U.S. NUCLEAR REGULATORY COMMISSION

OFFICE OF NUCLEAR REACTOR REGULATION, DIVISION OF LICENSE RENEWAL

Docket No:	50-341
License No:	NPF-43
Licensee:	DTE Electric Company
Facility:	Fermi 2 Nuclear Power Plant
Location:	Newport, MI
Dates:	September 15 – 19, 2014 September 29, 2014 – October 3, 2014
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Introduction

The U.S. Nuclear Regulatory Commission (NRC or the staff) conducted a 10-day audit at the Fermi 2 Nuclear Power Plant (Fermi 2), in Newport, MI, from September 15 to October 3, 2014. The purpose of the audit was to examine DTE Electric Company's (DTE or the applicant) aging management programs (AMPs) and related documentation to verify the applicant's claims of consistency with the corresponding AMPs in NUREG-1801, Revision 2, "Generic Aging Lessons Learned (GALL) Report," dated December 2010. As described in the GALL Report, the staff based its evaluation of the adequacy of each AMP on its review of the following 10 program elements in each AMP: (1) "scope of the program"; (2) "preventive actions"; (3) "parameters monitored or inspected"; (4) "detection of aging effects"; (5) "monitoring and trending"; (6) "acceptance criteria"; (7) "corrective actions"; (8) "confirmation process"; (9) "administrative controls"; and (10) "operating experience."

Exceptions to the GALL Report AMP elements will be evaluated separately as part of the staff's review of the Fermi 2 license renewal application (LRA) and documented in the staff's safety evaluation report (SER).

NUREG-1800, "Standard Review Plan for Review of License Renewal Applications for Nuclear Power Plants (SRP-LR)," Revision 2, dated December 2010, provides 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 Report AMPs, the applicant concludes that its AMPs correspond to those AMPs 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 onsite.

During the 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 August 4 – 7, 2014, and are evaluated separately. The staff audited all AMPs that the applicant stated were consistent with the GALL Report AMPs.

During the audit, if the applicant took credit for a program in the GALL Report, the staff verified that the plant program contained 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 addition to auditing AMP elements 1 through 6 and 10, the staff also reviewed documentation associated with the following aging management review (AMR) items: (1) LRA Table 3.3.2-6, "Compressed Air Systems," (2) LRA Table 3.3.2-12, "Control Center Heating, Ventilation and Air Conditioning System," and (3) LRA Table 3.4.2-3-7, "Circulating Water System, Nonsafety-Related Components Affecting Safety-Related Systems." The activities and observations associated with these AMR items are documented at the end of this report.

In performing the 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, 44 AMPs were reviewed and 41 breakout (discussion) sessions with applicant representatives were conducted. This report documents the staff's activities during the audit.

LRA AMP B.1.1, Aboveground Metallic Tanks

Summary of Information in the Application. The LRA states that AMP B.1.1, "Aboveground Metallic Tanks," is a new program that will be consistent with the program elements in GALL Report AMP XI.M29, "Aboveground Metallic Tanks," as modified by License Renewal Interim Staff Guidance (LR-ISG)-2012-02, "Aging Management of Internal Surfaces, Fire Water Systems, Atmospheric Storage Tanks, and Corrosion under Insulation." To verify this claim of consistency, the staff audited the LRA AMP. At the time of the audit, the applicant had not yet fully developed the documents necessary to implement this new program, and the staff's audit addressed only the program elements described in the applicant's basis document and applicable plant-specific operating experience. 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 combustion turbine generator (CTG) fuel oil tank and condensate storage tank (CST). The staff also conducted an independent search of the applicant's operating experience database using the keywords: "tank," "inspect" and "insulation."

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

Relevant Documents Reviewed

Document	Title	Revision / Date
1.FERMI-RPT-12-LRD03	Aging Management Evaluation Report Non-Class 1 Mechanical: Aboveground Metallic Tanks	Revision 2
2. FERMI-RPT-LRD09	Operating Esperance Review Report – Aging Management Program Effectiveness: Aboveground Metallic Tanks	Revision 1
3. WO-33628290	Flashing on Top of CST Coming Apart	03/27/2013
4. Condition Assessment Resolution Document (CARD) 99-19232	Contaminated Fuel Oil	12/08/1999
5. CARD 03-22558	Integrity Testing for the Combustion Turbine Generator, required under new SPCC rules and FL/CL rules	01/01/2003
6. CARD 05-25080	Coating Improvements for Fuel Tank as per Inspection Results [CTG tank]	06/16/2006
7. CARD 03-01084	Separated Sheet Metal Seams on the Roof [CST tank]	12/19/2003
8. WO-E517100100	Perform External Tank Inspection	08/14/2010
9. CARD 06-27638	Flashing Loose on Condensate Storage Tank	10/17/2008

Document	Title	Revision / Date
10. CARD 12-28843	More Insulation Blown from Top of CST	12/17/2012
11. Drawing 6C721K-1	Fuel Oil Storage Tank Foundation and Dike	Revision C
12. Drawing 6C721Y-2002	Condensate Storage Tank Foundation Unit #2	Revision D
13. P11-00-SD	Functional System Description for Condensate Storage and Transfer System	Revision 2
14. Drawing 5M721-5938	600,000 Gal. Condensate Storage Tank P1100A005 Low Cone Roof and Bottom Plate Layout	Revision 0
15. Drawing 5M721-5922	600,000 Gal. Condensate Storage Tank P1100A005 Low Cone Roof and Shell Layout	Revision A

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. For the "preventive actions" 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 a request for additional information (RAI) for the subject discussed below.

- The "preventive actions" program element of the LRA AMP states that "[i]n accordance with installation and design specifications, the tanks do not employ caulking or sealant at the concrete/tank interface." The GALL Report AMP recommends that sealant or caulking be applied to outdoor tanks at the external interface between the tank and concrete foundation. The function of the sealant or caulk is to minimize the amount of water and moisture penetrating the interface between the tank and concrete foundation. The GALL Report AMP further states that sealant or caulking are not necessary if the configuration of both the tank bottom and foundation is sloped in such a way that water cannot accumulate.

  It is not clear to the staff that these statements are consistent for the CST. The design of the CST foundation is a concrete ring with the tank bottom in contact with graded sand. The design also incorporates drains to facilitate the removal of water from the interior of the concrete ring foundation. However, the top surface of the concrete ring is not sloped to prevent water and moisture intrusion at the outside interface of the ring foundation. The accumulation of water or moisture at the outside interface of the ring foundation could result in the loss of material or cracking of the aluminum.

During the audit of the "operating experience" program element, the staff's independent database search found that the operating experience provided by the applicant is bounded by known industry operating experience. 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 an RAI for the subject discussed below.

- During the review of the past 10-years of applicable operating experience it was noted that there have been multiple instances of degradation of the insulation and jacketing on the roof of the CST, including separations in the sheet metal seams, loss of flashing, and loss of insulation due to weather. In 2013 the CST roof insulation was completely

removed and pre-fabricated insulation was installed. The as-found condition of the aluminum roof was not documented in the work order. The aluminum roof has been exposed to weather on multiple occasions and it is unclear if there is any age-related degradation under the pre-fabricated insulation.

The staff also audited the description of the LRA AMP provided in the updated final safety analysis report (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.

- The UFSAR supplement contains a commitment (Commitment No. 3) to implement the Aboveground Metallic Tanks Program. The implementation schedule for this commitment is "[p]rior to September 20, 2024, or the end of the last refueling outage prior to March 20, 2025." LR-ISG-2012-02, Table 3.0-1, recommends that the program be implemented 10 years prior to the period of extended operation. The recommendation to implement the program 10 years prior to the period of extended operation is to support the inspection guidance provided in LR-ISG-2012-02, Table 4a, "Tank Inspection Recommendations." The guidance provided in Table 4a includes inspections of all tank interior and exterior surfaces, including tank tops and bottoms, in timeframes ranging from within 5 to 10 years prior to the period of extended operation.

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 program elements in GALL Report AMP XI.M29. The staff also identified certain aspects of the "preventive actions" program element of the LRA AMP for which additional information or evaluation is required before consistency can be determined.

Based on this audit, the staff also verified that the operating experience at the plant is bounded by the operating experience for which the GALL Report program was evaluated. The staff also found that additional information is required before a determination can be made regarding whether the applicant's operating experience supports the sufficiency of the LRA AMP. In addition, the staff identified a need for additional information regarding the adequacy of the program description in the UFSAR supplement.

LRA AMP B.1.2, Bolting Integrity

Summary of Information in the Application. The LRA states that AMP B.1.2, "Bolting Integrity," is an existing program with enhancements and an exception 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 report includes enhancements necessary to make the LRA AMP consistent with the corresponding GALL Report AMP. The exception to the GALL Report AMP not necessary for consistency with the GALL Report is 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, reactor building, and the residual heat removal (RHR) complex. The staff also

conducted an independent search of the applicant's operating experience database using the keywords: "bolt," "torque," "preload," "crack," "leak," "corrosion," and "seal cap."

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

Relevant Documents Reviewed

Document	Title	Revision / Date
1. Corrective Action No. 14-21539	RHR Reservoir RF14 Work Order Documentation Issues	02/22/2014
2. Corrective Action No. 10-23235	RBCCW SCS Plate HX inlet/outlet flange & bolting corrosion wastage	04/19/2010
3. WO 32962709	Routine Div. 2 1.5 Year Lubrication Activities	12/05/2012
4. WO 30691577	Routine Div. 2 1.5 Year Lubrication Activities	06/03/2011
5. FERMI-RPT-12-LRD03	Fermi 2 License Renewal Project, Aging Management Program Evaluation Report Non-Class 1 Mechanical, Bolting Integrity	Revision 2
6. FERMI-RPT-12-LRD09	Fermi 2 License Renewal Project Operating Experience Review Report-Aging Management Program Effectiveness	Revision 1
7. 43.000.005	Plant Technical Procedure-Fermi 2 Visual Examination of Piping and Components (VT-2)	Revision 35
8. 35.000.240	Plant Technical Procedure-Fermi 2 Maintenance Procedure-Bolting and Torquing	Revision 41
9. MCE02	Fermi 2 Chemistry and Environmental Monitoring Conduct Manual Chemical Controls	Revision 16
10. Design Specification Number 3071-377	The Detroit Edition Company Specification for Approved Threaded Fasteners	Revision B
11. MES25	Engineering Support Conduct Manual, Visual Examination	Revision 7
12. 43.000.014	Visual Examination (VT-1) of ASME Class 1 Pressure Retaining Bolting	
13. FBP-70001	System Walkdown Checklist	Revision 0
14. ISI-NDE Program	Inservice Inspection Nondestructive Examination (ISI-NDE) Program (Plan) for Fermi 2 Power Plant	Revision 7
15. MES49	Evaluation and Control of Leakage from Class 1, 2, and 3 piping systems	Revision 7
16. PEP06	Section XI Inservice Inspection Program	Revision 1

Document	Title	Revision / Date
17. MES30	Repair and Replacement Programs	Revision 9
18. MQA11	Condition Assessment Resolution Document	Revision 35
19. CARD 03-14451	Corroded Bolts on RHRSW Pump A Column Flanges	01/01/2003
20. WO 000Z031277	Corroded Bolts on RHRSW Pump A Column Flanges	04/06/2003
21. CARD 03-16370	Adverse Trend: Second Valve Found with Loose Seal Bonnet Bolting During RF09 ISI NDE Inspections	01/01/2003
22. CARD 03-16366	Valve Bonnet Pressure Seal Plate Bolting Loose	5/7/2003
23. CARD 10-30499	Damaged Bolting on Drywell Dome	04/05/2011
24. WO 34488149	Check torque and lockwire EDG [emergency diesel generator] 11 Vertical Drive Bolts	10/11/2012

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. Aspects of the "detection of aging effects" program element of the LRA AMP associated with the exception were not evaluated during this audit. Aspects of this program element that are not associated with the exception were evaluated and are described below.

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. The staff noted that aspects of the "detection of aging effects" program element not associated with the exception are not consistent with the corresponding program element in the GALL Report AMP. The staff's evaluation of aspects of the "detection of aging effects" program element associated with the exception will be addressed in the SER. In addition, the staff found that for the "scope of program" 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 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.

- LRA Section B.1.2 states that the "Bolting Integrity Program manages loss of preload, cracking, and loss of material for accessible closure bolting for safety-related and nonsafety-related pressure components." GALL Report AMP XI.M18 "scope of program" program element states that the program manages aging of closure bolting for pressure retaining components within the scope of license renewal, including both safety-related and non-safety-related bolting. The GALL Report AMP also recommends periodic inspections of closure bolting be performed at least once per refueling cycle for signs of leakage to ensure the detection of age-related degradation due to loss of material and loss of preload. It is not clear to the staff whether all pressure-retaining closure bolting (both accessible and inaccessible) within the scope of license renewal is managed for age-related degradation. In addition, if inaccessible bolting is managed differently, the

staff is not clear as to the applicant's criteria for considering bolting inaccessible. The staff needs this information to determine whether the effects of aging will be managed consistent with the recommendations in the GALL Report AMP.

- LRA Section B.1.2 states an enhancement to the Bolting Integrity Program to revise the procedures to inspect the residual heat removal service water (RHRSW), emergency equipment service water (EESW), and emergency diesel generator service water system pump and valve bolting submerged in the RHRSW reservoir at least once per refueling outage. GALL Report AMP XI.M18 "detection of aging effects" program element recommends periodic inspections (at least once per refueling cycle) of closure bolting for signs of leakage to ensure the detection of age-related degradation due to loss of material and loss of preload. The staff reviewed the program basis documents and was not clear how the submerged closure bolting will be inspected such that loss of material and loss of preload can be detected prior to loss of intended function consistent with the GALL Report AMP "detection of aging effects" program element.

During the audit the staff performed a database search of Fermi 2 operating experience and found no results for the keyword "seal cap" associated to their installation for closure bolting at Fermi 2.

During the audit of the "operating experience" program element, the staff's independent database search found that the operating experience provided by the applicant is bounded by known industry operating experience. 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. 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 an RAI for the subject discussed below.

- The LRA states that "[p]lant procedures prohibit the use of lubricants containing molybdenum disulfide." The GALL Report AMP states that molybdenum disulfide should not be used as a lubricant due to its potential contribution to stress corrosion cracking (SCC), especially for high-strength bolts. During the audit the staff was able to confirm that plant procedures prohibit the use of molybdenum disulfide lubricants; however, it is not clear whether molybdenum disulfide lubricants have been used at Fermi 2 before plant procedures were revised to prohibit their use. If these lubricants have been used in the past, the staff needs additional information regarding how the program will manage aging of closure bolts lubricated with molybdenum disulfide.

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.

<u>Audit Results</u>. 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.M18. The staff's evaluation of aspects of the "detection of aging effects" program element associated with exceptions will be addressed in the SER. 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 found that additional information is required before a determination can be made regarding whether the applicant's operating experience supports the sufficiency of the LRA AMP. 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.1.3, Boraflex Monitoring

Summary of Information in the Application. The LRA states that AMP B.1.3, "Boraflex Monitoring," is an existing program with enhancements that will be consistent with the program elements in GALL Report AMP XI.M22, "Boraflex 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 report includes enhancements necessary to make the LRA AMP consistent with the corresponding GALL Report 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 search of the applicant's operating experience database using the keywords: "Boraflex," "neutron-absorber," and "coupon."

