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

February 28, 2012

Mr. Michael P. Gallagher
Vice President License Renewal Projects
Exelon Generation Company, LLC
200 Exelon Way
Kennett Square, PA 19348

SUBJECT: AGING MANAGEMENT PROGRAMS AUDIT REPORT REGARDING THE LIMERICK GENERATING STATION, UNITS 1 AND 2 (TAC NOS. ME6555 AND ME6556)

Dear Mr. Gallagher:

By letter, dated June 22, 2011, Exelon Generation Company, LLC (or the applicant) submitted an application for renewal of operating licenses NPF-39 and NPF-85 for the Limerick Generating Station (LGS) Units 1 and 2. On October 14, 2011, the staff of the U.S. Nuclear Regulatory Commission (NRC or 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 301-415-3733 or by e-mail at Robert.Kuntz@nrc.gov.

Sincerely,

Robert F. Kuntz, Senior Project Manager
Projects Branch 1
Division of License Renewal
Office of Nuclear Reactor Regulation

Docket Nos. 50-352 and 50-353

Enclosure:
As stated

cc w/encl: Listserv

U.S. NUCLEAR REGULATORY COMMISSION

OFFICE OF NUCLEAR REACTOR REGULATION, DIVISION OF LICENSE RENEWAL

Docket Nos:	50-352 and 50-353
License Nos:	NPF-39 and NPF-85
Licensee:	Exelon Generation Company, LLC
Facility:	Limerick Generating Station, Units 1 and 2
Location:	3146 Sanatoga Road Pottstown, PA, 19464
Dates:	October 3 through October 14, 2011
Reviewers:	R. Kuntz, Sr. Project Manager, Audit Team Leader, Division of License Renewal (DLR) R. Auluck, Branch Chief, DLR D. Pelton, Branch Chief, DLR A. Hiser, Senior Advisor, DLR W. Holston, Sr. Mechanical Engineer, DLR J. Klos, Mechanical Engineer, DLR C. Ng, Mechanical Engineer, DLR B. Fu, Mechanical Engineer, DLR S. Min, Mechanical Engineer, DLR O. Yee, Mechanical Engineer, DLR T. Morgan, Mechanical Engineer, DE P. Purtscher, Mechanical Engineer, DE A. Buford, Structural Engineer, DLR A. Prinaris, Structural Engineer, DLR A. Sheikh, Sr. Structural Engineer, DLR A. Istar, Structural Engineer, DLR D. Brittner, Mechanical Engineer, DLR C. Doutt, Sr. Electrical Engineer, DLR D. Nguyen, Electrical Engineer, DLR R. Li, Electrical Engineer, DLR D. Naus, Consultant (Oak Ridge National Lab)

Introduction

A 10-day audit was conducted by the U.S. Nuclear Regulatory Commission staff (NRC or the staff) at the Limerick Generating Station (LGS), Units 1 and 2, in Limerick, PA, from October 3-14, 2011. The purpose of this audit was to examine Exelon Generation Company, LLC's (Exelon's) aging management programs (AMPs) and related documentation to verify the applicant's claim of consistency with the corresponding Generic Aging Lessons Learned (GALL) Report (NUREG-1801, Revision 2) AMPs. As described in the GALL Report, the staff based its evaluation of the adequacy of each AMP on its review of the following 10 AMP program elements: 1) scope of program, 2) preventive actions, 3) parameters monitored or inspected, 4) detection of aging effect, 5) monitoring and trending, 6) acceptance criteria, 7) corrective actions, 8) confirmation process, 9) administrative controls, and 10) operating experience.

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

The Standard Review Plan for Review of LRAs for Nuclear Power Plants (SRP-LR) (NUREG-1800, Revision 2) provides the staff guidance for reviewing an LRA. The SRP-LR allows an applicant to reference in its LRA, the AMPs described in the GALL Report. By referencing the GALL 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, preventive actions, parameters monitored or inspected, detection of aging effects, monitoring and trending, acceptance criteria, and operating experience). These elements of the applicant's AMPs were claimed to be consistent with the GALL Report and 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 May 16-20, 2011, and are evaluated separately. The staff audited all AMPs that the applicant stated were consistent with the GALL Report AMPs.

During this audit, 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. In addition, the staff verified the conditions at the plant were bounded by the conditions for which the GALL Report program was evaluated.

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, 45 AMPs were reviewed and 32 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

Summary of Information in the Application. The LRA 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 Report AMP XI.M1, "ASME Section XI Inservice Inspection, Subsections IWB, IWC and IWD." To verify this claim of consistency, the staff audited LRA AMP B.2.1.1.

Audit Activities. 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: "cracking," "failure," "degradation" and "weld."

The table below lists the documents which 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. LGS-AMP-B.2.1.1	ASME Section XI Inservice Inspection, Subsections IWB, IWC and IWD	Revision 0
2. AR01149230	Small Leak in Weld on ESW Piping	12/07/2010
3. AR01149230	ESW Piping HBC-247 Has Pinhole Leak	07/26/2010
4. AR00990204	A ESW Discharge Pipe Leak	11/07/2009
5. AR00902110	Core Spray Piping Weld P8AD Anomaly	04/02/2009
6. AR00903914	Re-examination of Core Spray Piping Weld P8AD Indication	04/07/2009
7. LG-AMP-PBD-XI.M1	Program Basis Document GALL Program XI.M1	Revision 1 05/18/2011
8. ER-LG-330-1002	ISI Augmented Inspection Programs	Revision 0 03/11/2005
9. ER-AA-330-1002	Limerick Inservice Inspection (ISI) Program Health Report 2nd Quarter 2011	Revision 4
10. ER-LG-330-1001	Limerick Generating Station Units 1 & 2, ISI Program Plan	Revision 1

During the audit of program elements one through six, the staff found that program elements "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 AMP.

During the audit of the "operating experience" program element, 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 staff also found that 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 adequate to detect and manage the effects of aging.

The staff also audited the description of the LRA AMP provided in the UFSAR Supplement. The staff verified this description is consistent with the description provided in the SRP-LR.

Audit Results. Based on this audit, the staff verified that LRA program elements "scope of program," "preventive actions," "parameters monitored or inspected," "detection of aging effects," "monitoring and trending," and "acceptance criteria" are consistent with the corresponding program elements in GALL Report AMP XI.M1.

Based on this audit, the staff also verified that the operating experience is sufficient to indicate that LRA AMP B.2.1.1, as implemented by the applicant, is sufficient to detect and manage the effects of aging. In addition, the staff verified that the description provided in the UFSAR Supplement is consistent with the description provided in the SRP-LR.

LRA AMP B.2.1.2, Water Chemistry

Summary of Information in the Application. The LRA states that AMP B.2.1.2, "Water Chemistry," is an existing program that is consistent with the program elements in GALL Report AMP XI.M2, "Water Chemistry." To verify this claim of consistency, the staff audited the LRA AMP. Issues identified but not resolved in this report will be addressed in the SER.

Audit Activities. 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: "stress corrosion cracking," "pitting," and "cracking."

The table below lists the documents which 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. LG-AMP-PBD-XI.M2	Limerick Generating Station Units 1 and 2, License Renewal Project, Water Chemistry	Revision 1 05/18/2011
2. CY-AB-120-1000	Exelon Nuclear: BWR Strategic Water Chemistry Plan	Revision 10
3. BWRVIP-190, 1016579	BWRV-190: BWR Vessel and Internals Project BWR Water Chemistry Guidelines- 2008 Revision	2008 Revision, Final Report, 10/2008
4. CY-AB-120-100	Exelon Nuclear: Reactor Water Chemistry	Revision 10
5. CY-AB-120-200	Storage Tanks Chemistry	Revision 7

During the audit of program elements one through six, the staff verified that the "scope of program," "preventive actions," "parameters monitored or inspected," "detection of aging effects," "monitoring and trending," and "acceptance criteria" program elements of the LRA AMP are consistent with the corresponding elements of the GALL Report AMP.

During the audit of the "operating experience" program element, the staff determined 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 staff also determined that 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 the effects of aging.

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 subject discussed below.

- The LRA's UFSAR Supplement omits a reference to the EPRI (Electric Power Research Institute) BWRVIP-190 Water Chemistry guideline.

Audit Results. Based on this audit, the staff verified that the "scope of program," "preventive actions," "parameters monitored or inspected," "detection of aging effects," "monitoring and trending," and "acceptance criteria" program elements of the LRA AMP are consistent with the corresponding program elements in GALL Report AMP XI.M2.

Based on this audit, the staff also verified that the operating experience is sufficient to indicate that the LRA AMP, as implemented by the applicant, is sufficient to detect and manage the effects of aging. In addition, the staff identified a need for additional information regarding the adequacy of the program description in the UFSAR Supplement.

LRA AMP B.2.1.3, Reactor Head Closure Studs Program

Summary of Information in the Application. The LRA states that AMP B.2.1.3, "Reactor Head Closure Studs Program" is an existing program which is consistent with the program elements in GALL Report AMP XI.M3, "Reactor Head Closure Studs." To verify this claim of consistency, the staff audited the LRA AMP. Issues identified but not resolved in this report will be addressed in the SER.

Audit Activities. 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 such as: "bolt," "closure stud," "stress corrosion cracking," "corrosi," and "inspection."

The table below lists the documents which were reviewed by the staff and found relevant to the audit. These documents were either provided by the applicant or were identified during the staff's audit and review of the applicant's program.

Relevant Documents Reviewed

Document	Title	Revision / Date
1.LG-AMP-PBD-XI.M3	Reactor Head Closure Stud Bolting Program Basis Document	Revision 1 05/26/2011
2. M-041-400	Reactor Pressure Vessel Reassembly	Revision 27
3. IDH#1224947	Henkel MSDS for DAG 156 (Thread Lubricant)	02/05/2009
4. ER-AA-335-014	VT-1 Visual Examination	Revision 6
5. MAG-CG-407	Visual Examination of Pumps, Valves, Bolting, and Component Supports	Revision 7

Document	Title	Revision / Date
6. ER-AA-330-002	Inservice Inspection of Section XI Welds and Components	Revision 9
7. ML11209B709	ISI Summary Report Limerick Generating Station Unit 2	06/29/2009
8. ML101970123	ISI Summary Report Limerick Generating Station Unit 1	07/06/2010

During the audit of program elements one through six, the staff verified that the "scope of program," "parameters monitored or inspected," "detection of aging effects," "monitoring and trending," and "acceptance criteria" program elements of the LRA AMP are consistent with the corresponding elements of the GALL Report AMP. In addition, the staff found that for the "preventive actions" program element, sufficient information was not available to determine whether it was consistent with the corresponding program elements of the GALL Report AMP. In order to obtain the information necessary to verify whether this program element is consistent with the corresponding program elements of the GALL Report AMP, the staff will consider issuing RAIs for the subject discussed below.

- GALL Report AMP XI.M3 "preventive actions" program element lists preventive measures that can reduce the potential for stress corrosion cracking (SCC) or intergranular stress corrosion cracking (IGSCC), these measures include (1) using bolting material for closure studs that has an actual measured yield strength less than 150 ksi, and (2) using manganese phosphate or other acceptable surface treatments.

  During its audit, the staff noted that the applicant's onsite documents for its Reactor Head Closure Studs Program indicate that some of the closure studs and nuts are manufactured from material with actual measured yield strength greater than 150 ksi.

  The staff also noted that the LRA AMP states that the reactor head closure studs, nuts, bushings, flange threads, and washers are surface treated with an acceptable phosphate coating to inhibit corrosion and reduce SCC and IGSCC. However, the applicant's UFSAR Section 5.3.1.11, states that a phosphate coating is applied to threaded areas of studs and nuts and bearing areas of nuts and washers. The staff found a need to clarify whether or not the flange threads have a coating and if the coating on the closure bolting components is intact and is effective in managing corrosion and SCC of the bolting components, supporting the effectiveness of the coating for the period of extended operation. In order to obtain the information necessary to resolve the noted discrepancies, the staff will consider issuing RAIs for the subjects discussed below:

  - Clarify if closure studs and nuts manufactured from material with actual measured yield strength greater than 150 ksi will continue to be used in the period of extended operation.

  - Provide justification of the adequacy of the aging management program to manage loss of material due to corrosion and stress corrosion cracking in the high-strength material.

  - Clarification as to whether a phosphate coating is applied to the flange threads and whether the coating applied to the closure bolting components is intact.

During the audit of the "operating experience" program element, the staff determined 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 staff also determined that 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 the effects of aging.

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.

Audit Results. Based on this audit, the staff verified that the "scope of program," "parameters monitored or inspected," "detection of aging effects," "monitoring and trending," and "acceptance criteria" program elements of the LRA AMP are consistent with the corresponding elements of the GALL Report AMP. The staff also identified certain aspects of the "preventative actions" program element of the LRA AMP for which an exception to the GALL Report AMP was noted and will require additional information and evaluations. The staff's evaluation of the aspects of the program element associated with the noted exception will be addressed in the SER.

Based on this audit, the staff also verified that the operating experience is sufficient to indicate that the LRA AMP, as implemented by the applicant, is sufficient to detect and manage the effects of aging. In addition, the staff verified that the description provided in the UFSAR Supplement is consistent with the description provided in the SRP-LR.

LRA AMP B.2.1.4, BWR Vessel ID Attachment Welds

Summary of Information in the Application. The LRA states that AMP B.2.1.4, "BWR Vessel ID Attachment Welds," is an existing program that is consistent with the program elements in GALL Report AMP X1.M4, "BWR Vessel ID Attachment Welds." To verify this claim of consistency, the staff audited the LRA AMP. Issues identified but not resolved in this report will be addressed in the SER.

Audit Activities. 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: "attachment welds," "steam dryer," "jet pump," and "core spray."

The table below lists the documents which 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. LG-AMP-PBD-XI.M4	Program Basis Document – BWR Vessel ID Attachment Welds	Revision 2
2. BWRVIP-52-A	Shroud Support and Vessel Bracket Repair Design Criteria	9/2005
3. BWRVIP-48-A	Vessel ID Attachment Weld Inspection and Flaw Evaluation Guidelines	6/2004
4. ER-LG-330-1001	Limerick Generating Station, Units 1 & 2, ISI Program Plan	Revision 1

Document	Title	Revision / Date
5. ER-LG-330-1005	Limerick Generating Station, Units 1 & 2, ISI Selection Document	Revision 1
6. ER-AB-331	BWR Internal Program Management	Revision 10
7. ER-LG-331	Attachment 15, Augmented Inspection Program – AUG28 RPV Internal Attachment Welds.	Revision 1
8. AR 01049983	INR-LI1R13-IVVI-10-23 Wear on Steam Dryer Support Brackets	03/30/2010
9. AR 01051878	INR-LI1R13-IVVI-10-23 Rev 1 Wear on Steam Dryer Support Brackets	04/04/2010

During the audit of program elements one through six, the staff verified that "preventive actions," "parameters monitored or inspected," "detection of aging effects," "monitoring and trending," and "acceptance criteria" program elements of the LRA AMP are consistent with the corresponding elements of the GALL Report AMP. For the "scope of program," program element, sufficient information was not available to determine whether it was consistent with the corresponding program elements of the GALL Report AMP. In order to obtain the information necessary to verify whether this program element is consistent with the corresponding program element of the GALL Report AMP, the staff will consider issuing an RAI for the subject discussed below.

- LRA Section B.2.1.4 states that the BWR Vessel ID Attachment Welds Program is an existing condition monitoring program that also manages the effects of loss of material due to wear of the steam dryer support brackets by using a VT-3 inspection. GALL Report AMP XI.M4 indicates that the program is focused on managing the effects of cracking. It is not clear to the staff whether the VT-3 inspection is an appropriate and effective inspection method to identify loss of material of the steam dryer support brackets.

During the audit of the "operating experience" program element, the staff determined 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 staff also determined that 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 the effects of aging.

During its audit, the staff noted in a corrective action document (AR 01049983), that the applicant determined that wear of the steam dryer support bracket at the 94-degree location is likely to continue. However, the applicant also determined that it is unlikely to create any structural impact or loose pieces during the next cycle and found it acceptable to leave the condition as-is for the next cycle. The applicant plans to inspect the 94-degree steam dryer support bracket again at the next refueling outage (L1R14).

The staff also audited the description of the LRA AMP provided in the UFSAR Supplement. The staff verified this description is consistent with the description provided in the SRP-LR.

Audit Results. Based on this audit, the staff verified that the "preventive actions," "parameters monitored or inspected," "detection of aging effects," "monitoring and trending," and "acceptance criteria" program elements of the LRA AMP are consistent with the corresponding program elements in GALL Report AMP XI.M4. The staff also identified certain aspects of the "scope of

program" program element of the LRA AMP for which additional information or additional evaluation is required before consistency can be determined.

Based on this audit, the staff also verified that the operating experience is sufficient to indicate that the LRA AMP, as implemented by the applicant, is sufficient to detect and manage the effects of aging. In addition, the staff verified that the description provided in the UFSAR Supplement is consistent with the description provided in the SRP-LR.

LRA AMP B.2.1.5, BWR Feedwater Nozzle

Summary of Information in the Application. The LRA states that AMP B.2.1.5, "BWR Feedwater Nozzle," is an existing program that is consistent with the program elements in GALL Report AMP X1.M5, "BWR Feedwater Nozzle." To verify this claim of consistency, the staff audited the LRA AMP.

Audit Activities. 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: "feedwater nozzle," "NUREG-0619," "N4A," "triple thermal sleeve," "feedwater spargers," and "N4D."

The table below lists the documents which 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. LG-AMP-PBD-XI.M5	Program Basis Document – BWR Feedwater Nozzle	Revision 2
2. GE-NE-523-A71-0594-A	Alternate BWR Feedwater Nozzle Inspection Requirements	Revision 1
3. ER-AA-330	Conduct of Inservice Inspection Activities	Revision 8
4. ER-LG-330-1002	Limerick Generating Station, Units 1 & 2, ISI Augmented Inspection Program – AUG 02 BWR Feedwater Nozzle Inspection Requirements.	Revision 0
5. SIL No. 568	Feedwater Sparger End Bracket Degradation	Revision 0

During the audit of program elements one through six, the staff verified that the "scope of program," "preventive actions," "parameters monitored or inspected," "detection of aging effects," "monitoring and trending," and "acceptance criteria" program elements of the LRA AMP are consistent with the corresponding elements of the GALL Report AMP.

During the audit of the "operating experience" program element, the staff determined 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 staff also determined that 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 the effects of aging.

The staff also audited the description of the LRA AMP provided in the UFSAR Supplement. The staff verified this description is consistent with the description provided in the SRP-LR.

Audit Results. Based on this audit, the staff verified that the "scope of program," "preventive actions," "parameters monitored or inspected," "detection of aging effects," "monitoring and trending," and "acceptance criteria" program elements of the LRA AMP are consistent with the corresponding program elements in GALL Report AMP XI.M5.

Based on this audit, the staff also verified that the operating experience is sufficient to indicate that the LRA AMP, as implemented by the applicant, is sufficient to detect and manage the effects of aging. In addition, the staff verified that the description provided in the UFSAR Supplement is consistent with the description provided in the SRP-LR.

LRA AMP B.2.1.6, BWR Control Rod Drive Return Line Nozzle

Summary of Information in the Application. The LRA states that AMP B.2.1.6, "BWR Control Rod Drive Return Line Nozzle," is an existing program with an enhancement that is consistent with the program elements in GALL Report AMP XI.M6, "BWR Control Rod Drive Return Line Nozzle." To verify this claim of consistency, the staff audited the LRA AMP. The scope of this audit includes enhancements necessary to make the LRA AMP consistent with the corresponding GALL Report AMP; however, it does not consider the sufficiency of enhancements which are not necessary for consistency, which will be evaluated in the SER.

Audit Activities. 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: "stress corrosion cracking," "fatigue," and "degradation."

The table below lists the documents which 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. LG-AMP-PBD-XI.M6	Program Basis Document – BWR Control Rod Drive Return Line Nozzle	Revision 2 05/18/2011
2. ISI Component Examination Results	Limerick 1R12 ISI Component Examination Results – (results specially related to CRD return (capped) nozzle inside radius section/nozzle to vessel weld/nozzle to cap	Unit 1 R12
3. ISI Component Examination Results	Limerick 2R08 ISI Component Examination Results – (results specially related to CRD return (capped) nozzle inside radius section/nozzle to vessel weld/nozzle to cap	Unit 2 R08
4. DWG-No. XI-BF-9	Units 1 and 2 Drawing – 6"Control Rod Drive Hydraulic Return – Capped Nozzle	10/05/1989
5. BWRVIP-75A	BWR Vessel and Internals Project Technical Basis for Revisions to Generic Letter 88-01 Inspection Schedules	10/ 2005
6. ER-AA-330-009	ASME Section XI Repair/Replacement Program	Revision 6
7. ER-LG-330-1001	Limerick Generating Station Units 1 and 2 – ISI Program Plan	Revision 1

Relevant Documents Reviewed

Document	Title	Revision / Date
8. ER-LG-330-1005	Limerick Generating Station Units 1 and 2 – ISI Selection Document – Third Ten-Year Inspection Plan	Revision 1
9. CY-AB-120-100	Reactor Water Chemistry	Revision 10
10. ER-AA-330-02	Inservice Inspection of Section XI Welds and Components	Revision 9
11. ER-LG-330-1002	Limerick Generating Station Units 1 and 2 – ISI Augmented Inspection Programs	Revision 0
12. ER-AA-330-009	ASME Section XI Repair/Replacement Program	Revision 6
13. ER-AA-330	Conduct of Inservice Inspection Activities	Revision 8
14. Report No. D-4147	Limerick Unit 1 – Examination Summary – (nozzle-to-vessel weld, nozzle to vessel inner radius and nozzle-to-cap weld)	05/06/1992
15. Summary No. 602090	GE Inspection Service – Inspection Checklist – Limerick Generating Station, Unit 1 – R07 (Nozzle to Cap weld)	03/18/1998
16. Summary No. 711500, 71160 and 722970	GE Inspection Service – Inspection Checklist – Limerick Generating Station, Unit 1 – R07	01/31/1995; 01/31/1995; 02/07/1995

The staff conducted its audit of LRA program elements one through six based on the contents of the existing program as modified by the proposed enhancement.

During the audit, the staff verified that the "scope of program," "preventive actions," "parameters monitored or inspected," "detection of aging effects," "monitoring and trending," and "acceptance criteria" program elements of the LRA AMP are consistent with the corresponding elements of the GALL Report AMP.

The staff reviewed the inservice inspection results for LGS, Unit 1 from 1992, 1998 and 2008 and for LGS, Unit 2 from 1995 and 2005. The staff confirmed that the volumetric inspections were performed and that there were no recordable indications for the CRD inner radius, nozzle-to-vessel weld and nozzle-to-cap weld.

During the audit of the "operating experience" program element, the staff determined 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 staff also determined that 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 the effects of aging.

The staff also audited the description of the LRA AMP provided in the UFSAR Supplement. The staff verified this description to be consistent with the description provided in the SRP-LR.

Audit Results. Based on this audit, the staff verified that the "scope of program," "preventive actions," "parameters monitored or inspected," "detection of aging effects," "monitoring and trending," and "acceptance criteria" program elements of the LRA AMP are consistent with the corresponding program elements in GALL Report AMP XI.M6.

Based on this audit, the staff also verified that the operating experience is sufficient to indicate that the LRA AMP, as implemented by the applicant, is sufficient to detect and manage the

effects of aging. In addition, the staff verified that the description provided in the UFSAR Supplement is consistent with the description provided in the SRP-LR.

LRA AMP B.2.1.7, BWR Stress Corrosion Cracking

Summary of Information in the Application. The LRA states that AMP B.2.1.7, "BWR Stress Corrosion Cracking," is an existing program that is consistent with the program elements in GALL Report AMP XI.M7, "BWR Stress Corrosion Cracking." To verify this claim of consistency, the staff audited the LRA AMP. Issues identified but not resolved in this report will be addressed in the SER.

