by the applicant or were identified in the staff's search of the applicant's operating experience database.

Relevant Documents Reviewed

Document	Title	Revision / Date
1. LRTR-CLP	Containment Liner Plate	Revision 0 09/02/2010
2. A/R 00208123	Containment Liner at PEN-X62	12/04/2009
3. CR05-04373	Borated Water Leakage from the Fuel Transfer Tube Area	10/23/2006
4. UFSAR	Seabrook Station UFSAR, Section 3.8.1.1	Revision 12
5. 9763-F 101461	Eabrook Station Drawing for Containment Liner, Details & Attachments	Revision 12
6. C-S-1-1-10096	Containment Liner Minimum Wall Thickness Requirement Guidelines	Revision 0
7. A/R 002208474	Containment Liner IWE Examination Results Evaluation	11/20/2009
8. A/R 00208767	Unacceptable Areas Identified During IWE Examinations	10/23/2009
9. A/R 209442	IWE Vt-3 Examination Indications, Containment Dome	10/30/2009
10. A/R 00078196	Moisture Barrier Degradation in Containment	11/21/2000

During the audit of program elements 1-6, the staff found that:

> elements 1 through 6 (scope of program, preventive actions, parameters monitored or inspected, detection of aging effects, monitoring and trending, and acceptance criteria) of the LRA AMP were consistent with the corresponding elements of the GALL Report AMP.

During the audit of program element 10 (operating experience), the staff found that:

> the operating experience provided by the applicant and identified by the staff's independent database search is bounded by industry operating experience (i.e., no previously unknown aging effects were identified by the applicant or the staff);
>
> the operating experience provided by the applicant and identified by the staff's independent database search is not sufficient to allow the staff to verify that the LRA AMP, as implemented by the applicant, is sufficient to detect and manage aging effects during the period of extended operation.

In order to obtain the information necessary to verify whether the applicant's operating experience supports the sufficiency of the LRA AMP, the staff will consider issuing RAIs for the following subjects:

During the audit, the staff found that groundwater migrated into the annular space between the concrete enclosure building and concrete containment. The bottom 6 feet of the concrete containment wall was in contact with the groundwater for a long period of time. In addition, cracks due to Alkali-Silica Reaction (ASR) have been observed in different Seabrook plant concrete structures, including the concrete enclosure building. Thus, the groundwater could potentially seep through the concrete containment wall and corrode the liner plate. Therefore, the staff requested that the applicant provide the details of any plans to perform nondestructive examinations, such as ultrasonic testing (UT), of the containment liner to demonstrate that the effects of prolonged exposure of the bottom portion of the concrete containment to groundwater have not introduced corrosion on the concrete side of the liner plate. Corrosion on the concrete side of the containment liner can affect its ability to perform its intended design function during the period of extended operation.

During the audit, the NRC staff reviewed documentation concerning the corrosion of the containment liner plate around the fuel transfer tube vault documented during the 2009 IWE inspection. The containment liner plate had indications of heavy corrosion. UT examination of the containment liner indicated that liner plate thickness varied between 0.411 to 0.484 inches (variation of 18 percent) within a small area.

The applicant's justification for accepting the degradation was that the measured thickness of the liner plate was still greater than the 0.375 inch nominal thickness of the liner plate. However, the NRC staff did not find any requirement in the engineering evaluation that requires UT reexamination of the affected portion of the liner plate in accordance with IWE-2420. Therefore, the staff requested that the applicant provide the details of any actions planned for augmented examination of the containment liner plate around the fuel transfer tube where the corrosion was detected during the 2009 inspection. The staff needs this information to verify that the effects of aging on the intended function of the containment liner plate will be adequately managed for the period of extended operation.

The staff also audited the description of the LRA AMP provided in the UFSAR Supplement, Section A.2.1.27. The staff found this description to be consistent with the description provided in the SRP-LR and, therefore, acceptable.

Based on this audit, the staff:

verified that LRA program elements 1-6 are consistent with corresponding program elements in the GALL Report AMP;

identified that additional information regarding operating experience is required before an indication regarding the sufficiency of the LRA AMP, as implemented by the applicant, to detect and manage aging can be reached; and

verified that the description provided in the UFSAR Supplement is an adequate description of the program.

LRA AMP B2.1.28, ASME Section XI, Subsection IWL

In the LRA, the applicant states that AMP XI.S2, "ASME Section IX, Subsection IWL," is an existing program with an enhancement that is consistent with the program elements in GALL AMP XI.S2, "ASME Section IX, Subsection IWL." To verify this claim of consistency, the staff audited the LRA AMP. This audit report considers program elements 1-6 (scope of program, preventive actions, parameters monitored or inspected, detection of aging effects, monitoring and trending, and acceptance criteria) and 10 (operating experience) and the description of the program as contained in the UFSAR Supplement. Program elements 7-9 (corrective actions, confirmation process, and administrative controls) are audited as part of the scoping and screening methodology audit. Issues identified but not resolved in this report are addressed in the SER.

The first enhancement affects LRA program element 6 (acceptance criteria). This enhancement expands on the existing program element by adding the definition of "Responsible Engineer" to the implementing procedures for the ASME Section XI, Subsection IWL program.

In B.2.1.28 of the LRA, the applicant committed to implement this enhancement prior to the period of extended operation.

During its audit, the staff conducted walkdowns, interviewed the applicant's staff, and reviewed onsite documentation provided by the applicant. The staff also conducted an independent search of the applicant's operating experience database using keywords: "coating," "concrete," "corrosion," "cracking," "damage," "degradation," "loss of material," "spalling," and "steel."

The table below lists the documents which were reviewed by the staff and were found relevant to the audit. These documents were provided by the applicant or were identified in the staff's search of the applicant's operating experience database.

Relevant Documents Reviewed

Document	Title	Revision / Date
1. Seabrook Station AMP B.2.1.28	ASME Section IX, Subsection IWL	June 2010
2. LRTR-COE	Seabrook Station License Renewal Project Technical Report, Civil Operating experience	Revision 0, 07/07/2010
3. Work Order 0526254	Containment Inspection Program Containment Annulus	10/12/2005
4. CR: AR 579532	Prompt Operability Determination: Embedded Wood in the Containment Concrete	Revision 000
5. LRAP-S002	Seabrook Station License Renewal Project Aging Management Program Basis Document, ASME Section XI, Subsection IWL	04/27/2010 Revision 1
6. ES1807.031	Inservice Inspection Procedure Primary Containment Section XI IWL Program	03/03/2010 Revision 02

The staff conducted its audit of LRA program elements 1-6 based on the contents of the existing program as modified by the proposed enhancement.

During the audit, the staff found that:

elements 1-5 (scope of program, preventive actions, parameters monitored or inspected, detection of aging effects, and monitoring and trending) of the LRA AMP were consistent with the corresponding elements of the GALL Report AMP; and

sufficient information was not available to determine whether element 6 (acceptance criteria) of the LRA AMP was consistent with the corresponding element of the GALL Report AMP.

In order to obtain the information necessary to verify whether the LRA program element number 6 is consistent with the corresponding element of the GALL Report AMP, the staff will consider issuing RAIs for the following subjects:

In element 6 of the LRA AMP, it states that acceptance criteria in accordance with IWL-3000 for concrete containment are provided in Seabrook Station procedures and for concrete surfaces, the acceptance criteria rely on the determination of the "Responsible Engineer" regarding whether there is any evidence of damage or degradation sufficient to warrant further evaluation or repair in accordance with IWL-3300. In the GALL Report AMP, it states that quantitative acceptance criteria based on the "Evaluation Criteria" provided in Chapter 5 of ACI 349.3R may be used to augment the qualitative assessment of the responsible engineer. It is not clear to the staff that these statements are consistent because the procedure does not implement the three-tier evaluation criteria in Chapter 5 of ACI 349.3R.

In element 6 of the LRA AMP, it states that that preventive maintenance work orders are used for tracking and identifying conditions identified during surveillances. Issues and events, whether external or plant-specific, that are potentially significant to containment reinforced concrete at Seabrook Station or which show deficiencies in excess of acceptance criteria are evaluated. In the GALL Report AMP it states that ASME Section XI, Subsection IWL, Article IWL-3000 provides acceptance criteria for concrete containments and that quantitative acceptance criteria based on the "Evaluation Criteria" provided in Chapter 5 of ACI 349.3R may also be used to augment the qualitative assessment of the responsible engineer. It is not clear to the staff that these statements are consistent because the procedure does not implement the three-tier evaluation criteria in Chapter 5 of ACI 349.3R.

During the audit of program element 10 (operating experience), the staff found that:

the operating experience provided by the applicant and identified by the staff's independent database search is bounded by industry operating experience (i.e., no previously unknown aging effects were identified by the applicant or the staff); and

the operating experience provided by the applicant and identified by the staff's independent database search is not sufficient to allow the staff to verify that the

LRA AMP, as implemented by the applicant, is sufficient to detect and manage aging effects during the period of extended operation.

In order to obtain the information necessary to verify whether the applicant's operating experience supports the sufficiency of the LRA AMP, the staff will consider issuing RAIs for the following subjects:

The applicant is requested to provide a description of the test method or procedure used to confirm that the containment concrete between elevation -30 ft and +20 ft is not experiencing cracking due to expansion and reaction with aggregates and that the compressive strength and modulus of elasticity of the containment concrete between elevation -30 ft and +20 ft are not affected by cracking due to expansion and reaction with aggregates.

The staff also audited the description of the LRA AMP provided in the UFSAR Supplement. The staff found this description to be consistent with the description provided in the SRP-LR and, therefore, acceptable.

Based on this audit, the staff:

verified that most of the LRA program elements 1-6 are consistent with the corresponding program elements in the GALL Report while identifying certain aspects of LRA program elements 1-6 for which additional information or additional evaluation is required before consistency can be determined;

identified that additional information regarding operating experience is required before an indication regarding the sufficiency of the LRA AMP, as implemented by the applicant, to detect and manage aging can be reached; and

verified that the description provided in the UFSAR Supplement is an adequate description of the program.