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

Relevant Documents Reviewed

Document	Title	Revision / Date
1. 57.000.19	Spent Fuel Storage Rack Management Guidelines	Revision 5
2. 82.000.16	High Density Spent Fuel Storage Rack Surveillance Coupon Removal/Installation	Revision 34
3. MQA13	Trending	Revision 10
4. MQA11	Condition Assessment Resolution Document	Revision 37
5. NRC-96-0129	Detroit Edison Response to NRC Generic Letter 96-04	
6. NET-300023-01	Inspection and Testing of Boraflex Surveillance Coupons from the Fermi 2 Generating Station	
7. DER 90-0491	Notice 87-043: Gaps in Neutron-Absorbing Material in High-Density Spent Fuel Storage Racks	
8. FERMI-RPT-12-LRD03	Boraflex Monitoring	Revision 2
9. CARD 99-10401	Boraflex Test Coupon From High Density Fuel Storage Racks Exceeds Shrinkage Criteria of Procedure 82.000.16	
10. CARD 09-27451	Emerging Trend Observed in Spent Fuel Pool (SFP) Silica Level	
11. CARD 11-22582	Document Applicability of NRC Information Notice 2011-03, Nonconservative Criticality Safety Analyses for Fuel Storage	
12. CARD 12-27120	NRC Information Notice 2012-13 Boraflex Degradation	

Document	Title	Revision / Date
	Surveillance	
13. NET-300010-01	BADGER Test Campaign at Enrico Fermi Power Plant 2	

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's independent database search found that the operating experience provided by the applicant is bounded by known industry operating experience (e.g., no previously unknown or recurring aging effects were identified by the applicant or staff). 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.

- The applicant stated that three Boraflex panels were taken out of service due to the fact that their boron-10 areal density measurement test results did not meet the acceptance criteria. The measurement test results are provided in the 2013 Fermi 2 BADGER report, which summarizes the Boraflex test campaign conducted in 2013. The report provides information on the condition of the Boraflex material in the spent fuel pool. The staff reviewed the 2013 BADGER test report briefly during the audit; however, more information is needed to complete the review. The staff requests that the applicant provide this report to the NRC so a more detailed review can be performed.

The staff also audited the description of the LRA AMP provided in the UFSAR supplement. The staff verified that 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.M22.

Based on this audit, the staff also found that additional information is required before a determination can be made regarding whether the applicant's operating experience supports the sufficiency of the LRA AMP. 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.1.4, Buried and Underground Piping

Summary of Information in the Application. The LRA states that AMP B.1.4, "Buried and Underground Piping," is a new program that will be consistent with the program elements in GALL Report AMP XI.M41, "Buried and Underground Piping and Tanks," as modified by LR-ISG-2011-03, "Changes to the Generic Aging Lessons Learned (GALL) Report Revision 2 Aging Management Program XI.M41, 'Buried and Underground Piping and Tanks.'" To verify

this claim of consistency, the staff audited the LRA AMP. At the time of the audit, the applicant had not yet fully developed the documents necessary to implement this new program, and the staff's audit addressed only the scope of the program, buried and underground inspection results, cathodic protection acceptance criteria, risk ranking of inspection locations, plant-specific operating experience, and the UFSAR supplement. 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 a walkdown of the condensate storage tank dog house pit entranceway in order to view the associated underground piping. The staff also conducted an independent search of the applicant's operating experience database using the keywords: "buried," "coat," "degrad," "dug," "excavat," "holiday," "leak," "through-wall," and "vault."

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

Relevant Documents Reviewed

Document	Title	Revision / Date
1. FERMI-RPT-12-LRD03	Aging Management Program Evaluation Report Non-Class Mechanical Buried and Underground Piping	Revision 2
2. 1000128.405	Life Cycle Management and Buried Piping Evaluation Report for Fermi-2 Nuclear Generating Station	Revision 1
3. 6M721-4232	Yard Piping - Material Specifications, Codes, General Notes RHR Complex	Revision H
4.	Cathodic Protection Program Health Report Fermi-2	4th Qtr. 2013
5. 05000341/2013004	Fermi Power Plant, Unit 2, NRC Integrated Inspection Report	10/22/2103
6.	Buried Pipe Inspections Program Health Report Fermi-2	4th Qtr. 2013
7. 1000128.401	Soil Analysis Results for Enrico Fermi 2 Nuclear Generating Station	Revision 2
8. 1000128.403	APEC Survey Fermi 2 Nuclear Generating Station – August 2011	Revision 0
9. 1101381.401	Direct Examinations at Enrico Fermi Power Plant 2 - July through September 2012	Revision 0
10. 12-042	As-Found Buried Piping Visual Inspection Report – 6" General Service Water	09/10/2012
11. MES71	Buried Pipe Inspection Program	Revision 3
12. 1201079.401	Direct Examinations at Enrico Fermi Power Plant 2 - June through July 2013	Revision B
13. TMIS-11-0130	Year 2011 Annual Cathodic Protection System Evaluation Report for Fermi 2	11/18/2011

Document	Title	Revision / Date
14.	Year 2012 Annual Cathodic Protection System Evaluation Report for Fermi 2	08/23/2012
15.	Year 2013 Annual Cathodic Protection System Evaluation Report for Fermi 2	08/23/2013
16. 1000128.402	Enrico Fermi Nuclear Generating Station Inspection [Below-grade Piping] Plan	Revision 3
17. 1000128.404	Fermi 2 Nuclear Generating Station Buried Piping Risk Analysis Final Report	Revision 0
18. 4P-644	Piping Standard Details for Water Tight Sleeves Through Walls	Revision D
19. CARD 09-00627	12" Underground Piping [removed fire water system piping] for ISI	06/29/2009
20. WO 31084561 & WO 33383621	Work Order – Inspect all Piping, Valves, and Flanges Inside CST [Condensate Storage Tank] Valve Pit - Results	09/25/2012, 05/09/2014
21. PEP31	Performance Engineering Cathodic Protection Manual	Revision 0
22. CARD 12-26291	Protected Coating on 6-inch GSW Pipe Found Degraded	07/26/14
23. 6M721-3479	Isometric Yard 12" Condensate Return to Storage Tank Unit 2	Revision B
24. 6M721-3480	Isometric Yard 14" Condensate Supply from Storage Tanks	Revision C
25. 6M721-3481	Isometric Yard 8" Condensate Return to Storage Tank Unit 2	Revision D
26. 6M721-2852-1	Piping Isometric 16" HPCI RCIC Pump Suction in Yard from Condensate Storage Tank	Revision G
27. 6M721-3228-1	Piping Isometric Condensate Return to Storage Tanks from Reactor & Radwaste Bldg Cond Systems	Revision Q
28. 6M721-3499	Isometric Yard 18" CRD [control rod drive] & CSS Suction from Storage Tank Unit 2	Revision B
29. 6M721-3230-1	Piping Isometric Condensate from Storage Tank to System Pumps	Revision K
30. 6M721-3126-1	Piping Isometric Condensate Normal Emergency Relief Control Station to Condensate Storage Tanks Turbine Building Unit 2	Revision M
31. 6M721-3226-1	Piping Isometric Condensate from Storage Tanks to HPCI RCIC and CSS Pumps Unit 2	Revision M
32. 6M721Y-2001	Valve Pit and Piping Condensate Return in Yard	Revision T

During the audit of program elements one through six, the staff verified that the "scope of program," "parameters monitored or inspected," "preventive actions," and "monitoring and trending" program elements of the LRA AMP are consistent with the corresponding elements of

GALL Report AMP XI.M41, as modified by LR-ISG-2011-03. For the "detection of aging effects" and "acceptance criteria" program elements, sufficient information was not available to determine whether they were consistent with the corresponding program elements of GALL Report AMP XI.M41, as modified by LR-ISG-2011-03. In order to obtain the information necessary to verify whether these program elements are consistent with the corresponding program elements of GALL Report AMP XI.M41, as modified by LR-ISG-2011-03, the staff will consider issuing RAIs for the subjects discussed below.

- The "detection of aging effects" program element of the LRA AMP states that buried piping inspections will be conducted in a manner consistent with those in the "detection of aging effects" element of GALL Report AMP XI.M41, as modified by LR-ISG-2011-03. During the staff's review of buried pipe inspection reports, it was noted that the coatings for two excavated pipe inspections were classified as being in fair condition. However, the reports for the two inspections state that coating holidays ranging in size from 2 in^2 to 10 in^2 for one pipe and 30 in^2 to 95 in^2 for the other pipe were detected. The classification of the coating condition may not be consistent with LR-ISG-2011-03 Table 4a, "Inspections of Buried Pipe," footnote 2, which states that inspection category E, opposed to F (category E has a lower number of inspections relative to F), may be used if there is "no significant coating degradation." The staff lacks sufficient information to conclude that, given the size of the holidays reported; the coating condition is appropriately classified as fair rather than significantly degraded. As a result of classifying the coatings as being in fair condition, the number of inspections conducted may not be consistent with the "detection of aging effects" program element of GALL Report AMP XI.M41, as modified by LR-ISG-2011-03.
- The "acceptance criteria" program element of the LRA AMP states that the program activities associated with the acceptance criteria are consistent with GALL Report AMP XI.M41, as modified by LR-ISG-2011-03. The GALL Report AMP recommends that if a 100 millivolt (mV) polarization criterion is used to assess the performance of the cathodic protection system, the LRA should include the basis for why adequate protection is provided for steel components exposed to a mixed potential environment. The applicant's acceptance criteria for the cathodic protection system includes negative 0.85 volts and 100 mV of cathodic polarization. The applicant's acceptance criteria also includes an allowance for polarization potentials less negative than 0.85 volts if the buried components are in high resistivity soils that are well drained and well aerated. The applicant did not provide the basis for the acceptance criterion of the cathodic protection system.

During the audit, the staff made the following observations:

- The staff reviewed drawing 4P-644 and confirmed that buried piping penetrates plant building walls through a steel sleeve and is therefore not in contact with concrete.
- The staff reviewed program manual PEP31 and confirmed that the acceptance criteria for cathodic protection includes: (a) at least negative 0.85 volts, (b) a minimum of 100 mV of cathodic polarization, and (c) a polarization potential of less negative than 0.85 volts if the component is buried in high resistivity soil (greater than 10,000 ohm-cm) that is well drained and well aerated.
- The staff reviewed the buried piping drawings listed above, documents 23 through 32, and confirmed that there are no bolted flanged connections in the buried steam and power conversion systems.

During the audit of the "operating experience" program element, the staff's independent database search found that the operating experience provided by the applicant is bounded by known industry operating experience (e.g., no previously unknown or recurring aging effects were identified by the applicant or staff).

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 LR-ISG-2011-03 Table 3.0-1.

Audit Results. Based on this audit, the staff verified that the "scope of program," "parameters monitored or inspected," "preventive actions," and "monitoring and trending" program elements of the LRA AMP are consistent with the corresponding program elements in GALL Report AMP XI.M41, as modified by LR-ISG-2011-03. The staff also identified certain aspects of the "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 verified that the operating experience at the plant is bounded by the operating experience for which the GALL Report program was evaluated. In addition, the staff verified that the description provided in the UFSAR supplement is consistent with the description provided in LR-ISG-2011-03 Table 3.0-1.

LRA AMP B.1.5, BWR CRD Return Line Nozzle

Summary of Information in the Application. The LRA states that AMP B.1.5, "BWR CRD Return Line Nozzle," is an existing program 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.

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 the keywords: "return line nozzle," "fatigue," and "crack."

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

Relevant Documents Reviewed

Document	Title	Revision / Date
1. FERMI-RPT-12-LRD02	Aging Management Program Evaluation Report Class 1 Mechanical	Revision 1
2. FERMI-RPT-12-LRD09	Operating Experience Review Report – Aging Management Program Effectiveness	Revision 1
3. ISI-NDE Program	Inservice Inspection-Nondestructive Examination (ISI-NDE) Program (Plan) for Fermi 2 Power Plant	Revision 7 10/28/2010

Document	Title	Revision / Date
4. MES23	Engineering Support Conduct Manual, Inservice Inspection and Testing	Revision 18 12/21/2012
5. PEP06	Section XI Inservice Inspection Program	Revision 2 1/15/2013
6. Surveillance Procedure 43.000.016	Performance of ISI-NDE Inspections	Revision 28 10/26/2010
7. Surveillance Procedure 43.000.017	Reactor Pressure Vessel – Invessel Internals Inspection	Revision 24 5/8/2013
8. Drawing 6M721-5361-5	Inservice Inspection Detail Dwg. Reactor Vessel Shell & Top Head Nozzles	Revision A 6/21/1990
9. General Electric Stress Report 22A5506	Stress and Fatigue Analysis for the Cap and the CRDHSR Nozzle	Revision 0 3/24/1977
10. Letter NRC-89-0106	Submittal of NRC Requested Additional Information on Generic Letter 88-01	5/12/1989
11. Letter NRC-03-0061	Inservice Inspection Summary Report	8/8/2003
12. Summary No. FNP2-B3.90-0013	Component Summary for N-9 CRD Ref. Nozzle-to-Vessel Weld	4/13/2012
13. Summary No. FNP2-R1.16-0071	Component Summary for CRD Return Nozzle-to-Safe End Butt Weld (DM)	4/22/2012
14. CARD 13-20060	RVIM Self-Assessment Critical Attribute #6 Identified Program Implementation Deficiency. Inspections Performed on N9 Nozzle in RF15 Did Not Meet ASME or BWRVIP Guidelines Established in BWRVIP-03	1/2/2013
15. UFSAR Section 4.5.2.2.2.3	Control Rod Drive Hydraulic System	Revision 18
16. NUREG-0619	BWR Feedwater Nozzle and Control Rod Drive Return Line Nozzle Cracking	November 1980

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, the staff made the following observation:

- Per UFSAR Section 4.5.2.2.2.3, the applicant has eliminated the control rod drive return line as a preventive measure to avoid cracking. With this design change and the other system modifications described in UFSAR Section 4.5.2.2.2.3, there are no ongoing maintenance or testing activities from NUREG-0619 that would apply to Fermi 2. Therefore, under the applicant’s Boiling-Water Reactor (BWR) Control Rod Drive Return Line Nozzle Program, the only activities for detecting the effects of cracking are the periodic examinations that are implemented in accordance with American Society of Mechanical Engineers (ASME) Code, Section XI, Table IWB-2500-1.

During the audit of the "operating experience" program element, the staff's independent database search found that the operating experience provided by the applicant is bounded by known industry operating experience (e.g., no previously unknown or recurring aging effects were identified by the applicant or staff).

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.M6.

Based on this audit, the staff also verified that the operating experience at the plant is bounded by the operating experience for which the GALL Report program was evaluated. 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.1.6, BWR Feedwater Nozzle

Summary of Information in the Application. The LRA states that AMP B.1.6, "BWR Feedwater Nozzle," is an existing program that is consistent with the program elements in GALL Report AMP XI.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 search of the applicant's operating experience database using the keywords: "feedwater nozzle," "crack," and "fatigue."