Audit Activities. 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: "stress corrosion crack," "crack," "IGSCC," "SCC," "flaw," and "degradation."

The table below lists the documents which 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. LG-AMP-PBD-XI.M7	License Renewal Project Aging Management Program Basis Document, BWR Stress Corrosion Cracking	Revision 2 05/13//2011
2. ER-QQ-330-1002	Limerick Inservice Inspection (ISI) Program Health Report	Revision 4
3. AR 00922801	Unexpected HWC Tripped and Trouble Alarms	05/22/2009
4. ER-LG-330-1002	ISI Augmented Inspection Programs	Revision 0 05/21/2009
5. ER-LG-330-1005	ISI Selection Document Third Ten-Year Inspection Interval	Revision 1 11/20/2009
6. No Document No.	Section 14, "IGSCC," attached to ISI Selection Document Third Ten-Year Inspection Interval (Description: Unit 1 IGSCC Category B through G Welds Distribution Summary and IGSCC Category B through G Welds Selection)	Revision 0 02/06/2009
7. No Document No.	Section 15, "IGSCC," attached to ISI Selection Document Third Ten-Year Inspection Interval (Description: Unit 2 IGSCC Category B through G Welds Distribution Summary and IGSCC Category B through G Welds Selection)	Revision 1 09/04/2009
8. AR 00709152	Results of Weld Re-review of the LGS U/1 N5A Nozzle to Safe	12/08/2007
9. No Document No.	Response to NRC Generic Letter 88-01 "NRC Position on IGSCC in BWR Austenitic Stainless Steel Piping" for Limerick Generating Station	08/02/1988
10. No Document No.	Generic Letter 88-01 (TAC NOS. 69143 and 69144)	03/06/1990
11. No Document No.	Limerick Generating Station, Units 1 and 2 Response to NRC Letter Dated March 6, 1990, Results of NRC Review of Submittals Responding to NRC Generic Letter 88-01, "NRC Position on IGSCC in BWR Austenitic Stainless Steel Piping"	06/08/1990
12. No Document No.	Generic Letter 88-01 (TAC NOS. 69143 and 69144)	10/22/1990
13. AR 01100600	Incorrect IGSCC Classification of RWCU Welds	08/11/2010
14. IR 01272270	Error in ISI Augmented Program – AUG-07 Table	10/04/2011

Relevant Documents Reviewed

Document	Title	Revision / Date
15. No Document No.	Limerick Generating Station, Units 1 and 2 – Evaluation of Relief Requests I3R-02, I3R-05, I3R-06, I3R-07, I3R-08, I3R-09, I3R-10, I3R-11, I3R-12, Associated with the Third Inservice Inspection Interval (TAC NOS. MD5200 AND MD5201)	03/11/2008

During the audit of program elements one through six, the staff verified that the "preventive actions," "parameters monitored or inspected," "monitoring and trending," and "acceptance criteria" program elements of the LRA AMP are consistent with the corresponding elements of the GALL Report AMP. For the "scope of program," and "detection of aging effects," program elements sufficient information was not available to determine whether they were consistent with the corresponding program elements of the GALL Report AMP. In order to obtain the information necessary to verify whether these program elements are consistent with the corresponding program elements of the GALL Report AMP, the staff will consider issuing RAIs for the subjects discussed below.

- The "scope of program" program element of the LRA AMP states that the program implements the program delineated in NUREG-0313, Revision 2, Generic Letter (GL) 88-01 and its Supplement 1. The GALL Report AMP states that NUREG-0313, Revision 2 and NRC GL 88-01 delineate the guidance for selection of resistant materials and processes that provide resistance to inter granular stress corrosion cracking (IGSCC) such as solution heat treatment and stress improvement processes. During the audit, the staff noted that the applicant's inservice inspection program plan indicates that the following welds of LGS, Units 1 and 2 are made of Alloy 182 with Alloy 182 weld butter: (1) recirculation outlet nozzle to safe end welds for Loops A and B, (2) jet pump instrumentation nozzle to safe end welds for Loops A and B, and (3) control rod drive return nozzle to cap welds. Based on the guidance in GL 88-01, Attachment A, "Staff Position on Materials," the Alloy 182 welds of LGS, Units 1 and 2 are not resistant to IGSCC. However, the program basis document and onsite documentation indicate that the Alloy 182 welds of LGS, Unit 2 are categorized to IGSCC Category A (resistant material), which is inconsistent with GL 88-01. Therefore, the staff found a need to further clarify the following items regarding the Alloy 182 welds of LGS, Unit 2: (1) the proper IGSCC categories of these welds, (2) the basis of the applicant's categorization of these welds, and (3) consistency of the applicant's categorization with GL 88-01 and the IGSCC categorization of the LGS, Unit 1 Alloy 182 welds.

- The "scope of program" program element of the LRA AMP states that this program manages IGSCC in reactor coolant pressure boundary piping (RCPB) and piping components made of stainless steel and nickel-based alloy in a reactor coolant environment. The GALL Report AMP states that the program is applicable to all BWR piping and piping welds made of austenitic stainless steel and nickel alloy that are 4 inches or larger in nominal diameter containing reactor coolant at a temperature above 93 °C (200 °F) during power operation, regardless of code classification. It is not clear to the staff that the applicant's program clearly indicates whether or not the scope of the program includes relevant non-RCPB piping and piping welds regardless of the code classification.

- The "detection of aging effect" program element of the LRA AMP states that welds classified as Category A have been subsumed into the Risk-Informed Inservice Inspection (RISI) program in accordance with staff-approved Electric Power Research Institute (EPRI) Topical Report TR-112657, Revision B-A, Final Report, "Revised Risk-Informed Inservice Inspection Evaluation Procedure," December 1999. The GALL Report AMP states that the extent, method, and schedule of the inspection and test techniques delineated in GL 88-01 or BWRVIP-75-A are designed to maintain structural integrity and ensure that aging effects are discovered and repaired before the loss of intended function of the component. It is not clear to the staff that the applicant's approved relief request for using the RISI methodology for the third 10-year inservice inspection interval, which is scheduled to end on January 31, 2017, will continue for using this risk-informed method as an alternative to the ASME Code Section XI inservice inspection requirements for piping and the inspection requirements of GL 88-01.

During the audit of the "operating experience" program element, the staff determined 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 staff also determined that 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 the effects of aging.

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 subjects discussed below.

- The UFSAR Supplement states that the BWR Stress Corrosion Cracking aging management program is an existing augmented inservice inspection program that manages IGSCC in reactor coolant pressure boundary piping and piping components made of stainless steel and nickel based alloy as delineated in NUREG-0313, Revision 2, and NRC Generic Letter 88-01 and its Supplement 1. It is not clear to the staff that the UFSAR Supplement clearly addresses whether the program scope includes relevant piping and piping components regardless of code classification, consistent with the GALL Report recommendations.

- The UFSAR Supplement states that the schedule and extent of the inspections are performed in accordance with the NRC staff-approved BWRVIP-75-A report for normal water chemistry conditions, and staff-approved EPRI Topical Report TR-112657, Revision B-A, Final Report, "Risk-Informed Inservice Inspection Evaluation Procedure," December 1999. However, the staff finds that the applicant's relief request for using the risk-informed inservice inspection methodology is approved for the third 10-year inservice inspection interval, which is scheduled to end on January 31, 2017, and the applicant should continue to get NRC approval for using this risk-informed method as an alternative to the ASME Code Section XI inservice inspection requirements for piping and the inspection requirements of GL 88-01; therefore, this portion of the UFSAR Supplement may need revising to remove the applicant's reference to the risk-informed

inservice inspection methodology, which is approved for the third 10-year inservice inspection interval, but not approved permanently.

Audit Results. Based on this audit, the staff verified that the "preventive actions," "parameters monitored or inspected," "monitoring and trending," and "acceptance criteria" program elements of the LRA AMP are consistent with the corresponding program elements in GALL Report AMP XI.M7. The staff also identified certain aspects of the "scope of program," and "detection of aging effects" program elements of the LRA AMP, for which additional information or additional evaluation is required before consistency can be determined.

Based on this audit, the staff also verified that the operating experience is sufficient to indicate that the LRA AMP, as implemented by the applicant, is sufficient to detect and manage the effects of aging. In addition, the staff identified a need for additional information regarding the adequacy of the program description in the UFSAR Supplement.

LRA AMP B.2.1.8, BWR Penetrations

Summary of Information in the Application. The LRA states that AMP B.2.1.8, "BWR Penetrations," is an existing program that is consistent with the program elements in GALL Report AMP XI.M8, "BWR Penetrations." To verify this claim of consistency, the staff audited the LRA AMP. Issues identified but not resolved in this report will be addressed in the SER.

Audit Activities. 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: "nozzle," "crack," "stress corrosion cracking," "SCC," "vessel," "flaw," and "degradation."

The table below lists the documents which 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. LG-AMP-PBD-XI.M8	Program Basis Document BWR Penetrations	Revision 1 05/026/2011
2. AR 00905725	CRD 42-70 Leaking 24 DPM	04/10/2009
3. LER 353-1997-002	N12B, 2" RPV Instrument Nozzle Safe End Leak	02/12/1997
4. No Document No.	LGS Unit 1 Summary Report for Inservice Inspections (1R13)	06/09/2010
5. No Document No.	LGS Unit 2 Summary Report for Inservice Inspections (2R10)	07/10/2009
6. 2009-096	BWRVIP Inspection Summaries for Spring 2008 Outages	03/16/2009
7. 2010-053	BWRVIP Inspection Summaries for Spring 2009 Outages	02/16/2010
8. CY-AB-120-100	Reactor Water Chemistry	Revision 10
9. ER-LG-331	RPV & Internals Program Bases and Implementation Document	Revision 1
10. ER-AB-331	BWR Internals Program Management	Revision 10

Relevant Documents Reviewed

Document	Title	Revision / Date
11. No Document No.	Clinton Power Station, Unit No. 1; Dresden Nuclear Power Station, Units 2 and 3; LaSalle County Station Units 1 and 2; Limerick Generating Station, Units 1 and 2; Oyster Creek Nuclear Generating Station; Peach Bottom Atomic Power Station, Units 2, and 3; and Quad Cities Nuclear Power Station, Units 1 and 2 – Relief Request to Use Boling Water Reactor Vessel and Integrals Project Guidelines in Lieu of Specific ASME Code Requirements (TAC NOS. MD5352 thru MD5363)	04/30/2008
12. No Document No.	Final Safety Evaluation of "BWR Vessel and Internals Project, BWR Lower Plenum Inspection and Flaw Evaluation Guidelines (BWRVIP-47)," EPRI Report TR-108727 (TAC No. MA1102)	10/13/1999
13. No Document No.	Acceptance for Referencing of Report, "BWR Vessel and Internals Project, BWR Lower Plenum Inspection and Flaw Evaluation Guidelines (BWRVIP-47)," for Compliance with License Renewal Rule (10 CFR Part 54) (TAC NO. MA0790)	12/07/2000
14. No Document No.	Acceptance for Referencing of Report, "BWR Vessel and Internals Project, BWR Instrument Penetration Inspection and Flaw Evaluation Guidelines (BWRVIP-49)," for Compliance with License Renewal Rule (10 CFR Part 54)	12/01/1999

During the audit of program elements one through six, the staff verified that the "scope of program," "preventive actions," "detection of aging effects," "monitoring and trending," and "acceptance criteria" program elements of the LRA AMP are consistent with the corresponding elements of the GALL Report AMP. For the "parameters monitored or inspected" program element, sufficient information was not available to determine whether it was consistent with the corresponding program elements of the GALL Report AMP. In order to obtain the information necessary to verify whether this program element is consistent with the corresponding program elements of the GALL Report AMP, the staff will consider issuing RAIs for the subjects discussed below.

In addition, the staff found that the applicant's LRA and onsite documentation related to the BWR Penetrations Program do not provide applicant's responses to the licensee renewal applicant action items that are addressed in the staff's safety evaluations of BWRVIP-47 and BWRVIP-49 for compliance with the license renewal rule (10 CFR Part 54). In order to obtain the information necessary to verify that the applicant's responses to these action items are adequate to manage the aging effects of the BWR penetrations and their associated welds, the staff will consider issuing RAIs as discussed below.

- The "parameters monitored/inspected" program element of the applicant's program basis document indicates that the program performs the inspections of the control rod drive (CRD) housing and in-core monitoring housing penetrations as part of the Inservice Inspection Program per ASME Code Section XI, Table IWB-2500-1, and currently, BWRVIP-47-A does not require additional inspections of the CRD housing and in-core monitoring housing penetrations. By contrast, Section 3.2.5, "Other Inspections," of BWRVIP-47-A indicates that the BWRVIP has determined that removing or dismantling of internal components for the purpose of performing inspections is not warranted to assure safe operation; however, on occasion, utilities may have access to the lower

plenum due to maintenance activities [which are] not part of normal refueling outage activities. Therefore, the staff may need clarification why the program basis document indicates that BWRVIP-47-A does not require additional inspections for these lower head penetrations (including stub tubes) in addition to the requirements of ASME Code Section XI even though BWRVIP-47-A addresses "other inspections" that will be performed when the applicant has access to the lower plenum region.

- The "parameters monitored/inspected" program element of GALL Report AMP XI.M8, "BWR Penetrations" indicates that the program includes inspections for cracks in accordance with the guidelines of approved BWRVIP-49-A, BWRVIP-47-A or BWRVIP-27-A and the requirements of ASME Code, Section XI, Table IWB 2500-1. The applicant's procedure indicates that a relief request was approved so that the use of the BWRVIP guidance is allowed in lieu of the requirements of ASME Code Section XI, Table IWB-2500-1, Item Numbers B13.30 (for the interior attachments beyond the beltline) and B13.40 (for integrally welded core support structures). The applicant's procedure further indicates that the CRD stub tubes and related welds are the components for which the relief request was approved to use the BWRVIP guidance. By contrast, Attachment 1 to the staff's safety evaluation, dated April 30, 2008, of the applicant's relief request does not list CRD stub tubes or related welds for which the relief request was approved. Therefore, the staff found a need to further clarify why the applicant's implementing procedure for the BWR Penetrations Program includes this discrepancy with respect to the staff evaluation of the applicant's relief request. In addition, the staff found a need to further clarify when the applicant's CRD stub tube to vessel welds and CRD housing to stub tube welds are accessible for inspections.

- The NRC letter, "Acceptance for Referencing of Report BWR Vessel and Internals Project, "BWR Lower Plenum Inspection and Flaw Evaluation Guidelines (BWRVIP-47)," for Compliance with License Renewal Rule (10 CFR Part 54) (TAC NO. MA0790)," dated December 7, 2000, encloses the staff's safety evaluation of BWRVIP-47, for compliance with the license renewal rule (10 CFR Part 54). This letter indicates that in order for licensees participating in the BWRVIP to reference BWRVIP-47-A for license renewal applications, they must complete the license renewal applicant action items described in the licensee renewal safety evaluation. Similarly, the NRC letter, "Acceptance for Referencing of Report BWR Vessel and Internals Project, "BWR Instrument Penetration Inspection and Flaw Evaluation Guidelines (BWRVIP-49)," for Compliance with License Renewal Rule (10 CFR Part 54)," dated September 1, 1999, encloses the staff's safety evaluation of BWRVIP-49, for compliance with the license renewal rule (10 CFR Part 54). This letter also addresses license renewal applicant action items related to BWRVIP-49-A. LRA Section B.2.1.8, which addresses the applicant's BWR Penetration Program, references BWRVIP-49-A, BWRVIP-47-A and BWRVIP-27-A. The LRA also indicates that as stated in BWRVIP-27-A, the guidelines within BWRVIP-27-A, do not apply to plants such as applicant's plant, where standby liquid control system injects via core spray system piping. However, the LRA does not clearly address the applicant's specific responses to the license renewal applicant action items described in the staff's safety evaluations of BWRVIP-47 and BWRVIP-49. Therefore, the staff found a need to request that the applicant provide the responses to these license renewal applicant action items associated with BWRVIP-47-A and BWRVIP-49-A.

During the audit of the "operating experience" program element, the staff determined 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 staff also determined that 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 the effects of aging.

The staff also audited the description of the LRA AMP provided in the UFSAR Supplement. The staff verified this description is consistent with the description provided in the SRP-LR.

Audit Results. Based on this audit, the staff verified that the "scope of program," "preventive actions," "detection of aging effects," "monitoring and trending," and "acceptance criteria" program elements of the LRA AMP are consistent with the corresponding program elements in GALL Report AMP XI.M8. The staff also identified certain aspects of the "parameters monitored or inspected" program element of the LRA AMP require additional information or additional evaluation before consistency can be determined.

Based on this audit, the staff also verified that the operating experience is sufficient to indicate that the LRA AMP, as implemented by the applicant, is sufficient to detect and manage the effects of aging. In addition, the staff verified that the description provided in the UFSAR Supplement is consistent with the description provided in the SRP-LR.

LRA AMP B.2.1.9, BWR Vessel Internals

Summary of Information in the Application. The LRA states that AMP B.1.1.9, "BWR Vessel Internals," is an existing program with enhancements that is consistent with the program elements in GALL Report AMP XI.M9, "BWR Vessel Internals." To verify this claim of consistency, the staff audited the LRA AMP. The scope of this audit includes enhancements necessary to make the LRA AMP consistent with the corresponding GALL Report AMP; however, it does not consider the sufficiency of enhancements which are not necessary for consistency, which will be evaluated in the SER.

Audit Activities. 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: "cast," "stress corrosion cracking," "steel," "bolt," "nickel alloy," "embrittlement," and "jet pump."

The table below lists the documents which 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. LRA B.2.1.9	BWR Vessel Internals	06/22/2011
2. NUREG-1801 XI.M9	BWR Vessel Internals	Revision 2 12/2010
3. ER-AB-331-19	Evaluation for Thermal Aging / Neutron Embrittlement of Reactor Internals Components - Draft	Revision 0

Relevant Documents Reviewed

Document	Title	Revision / Date
4. BWRVIP-234	Thermal Aging and Neutron Embrittlement of Cast Austenitic Stainless Steels for BWR Internals	12/2009
5. NUREG/CR-4513	Estimation of Fracture Toughness of Cast Stainless Steels During Thermal Aging in LWR Systems	Revision 1 5/1994
6. BWRVIP-84	Guidelines for Selection and Use of Materials for Repairs to BWR Internal Components	10/2000
7. ECR 01-00413	Unit 2, Core Shroud Operability	04/18/2001
8.BWRVIP-138	Updated Jet Pump Beam Inspection and Flaw Evaluation Guidelines	Revision 1 12/2008
9. PASSPORT IR 747058	1R12 Jet pump hold down beam UT indications	03/09/2008
10.BWRVIP-41	BWR Jet Pump Assembly Inspection and Flaw Evaluation Guidelines	Revision 1 9/2005

The staff conducted its audit of LRA program elements one through six based on the contents of the existing program as modified by the proposed enhancements. During the audit, the staff verified that the "scope of program," "preventive actions," "parameters monitored or inspected," "detection of aging effects," "monitoring and trending," and "acceptance criteria" program elements of the LRA AMP are consistent with the corresponding elements of the GALL Report AMP.

During the audit of the "operating experience" program element, the staff determined 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 staff also determined that 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 the effects of aging.

The staff also audited the description of the LRA AMP provided in the UFSAR Supplement. The staff verified this description to be consistent with the description provided in the SRP-LR.

Audit Results. Based on this audit, the staff verified that the "scope of program," "preventive actions," "parameters monitored or inspected," "detection of aging effects," "monitoring and trending," and "acceptance criteria" program elements of the LRA AMP are consistent with the corresponding program elements in GALL Report AMP B.2.1.9.

Based on this audit, the staff also verified that the operating experience is sufficient to indicate that the LRA AMP, as implemented by the applicant, is sufficient to detect and manage the effects of aging. In addition, the staff verified that the description provided in the UFSAR Supplement is consistent with the description provided in the SRP-LR.

LRA AMP B.2.1.10, Flow-Accelerated Corrosion

Summary of Information in the Application. The LRA states that AMP B.2.1.10, "Flow-Accelerated Corrosion," is an existing program that is consistent with the program elements in GALL Report AMP XI.M17, "Flow-Accelerated Corrosion." To verify this claim of

consistency, the staff audited the LRA AMP. Issues identified but not resolved in this report will be addressed in the SER.

Audit Activities. 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: "cavitation," "corrosi," "erosi," "flow accelerated," "impingement," "loss of material," and "degradation."

The table below lists the documents which 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. LG-AMP-PBD-XI.M17	Program Basis Document, Flow-Accelerated Corrosion	Revision 2
2. ER-AA-430-1003	Flow Accelerated Corrosion Program Performance Indicators	Revision 1
3. ER-AA-430	Conduct of Flow Accelerated Corrosion Activities	Revision 5
4. ER-AA-430-1001	Guidelines for Flow Accelerated Corrosion Activities	Revision 6
5. ER-AA-430-1002	Feedwater Heater Shell Inspection for Detection of Flow Accelerated Corrosion	Revision 4
6. AR 00755516	INPO OE Digest – Low-Pressure FWH Shell Leakage	03/27/2008
7. AR 01052359	1R13 FAC Inspection HBD-120-2-N02 Has Minimum Wall Values	04/04/2010
8. AR 00607605	Min Wall Indication Below Code Acceptance Criteria	03/22/2007
9. AR 00969177	This is in Response to IR 969177 PSV-006-103B	10/23/2009
10. AR 00568318	Review of Investigation into FAC at Low Temperatures	03/30/2007
11. No Document No.	Program Health Report, Limerick Generating Station Flow Accelerated Corrosion Program	2Q-2011
12. 06-0700-TR-001	Altran Solutions, Technical Report, Limerick Unit 1 System Susceptibility Screening.	Revision 0
13. M-041-084	Limerick Generating Station Moisture Separator Internal Inspections	Revision 0
14. No Document No.	Limerick Generating Station, FAC Program Outage Report – 1R12	No date
15. No Document No.	Limerick Generating Station, FAC Program Outage Report – 1R13	No date
16. No Document No.	Limerick Generating Station, FAC Program Outage Report – 2R10	No date

During the audit of program elements one through six, the staff verified that the "preventive actions," "parameters monitored or inspected," "detection of aging effects," "monitoring and trending," and "acceptance criteria" program elements of the LRA AMP are consistent with the corresponding elements of the GALL Report AMP. For the "scope of program" program element sufficient information was not available to determine whether it was consistent with the corresponding program elements of the GALL Report AMP. In order to obtain the information necessary to verify whether this program element is consistent with the corresponding program element of the GALL Report AMP, the staff will consider issuing RAIs for the subject discussed below.

- The program description of the LRA AMP states that the program provides guidance for prediction, detection, and monitoring of wall thinning due to flow-accelerated corrosion.

However, the staff identified operating experience related to wall thinning due to cavitation, which was being managed by periodic inspections. It is not clear to the staff whether the Flow-Accelerated Corrosion Program, or another program, is being used to monitor the cavitation degradation, and thus the staff is unable to determine whether this aging effect is being adequately managed.

During the audit of the "operating experience" program element, the staff determined 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 staff also determined that 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 the effects of aging.

The staff also audited the description of the LRA AMP provided in the UFSAR Supplement. The staff verified this description is consistent with the description provided in the SRP-LR.

Audit Results. Based on this audit, the staff verified that the "preventive actions," "parameters monitored or inspected," "detection of aging effects," "monitoring and trending," and "acceptance criteria" program elements of the LRA AMP are consistent with the corresponding program elements in GALL Report AMP XI.M17. The staff also identified certain aspects of the "scope of program" program element of the LRA AMP for which additional information or additional evaluation is required before consistency can be determined.

Based on this audit, the staff also verified that the operating experience is sufficient to indicate that the LRA AMP, as implemented by the applicant, is sufficient to detect and manage the effects of aging. In addition, the staff verified that the description provided in the UFSAR Supplement is consistent with the description provided in the SRP-LR.