LRA AMP B.2.1.29, ASME Section XI, Subsection IWF

In the LRA, the applicant states that AMP B.2.1.29, "ASME Section XI, Subsection IWF," is an existing program that is consistent with the program elements in GALL AMP XI.S3, "ASME Section XI, Subsection IWF." To verify this claim of consistency, the staff audited the LRA AMP. This audit report considers program elements 1-6 (scope of program, preventive actions, parameters monitored or inspected, detection of aging effects, monitoring and trending, and acceptance criteria) and 10 (operating experience) and the description of the program as contained in the UFSAR Supplement. Program elements 7-9 (corrective actions, confirmation process, and administrative controls) are audited as part of the scoping and screening methodology audit. Issues identified but not resolved in this report are addressed in the SER.

During its audit, the staff conducted walkdowns, interviewed the applicant's staff, and reviewed onsite documentation provided by the applicant. The staff also conducted an independent

database search of the applicant's operating experience database using the keywords: "corrosion," "bolt," and "hanger."

The table below lists the documents which were reviewed by the staff and were found relevant to the audit. These documents were provided by the applicant or were identified in the staff's search of the applicant's operating experience database.

Relevant Documents Reviewed

Document	Title	Revision / Date
1. LRAP – S003 Revision 1	Seabrook Station Aging Management Program Basis Document – ASME Section XI Inservice Inspection, Subsection IWF Program	Revision 1 04/26/10
2.	Seabrook Station Reference Manual – Inservice Inspection Reference	Revision 12 06/02/10
3. ES1807.025	Seabrook Station Engineering Procedure – Inservice Inspection Visual Examination Procedure	Revision 04 Change 05
4. AR 00192359	NRC Information Notice IN 2009-04, Age Related Constant Support Degradation	03/10/09
5. SBK-L-07024	Seabrook Station Inservice Inspection Examination Report	02/02/2007
6. AR 00049998	EWR 97-0256 ISI Pipe Support/Snubber Problem	04/22/97
7. AR 00127201	EWR 97-0257 ISI Pipe Support/Snubber Problem	04/22/1997
8. AR 00186678	EWR 99-0104 Pipe Support, Inservice Inspection Problem	03/31/1999
9. AR 00078329	EWR 99-0116 Pipe Support, Inservice Inspection Problem	04/06/1999

During the audit of program elements 1-6, the staff found that:

> elements 1-6 (scope of program, preventative actions, parameters monitored, detection of aging effects, monitoring and trending, and acceptance criteria) of the LRA AMP were consistent with the corresponding elements of the GALL Report AMP.

During the audit of program element 10 (operating experience), the staff found that:

> the operating experience provided by the applicant and identified by the staff's independent database search is bounded by industry operating experience (i.e., no previously unknown aging effects were identified by the applicant or the staff); and
>
> the operating experience provided by the applicant and identified by the staff's independent database search is not sufficient to allow the staff to verify that the LRA AMP, as implemented by the applicant, is sufficient to detect and manage aging effects during the period of extended operation.

In order to obtain the information necessary to verify whether the applicant's operating experience supports the sufficiency of the LRA AMP, the staff will consider issuing an RAI for the following subject:

> According to ASME Section XI, Subsection IWF requirements, discovery of a deficiency during regularly scheduled inspections triggers an increase of the inspection scope. IWF-2430 provides requirements on how to increase the sample size. During the audit, the staff reviewed documentation of deficient conditions but could not find any documentation indicating the sample size was increased according to the requirements of IWF-2430. In addition, the staff did not find any guidance for increasing the sample size in the IWF implementing procedures.

The staff also audited the description of the LRA AMP provided in the UFSAR Supplement. The staff found this description to be consistent with the description provided in the SRP-LR and, therefore, acceptable.

Based on this audit, the staff:

> verified that LRA program elements 1-6 are consistent with corresponding program elements in the GALL Report AMP;
>
> identified that additional information regarding operating experience is required before an indication regarding the sufficiency of the LRA AMP, as implemented by the applicant, to detect and manage aging can be reached; and
>
> verified that the description provided in the UFSAR Supplement is an adequate description of the program.

LRA AMP B.2.1.30, 10 CFR Part 50 Appendix J

In the LRA, the applicant states that AMP XI.S4, "10 CFR Part 50, Appendix J," is an existing program that is consistent with the program elements in GALL AMP XI.S4, "10 CFR Part 50, Appendix J." To verify this claim of consistency, the staff audited the LRA AMP. This audit report considers program elements 1-6 (scope, preventive actions, parameters monitored or inspected, detection of aging effects, monitoring and trending, and acceptance criteria) and 10 (operating experience) and the description of the program as contained in the UFSAR Supplement. Program elements 7-9 (corrective actions, confirmation process, and administrative controls) are audited as part of the scoping and screening methodology audit. Issues identified but not resolved in this report are addressed in the SER.

During its audit, the staff conducted walkdowns, interviewed the applicant's staff, and reviewed onsite documentation provided by the applicant. The staff also conducted an independent database search of the applicant's operating experience database using the keywords: "coating," "concrete," "corrosion," "cracking," "damage," "degradation," "inspection," "loss of material," "rust," "spalling," and "steel."

The table below lists the documents which were reviewed by the staff and were found relevant to the audit. These documents were provided by the applicant or were identified in the staff's search of the applicant's operating experience database.

Relevant Documents Reviewed

Document	Title	Revision / Date
1. Seabrook Station AMP B.2.1.30	10 CFR Part 50 Appendix J	June 2010
2. LRTR-COE	Seabrook Station License Renewal Project Technical Report, Civil Operating experience	Revision 0, 07/07/2010
3. License Event Report 9701100	Containment Building Spray Sump Suction Valve Encapsulation	07/11/1997
4. License Event Report 9701000	Containment Building Spray Penetration Check Valve Failure	07/03/1997
5. Work Order 01160892	Local Leak Rate Test Summary	06/12/2008
6. ILRT-PTR-SEA-08, L080428A	Letter to Mr. Robert Parry, Subject: 2008 ILRT Preliminary Test Report	04/28/2008
7. TS2035Q	Appendix J Engineer Qualification Guide	01/26/2010
8. EX1803.001	"Complex Procedure" Reactor Containment Integrated Leakage Rate Test – Type A	Revision 5

During the audit of program elements 1-6, the staff found that:

> elements 1, 2, 3, 5, and 6 (scope, preventive actions, parameters monitored or inspected, monitoring and trending, and acceptance criteria) of the LRA AMP were consistent with the corresponding elements of the GALL Report AMP; and
>
> sufficient information was not available to determine whether element 4 (detection of aging effects) of the LRA AMP is consistent with the corresponding element of the GALL Report AMP.

In order to obtain the information necessary to verify whether the LRA program element number 4 is consistent with the corresponding element of the GALL Report AMP, the staff will consider issuing RAIs for the following subjects:

> In element 4 of the LRA AMP, it states that Seabrook complies with ASME Section XI, Subsections IWE and IWL requirements. In the GALL Report AMP, it states that effective detection of degradation of containment shells, liners, and components that compromise the containment pressure boundary, including seals and gaskets would be achieved with the additional implementation of an acceptable containment inservice inspection program as described in GALL AMP XI.S1 and XI.S2. It is not clear to the staff that these statements are consistent because the applicant's "complex procedure" for reactor containment integrated leakage rate testing does not specify examination methods for conducting internal and external inspections that are consistent with ASME Section XI, Subsections IWE and IWL requirements and qualification requirements for

inspectors of containment internal and external surfaces is not consistent with element 4 of GALL AMP XI.S4, "10 CFR Part 50, Appendix J."

During the audit of program element 10 (operating experience), the staff found that:

the operating experience provided by the applicant and identified by the staff's independent database search is bounded by industry operating experience (i.e., no previously unknown aging effects were identified by the applicant or the staff); and

the operating experience provided by the applicant and identified by the staff's independent database search is sufficient to allow the staff to verify that the LRA AMP, as implemented by the applicant, is sufficient to detect and manage aging effects during the period of extended operation.

The staff also audited the description of the LRA AMP provided in the UFSAR Supplement. The staff found this description to be consistent with the description provided in the SRP-LR and, therefore, acceptable.

Based on this audit, the staff:

verified that most of the LRA program elements 1-6 are consistent with the corresponding program elements in the GALL Report while identifying certain aspects of LRA program elements 1-6 for which additional information or additional evaluation is required before consistency can be determined;

verified that the operating experience is sufficient to indicate that the LRA AMP, as implemented by the applicant, is sufficient to detect and manage aging; and

verified that the description provided in the UFSAR Supplement is an adequate description of the program.

LRA AMP B.2.1.31, Structures Monitoring Program

In the LRA, the applicant stated that AMP B.2.1.31, "Structures Monitoring Program," integrates the Masonry Wall and RG 1.127, "Inspection of Water Control Structures Associated with Nuclear Power Plants Programs," and that these are existing programs that are consistent with the program elements in GALL AMP XI.S5, "Masonry Wall Program," GALL AMP XI.S6, "Structures Monitoring Program," and GALL AMP XI.S7, "RG 1.127, Inspection of Water Control Structures Associated with Nuclear Power Plants," with enhancements. To verify this claim of consistency, the staff audited the LRA AMPs. This audit report considers program elements 1-6 (scope of program, preventative actions, parameters monitored or inspected, detection of aging effects, monitoring and trending, and acceptance criteria) and 10 (operating experience), and the description as contained in the UFSAR supplement. Program elements 7-9 (corrective actions, confirmation process, and administrative controls) are audited as part of the scoping and screening methodology audit. Issues identified but not resolved in this report are addressed in the SER.

The first enhancement affects LRA program element 1 (scope of program). This enhancement expands the scope of the Structures Monitoring Program to add elastomers, overhead and fuel handling cranes, cranes identified in NUREG-0612, supports, tanks (1-FP-TK-35-A, 1-FP-TK-35-B, 1-FP-TK-36-A, 1-FP-TK-36-B, and 1-FP-TK-29-A) and their supports and foundations, fire house boiler building, safety-related and nonsafety-related electrical cable manhole, duct bank yard structures, and below-grade inspections of buried concrete.

The second enhancement affects LRA program element 3 (parameters monitored or inspected). This enhancement expands the Structures Monitoring Program procedure to include aging effects of loss of sealing, leakage, and deterioration of seals; cracking of aluminum; abrasion and flaking of non-metallic fire proofing; corrosion, dirt, and distortion of Lubrite; and degradation of below-grade concrete.