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

Relevant Documents Reviewed

Document	Title	Revision / Date
1. FERMI-RPT-12-LRD02	Aging Management Program Evaluation Report Class 1 Mechanical	Revision 1
2. FERMI-RPT-12-LRD09	Operating Experience Review Report – Aging Management Program Effectiveness	Revision 1
3. ISI-NDE Program	Inservice Inspection-Nondestructive Examination (ISI-NDE) Program (Plan) for Fermi 2 Power Plant	Revision 7 10/28/2010
4. MES24	Engineering Support Conduct Manual, Nondestructive Examination	Revision 8 8/26/2010
5. PEP06	Section XI Inservice Inspection Program	Revision 2 1/15/2013

Document	Title	Revision / Date
6. Surveillance Procedure 43.000.016	Performance of ISI-NDE Inspections	Revision 28 10/26/2010
7. Deviation Event Report No. 94-0204	Unusual Surface Conditions Identified on RPV Cladding and Nozzles	5/19/1994
8. CARD 12-22846	NQA Audit Recommendation – ISI Program Owner to Follow Up on the Inspection Frequency of Feedwater Nozzles	4/6/2012
9. CARD 12-23820	Feedwater Nozzle and Sparger Condition Monitoring	4/26/2012
10. CARD 12-24128	Enhancement to MES29 – Documentation and Reporting of Operating Transients and Cycles to Support License Renewal	5/3/2012
11. CARD 13-24539	Reactor Coolant Pressure Boundary Component Thermal-Pressure Cycles	5/25/2013
12. Design Calculation 5922	NUREG 0619 RPV Feedwater Nozzle Crack Growth Reevaluation, Volume 1	Revision 0 11/26/1997
13. Design Calculation 6222	ASME Section XI Appendix L Operating Plant Fatigue Assessment – RCPB Components, Volume 1, Book 2, “Miscellaneous Class 1 Components”	Revision 0 4/2/2006
14. GE-NE-523-22-0292	Updated NUREG-0619 Feedwater Nozzle Fatigue Crack Growth Analysis	Revision 0 July 1992
15. Contractor Procedure 54-ISI-850	Manual Ultrasonic Examination of BWR Reactor Vessel Nozzle Inner Radius Regions and Nozzle to Shell Welds (Inner 15%)	Revision 7 10/6/2010
16. Contractor Procedure GE-UT-705	Procedure for the Examination of Reactor Pressure Vessel Nozzle Inner Radius and Nozzle to Vessel Welds with the GERIS 2000 OD in Accordance with Appendix VIII	Revision 1 9/14/2004
17. Contractor Procedure GFRM2-ISI-246	Automated Ultrasonic Procedure for Examination of Feedwater Nozzle Inner Radius Areas at Fermi Using the Intraspect Imaging System	Revision 1 9/20/2001
18. IR-2010-431	Fermi Unit 2 Reactor Pressure Vessel (RPV) Feedwater Nozzle Examinations	October 2010
19. Wesdyne International Report R8-65	Fermi 2 ISI NDE Examination Summary Sheet RF-08	11/18/2001
20. Wesdyne International Report R8-69	Fermi 2 ISI NDE Examination Summary Sheet RF-08	11/19/2001
21. Wesdyne International Report R8-70	Fermi 2 ISI NDE Examination Summary Sheet RF-08	11/19/2001
22. Wesdyne International Report R8-75	Fermi 2 ISI NDE Examination Summary Sheet RF-08	11/19/2001
23. Wesdyne International Report R8-78	Fermi 2 ISI NDE Examination Summary Sheet RF-08	11/18/2001

Document	Title	Revision / Date
24. Wesdyne International Report R8-86	Fermi 2 ISI NDE Examination Summary Sheet RF-08	11/17/2001
25. Wesdyne International Report R8-87	Fermi 2 ISI NDE Examination Summary Sheet RF-08	11/17/2001
26. Wesdyne International Report R8-88	Fermi 2 ISI NDE Examination Summary Sheet RF-08	11/17/2001
27. Summary No. 09-12	GE Nuclear Energy UT [ultrasonic testing] Examination Summary Sheet	4/14/2003
28. AREVA Report No. RFO12-14	RPV Nozzle Ultrasonic Examination Summary Sheet	10/30/2007
29. AREVA Report No. RFO12-15	RPV Nozzle Ultrasonic Examination Summary Sheet	10/30/2007
30. AREVA Report No. RFO12-21	Ultrasonic Examination Summary Sheet	10/28/2007
31. AREVA Report No. RFO12-22	Ultrasonic Examination Summary Sheet	10/29/2007
32. AREVA Report No. RFO12-28	Ultrasonic Examination Summary Sheet	10/27/2007
33. AREVA Report No. RFO12-29	Ultrasonic Examination Summary Sheet	10/27/2007
34. Summary No. FNP2-B3.90-0017	Component Summary for F.W. Nozzle-to-Vessel Weld	11/19/2010
35. Summary No. FNP2-R1.11-0001	Component Summary for N21-2336-Feedwater Loop A Circ Weld	11/17/2010
36. Summary No. FNP2-R1.11-0015	Component Summary for N21-2336-Feedwater Loop A Circ Weld	11/17/2010
37. Summary No. FNP2-B3.90-0018	Component Summary for F.W. Nozzle-to-Vessel Weld	11/19/2010
38. Summary No. FNP2-N/A-0002	Component Summary for Nozzle Inner Bore Region	11/19/2010
39. Summary No. FNP2-B3.100-0017	Component Summary for Nozzle Inside Radius Section	11/19/2010
40. Summary No. FNP2-B3.100-0018	Component Summary for Nozzle Inside Radius Section	11/19/2010
41. Summary No. FNP2-R1.11-0005	Component Summary for N21-2336-Feedwater Loop B Circ Weld (CS)	4/10/2012
42. Summary No. FNP2-R1.11-0019	Component Summary for N21-2336-Feedwater Loop B Circ Weld (CS)	4/10/2012
43. Summary No. FNP2-B3.100-0021	Component Summary for N4E Nozzle Inside Radius Section	4/12/2012

Document	Title	Revision / Date
44. Summary No. FNP2-B3.100-0022	Component Summary for N4F Nozzle Inside Radius Section	4/17/2012
45. Summary No. FNP2-N/A-006	Component Summary for N4F Nozzle Inner Bore Region	4/17/2012
46. Summary No. FNP2-B3.90-0021	Component Summary for (N4E) F.W. Nozzle-to-Vessel Weld	4/13/2012
47. Summary No. FNP2-B3.90-0021	Component Summary for (N4E) F.W. Nozzle-to-Vessel Weld	4/13/2012
48. Summary No. FNP2-B3.90-0022	Component Summary for (N4F) F.W. Nozzle-to-Vessel Weld	4/13/2012

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's independent database search found that the operating experience provided by the applicant is bounded by known industry operating experience (e.g., no previously unknown or recurring aging effects were identified by the applicant or staff).

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 at the plant is bounded by the operating experience for which the GALL Report program was evaluated. 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.1.7, BWR Penetrations

Summary of Information in the Application. The LRA states that AMP B.1.7, "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.

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 the keywords: "crack," "penetration," "nozzle," "stub," "stress corrosion," "CRD," "RPV," and "SCC."

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

Relevant Documents Reviewed

Document	Title	Revision / Date
1. FERMI-RPT-12-LRD02	Aging Management Program Evaluation Report Class 1 Mechanical – BWR Penetrations	Revision 1
2. FERMI-RPT-12-LRD09	Operating Experience Review Results – Aging Management Program Effectiveness, Section 3.1.3, BWR Penetrations Program	Revision 1
3. PEP16	Performance Engineering Program Manual, In Core Guide Tube and Dry Tube, Core Plate DP and SLC Lines, and Instrument Penetrations.	Revision 7
4. PEP06	Section XI Inservice Inspection Program	Revision 2
5. CARD 10-30178	Indication Noted in Control Rod Drive Guide Tube 06-35 (Weld CRGT-2) Manufacturing Discontinuity Identified on CRGT-2 Weld in Cell 06-35	11/5/2010

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 the "operating experience" program element, the staff's independent database search found that the operating experience provided by the applicant is bounded by known industry operating experience (e.g., no previously unknown or recurring aging effects were identified by the applicant or the staff).

The staff also audited the description of the LRA AMP provided in the UFSAR supplement. The staff 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.M8.

Based on this audit, the staff also verified that the operating experience at the plant is bounded by the operating experience for which the GALL Report program was evaluated. 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.1.8, BWR Stress Corrosion Cracking

Summary of Information in the Application. The LRA states that AMP B.1.8, "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 search of the applicant's operating experience database using the keywords: "IGSCC," "weld," "stress corrosion," and "safe end."

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

Relevant Documents Reviewed

Document	Title	Revision / Date
1. FERMI-RPT-12-LRD02	Aging Management Program Evaluation Report Class 1 Mechanical, Section 4.4 BWR Stress Corrosion Cracking	Revision 1
2. FERMI-RPT-12-LRD09	Operating Experience Review Report – Aging Management Program Effectiveness	Revision 1
3. PEP06	Section XI Inservice Inspection Program	Revision 2 01/15/2013
4. ISI-NDE Program	Inservice Inspection-Nondestructive Examination (ISI-NDE) Program (Plan) for Fermi 2 Power Plant	Revision 7 10/13/2010
5. MES24	Fermi 2 Engineering Support Conduct Manual MES24, Nondestructive Examination	Revision 8 08/26/2010
6. MES23	Fermi 2 Engineering Support Conduct Manual MES23, Inservice Inspection and Testing	Revision 18 12/21/2012
7. MES30	Fermi 2 Engineering Support Conduct Manual MES30, Repair and Replacement Programs	Revision 10 12/20/2012
8. NRC-03-0061	Inservice Inspection Summary Report	08/08/2003
9. NRC-92-0090	Fermi 2 Response to Generic Letter 88-01, Supplement 1, NRC Position on Intergranular Stress Corrosion Cracking (IGSCC) in BWR Austenitic Stainless Steel Piping	07/29/1992
10.	NRC Letter to Detroit Edison Company, Fermi-2 Removal of 24 Condensate and Feedwater System Welds from the Inservice Inspection Nondestructive Examination (ISI-NDE) Program (TAC No. M84177)	12/18/1992
11. CARD 13-23127	Institute of Nuclear Power Operations Event Report (IER) 13-17 Level 4 Main Condenser Cooling Water Leakage	05/03/2013
12. CARD 11-21607	Condenser Leak SW Hotwell Quad 2/10-11/2011	02/11/2011
13. CARD 08-26361	Indications of a Small Condenser Tube Leak	09/26/2008
14. CARD 07-26347	ISI Ultrasonic Exam Adversely Affected by Component Surface Profile	10/18/2007

Document	Title	Revision / Date
15. VE-S14-003	Ultrasonic Examination (Refueling Outage RF16; Component ID FW-RD-2-B19; Recirculation system safe end extension to safe end weld; and Work Order 34704484)	3/8/2014
16. VE-S14-001	Ultrasonic Examination (Refueling Outage RF16; Component ID 101-304E; Recirculation system nozzle to safe end weld; and Work Order 34704433)	3/7/2014

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 subjects discussed below.

- The LRA states that the BWR Stress Corrosion Cracking Program is consistent with GALL Report AMP XI.M7, with no exceptions. The "detection of aging effects" program element of the GALL Report AMP states that the extent and schedule of the inspection are described in NRC Generic Letter (GL) 88-01 and may be modified in accordance with Boiling-Water Reactor Vessel and Internals Project (BWRVIP)-75-A. The staff noted that the applicant's Category A welds are subsumed in the applicant's risk-informed inservice inspection. The staff also noted that the percentage of Category A welds to be inspected by the applicant is not stated in the LRA. It is unclear to the staff if the extent and schedule of the inspection are consistent with GL 88-01 and BWRVIP-75-A.
- The aging management review tables for the condensate and feedwater systems in the LRA do not include AMR items to manage IGSCC for Category D welds, which were identified in the 1992 communications between the Detroit Edison Company and the NRC (letters dated July 29, 1992, and December 18, 1992, referenced in the document table above). The staff cannot determine the adequacy of the applicant's program and AMR results without additional information to justify the omission of relevant AMR items.
- The staff also noted that the 1992 communications (letters dated July 29, 1992, and December 18, 1992, referenced in the document table above) indicate that the applicant's Category D welds are located outboard of the containment isolation valves and at least 10 percent of these welds should be inspected during each refueling outage. The staff further noted that the extent and frequency of these inspections are different from the inspection guidelines provided in GL 88-01 and BWRVIP-75-A. BWRVIP-75-A states that in the case of the implementation of hydrogen water chemistry 100 percent of Category D welds should be inspected every 10 years and at least 50 percent of these welds should be inspected in the first 6 years. However, the LRA does not identify this difference as a program exception. The staff finds that additional information is necessary to clarify why this difference is not identified as a program exception and to confirm whether this difference is acceptable for adequate aging management.

During the audit of the "operating experience" program element, the staff found a need to confirm whether the plant-specific operating experience regarding condenser inleakage affects the sufficiency of the LRA program. 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.

- The staff noted that CARD 11-21607 states that during the startup on February 10, 2011, the applicant's plant was shut down due to main condenser tube inleakage and associated water chemistry excursions. CARD 11-21607 also indicates that inspections of all condenser water boxes identified the ejection of tube plugs from receptive condenser tubes. The ingress of chloride, sulfate, and other contaminants into the reactor coolant system, due to main condenser inleakage, can promote IGSCC in BWR piping and piping welds. However, LRA Section B.1.8 and the onsite program evaluation report for the applicant's program do not clearly address the potential impact of condenser cooling water inleakage on the effectiveness of the applicant's program. The staff finds that additional information is necessary to confirm that the applicant's assessment of operating experience regarding condenser inleakage ensures the effectiveness of the applicant's program.

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

Based on this audit, the staff also finds that additional information is required before a determination can be made regarding whether the applicant's operating experience supports the sufficiency of the LRA AMP. 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.1.9, BWR Vessel ID Attachment Welds

Summary of Information in the Application. The LRA states that AMP B.1.9, "BWR Vessel ID Attachment Welds," is an existing program that is consistent with the program elements in GALL Report AMP XI.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 search of the applicant's operating experience database using the keywords: "cracking," "wear," "hold down," "core spray," "attachment welds," "steam dryer," and "jet pump."

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

Relevant Documents Reviewed

Document	Title	Revision / Date
1. FERMI-RPT-12-LRD02	Aging Management Program Evaluation Report Class 1 Mechanical – BWR Vessel ID Attachment Welds	Revision 1
2. FERMI-RPT-12-LRD09	Operating Experience Review Report - Aging Management Program Effectiveness Section 3.1.7 BWR Vessel ID Attachment Welds Program	Revision 1
3. PEP16	Performance Engineering Program Manual, Reactor Vessel Internals Management Program	Revision 7
4. BWRVIP-48-A	Vessel ID Attachment Weld Inspection and Flaw Evaluation Guidelines	06/2004
5. ISI-NDE Program	Inservice Inspection Non-Destructive Examination Program Plan for Fermi 2	Revision 7
6. CARD 05-24653	Condition Assessment Resolution Document, Misunderstanding of New Inspection Criteria in BWRVIP – 48 Guideline	08/09/2005
7. CARD 06-22432	Condition Assessment Resolution Document, Inspection Scheduled for New Inspection Criteria in BWRVIP – 48 Guideline	04/07/2006
8. CARD 05-25333	INPO [Institute of Nuclear Power Opeations] Recommendations Resulting from the BWR Vessel and Internals Review Visit	09/07/2005

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 noted inconsistencies in the operating experience provided in the LRA AMP. 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 an RAI for the subject discussed below.

- The operating experience section of the LRA discusses plant-specific inspection results from 2001, 2005, and 2012. It specifically states that, "In 2005, shroud support weld examinations as well as other inspections of reactor vessel internal welds and components were performed as scheduled by the Reactor Vessel Internals Management (RVIM) program." However, the staff discovered during the onsite audit that there was no such inspection in 2005.

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.M4.

Based on this audit, the staff also found that additional information is required before a determination can be made regarding whether the applicant's operating experience supports the sufficiency of the LRA AMP. 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.1.10, BWR Vessel Internals

Summary of Information in the Application. The LRA states that AMP B.1.10, "BWR Vessel Internals," is an existing program with enhancements that will be 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. Issues identified but not resolved in this report will be addressed in the SER. The scope of this audit report includes enhancements necessary to make the LRA AMP consistent with the corresponding GALL Report 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 search of the applicant's operating experience database using the keywords: "shroud," "jet pump," "stress corrosion cracking," "embrittlement," "cast," "steel," "bolt," "nickel alloy," and "top guide."

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

Relevant Documents Reviewed

Document	Title	Revision / Date
1. Fermi-RPT-12-LRD02	Aging Management Program Evaluation Report: BWR Vessel Internal	Revision 1
2. MES47	Fermi 2 Engineering Support Conduct Manual, Chapter 47 – Reactor Vessel Internals Management (RVIM) Program	Revision 8 11/07/2012
3. PEP16	Performance Engineering Program Manual: Fermi-2 Reactor Vessel Internals Management (RVIM) Program Plan	Revision 7 09/26/2012
4. DD-2011-01	Variance from BWRVIP-25 Guidelines on Performing Recommended Inspections on Core Plate Bolting	03/30/2011
5. FERMI-RPT-12-AMM02	Aging Management Review of the Reactor Vessel Internals	06/09/2014
6. CARD 05-25333	INPO BWRVIP Recommendation, BWRVIP Program Improvements	09/20/2005
7. CARD 08-26919	Observation From the Self-Assessment of the Reactor Vessel Internals Management Program	10/20/2008

Document	Title	Revision / Date
8. CARD 10-30726	Indications on 0 degree Access Hole Cover	11/16/2010
9. CARD 12-23540	Jet Pump 7/8 Weld RS-1 Condition Monitoring Inspection during RF-15	04/20/2012
10. CARD 06-22334	Wedge Wear identified on Jet Pump #2 during Invessel Visual Inspections	04/14/2006

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 "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. In addition, the staff found that for the "scope of program" program element, insufficient information was available to determine if they were consistent with the corresponding program elements of the GALL Report AMP. To obtain the information necessary to verify if these program elements are consistent with the corresponding program elements of the GALL Report, the staff will consider issuing an RAI for the subjects discussed below.