LRA AMP B.2.1.11, Bolting Integrity

Summary of Information in the Application. The LRA states that AMP B.2.1.11, "Bolting Integrity," is an existing program with enhancements that is consistent with the program elements in GALL Report AMP XI.M18, "Bolting Integrity." To verify this claim of consistency, the staff audited the LRA AMP. Issues identified but not resolved in this report will be addressed in the SER. The scope of this audit includes enhancements necessary to make the LRA AMP consistent with the corresponding GALL Report AMP; however, it does not consider the sufficiency of enhancements which are not necessary for consistency, which will be evaluated in the SER.

Audit Activities. 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: "bolts," "preload," and "corrosi."

The table below lists the documents which 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. LG-AMP-PBD-XI.M18	Program Basis Document – Bolting Integrity	Revision 3
2. NE-004	Specification for Torquing Flange Bolts	Revision 3
3. P-301	Specification for Field Fabrication and Installation of Piping for Nuclear Service	Revision 17
4. MA-LG-716-1017	Control of Bolting/Torquing/Tensioning	Revision 0
5. MA-CG-407	Visual Examination of Pumps, Valves, Bolting, and Component Supports	Revision 7
6. AR 217706	U2 HPCI Spectacle Flange Bolts Not Torqued	04/29/2004
7. AR 303864	Found Nut Off Suction Flange of 2A Feed Pump	02/21/2005

The staff conducted its audit of LRA program elements one through six based on the contents of the existing program as modified by the proposed enhancements.

During the audit, the staff verified that the "scope of program," "preventive actions," "monitoring and trending," and "acceptance criteria" program elements of the LRA AMP are consistent with the corresponding elements of the GALL Report AMP. In addition, the staff found that for the "parameters monitored or inspected" and "detection of aging effects" program elements, sufficient information was not available to determine whether they were consistent with the corresponding program elements of the GALL Report AMP. In order to obtain the information necessary to verify whether these program elements are consistent with the corresponding program elements of the GALL Report AMP, the staff will consider issuing RAIs for the subjects discussed below.

- The "parameters monitored or inspected" and "detection of aging effects," program elements of the LRA AMP do not state that they manage cracking and do not include inspections for cracking. The "parameters monitored or inspected" and "detection of aging effects," program elements of the GALL Report AMP recommend that the program include periodic inspections of closure bolting for loss of material, loss of preload, and cracking. It is not clear to the staff that the applicant's program manages cracking.

- The "parameters monitored or inspected" and "detection of aging effects" program elements of the LRA AMP state that inspections will be performed for leakage but do not state that inspections will be performed for other indications of loss of material (such as corrosion or rust), cracking, or loss of preload (such as loose or missing bolts). The "parameters monitored or inspected" and "detection of aging effects" program elements of the GALL Report AMP state that bolting for safety-related pressure retaining components should be inspected for leakage as well as loss of material, cracking, and loss of preload. It is not clear to the staff that the applicant's program includes inspections for other indications of loss of material, cracking, or loss of preload.

During the audit of the "operating experience" program element, the staff determined 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 staff also determined that 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 the effects of aging.

The staff also audited the description of the LRA AMP provided in the UFSAR Supplement. The staff verified this description to be consistent with the description provided in the SRP-LR.

Audit Results. Based on this audit, the staff verified that the "scope of program," "preventive actions," "monitoring and trending," and "acceptance criteria" program elements of the LRA AMP are consistent with the corresponding program elements in GALL Report AMP XI.M18. The staff also identified certain aspects of the "parameters monitored or inspected" and "detection of aging effects" program elements of the LRA AMP for which additional information or additional evaluation is required before consistency can be determined.

Based on this audit, the staff also verified that the operating experience is sufficient to indicate that the LRA AMP, as implemented by the applicant, is sufficient to detect and manage the effects of aging. In addition, the staff verified that the description provided in the UFSAR Supplement is consistent with the description provided in the SRP-LR.

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

Summary of Information in the Application. The LRA states that AMP B.2.1.12, "Open-Cycle Cooling Water System," is an existing program with enhancements that is consistent with the program elements in GALL Report AMP XI.M20, "Open-Cycle Cooling Water System." To verify this claim of consistency, the staff audited the LRA AMP. Issues identified but not resolved in this report will be addressed in the SER. The scope of this audit includes enhancements necessary to make the LRA AMP consistent with the corresponding GALL Report AMP; however, it does not consider the sufficiency of enhancements which are not necessary for consistency, which will be evaluated in the SER.

Audit Activities. During its audit, the staff interviewed the applicant's staff and reviewed onsite documentation provided by the applicant. In addition, the staff conducted walkdowns of the spray pond, spray pond pump house, core spray pump room (LGS, Unit 2), main control room chiller, and the emergency diesel generator bays. The staff also conducted an independent search of the applicant's operating experience database using keywords: "biofoul," "microbiological," "corrosi," "erosi," "loss of material," "degradation," and "pitting."

The table below lists the documents which 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. LG-AMP-PBD-XI.M20	Program Basis Document , Open-Cycle Cooling Water System	Revision 3
2. No Document No.	LGS Program Basis Document for NRC Generic Letter 89-13 (Service Water Problems Affecting Safety-Related Equipment)	Revision 2
3. ER-AA-340	GL 89-13 Program Implementing Procedure	Revision 6
4. ER-AA-340-1001	GL 89-13 Program Implementation Instructional Guide	Revision 7
5. ER-AA-340-1002	Service Water Heat Exchanger Inspection Guide	Revision 4
6. ER-AA-340-1003	GL 89-13 Program Performance Indicators	Revision 4

Relevant Documents Reviewed

Document	Title	Revision / Date
7. No Document No.	Response to NRC Generic Letter 89-13, "Service Water System Problems Affecting Safety-Related Equipment"	01/29/1990
8. No Document No.	Supplemental Response to Generic Letter 89-13, "Service Water System Problems Affecting Safety-Related Equipment"	01/09/1991
9. No Document No.	Generic Letter 89-13, "Service Water System Problems Affecting Safety-Related Equipment," Implementation of Actions	08/05/1991
10. No Document No.	Generic Letter 89-13, "Service Water System Problems Affecting Safety-Related Equipment," Implementation of Actions	01/14/1992
11. SIR-02-160	Limerick ESW Evaluation (Structural Integrity Associates)	Revision 0 01/20/2003
12. 0800108.401	Limerick ESW/RHRSW Pre-Outage Support (Structural Integrity Associates)	Revision 0 05/07/2008
13. AR 00731389	Internal Corrosion of RHRSW System Piping	04/30/2008
14. AR 00098546	ESW Pinhole leak	03/06/2002
15. AR 00858703	ESW Pin Hole Leak	12/20/2008
16. AR 01114013	ESW Piping Pin Hole Leak	09/16/2010
17. AR 00508152	Raw Water Pipe Thickness Reading Below T-Allowable	07/11/2006
18. AR 01098693	Buried Pipe/Raw Water Program NDE UT Reinspection	08/06/2010
19. No Document No.	System Health Report: RHRSW (common)	Q2-2011
20. No Document No.	System Health Reports: ESW, Units 1 and 2	Q2-2011
21. No Document No.	System Health Reports: Service Water, Units 1 and 2	Q2-2011

The staff conducted its audit of LRA program elements one through six based on the contents of the existing program as modified by the proposed enhancements.

During the audit, the staff verified that the "scope of program," "preventive actions," "monitoring and trending," and "acceptance criteria" program elements of the LRA AMP are consistent with the corresponding elements of the GALL Report AMP. In addition, the staff found that for the "parameters monitored or inspected" and "detection of aging effects" program elements, sufficient information was not available to determine whether they were consistent with the corresponding program elements of the GALL Report AMP. In order to obtain the information necessary to verify whether these program elements are consistent with the corresponding program elements of the GALL Report AMP, the staff will consider issuing RAIs for the subjects discussed below.

- Enhancement 1, associated with the "parameters monitored or inspected" and "detection of aging effects" program elements of the LRA AMP, states that internal inspections of buried safety related service water piping will be performed when it is accessible during maintenance and repair activities. The staff noted that the applicant's operating experience includes frequent pinhole leaks of safety-related service water piping and the GALL Report recommends opportunistic inspections only when operating experience does not include repetitive failures. It is not clear to the staff that opportunistic inspections will be capable of managing the effects of aging so that the piping will be able to perform its intended function given the plants operating experience.

- Enhancement 2, associated with the "parameters monitored or inspected" and "detection of aging effects" program elements of the LRA AMP, states that periodic inspections for

loss of material in the nonsafety-related service water system will be performed at a frequency in accordance with NRC Generic Letter (GL) 89-13. The staff noted that GL 89-13 does not identify inspection frequencies, and thus it is not clear to the staff how the inspections will be conducted.

During the audit of the "operating experience" program element, the staff determined 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). However, the staff was unable to determine whether corrective actions taken in response to the plant-specific operating experience is sufficient to detect and manage the effects of aging during the period of extended operation. In order to obtain the information necessary to determine whether the applicant's operating experience supports the sufficiency of the LRA AMP, the staff will consider issuing RAIs for the subject discussed below.

- Based on documents reviewed, the historical corrosion issues in small and medium diameter raw water piping have more recently become evident in large diameter piping for the essential service water and residual heat removal service water systems. Although discussions during the audit indicated that additional portions of above ground piping may be replaced, the LRA did not describe program enhancements that address this ongoing problem. It is not clear to the staff that program will be capable of managing the effects of aging so that the piping will be able to perform its intended function given the plants operating experience.

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

Audit Results. Based on this audit, the staff verified that the "scope of program," "preventive actions," "monitoring and trending," and "acceptance criteria" program elements of the LRA AMP are consistent with the corresponding program elements in GALL Report AMP XI.M20. The staff also identified certain aspects of the "parameters monitored or inspected" and "detection of aging effects" program elements of the LRA AMP for which additional information or additional evaluation is required before consistency can be determined.

Based on this audit, the staff also identified that additional information regarding operating experience is required before a determination can be made regarding the sufficiency of the LRA AMP to detect and manage the effects of aging. In addition, the staff verified that the description provided in the UFSAR Supplement is consistent with the description provided in the SRP-LR.

LRA AMP B.2.1.13, Closed Treated Water Systems

Summary of Information in the Application. The LRA states that AMP B.2.1.13, "Closed Treated Water Systems," is an existing program with an enhancement that is consistent with the program elements in GALL Report AMP XI.M21A, "Closed Treated Water Systems." To verify this claim of consistency, the staff audited the LRA AMP. Issues identified but not resolved in this report will be addressed in the SER. The scope of this audit includes an enhancement necessary to make the LRA AMP consistent with the corresponding GALL Report AMP;

however, it does not consider the sufficiency of enhancements which are not necessary for consistency, which will be evaluated in the SER.

Audit Activities. During its audit, the staff interviewed the applicant's staff and reviewed onsite documentation provided by the applicant. In addition, the staff conducted walkdowns of the drywell chiller area and the reactor enclosure cooling water heat exchanger room. The staff also conducted an independent search of the applicant's operating experience database using keywords: "cavitation," "corrosi," "cracking," "erosi," "loss of material," and "degradation."

The table below lists the documents which 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. LG-AMP-PBD-XI.M21A	Program Basis Document, Closed Treated Water Systems	Revision 2
2. No Document No.	LGS Program Basis Document for NRC Generic Letter 89-13 (Service Water Problems Affecting Safety-Related Equipment)	Revision 2
3. CY-AA-120-4000	Closed Cooling Water Chemistry Strategic Plan	Revision 4
4. CY-AA-120-400	Closed Cooling Water Chemistry (Corporate)	Revision 12
5. CY-LG-120-1114	Closed Cooling Water Chemistry (Limerick)	Revision 10
6. CY-LG-120-110	Chemistry Sampling and Analysis	Revision 10
7. AR 00991271	Increased Trend in U1 TECW Nitrate Concentration	11/10/2009
8. AR 00865857	Increasing Trends on U1 TECW Adds	1/09/2009
9. AR 00695745	Develop Plan for Increasing "B" CECW Chemical Concentration	11/07/2007
10. AR 01093277	D14 – Perf. Mon Identifies Low Temp Diff for JW Heat Exch.	07/21/2010
11. M-059-007	Instrument Gas Compressor Aftercooler Maintenance E221	Revision 0
12. No Document No.	System Health Reports: RECW, Units 1 and 2	Q1-2011
13. No Document No.	System Health Reports: TECW, Units 1 and 2	Q1-2011
14. No Document No.	System Health Reports: Control Enclosure HVAC, Units 1 and 2	Q1-2011
15. No Document No.	System Health Reports: Plant Chilled Water, Units 1 and 2	Q1-2011

The staff conducted its audit of LRA program elements one through six based on the contents of the existing program as modified by the proposed enhancements.

During the audit, the staff verified that the "preventive actions" and "acceptance criteria" program elements of the LRA AMP are consistent with the corresponding elements of the GALL Report AMP. In addition, the staff found that for the "scope of program," "parameters monitored or inspected," "detection of aging effects," and "monitoring and trending" program elements, sufficient information was not available to determine whether they were consistent with the corresponding program elements of the GALL Report AMP. In order to obtain the information necessary to verify whether these program elements are consistent with the corresponding program elements of the GALL Report AMP, the staff will consider issuing RAIs for the subject discussed below.

- The LRA AMP does not include cracking due to stress corrosion cracking as an aging effect requiring age management. The GALL Report AMP recommends that cracking in closed treated water systems be managed for aging. It is not clear to the staff that the applicant sufficiently described the closed treated water system environments to allow the staff to evaluate whether cracking was a potential aging effect.

During the audit of the "operating experience" program element, the staff determined 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 staff also determined that 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 the effects of aging.

The staff also audited the description of the LRA AMP provided in the UFSAR Supplement. The staff verified this description to be consistent with the description provided in the SRP-LR.

Audit Results. Based on this audit, the staff verified that the "preventive actions" and "acceptance criteria" program elements of the LRA AMP are consistent with the corresponding program elements in GALL Report AMP XI.M21A. The staff also identified certain aspects of the "scope of program," "parameters monitored or inspected," "detection of aging effects," and "monitoring and trending" program elements of the LRA AMP for which additional information or additional evaluation is required before consistency can be determined.

Based on this audit, the staff also verified that the operating experience is sufficient to indicate that the LRA AMP, as implemented by the applicant, is sufficient to detect and manage the effects of aging. In addition, the staff verified that the description provided in the UFSAR Supplement is consistent with the description provided in the SRP-LR.

LRA AMP B.2.1.14, Inspection of Overhead Heavy Load and Light Load (Related to Refueling) Handling Systems

Summary of Information in the Application. The LRA states that AMP B.2.1.14, "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 Report 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. The scope of this audit includes enhancements necessary to make the LRA AMP consistent with the corresponding GALL Report AMP; however, it does not consider the sufficiency of enhancements which are not necessary for consistency, which will be evaluated in the SER.

Audit Activities. During its audit, the staff interviewed the applicant's staff and reviewed onsite documentation provided by the applicant. In addition, the staff conducted walkdowns of the spray pond pump house and reactor building. During the walkdown of the auxiliary hoist in the spray pond pump house, the staff identified slight general corrosion on the structural bolts that secure the monorail to the building. The applicant submitted corrective action report number 1273272 to perform a closer inspection of the condition and correct the deficiency. The staff also conducted an independent search of the applicant's operating experience database using the keywords: "crane" and "wear."

The table below lists the documents which 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. LG-AMP-PBD-XI.M23	Program Basis Document - Inspection of Overhead Heavy Load and Light Load (Related to Refueling) Handling Systems	Revision 1
2. M-038-00008	Overhead Handling Systems Review	Revision 6
3. M-C-700-332	Rigging and Handling Heavy Loads	Revision 11
4. M-C-700-327	Periodic Inspection of Electric and Air Operated Hoisting Devices	Revision 7
5. AR 729326	U1 Refuel Platform Main Trolley Mechanical Binding	01/30/2008
6. AR 830808	U1 Refuel Platform Main Trolley Rail Long-Term Wear	10/14/2008
7. R1068366-A01	Preoutage/Prepare as Backup for U2 Outage – Work Order to Repair Out of Plum Condition on Refuel Platform	02/05/2009
8. R1095019-A01	Work Order to Take Wear Readings on Refuel Platform Main Trolley Rails	12/07/2009
9. AR 1273272	Minor Surface Corrosion on 00-H513 Hoist Monorail Bolts	10/06/2011
10. AR 668328	Tie Backs for South Side Crane Rail Girders Loose	09/06/2007

The staff conducted its audit of LRA program elements one through six based on the contents of the existing program as modified by the proposed enhancements. During the audit, the staff verified that the "scope of program," "preventive actions," "parameters monitored or inspected," "detection of aging effects," "monitoring and trending," and "acceptance criteria" program elements of the LRA AMP are consistent with the corresponding elements of the GALL Report AMP.

During the audit of the "operating experience" program element, the staff determined 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 staff also determined that 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 the effects of aging.

The staff also audited the description of the LRA AMP provided in the UFSAR Supplement. The staff verified this description to be consistent with the description provided in the SRP-LR.

Audit Results. Based on this audit, the staff verified that the "scope of program," "preventive actions," "parameters monitored or inspected," "detection of aging effects," "monitoring and trending," and "acceptance criteria" program elements of the LRA AMP are consistent with the corresponding program elements in GALL Report AMP XI.M23.

Based on this audit, the staff also verified that the operating experience is sufficient to indicate that the LRA AMP, as implemented by the applicant, is sufficient to detect and manage the effects of aging. In addition, the staff verified that the description provided in the UFSAR Supplement is consistent with the description provided in the SRP-LR.

LRA AMP B.2.1.15, Compressed Air Monitoring

Summary of Information in the Application. The LRA states that AMP B.2.1.15, "Compressed Air Monitoring," is an existing program that is consistent with the program elements in GALL Report AMP XI.M24, "Compressed Air Monitoring." To verify this claim of consistency, the staff audited the LRA AMP. Issues identified but not resolved in this report will be addressed in the SER.

Audit Activities. 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: "rust," "steel," "corrosi," "loss of material," and "through wall." In addition, the staff reviewed all issue reports from the past ten years associated with the two in-scope compressed air systems, systems 015 and 059.

The table below lists the documents which 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. LG-AMP-PBD-XI.M24	Program Basis Document Compressed Air Monitoring – GALL Program XI.M24 Compressed Air Monitoring	Revision 1 05/17/2011
2. AR1501130	Instrument Air Dryer 1B Moisture Indicating Switch	03/04/2005
3. AR00502585	1B Instrument Air Compressor Overhaul Observations	07/26/2006
4. ANSI/ISA-7.0.01-1996	Quality Standard for Instrument Air	11/12/1996
5. ASME OM-S/G-1998, Part 17	Standards and Guides for Operations and Maintenance of Nuclear Power Plants	1998
6. EPRI TR-108147	Compressor and Instrument Air System Maintenance Guide	March 1998
7. No Document No.	Letter JW Gallagher to USNRC, Limerick Response to GL 88-14	02/13/1989
8. No Document No.	Letter GJ Beck to USNRC, Limerick Response to GL 88-14	02/24/1992
9. ECR LG 09-00006	UFSAR Revision to Sections 9.3 and 5.2	02/27/2009
10. S15.9.A	Instrument Air, Service Air, Back-up Service Air Compressors and Instrument Air Dryer Package Routine Inspection	Revision 22
11. ER-AA-2030	Conduct of Plant Engineering Manual	Revision 11
12. S59.9.A	Routine Inspection of Primary Containment Instrument Gas System	Revision 18
13. No Document No.	Compressed Air System, System and Structures Scoping Report	Revision 1
14. No Document No.	Primary Containment Instrument Gas System, System and Structures Scoping Report	Revision 3
15. M-015-001	Service and Instrument Air Compressor Major Maintenance	Revision 11
16. M-015-002	Instrument Dryer Tower Maintenance	Revision 5

During the audit of program elements one through six, the staff verified that the "scope of program," "preventive actions," "parameters monitored or inspected," "detection of aging effects," and "acceptance criteria" program elements of the LRA AMP are consistent with the

corresponding elements of the GALL Report AMP. For the "monitoring and trending" program element sufficient information was not available to determine whether it was consistent with the corresponding program element of the GALL Report AMP. In order to obtain the information necessary to verify whether this program element is consistent with the corresponding program element of the GALL Report AMP, the staff will consider issuing an RAI for the subject discussed below.

- The "monitoring and trending" program element of the LRA AMP states that the instrument air system dew point is continuously monitored and alarmed, inspected weekly, and recorded quarterly. The LRA AMP also states that the primary containment instrument gas system's dryer desiccant outlet moisture indicator is verified weekly. The GALL Report AMP recommends that daily readings of system dew point are recorded and trended. It is not clear to the staff that the dew point will be recorded and trended.

During the audit of the "operating experience" program element, the staff determined 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 staff also determined that 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 the effects of aging.

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 subject discussed below.

- SRP-LR Table 3.0-1 recommends that the UFSAR Supplement for the "Compressed Air Monitoring" program reference the applicant's crediting of its response to NRC Generic Letter 88-14 and ISA-S7.0.1-1998 as guidance for testing and monitoring air quality and moisture. LRA Section A.2.1.15, Compressed Air Monitoring program does not reference the above.

Audit Results. Based on this audit, the staff verified that the "scope of program," "preventive actions," "parameters monitored or inspected," "detection of aging effects," and "acceptance criteria" program elements of the LRA AMP are consistent with the corresponding program elements in GALL Report AMP XI.M24. The staff also identified certain aspects of the "monitoring and trending" program element of the LRA AMP for which additional information or additional evaluation is required before consistency can be determined.

Based on this audit, the staff also verified that the operating experience is sufficient to indicate that the LRA AMP, as implemented by the applicant, is sufficient to detect and manage the effects of aging. In addition, the staff identified a need for additional information regarding the adequacy of the program description in the UFSAR Supplement.

LRA AMP B.2.1.16, BWR Reactor Water Cleanup System

Summary of Information in the Application. The LRA states that AMP B.2.1.16, "BWR Reactor Water Cleanup System," is an existing program that is consistent with the program elements in GALL Report AMP XI.M25, "BWR Reactor Water Cleanup System." To verify this claim of consistency, the staff audited the LRA AMP.

Audit Activities. 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: "leak," "crack," "indication," and "failure" associated with the reactor water cleanup system.

The table below lists the documents which 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. LG-AMP-PBD-XI.M25	BWR Reactor Water Cleanup System	Revision 2 05/04/2011
2. ER-LG-330-1002	ISI Augmented Inspection Programs	Revision 0
3. Letter from Frank Rinaldi, NRC, to George A. Hunger, Jr., PECO Energy Company	IGSCC Inspection Plan of RWCU System Piping Welds Outboard of the Primary Containment Isolation Valves; Limerick Generating Station, Units 1 and 2 (TAC Nos. M92754 and M92755)	02/07/1996

During the audit of program elements one through six, the staff verified that the "scope of program," "preventive actions," "parameters monitored or inspected," "detection of aging effects," "monitoring and trending," and "acceptance criteria" program elements of the LRA AMP are consistent with the corresponding elements of the GALL Report AMP.

During the audit of the "operating experience" program element, the staff determined 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 staff also determined that 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 the effects of aging.

The staff also audited the description of the LRA AMP provided in the UFSAR Supplement. The staff verified this description is consistent with the description provided in the SRP-LR.

Audit Results. Based on this audit, the staff verified that the "scope of program," "preventive actions," "parameters monitored or inspected," "detection of aging effects," "monitoring and trending," and "acceptance criteria" program elements of the LRA AMP are consistent with the corresponding program elements in GALL Report AMP XI.M25.

Based on this audit, the staff also verified that the operating experience is sufficient to indicate that the LRA AMP, as implemented by the applicant, is sufficient to detect and manage the

effects of aging. In addition, the staff verified that the description provided in the UFSAR Supplement is consistent with the description provided in the SRP-LR.