The third enhancement affects LRA program element 4 (detection of aging effects). This enhancement expands on the existing program element by adding ultrasonic testing and evaluation requirements for the two fire protection water storage tanks.

The fourth enhancement affects LRA program element 5 (monitoring and trending). This enhancement expands the Structures Monitoring Program to perform below grade inspections of buried concrete at least once every five years through either opportunistic or focused inspections.

In Appendix A, Table A.3 of the LRA, the applicant committed to implement these enhancements prior to the period of extended operation.

During its audit, the staff conducted field walk downs, interviewed the applicant's staff, and reviewed on-site documentation provided by the applicant. The staff also conducted an independent search of the applicant's operating experience database using keywords: "concrete," "corrosion," "cracking," "groundwater," "spalling," and "leach."

The table below lists the documents that were reviewed by the staff and found relevant to the audit. These documents were provided by the applicant or were identified in the staff's search of the applicant's operating experience database.

Relevant Documents Reviewed

Document	Title	Revision / Date
1. LRAP – S0006	Aging Management Program Basis Document – Structures Monitoring Program	Revision 1 04/27/2010
2. SH 6.4	Dig Safe	Revision 1 09/30/2009
3. LRTR - CMAE	Aging Effects Applicability for Structural Components	Revision 2 08/09/2010
4. UFSAR	Introduction and General Description of Plant – Conformance to NRC Regulatory Guide	Revision 13 Section 1.8
5. PEG-04	Plant Engineering Guidelines – Building/Structures Surveillance Inspections	Revision 09

Document	Title	Revision / Date
6.	Periodic Assessment of Maintenance Rule Program – July 1998 through March 2000	
7.	Periodic Assessment of Maintenance Rule Program – October 2004 through March 2006	
8.	Periodic Assessment of Maintenance Rule Program – April 2006 through March 2008	
9. EDS 36180	Structural Monitoring Program Form 1 – Monitoring Checklist	Rev. 0
10. LRTR - CONC	Concrete Conformance with NUREG 1801	Revision 3 08/30/2010
11. Specification 9763-13-2	Specification for Containment Concrete Work for New Hampshire Seabrook Station Init Nos. 1 & 2	03/24/1975
12. LRAM - WCS	Seabrook Station License Renewal Project Aging Management Review Report Water Control Structures	Revision 2 04/27/2010
13. CR 04-02862	Groundwater inleakage	03/29/2004
14. CR 01-05120	Groundwater inleakage	05/31/2001
15. CR 08-13706	A 6" fire protection support	10/03/2008
16. CR 03-04177	Evaluate the effect of spent fuel pool leakage	05/12/2003

The staff conducted its on-site audit of LRA program elements 1-6 based on the contents of the existing program as modified by the proposed enhancements.

During the audit, the staff found that:

> elements 1-6 (scope of program, preventative actions, parameters monitored, detection of aging effects, monitoring and trending, and acceptance criteria) of the LRA AMP were consistent with the corresponding elements of the GALL Report AMP.

During the on-site audit of program element 10 (operating experience), the staff found that:

> the operating experience provided by the applicant and identified by the staff's independent database search is bounded by industry operating experience (i.e., no previously unknown aging effects were identified by the applicant or the staff);
>
> the operating experience provided by the applicant and identified by the staff's independent database search is not sufficient to allow the staff to verify that the LRA AMP, as implemented by the applicant, is sufficient to detect and manage aging effects during the period of extended operation.

In order to obtain the information necessary to verify that the LRA AMP, as implemented by the applicant, is sufficient to detect and mange aging effects during the period of extended operation, the staff will consider issuing RAIs for the following subjects:

> During the audit, the staff became aware that the applicant has an issue with chronic groundwater infiltration throughout the below-grade structures. The staff is unclear how

this leakage is affecting the below-grade concrete structures, and how possible concrete degradation will be managed during the period of extended operation.

The staff is also unclear how the groundwater is affecting the structures and components (e.g., cable trays, supports, etc.) inside the below-grade concrete structures, which are exposed to the groundwater infiltration.

During the audit, the staff was unable to locate inspection reports which identified and tracked the concrete degradation due to groundwater infiltration in a quantitative manner. A baseline quantitative concrete inspection is necessary to track degradation during the period of extended operation.

During the audit, the staff became aware that the fuel transfer canal and the cask handling pit have experienced leakage. The staff is unclear if the leakage has been stopped, how the leakage is affecting surrounding structures, and how possible aging effects of the leakage will be managed during the period of extended operation.

The staff also audited the description of the LRA AMP provided in the UFSAR Supplement. The staff found this description to be incomplete but the applicant has committed to revise it to appropriately reflect the documents (ACI 349.3R) referenced by the enhanced program.

Based on this audit, the staff:

verified that most of the LRA program elements 1-6 are consistent with the corresponding program elements in the GALL Report while identifying certain aspects of LRA program element 4 for which additional information or additional evaluation is required before consistency can be determined;

verified that the operating experience is not sufficient to indicate that the LRA AMP, as implemented by the applicant, is sufficient to detect and manage aging; and

verified that the applicant has committed to modify the UFSAR Supplement to make the program description adequate.

LRA AMP B2.1.32, Electrical Cables and Connections Not Subject To 10 CFR 50.49 EQ Requirements

In the LRA, the applicant states that AMP B2.1.32, “Electrical Cables and Connections Not Subject To 10 CFR 50.49 EQ Requirements,” is a new program that is consistent with the program elements in GALL AMP XI.E1, “Electrical Cables and Connections Not Subject To 10 CFR 50.49 EQ Requirements.” The applicant committed to implementing this program prior to the period of extended operation in LRA Section A, Table A4-1, License Renewal Commitments. To verify this claim of consistency, the staff audited the LRA AMP. This audit report considers program elements 1-6 (scope, preventive actions, parameters monitored or inspected, detection of aging effects, monitoring and trending, and acceptance criteria) and 10 (operating experience) and the description of the program as contained in the UFSAR Supplement. Program elements 7-9 (corrective actions, confirmation process, and

administrative controls) are audited as part of the scoping and screening methodology audit. Issues identified but not resolved in this report are addressed in the SER.

During its audit, the staff conducted a walk down, interviewed the applicant's staff, and reviewed onsite documentation provided by the applicant. The staff also conducted an independent search of the applicant's operating experience database using keywords: "cable" and "bus fault."

The table below lists the documents which were reviewed by the staff and were found relevant to the audit. These documents were provided by the applicant or were identified in the staff's search of the applicant's operating experience database.

Relevant Documents Reviewed

Document	Title	Revision / Date
1. LRAP – E1	Electrical Cables And Connections Not Subject To 10 CFR 50.49 EQ Requirements Aging Management Program Basis Document	Rev. 1 04/26/2010
2. LRAP – E1	Electrical Cables And Connections Not Subject To 10 CFR 50.49 EQ Requirements Aging Management Program Basis Document	Rev. 2 10/27/2010
3. CR 05-00228	Water from rain/melting snow penetrates into the "A" train electrical tunnel onto cable tray	Rev. NA 01/07/2005
4. CR 01-07730	Several Seismic Gap Seals have groundwater inleakage in the el. -26' electrical tunnel cable tray room and chase.	Rev. NA 08/06/2001
5. CR 00-03907	Rusting/corrosion of ALS cable jacket, high and low voltage cable trays & their supports may be the result of leakage from the discharge of 1-CW-MM-17R	Rev. NA 04/28/2000
6. CR 05-00228-01	Water from rain/melting snow penetrates into the "A" train electrical tunnel onto cable trays. Evaluate source of water and possible solution	Rev. NA Date: 01/18/2005
7. CR 01-07734	Ladder feet are corroding due to groundwater inleakage in the electrical tunnel -26' cable tray chase	Rev. NA 08/06/2001

During the audit, the staff questioned the applicant's technical basis for selecting samples of cables and connections installed in adverse localized environments because the applicant's basis document did not specify the sampling size of cables within an adverse localized environment. When the staff addressed this issue to the applicant, the applicant revised the basis document to clarify that all cables and connections within an adverse localize environment will be inspected.

During the audit, the staff indentified operating experience that indicated cable trays experienced degradation due to water intrusion. In CR#01-07728, the applicant stated that a project was undertaken in 1998 and 1999 to reduce the infiltration of groundwater into plant buildings by injecting a hydrophobic material through to the outside of the building walls. The

effort was only partially successful and was terminated when Tritium contamination above background was found in groundwater leaking into the containment annulus. The applicant performed a root cause evaluation and installed de-watering points in three locations around the plant. The staff noted that no recent events of water intrusion in cable trays and tunnels were indentified. The staff performed an inspection of the -26' electrical tunnel cable tray room and observed no water on cable tray or cables.

During the audit of program elements 1-6, the staff found that:

> elements 1-6 (scope of program, preventive actions, parameters monitored or inspected, detection of aging effects, monitoring and trending, and acceptance criteria) of the LRA AMP were consistent with the corresponding elements of the GALL Report AMP.

During the audit of program element 10 (operating experience), the staff found that:

> the operating experience identified by the staff's independent database search and supplemented by the applicant is bounded by industry operating experience (i.e., no previously unknown aging effects were identified by the applicant or the staff); and
>
> the operating experience identified by the staff's independent database search and supplemented by the applicant is sufficient to allow the staff to verify the LRA AMP, as implemented by the applicant, is sufficient to detect and manage aging effects during the period of extended operation.

The staff also audited the description of the LRA AMP provided in the UFSAR Supplement. The staff found this description to be consistent with the description provided in the SRP-LR and, therefore, acceptable.

Based on this audit, the staff:

> verified that LRA program elements 1-6 are consistent with corresponding program elements in the GALL Report AMP;
>
> verified that the operating experience is sufficient to indicate that the LRA AMP, as implemented by the applicant, is sufficient to detect and manage aging; and
>
> verified that the description provided in the UFSAR Supplement is an adequate description of the program.