- The "scope of program" program element of the GALL Report AMP includes BWRVIP-58-A as guidelines for the repair design criteria for the control rod drive housing and BWRVIP-57-A as the guidelines for the repair design criteria for the lower plenum components. The applicant references these documents as the repair design criteria guidelines for these components as well as BWRVIP-55-A; however, the plant procedures only reference BWRVIP-55-A. The staff is unclear if the applicant is using any BWRVIP guidelines beyond those in the GALL Report AMP.
- The "scope of program" program element of the GALL Report AMP includes BWRVIP guidelines for which the BWR vessel internal components are subject and which may contain applicant action items. The applicant responded to these BWRVIP applicant action items in LRA Appendix C. The staff is unclear if LRA Appendix C includes the accurate list of BWRVIP guidelines actually used at Fermi 2 or if the responses to the applicant action items considered the recently approved measurement uncertainty recapture power uprate.

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.

<u>Audit Results</u>. 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.M9. 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 at the plant is bounded by the operating experience for which the GALL Report program was evaluated. 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.1.11, Compressed Air Monitoring

Summary of Information in the Application. The LRA states that AMP B.1.11, "Compressed Air Monitoring," is an existing program with enhancements and an exception 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. The scope of this audit report includes enhancements necessary to make the LRA AMP consistent with the corresponding GALL Report AMP. The exception to the GALL Report AMP 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 the keywords: "dew point," "instrument air," "air quality," and "compressed air."

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

Relevant Documents Reviewed

Document	Title	Revision / Date
1. Generic Letter 88-13	INSTRUMENT AIR SUPPLY SYSTEM PROBLEMS AFFECTING SAFETY-RELATED EQUIPMENT	08/08/1988
2. NRC-89-0046	DTE Response to NRC Generic Letter 88-18	03/01/1989
3. Health Report P5000	System Health Report P5000, Compressed Air Systems	2012
4. LRA	License Renewal Application	2014
5. CHS-AUX-14	Station/Instrument Air Chemistry Specifications	Revision 7
6. Interview	FERMI 2 LRD09 Program Owner Interview Documentation	03/27/2013
7. CARD 07-21958	Industry Trend- EDG leaks/Failures Identified in INPO OEs	04/11/2007
8. FERMI-RPT-12-AMM21	Aging Management Review of the Compressed Air System	Revision 0
9. WO36214845	East IAS Dryer Outlet Dewpoint	05/27/2014
10. WO36207201	West IAS Dryer Outlet Dewpoint	05/27/2014
11. WO35749811	North IAS Dryer Outlet Dewpoint	08/11/2014

Document	Title	Revision / Date
12. WO36305840	South IAS Dryer Outlet Dewpoint	05/27/2014
13. NRC-94-0068	Revision to NRC Commitments	08/29/1994
14. CARD 13-26509	Water in station air system causes radwaste tank high-level alarms	09/15/2013
15. CARD 09-24276	Condensation buildup in SA header	06/02/2009
16. CARD 13-20327	Review Recent Communication on Vulnerability to SOER 88-01, "Instrumental Air System Failures"	01/13/2013
17. CARD 04-21812	Investigate use of reinforced rubber hose for actuator air supply in Safety Related application	04/26/2004
18. CARD 04-22824	Air leak on hose for EDG 11 ACS TCV Loop	06/24/2004
19. CARD 10-22024	Div 2 Control Air Compressor Room Cooler Fan Wheel has Minor Cracks	03/08/2010
20. CARD 10-25093	Document Applicability for IN Significant Event Report 2-10, Multiple control Rods Fail to Meet Insertion Time Limits Because of Sluggish Scram Solenoid Pilot Valves, to Fermi	06/18/2010
21. CARD 07-24482	Central Station Air Compressor Alarming on Low Cooling Water flow	08/14/2007
22. CARD 04-20873	H21P429 has air leaks on instrumental tubing and fittings	03/03/2004

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. Aspects of the "monitoring and trending" program element of the LRA AMP associated with the exception were not evaluated during this audit. Aspects of this program element that are not associated with the exception were evaluated and are described below.

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. The staff also verified that aspects of the "monitoring and trending" program element not associated with the exceptions are consistent with the corresponding program elements in the GALL Report AMP. The staff's evaluation of aspects of this program element associated with the exception will be addressed in the SER.

During the audit of the "operating experience" program element, the staff's independent database search for Fermi 2 found that the operating experience provided by the applicant is bounded by known industry operating experience.

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," 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 verified that for the "monitoring and trending" program element, the aspects of the LRA AMP program element not associated with the exception are consistent with the corresponding program element in GALL Report AMP XI.M24. The staff's evaluation of aspects of the program elements associated with exceptions will be addressed in the SER.

Based on this audit, the staff also verified that the operating experience at the plant is bounded by the operating experience for which the GALL Report program was evaluated. 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.1.12, Containment Inservice Inspection – IWE

Summary of Information in the Application. The LRA states that AMP B.1.12, "Containment Inservice Inspection - IWE," is an existing program with enhancements that will be 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 report includes enhancements necessary to make the LRA AMP consistent with the corresponding GALL Report AMP. The LRA states that the Fermi 2 primary containment is a General Electric (GE) Mark I steel pressure suppression containment consisting of a drywell, a torus (or suppression chamber), and a vent system connecting the drywell and the torus.

Audit Activities. During its audit, the staff interviewed the applicant's staff and reviewed onsite documentation provided by the applicant. In addition, the staff reviewed structural drawings of the Fermi 2 primary containment and photographs in recent inspection reports of the torus interior since the plant was at power operation and a walkdown to observe the condition of the steel containment was not possible. The staff also conducted an independent search of the applicant's operating experience database using the keywords: "blister," "containment," "corros," "shell," "drywell," "vent," "header," "downcomer," "bellows," "torus," "suppression chamber," "seal," "moisture barrier," "rust," "pit," and "loss of material."

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

Relevant Documents Reviewed

Document	Title	Revision / Date
1. FERMI-RPT-12-LRD05	Aging Management Program Evaluation Report Civil/Structural, Section 3.2 Containment Inservice Inspection (CII) – IWE Program	Revision 1 03/05/2014
2. FERMI-RPT-12-LRD09	Operating Experience Review Report – Aging Management Program Effectiveness, Section 3.1.10 Containment Inservice Inspection - IWE Program	Revision 1 03/25/2014
3. MES46	Fermi 2 Engineering Support Conduct Manual – ASME Section XI Containment Inservice Inspection Program	Revision 4 02/19/2010

Document	Title	Revision / Date
4. ISI-NDE-Program	Inservice Inspection - Nondestructive Examination (ISI-NDE) Program Plan for Fermi 2, Part F – ASME Section XI Containment ISI Program	Revision 7 (Change 2) 5/23/2013
5. 43.000.019	Plant Technical Surveillance Procedure - Primary Containment Inspection	Revision 5 9/10/2010
6. NRC-87-005	Fermi Response to GL 87-05, Potential Degradation of Mark I Drywells	06/15/1987
7. NRC-88-0081	Revised Response to GL 87-05	04/20/1988
8. CARD 03-12847	Torus Room, Areas of Degraded Coating	30/10/2003
9. CARD 09-23951	Review Fermi 2 Sand Cushion Investigation History including Evaluation of the Oyster Creek Degraded Drywell Shell as a Result of Water in the Drywell Sand Cushion	04/25/2011
10. 000Z940162	Work Request – Remove Sand from Drywell Shell Drainage Area	05/12/1994
11. CARD 00-14421	Drywell EL. 583, 0 to 100° AZ Rusty 583' Main "I" Beam Fl. Supports	04/06/2000
12. CARD 10-29800	Torus Room, Degraded Torus Earthquake Tie Attached to Bay 9	10/30/2010
13. CARD 11-30471	Document Applicability of NRC Information Notice 2011-15	11/23/2011
14. CARD 12-24714	Remove Grating at Four Sand Cushion Drains to Perform Inspections (WO-34542841)	05/25/2012
15. CARD 09-23023	Drywell, Accumulated Debris on Drywell Vent Jet Deflector Gusset	04/20/2009
16.	IWE Primary Containment Inspection Program – 2nd Quarter 2013 Program Health Report	07/12/2013
17. 24.000.03	Plant Technical Procedure - Fermi 2 Surveillance Procedure Mode 5 Shiftly, Daily, and Weekly Surveillances, Attachment 1 and 2	Revision 77 03/29/14
18. NUC201202	Torus Desludge, Inspection and Coating Repair – Immersion Area, Final Engineering Report for Fermi 2, Underwater Engineering Service Inc. (Proprietary)	Revision 0 5/25/2012
19. NUC2014105	Torus Inspection and Coating Repair, Vapor Phase Final Assessment Report for Fermi 2, Underwater Engineering Service Inc. (Proprietary)	Revision 0 03/12/2014
20. CARD 12-28374 (MMI Item No. 110)	Blistered Protective Coating on the Torus Wetted Region	10/10/2012
21. WR 34542806	Ultrasonic Instrument Calibration Record and Exam Report for Thickness Measurements at Drywell Basement Az. 300-0-120 Shell at Sand Cushion Region (CARD 12-24713)	03/03/2014
22. 6C721-2971	IWE Containment Inspection Drywell Reference Drawing	Rev A, 4/27/07
23. 6C721-2972	IWE Containment Inspection Suppression Chamber Reference Drawing	Rev 0, 9/13/01

Document	Title	Revision / Date
24. 6C721-2701	Outside Elevation View at 180 Az of Drywell and Suppression Chamber	Rev A, 5/19/00
25. 6C721-2358	Reactor Bldg and Aux Building Framing Section 40-40 Lower (Sand Pocket Detail)	Rev T, 10/30/09
26. 6M721-2219	Floor and Equipment Drains Basement and First Floor Reactor Building (Sand pocket drain line detail)	Rev Z, 10/23/12
27. 6M721-2219	Isometric of HPCI Turbine Exhaust Reactor Building (Sparger Detail E3)	Rev Z, 3/5/03

The staff conducted its audit of LRA program elements one through seven based on the contents of the existing program as modified by the proposed enhancements. The staff notes that the scope of the audit covered the additional program element 7 "corrective actions" because the applicant included an enhancement for this element to establish consistency with the recommended actions in the corresponding element of the GALL Report AMP XI.S1 that is specific to the potential case if moisture is detected or suspected in the inaccessible area on the exterior of Mark I containment drywell shell.

During the audit, the staff verified that the "scope of program," 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," "parameters monitored or inspected," "detection of aging effects," "monitoring and trending," and "corrective 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 "preventive actions" program element of GALL Report AMP XI.S1 recommends preventive actions in accordance with Research Council for Structural Connections publication for structural bolting consisting of American Society for Testing and Materials (ASTM) A325, ASTM F1852, and ASTM A490 bolts. The staff noted that the corresponding element, with enhancements, of the LRA AMP basis document (FERMI-RPT-12-LRD05, Revision 1) addresses ASTM A325 and A490 bolting, but made no mention of ASTM F1852 bolting. It is not clear to the staff that the above mentioned program element of the LRA AMP is consistent with the recommendations in the GALL Report AMP because there was no mention of ASTM F1852 bolting. Note that this is a common issue across B.1.12 "Containment Inservice Inspection – IWE," B.1.22 "Inservice Inspection – IWF," and B.1.42 "Structures Monitoring" AMPs.
- The "detection of aging effects" program element of GALL Report AMP XI.S1 recommends that the program be augmented to require surface examination, in addition to visual examination, to detect cracking in stainless steel penetration sleeves, bellows, dissimilar metal welds, and steel components that are subject to cyclic loading but have no current licensing basis fatigue analysis. The GALL Report AMP also states that where feasible, appropriate Appendix J tests may be performed in lieu of surface examination. The LRA AMP program basis document states that the above mentioned components are monitored for cracking. It also states that, additionally, XI.S4 Containment Leak Rate Program tests may be performed in lieu of surface examination.

It is not clear to the staff that these statements are consistent because the LRA AMP basis document does not state that to detect cracking supplemental surface examination will be performed on the subject components, in addition to visual examination. Further, it does not identify the specific components for which the option to perform Appendix J tests, in lieu of surface examination, will be used and the type of Appendix J test that would be performed in order for staff to evaluate the appropriateness of the test to detect cracking in these components prior to loss of intended function.

- The "preventive action" program element of GALL Report AMP XI.S1 recommends that the program be augmented to include preventive actions that ensure that moisture levels associated with an accelerated corrosion rate do not exist in the exterior portion of the BWR Mark I steel containment drywell shell. The actions consist of ensuring that the sand pocket area drains and/or the refueling seal drains are clear. The "parameters monitored or inspected" program element of the GALL Report AMP recommends that applicants with BWR Mark I steel containments should monitor sand pocket area drains and/or the refueling seal drains for water leakage. The licensees should ensure the drain lines are clear to prevent moisture levels associated with accelerated corrosion rates in the exterior portion of the drywell shell. The "preventive action" program element of the LRA AMP includes an enhancement to revise plant procedures to require inspection of the sand pocket drain lines prior to the period of extended operation. Also, the "parameters monitored or inspected" program element of the LRA AMP includes an enhancement to revise plant procedures to specify that inspections of sand pocket drain lines will monitor the internal condition of drain lines. Further, the "detection of aging effects" program element of the LRA AMP includes an enhancement to revise plant procedures to require visual inspection of sand pocket drain lines to ensure there is no evidence of blockage. Based on item 9 of LRA Section A.4, "License Renewal Commitment List," these enhancements (i.e., Commitments No. 9a, 9d and 9e) are scheduled to be completed prior to the period of extended operation. The staff needs additional information to determine that these enhancements are consistent with the recommendations for BWR Mark I steel containments in the "preventive actions" and "parameters monitored or inspected" program elements of the GALL Report AMP because: (i) it is not clear if the intent of the license renewal commitments is to revise plant procedures prior to the period of extended operation or to revise plant procedures and perform inspections of drain lines prior to the period of extended operation; (ii) the proposed enhancements (i.e., Commitments No. 9a and 9d) do not provide a stated objective for the inspection (i.e., to ensure that drain lines are clear or to monitor for water leakage or moisture in the drains or both; based on description in the above mentioned program elements, they appear to be exclusively intended to ensure that sand pocket drain lines are clear); and (iii) the enhancements (i.e., Commitments No. 9a, 9d, and 9e) do not provide the associated frequency of inspections and the basis for its adequacy to meet the intended objective; and (iv) it is not clear to the staff as to how the LRA AMP ensures that the refueling seal drains are clear.

- The "preventive actions" program element of the LRA AMP basis document states on page 26 that:

> During refueling the refueling bellows drain empties into a manifold which is equipped with a sight glass. This sight glass is monitored when the refueling pool is flooded to detect potential leakage of water into the space around the drywell shell. The sand pocket drains are also [to] be monitored for signs of moisture. Fermi 2 plans to re-inspect the drain lines to verify their condition prior to the period of extended operation ***to confirm that these preventative actions***

> ***are not warranted.*** The program will be enhanced to require inspection of the sand pocket drain lines prior to the period of extended operation. (emphasis added)

Further, the "parameters monitored or inspected" program element on page 28 of the program basis document states that: "Fermi 2 performs routine surveillances of the drains to record the observed condition of the drain lines for any leakage. Fermi 2 will inspect the sand pocket drain lines to verify their condition prior to the period of extended operation to confirm that the sand pocket drains are clear in ..."