LRA AMP B.2.1.17, Fire Protection

Summary of Information in the Application. The LRA states that AMP B.2.1.17, "Fire Protection," is an existing program with enhancements that is consistent with the program elements in GALL Report AMP XI.M26, "Fire Protection." To verify this claim of consistency, the staff audited the LRA AMP. Issues identified but not resolved in this report will be addressed in the SER. The scope of this audit includes enhancements necessary to make the LRA AMP consistent with the corresponding GALL Report AMP; however, it does not consider the sufficiency of enhancements which are not necessary for consistency, which will be evaluated in the SER.

Audit Activities. During its audit, the staff interviewed the applicant's staff and reviewed onsite documentation provided by the applicant. In addition, the staff conducted walkdowns of the cable spreading room, remote shutdown panel room, carbon dioxide tank, and the halon system for the remote shutdown panel room. The staff also conducted an independent search of the applicant's operating experience database for operating experience related to the Fire Protection Program using the fire protection system number (system 22) and the keywords "steel," "erosi," "loss of material," and "damage."

The table below lists the documents which 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. LG-AMP-PBD-XI.M26	Program Basis Document – Fire Protection	Revision 2
2. Technical Requirements Manual	Technical Requirements Manual, Section 3/4.7	Revision 0
3. Specification A-39A	Fire Protection Specification for Structural Steel Fireproofing (CAFCOTE 800)	Revision 9
4. AR 01032150	Tear in Fire Rated Assembly Fabric	02/18/2010
5. AR 01020923	Tears in Red Fabric Fire Seal	01/25/2010

The staff conducted its audit of LRA program elements one through six based on the contents of the existing program as modified by the proposed enhancements. During the audit, the staff verified that the "preventive actions," "parameters monitored or inspected," "monitoring and trending," and "acceptance criteria" program elements of the LRA AMP are consistent with the corresponding elements of the GALL Report AMP. In addition, the staff found that for the "scope of program" and "detection of aging effects" program elements, sufficient information was not available to determine whether they were consistent with the corresponding program elements of the GALL Report AMP. In order to obtain the information necessary to verify whether these program elements are consistent with the corresponding program elements of the GALL Report AMP, the staff will consider issuing RAIs for the subjects discussed below.

- The "scope of program" program element of GALL Report AMP XI.M26, "Fire Protection," states that the program includes visual inspections of fire barrier penetration

seals, walls, ceilings, floors, doors, and other fire resistant materials that perform a fire barrier function. The Limerick UFSAR states that gypsum fire barrier walls, fiberglass sleeving fire barriers, and refractory material raceway fire stops covered with silicone rubber are used at the plant as fire barriers. However, the LRA does not include any aging management results for components constructed of these materials. It is not clear to the staff that all fire barrier materials are being managed for aging.

- The LRA states that not less than 10 percent of each type of penetration seal is inspected at least once per refueling cycle, except for internal conduit seals which are not accessible for visual inspection. The "detection of aging effects" program element of GALL Report AMP XI.M26, "Fire Protection," recommends that visual inspections be performed of not less than 10 percent of each type of penetration seal during walkdowns, and that the scope of the inspections be expanded if any sign of seal degradation is detected. The LRA does not discuss how internal conduit seals which are not accessible for visual inspection are managed for aging.

- The LRA states that the personnel performing inspections are qualified and trained to perform the inspection activities. However, during the audit, the staff noted that the personnel responsible for performing fire barrier inspections are maintenance qualified personnel; not fire protection qualified personnel. The "detection of aging effects" program element of GALL Report AMP XI.M26, "Fire Protection," recommends that visual inspections be performed by fire protection qualified personnel of fire barrier penetration seals, walls, ceilings, floors, doors, and other fire barrier materials. It is not clear to the staff that personnel performing the fire barrier inspections are fire protection qualified.

During the audit of the "operating experience" program element, the staff determined 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 staff also determined that 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 the effects of aging.

The staff also audited the description of the LRA AMP provided in the UFSAR Supplement. The staff verified this description to be consistent with the description provided in the SRP-LR.

Audit Results. Based on this audit, the staff verified that the "preventive actions," "parameters monitored or inspected," "monitoring and trending," and "acceptance criteria" program elements of the LRA AMP is consistent with the corresponding program elements in GALL Report AMP XI.M26. The staff also identified certain aspects of the "scope of program" and "detection of aging effects" program elements of the LRA AMP for which additional information or additional evaluation is required before consistency can be determined.

Based on this audit, the staff also verified that the operating experience is sufficient to indicate that the LRA AMP, as implemented by the applicant, is sufficient to detect and manage the effects of aging In addition, the staff verified that the description provided in the UFSAR Supplement is consistent with the description provided in the SRP-LR.

LRA AMP B.2.1.18, Fire Water System

Summary of Information in the Application. The LRA states that AMP B.2.1.18, "Fire Water System," is an existing program with enhancements that is consistent with the program elements in GALL Report AMP XI.M27, "Fire Water System." To verify this claim of consistency, the staff audited the LRA AMP. The scope of this audit includes enhancements necessary to make the LRA AMP consistent with the corresponding GALL Report AMP; however, it does not consider the sufficiency of enhancements which are not necessary for consistency, which will be evaluated in the SER.

Audit Activities. During its audit, the staff interviewed the applicant's staff and reviewed onsite documentation provided by the applicant. In addition, the staff conducted walkdowns of the cable spreading rooms, main fire pumps, diesel fire pump, backup fire water pump, and the backup fire water storage tank. The staff also conducted an independent search of the applicant's operating experience database for operating experience related to the Fire Water Program using the fire protection system number (system 22) and the keywords "steel," "erosi," "loss of material," and "damage."

The table below lists the documents which 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. LG-AMP-PBD-XI.M27	Program Basis Document – Fire Water	Revision 2
2. Technical Requirements Manual	Technical Requirements Manual, Section 3/4.7	Revision 0
3. AR 932808	Deluge Valve Leaking	06/18/2009
4. AR 988357	Fire Protection Deluge Valve-Obsolete	11/03/2009
5. AR 1135291	Fire System Obsolescence Consolidation	11/04/2010
6. AR 913109	00-P511 Diesel Engine Driven Fire Pump Casing	04/29/2009
7. AR 555927	Clogged Nozzle Identified on 4A Transformer Fire System	11/09/2006

The staff conducted its audit of LRA program elements one through six based on the contents of the existing program as modified by the proposed enhancements. During the audit, the staff verified that the "scope of program," "preventive actions," "parameters monitored or inspected," "detection of aging effects," "monitoring and trending," and "acceptance criteria" program elements of the LRA AMP are consistent with the corresponding elements of the GALL Report AMP.

During the audit of the "operating experience" program element, the staff determined 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 staff also determined that 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 the effects of aging.

The staff also audited the description of the LRA AMP provided in the UFSAR Supplement. The staff verified this description to be consistent with the description provided in the SRP-LR.

Audit Results. Based on this audit, the staff verified that the "scope of program," "preventive actions," "parameters monitored or inspected," "detection of aging effects," "monitoring and trending," and "acceptance criteria" program elements of the LRA AMP are consistent with the corresponding program elements in GALL Report AMP XI.M27.

Based on this audit, the staff also verified that the operating experience is sufficient to indicate that the LRA AMP, as implemented by the applicant, is sufficient to detect and manage the effects of aging. In addition, the staff verified that the description provided in the UFSAR Supplement is consistent with the description provided in the SRP-LR.

LRA AMP B.2.1.19, Aboveground Metallic Tanks

Summary of Information in the Application. The LRA states that AMP B.2.1.19, "Aboveground Metallic Tanks," is an existing program with enhancements that is consistent with the program elements in GALL Report AMP XI.M29, "Aboveground Metallic Tanks." To verify this claim of consistency, the staff audited the LRA AMP. Issues identified but not resolved in this report will be addressed in the SER. The scope of this audit includes enhancements necessary to make the LRA AMP consistent with the corresponding GALL Report AMP; however, it does not consider the sufficiency of enhancements which are not necessary for consistency, which will be evaluated in the SER.

Audit Activities. During its audit, the staff interviewed the applicant's staff and reviewed onsite documentation provided by the applicant. In addition, the staff conducted a walk down of the backup fire water storage tank, the only in-scope aboveground steel tank. The staff also conducted an independent search of the applicant's operating experience database using keywords: "tank," "rust," "steel," "corrosi," and "loss of material."

The table below lists the documents which 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. LG-AMP-PBD-XI.29	Program Basis Document – Aboveground Metallic Tanks	Revision 3 05/10/2011
2. PM384104	PM Change Request Form – revise existing PM to conduct external tank inspections	No date
3. NA	PM Change Request Form – create a tank bottom UT measurement PM	No date
4. C0190499	Work Order – Inspection of Back-up Fire Water Storage Tank 10-T402	09/19/2000
5. R1031744	Work Order – Inspection of Back-up Fire Water Storage Tank 10-T402	10/25/2007
6. 8031-FC-5	Specification for Temporary and Fire Protection System for the Limerick Generating Station Units 1 & 2	Revision 1 11/18/1987
7. SP-1302-52-108	Specification for Inspection of Tanks	Revision 3 05/19/1992
8. ER-AA-2030	Conduct of Plant Engineering Manual	Revision 9

Document	Title	Revision / Date
9. AR 00877556	Backup Water Storage Tank Level Lowering	02/06/2009

The staff conducted its audit of LRA program elements one through six based on the contents of the existing program as modified by the proposed enhancements.

During the audit, the staff verified that the "scope of program," "parameters monitored or inspected," "monitoring and trending," and "acceptance criteria" program elements of the LRA AMP are consistent with the corresponding elements of the GALL Report AMP. In addition, the staff found that for the "preventive actions" and "detection of aging effects" program elements, sufficient information was not available to determine whether they are consistent with the corresponding program elements of the GALL Report AMP. In order to obtain the information necessary to verify whether these program elements are consistent with the corresponding program elements of the GALL Report AMP, the staff will consider issuing RAIs for the subjects discussed below.

- The "preventive actions" program element of the LRA AMP states that there is no caulking or sealant at the base of the backup fire water storage tank. The GALL Report AMP recommends periodic inspection of caulking that may be installed at the tank to foundation interface to minimize the amount of water and moisture penetrating the interface, which could lead to corrosion of the tank bottom. It is not clear to the staff that caulking or sealant is installed and the applicant did not provide a basis for why this exception is acceptable.

- The "detection of aging effects" program element, Enhancement 2, of the LRA AMP states in order to provide for visual inspections of the external surface of the tank on a two-year frequency, insulation will be removed on a sampling basis. The GALL Report AMP recommends that the external surface of the tank be visually inspected at each outage to confirm that the paint is intact. It is not clear to the staff how much insulation would be removed to facilitate visual inspection.

During the audit of the "operating experience" program element, the staff determined 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 staff also determined that 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 the effects of aging.

The staff also audited the description of the LRA AMP provided in the UFSAR Supplement. The staff verified this description to be consistent with the description provided in the SRP-LR.

Audit Results. Based on this audit, the staff verified that the "scope of program," "parameters monitored or inspected," "monitoring and trending," and "acceptance criteria" program elements of the LRA AMP are consistent with the corresponding program elements in GALL Report AMP XI.M29. The staff also identified certain aspects of the "preventive actions" and "detection of aging effects" program elements of the LRA AMP for which additional information or additional evaluation is required before consistency can be determined.

Based on this audit, the staff also verified that the operating experience is sufficient to indicate that the LRA AMP, as implemented by the applicant, is sufficient to detect and manage the effects of aging. In addition, the staff verified that the description provided in the UFSAR Supplement is consistent with the description provided in the SRP-LR.

LRA AMP B.2.1.20, Fuel Oil Chemistry

Summary of Information in the Application. The LRA states that AMP XI.M30, "Fuel Oil Chemistry," is an existing program with enhancements that is consistent with the program elements in GALL Report AMP XI.M30, "Fuel Oil Chemistry." Issues identified but not resolved in this report will be addressed in the SER. The scope of this audit includes enhancements necessary to make the LRA AMP consistent with the corresponding GALL Report AMP; however, it does not consider the sufficiency of enhancements which are not necessary for consistency, which will be evaluated in the SER.

Audit Activities. During its audit, the staff interviewed the applicant's staff and reviewed onsite documentation provided by the applicant. In addition, the staff conducted walkdowns of Diesel Fuel Oil Storage Tanks, Diesel Fuel Oil Day Tanks, Emergency Diesel Generators and related piping, strainers, filters, and sample locations. The staff also conducted an independent search of the applicant's operating experience database using keywords: "stress corrosion cracking," "rust," "pitting," "microbiological," "degradation," "tank," "steel," and "underground."

The table below lists the documents which 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. LG-AMP-PBD-XI.M30	Program Basis Document	Revision 2
2. UFSAR 9.5.4	Updated Final Safety Analysis Report/Drawings	Revision 13
3. ST-4-092-631-1	Diesel Generator Fuel Tank Cleaning	Revision 5
4. ST-6-092-611-1	D11 Diesel Generator Day Tank Check for Water	Revision 9
5. ST-6-020-812-1	D12 Diesel Generator Fuel Oil Analysis	Revision 20
6. SFCP-11	Limerick Generating Station, Unit 1 Surveillance Frequency Control Program	Revision 6
7. A0975839	Work Order (D11 Fuel Oil Tank Cleaning)	03/31/2008
8. A1646404	Work Order (Internal Fuel Oil Storage Tank Cleaning)	05/08/2008
9. A1370058	Work Order D21 Fuel Oil Tank Cleaning	05/09/2008
10. I0012833	Water in D11/D12 Diesel Oil Storage Tank	11/24/2001
11. OP EX Master File	Operating Experience	09/14/2011
12. LR-M-30, Sheet3	License Renewal Boundary Drawing Fuel And Diesel Oil Storage and Transfer	Revision 0
13. ASTM D 4057-95	Standard Practice for Manual Sampling of Petroleum and Petroleum Products	1995
14. ASTM D 4057-06	Standard Practice for Manual Sampling of Petroleum and Petroleum Products	2006
15. C-028-00054 Sheet001	Diesel Oil Storage Tank (Drawing)	Revision 5

The staff conducted its audit of LRA program elements one through six based on the contents of the existing program as modified by the proposed enhancements.

During the audit, the staff verified that the "scope of program," "preventive actions," "parameters monitored/inspected, "monitoring and trending," and "acceptance criteria" program elements of the LRA AMP are consistent with the corresponding elements of the GALL Report AMP. In addition, the staff found that for the "detection of aging effects," program element, sufficient information was not available to determine whether it was consistent with the corresponding program element of the GALL Report AMP. In order to obtain the information necessary to verify whether this program element is consistent with the corresponding program element of the GALL Report AMP, the staff will consider issuing an RAI for the subject discussed below.

- The "detection of aging effects" program element of the LRA AMP states that diesel fuel oil sampling for sediment and water is performed by using the current design features, namely the diesel fuel oil transfer pump, rather than using multilevel sampling. The LRA AMP also states that the diesel fuel oil transfer pump takes suction from the bottom of the Emergency Diesel Generator Oil Storage Tank. The GALL Report AMP recommends that if Emergency Diesel Generator Oil Storage Tank design features do not allow for multilevel sampling, a sampling methodology that includes a representative sample from the lowest point in the tank may also be used. The diesel fuel oil transfer pump suction is located 11-inches from the bottom of the Emergency Diesel Generator Oil Storage Tank, which may not provide a representative sample of the lowest point in the tank. This design does not appear to provide a representative sample from the lowest point in the tank given the above information.

During the audit of the "operating experience" program element, the staff determined 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 staff also determined that 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 the effects of aging.

The staff also audited the description of the LRA AMP provided in the UFSAR Supplement. The staff verified this description to be consistent with the description provided in the SRP-LR.

Audit Results. Based on this audit, the staff verified that the "scope of program," "preventive actions," "parameters monitored/inspected, "monitoring and trending," and "acceptance criteria" program elements of the LRA AMP are consistent with the corresponding program elements in GALL Report AMP XI.M30. The staff also identified certain aspects of the "detection of aging effects," program element of the LRA AMP for which additional information or additional evaluation is required before consistency can be determined.

Based on this audit, the staff also verified that the operating experience is sufficient to indicate that the LRA AMP, as implemented by the applicant, is sufficient to detect and manage the effects of aging. In addition, the staff verified that the description provided in the UFSAR Supplement is consistent with the description provided in the SRP-LR.

LRA AMP B2.1.22, One-Time Inspection

Summary of Information in the Application. The LRA states that AMP B.2.1.22, "One-Time Inspection," is a new program that is consistent with the program elements in GALL Report AMP XI.M32, "One-Time Inspection." To verify this claim of consistency, the staff audited the LRA AMP.

Audit Activities. 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: "loss of material," "cracking," and "degradation."

The table below lists the documents which 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. LG-AMP-PBD-XI.M32	Limerick Generating Station Units 1 and 2, License Renewal Project One-Time Inspection	Revision 3 05/24/2011
2. LG-SSBD-OTI	One-Time Inspection Sample Basis Document	Revision 0 08/10/2011

During the audit of program elements one through six, the staff verified that the "scope of program," "preventive actions," "parameters monitored or inspected," "detection of aging effects," "monitoring and trending," and "acceptance criteria" program elements of the LRA AMP are consistent with the corresponding elements of the GALL Report AMP.

During the audit of the "operating experience" program element, the staff determined 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 staff also determined that 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 the effects of aging.

The staff also audited the description of the LRA AMP provided in the UFSAR Supplement. The staff verified this description is consistent with the description provided in the SRP-LR.

Audit Results. Based on this audit, the staff verified that the "scope of program," "preventive actions," "parameters monitored or inspected," "detection of aging effects," "monitoring and trending," and "acceptance criteria" program elements of the LRA AMP are consistent with the corresponding program elements in GALL Report AMP XI.M32.

Based on this audit, the staff also verified that the operating experience is sufficient to indicate that the LRA AMP, as implemented by the applicant, is sufficient to detect and manage the effects of aging. In addition, the staff verified that the description provided in the UFSAR Supplement is consistent with the description provided in the SRP-LR.

LRA AMP B.2.1.23, Selective Leaching

Summary of Information in the Application. The LRA states that AMP B.2.1.23, "Selective Leaching," is a new program that is consistent with the program elements in GALL Report AMP XI.M33, "Selective Leaching." To verify this claim of consistency, the staff audited the LRA AMP. Issues identified but not resolved in this report will be addressed in the SER.

Audit Activities. 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," "cast," "degradation," and "through wall."

The table below lists the documents which 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. LG-AMP-PBD-XI.M33	Program Basis Document Selective Laeching GALL Program XI.M33 – Selective Leaching of Materials	Revision 1 05/05/2011
2. ER-AA-335-014	VT-1 Visual Examination procedure	Revision 4
3. ER-TM-700-401	Guidance for Performing Selective Leaching Inspections	Revision 0
4. LG-SSBD-SLI	Selective Leaching Inspection Sample Basis Document – Draft Procedure	Revision 0
5. No Document No.	PM Change Request Forms – gray cast iron exposed to closed cycle cooling water, gray cast iron exposed to raw water, gray cast iron exposed to treated water, gray cast iron exposed to soil, gray cast iron exposed to waste water, copper greater than 15% zinc exposed to closed cycle cooling water, and copper greater than 15% zinc exposed to raw water.	NA

During the audit of program elements one through six, the staff verified that the "scope of program," "preventive actions," "parameters monitored or inspected," "detection of aging effects," "monitoring and trending," and "acceptance criteria" program elements of the LRA AMP are consistent with the corresponding elements of the GALL Report AMP. Although the "acceptance criteria" program element is consistent with the GALL Report, sufficient information was not available for the staff to complete its evaluation. In order to obtain the information necessary to complete its evaluation, the staff will consider issuing RAIs for the subjects discussed below.

- The "acceptance criteria" program element of the LRA AMP states the acceptance criteria as follows: no visible signs of selective leaching, no more than a 20 percent reduction in hardness, or no reddish copper color. The GALL Report AMP recommends similar acceptance criteria for the visual examination and hardness testing; however, the applicant proposes to use alternative mechanical examination techniques. It is not clear to the staff what acceptance criteria will be used when the alternative mechanical examinations techniques are implemented.

- The staff noted that the applicant's draft implementing procedures state that a hardness test will be performed if access permits; however, they do not state what alternative testing will be conducted if access is not sufficient. Given that the procedures are in a draft state, the staff did not issue an RAI. During the audit, the applicant acknowledged this gap and documented it in its License Renewal Change Request Process.

During the audit of the "operating experience" program element, the staff determined 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 staff also determined that 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 the effects of aging.

The staff also audited the description of the LRA AMP provided in UFSAR Supplement. The staff verified this description is consistent with the description provided in the SRP-LR.

Audit Results. Based on this audit, the staff verified that the "scope of program," "preventive actions," "parameters monitored or inspected," "detection of aging effects," "monitoring and trending," and "acceptance criteria" program elements of the LRA AMP are consistent with the corresponding program elements in GALL Report AMP XI.M33. The staff also identified certain aspects of the "acceptance criteria" program element of the LRA AMP for which additional information or additional evaluation is required for the staff to complete its evaluation.

Based on this audit, the staff also verified that the operating experience is sufficient to indicate that the LRA AMP, as implemented by the applicant, is sufficient to detect and manage the effects of aging. In addition, the staff verified that the description provided in the UFSAR Supplement is consistent with the description provided in the SRP-LR.

LRA AMP B.2.1.24, One-Time Inspection of ASME Code Class 1 Small-Bore Piping

Summary of Information in the Application. The LRA states that AMP B.2.1.24, "One-Time Inspection of ASME Code Class 1 Small-Bore Piping," is a new program that is consistent with the program elements in GALL Report 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. Issues identified but not resolved in this report will be addressed in the SER.

Audit Activities. 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," "failure," "socket," "butt," "full penetration," and "weld."

The table below lists the documents which 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. LGS-AMP-B2.1.24	One-Time Inspection of ASME Code Class 1 Small-Bore Piping	Revision 0
2. AR 00153489	Limerick Small Bore Vibration Screening and Resolution	11/03/2003
3. AR 1402968	Chilled Water Valve Damage from Vibration	02/03/2003
4. ML0900602180	Limerick Generating Station, Units 1 and 2 – Evaluation of Relief Requests RR-33, RR-34 and RR-35, Associated with the Second Inservice Inspection Interval (TAC NOS. MD8071, MD8073, MD8074, MD8075, AND MD8076)	01/27/2009
5. LER 35287048	Reactor Scram Resulting from a Main Turbine Trip due to Low Electro-Hydraulic Pressure	01/05/1988
6. NES-MS-03.04	Small Bore Piping Design for High Cycle Fatigue	Revision 0 03/15/2000
7. AR 1398002	Steam Leak on EBD-105 (Unit 1 RCIC Steam Line Drain)	05/12/2003

During the audit of program elements one through six, the staff verified that the "scope of program," "preventive actions," "parameters monitored or inspected," "monitoring and trending," and "acceptance criteria" program elements of the LRA AMP are consistent with the corresponding elements of the GALL Report AMP. For the "detection of aging effects" program element, sufficient information was not available to determine whether it was consistent with the corresponding program element of the GALL Report AMP. In order to obtain the information necessary to verify whether this program element is consistent with the corresponding program element of the GALL Report AMP, the staff will consider issuing RAIs for the subject discussed below.

- The "detection of aging effects" program element of the LRA AMP states that, for socket weld volumetric examinations, 25 welds at each unit will be examined and the number of welds examined represents 38 percent of the high and medium consequence ranked socket welds. The GALL Report AMP recommends that the inspection sampling should include ten percent of the weld population or a maximum of 25 welds of each weld type (e.g., butt welds and socket welds) using a methodology to select the most susceptible and risk-significant welds. The staff could not determine (a) how the percentage was calculated, and (b) the total population of American Society of Mechanical Engineers (ASME) Code Class 1 butt welds and socket welds at each unit that is within the scope of the program.