LRA AMP B2.1.33, Electrical Cables and Connections Not Subject To 10 CFR 50.49 EQ Requirements Used In Instrumentation Circuits

In the LRA, the applicant states that AMP B2.1.33, "Electrical Cables and Connections Not Subject To 10 CFR 50.49 EQ Requirements Used In Instrumentation Circuits," is a new program that is consistent with the program elements in GALL AMP XI.E2, "Electrical Cables and Connections Not Subject To 10 CFR 50.49 EQ Requirements Used In Instrumentation

Circuits." The applicant committed to implementing this program prior to the period of extended operation in LRA Section A, Table A4-1, License Renewal Commitments to verify this claim of consistency, the staff audited the LRA AMP. This audit report considers program elements 1-6 (scope, preventive actions, parameters monitored or inspected, detection of aging effects, monitoring and trending, and acceptance criteria) and 10 (operating experience) and the description of the program as contained in the UFSAR Supplement. Program elements 7-9 (corrective actions, confirmation process, and administrative controls) are audited as part of the scoping and screening methodology audit. Issues identified but not resolved in this report are addressed in the SER.

During its audit, the staff conducted a walk down, interviewed the applicant's staff, and reviewed onsite documentation provided by the applicant. The staff also conducted an independent search of the applicant's operating experience database using keywords: "cable," "instrumentation degrade," and "instrumentation cable."

The table below lists the documents which were reviewed by the staff and were found relevant to the audit. These documents were provided by the applicant or were identified in the staff's search of the applicant's operating experience database.

Relevant Documents Reviewed

Document	Title	Revision / Date
1. LRAP – E2	Electrical Cables and Connections Not Subject To 10 CFR 50.49 EQ Requirements Used In Instrumentation Circuits Aging Management Program Basis Document	Rev. 1 04/26/2010
2. 1-RM-RE-6576-A	EC-01.12 Equipment Data Sheet – SQA Level B	Rev. 0
3. 1-RM-RE-6576-B	EC-01.12 Equipment Data Sheet – SQA Level B	Rev. 0
4. LER # 88-007-00	Post-Accident Nuclear Instrumentation Cable Separation	11/28/1988

During the audit, staff verified that high voltage, low level Radiation Monitoring System cables are included in the EQ Program by reviewing EQ equipment data sheets.

During the audit of program elements 1-6, the staff found that:

> elements 1-6 (scope of program, preventive actions, parameters monitored or inspected, detection of aging effects, monitoring and trending, and acceptance criteria) of the LRA AMP were consistent with the corresponding elements of the GALL Report AMP.

During the audit of program element 10 (operating experience), the staff found that:

> the operating experience identified by the staff's independent database search and supplemented by the applicant is bounded by industry operating experience (i.e., no previously unknown aging effects were identified by the applicant or the staff); and

The operating experience by the staff's independent database search and supplemented by the applicant is sufficient to allow the staff to verify that the LRA AMP, as implemented by the applicant, is sufficient to detect and manage aging effects during the period of extended operation.

The staff also audited the description of the LRA AMP provided in the UFSAR Supplement. The staff found this description to be consistent with the description provided in the SRP-LR and, therefore, acceptable.

Based on this audit, the staff:

verified that LRA program elements 1-6 are consistent with corresponding program elements in the GALL Report AMP;

verified that the operating experience is sufficient to indicate that the LRA AMP, as implemented by the applicant, is sufficient to detect and manage aging; and

verified that the description provided in the UFSAR Supplement is an adequate description of the program.

LRA AMP BB.2.1.34, Inaccessible Medium-Voltage Cables Not Subject to 10 CFR 50.49 EQ Requirements

In the LRA, the applicant states that AMP B.2.1.34, "Inaccessible Medium-Voltage Cables Not Subject to 10 CFR 50.49 EQ Requirements," is a new program that is consistent with the program elements in GALL AMP XI.E3, "Inaccessible Medium-Voltage Cables Not Subject To 10 CFR 50.49 Environmental Qualification Requirements." The applicant committed to implementing this program prior to the period of extended operation in LRA Appendix A, Table A.3, "License Renewal Commitment List." To verify this claim of consistency, the staff audited the LRA AMP. This audit report considers program elements 1-6 (scope of program, preventive actions, parameters monitored or inspected, detection of aging effects, monitoring and trending, and acceptance criteria) and 10 (operating experience) and the description of the program as contained in the UFSAR Supplement Program elements 7-9 (corrective actions, confirmation process, and administrative controls) are audited as part of the scoping and screening methodology audit. Issues identified but not resolved in this report are addressed in the SER.

During its audit, the staff conducted walkdowns, interviewed the applicant's staff, and reviewed onsite documentation provided by the applicant. The staff also conducted an independent search of the applicant's operating experience database using keywords: "manhole," "duct," "water," "submergence," "cable," "underground," "manway," and "vault."

Further, the staff performed a search of operating experience for the period 2000-November 2009. Databases were searched using various key word searches and then reviewed by technical auditor staff. Databases searched include Generic Letters, Bulletins, Regulatory Issue Summaries, Licensee Event Reports, Event Notification, Inspection Findings, and Inspection Reports.

The table below lists the documents which were reviewed by the staff and were found relevant to the audit. These documents were provided by the applicant or were identified in the staff's search of the applicant's operating experience database.

Relevant Documents Reviewed

Document	Title	Revision / Date
1. 94-41	Engineering Evaluation – Submerged Electrical Cables and Supports	Revision N/A 01/30/1995
2. ER-AA-106	Cable Condition Monitoring Program	Revision 1 02/04/2010
3. N/A	Cable Vault Data Spreadsheet	Revision: N/A Date: N/A
4. LRAP-E3	Aging Management Program Basis Document Inaccessible Medium-Voltage Cables Not Subject to 10 CFR Environmental Qualification Requirements Program	Revision: 1 04/26/2010
5. LRAP-E3 (draft)	Aging Management Program Basis Document Inaccessible Medium-Voltage Cables Not Subject to 10 CFR Environmental Qualification Requirements Program	Revision : 2 Date: N/A
6. 1-BM-MM-INSP-MH-IE-000	Electronic Work Control – Perform 5 Year Inspection of Supports In Safety-Related Electrical Manway Enclosures	Revision: N/A Date: 09/27/1999
7. L-2007-067	Response to Generic Letter 2007-01	Revision: N/A 05/08/2010
8. 1-SW-P-41-A-E320-0803-000	Service Water 4.16 kV Motor Inspection and Feeder Cable Megger	Revision: N/A 08/08/2010
9. PEG-4	Plant Engineering Guidelines – Building/Structures Surveillance Inspections	Revision: 8 Date: N/A
10. LS0564.01	Insulation Resistance/Dielectric Absorption Testing	Revision: Rev:3 Date: N/A

During the audit of program elements 1-6, the staff found that:

> elements 1, 2, 3, 4, 5, and 6 (scope of program, preventive actions, parameters monitored/inspected, detection of aging effects, monitoring and trending, acceptance criteria) of the LRA AMP were consistent with the corresponding elements of the GALL Report AMP.

During the audit of program element 10 (operating experience), the staff found that:

> the operating experience identified by the staff's independent database search and supplemented by the applicant is bounded by industry operating experience (i.e., no previously unknown aging effects were identified by the applicant or the staff); and

the operating experience identified by the staff's independent database search and supplemented by the applicant is not sufficient to allow the staff to verify that the LRA AMP, as implemented by the applicant, is sufficient to detect and manage aging effects during the period of extended operation.

In order to obtain the information necessary to verify whether the applicant's operating experience supports the sufficiency of the LRA AMP, the staff will consider issuing RAIs for the following subjects:

The applicant's operating experience and staff review of operating experience identified cases of in-scope inaccessible medium voltage cable exposure to significant moisture/cable submergence (i.e., periodic exposure to moisture that lasts more than a few days). Prolonged exposure to significant moisture is inconsistent with GALL AMP XI.E3 including program elements 2, "preventive actions," and 4, "detection of aging effects."

In addition, the application of AMP XI.E3 to medium voltage cables was based on the operating experience available at the time Revision 1 of the GALL Report was developed. However, recently identified industry operating experience indicates that the presence of water or moisture can be a contributing factor in inaccessible power cables failures at lower service voltages (400V to 2kV). Applicable operating experience (OE) was identified in licensee responses to Generic Letter (GL) 2007-01, "Inaccessible or Underground Power Cable Failures that Disable Accident Mitigation Systems or Cause Plant Transients," which included failures of power cable operating at service voltages of less than 2kV where water was considered a contributing factor.

Further, recently identified industry OE, provided by NRC licensees in response to GL 2007-01, has shown: (a) that there is an increasing trend of cable failures with length-in-service beginning in the 6^{th} through 10^{th} years of operation and (b) that moisture intrusion is a predominant factor contributing to cable failure. Industry operating experience has also shown that some NRC licensees may experience events, such as flooding or heavy rain, that subjects cables within the scope of the GALL AMP XI.E3 to significant moisture.

Based on the above, the applicant's aging management program may not be consistent with GALL AMP XI.E3 or LR SRP Section A.1.2.3.10 in that as additional operating experience is obtained, lessons learned are evaluated and the program adjusted as needed. Therefore, additional information is required by the staff to verify the applicant's conclusion that the effects of aging will be managed adequately so that the in-scope inaccessible power cable intended functions will be maintained during the period of extended operation.

During the audit, the applicant stated that they intend to enhance the Inaccessible Medium-Voltage Cables Not Subject to 10 CFR 50.49 EQ Requirements Program and the associated UFSAR supplement to address the staff's concern regarding recent industry operating experience. The review of the proposed supplement to the applicant's LRA will be addressed in the staff's SER.

The staff also audited the description of the LRA AMP provided in the UFSAR Supplement. The staff found that sufficient information was not available to determine whether the description provided in the UFSAR Supplement was an adequate description of the LRA AMP.

In order to obtain the information necessary to verify the sufficiency of the UFSAR Supplement program description, the staff will consider issuing RAIs for the following subjects:

> LRA UFSAR Supplement Section A.2.1.34 does not include definitions of significant moisture consistent with SRP LR Table 3.6-2 or GALL AMP XI.E3, "Inaccessible Medium Voltage Cables Not Subject to 10 CFR 50.49 Environmental Qualification Requirements." The lack of this definition in combination with the applicant's objective of inspection to prevent cable submergence may not provide consistency with GALL AMP XI.E3.