The "parameters monitored or inspected" program element of GALL Report AMP XI.S1 recommends that license renewal applicants with BWR Mark I steel containments should [periodically] monitor the sand pocket area drains and/or the refueling seal drains for water leakage.

During the audit, the staff reviewed Fermi 2 Surveillance Procedure 24.000.03, Revision 77 (including Attachments 1 and 2), and noted that the procedure includes the following regulatory commitments made by letter NRC-88-0081, "Revised Response to GL 87-05," dated 4/20/88, and tracked in the applicant's Regulatory Action Commitment Tracking System (RACTS) under RACTS 88027. These items require inspection of the reactor-drywell seal bellows and the four sand cushion drain lines for leakage during every refueling outage.

(a) Items (35.0 in Attachment 1 and 1.10 in Attachment 2 identified as commitments [CM]) requiring verification that reactor-drywell seal bellows leakage is within limits. The procedure requires this verification to be performed during Mode 5 "Refueling" on a daily basis for the first 3 days following reactor cavity flooding and at a frequency of 7 days following that with an acceptance criteria of no observed leakage;

(b) Item (1.09 in Attachment 2 identified as commitment [CM]) requiring verification that drywell sand cushion leakage is within limits. The procedure requires this verification to be performed during Mode 5 "Refueling" at a frequency of 7 days (with a note that the commitment is monthly but performance will be 7 days) following reactor cavity flooding with an acceptance criteria of no observed leakage. Checks for leakage are required at Azimuth 90/180/270/360 6" below reactor pedestal catwalk between torus and drywell.

Despite the above existing commitments controlled by Procedure 24.000.03 to periodically monitor the sand pocket cushion drain lines and reactor-drywell seal bellows for signs of water leakage into inaccessible areas of the drywell, it is not clear to the staff if these periodic monitoring of the sand cushion drain lines and refueling seal bellows for water leakage every refueling outage will continue into the period of extended operation because of the inconsistent and contradicting statement (cited with ***emphasis added*** in the indented paragraph at the beginning of the bullet for this issue) on page 26 of the program basis document. Therefore, the staff needs additional information to determine if the "parameters monitored or inspected" program element is consistent with the GALL Report AMP with regard to the recommendation for periodically monitoring the sand pocket area drains and the refueling seal drains for water leakage.

- The "monitoring and trending" program element of the LRA AMP included the enhancement, "Revise plant procedures to determine drywell shell thickness in the sand pocket areas before the period of extended operation. From the results, develop a corrosion rate to demonstrate that the drywell shell will have sufficient thickness to perform its intended function through the period of extended operation." The

corresponding program element in GALL Report AMP XI.S1 recommends that the applicant develop a corrosion rate that can be inferred from past ultrasonic testing (UT) examinations or establish a corrosion rate using representative alternate means and provide a technical basis based on the developed or established corrosion rate that the drywell will have sufficient thickness to perform its intended function through the period of extended operation. During the audit, the staff noted that, for reasons indicated in the letters NRC-87-005 and NRC-88-0081, dated September 10, 1987, and April 20, 1988, respectively, ultrasonic thickness measurements of the drywell shell sand pocket areas were not performed at Fermi 2 in response to Generic Letter 87-05. It is not clear to the staff if these statements are consistent because the proposed enhancement in the LRA AMP program basis does not indicate the minimum number of sets and interval at which UT measurements will be performed, and does not provide the technical basis of how an appropriate corrosion rate will be developed if only one set of UT measurements is intended.

- The "corrective actions" program element of the LRA AMP included an enhancement to revise plant procedures to require three specific corrective actions should moisture be detected or suspected in the inaccessible area on the exterior of the Mark I steel containment drywell shell. The staff noted that the specific actions included in the above enhancement to the LRA AMP correspond to recommended actions (b), (c), and (d) in the "corrective actions" program element of GALL Report AMP XI.S1 if moisture has been detected in the inaccessible area on the exterior of the Mark I containment drywell shell or the source of moisture cannot be determined subsequent to root cause analysis. However, the LRA AMP program basis document and corresponding enhancement did not address action (a) of the GALL Report AMP which recommends including in the scope of license renewal any components that are identified as a source of moisture, if applicable, and performing aging management review. It is not clear to the staff that the "corrective actions" program element of the LRA AMP is consistent with recommended actions in the GALL Report AMP specifically applicable to inaccessible areas of the drywell shell exterior of Mark I containments because the LRA AMP basis document did not identify the components that are potential sources of moisture to inaccessible areas of the drywell exterior and whether they were subjected to AMR.

During the audit, the staff made the following observations:

- The staff reviewed the ISI-NDE Program Plan for Fermi 2, Part F, "ASME Section XI Containment Inservice Inspection Program," Appendix F4.5, and noted that Fermi 2 has a proactive inspection program of the interior wetted surfaces of submerged areas of the torus and the vent header. The interior of the torus is inspected and repaired on an every other refueling outage basis. During these examinations, the submerged areas of the torus shell are cleaned from water line to water line to remove sludge and other foreign material, and then coating inspectors inspect the entire area by VT-3 visual inspection. All areas of broken blisters and mechanical damage exhibiting corrosion on the pressure boundary immersion area are repaired. Additionally, Fermi 2 monitors the blister condition on specific immersed areas of the torus chosen based on their relatively high number of indications. During each inspection, the size, population density and condition of the blisters are monitored and trended to identify and evaluate adverse trends.

During the audit of the "operating experience" program element, the staff's independent database search found that the operating experience provided by the applicant is bounded by

known industry operating experience (e.g., no previously unknown aging effects were identified by the applicant or staff).

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, noting that conforming changes may be required as a result of responses to potential RAI issues identified above.

Audit Results. Based on this audit, the staff verified that the "scope of program," "preventive actions," and "acceptance criteria" program elements of the LRA AMP are consistent with the corresponding program elements in GALL Report AMP XI.S1. The staff also identified certain aspects of the "preventive actions," "parameters monitored or inspected," "detection of aging effects," "monitoring and trending," and "corrective 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 verified that the operating experience at the plant is bounded by the operating experience for which the GALL Report program was evaluated. In addition, the staff verified that the description provided in the UFSAR supplement is consistent with the description provided in the SRP-LR, subject to conforming changes that may be required as a result of responses to the potential RAI issues.

LRA AMP B.1.13, Containment Leak Rate

Summary of Information in the Application. The LRA states that AMP B.1.13, "Containment Leak Rate," 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.

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 the keywords: "10 CFR Part 50 Appendix J," "ILRT," "LLRT," and "leakage."

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

Relevant Documents Reviewed

Document	Title	Revision / Date
1. FERMI-RPT12-LRD05	Fermi 2 License Renewal Project, Aging Management Program Evaluation Report Civil/Structural, Containment Leak Rate on Pages 11-20.	Revision 1 03/05/2014
2. FERMI 2-MES 28	Engineering Support Conduct Manual, Leakage Reduction and Primary Containment Leakage Rate Programs.	Revision 17 06/23/2010
3. FERMI 2-PEP 22	10 CFR Part 50, Appendix J, Option B Program.	Revision 0 01/26/2011

Document	Title	Revision / Date
4. FERMI 2-43.401.100	Plant Technical Procedure-Surveillance Procedure. Leak Rate Test-Type A-General.	Revision 31 08/25/2011
5. FERMI 2-43.401.200	Plant Technical procedure-Surveillance Procedure. Leak Rate Test-Type B-General.	Revision 35 01/30/2009
6. FERMI 2-43.401.300	Plant Technical procedure-Surveillance Procedure. Leak Rate Test-Type C-General.	Revision 54 02/10/2012
7. Job ID 1138030328	Integrated Leak Rate Test [ILRT]-Type A-General, Perform 43.101.100 Type A - PCILRT Surveillance.	11/09/2007
8. Agencywide Documents Access and Management System (ADAMS) Accession No. ML030780865	U.S. Nuclear Regulatory Commission (NRC) Letter to Fermi 2 - "Issuance of Amendment 153, A One-Time Deferral of the Primary Containment Integrated Leak Rate Test."	03/27/2003
9. ADAMS Accession No. ML021510342	Detroit Edison Letter to NRC, "Proposed License Amendment for a One-Time Deferral of the Primary Containment Integrated Leak Rate Test."	05/23/2002
10. ADAMS Accession No. ML023610417	Detroit Edison Letter to NRC, "Response to NRC Request for Additional Information Regarding the Proposed License Amendment for a One-Time Deferral of the Primary Containment Integrated Leak Rate Test."	12/20/2002
11.	NRC Requests for B.1.13: Containment Leak Rate (List of Excluded Components)	09/29/2014
12. Chicago Bridge & Iron, Contract 69-5562, DWG 2	Shell Stretch-out, Enrico Fermi Power Plant Unit 2.	Revision 8 07/02/1970
13. Fermi 2- Drawing Number 6C721-2304	Primary Containment Penetrations Drywell, Detroit Edison Fermi 2.	07/31/2009
14. TMIS-12-0021	Quick Hit Self-Assessment Results on Appendix J Program.	02/27/2012
15. CARD 09-22205	B2100-F1010B failed its LLRT [local leak rate test], Investigation, Root Cause, and Closure.	04/03/2009
16. CARD 08-23745	Evaluate Appendix J, Type C Acceptance Criteria Bases, Industry Benchmarking Investigation.	06/06/2008
17. CARD 12-22315	B2103F019 Exceeded the Maximum Allowable Leakage in its LLRT.	03/27/2012
18. CARD 09-23364	LLRT of T2301A0011C Exceeded Acceptance Criteria, Overall Leakage Rate of the Containment is Below the Limit, and this Component is Acceptable within the Measured Leak Rate.	04/27/2009

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, the staff made the following observation:

- The staff reviewed Reference 11, "NRC Requests for B.1.13: Containment Leak Rate (List of Excluded Components)," in the table above titled "Relevant Documents Reviewed," and noted that for each of the excluded components from the Containment

> Leak Rate Program, "scope of program" program element, the applicant has identified the components in the LRA Table 2's requiring aging management and proposed various other AMPs or TLAAs [time-limited aging analyses] to demonstrate that the effects of aging will be adequately managed during the period of extended operation.

During the audit of the "operating experience" program element, the staff's independent database search found that the operating experience provided by the applicant is bounded by known industry operating experience.

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.S4.

Based on this audit, the staff also verified that the operating experience at the plant is bounded by the operating experience for which the GALL Report program was evaluated. 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.1.14, Diesel Fuel Monitoring

Summary of Information in the Application. The LRA states that AMP B.1.14, "Diesel Fuel Monitoring," is an existing program with enhancements that is consistent with the program elements in GALL Report AMP XI.M30, "Fuel Oil Chemistry." To verify this claim of consistency, the staff audited the LRA AMP. The scope of this audit report includes enhancements necessary to make the LRA AMP consistent with the corresponding GALL Report 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 the emergency diesel generator tanks, diesel fire pump tanks, and the combustion turbine generator tank. The staff also conducted an independent search of the applicant's operating experience database using the keywords: "diesel fuel," "sampling," and "bio-diesel."

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

Relevant Documents Reviewed

Document	Title	Revision / Date
1.FERMI-RPT-12-AMM14	Aging Management Review of the Fuel Oil System	Revision 0
2. WO35253617	Obtain FERMI 1- CTG Fuel Oil Sample for Analysis (procedure)	01/14/2014
3. CARD 09-26511	High Water and Sediment in EOF Diesel Fuel	08/24/2009

Document	Title	Revision / Date
4. CARD 10-28818	EOF EDG fuel oil sample out of specification	10/04/2014
5. CARD 10-22346	Evaluate Changing Frequency to Annual (From Quarterly) for Fuel Oil Stratification Testing	03/18/2010
6. CARD 10-24128	DFP FO Tank Contaminated	05/18/2010
7. FERMI-RPT-12-LRD03	Aging Management Program evaluation Report Non-Class 1 Mechanical	Revision 2
8. FERMI-RPT-12-LRD09	Operating Experience Review Report-Aging Management Program Effectiveness	Revision 1
9. 74.000.19	Chemistry Routine Surveillances	Revision 24
10. 77.000.81	Sampling EDG Fuel Oil Tanks	Revision 1
11. 6M721S-2008	Layout and Installation For Fire Protection Equipment General Service Water Pump House	06/27/2002
12. 6M721K-0002	Fuel Oil Sys&FI Prot TK-Aux BLR	06/14/2005
13. 11907105	Fuel Oil Day Tank 550 (drawing)	Revision 5
14. 6M721K-0001	Fuel Oil Sys&FI Prot TK-Aux BLR	06/14/2005
15. NL10276	Horizontal Diesel Fuel Storage Tanks	06/26/1977
16. Certificate of Analysis	EDG13 FO Storage Tank	08/01/2008
17. WO37833595	Obtain Diesel Fire Pump Sample (procedure)	12/17/2013

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’s independent database search found that the operating experience provided by the applicant is bounded by known industry operating experience.

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.M30. The staff’s evaluation of aspects of the program elements associated with enhancements that are not necessary for consistency will be addressed in the SER.

Based on this audit, the staff also verified that the operating experience at the plant is bounded by the operating experience for which the GALL Report program was evaluated. 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.1.15, Environmental Qualification (EQ) of Electric Components

Summary of Information in the Application. The LRA states that AMP B.1.15, "Environmental Qualification (EQ) of Electric Components," is an existing program that will be 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. 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 the keywords: "EQ," "Environmental Qualification," "cable," "connection," "jacket," and "insulation."

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

Relevant Documents Reviewed

Document	Title	Revision / Date
1. FERMI-RPT-12-LRD04	Aging Management Program Evaluation Results – Electrical Page 53	Revision 1
2. FERMI-RPT-12-LRD06	TLAA and Exemption Evaluation Results (includes EQ) – Page 23	Revision 1
3. EQ1-EF2-044	Electrical Environmental Qualification Central File - Limitorque	Revision F 11/8/2011
4. EQI-EF2-038	Electrical Environmental Qualification File – Okinite	Revision E 2/17/2012
5. EQ0-EF2-018	General Information Lead Sheet Environmental Qualification Central File	Revision L 12/14/2012
6. EQ1-EF2-004	EEQ-Lead Sheet - Electrical Environmental Qualification Central File	Revision C 7/14/2010
7.	Program Health Report Fermi 2 – 3rd Quarter 2013	11/25/2013
8.	Program Health Report Fermi 2 – 4th Quarter 2012	1/31/2013
9.	Environmental Qualification Program Focused Self-Assessment Report	7/20/2012
10. Fermi-RPT-12-LRD09	Operating Experience Review Report – Aging Management Program Effectiveness	Revision 1
11.	Program Health Report Fermi 2 - 1st Quarter 2011	5/18/2011

Document	Title	Revision / Date
12.	Program Health Report Fermi 2 - 2nd Quarter 2011	8/29/2011
13.	Program Health Report Fermi 2 – 3rd Quarter 2011	12/7/2011
14.	Program Health Report Fermi 2 – 4th Quarter 2011	
15.	Program Health Report Fermi 2 – 1st and 2nd Quarter 2012	1/24/2012
16.	Program Health Report Fermi 2 – 3rd Quarter 2012	
17.	Program Health Report Fermi 2 – 1st Quarter 2013	4/17/2013
18.	Program Health Report Fermi 2 – 2nd Quarter 2013	7/19/2013
19.	Program Health Report Fermi 2 – 4th Quarter 2013	2/3/2014
20.	Program Health Report Fermi 2 – 1st Quarter 2014	
21.	Program Health Report Fermi 2 – 2nd Quarter 2014	7/31/2014
22.	Environmental Qualification Program Focused Self-Assessment Report	7/20/20125
23. WO 33325460	RF15 Indenter Testing of Environmentally Qualified Okoprene Cable in Drywell	6/13/2012
24. 09-29658	Cable Examination and Contingency Repair Work Orders	12/17/2009
25. EFA-R16-07-003	Engineering Functional Analysis Appendix C and B	Revision A

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’s independent database search found that the operating experience provided by the applicant is bounded by known industry operating experience (e.g., no previously unknown or recurring aging effects were identified by the applicant or staff).