During the audit of the "operating experience" program element, the staff determined 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 staff also determined that 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 the effects of aging during.

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 subject discussed below.

- The UFSAR supplement for the program, as described in LRA Section A.1.24, does not include any statement regarding corrective actions to be taken in the event that evidence of cracking is revealed by the One-Time Inspection of ASME Code Class 1 Small-Bore Piping program. SRP-LR Table 3.0-1 addresses the content of the UFSAR supplement summary description for GALL Report AMP XI.M35. The table states that, "Should evidence of cracking be revealed by a one-time inspection, periodic inspection is also proposed, as managed by a plant-specific AMP." It is not clear to the staff what corrective actions would be taken if the one-time inspection detected evidence of cracking.

Audit Results. Based on this audit, the staff verified that the "scope of program," "preventive actions," "parameters monitored or inspected," "monitoring and trending," and "acceptance criteria" program elements of the LRA AMP are consistent with the corresponding program elements in GALL Report AMP XI.M35. The staff also identified certain aspects of the "detection of aging effects" program element of the LRA AMP for which additional information or additional evaluation is required before consistency can be determined.

Based on this audit, the staff also verified that the operating experience is sufficient to indicate that the LRA AMP, as implemented by the applicant, is sufficient to detect and manage the effects of aging. In addition, the staff identified a need for additional information regarding the adequacy of the program description in the UFSAR Supplement.

LRA AMP B.2.1.25, External Surfaces Monitoring of Mechanical Components Program

Summary of Information in the Application. The LRA states that AMP B.2.1.25, "External Surfaces Monitoring of Mechanical Components," is a new program that is consistent with the program elements in GALL Report AMP XI.M36, "External Surface Monitoring of Mechanical Components." To verify this claim of consistency, the staff audited the LRA AMP. Issues identified but not resolved in this report will be addressed in the SER.

Audit Activities. During its audit, the staff interviewed the applicant's staff and reviewed onsite documentation provided by the applicant. In addition, the staff conducted walkdowns of Spray Pond Pump Room, Core Spray Room, Control Room Chiller, Diesel Generator Bay and Fire Protection Room. The staff also conducted an independent database search of the applicant's operating experience database using the keywords: "cracking," "crevice," "corrosi," "degradation," "damage," "loss of material," "perforation," and "pitting."

The table below lists the documents which 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. LG-AMP-PBD-XI.M36	LGS AMP Evaluation Report External Surfaces Monitoring Program	Revision 4 05/24/2011
2. ER-LG-700-402	External Surfaces Monitoring Program Draft Procedures	Draft
3. CR 00719685	Essential Service Water Piping	03/12/2008
4. CR 01046233	Moderate Corrosion on SW Pipe	03/23/2010
5. CR 01048922	Corrosion on RWCU piping (DBB-105) in Outboard MSIV Room	03/28/2010

During the audit of program elements one through six, the staff verified that the "scope of program," "preventive actions," "parameters monitored or inspected," "monitoring and trending," and "acceptance criteria" program elements of the LRA AMP are consistent with the corresponding elements of the GALL Report AMP. For the "detection of aging effects" program element sufficient information was not available to determine whether it was consistent with the corresponding program elements of the GALL Report AMP. In order to obtain the information necessary to verify whether this program element is consistent with the corresponding program element of the GALL Report AMP, the staff will consider issuing an RAI on the subject discussed below.

- The "detection of aging effects" program element of the LRA AMP states that inspection parameters for metallic components include material condition, which consists of evidence of rust, corrosion, overheating, blistering, and discoloration; evidence of insulation damage or wetting; degradation, blistering, and peeling or protective coatings; unusual leakage from piping, ducting, or component bolted joints. The GALL Report AMP program element "detection of aging effects" recommends that this program manages aging effects for loss of material, cracking, and change in material properties using visual inspection. It is not clear to the staff how the applicant will manage cracking as an aging effect.

During the audit of the "operating experience" program element, the staff determined 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 staff also determined that 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 the effects of aging.

The staff also audited the description of the LRA AMP provided in the UFSAR Supplement. The staff verified this description is consistent with the description provided in the SRP-LR.

Audit Results. Based on this audit, the staff verified that the "scope of program," "preventive actions," "parameters monitored or inspected," "monitoring and trending," "acceptance criteria" and "operating experience" program elements of the LRA AMP are consistent with the corresponding program elements in GALL Report AMP XI.M36. The staff also identified certain aspects of the "detection of aging effects" program element of the LRA AMP for which additional information or additional evaluation is required before consistency can be determined.

Based on this audit, the staff also verified that the operating experience is sufficient to indicate that the LRA AMP, as implemented by the applicant, is sufficient to detect and manage the effects of aging. In addition, the staff verified that the description provided in the UFSAR Supplement is consistent with the description provided in the SRP-LR.

LRA AMP B.2.1.26, Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components

Summary of Information in the Application. The LRA states that AMP B.2.1.26, "Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components," is a new program that is consistent with the program elements in GALL Report 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. Issues identified but not resolved in this report will be addressed in the SER.

Audit Activities. 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: "loss of material," "inspection," and "piping."

The table below lists the documents which 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. LG-AMP-PBD-XI.M38	Limerick Generating Station Unit 1 and 2 License Renewal Project Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components	Revision 2 05/05/2011
2. ER-LG-700-403	Exelon Nuclear: Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components Aging Management Program	Revision A

During the audit of program elements one through six, the staff verified that the "preventive actions," "parameters monitored or inspected," "detection of aging effects," "monitoring and trending," and "acceptance criteria" program elements of the LRA AMP are consistent with the corresponding elements of the GALL Report AMP. For the "scope of program" program element sufficient information was not available to determine whether it was consistent with the corresponding program elements of the GALL Report AMP. In order to obtain the information necessary to verify whether this program element is consistent with the corresponding program element of the GALL Report AMP, the staff will consider issuing RAIs for the subjects discussed below.

- The "scope of program" program element of the LRA AMP does not include the aging effects of loss of fracture toughness, reduction of heat transfer and cracking included in this program for which the program is credited with managing in various LRA tables (e.g. LRA tables 3.3.2-4, 3.3.2-8, 3.3.2-19, 3.3.2-20, and 3.3.2-21). The GALL Report AMP recommends that the aging effects that will be age managed within the program be should included in this program element. The LRA AMP does not state a complete list of the aging effects that will be managed.

- LRA AMP B.2.1.26 states that the program will manage the aging effects of loss of material for metallic and elastomeric components, and hardening and loss of strength for elastomers, in air/gas wetted, closed-cycle cooling water, diesel exhaust, fuel oil, lube oil, raw water, treated water, and waste water environments. The staff considers the application of LRA AMP B.2.1.26 to components in environments of fuel oil, lube oil, and closed cycle cooling (i.e., closed treated water), to be beyond the scope of GALL Report AMP XI.M38 and therefore requires an appropriate technical justification, consistent with the SRP-LR.

During the audit of the AMP's design basis documents some editorial corrections were noted with the applicant. In document LG-AMP-PBD-XI.M38, LGS, Unit 1 and 2 License Renewal Project Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components, revision 2, dated 05/05/2011 the following editorial corrections, on page 6, will be made;

- amend the description of environmental exposure from "air, condensation, and water" to the program's description and,

- amend the list of inspection activities to include all those associated with the program (currently schedule outages is omitted).

Additional edits to ER-LG-700-403, Revision A, "Exelon Nuclear," Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components Aging Management Program" (the draft implementation procedure) will amend Section 1.2.1 to describe the complete scope of systems applied to the program versus the current text of "air, condensation, and certain water systems."

During the audit of the "operating experience" program element, the staff determined 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 staff also determined that 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 the effects of aging.

The staff also audited the description of the LRA AMP provided in the UFSAR Supplement. The staff verified this description is consistent with the description provided in the SRP-LR.

Audit Results. Based on this audit, the staff verified that the "preventive actions," "parameters monitored or inspected," "detection of aging effects," "monitoring and trending," and "acceptance criteria" program elements of the LRA AMP are consistent with the corresponding program elements in GALL Report AMP XI.M38. The staff also identified certain aspects of the "scope of program" program element of the LRA AMP for which additional information or additional evaluation is required before consistency can be determined.

Based on this audit, the staff also verified that the operating experience is sufficient to indicate that the LRA AMP, as implemented by the applicant, is sufficient to detect and manage the effects of aging. In addition, the staff verified that the description provided in the UFSAR Supplement is consistent with the description provided in the SRP-LR.

LRA AMP B.2.1.27, Lubricating Oil Analysis

Summary of Information in the Application. The LRA states that AMP XI.M39, "Lubricating Oil Analysis," is an existing program that is consistent with the program elements in GALL Report AMP XI.M39, "Lubricating Oil Analysis." To verify this claim of consistency, the staff audited the LRA AMP.

Audit Activities. 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: "zinc," "biofouling," "loss of materials," and "wear."

The table below lists the documents which 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. NUREG-1801	Generic Aging Lessons Learned (GALL) Report	Revision 2
2. LG-AMP-PBD-XI.M39	Program Basis Document	Revision 2
3. MA-AA-716-230	Predictive Maintenance Program	Revision 6
4. MA-AA-716-006	Control of Lubricants Program	Revision 7
5. MA-AA-716-230-1001	Oil Analysis Interpretation Guideline	Revision 12
6. CY-LG-120-110	Chemistry Sampling and Analysis	Revision 10
7. OP EX Master File	Operating Experience	09/14/2011

During the audit of program elements one through six, the staff verified that the "scope of program," "preventive actions," "parameters monitored or inspected," "detection of aging effects," "monitoring and trending," and "acceptance criteria" program elements of the LRA AMP are consistent with the corresponding elements of the GALL Report AMP.

During the audit of the "operating experience" program element, the staff determined 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 staff also determined that 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 the effects of aging.

The staff also audited the description of the LRA AMP provided in the UFSAR Supplement. The staff verified this description is consistent with the description provided in the SRP-LR.

Audit Results. Based on this audit, the staff verified that the "scope of program," "preventive actions," "parameters monitored or inspected," "detection of aging effects," "monitoring and trending," and "acceptance criteria" program elements of the LRA AMP are consistent with the corresponding program elements in GALL Report AMP XI.M39, "Lubricating Oil Analysis."

Based on this audit, the staff also verified that the operating experience is sufficient to indicate that the LRA AMP, as implemented by the applicant, is sufficient to detect and manage the effects of aging. In addition, the staff verified that the description provided in the UFSAR Supplement is consistent with the description provided in the SRP-LR.

LRA AMP B.2.1.28, Monitoring of Neutron-Absorbing Materials Other than Boraflex

Summary of Information in the Application. The LRA states that AMP B.2.1.28, "Monitoring of Neutron-Absorbing Materials Other than Boraflex," is an existing program with enhancements that is consistent with the program elements in GALL Report AMP XI.M40, "Monitoring of Neutron-Absorbing Materials Other than Boraflex." To verify this claim of consistency, the staff audited the LRA AMP. Issues identified but not resolved in this report will be addressed in the SER. The scope of this audit includes enhancements necessary to make the LRA AMP consistent with the corresponding GALL Report AMP; however, it does not consider the sufficiency of enhancements which are not necessary for consistency, which will be evaluated in the SER.

Audit Activities. During its audit, the staff interviewed the applicant's staff and reviewed onsite documentation provided by the applicant. In addition, the staff conducted a walkdown of the spent fuel pool floors of LGS, Units, 1 and 2, as well as the remote camera station for the spent fuel pool floors. The staff also conducted an independent search of the applicant's operating experience database using keywords: "corrosion," "corrosive," "degradation," "detection," and "loss of material."

The table below lists the documents which 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. IR 987616	IN 2009-26 Degradation of Neutron Absorbing Materials in the SFP	Revision 1
2. NRC Safety Evaluation	Increase in Spent Fuel Pool Capacity, Limerick Generating Station, Units 1 and 2 (TAC Nos. M88610 and M88657)	11/29/1994
3. Holtec Report HI-931012	Licensing Report for Spent Fuel Storage Capacity Expansion	Revision 1
4. WO R0867804	Maximum Density Spent Fuel Storage Rack Coupon Analysis, Coupon Removed in 2001	Revision 1
5. WO R0909126	Maximum Density Spent Fuel Storage Rack Coupon Analysis, Coupon Removed in 1999	Revision 1
6. WO R0803622	Maximum Density Spent Fuel Storage Rack Coupon Analysis, Coupon Removed in 1997	Revision 1
7. UFSAR Section 9.1.2	Spent Fuel Storage	Revision 13
8. ATI 987616 A21	Engineering change package for max density SFR racks	Revision 1
9. FR-AA-600	Spent Fuel Management	Revision 1

The staff conducted its audit of LRA program elements one through six based on the contents of the existing program as modified by the proposed enhancements.

During the audit, the staff verified that the "scope of program," "preventive actions," "parameters monitored or inspected," "monitoring and trending," and "acceptance criteria" program elements of the LRA AMP are consistent with the corresponding elements of the GALL Report AMP. In addition, the staff found that for the "detection of aging effects" program element, sufficient information was not available to determine whether it was consistent with the corresponding program element of the GALL Report AMP. In order to obtain the information necessary to verify whether this program element is consistent with the corresponding program element of the GALL Report AMP, the staff will consider issuing RAIs for the subject discussed below.

- The staff's review of the program documentation found that the Boral coupon trees in both the LGS, Unit 1 and Unit 2, spent fuel pools are located in a "representative" location rather than a "bounding" location. That is, the coupon tree location is expected to receive a uniform gamma flux that is representative of typical rack exposures. The GALL Report AMP recommends that, "For these materials, gamma irradiation and/or long-term exposure to the wet pool environment may cause loss of material and changes in dimension (such as gap formation, formation of blisters, pits, and bulges) that could result in loss of neutron-absorbing capability of the material." It is not clear to the staff that "representative" coupon exposures will provide reasonable assurance that Boral degradation (i.e., loss of material and changes in dimension) will be identified prior to a potential loss in neutron-absorbing capacity of the material.

During the audit of the "operating experience" program element, the staff determined 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 staff also determined that 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 the effects of aging.

The staff also audited the description of the LRA AMP provided in the UFSAR Supplement. The staff verified this description to be consistent with the description provided in the SRP-LR.

Audit Results. Based on this audit, the staff verified that the "scope of program," "preventive actions," "parameters monitored or inspected," "monitoring and trending," "acceptance criteria," and "operating experience" program elements of the LRA AMP are consistent with the corresponding program elements in GALL Report AMP XI.M40. The staff also identified certain aspects of the "detection of aging effects" program element of the LRA AMP for which additional information or additional evaluation is required before consistency can be determined.

Based on this audit, the staff also verified that the operating experience is sufficient to indicate that the LRA AMP, as implemented by the applicant, is sufficient to detect and manage the effects of aging. In addition, the staff verified that the description provided in the UFSAR Supplement is consistent with the description provided in the SRP-LR.

LRA AMP B.2.1.29, Buried and Underground Piping and Tanks

Summary of Information in the Application. The LRA states that AMP B.2.1.29, "Buried and Underground Piping and Tanks," is an existing program with enhancements that is consistent with the program elements in GALL Report AMP XI.M41, "Buried and Underground Piping and Tanks." To verify this claim of consistency, the staff audited the LRA AMP. Issues identified but not resolved in this report will be addressed in the SER. The scope of this audit includes enhancements necessary to make the LRA AMP consistent with the corresponding GALL Report AMP; however, it does not consider the sufficiency of enhancements which are not necessary for consistency, which will be evaluated in the SER.

Audit Activities. 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: "steel," "buried," and "coating," "corrosi," "crevice," "damage," "degradation," "dug," "dug up," "excavat," "flaw," "holiday," "loss of material," "throughwall," "underground," and "wrap."

The table below lists the documents which 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. LG-AMP-PBD-XI.M41	Program Basis Document Buried and Underground Piping and Tanks GALL Program XI.M41 – Buried and Underground Piping and Tanks	Revision 1 05/23/2011
2. ER-AA-5400	Buried Piping and Raw Water Corrosion Program Guide	Revision 2
3. ER-AA-5400-1002	Buried Piping Examination Guide	Revision 2
4. AR 01003884	High Risk Piping Requires Review and Inspection	12/10/2009
5. AR 01150274	Underground Piping Inspection Results	12/09/2010
6. 8031-P-306	Specification for External Surface Treatment of Underground [Buried] Metallic Pipe for Limerick Generating Station	Revision 15 12/04/1987
7. 8031-C-9	Specification for Installation and Testing of Underground [Buried] Piping for Limerick Generating Station	Revision 5 04/14/1988
8. 8031-C-012	Specification for Installation of Underground [Buried] Non Process Piping for Limerick Generating Station	Revision 6 06/11/2009
9. 8031-C-60	Specification for Furnishing and Delivery of Ready Mix Fillcrete and Temporary Concrete for Limerick Generating Station	Revision 4 02/07/1980
10. 8031-C-18	Specification for Furnishing and Delivery of Circulating Water Pipe for Limerick Generating Station	Revision 2 ?/28/1983
11. 8031-C-28	Specification for Underground [Buried] tanks for Limerick Generating Station	Revision 14
12. E-1040	Cathodic Protection Plan – Circulating Water Unit 1	Revision 25
13. E-1041	Cathodic Protection Plan – Circulating Water Unit 2	Revision 14
14. L-S-12	Cathodic Protection System Design Basis Document	Revision 2
15. ST-6-0220250-0	Underground [Buried] Fire Main Flow Test	Revision 7
16. RT-6-109-001-0	Cathodic Protection Monthly Inspection	Revision 19
17. No Document No.	Corrpro – Cathodic Protection Survey for Underground [Buried] Piping Systems, Limerick Generating Station	03/23/2011

Relevant Documents Reviewed

Document	Title	Revision / Date
18. LG-AMP-PBD-XI.S6	Program Basis Document Structures Monitoring Program GALL AMP XI.S6 – Structures Monitoring Program	Revision 1 05/02/2011
19. AR 1698296	Back Up Water Storage Tank Level Lowering	02/11/2009
20. AR 00772456	Corrosion Identified on Piping in Manhole 216	05/06/2008

The staff conducted its audit of LRA program elements one through six based on the contents of the existing program as modified by the proposed enhancements.

During the audit, the staff verified that the "scope of program," "parameters monitored or inspected," and "monitoring and trending" program elements of the LRA AMP are consistent with the corresponding elements of the GALL Report AMP. In addition, the staff found that for the "preventive actions," "detection of aging effects," and "acceptance criteria" program elements, sufficient information was not available to determine whether they are consistent with the corresponding program elements of the GALL Report AMP. In order to obtain the information necessary to verify whether these program elements are consistent with the corresponding program elements of the GALL Report AMP, the staff will consider issuing RAIs for the subjects discussed below.

- The "preventive actions" program element of the LRA AMP states, as provided in the program basis document, that the plant drainage system piping is neither coated nor cathodically protected, and the circulating water system piping is not coated. The GALL Report AMP recommends that steel piping systems be coated and provided with cathodic protection. Because the applicant did not state the basis for acceptability of this exception, the staff could not determine if the effects of aging will be adequately managed so that these components will perform their intended function.

- The "detection of aging effects" program element of the LRA AMP states, as provided in the program basis document, that adverse conditions detected during inspections will be evaluated and the potential inspection expansion will be determined in accordance with the corrective action program. The GALL Report AMP recommends if adverse indications are detected, inspection sample sizes within the affected piping categories are doubled and if adverse indications are found in the expanded sample, the inspection sample size is again doubled, with the doubling of the inspection sample size continuing as necessary. The inspection expansion as determined by the applicant's corrective action program may not meet the quantities recommended in the GALL Report.

- The "acceptance criteria" program element of the LRA AMP states, as provided in the cathodic protection design basis document, that the cathodic protection system is required to maintain an energized voltage of not less than 850 millivolts negative potential with respect to a copper-copper sulfate reference electrode with no upper limit specified. The GALL Report AMP recommends that cathodic protection system soil to pipe potential acceptance criteria be consistent with NACE SP0169-2007. NACE SP0169-2007, section 7.1.2.7 states that excessive levels of cathodic protection can cause external coating disbondment. The application of the cathodic protection may cause external coating disbondment if no upper limit is specified in the program.

During the audit of the "operating experience" program element, the staff determined 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 staff also determined that 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 the effects of aging.

The staff also audited the description of the LRA AMP provided in the UFSAR Supplement. The staff verified this description to be consistent with the description provided in the SRP-LR.

Audit Results. Based on this audit, the staff verified that the "scope of program," "parameters monitored or inspected," and "monitoring and trending" program elements of the LRA AMP are consistent with the corresponding program elements in GALL Report AMP XI.M41. The staff also identified certain aspects of the "preventive actions," "detection of aging effects," and "acceptance criteria" program elements of the LRA AMP for which additional information or additional evaluation is required before consistency can be determined.

Based on this audit, the staff also verified that the operating experience is sufficient to indicate that the LRA AMP, as implemented by the applicant, is sufficient to detect and manage the effects of aging. In addition, the staff verified that the description provided in the UFSAR Supplement is consistent with the description provided in the SRP-LR.

LRA AMP B.2.1.30, ASME Section XI, Subsection IWE

Summary of Information in the Application. The LRA states that AMP B.2.1.30, "ASME Section XI, Subsection IWE," is an existing program with enhancements that is consistent with the program elements in GALL Report AMP XI.S1, "ASME Section XI, Subsection IWE." To verify this claim of consistency, the staff audited the LRA AMP. Issues identified but not resolved in this report will be addressed in the SER. The scope of this audit includes enhancements necessary to make the LRA AMP consistent with the corresponding GALL Report AMP; however, it does not consider the sufficiency of enhancements which are not necessary for consistency, which will be evaluated in the SER.

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

The table below lists the documents which 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. LG-AMP-PBD-XI.S1	Program Basis Document, GALL Program XI.S1 – ASME Section XI, Subsection IWE	Revision 1 05/12/2011
2. AR 00840654	Perform ACE for missing inspection requirements in program	12/05/2008

Document	Title	Revision / Date
3. AR 01063631	IR13 Suppression Pool Condition	04/30/2010
4. AR 00930318	Unit 2 Suppression Pool Liner and Coatings	12/17/2010
5. ER-AA-335-018	Detailed, General VT-1, VT-1C, VT-3, and VT-3C Visual Examination of ASME Class MC and CC Containment Surfaces and Components	Revision 5
6. SPEC. No. NE-101	Specification for Coating and Liner Inspection and Coating Repair of the Suppression Chambers at Limerick Generating Station Units 1 and 2	Revision 5 05/16/2011
7. ML0803310759	Limerick Generating Station Units 1 and 2 – Issuance of Amendment RE: One Time Type A Test Extension (TAC Nos. MD5198 and MD5199	02/20/2008

The staff conducted its audit of LRA program elements one through six based on the contents of the existing program as modified by the proposed enhancements.

During the audit, the staff verified that the "preventive actions," and "parameters monitored or inspected" program elements of the LRA AMP are consistent with the corresponding element of the GALL Report AMP. In addition, the staff found that for the "scope of program," "detection of aging effects," "monitoring and trending," and "acceptance criteria" program elements, sufficient information was not available to determine whether they were consistent with the corresponding program elements of the GALL Report AMP. In order to obtain the information necessary to verify whether these program elements are consistent with the corresponding program elements of the GALL Report AMP, the staff will consider issuing RAIs for the subjects discussed below.

- The "scope of program" program element of the LRA AMP states that coatings are not credited to prevent corrosion of the containment liner plate and associated components. However, Section 2.4 of the program basis document, LG-AMP-PBD-XI.S1, Revision 1, states that the coating maintenance plan will continue through the period of extended operation to ensure that the coating protects the liner to avoid significant material loss. It is not clear to the staff if coatings are relied upon to provide corrosion protection for containment liner plate and if they are, if they will be adequately managed for the period of extended operation.