Based on this audit, the staff:

> verified that LRA program elements 1-6 are consistent with corresponding program elements in the GALL Report AMP;
>
> identified that additional information regarding operating experience is required before an indication regarding the sufficiency of the LRA AMP, as implemented by the applicant, to detect and manage aging can be reached; and
>
> identified a need for additional information regarding the adequacy of the program description in the UFSAR Supplement.

LRA AMP B.2.1.35, Metal Enclosed Bus Program

In the LRA, the applicant states that AMP B.2.1.35, "Metal Enclosed Bus," is a new program that is consistent with the program elements in GALL AMP XI.E4, "Metal Enclosed Bus." The applicant committed to implementing this program prior to the period of extended operation in LRA Section A, Table A4-1, License Renewal Commitments. To verify this claim of consistency, the staff audited the LRA AMP. This audit report considers program elements 1-6 (scope, preventive actions, parameters monitored or inspected, detection of aging effects, monitoring and trending, and acceptance criteria) and 10 (operating experience) and the description of the program as contained in the UFSAR Supplement. Program elements 7-9 (corrective actions, confirmation process, and administrative controls) are audited as part of the scoping and screening methodology audit. Issues identified but not resolved in this report are addressed in the SER.

During its audit, the staff conducted a walk down, interviewed the applicant's staff, and reviewed onsite documentation provided by the applicant. The staff also conducted an independent search of the applicant's operating experience database using keywords: "bus," "metal," "connections," "duct," and "phase."

The table below lists the documents which were reviewed by the staff and were found relevant to the audit. These documents were provided by the applicant or were identified in the staff's search of the applicant's operating experience database.

Relevant Documents Reviewed

Document	Title	Revision / Date
1. LRAP-E4	Aging Management Program Basis Document for Metal Enclosed Bus	Rev. 1
2. LRAM-ELEC	Aging Management Review Report Electrical Components and Commodities	Rev. 1
3. LRTR-EOE	Electrical Operating experience Review for Identification of New Aging Effects	Rev. 0

During the audit, the staff found that elements 1, 2, 5, and 6 (scope of program, preventive actions, monitoring and trending, and acceptance criteria) of the LRA AMP was consistent with the corresponding elements of the GALL Report AMP. Sufficient information was not available to determine whether elements 3 and 4 (parameters monitored or inspected and detection of aging effects) of the AMP were consistent with the corresponding elements of the GALL Report AMP. In order to obtain the information necessary to verify whether the LRA program elements 3 and 4 were consistent with the corresponding elements of the GALL Report AMP, the staff will consider issuing RAIs for the following subjects:

The GALL AMP XI.E4, under "parameters monitored or inspected" and "detection of aging effects," recommends visual inspection of internals, internal bus supports, and bus insulation of all metal enclosed bus (MEB) prior to extended operation and every 10 years thereafter. In the LRA, the applicant states that the program is consistent with GALL AMP XI.E4, elements 3 and 4. However, the Seabrook Station MEB program B.2.1.35, under the same program attributes, states that visual inspection will performed by randomly removing a number of covers for each bus duct. The applicant also stated that the Seabrook Station Program will complete the visual inspection before the period of extended operation and every 10 years thereafter. The applicant's MEB program is not consistent with GALL AMP XI.E4, elements 3 and 4 in that it visually inspects only a sample of bus duct internals, bus insulation, and bus supports. During the break-out meeting, the staff discussed the inconsistency with the applicant. The applicant revised the basis document to require removing a sufficient numbers of covers to allow for inspection of the entire bus. The staff reviewed the revisions and found them acceptable because the applicant will inspect the entire MEB not just a sample of buses. These inspections are consistent with the GALL AMP XI.E4 elements 3 and 4.

In the LRA, the applicant states that Seabrook station MEB program will perform thermography inspections external to the MEB to determine if the in-scope MEBs have loose connections due to thermal cycling and ohmic heating. The inspection will be performed on all accessible bus sections while the bus is energized. In general, other applicants install windows on the MEB for thermography inspections. The metal enclosed cover may mask the heat created by bus connection loosening and the temperature differences between bus connections may not be detected if windows are not installed on MEBs. During the LRA audit, the staff requested the applicant to provide a clarification on how the MEB connection inspections at Seabrook are effective in detecting loosening of bus connections using external thermography measurements.

During the audit, the applicant stated that they intend to enhance the metal enclosed bus program to address the staff's concern. The review of the proposed supplement to the applicant's LRA will be addressed in the staff's SER.

During the audit of program element 10 (operating experience), the staff found that:

> the operating experience identified by the staff's database search and supplemented by the applicant is bounded by industry operating experience (i.e., no previously unknown aging effects were identified by the applicant or the staff); and
>
> the operating experience identified by the staff's independent database search and supplemented by the applicant is sufficient to allow the staff to verify that the LRA AMP, as implemented by the applicant, is sufficient to detect and manage aging effects during the period of extended operation.

The staff also audited the description of the LRA AMP provided in the UFSAR Supplement. The staff found this description to be consistent with the description provided in the SRP-LR and, therefore, acceptable.

Based on this audit, the staff:

> verified that most of LRA program elements 1, 2, 5, and 6 are consistent with corresponding program elements in the GALL Report AMP while identifying certain aspect of LRA program elements 3 and 4 for which additional information or additional evaluation is required before consistency can be determined;
>
> verified that the operating experience is sufficient to indicate that the LRA AMP, as implemented by the applicant, is sufficient to detect and manage aging; and
>
> verified that the description provided in the UFSAR Supplement is an adequate description of the program.

LRA AMP B.2.1.36, Fuse Holders

In the LRA, the applicant states that AMP B.2.1.36, "Fuse Holder Program," is a new program that is consistent with the program elements in GALL AMP XI.E5, "Fuse Holder." The applicant committed to implementing this program prior to the period of extended operation in reference to LRA Section A, Table A4-1, License Renewal Commitments. To verify this claim of consistency, the staff audited the LRA AMP. This audit report considers program elements 1-6 (scope, preventive actions, parameters monitored or inspected, detection of aging effects, monitoring and trending, and acceptance criteria) and 10 (operating experience) and the description of the program as contained in the UFSAR Supplement. Program elements 7-9 (corrective actions, confirmation process, and administrative controls) are audited as part of the scoping and screening methodology audit. Issues identified but not resolved in this report are addressed in the SER.

During its audit, the staff interviewed the applicant's staff, and reviewed onsite documentation provided by the applicant. The staff also conducted an independent search of the applicant's operating experience database using keywords: "fuse holder," "corrosion," "fatigue," and "vibration."

The table below lists the documents which were reviewed by the staff and were found relevant to the audit. These documents were provided by the applicant or were identified in the staff's search of the applicant's operating experience database.

Relevant Documents Reviewed

Document	Title	Revision / Date
1. LRAP-E5	Aging Management Program Basis Document Fuse Holders	Rev. 1
2. LRAM-ELEC	Aging Management Review Report Electrical Components and Commodities	Rev. 1
3. LRTR-EOE	Electrical Operating experience for Identification of New Aging Effects	Rev. 0

During the audit, the staff found that elements 1, 2, 4, 5 and 6 (scope of program, preventive actions, detection of aging effects, monitoring and trending, and acceptance criteria) of the LRA AMP were consistent with the corresponding elements of the GALL Report AMP. Sufficient information was not available to determine whether elements 3 (parameters monitored or inspected) of the LRA AMP was consistent with the corresponding element of the GALL Report AMP. In order to obtain the information necessary to verify whether the LRA program staff will consider issuing a RAI for the following subjects:

GALL AMP XI.E5, under "parameters monitored or inspected" element, states that the monitoring includes thermal fatigue in the form of high resistance caused by ohmic heating, thermal cycling or electrical transients, mechanical fatigue caused by frequent removal/replacement of the fuse or vibration, chemical contamination, corrosion, and oxidation. In the Seabrook aging management program basis document LRAP-E5, under the same element, the applicant states that the Seabrook Station program only includes monitoring for the presence of corrosion and oxidation. Although the applicant concludes that the aging effects/mechanisms due to thermal fatigue in the form of high resistance caused by ohmic heating, thermal cycling or electrical transients, mechanical fatigue caused by frequent removal/replacement of the fuse or vibration identified by GALL Report are not applicable to the fuse holders at the Seabrook Station, the applicant does not provide justification to substantiate their conclusion.

During the audit of program element 10 (operating experience), the staff found that:

> the operating experience identified by the staff's independent database search and supplemented by the applicant is bounded by industry operating experience (i.e., no previously unknown aging effects were identified by the applicant or the staff); and
>
> the operating experience identified by the staff's independent database search and supplemented by the applicant is sufficient to allow the staff to verify that the LRA AMP,

as implemented by the applicant, is sufficient to detect and manage aging effects during the period of extended operation.

The staff also audited the description of the LRA AMP provided in the UFSAR Supplement. The staff found this description to be consistent with the description provided in the SRP-LR and, therefore, acceptable.

Based on this audit, the staff:

verified that most of program elements 1, 2, 4, 5, and 6 are consistent with corresponding program elements in the GALL Report AMP while identifying certain aspect of LRA program element 3 for which additional information or additional evaluation is required before consistency can be determined;

verified that the operating experience is sufficient to indicate that the LRA AMP, as implemented by the applicant, is sufficient to detect and manage aging;

verified that the description provided in the UFSAR Supplement is an adequate description of the program.

LRA AMP B2.1.37 Electrical Cable Connections Not Subject To 10 CFR 50.49 Environmental Qualification Requirements

In the LRA, the applicant states that AMP B.2.1.37, "Electrical Cable Connections Not Subject To 10 CFR 50.49 Environmental Qualification Requirements Program," is a new program that is consistent with the program elements in GALL AMP XI.E6, "Electrical Cable Connections Not Subject to 10 CFR 50.49 Environmental Qualification Requirements." The applicant committed to implementing this program prior to the period of extended operation in reference to LRA Section A, Table A.3, License Renewal Commitment List. To verify this claim of consistency, the staff audited the LRA AMP. This audit report considers program elements 1-6 (scope, preventive actions, parameters monitored or inspected, detection of aging effects, monitoring and trending, and acceptance criteria) and 10 (operating experience) and the description of the program as contained in the UFSAR Supplement. Program elements 7-9 (corrective actions, confirmation process, and administrative controls) are audited as part of the scoping and screening methodology audit. Issues identified but not resolved in this report are addressed in the SER.