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 B.1.15.

Based on this audit, the staff also verified that the operating experience at the plant is bounded by the operating experience for which the GALL Report program was evaluated. 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.1.16, External Surfaces Monitoring

Summary of Information in the Application. The LRA states that AMP B.1.16, "External Surfaces Monitoring," is an existing program with enhancements that will be consistent with the program elements in GALL Report AMP XI.M36, "External Surfaces Monitoring of Mechanical Components," as modified by LR-ISG-2011-03, "Changes to the Generic Aging Lessons Learned (GALL) Report Revision 2, Aging Management Program XI.M41, 'Buried and Underground Piping and Tanks,'" and LR-ISG-2012-02, "Aging Management of Internal Surfaces, Fire Water Systems, Atmospheric Storage Tanks, and Corrosion under Insulation." To verify this claim of consistency, the staff audited the LRA AMP. The scope of this audit report includes enhancements necessary to make the LRA AMP consistent with the corresponding GALL Report AMP. Prior to the staff's audit, the applicant supplemented its program by letter dated July 30, 2014, to include inspections under insulation as recommended in LR-ISG-2012-02, and the staff's audit included this additional aspect of the program. 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 the keywords: "rust," "pit," "corros," "leak," and "wastage."

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

Relevant Documents Reviewed

Document	Title	Revision / Date
1. FERMI-RPT-12-LRD03	Aging Management Program Evaluation Report, Non-Class 1 Mechanical	Revision 2
2. FERMI-RPT-12-LRD09	Operating Experience Review Report – Aging Management Program Effectiveness	Revision 1
3. FBP-70	System Engineering Fundamentals	Revision 4
4. FBP-70001	System Walkdown Checklist	Revision 0
5. MQA13	Quality Assurance Conduct Manual – Trending	Revision 9
6. MQA11	Quality Assurance Conduct Manual – Condition Assessment Resolution Document	Revision 35
7. MLS04	Licensing/Engineering Conduct Manual – Operating Experience Program	Revision 26
8. CARD 12-28246	Rust Found On Div. 1 and Div. 2 CCHVAC Chiller Isolators	10/04/2012
9. CARD 14-20872	Rusty flanges and hardware	2/08/2014
10. CARD 11-29134	Air seal at Grid G-12 is bulging approx. 12" long x 2" in CCHVAC Div-2 Mech Room south wall	11/06/2011

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, as modified by LR-ISG-2011-03 and LR-ISG-2012-02. However, 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 include an enhancement to revise program procedures to ensure that walkdowns will include inspections for leakage to detect cracking in stainless steel components exposed to air containing halides. However, some of the subject components have a gaseous internal environment. It is not clear to the staff how external leakage of the gas will be detected.
- LR-ISG-2012-02 revised GALL Report AMP XI.M36 to recommend inspections of thermal insulation when the insulation has a function to reduce heat transfer. The LRA AMP does not contain this activity. The applicant's program basis document, FERMI-RPT-12-LRD03, states that thermal insulation is not credited for reduction of heat transfer. However, LRA Table 3.5.2-4 includes an AMR item for insulation with an intended function of heat transfer reduction, and the Structures Monitoring Program is proposed to manage loss of material and change in material properties. It is not clear to the staff whether the activities to inspect thermal insulation under the Structures Monitoring Program are consistent with those recommended in LR-ISG-2012-02.

During the audit of the "operating experience" program element, the staff's independent database search found that the operating experience provided by the applicant is bounded by known industry operating experience.

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, as modified by LR-ISG-2012-02.

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.M36, as modified by LR-ISG-2011-03 and LR-ISG-2012-02. 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 at the plant is bounded by the operating experience for which the GALL Report program was evaluated. 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.1.17, Fatigue Monitoring

Summary of Information in the Application. The LRA states that AMP B.1.17, "Fatigue Monitoring," is an existing program that, with enhancements and an exception, 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 report includes enhancements necessary to make the LRA AMP consistent with the corresponding GALL Report AMP. The exception to the GALL Report AMP, which is not necessary for consistency with the GALL Report, 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 the keywords: "transient," "fatigue," and "flaw."

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

Relevant Documents Reviewed

Document	Title	Revision / Date
1. MES29	Documentation and Reporting of Operating Transients and Cycles	Revision 7
2. MQA13	Trending	Revision 9
3. CARD 98-14294	Technical Specification Transient Count on the Reactor Pressure Vessel	06/05/1998
4. CARD 06-21871	Evaluate Cool Down Rate of RPV During Core Spray Flood UP for Refueling	02/07/2008
5. CARD 11-28422	Fatigue Usage Factor at Containment Flued Heads	06/20/2012
6. CARD 09-20254	Evaluate NRC Regulatory Issues Summary 2008-30, Fatigue Analysis of Nuclear Power Plant Components, for impact to Fermi	03/24/2009
7. CARD 12-20064	Document Applicability of NRC Regulatory Issues Summary 2011-14, Metal Fatigue Analysis Performed by Computer Software	02/03/2012
8. FERMI-RPT-12-LRD07	TLAA – Mechanical Fatigue	Revision 2
9. 1101554.302	Fermi LR Transient Counting (Proprietary Information)	02/10/2014
10. 1101554.301	License Renewal Transient Events for Thermal Cycle Counts (Proprietary Information)	02/10/2014

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. Aspects of the "corrective actions" program element of the LRA AMP associated with the exception were not evaluated during this audit. Aspects of this program element that are not associated with the exception were evaluated and are described below.

During the 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 elements of the GALL Report AMP. The staff also verified that aspects of the “corrective actions” program element not associated with the exception are consistent with the corresponding program elements in the GALL Report AMP. The staff’s evaluation of aspects of the program element associated with the exception will be addressed in the SER. In addition, the staff found that for the “parameters monitored or inspected” 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 RAIs for the subject discussed below.

- The “parameters monitored or inspected” program element of the LRA AMP states that the “cycle counting” method of fatigue monitoring will be used to track the number of occurrences for plant transients. The GALL Report AMP recommends tracking the number of each plant transient, although it does not provide guidance on the use of a specific fatigue monitoring method. The applicant’s Fatigue Monitoring Program is currently limited to cycle counting and does not allow for more detailed fatigue monitoring methods, such as “Cycle-Based Fatigue” and “Stress-Based Fatigue,” to prevent the fatigue design limit from being exceeded. It is not clear to the staff if fatigue monitoring methods other than Cycle Counting are being used to prevent the fatigue design limit of components from being exceeded.

During the audit of the “operating experience” program element, the staff’s independent database search found that the operating experience provided by the applicant is bounded by known industry operating experience. The staff also noted that the applicant tracks cumulative operating time on components in support of flaw evaluations. 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.

- The applicant’s Fatigue Monitoring Program is limited to monitoring plant transients in order to remain below component design limits based on crack initiation. The applicant is currently tracking cumulative operating time on components in support of flaw evaluations. The applicant’s Fatigue Monitoring Program does not track usage time or support crack growth calculations. It is unclear if the TLAAs associated with these components can be tracked using the Fatigue Monitoring Program.

The staff also audited the description of the LRA AMP provided in the UFSAR supplement. The staff verified that this description is consistent with the description provided in the SRP-LR, although information regarding the methodologies to implement the commitments was not available for review. In order to obtain the information necessary to verify the sufficiency of the UFSAR supplement commitments, the staff will consider issuing RAIs for the subject discussed below.

- The applicant’s Fatigue Monitoring Program contains enhancements to prevent the fatigue design limit of components from being exceeded when accounting for environmental effects. The UFSAR supplement contains a commitment (Commitment No. 12, part b) to calculate environmental correction factors in order to assess the impact of the reactor coolant environment on component fatigue life. As part of this

commitment, plant-specific component locations in the reactor coolant pressure boundary that lead the components identified in NUREG/CR-6260 will be identified for tracking purposes. It is unclear what methodology is being used to identify the plant-specific limiting locations.

Audit Results. Based on this audit, the staff verified that the "scope of program," "preventive actions," "detection of aging effects," and "monitoring and trending" program elements of the LRA AMP are consistent with the corresponding program elements in GALL Report AMP X.M1. The staff also verified that for the "acceptance criteria" program element, the aspects of the LRA AMP program element not associated with the exception are consistent with the corresponding program element in GALL Report AMP X.M1. The staff's evaluation of aspects of the program element associated with exceptions will be addressed in the SER. The staff also identified certain aspects of the "parameters monitored or inspected" 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 at the plant is bounded by the operating experience for which the GALL Report program was evaluated. However, the sufficiency of the AMP to track parameters other than transients, such as cumulative operating time, may require additional information. In addition, the staff verified that the description provided in the UFSAR supplement is consistent with the description provided in the SRP-LR, although additional information regarding the methodologies being used to satisfy the aspects of the associated commitments may be requested.

LRA AMP B.1.18, Fire Protection

Summary of Information in the Application. The LRA states that AMP B.1.18, "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 report 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 the keywords: "carbon dioxide," "CO2," "damper," "fire barrier," "halon," and "wrap."

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

Relevant Documents Reviewed

Document	Title	Revision / Date
1. FERMI-RPT-12-LRD03	Aging Management Program Evaluation Report, Non-Class 1 Mechanical, Section 4.6, "Fire Protection"	Revision 2
2. MES35	Fermi 2 Engineering Support Conduct Manual, "Fire Protection"	Revision 9

Document	Title	Revision / Date
3. MOP11	Fermi 2 Operations Conduct Manual, “Fire Protection”	Revision 16
4. 28.507.01	Fire Barrier Inspection	Revision 10
5. 28.507.07	Fire Barrier Inspection – BOP	Revision 3
6. 28.507.02	Fire Door Surveillance Test	Revision 18
7. 28.507.03	Fire Door Inspection – BOP	Revision 29
8. 28.507.05	Inspection of Penetration Fire Stops	Revision 19
9. 28.502.04	Low Pressure CO2 System Evaluation Test	Revision 7
10. 28.502.06	CO2 Fire Suppression Systems Functional Test Zone 9A – Auxiliary Building 2nd Floor Mezzanine Cable Tray Area	Revision 15
11. 28.502.07	CO2 Fire Suppression Functional Test Zone 14, Auxiliary Building, 3rd Floor	Revision 13
12. 28.502.08	CO2 Fire Suppression Functional Test RHR Complex Div I - EDG 11	Revision 16
13. 28.502.09	CO2 Fire Suppression Functional Test RHR Complex Div I- EDG 12	Revision 16
14. 28.502.10	CO2 Fire Suppression Functional Test RHR Complex Div II-EDG 13	Revision 16
15. 28.502.11	CO2 Fire Suppression Functional Test RHR Complex Div II - EDG 14	Revision 18
16. 28.502.18	Standby Gas Treatment System CO2 System Actuation Test	Revision 10
17. 28.502.19	CO2 Fire Suppression Systems Functional Test Zone 9, Auxiliary Building, 2nd Floor Cable Tray Tunnel	Revision 7
18. 28.503.03	Halon Storage Tank Weight and Pressure Test	Revision 12
19. 28.503.04	Halon Fire Suppression System Functional Test Zone 8 - Relay Room	Revision 15
20. 28.503.05	Halon Fire Suppression System Functional Test Zone 11 - Cable Spreading Room	Revision 14
21. 28.503.06	Halon Fire Suppression System Functional Test Zone 13 - Computer Room	Revision 16
22. 28.503.11	Halon Fire Suppression System Functional Test SAS File Room GH1	Revision 1
23. 27.000.02	Shiftly, Daily, Weekly, and Situation Required Performance Evaluations	Revision 44
24. 28.507.04	Test and Inspection of Fire Dampers	Revision 8
25. 28.507.06	Test and Inspection of Fire Dampers – BOP	Revision 3
26. MQA11	Condition Assessment Resolution Document	Revision 35

Document	Title	Revision / Date
27. MQA13	Quality Assurance Conduct Manual	Revision 9
28. CARD 06-27099	Fire doors need repairing	11/02/2006
29. CARD 09-22369	Cracked fire penetrations due to heat stress	04/06/2009
30. CARD 09-00005	Foil fire barrier wrap is damaged on conduit run from H21-P022 panel	01/08/2009
31. CARD 09-22520	Deteriorated penetration seals, and excessive debris in penetration area	04/09/2009
32. CARD 10-21247	Hole in floor of UFSAR Fire Barrier	02/11/2010
33. CARD 10-30772	Fire door seal damaged	11/17/2010
34. CARD 10-30102	Penetration fire stops damaged due to heat stress	11/10/2010
35. CARD 11-28605	Fire Rated Foam Seals damaged on Aux. Building Wall at EDG Cable Vault Modification area	09/19/2011
36. CARD 12-21188	Fire boot seal with hole in it	02/13/2012
37. CARD 12-23205	Penetration fire stops damaged due to heat stress	04/13/2012
38. CARD 12-26531	Damaged Fire Seals and inconsistencies with drawings	08/03/2012
39. CARD 14-20928	Fire barrier cinder block cracked	02/10/2014
40. FERMI-RPT-12-AMC04	Aging Management Review of Bulk Commodities	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. However, the staff found that for the “detection of aging effects” program element, additional information is necessary in order for the staff to complete its review; the staff will consider issuing RAIs for the subject discussed below.

- The staff noticed that the Aging Management Program Evaluation Report for Fire Protection, under the comparison statement for the Detection of Aging Effects program element, states that visual inspection of other fire barrier materials, *including fire barrier dampers*, is performed at a frequency in accordance with the technical requirements manual, which is every 18 months.

  Consistent with the SRP-LR and the GALL Report, DTE selected the Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components Program and the External Surfaces Monitoring Program to manage for loss of material. The periodicity for the Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components Program is based on a sampling of at least 20 percent or maximum of 25 components every 10 years. Selection of the Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components Program may conflict with DTE’s current requirement to inspect the fire damper housings every 18 months.

During the audit, the staff made the following observations:

- In Section 4.6 of FERMI-RPT-12-LRD03, under the Detection of Aging Effects element, it states that "…If any sign of degradation is detected within that sample, the scope of the inspection is expanded to include additional seals." This statement is consistent with the statement in GALL Report AMP XI.M26 for expansion of the sample. The staff noticed that Technical Requirements Manual (TRM) Section 3.12.8 (Technical Requirements Surveillance Requirement (TRSR) 3.12.8.7) states that if apparent changes in appearance or abnormal degradations are found, a visual inspection of an additional 10 percent of each type of sealed penetration shall be made, and that this inspection process shall continue until a 10 percent sample with no apparent changes in appearance or abnormal degradation is found. To show consistency with the GALL Report for this particular activity, DTE references Plant Technical Procedure – Fermi 2 28.507.05, Revision 19, "Inspection of Penetration Fire Stops." General Requirement 5.1.1 states, in part, "…If changes in appearance from normal are found, a visual inspection of an additional 10 percent of that type of sealed penetration shall be made. This inspection process shall continue until a 10 percent sample is found with no apparent changes in appearance or abnormal degradation."
- Enhancement No. 2 states that Fire Protection Program procedures will be revised to require visual inspections of in-scope fire wrap and fire stop materials constructed of fibersil cloth, cerafoam, kaowool, thermolag, flamemastic, and pyrocrete. The staff noticed that LRA Table 3.5.2-4 does not include cerafoam, kaowool, flamemastic or pyrocrete as materials. However, FERMI-RPT-12-AMC04 states that "[m]aterial used for fire stops and fire wraps include carborundum durablankets, carborundum fibersil cloth, silicone fabric boot, silicone elastomers and steel." It is not clear if the applicant uses cerafoam, kaowool, flamemastic or pyrocrete in the plant as fire stop materials.

During the audit of the "operating experience" program element, the staff's independent database search found that the operating experience provided by the applicant is bounded by known industry operating experience.

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," and "acceptance criteria" program elements of the LRA AMP are consistent with the corresponding program elements in GALL Report AMP XI.M26. 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 the staff can complete its review.