- The "detection of aging effects" Section 3.4 of the program basis document, LG-AMP-PBD-XI.S1, Revision 1, states that the results of the ASME Code, Section XI, Subsection IWE examination will be used to implement a coatings maintenance plan to perform local recoating of areas that exhibit a greater than a predetermined loss in plate thickness. Section 3.4 of this document also states that there are no areas identified for augmented inspection in the drywells or suppression pools. In addition, the "acceptance criteria" Section 3.6 of the program basis document states that the ASME Section XI, Subsection IWE aging management program implementing procedures and references contain the acceptance criteria for containment surface examinations.

  GALL Report AMP XI.S1, ASME Section XI, Subsection IWE, "acceptance criteria" program element recommends that for the containment steel shell or liner, material loss locally exceeding 10 percent of the nominal wall thickness or material loss that is projected to locally exceed 10 percent of the nominal containment wall thickness before the next examination is documented. Such areas are corrected by repair or replacement in accordance with ASME Code, Section XI, Subsection IWE-3122 or accepted by

engineering evaluation. In addition, GALL Report AMP XI.S1, ASME Section XI, Subsection IWE, element 4 recommends augmented examinations (examination Category E-C) for containment surfaces subject to degradation in accordance with IWE-1240.

However, during the audit, the staff reviewed LGS implementing procedure and disposition of different assignment reports (ARs) and found an apparent inconsistency between the GALL Report, program basis document, implementing procedures, and disposition of the ARs. It is not clear how existing degradation in excess of the GALL Report recommendation will be managed.

- LGS Specification NE-101, Revision 5, requires that a floor or wall steel plate or downcomer in the suppression chamber with a loss coating greater than 25 percent of the surface area to be classified as ASME Code, Section XI, Subsection IWE, Category E-C, "Containment Surfaces Requiring Augmented Inspection." In addition, during the audit, the staff noted that some ARs identified extensive general and pitting corrosion of the suppression pool liner plate, downcomers, and columns that were found to be acceptable. The staff did not find any basis for performing augmented inspections for surfaces with 25 percent surface area coating loss or acceptability of coating loss identified in the different ARs.

- GALL Report AMP XI.S1, "monitoring and trending" program element, recommends that license renewal applicants develop a corrosion rate for containment liner plate and associated components that can be inferred from past ultrasonic testing (UT) examinations or establish a corrosion rate using representative samples in similar operating conditions, materials, and environments. However, during the audit, the staff did not find any evidence that the applicant is trending degradation of the containment drywell and suppression chambers, and have established a corrosion rate using UT examinations or by any other method.

During the audit of the "operating experience" program element, the staff determined 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 staff also determined that 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 the effects of aging during the period of extended operation. In order to obtain the information necessary to determine whether the applicant's operating experience supports the sufficiency of the LRA AMP, the staff will consider issuing RAIs for the subject discussed below.

- During the audit, the staff reviewed the ASME Code, Section XI, Subsection IWE (Class MC) Containment Visual Examination NDE Report for different components, including IWE-20S199-DWH. This report had photographs of the components that show extensive corrosion and pitting. However, the examination report found the condition was acceptable by visual examination. The basis for acceptance of extensive corrosion and pitting on the different components, including IWE-20S199-DWH, is not clear to the staff.

The staff also audited the description of the LRA AMP provided in the UFSAR to match LRA FSAR Supplement. The staff verified this description to be consistent with the description provided in the SRP-LR.

Audit Results. Based on this audit, the staff verified that the "preventive actions," and "parameters monitored or inspected" program elements of the LRA AMP are consistent with the corresponding program elements in GALL Report AMP XI.S1. The staff's evaluation of aspects of the program element associated with enhancements not necessary for consistency will be addressed in the SER. The staff also identified certain aspects of the "scope of program," "detection of aging effects," "monitoring and trending," "acceptance criteria," and "operating experience" program elements of the LRA AMP for which additional information or additional evaluation is required before consistency can be determined.

Based on this audit, the staff also identified that additional information regarding operating experience is required before a determination can be made regarding the sufficiency of the LRA AMP to detect and manage the effects of aging. In addition, the staff verified that the description provided in the FSAR Supplement is consistent with the description provided in the SRP-LR.

LRA AMP B.2.1.31, ASME Section XI, Subsection IWL

Summary of Information in the Application. The LRA states that AMP B.2.1.31, "ASME Section XI, Subsection IWL," is an existing program that is consistent with the program elements in GALL Report AMP X1.S2, "ASME Section XI, Subsection IWL." To verify this claim of consistency, the staff audited the LRA AMP. Issues identified but not resolved in this report will be addressed in the SER.

Audit Activities. During its audit, the staff interviewed the applicant's staff and reviewed onsite documentation provided by the applicant. In addition, the staff conducted walkdowns to determine the general conditions of the LGS, Unit 1 containment concrete from the floor elevations of 201 feet and 253 feet. The staff also conducted an independent database search of the applicant's operating experience database using the keywords: "concrete," "containment," and "corrosion."

The table below lists the documents which 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. ER-AA-330	Conduct of Inservice Inspection Activities	Revision 8
2. ER-AA-330-005	Visual Examination of Section XI Class CC Concrete Containment Structures	Revision 8
3. ER-AA-335-018	Detailed, General, VT-1, VT-1C, VT-3 and T-3C, Visual Examination of ASME Class MC and CC Containment Surfaces and Components	Revision 5
4. MA-LG-793-001	Visual Examinations of Containment Vessels and Internals	Revision 2
5. ER-AA-335-001	Qualification and Certification of Nondestructive Examination (NDE) Personnel	Revision 5
6. MAC-CG-425	Visual Examination of Containment Vessels and Internals	Revision 4

Document	Title	Revision / Date
7. No Document No.	ISI Program Health Report	4th Quarter, 2009
8. No Document No.	ISI Program Health Report	1st Quarter, 2010
9. No Document No.	ISI Program Health Report	2nd Quarter, 2010
10. No Document No.	ISI Program Health Report	3rd Quarter, 2010
11. No Document No.	ISI Program Health Report	4th Quarter, 2009
12. No Document No.	ISI Program Health Report	1st Quarter, 2011
13. No Document No.	ISI Program Health Report	2nd Quarter, 2011
14. No Document No.	Unit 1 ISI IWL Examinations	2000
15. No Document No.	Unit 2 ISI IWL Examinations	2001
16. No Document No.	Unit 1 ISI IWL Examinations	2004
17. No Document No.	Unit 2 ISI IWL Examinations	2005
18. No Document No.	Unit 1 ISI IWL Examinations – 1R12, performed under MAG-CG-425, Revision 4	2008
19. No Document No.	Unit 2 ISI IWL Examinations – 2R10, performed under MA-LG-793-001, Revision 1	2009
20. Drawing LR-C-2	License Renewal Drawing Site Plan, Sheets 1 and 2	Revision 0
21. Drawing C-29-7, Sheet 1	Reactor Building Units 1 & 2 Primary Containment Diaphragm Slab-Structure Support	Revision 18
22. Drawing C-247	Reactor Building Units 1 & 2 Primary Containment General Arrangement	Revision 11
23. Drawing C-261	Reactor Building Units 1 & 2 Primary Containment Sections and Details	Revision 7
24. Drawing C-284	Reactor Building Units 1 & 2 Liner Plate Requirements Diaphragm and Slab Anchorage Details	Revision 9
25. Drawing C-250	Reactor Building Units 1 & 2 Liner Suppression Pool Wall – Sections for cover of 2" min. from 6X6X6/6 W.W.F, Wall thickness: 6'-8", w/ #18	Revision 8
26. Drawing C-866	Reactor Building Units 1 & 2 Primary Containment Drywell Wall – Sections & Details for cover of 2" min.	Revision 5
27. Tech. Spec.	Unit 1, Sections 4.6.1.5.1 Surveillance & 4.6.1.5.2 Records	Amendment # 118
28. Tech. Spec.	Unit 2, Sections 4.6.1.5.1 Surveillance & 4.6.1.5.2 Records	Amendment # 81
29. AR 010448714	Inspection Results for Suppression Pool Vapor Space. The inspection results captured in CNF-10-001.	03/27/2010
30. AR 00836350	ISI Focus Area Self Assessment (FASA) – No Containment Boundary Drawings	10/27/2008
31. AR 00844065	ISI FASA – Components Missing from CISI Program	11/05/2008

During the audit of program elements one through six, the staff found that program elements "scope of program," "preventive actions," "parameters monitored or inspected," "detection of aging effects," and "monitoring and trending" of the LRA AMP are consistent with the corresponding elements of the GALL Report AMP. For program element "acceptance criteria" sufficient information was not available to determine whether it was consistent with the corresponding program elements of the GALL Report AMP. In order to obtain the information necessary to verify whether the program element is consistent with the corresponding program elements of the GALL Report AMP, the staff will consider issuing RAIs for the subjects discussed below.

- As stated in the basis document and implementing procedures, the applicant starts the evaluation criteria of containment concrete from the second-tier per Chapter 5.2 of ACI 349.3R-02, "Evaluation of Existing Nuclear Safety-Related Concrete Structures." The staff plans to request for justification for not starting the evaluation criteria of the

LGS concrete containment structures from the first-tier evaluation per the recommendations of Chapter 5.1 of ACI 349.3R-02.

- The LRA AMP did not cite the ASME Code requirement for the final determination of containment concrete inspections by a registered professional engineer experienced in evaluating the conditions of structural concrete in some of the applicable procedures which is recommended in the GALL Report. It is not clear to the staff that the inspections will be conducted by a qualified inspector.

During the audit of the "operating experience" program element, 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 staff also found that 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 subject discussed below.

- During the audit, the staff reviewed the issue reports, inspection reports, procedures, focused area self-assessment (FASA) reports, construction drawings. The applicant included the ceiling of the suppression pool, which consists of steel Q-deck, abandoned structural steel members and reinforced concrete diaphragm slab, as part of the ASME Section XI, Subsection IWL program. The staff needs to confirm that the following issues are to be managed through the period of current and extended operation.

    - Effect of degrading Q-deck on the reinforced concrete diaphragm slab.

    - Impact on the operations of the emergency core cooling system (ECCS) suction strainers due to the falling degrading-products from the Q-deck and abandoned steel structures into the suppression pool.

The staff also audited the description of the LRA AMP provided in the UFSAR Supplement. The staff verified this description to be consistent with the description provided in the SRP-LR.

Audit Results. Based on this audit, the staff verified that the "scope of program," "preventive actions," "parameters monitored or inspected," "detection of aging effects," and "monitoring and trending," program elements of the LRA AMP are consistent with the corresponding program elements in the GALL Report AMP XI.S2. The staff also identified certain aspects of the "acceptance criteria" and "operating experience" program elements of the LRA AMP for which additional information or additional evaluation is required before consistency can be determined.

Based on this audit the staff identified that additional information regarding operating experience is required before a determination can be made regarding the sufficiency of the LRA AMP to detect and manage the effects of aging. In addition, the staff verified that the description provided in the UFSAR Supplement is consistent with the description provided in the SRP-LR.

LRA AMP B.2.1.32, ASME Section XI, Subsection IWF

Summary of Information in the Application. The LRA states that AMP B.2.1.32, "ASME Section XI, Subsection IWF," is an existing program with enhancement that is consistent with the program elements in GALL Report AMP XI.S3, "ASME Section XI, Subsection IWF." To verify this claim of consistency, the staff audited the LRA AMP. Issues identified but not resolved in this report will be addressed in the SER. The scope of this audit includes enhancements necessary to make the LRA AMP consistent with the corresponding GALL Report AMP; however, it does not consider the sufficiency of enhancements which are not necessary for consistency, which will be evaluated in the SER.

Audit Activities. During its audit, the staff interviewed the applicant's staff and reviewed onsite documentation provided by the applicant. In addition, the staff conducted walkdowns of the plant to determine the general condition of component supports in the scope of license renewal. The staff also conducted an independent search of the applicant's operating experience database using keywords: "supports," "bolting," and "IWF."

The table below lists the documents which 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. LG-PBD-AMP-XI.S3	ASME Section XI, Subsection IWF	Revision 1 05/15/2011
2. AR A1472680	(Description) Loose Bolting on the North Side of the Pipe Clamp U-Bolt	06/16/2004
3. AR 00608323	Insufficient Thread Engagement on EBB-202-H26 Support	03/23/2007
4. AR A1608599	Tech Evaluation for Hanger DCA-201-H004	03/23/2007
5. AR A1565572	Unsat VT-3 visual inspection on hanger APE-2MS-HHA1	03/06/2003
6. AR 01202443	Rework of Support DLA-208-H004	04/14/2011
7. AR 0607219	As-found Setting on Spring Can EBB-208-H03 is out of tolerance	03/21/2007
8. OPXR ATI 00904247-06	NRC Information Notice "IN 2009-04" & "Age-Related Constant Support Degradation"	06/18/2009
9. ER-AA-330-003	Inservice Inspection of Section XI Component Supports	Revision 7
10. MA-LG-716-1017	Control of Bolting/Tensioning	Revision 0
11. ER-LG-330-1001	ISI Program Plan	Revision 1 11/23/2009
12. ER-LG-330-1003	ISI Classification Basis Document	Revision 1 11/23/2009

The staff conducted its audit of LRA program elements one through six based on the contents of the existing program as modified by the proposed enhancements.

During the audit, the staff verified that the "parameters monitored or inspected," "detection of aging effects," "monitoring and trending," and "acceptance criteria" program elements of the LRA AMP are consistent with the corresponding element of the GALL Report AMP. In addition, the staff found that for the "scope of program" and "preventive actions" program elements, sufficient information was not available to determine whether they were consistent with the

corresponding program elements of the GALL Report AMP. In order to obtain the information necessary to verify whether these program elements are consistent with the corresponding program elements of the GALL Report AMP, the staff will consider issuing RAIs for the subjects discussed below.

- The "scope of program" program element of the LRA AMP states that MC piping and support members are examined as part of the ASME Section XI, Subsection IWF program, but basis documents reviewed onsite specifically exempt MC component supports from the scope of the ASME Section XI, Subsection IWF program. The GALL Report AMP recommends that MC supports be examined as part of the ASME Section XI, Subsection IWF program. It is not clear to the staff why implementing procedures for the ASME Section XI, Subsection IWF program are not consistent with the AMP description and GALL Report for examination of MC supports.

- The "preventative actions" program element of the LRA AMP states that structural bolting used in ASME Section XI, Subsection IWF supports does not include A325, F1852, or A490 bolts. The "detection of aging effects" program element of the LRA AMP states that while the use of high strength bolts in supports is not common at LGS, A490 bolts are used for some larger supports. The GALL Report AMP recommends that if ASTM A325, ASTM F1852, and/or ASTM A490 bolts are used, the preventative actions in Section 2 of "Specification for Structural Joints Using ASTM A325 or A490 Bolts" should be addressed. It is not clear to the staff whether any A490 bolts are used in ASME Section XI, Subsection IWF supports, and if so, whether the preventative actions in Section 2 of the "Specification for Structural Joints Using ASTM A325 or A490 Bolts" are applicable.

During the audit of the "operating experience" program element, the staff determined 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 staff also determined that 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 the effects of aging during the period of extended operation. In order to obtain the information necessary to determine whether the applicant's operating experience supports the sufficiency of the LRA AMP, the staff will consider issuing RAIs for the subject discussed below.

- Upon review of plant-specific operating experience, the staff noted several cases in which conditions were found during ASME Code, Section XI, Subsection IWF examinations that appeared to be degraded. In each case, the licensee performed an engineering evaluation and determined that the as-found component was acceptable for continued service (i.e., did not violate the acceptance standards of IWF-3410) but still chose to enter the component into its Corrective Action Program and re-work the component to as-new condition. The staff's concern is that re-worked supports that are part of the ISI IWF inspection sample may not be representative of the age-related degradation of similar components that are not part of the ISI inspection sample.

The staff also audited the description of the LRA AMP provided in the UFSAR Supplement. The staff verified this description to be consistent with the description provided in the SRP-LR.

Audit Results. Based on this audit, the staff verified that the "parameters monitored or inspected," "detection of aging effects," "monitoring and trending," and "acceptance criteria," program elements of the LRA AMP are consistent with the corresponding program elements in GALL Report AMP XI.S3. The staff also identified certain aspects of the "scope of program," and "preventive actions" program elements of the LRA AMP for which additional information or additional evaluation is required before consistency can be determined.

Based on this audit, the staff also identified that additional information regarding operating experience is required before a determination can be made regarding the sufficiency of the LRA AMP to detect and manage the effects of aging. In addition, the staff verified that the description provided in the UFSAR Supplement is consistent with the description provided in the SRP-LR.

LRA AMP B.2.1.33, 10 CFR Part 50, Appendix J Program

Summary of Information in the Application. The LRA states that AMP B.2.1.33, "10 CFR Part 50, Appendix J," is an existing program that is consistent with the program elements in GALL Report AMP XI.S4, "10 CFR Part 50, Appendix J." To verify this claim of consistency, the staff audited the LRA AMP. Issues identified but not resolved in this report will be addressed in the SER.

Audit Activities. During its audit, the staff interviewed the applicant's staff and reviewed onsite documentation provided by the applicant. In addition, the staff conducted plant walkdowns of the LGS, Unit 1 outside containment structure and penetrations. The staff also conducted an independent database search of the applicant's operating experience database using the keywords: "Appendix J," "ILRT," and "LLRT."

The table below lists the documents 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. LG-AMP-PBD-XI.S4	10 CFR Part 50, Appendix J	Revision 2 05/18/2011
2. ER-AA-380	Primary Containment Leakrate Testing Program	Revision 7 Undated
3. LS-AA-126-1001	Focus Area Self Assessment (FASA) of the Limerick Appendix J Program	Revision 5 Dated 2007
4. TRM-01	Technical Requirements Manual Limerick Unit 1 (See pages TRM ¾ 6-19 through 6-43a dated and revisions various)	Revision 28 11/15/2006
5. TRM-02	Technical Requirements Manual Limerick Unit 2 (See pages TRM ¾ 6-19 through 6-43a dated and revisions various)	Revision 28 11/15/2006
6. ST-4-060-970-1	Containment Structures Inservice Inspection	Revision 8 03/15/2008
7. ST-4-060-970-2	Containment Structures Inservice Inspection	Revision 7 04/21/2011
8. ST-4-LLR-001-1	The LLRT Program and Accountability Test	Revision 10 04/15/2010

Relevant Documents Reviewed

Document	Title	Revision / Date
9. ST-4-LLR-001-2	The LLRT Program and Accountability Test	Revision 11 04/23/2011
10. ST-4-LLR-031-1	Main Steam Line "A"	Revision 12 04/08/2010
11. ST-4-LLR-031-2	Main Steam Line "A"	Revision 12 04/09/2010
12. ST-1-060-490-2 WO0516299	Integrated Leak Rate Test or Initiating Events Tech Specs 3.6.1.2a, 4.6.1.2a, 3.6.2.1b, 4.6.6.1c, 4.6.2.1e UFSAR 6.2.1.1.5.4, 6.2.6.5.1, 6.2.6	Revision 6 05/22/1999
13. AR 00568249 Report	IN 2006-15 Documentation of Results Review, Vibration Induced Degradation and Failure of Safety Related Valves	03/30/2007
14. AR 00372936 Report	IN 2005-23 Documentation of Results Review, Vibration Induced Degradation of Butterfly Valves	09/13/2005
15. AR 01246974 Report	CCP-ILRT Valve Position Discrepancy	08/02/2011
16. AR 01138046	FASA Report - Appendix J Fill in FASA Report & Approval	08/02/2011
17. AR 01199008 Report	"B" Outboard MSIV Failed to Stroke Full Closed During Test (HV-041-2F028B)	04/07/2011
18. AR 01052788 Report	XV-047-1F181 Thru Valve Leak During LLRT(Scram Discharge Volume Drain Valve)	04/05/2010
19. AR 01246983	Appendix J Program Procedure Requirement Deficiency	08/02/2011
20. Bechtel Drawing 8031 C-277	Reactor Building Unit 1, Liner Plate Requirements, Liner Layout & Penetration Location	Revision 16 02/10/1983
21. Bechtel Drawing 8031 C-278	Reactor Building Unit 2, Liner Plate Requirements, Liner Layout & Penetration Location	Revision 3 06/14/1983
22. Bechtel Drawing 8031 C-279	Reactor Building Unit 1, Liner Plate Requirements Penetration Schedule	Revision 38 11/28/1988
23. Bechtel Drawing 8031 C-280	Reactor Building Unit 2, Liner Plate Requirements Penetration Schedule	Revision 21 01/13/1989

During the audit of program elements one through six, the staff found that program element(s) "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 AMP.

For the "scope of program," program element, sufficient information was not available to determine whether it was consistent with the corresponding program elements of the GALL Report AMP. In order to obtain the information necessary to verify whether this program element is consistent with the corresponding program element of the GALL Report AMP, the staff will consider issuing an RAI for the subject discussed below.

- Through the integrated leak rate test (ILRT) and local leak rate test (LLRT) testing and ASME Code Section XI, Subsection IWE, visual examinations, LGS ensures that the structural integrity of the containment structure will be maintained to withstand the maximum calculated pressure in the event of a loss of coolant accident (LOCA). For the period of extended operation these tests as implemented through the 10 CFR Part 50, Appendix J Program also provide for the detection of age related pressure boundary degradation for loss of material, loss of sealing/degradation of gaskets, leakage, and loss of bolt preload for valves and penetrations. Pursuant to 10 CFR Part 50 the applicant through exemptions (per 10 CFR 50.12) and exclusions (per 10 CFR 50.59) excluded certain SSCs (valves and penetrations) from Appendix J testing. The GALL

Report, however, in its "scope of program," program element recommends that the scope of the containment LRT program include all containment boundary pressure-retaining components. It is not clear to the staff if the SSCs currently excluded from the Appendix J testing would be included for the period of extended operation.

During the audit of the "operating experience" program element, 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 staff also found that 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 the effects of aging.

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.

Audit Results. Based on this audit, the staff verified that LRA program elements - "preventive actions," "parameters monitored or inspected," "detection of aging effects," "monitoring and trending," and "acceptance criteria" are consistent with the corresponding program elements in the GALL Report AMP. The staff also identified certain aspects of the "scope of program," program element of the LRA AMP for which additional information is required before consistency can be determined.

Based on this audit, the staff also 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. In addition, the staff verified that the description provided in the FSAR Supplement is consistent with the description provided in the SRP-LR.

LRA AMP B2.1.34, Masonry Walls

Summary of Information in the Application. The LRA states that AMP B.2.1.34, "Masonry Walls," is an existing program with enhancements that is consistent with the program elements in GALL Report AMP XI.S5, "Masonry Walls." To verify this claim of consistency, the staff audited the LRA AMP. The scope of this audit includes enhancements necessary to make the LRA AMP consistent with the corresponding GALL Report AMP; however, it does not consider the sufficiency of enhancements which are not necessary for consistency, which will be evaluated in the SER.

Audit Activities. During its audit, the staff interviewed the applicant's staff and reviewed onsite documentation provided by the applicant. In addition, the staff conducted walkdowns of the feedwater heater rooms in the turbine enclosure. The staff also conducted an independent search of the applicant's operating experience database using keywords: "masonry," "block wall," and "cracking."

The table below lists the documents which 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. LG-PBD-AMP-XI.S5	Masonry Walls	Revision 1 05/13/2011
2. AR 00343293	Crack in Block Wall in FW Heater Area	06/13/2005
3. ER-LG-310-1010	Maintenance Rule Implementation	Revision 13
4. ER-LG-450	Structures Monitoring Program	Revision 0
5. LGS Dwg 8031	Turbine Bldg & Aux Bay Units 1&2	Revision 5

The staff conducted its audit of LRA program elements one through six based on the contents of the existing program as modified by the proposed enhancements.