During its audit, the staff interviewed the applicant's staff, and reviewed onsite documentation provided by the applicant. The staff also conducted an independent search of the applicant's operating experience database using keywords: "connector," "connections," "thermography," "cracking," "swelling," "discoloration," "burn," and "embrittlement."

The table below lists the documents which were reviewed by the staff and were found relevant to the audit. These documents were provided by the applicant or were identified in the staff's search of the applicant's operating experience database.

Relevant Documents Reviewed

Document	Title	Revision / Date
1. LRAP-E6	Seabrook Aging Management Program Basis Document Electrical Cable Connections Not Subject to 10 CFR 50.49 EQ Requirements Program	Rev. 1
2. LRTR-E6	Seabrook Aging Management Program, Electrical Cable Connections Not Subject to 10 CFR 50.49 Environmental Qualification Requirements Sample Selection Technical Report	Rev. 1

During the audit of program elements 1-6, the staff found that elements 1, 2, 4, 5, and 6 (preventive actions, parameters monitored or inspected, detection of aging effects, monitoring and trending, and acceptance criteria) of the LRA AMP were consistent with the corresponding elements of the GALL Report AMP.

Sufficient information was not available to determine whether element 3 (parameters monitored or inspected) of the LRA AMP was consistent with the corresponding element of the GALL Report AMP. In order to obtain the information necessary to verify whether the LRA program is consistent with the GALL Report AMP, the staff will consider issuing a RAI for the following subjects:

GALL Report XI.E6 program under program element 3, parameters monitored or inspected, states that a representative sample of electrical cable connections is tested. The technical basis for the sample selected is to be provided. The implementing document for the program will provide the technical basis for the sample selection, with respect to both sample size and inspection locations. In the basis document LRAP – E6 under the same element, the Seabrook Station program performs tests on a representative sample of electrical cable connections. The monitoring includes loosening bolted connections due to thermal cycling, ohmic heating, electrical transients, vibration, chemical contamination, corrosion, and oxidation. The applicant has developed the technical basis for selecting sample of cable connections and documented as Technical Report, LRTR – E6, “Electrical Cable Connections Not Subject to 10 CFR 50.49 Environmental Qualification Requirements Sample Selection,” Revision 1. During the audit, the staff found that the sample size was not included in the LRTR – E6. During the break-out meeting, the staff discussed the sample size not included in the technical report. The applicant revised the technical report to include the sample size such as that the sample set shall include at least 20 percent of each category listed below or a minimum of 25 connections of each of the four categories which are the power (4.160kV and 13.8kV) crimped/bolted; power (460V and 480V) crimped/bolted; control (120VAC and 125VDC) crimped/terminal board connection; and instrument (low voltage) crimped/terminal board connection. The staff reviewed the revision and found that the sample size is consistent with current staff positions.

During the audit of program element 10 (operating experience), the staff found that:

> the operating experience identified by the staff's independent database search and supplemented by the applicant is bounded by industry operating experience (i.e., no previously unknown aging effects were identified by the applicant or the staff); and
>
> the operating experience identified by the staff's independent database search and supplemented by the applicant is sufficient to allow the staff to verify that the LRA AMP, as implemented by the applicant, is sufficient to detect and manage aging effects during the period of extended operation.

The staff also audited the description of the LRA AMP provided in the UFSAR Supplement. The staff found this description to be consistent with the description provided in the SRP-LR and, therefore, acceptable.

Based on this audit, the staff:

> verified that all of the LRA program elements (1, 2, 3, 4, 5, and 6) are consistent with corresponding program elements in the GALL Report;
>
> verified that the operating experience is sufficient to indicate that the LRA AMP, as implemented by the applicant, is sufficient to detect and manage aging; and
>
> verified that the description provided in the UFSAR Supplement is an adequate description of the program.

LRA AMP B.2.2.2 Boral Monitoring

In the LRA, the applicant states that AMP B.2.2.2, "Boral Monitoring," is an existing program that is consistent with the program elements in final license renewal interim staff guidance (LR-ISG) LR-ISG-2009-01 AMP XI.M40, "Monitoring of Neutron-Absorbing Materials other than Boraflex." To verify this claim of consistency, the staff audited the LRA AMP. This audit report considers program elements 1-6 (scope, preventive actions, parameters monitored or inspected, detection of aging effects, monitoring and trending, and acceptance criteria) and 10 (operating experience) and the description of the program as contained in the UFSAR Supplement. Program elements 7-9 (corrective actions, confirmation process, and administrative controls) are audited as part of the scoping and screening methodology audit. Issues identified but not resolved in this report are addressed in the SER.

During its audit, the staff interviewed the applicant's staff, and reviewed onsite documentation provided by the applicant. The staff also conducted an independent database search of the applicant's operating experience database using the keywords: "Boral" and "Neutron Absorber."

The table below lists the documents which were reviewed by the staff and were found relevant to the audit. These documents were provided by the applicant or were identified in the staff's search of the applicant's operating experience database.

Relevant Documents Reviewed

Document	Title	Revision / Date
1. LRAP-M040	Boral Monitoring	Revision 1
2. RN1745	Seabrook Station Reactor Engineering Procedure "BORAL Monitoring Program"	Revision 3
3. EE-03-026	"BORAL Monitoring Cycle" Ending 08/08/03, Engineering Evaluation	Revision 00
4. CR 03-00134	Seabrook Station Condition Report	Revision 0
5. CR 01-12226	Seabrook Station Condition Report	Revision 0
6. CR 03-00267	Seabrook Station Condition Report	Revision 0
7. CR 05-02582	Seabrook Station Condition Report	Revision 0
8. 05-02569	Seabrook Station Condition Report	Revision 0
9. EE-06-022	"BORAL Monitoring Cycle" Ending 06/06/06 Cycle 11 Engineering Evaluation	Rev 00
10. LRTR-QUAL	Seabrook Station License Renewal Project Technical Report "Corrective Actions, Confirmation Process & Administrative Controls"	Revision 1
11. LI-AA-207	Renewed License Program	Revision 0
12. PI-AA-204	Condition Identification and Screening Process	Revision 0
13. PI-AA-205	Condition Evaluation and Corrective Action	Revision 0

During the audit of program elements 1-6, the staff found that:

> Elements 1-6 (scope of program, preventive actions, parameters monitored/Inspected, Detection of aging effects, monitoring and trending and Acceptance criteria) of the LRA AMP were consistent with the corresponding elements in the LR-ISG-2009-01 Report AMP.

During the audit of program element 10 (operating experience), the staff found that:

> The operating experience provided by the applicant and identified by the staff's independent database search is bounded by industry operating experience (i.e., no previously unknown aging effects were identified by the applicant or the staff); and
>
> The operating experience provided by the applicant and identified by the staff's independent database search is sufficient to allow the staff to verify that the LRA AMP, as implemented by the applicant, is sufficient to detect and manage aging effects during the period of extended operation.

In order to obtain the information necessary to verify whether the applicant's operating experience supports the sufficiency of the LRA AMP, the staff will consider issuing RAIs for the following subjects:

> The program is implemented to assure that degradation of spent fuel pool neutron-absorbing material that could compromise the criticality analysis will be detected in the period of extended operation. Additional information on operational experience gained from the testing and analysis of the Boral coupons is desired in order to ensure that the program will be adequate for the period of extended operation.

The staff also audited the description of the LRA AMP provided in the UFSAR Supplement. The staff found this description to be consistent with the description provided in the LR-ISG-2009-01 and, therefore, acceptable.

Based on this audit, the staff:

> verified that LRA program elements 1-6 are consistent with corresponding program elements in the LR-ISG-2009-01 AMP;
>
> identified that additional information regarding operating experience is required before an indication regarding the sufficiency of the LRA AMP, as implemented by the applicant, to detect and manage aging can be reached; and
>
> verified that the description provided in the UFSAR Supplement is an adequate description of the program.

LRA AMP B.2.3.1, Metal Fatigue of Reactor Coolant Pressure Boundary

In the LRA, the applicant states that AMP B.2.3.1, "Metal Fatigue of Reactor Coolant Pressure Boundary," program is an existing program with enhancements that is consistent with the program elements in GALL AMP X.M1, "Metal Fatigue of Reactor Coolant Pressure Boundary." To verify this claim of consistency, the staff audited the LRA AMP. This audit report considers program elements 1-6 (scope, preventive actions, parameters monitored or inspected, detection of aging effects, monitoring and trending, and acceptance criteria) and 10 (operating experience) and the description of the program as contained in the UFSAR Supplement described in LRA Section A.2.3.1, "Metal Fatigue of Reactor Coolant Pressure Boundary."

Program elements 7-9 (corrective actions, confirmation process, and administrative controls) are audited as part of the scoping and screening methodology audit. Issues identified but not resolved in this report are addressed in the SER.

The first enhancement affects LRA program element 3 (parameters monitored/inspected). This enhancement expands on the existing program element by including additional transients beyond those defined in the Technical Specification and UFSAR.

The second enhancement affects LRA program elements 1, 3, 5, and 6 (scope of program, parameters monitored/inspected, monitoring and trending, and acceptance criteria). This enhancement expands on the existing program elements by using a software program to count transients to monitor cumulative usage on select components.

In Table A.3, "License Renewal Commitment List," items 41 and 42 of the LRA, the applicant committed to implement these enhancements prior to the period of extended operation.

During its audit, the staff interviewed the applicant's staff, and reviewed onsite documentation provided by the applicant. The staff also conducted an independent search of the applicant's operating experience database using keywords: "fatigue," "crack," and "environment."

The table below lists the documents which were reviewed by the staff and were found relevant to the audit. These documents were provided by the applicant or were identified in the staff's search of the applicant's operating experience database.