Based on this audit, the staff also verified that the operating experience at the plant is bounded by the operating experience for which the GALL Report program was evaluated. 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.1.19, Fire Water System

Summary of Information in the Application. As amended by letter dated July 30, 2014, the LRA states that AMP B.1.19, "Fire Water System," is an existing program with enhancements and exceptions that will be consistent with the program elements in GALL Report AMP XI.M27, "Fire Water System," as modified by LR-ISG-2012-02, "Aging Management of Internal Surfaces, Fire Water Systems, Atmospheric Storage Tanks, and Corrosion under Insulation." 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 report includes enhancements necessary to make the LRA AMP consistent with LR-ISG-2012-02 AMP XI.M27 and exceptions to LR-ISG-2012-02 AMP XI.M27.

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 general service water pump house and the fuel oil tank for the diesel-driven firewater pump. The staff also conducted an independent search of the applicant's operating experience database using the keywords: "biofoul," "biological," "clog," "silt," "through-wall," and "foul."

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

Relevant Documents Reviewed

Document	Title	Revision / Date
1. FERMI-RPT-12-LRD03	Aging Management Program Evaluation Report Non-Class 1 Mechanical Fire Water System	Revision 2
2. 28.501.10	Fire Hose Station Flow Test and Fire Hose Hydrostatic Test	Revision 9
3. TR 3.12.1	Technical Requirements Manual - Fire Protection	Revision 75
4. 28.501.14	Sprinkler System Integrity Inspection – Results	08/03/2012 01/30/2014
5. 28.501.16	Sprinkler System Integrity Inspection – BOP Results	04/10/2012 01/13/2014
6. 28.504.04	Fire Suppression Water System Flow Test	Revision 24
7. 28.501.13	Sprinkler System Simulated Automatic Actuation Test	Revision 22
8. 23.501.01	Fire Water Suppression System	Revision 53
9. 28.501.15	Sprinkler System Simulated Automatic Actuation Test – BOP	Revision 17
10. 28.504.04	Fire Suppression Water System Flow Test – Test Results	05/14/2008 05/13/2009 07/21/2010 03/17/2011 09/06/2012 09/07/2012 12/13/2012

Document	Title	Revision / Date
11. FPEE-11	Fire Protection Engineering Evaluation of Impact of Degraded C Factor on TRM Required Sprinkler Water Supply	03/04/2011
12. 28.501.17	Deluge System and Pre-Action Sprinkler System Trip Test – BOP	Revision 28
13. CARD 12-28274	INPO RFI [Recommendation for Improvement] Lack of Detailed Plan for Resolution of the Underground Fire Header Issue	10/05/2012
14. CARD 12-20083	External Corrosion on 12" Ring Header	01/09/2012
15. CARD 08-23973	Trending Identified Underground Fire Suppression Ring Header Degradation	06/16/2008
16. CARD 09-00627	12" Underground Piping [removed fire water system piping] for ISI	06/29/2009
17. CARD 10-24296	Condition of Underground Fire Header	05/24/2010
18. 1284705	PM [Preventive Maintenance] – Performance Scheduling Tracking (PST) Database - Perform Functional Test on the Deluge System for the Hydrogen Seal Oil Unit	
19. 28.504.06	Fire Suppression Water System – Flush	Revision 25
20. P80/82-00	Fire Protection System Design Basis Document	Revision C
21. WO 000Z031830 & WO 000Z966845	CCHVAC Makeup Charcoal Replacement	05/02/2003 11/02/1996
22. WO 000Z050437 & WO 000Z966956	CCHVAC Recirc Charcoal Replacement	04/05/2006 10/26/1996
23. CARD 04-23042	Fire Sprinkler Piping Contains Large Amounts of Silt and Corrosion Products	07/06/2004
24. WO 34393618	Perform 28.501.19 (Sect 5.4) Deluge System Functional Test for Main Transformer 2A	03/24/2013
25. WO 34422151	Perform 28.501.17 (Sect 5.1) Deluge System Functional Test for SYS SER Transformer 64	02/19/2014
26. WO 36286444	Perform 28.501.17 (Sect 5.5) Functional Test for Loading Dock Pre-Action Sprinkler	08/26/2014
27. WO 34617819	Perform 28.501.17 (Sect 5.3) Deluge System Functional Test for Hydrogen Seal Oil Deluge	07/31/2014
28. WO 38192166	Perform 28.501.19 (Sect 5.3) Deluge System Functional Test for Main Transformer 2B	04/22/2014

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. Aspects of the "detection of aging effects" program element of the LRA AMP associated with the exceptions were evaluated during this audit. Aspects of the program elements that are not associated with the exceptions were evaluated and are described below.

During the audit, the staff verified that the “scope of program,” “preventive actions,” and “monitoring and trending” program elements of the LRA AMP are consistent with the corresponding elements of the GALL Report AMP. The staff also verified that aspects of the “detection of aging effects” program element not associated with the exceptions are consistent with the corresponding program elements in the GALL Report AMP. The staff’s evaluation of aspects of this program element associated with the exceptions will be addressed in the SER. In addition, the staff found that for the “parameters monitored or inspected,” “detection of aging effects,” 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.

- Enhancement Nos. 2 and 7 to the “parameters monitored or inspected” and “detection of aging effects” program elements of the LRA AMP state that an inspection of the wet fire water system piping condition will be conducted at least once every 5 years. The applicant will conduct the test by opening a flushing connection at the end of one main and by removing a sprinkler toward the end of one branch line. LR-ISG-2012-02 AMP XI.M27 recommends that, as stated in National Fire Protection Association (NFPA) 25 Section 14.2.2, the licensee inspect every other system in buildings with multiple wet pipe systems every 5 years. During the audit, the applicant confirmed that it has multiple wet pipe systems in buildings with in-scope components protected by the fire water system. The applicant did not provide a basis for why testing only one system every 5 years is sufficient.
- Enhancement No. 4 to the “detection of aging effects” program element of the LRA AMP, as amended by letter dated July 30, 2014, states that a basis for the acceptance criteria of less than or equal to 25 pounds per square inch gauge (psig) and less than or equal to 10 psig that currently exists in the main drain test procedures will be developed. LR-ISG-2012-02 AMP XI.M27 recommends that, as stated in NFPA 25 Section 13.2.5.2, a 10 percent reduction on full flow pressure during main drain tests should be corrected. During the audit, the staff confirmed that the fire water system header pressure is 150 psig plus or minus 10 psig. While the less than or equal to 10 psig acceptance criterion could be conservative based on the 150 psig header pressure, it is not clear to the staff how a less than or equal to 25 psig criterion can be justified.
- Enhancement No. 6 to the “detection of aging effects” program element of the LRA AMP, as amended by letter dated July 30, 2014, states that sprinklers will be cleaned if obstructions are identified during internal inspections. LR-ISG-2012-02 AMP XI.M27 recommends that, as stated in NFPA 25 Section 5.2.1.1.2, licensee should replace corroded or loaded sprinklers. The applicant did not provide a basis for why corroded or loaded sprinklers can be cleaned versus replaced.
- Enhancement No. 11 to the “detection of aging effects” program element of the LRA AMP, as amended by letter dated July 30, 2014, states that an obstruction investigation will be conducted after an extended shutdown of more than one year. LR-ISG-2012-02 AMP XI.M27 recommends that, as stated in NFPA 25 Sections 14.2.1.3 and 14.3.1, there are additional criteria for conducting obstruction investigations (e.g., discharge of obstructive material during routine water tests, plugging of inspector’s test connection, pinhole leaks). During the audit, the staff did not find any procedures that included the additional criteria, nor did the applicant provide a basis for why its enhancement is sufficient to ensure that obstruction investigations would be conducted when

appropriate. It is not clear to the staff that these statements are consistent because only one criterion to conduct an obstruction investigation is identified.

- Exception No. 7 to the "detection of aging effects" program element of the LRA AMP, as amended by letter dated July 30, 2014, states that a one-time inspection of the internal surfaces of the dry piping downstream of the manual isolation valve for the wet pipe system in the cable spreading room will be conducted. LR-ISG-2012-02 AMP XI.M27 recommends that a licensee should conduct periodic inspections of fire water system piping exposed to indoor air (see LRA Table 3.3.2-7). It is not clear to the staff that these statements are consistent because the applicant did not provide a basis for why there is reasonable assurance that the current licensing basis intended function(s) of the piping would be met when only a one-time inspection is conducted.
- Exception No. 7 to the "detection of aging effects" program element of the LRA AMP, as amended by letter dated July 30, 2014, states that in lieu of conducting a deluge test with air or smoke for the control center heating, ventilation, and air conditioning (HVAC) make-up filter charcoal filter absorber unit and the control center HVAC recirculation filter charcoal absorber unit, it will inspect the internal surfaces of the piping downstream of the manual isolation valves whenever the charcoal is replaced. LR-ISG-2012-02 AMP XI.M27 recommends that, as stated in NFPA 25 Section 13.4.3.2.2.4, a licensee should conduct deluge valve testing at least every 3 years. It is not clear to the staff that these statements are consistent because during the audit, the staff reviewed charcoal filter media replacement work orders and determined that media is replaced approximately every 7 to 10 years.
- The "acceptance criteria" program element of the LRA AMP, as amended by letter dated July 30, 2014, does not include an acceptance criteria associated with corrosion of sprinklers during periodic visual sprinkler inspections. LR-ISG-2012-02 AMP XI.M27 recommends that, as stated in NFPA 25 Section 5.2.1.1.2, licensees should replace sprinklers that exhibit corrosion. It is not clear to the staff that these statements are consistent because the Fire Water System Program does not include a criterion to replace corroded sprinklers and the applicant did not provide a basis for why corroded sprinklers can remain in service.

During the audit, the staff made the following observations:

- The staff reviewed procedure 23.501.01 and confirmed that there are seven main drain locations in the reactor building, two in the auxiliary building, three in the radwaste building, eight in the turbine building, three in the on-site storage facility, four in the residual heat removal building, and one in the general service water pump house. The staff also reviewed procedure 28.501.13 in conjunction with 23.501.01 and confirmed that the applicant conducts main drain tests in accordance with NFPA 25, "Standard for the Inspection, Testing, and Maintenance of Water-Based Fire Protection Systems," at locations in the reactor building, auxiliary building, and general service water pump house building every 18 months.
- The staff reviewed CARD 08-23973. The CARD states that recent testing, May 2008, demonstrated that the C factor for the east and north portion of the header is approximately 59 and for the south and west portion of the header, the C factor is approximately 61. The previous test yielded C factors of 63 and 62 respectively. The design calculation uses a value of 60. CARD 01-24296 states that the May 2009 testing resulted in a C factor of 64. CARD 01-24296 also states that the applicant detected an error in the calculation of hydrant flows resulting in an average C factor increase of 3.6.

CARD 01-24296 further states that average C factor results are as follows: 66 in 2001, 61 in 2002, 63 in 2005, 57 in 2008, and 60 in 2009.

- The staff reviewed procedure 28.504.04 and confirmed that the applicant conducts a fire water system main header flow testing every 3 years.
- The staff reviewed procedure 28.501.10 and confirmed that the applicant conducts a flow confirmation at each hose station every 3 years.
- The staff reviewed procedure PST 1284705 and confirmed that the applicant tests the hydrogen seal oil unit deluge system every 364 days.
- The staff reviewed the Fire Protection System Design Basis Document and confirmed that the fire water system pressure at all automatic and manual water-based system points should be 150 psig plus or minus 10 psig.
- The staff reviewed procedure 28.504.06 and confirmed that the applicant conducts a flush of the yard piping every 12 months.
- The staff reviewed the corrective actions associated with CARD 04-23042, which documented silting in fire protection sprinkler piping, and confirmed that the degraded piping was associated with a warehouse supplied from Fermi Unit 1. The applicant flushed the piping to remove all debris and implemented a modification to supply the sprinklers from Fermi Unit 2. The staff noted that NFPA 25, Sections D.5, "Flushing Procedures," cites flushing as an effective method to conduct obstruction investigations of yard mains, risers, feed mains, cross mains, and branch lines.

During the audit of the "operating experience" program element, the staff's independent database search found that the operating experience provided by the applicant is bounded by known industry operating experience (e.g., no previously unknown or recurring aging effects were identified by the applicant or staff). 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 an RAI for the subject discussed below.

- One of the plant-specific operating experience examples cited in the LRA describes fire suppression flow testing that demonstrated degrading conditions in the underground piping system. The applicant stated that it increased the frequency of testing and evaluation of this piping from 3 years, as required in the current licensing basis, to annual testing. Based on its review of corrective action reports that describe the trend of degradation, it is not clear to the staff why the increased frequency of testing should not be continued during the period of extended operation.

The staff also audited the description of the LRA AMP provided in the UFSAR supplement. The staff found that sufficient information was not available to determine whether the description provided in the UFSAR supplement was an adequate description of the LRA AMP. In order to obtain the information necessary to verify the sufficiency of the UFSAR supplement program description, the staff will consider issuing RAIs for the subject discussed below.

- As amended by letter dated July 30, 2014, LRA Section A.1.19 states that "[t]he Fire Water System Program manages loss of material for in-scope long-lived passive water-based fire suppression system components using periodic flow testing and visual inspections." LR-ISG-2012-02 Table 3.0-1 recommends that the UFSAR supplement summary description for the Fire Water System Program should also state that it manages fouling and flow blockage. Although LRA Section A.1.19 references fouling

and flow blockage, it is only in reference to conducting visual inspections and not all of the inspections and testing in the program. It is not clear to the staff that the applicant's current licensing basis will be adequate during the period of extended operation if the Fire Water System Program UFSAR supplement does not state that the program manages fouling and flow blockage.

Audit Results. Based on this audit, the staff verified that the "scope of program," "preventive actions," and "monitoring and trending" program elements of the LRA AMP are consistent with the corresponding program elements in LR-ISG-2012-02 AMP XI.M27. The staff also verified that for the "detection of aging effects" program element, the aspects of the LRA AMP program element not associated with the exception are consistent with the corresponding program element in LR-ISG-2012-02 AMP XI.M27. The staff's evaluation of aspects of the program element associated with exceptions will be addressed in the SER. The staff also identified certain aspects of the "parameters monitored or inspected," "detection of aging effects," and "acceptance criteria" program elements of the LRA AMP for which additional information or evaluation is required before consistency can be determined.

Based on this audit, the staff also found that additional information is required before a determination can be made regarding whether the applicant's operating experience supports the sufficiency of the LRA AMP. In addition, the staff identified a need for additional information regarding the adequacy of the program description in the UFSAR supplement.

LRA AMP B.1.20, Flow-Accelerated Corrosion

Summary of Information in the Application. The LRA states that AMP B.1.20, "Flow-Accelerated Corrosion," is an existing program with enhancements that will be consistent with the program elements in GALL Report AMP XI.M17, "Flow-Accelerated Corrosion," as modified by LR-ISG-2012-01, "Wall Thinning Due to Erosion Mechanisms." 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 report includes enhancements necessary to make the LRA AMP consistent with the corresponding GALL Report 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 search of the applicant's operating experience database using the keywords: "cavitat," "erosi," "fac," "flow accel," "flow assist," "impinge," "through-wall," and "wall-thinning."