During the audit, the staff verified that the "scope of program," "preventive actions," "parameters monitored or inspected," "detection of aging effects," "monitoring and trending," and "acceptance criteria" program elements of the LRA AMP are consistent with the corresponding elements of the GALL Report AMP.

During the audit of the "operating experience" program element, the staff determined 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 staff also determined that 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 the effects of aging.

The staff also audited the description of the LRA AMP provided in the UFSAR Supplement. The staff verified this description to be consistent with the description provided in the SRP-LR.

Audit Results. Based on this audit, the staff verified that the "scope of program," "preventive actions," "parameters monitored or inspected," "detection of aging effects," "monitoring and trending," and "acceptance criteria" program elements of the LRA AMP are consistent with the corresponding program elements in GALL Report AMP XI.S5. The staff's evaluation of aspects of the program elements associated with enhancements which are not necessary for consistency will be addressed in the SER.

Based on this audit, the staff also verified that the operating experience is sufficient to indicate that the LRA AMP, as implemented by the applicant, is sufficient to detect and manage the effects of aging. In addition, the staff verified that the description provided in the UFSAR Supplement is consistent with the description provided in the SRP-LR.

LRA AMP B.2.1.35, Structures Monitoring Program

Summary of Information in the Application. The LRA states that AMP B.2.1.35, "Structures Monitoring Program," is an existing program with enhancements that is consistent with the program elements in GALL Report AMP XI.S6, "Structures Monitoring Program. To verify this claim of consistency, the staff audited the LRA AMP. Issues identified but not resolved in this report will be addressed in the SER. The scope of this audit includes enhancements necessary to make the LRA AMP consistent with the corresponding GALL Report AMP; however, it does not consider the sufficiency of enhancements which are not necessary for consistency, which will be evaluated in the SER.

Audit Activities. During its audit, the staff interviewed the applicant's staff and reviewed onsite documentation provided by the applicant. In addition, the staff conducted walkdowns of the turbine building and the spray pond and pumphouse. The staff also conducted an independent search of the applicant's operating experience database using keywords: "concrete," "corrosion," "cracking," "degradation," "erosion," leaching," "pitting," "rust," "spalling," and "underground."

The table below lists the documents which 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. LG-AMP-PBD-XI.S6	"Structures Monitoring Program"	Revision 1
2. ER-LG-310-1010.	Maintenance Rule Implementation - Limerick Generating Station	Revision 14
3. ER-AA-310-1004	Maintenance Rule – Performance Monitoring	Revision 8
4. SA-AA-117	Excavation, Trenching, Shoring	Revision 13
5. MA-MA-716-009	A Power Block Foundation Subdrainage Sump Pump Pit	Revision 6
6. ER-LG-450	Condition Monitoring of Structures	Revision 0
7. EN-LG-408-4160	RGPP Reference Material for Limerick Generating Station	Revision 1
8. MA-LG-716-1017	Control of Bolting/Torquing/Tensioning	Revision 0
9. RT-6-053-490-2	Determination of Fuel Pool Tell-Tale Liner Drain Leakage	Revision 0

The staff conducted its audit of LRA program elements one through six based on the contents of the existing program as modified by the proposed enhancements.

During the audit, the staff verified that the "scope of program," "preventive actions," "parameters monitored or inspected," "detection of aging effects," and "acceptance criteria" program elements of the LRA AMP are consistent with the corresponding elements of the GALL Report AMP. In addition, the staff found that for the "monitoring and trending" program element sufficient information was not available to determine whether it was consistent with the corresponding program element of the GALL Report AMP. In order to obtain the information necessary to verify whether this program element is consistent with the corresponding program elements of the GALL Report AMP, the staff will consider issuing an RAI for the subject discussed below.

- The "monitoring and trending" program element of the LRA AMP states that the existing Structures Monitoring Program requires monitoring of structures and components in accordance with 10 CFR 50.65 and RG 1.160 Revision 2 Regulatory Position 1.5; structures and components within the scope of the maintenance rule are monitored in accordance with 10 CFR 50.65 (a)(2) if inspection results do not identify significant degradation; and the program contains provisions for increased inspection frequency and trending for structures and components in accordance with 10 CFR 50.65 (a)(1). The GALL Report AMP recommends these same actions; however, it is not clear to the staff that a plant-specific time-limited aging analysis or inspection/surveillance program exists to provide assurances that the capability of the prestressed concrete girders

associated with the spent fuel pool will continue to meet their intended function(s) during the period of extended operation.

During the audit of the "operating experience" program element, the staff determined 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 staff also determined that 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 the effects of aging during the period of extended operation. In order to obtain the information necessary to determine whether the applicant's operating experience supports the sufficiency of the LRA AMP, the staff will consider issuing RAIs for the item discussed below.

- The applicant's program basis document notes that the ends of the steel beams adjacent to the turbine pedestal are supported by concrete ledges of the turbine surface and the beam seat assemblies supported by the turbine pedestal consist of sliding surface plates, backup plates, and elastomeric pads. A walk-down by plant personnel found that the beam ends supported by the turbine pedestal at numerous locations had settled approximately 0.5 inches as a result of deterioration/melting of elastomeric seals. It is not clear to the staff that the proposed Structures Monitoring program will be able to adequately manage the effects of aging for the turbine building operating floor and structure so that it will be able to meet its intended functions and that the resulting change in alignment will not impact attachments or supports.

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

Audit Results. Based on this audit, the staff verified that the "scope of program," "preventive actions," "parameters monitored or inspected," "detection of aging effects," and "acceptance criteria" program elements of the LRA AMP are consistent with the corresponding program elements in GALL Report AMP XI.S6. The staff's evaluation of aspects of the program elements associated with enhancements which are not necessary for consistency will be addressed in the SER. The staff also identified certain aspects of the "monitoring and trending" program element of the LRA AMP for which additional information or additional evaluation is required before consistency can be determined.

Based on this audit, the staff also identified that additional information regarding operating experience is required before a determination can be made regarding the sufficiency of the LRA AMP to detect and manage the effects of aging. In addition, the staff verified that the description provided in the UFSAR Supplement is consistent with the description provided in the SRP-LR.

LRA AMP B.2.1.36, RG 1.127, Inspection of Water-Control Structures Associated with Nuclear Power Plants

Summary of Information in the Application. The LRA states that AMP B.2.1.36, "RG 1.127, Inspection of Water-Control Structures Associated with Nuclear Power Plants," is an existing

program with enhancements that is consistent with the program elements in GALL Report AMP XI.S7, "RG 1.127, Inspection of Water-Control Structures Associated with Nuclear Power Plants." To verify this claim of consistency, the staff audited the LRA AMP. The scope of this audit includes enhancements necessary to make the LRA AMP consistent with the corresponding GALL Report AMP; however, it does not consider the sufficiency of enhancements which are not necessary for consistency, which will be evaluated in the SER.

Audit Activities. During its audit, the staff interviewed the applicant's staff and reviewed onsite documentation provided by the applicant. In addition, the staff conducted walkdowns of the Spray Pond and Pump House. The staff also conducted an independent search of the applicant's operating experience database using keywords: "concrete," "corrosion," "cracking," "degradation," "erosion," leaching," "pitting," "rust," "spalling," and "underground."

The table below lists the documents which 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. LG-AMP-PBD-XI.S7	RG 1.127, Inspection of Water-Control Structures Associated with Nuclear Power Plants	Revision 1
2. ER-LG-310-1010	Maintenance Rule Implementation - Limerick Generating Station	Revision 13
3. ST-1-012-901-0	Spray Pond Structural Inspection	Revision 1
4. ST-1-008-900-1	CST and RWST Dike Inspection	Revision 2
5. ST-1-008-900-2	Unit 2 CST Dike Inspection	Revision 3
6. ER-LG-450	Condition Monitoring of Structures	Revision 0
7. EN-LG-408-4160	RGPP Reference Material for Limerick Generating Station	Revision 1
8. MAG-CG-301	Control of Bolting/Torquing/Tensioning	Revision 7
9. MA-LG-716-1017	Control of Bolting/Torquing/Tensioning	Revision 0

The staff conducted its audit of LRA program elements one through six based on the contents of the existing program as modified by the proposed enhancements.

During the audit, the staff verified that the "scope of program," "preventive actions," "parameters monitored or inspected," "detection of aging effects," "monitoring and trending," and "acceptance criteria" program elements of the LRA AMP are consistent with the corresponding elements of the GALL Report AMP.

During the audit of the "operating experience" program element, the staff determined 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 staff also determined that 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 the effects of aging.

The staff also audited the description of the LRA AMP provided in the UFSAR Supplement. The staff verified this description to be consistent with the description provided in the SRP-LR.

Audit Results. Based on this audit, the staff verified that the "scope of program," "preventive actions," "parameters monitored or inspected," "detection of aging effects," "monitoring and trending," and "acceptance criteria" program elements of the LRA AMP are consistent with the corresponding program elements in GALL Report AMP XI.S7. The staff's evaluation of aspects of the program elements associated with enhancements which are not necessary for consistency will be addressed in the SER.

Based on this audit, the staff also verified that the operating experience is sufficient to indicate that the LRA AMP, as implemented by the applicant, is sufficient to detect and manage the effects of aging. In addition, the staff verified that the description provided in the UFSAR Supplement is consistent with the description provided in the SRP-LR.

LRA AMP B.2.1.37, Protective Coating Monitoring and Maintenance Program

Summary of Information in the Application. The LRA states that AMP B.2.1.37, "Protective Coating Monitoring and Maintenance Program," is an existing program with enhancement that is consistent with the program elements in GALL Report AMP XI.S8, "Protective Coating Monitoring and Maintenance Program." To verify this claim of consistency, the staff audited the LRA AMP. Issues identified but not resolved in this report will be addressed in the SER. The scope of this audit includes enhancements necessary to make the LRA AMP consistent with the corresponding GALL Report AMP; however, it does not consider the sufficiency of enhancements which are not necessary for consistency, which will be evaluated in the SER.

Audit Activities. 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: "coating," "flaw," "holiday," "pitting," "rust," and "spalling."

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 identified in the staff's search of the applicant's operating experience database.

Relevant Documents Reviewed

Document	Title	Revision / Date
1. ASTM D 7108-05	Standard Guide for Establishing Qualifications for a Nuclear Coatings Specialist	09/01/2005
2. UFSAR Section 1.8	Conformance to NRC Regulatory Guides (RG 1.54)	Revision 13
3. UFSAR Section 6.1.2	Organic Materials	Revision 13
4. ASTM D 5163-08	Standard Guide for Establishing a Program for Condition Assessment of Coating Service Level I Coating Systems in Nuclear Power Plants	11/01/2008
5. Response to GL 98-04	Response to Generic Letter 98-04, "Potential for Degradation of the Emergency Core Cooling System and the Containment Spray System After a Loss-of-Coolant Accident Because of Construction and Protective Coating Deficiencies and Foreign Material in Containment."	11/11/1998
6. ER-AA-330-008	Exelon Service Level I, and Safety-Related (Service Level III) Protective Coatings	Revision 7
7. M-060-010	Suppression Pool Coating Inspection	Revision 1

Document	Title	Revision / Date
8. ST-4-060-970-1	Containment Structures Inservice Inspection	Revision 9

The staff conducted its audit of LRA program elements one through six based on the contents of the existing program as modified by the proposed enhancement.

During the audit, the staff verified that the "scope of program," "preventive actions," "parameters monitored or inspected," "monitoring and trending," and "acceptance criteria" program elements of the LRA AMP are consistent with the corresponding elements of the GALL Report. In addition, the staff found that for the "detection of aging effects," program element, sufficient information was not available to determine whether it was consistent with the corresponding program elements of the GALL Report AMP. In order to obtain the information necessary to verify whether this program element is consistent with the corresponding program elements of the GALL Report AMP, the staff will consider issuing RAIs for the subject discussed below.

- The "detection of aging effects" program element of the LRA AMP states that 100 percent of the accessible coating in the immersed region of the suppression pool will be inspected each inservice inspection period (i.e., 3 times in 10 years). The GALL Report AMP recommends that in-service coating inspections be performed during each refueling outage. The GALL Report recommendation would have the applicant perform coating inspections in the immersed region of the suppression pool 5 times in a 10 year period (Limerick has 2 year refueling cycles), and the LRA states that the applicant will be performing these inspections 3 times in 10 years.

During the audit of the "operating experience" program element, the staff determined 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 staff also determined that 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 the effects of aging.

The staff also audited the description of the LRA AMP provided in the UFSAR Supplement. The staff verified this description to be consistent with the description provided in the SRP-LR.

Audit Results. Based on this audit, the staff verified that the "scope of program," "preventive actions," "parameters monitored or inspected," "monitoring and trending," and "acceptance criteria" program elements of the LRA AMP are consistent with the corresponding program elements in GALL Report AMP XI.S8. The staff also identified certain aspects of the "detection of aging effects," program elements of the LRA AMP for which additional information or additional evaluation is required before consistency can be determined.

Based on this audit, the staff also verified that the operating experience is sufficient to indicate that the LRA AMP, as implemented by the applicant, is sufficient to detect and manage the effects of aging. In addition, the staff verified that the description provided in the UFSAR Supplement is consistent with the description provided in the SRP-LR.

LRA AMP B.2.1.38, Insulation Material for Electrical Cables and Connection Not Subject to 10 CFR 50.49 Environmental Qualification Requirements

Summary of Information in the Application. The LRA states that AMP B.2.1.38, "Insulation Material for Electrical Cables and Connection Not Subject to 10 CFR 50.49 Environmental Qualification Requirement," is a new program that is consistent with the program elements in GALL Report AMP XI.E1, "Insulation Material for Electrical Cables and Connection Not Subject to 10 CFR 50.49 Environmental Qualification Requirement." To verify this claim of consistency, the staff audited the LRA AMP.

Audit Activities. During its audit, the staff interviewed the applicant's staff and reviewed onsite documentation provided by the applicant. In addition, the staff conducted walkdowns of station auxiliary transformer, manholes to the safeguards bus, 500KV and 220KV switchyard. The staff also conducted an independent database search of the applicant's operating experience database using the keywords: "corrosion," "cable" and "cracking."

The table below lists the documents which 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. LG-AMP-PBD-XI.E1	Insulation Material for Electrical Cables and Connections Not Subject to 10 CFR50.49 Environmental Qualification Requirements	Revision 2 05/18/2011
2. No Document No.	Insulation Material for Electrical Cables and Connections Not Subject to 10 CFR50.49 Environmental Qualification Requirements Results Book	NA
3. IEEE Std 1205-2000	IEEE Guide for Assessing, Monitoring, and Mitigating Aging Effects on Class 1E Equipment Used in Nuclear Power Generating Station	03/30/2000
4. MA-AA-723-500	Inspection of Non EQ Cables and Connections for Managing Adverse Localized Environments	Revision 4a
5. MA-AA-723-500	Inspection of Non EQ Cables and Connections for Managing Adverse Local Environments Revision change	Revision 1, Revision 2

During the audit of program elements one through six, the staff verified that the "scope of program," "preventive actions," "parameters monitored or inspected," "detection of aging effects," "monitoring and trending," and "acceptance criteria" program elements of the LRA AMP are consistent with the corresponding elements of the GALL Report AMP.

During the audit of the "operating experience" program element, the staff determined 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 staff also determined that 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 the effects of aging.

The staff also audited the description of the LRA AMP provided in the UFSAR Supplement. The staff verified this description is consistent with the description provided in the SRP-LR.

Audit Results. Based on this audit, the staff verified that the "scope of program," "preventive actions," "parameters monitored or inspected," "detection of aging effects," "monitoring and trending," and "acceptance criteria" program elements of the LRA AMP are consistent with the corresponding program elements in GALL Report AMP XI.E1. The staff's evaluation of aspects of the program elements associated with enhancements which are not necessary for consistency will be addressed in the SER.

Based on this audit, the staff also verified that the operating experience is sufficient to indicate that the LRA AMP, as implemented by the applicant, is sufficient to detect and manage the effects of aging. In addition, the staff verified that the description provided in the UFSAR Supplement is consistent with the description provided in the SRP-LR.

LRA AMP B.2.1.39, Insulation Material for Electrical Cables and Connections Not Subject to 10 CFR 50.49 Environmental Qualification Requirements Used in Instrumentation Circuits

Summary of Information in the Application. The LRA states that AMP B.2.1.39, "Insulation Material for Electrical Cables and Connections Not Subject to 10 CFR 50.49 Environmental Qualification Requirements Used in Instrumentation Circuits," is a new program that is consistent with the program elements in GALL Report AMP X1.E2, "Insulation Material for Electrical Cables and Connections Not Subject to 10 CFR 50.49 Environmental Qualification Requirements Used in Instrumentation Circuits." To verify this claim of consistency, the staff audited the LRA AMP.

Audit Activities. During its audit, the staff interviewed the applicant's staff and reviewed onsite documentation provided by the applicant. In addition, the staff conducted walkdowns of station aux transformer, manholes to the safeguards bus, 500KV and 220KV switchyard. The staff also conducted an independent database search of the applicant's operating experience database using the keywords: "corrosion," "cable" and "cracking."

The table below lists the documents which 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. LG-AMP-PBD-X1.E2	Insulation Material for Electrical Cables and Connections Not Subject to 10 CFR 50.49 Environmental Qualification Requirements Used in Instrumentation Circuits	Revision 2 05/13/2011
2. No Document No.	Insulation Material for Electrical Cables and Connections Not Subject to 10 CFR 50.49 Environmental Qualification Requirements Used in Instrumentation Circuits Results Book	NA
3. PM# 220030	Preventive Maintenance request – Unit 1 and Unit 2 /OZ4	Revision 0 09/08/1995
4. GE SIL No. 564	Verification of SRM, IRM or LPRM detector response	Revision 1 12/03/2003
5. GE SIL No. 500	SPRM Spiking	10/23/1989
6. AR 0877220	IRM B Detector Defective	02/06/2009

Document	Title	Revision / Date
7. AR 00064068	1-98-11-203 Inappropriate use of NSED Procedure No. D46 and CPS Procedure No. 1003.01	11/17/1998
8. AR 01259395	Loose Parts Inside 1PDS-TO015	09/04/2011

During the audit of program elements one through six, the staff verified that the "scope of program," "preventive actions," "parameters monitored or inspected," "detection of aging effects," "monitoring and trending," and "acceptance criteria" program elements of the LRA AMP are consistent with the corresponding elements of the GALL Report AMP.

During the audit of the "operating experience" program element, the staff determined 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 staff also determined that 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 the effects of aging.

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

Audit Results. Based on this audit, the staff verified that the "scope of program," "preventive actions," "parameters monitored or inspected," "detection of aging effects," "monitoring and trending," and "acceptance criteria" program elements of the LRA AMP are consistent with the corresponding program elements in GALL Report AMP XI.E2. The staff's evaluation of aspects of the program elements associated with enhancements which are not necessary for consistency will be addressed in the SER.

Based on this audit, the staff also verified that the operating experience is sufficient to indicate that the LRA AMP, as implemented by the applicant, is sufficient to detect and manage the effects of aging. In addition, the staff verified that the description provided in the UFSAR Supplement is consistent with the description provided in the SRP-LR.

LRA AMP B.2.1.40, Inaccessible Power Cables Not Subject to 10 CFR 50.49 Environmental Qualification Requirements

Summary of Information in the Application. The LRA states that AMP B.2.1.40, "Inaccessible Power Cables Not Subject to 10 CFR 50.49 Environmental Requirements," is a new program that is consistent with the program elements in GALL Report AMP XI.E3, "Inaccessible Power Cables Not Subject to 10 CFR 50.49 Environmental Requirements." To verify this claim of consistency, the staff audited the LRA AMP. Issues identified but not resolved in this report will be addressed in the SER.

Audit Activities. During its audit, the staff interviewed the applicant's staff and reviewed onsite documentation provided by the applicant. In addition, the staff conducted walkdowns of Manholes 001 and 101 and reviewed the applicant's in-scope manhole inspection history. The staff also conducted an independent database search of the applicant's operating experience database using the keywords: "manhole," "duct," "water," "cable," "underground," and "vault."

The table below lists the documents which 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. No Document No.	LGS Electrical Manholes In Scope of License Renewal	Revision: N/A Date: N/A
2. No Document No.	LGS Inaccessible Cable Test Results (In Scope for License Renewal	Revision: N/A Date: N/A
3. FSK-G-534	Yardwork Record Drawings – Manhole and Valve Pit Location Plan	Revision B8 09/12/1988
4. E-1002	Electrical Duct Layout Profiles, Sections, and Details – North Area	Revision 19 10/10/1990
5. C-40 Sheet 1	Yardwork Safeguard Electrical Manholes and Ducts Details and Schedule	Revision 13 06/18/1987
6. C39 Sheet 1 of 3	Yardwork Electrical Manholes and Ducts Schedule and Details	Revision 17 10/28/1992
7. C0239049	Station Work Order - Level Transmitter Non-Q Manholes	Revision: N/A Date: N/A
8. LG 10-00462-000	Engineering Change Request – Non-Safety Electrical Manholes Level Detection System	Revision 0 Date: N/A
9. E-1001	Electrical Duct Layout-Site Plan	Revision 41 05/25/1999
10. E-1414 Sheet 4.003	Manholes – Notes Details and Schedules	Revision 41 04/12/1993
11. E-1414 Sheet 4.0002.1	Manholes – Notes Details and Schedules	Revision 2 10/10/1990
12. R1108201	PM To Perform Cable Testing	Revision: N/A Date: N/A
13. ER-AA-3003	Cable Condition Monitoring Program	Revision: 2 Date: N/A
14.AR 00760587	Evaluate Submerged Cables Assignment 7	Revision: N/A Date: N/A
15. GL 2007-01	Inaccessible or Underground Power cable Failures That Disable Accident Mitigation Systems or Cause Plant Transients	Revision: N/A 02/07/2007
16. AR 00980246	Extent of Condition for Manhole 002	Revision: N/A 10/16/2009
17. AR 00982783	Provide Plan for Resolution of Wet Electrical Manholes	Revision: N/A 10/22/2009
18. ER-LG-310-1010	LGS Maintenance Rule Structural Monitoring Program	Revision 13 Date: N/A
19. LS-AA-115	Operating Experience Program	Revision 17 Date: N/A
20. AR 01146965	Inspection and Drainage of Non-Q Electrical Manholes	Revision: N/A 12/01/2010
21. LER 3522010001	Valid Actuation of the Reactor Protection System With the Reactor Critical	Revision: N/A 08/23/2010
22. 05000352/2008005 05000353/2008005	Limerick Generating Station – NRC Integrated Inspection Report	Revision: N/A 01/30/2009
23. 05000352/2009004 05000353/2009004	Limerick Generating Station – NRC Integrated Inspection Report	Revision: N/A 11/03/2009

Relevant Documents Reviewed

Document	Title	Revision / Date
24. RS-07-156	Exelon Generating Company, LLC/AmerGen Energy Company, LLC Response to the Request for Additional Information (RAI) Regarding Resolution of NRC Generic Letter 2007-01, "Inaccessible or Underground Power Cable Failures That Disable Accident Mitigation Systems or Cause Plant Transients."	Revision: N/A 12/07/2007
25. RS-07-067	Response to NRC Generic Letter 2007-01, "Inaccessible or Underground Power Cable Failures That Disable Accident Mitigation Systems or Cause Plant Transients."	Revision: N/A 05/07/2007
26. AR 01003826	Sump Pumps in Electrical Manholes – Initiate Project	Revision: N/A 12/10/2009
27. LG-AMP-PBD-XI.E3	Limerick Generating Station Units 1 and 2 License Renewal Project Inaccessible Power cables Not Subject To 10 CFR 50.49 Environmental Qualification Requirements	Revision 2 Date: N/A

During the audit of program elements one through six, the staff found that program elements "scope of program," "parameters monitored or inspected," "monitoring and trending," and "acceptance criteria" of the LRA AMP are consistent with the corresponding elements of the GALL Report AMP. For program elements "preventive actions," and "detection of aging effects," sufficient information was not available to determine whether they were consistent with the corresponding program elements of the GALL Report AMP. In order to obtain the information necessary to verify whether these program elements are consistent with the corresponding program elements of the GALL Report AMP, the staff will consider issuing RAIs for the subjects discussed below.