Relevant Documents Reviewed

Document	Title	Revision / Date
1. LRAP-M TLAA	Metal Fatigue of Reactor Coolant Pressure Boundary	Revision 0 04/22/2010
2. LRTR - TLAA	Time-Limited Aging Analysis (TLAA)	Revision 0 05/12/2010
3. FP-SNPS-401P	System Review and Recommendations for a Fatigue Management Program at the Seabrook Station Unit 1	Revision 1 10/13/2010
4. 0800594.301P	Seabrook Station Environmentally Assisted Fatigue (EAF) Analysis	Revision 0 08/20/2008
5. FP-PSB-306	Combine Baseline and 60-Year Projected Manual Cycle Count for Seabrook Plant-Specific FatiguePro	Revision 2 05/04/2010
6. WCAP-16255-P	Seabrook Station Stretch Power Uprate Project NSSS Engineering Report	Revision 1 January 2005
7. FP-100249	Seabrook PZR Safety Relief Nozzle Weld Overlay Crack Growth Evaluation	Revision 2 04/17/2008
8. FP-100340	PZR Safety Nozzle A Weld Overlay Crack Growth Evaluation at DM Weld	Revision 1 04/22/2008
9. FP-100342	PZR Safety Nozzle A Weld Overlay Crack Growth Evaluation at DM Weld – Summary of Results	Revision 1 04/22/2008

Document	Title	Revision / Date
10. WCAP-11144	ASME Section III Analysis of Reactor Coolant Loop Branch Nozzles for the Seabrook Power Plant Unit 1	Revision 1 April 1990
11. WCAP-9936	ASME Section III Class 1 Piping Stress Analysis for the Seabrook Nuclear Generating Station Unit 1	Revision 2 April 1990
12. WCAP-10567	Technical Basis for Eliminating Large Primary Loop Pipe Rupture as the Structural Design Basis for Seabrook Units 1 and 2	(No revision no.) June 1984
13. C-S-1-28066	Steam Generator Tube Wear and Fatigue Evaluation	Revision 0 11/07/2004
14. UE&C Calc 760-14	Diesel Generator – Thermal Cycle Evaluation	Revision 0 05/05/1986
15. UE&C Calc CS-27	Fatigue Analysis of Containment Liner	Revision 0 03/24/1982

The staff conducted its audit of LRA program elements 1-6 based on the contents of the existing program as modified by the proposed enhancements.

During the audit, the staff found that:

element 5 (monitoring and trending) of the LRA AMP was consistent with the corresponding element of the GALL Report AMP;

element 2 (preventive actions) of the LRA AMP was not strictly consistent with the corresponding elements of the GALL Report AMP but sufficient information was available to allow the staff to determine that this element of the LRA AMP is equivalent to the corresponding elements of the GALL Report AMP; and

sufficient information was not available to determine whether elements 1, 3, 5, and 6 (scope of program, parameters monitored/inspected, detection of aging effects, and acceptance criteria) of the LRA AMP were consistent with the corresponding elements of the GALL Report AMP.

The basis for the staff's determination that elements 2 and 5 (preventive actions and monitoring and trending) of the LRA AMP are equivalent to the corresponding GALL Report AMP is:

Regarding element 5, as recommended in the GALL Report AMP, the Seabrook program monitors a sample of high fatigue usage locations including the critical locations identified in NUREG/CR-6260.

LRA Section B.2.3.1 states that the Seabrook Metal Fatigue of Reactor Pressure Boundary program is a preventive program that monitors and tracks the number of critical thermal and pressure transients to ensure that the cumulative usage factor (CUF) for select reactor coolant system (RCS) components remains less than 1.0. In addition, LRA Section 4.3.1 states that if the 60-year projected numbers of cycles is less than the

number of cycles used in the design fatigue analyses, then the fatigue analyses based upon the design transients will remain valid for 60 years of operation, if the design transient severity is also bounding of the actual transient severity. Therefore, an evaluation was performed to determine if the severity of the actual plant transients that have occurred during past operations remains bounded by the transient severity provided for each transient definition in the design specification. However, the LRA does not provide details how the severity of the transients is verified. In its review, the staff noted that these details are provided in Section 4.0 of Seabrook document FP-SNPS-401P, which states that in addition to detecting events, the automated cycle counting program collects descriptive statistics and profiles for each event (e.g., duration, maximum and/or minimum temperature, rates of change, etc.), thereby addressing design basis severity versus actual transient severity. Therefore, consistent with the GALL Report AMP element 2, the Seabrook Metal Fatigue of Reactor Pressure Boundary program ensures that the fatigue CUF is maintained below the design code limit, thereby providing adequate margin against fatigue cracking of RCS components due to anticipated cyclic strains.

In order to obtain the information necessary to verify whether the LRA program element numbers 1, 3, 4, and 6 are consistent with the corresponding elements of the GALL Report AMP, the staff will consider issuing RAIs for the following subjects:

RAI's should be 2 or 3 sentences:

Program element 1 of the GALL Report AMP states that the program includes preventive measures to mitigate fatigue cracking of metal components of the reactor coolant pressure boundary caused by anticipated cyclic strains in the material. The LRA or the UFSAR does not give a list of RCS locations for which fatigue CUF was determined in the current licensing basis (CLB), or provide the CUF value of record for these locations. Without this information the staff is unable to evaluate applicant's bases for dispositioning the CUF TLAA analyses for these components in accordance with the TLAA acceptance criteria in either 10 CFR 54.21(c)(1)(I), (ii), or (iii). Also, design transients listed in LRA Table 4.3.1-2 are significantly more than those listed in Seabrook Technical Specification (TS) Table 5.7-1. It is not clear whether the original design basis fatigue analyses and the supplemental fatigue analyses of RCS components were based on transients listed in the TS Table 5.7-1 or LRA Table 4.3.1-2. Furthermore, the reactor components and locations that are monitored for fatigue CUF under the Seabrook B.2.3.1 program do not include core support structures or vessel internal components. The staff also noted that SRP-LR Section 4.3.1 states that the metal fatigue analysis review includes, as appropriate, a review of reactor vessel internals fatigue analysis. Also, SRP-LR Section 4.3.1.1.1 states that ASME Class 1 components, which include core support structures, are analyzed for metal fatigue.

Program element 3 of the GALL Report AMP states that the program monitors all plant transients that cause cyclic strains, which are significant contributors to the fatigue usage for each critical RCS component. However, the transients are termed differently in the LRA, UFSAR, and relevant documents that were reviewed during the audit, and it is not clear where and how these transients are included in the list of design transients given in LRA Table 4.3.1-2. In addition, LRA Subsection 4.3.2.2 states that the

pressurizer surge line stratification sub-transients were developed based on NSSS-vendor Seabrook-specific evaluations for pre-MOP (Modified Operating Procedure) plant operating procedures and NSSS vendor evaluations of surge line monitoring data from similar units and historical records for Seabrook for post-MOP operating procedures. The LRA does not provide any if the pressurizer surge line thermal stratification transients were different prior to MOP; whether these earlier transients included in the fatigue analyses and how theses transients will be accounted for in the Metal Fatigue of Reactor Coolant Pressure Boundary Program.

Program element 4 of the GALL Report AMP states that the program provides for periodic updates of the fatigue usage calculations. The LRA Section B.2.3.1 states that the Seabrook Metal Fatigue of Reactor Coolant Pressure Boundary Program will be enhanced to include additional transients beyond those defined in the TS and UFSAR and to use a software program to count transients to monitor cumulative usage on select components. The LRA does not provide any details for the additional transients, or the software package that will be used. It is not clear whether the methodology for incorporating environmental effects is consistent with the recommendations of SRP-LR Section 4.3. Also, it is not clear if the software involves cycle based or stress based fatigue analysis, and includes CUF updates.

Program element 6 of the GALL Report AMP states that the program involves monitoring the fatigue usage below the design Code limit considering environmental effects. The Seabrook B.2.3.1 program acceptance criterion maintains the number of counted transient cycles below the analyzed number of cycles for each transient to ensure that the CUF for select reactor coolant system components remains less than 1.0 through the period of extended operation. However, the LRA does not provide any details regarding (or justify) the action limits that are set on design basis transient cycle counting activities or on CUF monitoring activities, or the corrective actions that will be implemented if an action limit of cycle counting or CUF monitoring is reached.

During the audit of program element 10 (operating experience), the staff found that:

the operating experience provided by the applicant and identified by the staff's independent database search is bounded by industry operating experience (i.e., no previously unknown aging effects were identified by the applicant or the staff); and

the operating experience provided by the applicant and identified by the staff's independent database search is sufficient to allow the staff to verify that the LRA AMP, as implemented by the applicant, is sufficient to detect and manage aging effects during the period of extended operation.

The staff also audited the description of the LRA AMP provided in the UFSAR Supplement in LRA Section A.2.3.1. The staff found this description to be incomplete but the applicant has committed to revise it to reflect the program enhancement(s).

Based on this audit, the staff:

verified that most of the LRA program elements 1-6 are consistent with the corresponding program elements in the GALL Report while identifying certain aspects of LRA program elements 1-6 for which additional information or additional evaluation is required before consistency can be determined;

verified that the operating experience is sufficient to indicate that the LRA AMP, as implemented by the applicant, is sufficient to detect and manage aging; and

verified that the applicant has committed to modify the UFSAR Supplement to make the program description adequate.

LRA AMP B.2.3.2, Environmental Qualification (EQ) of Electrical Components

In the LRA, the applicant states that AMP B.2.3.2, "Environmental Qualification (EQ) of Electric Components," is an existing program that is consistent with the program elements in GALL AMP X.E1, "Environmental Qualification (EQ) of Electric Components." The applicant committed to implementing this program prior to the period of extended operation in LRA Section A, Table A4-1, License Renewal Commitments. To verify this claim of consistency, the staff audited the LRA AMP. This audit report considers program elements 1-6 (scope, preventive actions, parameters monitored or inspected, detection of aging effects, monitoring and trending, and acceptance criteria) and 10 (operating experience) and the description of the program as contained in the UFSAR Supplement. Program elements 7-9 (corrective actions, confirmation process, and administrative controls) are audited as part of the scoping and screening methodology audit. Issues identified but not resolved in this report are addressed in the SER.

During its audit, the staff conducted a walk down, interviewed the applicant's staff, and reviewed onsite documentation provided by the applicant. The staff also conducted an independent search of the applicant's operating experience database using keywords: "cable" and "EQ cables."

The table below lists the documents which were reviewed by the staff and were found relevant to the audit. These documents were provided by the applicant or were identified in the staff's search of the applicant's operating experience database.