- The program description, and "preventive actions" program element of the LRA AMP, LG-AMP-PBD-XI.E3 , LRA Appendix A, Section A.2.1.40, LRA Appendix B, Section B.2.1.40 and LRA Table A.5, "License Renewal Commitment List," Commitment No. 40 are not consistent in describing the applicant's program to manage inaccessible power cables subject to significant moisture. The GALL Report AMP recommends periodic actions are taken to prevent cables from being exposed to significant moisture. It is not clear to the staff that the applicant's AMP and LRA including Sections B.2.1.40, A.2.1.40, and Table A.5, Commitment No. 40 describes the program as minimizing potential exposure to significant moisture.

- The "preventive actions" program element of the LRA AMP, LG-AMP-PBD-XI.E3 and LRA Appendix A, Section A.2.1.40, LRA Appendix B, Section B.2.1.40 and LRA Table A.5, "License Renewal Commitment List," are not consistent with the GALL Report in that event driven inspections are not specified to be performed after heavy rain or flooding events. The GALL Report AMP recommends that inspections are performed periodically based on water accumulation over time and event driven occurrences, such as heavy rain or flooding. The applicant has not clearly specified that event driven inspections will be performed subsequent to heavy rain or flooding events or provided justification for not including this inspection.

- The LRA uses the term "electrical continuity" in describing the intended function in LRA Table 2.5.2-1 for commodity "Insulation Material for Electrical Cable and Connections. LRA Table 3.6.2-1, uses electrical continuity for the intended function for component types, "Conductor Insulation for Inaccessible Power Cables Greater than or Equal to

400V," "Fuse Holders (Not Part of Active Equipment): Insulation Material," "Insulation Material for Electrical Cables and Connections," Insulation Material for Electrical Cables and Connections Used in Instrumentation Circuits," and LRA Section 2.5.2.5.2, Electrical Penetrations." In addition, component type, "Electrical Equipment Subject to 10 CFR 50.49 EQ Requirements," in LRA Table 3.6.2-1 lists the materials "Various Polymeric and Metallic Materials" and therefore also should include both intended functions "Insulate (Electrical)" and "Electrical Continuity." The use of the intended function "Electrical Continuity" is inconsistent with the material referenced (various organic polymers).

- The "detection of aging effects" program element of the LRA AMP states that testing will be performed every six years but does not include a provision that test frequencies are adjusted based on test results as well as operating experience. Draft procedure MA-MA-716-009 specifies a test frequency of every third refueling outage. The GALL Report AMP recommends that inaccessible power cables which are exposed to significant moisture will be tested at a frequency of at least every six years and that test frequencies will be adjusted based on test results and operating experience. It is not clear to the staff that the applicant's program, when implemented, will be consistent with the GALL Report AMP such that more frequent testing will occur, if test results or operating experience dictate.

During the audit of the "operating experience" program element, 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 staff also found that 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 the effects of aging.

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 subject discussed below.

- LRA Appendix A, Section A.2.1.40, "Inaccessible Power Cables Not Subject to 10 CFR 50.49 Environmental Qualification Requirements," does not address the GALL Report recommendation that inspections are performed periodically based on water accumulation over time and event driven occurrences, such as heavy rain or flooding. The applicant has not clearly specified that event driven inspections will be performed subsequent to heavy rain or flooding events or provided justification for not including this inspection.

Audit Results. Based on this audit, the staff verified that LRA program elements "scope of program," "parameters monitored or inspected," "monitoring and trending," and "acceptance criteria" are consistent with the corresponding program elements in the GALL Report AMP. The staff also identified certain aspects of the LRA program elements "preventive actions," and "detection of aging effects," for which additional information or additional evaluation is required before consistency can be determined.

Based on this audit, the staff also verified that the operating experience is sufficient to indicate that the LRA AMP, as implemented by the applicant, is sufficient to detect and manage the effects of aging. In addition, the staff identified a need for additional information regarding the adequacy of the program description in the UFSAR Supplement.

LRA AMP, B.2.1.41, Metal Enclosed Bus

Summary of Information in the Application. The LRA states that AMP B.2.1.41, "Metal Enclosed Bus," is a new program that is consistent with the program elements in GALL Report AMP XI.E4, "Metal Enclosed Bus." To verify this claim of consistency, the staff audited the LRA AMP. Issues identified but not resolved in this report will be addressed in the SER.

Audit Activities. During its audit, the staff interviewed the applicant's staff and reviewed onsite documentation provided by the applicant. In addition, the staff conducted walkdowns of the metal enclosed bus outside the turbine building. In addition, the staff conducted walkdowns of station auxiliary transformer, manholes to the safeguards bus, 500KV and 220KV switchyard. The staff also conducted an independent database search of the applicant's operating experience database using the keywords: "bus insulation," "loose connection," "corrosion," and "cracking."

The table below lists the documents which 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. LG-AMP-PBD-XI.E4,	Metal Enclosed Bus	Revision 1 Date: N/A
2. M-092-002	4kV Switchgear Maintenance	Revision 5 Date: N/A
3. R0480316	Routine Task Work Order for PM325119, (101- Bus) M-092-002 Clean, Examine, and Megger	Revision: N/A 01/14/2010
4. R0042723	(201-Bus) M-092-002 Clean, Examine, and Megger	Revision: N/A 06/17/2007
5. R1126893	Perform Thermography on Various Component	Revision: N/A 10/08/2010
6. AR 00600808	WANO Walkdown Results	No date

During the audit of program elements one through six, the staff found that program elements "preventive actions," "monitoring and trending," and "acceptance criteria" of the LRA AMP are consistent with the corresponding element(s) of the GALL Report AMP. For program elements "scope of program," "detection of aging effects," and "parameters monitored or inspected," sufficient information was not available to determine whether they were consistent with the corresponding program elements of the GALL Report AMP. In order to obtain the information necessary to verify whether these program elements are consistent with the corresponding program elements of the GALL Report AMP, the staff will consider issuing RAIs for the subjects discussed below.

- The "parameters monitored or inspected" program element of the program basis document (LG-AMP-PBD-XI.E4, Rev 1) references implementation procedure M-092-002. In this procedure, it requires bus joint nuts and bolts be retorqued. EPRI TR-104213s, Bolted Joint Maintenance & Application Guide, states that bolted joints should be inspected for evidence of overheating, signs of burning or discoloration, and indications of loose bolts. The bolts should not be retorqued unless the joint requires service or the bolts are clearly loose. Verifying the torque is not recommended. The torque required to turn the fastener in the tightening direction (restart torque) is not a good indicator of the preload once the fastener is in service. Due to relaxation of the parts of the joint, the final loads are likely to be lower than the installed loads. The GALL Report AMP recommends measuring the connection resistance of bolted joints using a micro-ohmmeter. Retorqueing of bus connections is not a good engineering practice to check for loose bolts and is inconsistent with the GALL Report AMP.

- The "detection of aging effects" program element of the program basis document (LG-AMP-PBD-XI.E4, revision 1) states that a sample of the metal enclosed bus accessible bolted connections in each bus section shall be inspected using thermography for increased resistance. The inspections are performed on all accessible bus sections while the bus is energized. The applicant provided the staff a photograph of thermography showing a heat source from a space heater inside a metal enclosed bus. However, the applicant did not provide any photograph taken from outside the bus duct showing the temperature difference between the bus connection due to increased resistance. In general, keeping with operating experience best practices of the industry, windows are installed on the metal enclosed bus for thermographic inspections. The metal enclosed cover as well as space heater may mask the heat created by loosened bus connections. The temperature differences between bus connections may not be detected if windows are not installed on metal enclosed buses. It is not clear to the staff that what the applicant is doing is in accordance with the manufacturer's recommendations for inspecting bolted connections from outside a bus enclosure and if the maintenance practices are updated to be in accordance with the industry operating experience best practices.

During the audit of the "operating experience" program element, 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 staff also found that 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 the effects of aging.

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.

Audit Results. Based on this audit, the staff verified that LRA program elements "preventive actions," "monitoring and trending," and "acceptance criteria" are consistent with the corresponding program elements in the GALL Report AMP. The staff also identified certain aspects of LRA program elements "scope of program," "detection of aging effects," and "parameters monitored or inspected," for which additional information or additional evaluation is required before consistency can be determined.

Based on this audit the staff also 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. In addition, the staff verified that the description provided in the UFSAR Supplement is consistent with the description provided in the SRP-LR.

LRA AMP B.2.1.42, Fuse Holders

Summary of Information in the Application. The LRA states that AMP B.2.1.42, "Fuse Holders," is a new program that will be consistent with the program elements in GALL Report AMP XI.E5, "Fuse Holder." To verify this claim of consistency the staff audited the LRA AMP.

Audit Activities. During its audit, the staff interviewed the applicant's staff, and reviewed onsite documentation provided by the applicant. In addition, the staff conducted walkdowns of station auxiliary transformer, manholes to the safeguards bus, 500KV and 220KV switchyard. 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 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. LG-AMP-PBD-	Aging Management Program Basis Document Fuse Holders	Revision 1 Date: N/A
2. ST-2-087-400-1	Reactor Coolant System Leak Detection System – Drywell Unit Cooler Condensate Flow Monitor Calibration/Functional Test	Revision 27 Date: N/A
3. R0042898	PIMS Library Routine Work Order for PM214361, (FT-087-120A-D, G & H) Routine Calibration & Clean Flow Elements	Revision: N/A 11/11/2010
4. ST-2-087-400-2	Reactor Coolant System Leak Detection System – Drywell Unit Cooler Condensate Flow Monitor Calibration/Functional Test	Revision 19 Date: N/A
5. R0255567	PIMS Library Routine Work Order for PM259893, (FT-087-220A-D, G & H) Routine Calibration & Clean Flow Elements	Revision: N/A 11/11/2010

During the audit of program elements one through six, the staff verified that the "scope of program," "preventive actions," "parameters monitored or inspected," "detection of aging effects," "monitoring and trending," and "acceptance criteria" program elements of the LRA AMP are consistent with the corresponding elements of the GALL Report AMP.

During the audit of "operating experience" program element, 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 staff also found that 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 the effects of aging.

The staff also audited the description of the LRA AMP provided in the UFSAR Supplement. The staff found this description is consistent with the description provided in the SRP-LR.

Audit Results. Based on this audit, the staff verified that LRA program elements "preventive actions," parameters monitored or inspected," "detection of aging effects," "monitoring and trending," and "acceptance criteria" are consistent with the corresponding program elements in GALL Report AMP. The staff also identified certain aspects of the LRA program element "scope of program" for which additional information or additional evaluation is required before consistency can be determined.

Based on this audit, the staff also verified that the operating experience is sufficient to indicate that the LRA AMP, as implemented by the applicant, is sufficient to detect and manage the effects of aging. In addition, the staff verified that the description provided in the UFSAR Supplement is consistent with the description provided in the SRP-LR.

LRA AMP B.2.1.43, Electrical Cable Connections Not Subject to 10 CFR 50.49 Environmental Qualification Requirements

Summary of Information in the Application. The LRA states that AMP B.2.1.43, "Electrical Cable Connections Not Subject to 10 CFR 50.49 Environmental Qualification Requirements," is a new program that is consistent with the program elements in the GALL Report AMP XI.E6, "Electrical Cable Connections Not Subject to 10 CFR 50.49 Environmental Qualification Requirements." To verify this claim of consistency, the staff audited the LRA AMP.

Audit Activities. During its audit, the staff interviewed the applicant's staff and reviewed onsite documentation provided by the applicant. In addition, the staff conducted walkdowns of station aux transformer, manholes to the safeguards bus, 500KV and 220KV switchyard. The staff also conducted an independent database search of the applicant's operating experience database using the keywords: "cable connections," "loosening," and "corrosions."

The table below lists the documents which 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
LG-AMP-PDB-XI.E6	Electrical Cable Connections Not Subject to 10 CFR 50.49 Environmental Qualification Requirements	Revision 2 Date: N/A
2. CR 380042	Molded Circuit Breaker C Phase Outgoing Wire is 25 deg. C Warmer	Revision: N/A 09/28/2005
3. CR 874599, D224-R-G08	Breaker Failed	Revision: N/A 01/31/2009
4. EPRI TR-104213s	Bolted Joint Maintenance & Application Guide	Revision: N/A 12/1995

During the audit of program elements one through six, the staff found that program elements "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 AMP.

During the audit of the "operating experience" program element, 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 staff also found that 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 the effects of aging.

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.

Audit Results. Based on this audit, the staff verified that LRA program elements "scope of program," "preventive actions," "parameters monitored or inspected," "detection of aging effects," "monitoring and trending," and "acceptance criteria" are consistent with the corresponding program elements in the GALL Report AMP.

Based on this audit, the staff also 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. In addition, the staff verified that the description provided in the UFSAR Supplement is consistent with the description provided in the SRP-LR.

LRA AMP B.3.1.1, Fatigue Monitoring Program

Summary of Information in the Application. The LRA states that AMP B.3.1.1, "Fatigue Monitoring," is an existing program with an enhancement that is consistent with the program elements in GALL Report AMP X.M1, "Fatigue Monitoring." To verify this claim of consistency, the staff audited the LRA AMP. Issues identified but not resolved in this report will be addressed in the SER. The scope of this audit includes enhancements necessary to make the LRA AMP consistent with the corresponding GALL Report AMP; however, it does not consider the sufficiency of enhancements which are not necessary for consistency, which will be evaluated in the SER.

Audit Activities. 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," "cycle," and "cracking."

The table below lists the documents which 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. LG-AMP-PBD-X.M1	Program Basis Document – Fatigue Monitoring Program	Revision 2 05/23/2011
2. LGS ECR 06-00224	Snubber VRR-2RP-H002 Cold Setting is Out of Tolerance	Revision 0 11/26/2006
3. IR01050522, including Attachment 1-10	Snubber DCA-319-H002 Functional Test Failure	Revision 0 03/31/2010

Relevant Documents Reviewed

Document	Title	Revision / Date
4. AR01058539	RV Thermal Transient Monitoring Data Sheets Contain Errors	Revision 0, 04/19/2010
5. ER-AA-470	Fatigue and Transient Monitoring Program	Revision 5
6. ST-107-640-1	Reactor Vessel Thermal Transient Monitoring – Unit 1	Revision 6
7. ST-107-640-2	Reactor Vessel Thermal Transient Monitoring – Unit 2	Revision 5
8. ST-107-990-1	ECCS/RCIC Vessel Injection Recording and Reporting – Unit 1	Revision 2
9. ST-107-990-1	ECCS/RCIC Vessel Injection Recording and Reporting – Unit 2	Revision 2
10. ST-107-640	Unit 1 and 2 results from surveillance test	1/2011
11. ST-107-640 and ST-107-990	Marked up surveillance test procedures for both Units 1 and 2	10/2011
12. ST-1-103-300-1	24 Month Snubber Functional Test Program	04/12/2010
13. AR01271786	Fatigue Monitoring Discrepancy	10/03/2011
14. SIA 1000030.301	Limerick Unit 1 Cycle Projections (new)	Revision 2
15. SIA 1000030.302	Limerick Unit 2 Cycle Projections (new)	Revision 2
16. SIA1000030.303	Methodology for Environmental Fatigue Evaluation of NUREG/CR-6260 Components (new)	Revision 0
17. SIA 1000030.304	Environmentally Assisted Fatigue (EAF) for Reactor Pressure Vessel (RPV) Locations	Revision 1
18. SIA 1000030.305	Environmentally Assisted Fatigue for Piping Locations	Revision 1
19. SIA 1000030.306	Environmentally Assisted Fatigue for Main Steam Piping Locations	Revision 0
20. SIA 1000818.301	Feedwater Nozzle FEA Loads Calculation	Revision 0
21. SIA 1000818.302	Feedwater Nozzle Finite Element Model	Revision 0
22. SIA 1000818.303	Feedwater Nozzle Stress Analysis	Revision 0
23. SIA 1000818.304	Feedwater Nozzle Fatigue Analysis	Revision 0
24. SIA 1000818.305	Feedwater Nozzle Rapid Cycle Update	Revision 0

The staff conducted its audit of LRA program elements one through six based on the contents of the existing program as modified by the proposed enhancement.

During the audit, the staff verified that the "scope of program," "preventive actions," "parameters monitored or inspected," "detection of aging effects," and "acceptance criteria" program elements of the LRA AMP are consistent with the corresponding elements of the GALL Report AMP. In addition, the staff found that for the "monitoring and trending" program element, sufficient information was not available to determine whether it was consistent with the corresponding program element of the GALL Report AMP. In order to obtain the information necessary to verify whether this program element is consistent with the corresponding program element of the GALL Report AMP, the staff will consider issuing RAIs for the subject discussed below.

- The "monitoring and trending" program element of the LRA AMP states in order to assure that assumption of 60-year projections is valid, the Fatigue Monitoring program will continue to monitor and track these transient cycles against the cycle limits throughout the period of extended operation. The GALL Report AMP recommends trending is assessed to ensure that the fatigue usage factor remains below the design limit during the period of extended operation. It is not clear to the staff that these

statements are consistent because several TLAA evaluations were dispositioned in accordance with 10 CFR 54.21(c)(1)(i) and rely on the 60 year projections, whose validity is confirmed by the Fatigue Monitoring Program. Therefore, it is not clear whether the implementing procedures or corrective actions of the Fatigue Monitoring Program will ensure that TLAAs, relying on the 60-year projections and dispositioned in accordance with 10 CFR 54.21(c)(1)(i), will be evaluated if a transient cycle count reaches a cycle limit.

During the audit of the "operating experience" program element, the staff determined 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 staff also determined that 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 the effects of aging.

The staff also audited the description of the LRA AMP provided in the UFSAR Supplement. The staff verified this description to be consistent with the description provided in the SRP-LR.

Audit Results. Based on this audit, the staff verified that the "scope of program," "preventive actions," "parameters monitored or inspected," "detection of aging effects," and "acceptance criteria" program elements of the LRA AMP are consistent with the corresponding program elements in GALL Report AMP X.M1. The staff also identified certain aspects of the "monitoring and trending" program element of the LRA AMP for which additional information or additional evaluation is required before consistency can be determined.

Based on this audit, the staff also verified that the operating experience is sufficient to indicate that the LRA AMP, as implemented by the applicant, is sufficient to detect and manage the effects of aging. In addition, the staff verified that the description provided in the UFSAR Supplement is consistent with the description provided in the SRP-LR.

LRA AMP B.3.1.2, Environmental Qualification (EQ) of Electric Components

Summary of Information in the Application. The LRA states that AMP B.3.1.2, "Environmental Qualification (EQ) of Electric Components," is an existing program that is consistent with the program elements in GALL Report AMP X.E1, "Environmental Qualification (EQ) of Electric Components." To verify this claim of consistency, the staff audited the LRA AMP.

Audit Activities. During its audit, the staff interviewed the applicant's staff and reviewed onsite documentation provided by the applicant. In addition, the staff conducted walkdowns of station auxiliary transformer, manholes to the safeguards bus, 500KV and 220KV switchyard. The staff also conducted an independent database search of the applicant's operating experience database using the keywords: "corrosion," "cable" and "cracking."

The table below lists the documents which 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. LG-AMP-PBD-X.E1	Environmental Qualification (EQ) of Electric Components GALL Program XI.E1	Revision 1 05/18/2011
2. NA	Environmental Qualification (EQ) of Electric Components GALL Program XI.E1 Results Book	NA
3. AR#00506103	Self-Assessment Summary Sheet	09/04/2006
4. AR#00864892	Temperature Limits/Bands Do Not Agree With Spec M-171	01/09/2009
5. AR#00360602	HV-011-201D (2D Core Spray Unit Cooler) Failed To Open Fully	08/06/2005
6. NRC RIS 2003-09	Environmental Qualification of Low-Voltage Instrumentation and Control Cables	05/02/2003
7. CC-AA-203	Environmental Qualification Program	Revision 8
8. KCI-10-016	Proposal for Engineering Services to Address the EQ Aspects of License Renewal and to Upgrade the EQ Documentation at Limerick Generating Station	02/01/2010
9. LE-0089	Calculation for Qualified Life and Post LOCA Operability Evaluation of Agastat Relays	Revision 4
10. LS-AA-126-1001	FASA Self-Assessment Report	Revision 6 07/12/2011
11. EQ Binder No. EQ-LGS-010	Equipment Qualification: Valcor Solenoid Valves	Revision 0
12. M-171	Specification for Environmental Service Conditions System/Topic No: 908	Revision 16
13. M-171	Specification for Environmental Service Conditions System/Topic No: 908	Revision 17
14. AR 01138050	FASA – EQ	11/09/2010
15. No Document No.	LGS Environmental Qualification Program Triennial FASA	09/28/2006
16. A1601059	Re-Calculate EQ Life of H2/O2 Hot-Box Components	03/12/2007
17. CC-AA-203	Limerick Generating Station EQ Program Health Report (Draft)	Q3/2010, Q4/2010, Q1/2011, Q2/2011
18. M-171	Specification for Environmental Service Conditions Limerick Generating Station Units 1 & 2	Revision 17, Revision 16
19. KCI-11-134 Attachment	Figure 1: Skyscraper Report for Initial Binder Transition into EQPro	08/29/2011
20. ER-AA-1100	Implementing and Managing Engineering Programs	Revision 9

During the audit of program elements one through six, the staff verified that the "scope of program," "preventive actions," "parameters monitored or inspected," "detection of aging effects," "monitoring and trending," and "acceptance criteria" program elements of the LRA AMP are consistent with the corresponding elements of the GALL Report AMP.

During the audit of the "operating experience" program element, the staff determined 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 staff also determined that 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 the effects of aging.

The staff also audited the description of the LRA AMP provided in the UFSAR Supplement. The staff verified this description is consistent with the description provided in the SRP-LR.

Audit Results. Based on this audit, the staff verified that LRA program elements "scope of program," "preventive actions," "parameters monitored or inspected," "detection of aging effects," "monitoring and trending," and "acceptance criteria" are consistent with the corresponding program elements in the GALL Report AMP.

Based on this audit, the staff also 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. In addition, the staff verified that the description provided in the UFSAR Supplement is consistent with the description provided in the SRP-LR.

Mr. Michael P. Gallagher
Vice President License Renewal Projects
Exelon Generation Company, LLC
200 Exelon Way
Kennett Square, PA 19348

SUBJECT: AGING MANAGEMENT PROGRAMS AUDIT REPORT REGARDING THE LIMERICK GENERATING STATION, UNITS 1 AND 2 (TAC NOS. ME6555 AND ME6556)

Dear Mr. Gallagher:

By letter, dated June 22, 2011, Exelon Generation Company, LLC (or the applicant) submitted an application for renewal of operating licenses NPF-39 and NPF-85 for the Limerick Generating Station (LGS) Units 1 and 2. On October 14, 2011, the staff of the U.S. Nuclear Regulatory Commission (NRC or 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 301-415-3733 or by e-mail at Robert.Kuntz@nrc.gov.

Sincerely,

/RA/
Robert F. Kuntz, Senior Project Manager
Projects Branch 1
Division of License Renewal
Office of Nuclear Reactor Regulation

Docket Nos. 50-352 and 50-353

Enclosure:
As stated

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DATE	02/ 23 /12	02/ 23 /12	02/ 27 /12	02/ 28 /12

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Letter to Michael P. Gallagher from Robert F. Kuntz dated February 28, 2012.

SUBJECT: AGING MANAGEMENT PROGRAMS AUDIT REPORT REGARDING THE LIMERICK GENERATING STATION, UNITS 1 AND 2 (TAC NOS. ME6555 AND ME6556)

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