Relevant Documents Reviewed

Document	Title	Revision / Date
1. LRAP - EQ	Environmental Qualification (EQ) of Electric Components Aging Management Program Basis Document	Rev. 1 04/26/2010
2. 03-012	Seabrook Stage 1 Power Uprate	Rev. 27 04/29/2005
3. SBK-04-04	Seabrook Quality Assurance Audit Report	

Document	Title	Revision / Date
4. Job Order #: 5945270	Power Uprate Temperature Calculation No. 6.01.48.03	Rev. 5
5. EQF No. 118-01-01	EQ Assessment Report No. 1	Rev. 3
6.	EQ Health Report Summary	
7. EQF No. 113-03-01	EQ Assessment Report No. 5	Rev. 5

During the audit, the staff evaluated the applicant's calculation of EQ zone total integrated radiation dose values for a 60 year plant life. The staff noted that applicant had implemented Stretch Power Uprate. The staff verified algorithms used to develop EQ radiation dose for all zones except inside containment. The applicant claimed that normal containment dose has not changed due to Power Uprate. The staff also verified algorithms used to develop EQ temperature calculations.

During the audit of program elements 1-6, the staff found that elements 1, 2, 3, 4, and 5 (scope of program, preventive actions, parameters monitored or inspected, detection of aging effects, and monitoring and trending) of the LRA AMP were consistent with the corresponding elements of the GALL Report AMP.

During the audit of program element 10 (operating experience), the staff found that the operating experience identified by the staff's independent database search and supplemented by the applicant is bounded by industry operating experience (i.e., no previously unknown aging effects were identified by the applicant or the staff). The staff also audited the description of the LRA AMP provided in the UFSAR Supplement. The staff found this description to be consistent with the description provided in the SRP-LR and, therefore, acceptable.

Based on this audit, the staff:

verified that LRA program elements 1-6 are consistent with corresponding program elements in the GALL Report AMP;

verified that the operating experience is sufficient to indicate that the LRA AMP, as implemented by the applicant, is sufficient to detect and manage aging; and

verified that the description provided in the UFSAR Supplement is an adequate description of the program.

Plant-Specific Operating Experience Review

The staff performed an independent database search of an applicant's OE database to determine the adequacy of the use of OE to inform the AMPs for the period of extended operation. The NRC's SRP-LR provides guidance to the NRC staff on assessing the 10 program elements for each AMP submitted in a LRA. OE is listed as one of these elements, and defined in brief in the GALL Report.

The on-site specific and industry OE is also an important part of two other AMP elements: specifically, detection of aging effects and monitoring and trending. The SRP-LR also calls attention to the importance of the applicants specific OE in relation to scoping and screening, aging management review, and time-limited aging analysis activities.
For the AMP audit of the Seabrook LRA, two dedicated audit team members conducted an independent database search of the applicant's plant-specific OE database to provide the staff team members with relevant and appropriate OE, and the associated corrective actions performed.

Random Sample of Seabrook Components

The staff audited the applicant's method of scoping and screening to support the license renewal application and the resulting components and systems scoped into the applicant's aging management review. For this survey, the NRC staff independently selected a random sample of components and independently determined whether the randomly selected components were appropriately scoped and screened into the applicant's license renewal program.

A requirement for this audit activity was a database that would provide a relatively complete list of all components and structures at Seabrook. The Seabrook plant equipment database provides such a list and had been used as a major tool in the applicant's license renewal scoping and screening process. The plant equipment database was used for scoping and screening for license renewal, aging management reviews, and assignment of aging management programs. Data extracted from the plant equipment database were used for creating the Seabrook License Renewal Database.

The NRC staff estimated that a sample of 85 randomly selected components from the plant equipment database of 136,860 components would provide an estimate of the percent of components/structures appropriately scoped with a 3% margin of error at the 95% confidence level. The applicant provided the staff a spreadsheet with selected information on all components in the database. The staff used a random number generator to generate 85 random numbers. All the components in plant equipment database were then assigned a sequential number from one to 136,860 and the corresponding random numbers were used to select the 85 random components. From the plant equipment database, information on the component's system, function, tag number, location, name, and many of the parameters associated with license renewal were then extracted. The applicant's staff then indicated for each component whether or not it had been scoped and screened into the license renewal process as subject to an aging management review.

The selected components were then reviewed by the NRC staff. Of the 85 randomly selected components, 46 components had been scoped by the applicant into their aging management reviews; 39 were considered by the applicant to be out of scope or screened out by the criteria of 10 CFR Part 54. All components that the applicant had assigned to the license renewal scope were accepted by the NRC staff as correctly scoped. The NRC staff then independently reviewed the 39 components that had been designated by the applicant as not subject to an aging management review. Through a review of the components description and system, the

NRC agreed that 39 of the components were correctly scoped and screened as not subject to an AMR for license renewal.

As a result of the statistical analysis of this sample, the staff is 95% confident that they are 97% or more in agreement with Seabrook's scooping and screening.

Seabrook Material and Environment Sample Audit

The applicant identified generic components for its aging management programs (AMPs) by performing an integrated plant assessment (IPA) in accordance with requirements of 10 CFR 54.21(a). The IPA first involved: (1) identifying the plant systems, structures and components that are within the scope of license renewal in accordance with 10 CFR 54.4, and then determining which specific component types require an aging management review (AMR), referred to as "Screening." The screening process identified in-scope passive component types subject to an AMR. Short-lived passive components, which could be excluded from an AMR on the basis of a qualified life or a specified replacement time period, were also identified and removed from any further aging evaluation considerations.

To validate the Seabrook plant specified in-scope generic component material and environment information as shown in the tables in the LRA, the staff performed an independent on-site audit during the week of September 20, 2010. Due to the extensive number of actual component types subject to an AMR, the staff developed a statistical method to sample the Seabrook material and environment component information submitted by the applicant as part of the LRA. A random sample of 35 components was selected in advance for the on-site audit. The staff assigned sequential numbers to all component groups (i.e., line items) in the Seabrook LRA tables. A random number generator was then used to select the 35 sample generic component types. The staff then developed tables of the information in the LRA for the specific components in the sample for walkdowns during the audit. These specific line items were provided to the applicant prior to the audit to ensure that references and examples of component types could be provided for inspection and validation.

The staff performed the on location material/environment verification by walkdowns and by review of Seabrook's plant-specific reference materials. These reference documents included Seabrook's UFSAR, plant system and design drawings, and component vendor manuals. The staff was able to visually inspect 21 of the 35 randomly selected generic component types from Table 3 of the LRA. The example component items selected represented components that could be readily accessed by a walkdown inside and outside of the physical plant.

During the staff review of the 35 selected line items, 34 line items of generic material environments were verified by the staff to be correct in the LRA application Table 3. The staff was informed during its walkdown that the "Auxiliary Boiler Flame arrestor" in LRA Table 3.3.2-1 was not correct in regards to being listed as a steel component; the component appeared to be aluminum. It was necessary for the applicant to contact the manufacturer of this component to verify the material. The manufacture did confirm the component's material was aluminum which the applicant then physically verified by accessing the component. This action was completed prior to the audit team's arrival.

An action request report was generated and a revision to the LRA source document will be issued.

This random selection of these components permitted the staff to estimate the accuracy of Seabrook's in-scope screened component material and environment information. Based on the results of the survey, the staff estimates that the Seabrook's LRA information on component material and environment is 97 percent accurate and we are 95 percent certain that the information is greater than 92 percent accurate.

March 21, 2011

Mr. Paul Freeman
Site Vice President
c/o Mr. Michael O'Keefe
NextEra energy Seabrook, LLC
P.O. Box 300
Seabrook, NH 03874

SUBJECT: AUDIT REPORT REGARDING THE SEABROOK STATION LICENSE RENEWAL APPLICATION (TAC NUMBER ME4028)

Dear Mr. Freeman:

By letter dated May 25, 2010, NextEra Energy Seabrook, LLC submitted an application pursuant to Title 10 of the *Code of Federal Regulations* Part 54, to renew the operating licenses for Seabrook Station, Unit 1, for review by the U.S. Nuclear Regulatory Commission (NRC or the staff). On October 22, 2010, the staff completed the on-site audit of aging management programs. The audit report is enclosed.

If you have any questions, please contact me by telephone at 301-415-1427 or by e-mail at richard.plasse@nrc.gov.

Sincerely,

/RA/

Richard A. Plasse, Project Manager
Projects Branch 2
Division of License Renewal
Office of Nuclear Reactor Regulation

Docket No. 50-443

Enclosure:
As stated

cc w/encl: Listserv

DISTRIBUTION:
See next page

ADAMS Accession Number: ML110280424 *concurrence via e-mail

OFFICE	LA:DLR	PM:RPB2:DLR	BC:RPB2:DLR	(A)BC:RARB:DLR*
NAME	SFigueroa	RPlasse	DWrona	ADias
DATE	03/17/2011	03/18/2011	03/18/2011	03/21/2011
OFFICE	BC:RAPB:DLR*	BC:RASB:DLR*	PM:RPB2:DLR	
NAME	DPelton	RAuluck	RPlasse	
DATE	03/17/2011	03/18/2011	0321/2011	

OFFICIAL RECORD COPY

Letter to Paul Freeman from Richard A. Plasse dated March 21, 2011

SUBJECT: AUDIT REPORT REGARDING THE SEABROOK STATION LICENSE RENEWAL APPLICATION (TAC NUMBER ME4028)

DISTRIBUTION:

HARD COPY:
DLR R/F

E-MAIL:
PUBLIC
RidsNrrDlr Resource
RidsNrrDlrRpb1 Resource
RidsNrrDlrRpb2 Resource
RidsNrrDlrRarb Resource
RidsNrrDlrRapb Resource
RidsNrrDlrRasb Resource
RidsNrrDlrRerb Resource
RidsNrrDlrRpob Resource
RidsNrrDraApla Resource

JSusco
RPlasse
BPham
DWrona
EMiller
ICouret, OPA
EDacus, OCA
MSpencer, OGC
WRaymond, RI
DTifft, RI
NMcNamara, RI
NSheehan, RI
DScrenci, RI
JJohnson, RI
ABurritt, RI