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

Relevant Documents Reviewed

Document	Title	Revision / Date
1. FERMI-RPT-12-LRD03	Aging Management Program Evaluation Report, Non-Class 1 Mechanical, Section 4.8 "Flow-Accelerated Corrosion"	Revision 2
2. FERMI-RPT-12-LRD09	Operating Experience Review Report – Aging Management Program Effectiveness, Section 3.1.18, "Flow-Accelerated Corrosion"	Revision 1

Document	Title	Revision / Date
3. NRC-89-0164	Fermi 2 Response to NRC Generic Letter 89-08	7/21/1989
4. MES26	Engineering Support Conduct Manual, "Flow Accelerated Corrosion Prediction, Detection, and Correction"	Revision 12
5. PEP 19	Program Notebook, Flow Accelerated Corrosion	Revision 2
6. PEP 19, Appendix A	FAC [Flow Accelerated Corrosion] Program Susceptibility Review	Revision 1
7. PEP 19, Appendix I	FAC Program Long Range Plan	Revision 3
8. WR E965060100	Flow Accelerated Corrosion Program Evaluation Data, No. 3160-2A, RHR A-AC, 1-29	3/31/2006
9. CARD 13-25054	Peer Review Performance Deficiency – FAC Model	7/17/2013
10. CARD 11-24244	MES26 to be Revised to Include Process for Technical Justification for Deferrals	4/26/2011
11. CARD 11-24236	NDE.014 Regarding Upstream Gridding	4/26/2011
12. CARD 11-24233	MES26 Does Not Require Collecting Baseline UT for Replacement Components	4/26/2011
13. CARD 98-11053	High Mild Steel Corrosion Rates Indicated in RHRSW and Associated Systems	2/2/1998
14. TE-N22-11-027	RF14 FAC Program Outage Summary Report	Revision 0
15. TE-N22-12-047	RF15 FAC Program Outage Summary Report	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 "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. However, the staff found that for the "scope of program" 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 subjects discussed below.

- The Flow Accelerated Corrosion Program includes safety-related components. Electric Power Research Institute (EPRI) guidelines in Nuclear Safety Analysis Center (NSAC)-202L, "Recommendations for an Effective Flow Accelerated Corrosion Program," recommend that appropriate quality assurance be applied to all phases of the Flow Accelerated Corrosion Program. The current Flow Accelerated Corrosion Program allows projected wall thicknesses to be determined using a wear value that is calculated by the CHECWORKS™ computer software. The wall thickness projection ensures that a component will continue to meet the minimum wall thickness allowed by design codes until its next scheduled inspection. Fermi 2 currently classifies CHECWORKS™ as a Category B software, which should not be used for safety-related design activities. For safety-related components, it is not clear that only results from software classified as Category A will be used to demonstrate that the design wall thickness will be met at the

next refueling outage. Otherwise, the other options included in the Flow Accelerated Corrosion Program, which use wall thickness measurements based on an engineering evaluation of ultrasonic testing data, should be used for safety-related applications.

- Program Notebook PEP19, "Flow-Accelerated Corrosion," contains a discussion for the inspection scope selection, which includes a "Feedwater Heater Shell Susceptibility Review." However, in its review of LRA Tables 3.4.2-2, "Feedwater and Standby Feedwater System," and 3.4.2-3-2, "Condensate System, Nonsafety-Related Components Affecting Safety-Related Systems," that contain the feedwater heaters, the staff could not identify any heat exchanger items for the feedwater heater shell that are managed by the Flow Accelerated Corrosion Program. Therefore, it is not clear as to how the effects of aging will be adequately managed for these components.

During the audit of the "operating experience" program element, the staff's independent database search found that the operating experience provided by the applicant is bounded by known industry operating experience (e.g., no previously unknown or recurring aging effects were identified by the applicant or staff).

The staff also audited the description of the LRA AMP provided in the UFSAR supplement. The staff verified that this description is consistent with the description provided in the SRP-LR, as modified by LR-ISG-2012-01.

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, as modified by LR-ISG-2012-01. 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 at the plant is bounded by the operating experience for which the GALL Report program was evaluated. In addition, the staff verified that the description provided in the UFSAR supplement is consistent with the description provided in the SRP-LR, as modified by LR-ISG-2012-01.

LRA AMP B.1.21, Inservice Inspection

Summary of Information in the Application. The LRA states that AMP B.1.21, "Inservice Inspection," 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 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 search of the applicant's operating experience database using the keywords: "cracking," "leak," "flaw," "failure," "degradation," "repair," and "weld."

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

Relevant Documents Reviewed

Document	Title	Revision / Date
1. ISI-NDE Program	Inservice Inspection Nondestructive Examination Program Plan for Fermi 2	Revision 7 10/28/2010
2. PEP06	Section XI Inservice Inspection Program	Revision 2 01/15/2013
3. MES23	Engineering Support Conduct Manual – Inservice Inspection and Testing	Revision 18 12/21/2012
4. MES24	Engineering Support Conduct Manual – Nondestructive Examinations	Revision 8 08/26/2010
5. MES25	Engineering Support Conduct Manual – Visual Examination	Revision 7 08/26/2010
6. MQA13	Fermi 2 Quality Assurance Manual – Trending	Revision 9 02/10/2011
7. MES30	Fermi 2 Engineering Support Conduct Manual – Repair Replacement Programs	Revision 10 12/20/2012
8. TMIS 12-0002	Self-Assessment of ISI	01/05/2012
9.	Program Health Report Fermi 2 – ISI-NDE Program	02/07/2013
10. CARD 04-20518	Some Areas of the ASME Class 1 Pressure Retaining Boundary Were Not Pressurized as Required by ASME Section XI and Code Case N-498-1 during the 10-year System Leakage Test Performed during RF-06	02/11/2004
11. CARD 04-20518-03	Determine Next Reasonable Opportunity for Testing	03/05/2004
12. CARD 04-20518-05	Create SST Event for 1-Year Pressure Test	03/05/2004
13. CARD 05-22440	Investigate Hope Creek Recirc Decon Line Crack Cause Determination for Applicability to Fermi	04/18/2005
14. CARD 05-23381	Visual Inspection Type is Incorrect for Three ASME Class 3 Integral Attachment Welds in the ISI NDE Program Plan	06/02/2005
15. CARD 07-20239	GE 10 CFR 21 Communication – Safety Information Communication	01/16/2007
16. CARD 07-26347	ISI Ultrasonic Exam Adversely Affected by Component Surface Profile	07/18/2007
17. CARD 07-26900	New Weld Selection Required Due to Component Configuration	11/01/2007
18. CARD 07-25329	ISI Weld Selection Change Due to ALARA Considerations	09/21/2007
19. CARD 10-20422	Minimum Wall Condition Detected during UT Thickness Inspection	01/19/2010

Document	Title	Revision / Date
20. CARD 10-20777	Wall Thinning Detected on DGSW Piping during UT Inspection for WO 29999174	01/29/2010
21. CARD 11-20456	Assess Impact of RPV Ligament Calibration Standard Design On Exam Coverage	01/14/2011
22. CARD 12-22124	Collet Failure on CRDM 4141 (insert/ withdraw ports)	03/20/2012

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's independent database search found that the operating experience provided by the applicant is bounded by known industry operating experience.

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.M1.

Based on this audit, the staff also verified that the operating experience at the plant is bounded by the operating experience for which the GALL Report program was evaluated. In addition, the staff verified that the description provided in the UFSAR supplement is consistent with the description provided in SRP-LR.

LRA AMP B.1.22, Inservice Inspection-IWF

Summary of Information in the Application. The LRA states that AMP B.1.22, "Inservice Inspection IWF," is an existing program with enhancements 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 report includes enhancements necessary to make the LRA AMP consistent with the corresponding GALL Report 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 the turbine building, reactor building, and the RHR complex. The staff also conducted an independent search of the applicant's operating experience database using the keywords: "loss of material," "torque," "preload," "corrosion," "support," "Lubrite," and "vibration isolator."

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

Relevant Documents Reviewed

Document	Title	Revision / Date
1. 43.000.004	Visual Examination of Component Supports	Revision 32
2. WO 34378913	Perform 43.000.004 Visual Examination of Component Supports (VT-3)	4/24/2012
3. ISI-NDE Program	Inservice Inspection-Nondestructive Examination (ISI-NDE) Program (Plan) for Fermi 2 Power Plant	Revision 7
4. 35.000.240	Bolting and Torquing	Revision 41
5. 43.000.004.090404	Visual Examination of Component Supports	04/04/2009
6.	ISI/IWF Program Owner Interview	03/27/2013
7. 43.000.004.120424	Visual Examination of Component Supports	04/28/2012
8. 43.000.004.120428	Visual Examination of Component Supports	04/28/2012
9. CARD 08-21085	Evaluation of Piping System Component Anchor Points Need to Support ISI Scope Determination (Closed)	02/12/2009
10. CARD 10-29737	Guide Clearance Less Than Shown on Hanger Sketch (Closed)	04/25/2011
11. CARD 10-30130	Spring Can E41-3172-G01 Found More Than 5% Out of Tolerance (Closed)	04/07/2011
12. WO 32031674	Spring Can E41-3172-G01 Found More Than 5% Out of Tolerance	11/12/2010
13. WO 32031768	Spring Can Pair for P44-3048-G10 More than 5% Out of Range	11/14/2010
14. Corrective Action No. 10-23486	Broken Bolt on West CW Reservoir Make-up pump pipe support in GSWPH	04/26/2010
15. MES02 Evaluation	Modify Support X21-2005-G69	7/14/2011
16. CARD 14-21174	Spring Support P42-3340-G06 is out of tolerance based on the current hanger sketch	02/15/2014
17. CARD 14-21422	Support paddles misaligned on RHR Div. 1 Strut E11-3158-G33	02/20/2014
18. CARD 14-21596	Unacceptable Conditions on Spring Support E41-3162-G01	02/24/2014
19. CARD 14-21869	Rigid Support E11-3151-G29 is Bound Up	03/03/2014

Document	Title	Revision / Date
20. CARD 14-21926	Rigid Support E11-3158-G46 is Bound Up	03/03/2014
21. CARD 14-21868	Spring Support Out of Tolerance	03/01/2014
22. TE-P45-14-018	Evaluate Loss of Flange Material in Div. I EESW, DGSW & RHRSW Pump Column Flange Connections	Revision 0, 02/18/2014
23. CARD 14-21177	EDG-11 Service Water Pump has slight Mass Loss on Bolts and Flanges	02/15/2014
24. WO 38055356	Div 2 EESW pump column and flange bolting contingency	02/18/2014
25. WO 38055401	Div 2 DGSW pump column and flange bolting contingency	03/03/2014

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 “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,” “preventive actions,” “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 GALL Report AMP states that the scope of the program includes high-strength structural bolting. The GALL Report AMP “preventive actions” program element recommends using bolting material that has an actual measured yield strength of less than 150 kilopounds per square inch (ksi). The GALL Report AMP “parameters monitored or inspected” program element also recommends that high-strength structural bolting (actual measured yield strength greater than or equal to 150 ksi) in sizes greater than 1 inch nominal diameter, susceptible to stress corrosion cracking be monitored for cracking. In addition, the GALL Report AMP “detection of aging effects” program element recommends that, for high-strength structural bolting (actual measured yield strength greater than or equal to 150 ksi) in sizes greater than 1 inch nominal diameter, volumetric examination be performed to detect cracking. It is not clear that the Inservice Inspection-IWF Program is consistent with the GALL Report AMP because, based on its review of the LRA and associated AMP basis documents, the staff found no mention of the GALL Report AMP XI.S3 recommendations in the “preventive actions,” “parameters monitored or inspected,” and “detection of aging effects” program elements recommendations described above. In addition, for the “scope of program” program element it is not clear if there are high-strength structural bolts (actual measured yield strength greater than or equal to 150 ksi) in sizes greater than 1 inch nominal diameter within the scope of the Inservice Inspection-IWF Program.

During the audit, the staff made the following observations:

- The Inservice Inspection-IWF Program basis document states that Fermi 2 does not have ASME Code Section XI, Subsection IWF vibration isolation supports. The staff performed a database search using the keyword "vibration isolator" and found no vibration isolation supports within the scope of the Inservice Inspection-IWF Program.
- LRA Table 3.5.1, item 3.5.1-75, addresses sliding surfaces of column base plates that rest on Lubrite® pads exposed to air – indoor uncontrolled. The LRA states that "[l]ubrite plates are not subject to aging management because the listed aging mechanisms are event driven and typically can be avoided though proper design." The staff reviewed the applicant's claim and noted that the applicant has not screened in any sliding surfaces with Lubrite® within the scope of license renewal. During the audit, the staff performed a search of the applicant's operating experience database and found no results for the keyword "Lubrite."

During the audit of the "operating experience" program element, the staff's independent database search found that the operating experience provided by the applicant is bounded by known industry operating experience. 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. 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 subjects discussed below.

- ASME Code Section XI, Subsection IWF, states, that to the extent practical, the same supports selected for examination during the first inspection interval shall be examined during each successive inspection interval. Recent industry operating experience has revealed situations in which supports within the IWF sample were degraded, but did not meet the IWF threshold for repair. The supports were reworked to as-new condition and remained in the IWF sample. The staff's concern with respect to aging management is that if ASME Code, Section XI, Subsection IWF supports that are part of the inspection sample are reworked to as-new condition, they are no longer typical of the other supports in the population. Subsequent ASME Code, Section XI, Subsection IWF inspections of the same sample would not represent the age-related degradation of the rest of the population. The LRA and the associated basis documents provided no discussion of how this issue would be addressed.
- The LRA states that "[p]lant procedures prohibit the use of lubricants containing molybdenum disulfide." GALL Report AMP XI.S3 "preventive action" program element states that molybdenum disulfide should not be used as a lubricant due to its potential contribution to SCC, especially for high-strength bolts. During the audit, the staff was able to confirm that plant procedures inhibit the use of molybdenum disulfide lubricants; however, it is not clear whether molybdenum disulfide lubricants have been used at Fermi 2 before plant procedures were revised to prohibit their use. If these lubricants have been used, the staff needs additional information regarding what will be done to age manage structural bolts lubricated with molybdenum disulfide.

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. 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.

Audit Results. Based on this audit, the staff verified that the "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," "preventive actions," "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 found that additional information is required before a determination can be made regarding whether the applicant's operating experience supports the sufficiency of the LRA AMP. 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.1.23, 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.1.23, "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 report includes enhancements necessary to make the LRA AMP consistent with the corresponding GALL Report 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 the following equipment areas: reactor building crane, turbine building cranes, hoist for residual heat removal pumps Division 1 A and C, hoists for core spray pumps A and C, reactor core isolation cooling (RCIC) pump and turbine hoist Division 1, and channel handling boom jib crane (nonsafety related). The staff also conducted an independent search of the applicant's operating experience database using the keywords: "crane," "steel," "rail," "wear," "corrosion," "bolt," and "preload."

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

Relevant Documents Reviewed

Document	Title	Revision / Date
1. FERMI-RPT-12-LRD05	Fermi 2 License Renewal Project, Aging Management Evaluation Report Civil/Structural. Inspection of Overhead Heavy Load and Light Load (Related to Refueling) Handling Systems (pages 125-143).	Revision 1
2. FERMI-RPT-12-LRD01	Fermi 2 License Renewal Project, System and Structure Scoping Results, Attachment 2, Structures. Determination of Applicability to License Renewal, Cranes, Trolleys, Monorails, and Hoists (page 200/246).	Revision 2
3. FERMI-RPT-12-LRD09	3.1.21 Inspection of Overhead Heavy Load and light Load (Related to Refueling) Handling Systems (pages 48-93).	Revision 1

Document	Title	Revision / Date
4. 35.717.003	Plant Technical Procedure-Fermi 2, Maintenance Procedure. Reactor Building Crane-Frequent and Periodic Inspection.	Revision 7
5. 35.716.003	Plant Technical Procedure-Fermi 2, Maintenance Procedure. Turbine Building Cranes-Frequent and Periodic Inspection.	Revision 10
6. 35.RIG.012	Plant Technical Procedure-Fermi 2, Maintenance Procedure. Trolley and Trolley Beam Inspection.	Revision 29
7. 35.RIG.014	Plant Technical Procedure-Fermi 2, Maintenance Procedure. Miscellaneous Top Running and Gantry Crane Inspections.	Revision 5
8. Specification 3071-1	Turbine House Overhead Travelling Crane, Enrico Fermi Atomic Power Plant, Unit 2, Chapter 11, "Design and Construction, A. Bridge" - Girders Design, EOCI Specification 61.	04/18/1970
9. MMA07	Fermi 2, Maintenance Conduct Manual. Hoisting, Rigging and Load Handling.	Revision 20 12/18/2013
10.	Material Handling Lifting and Rigging, Quick Hit Self-Assessment Report.	06/17/2013
11. CARD 09-28093	Sheared Bolt, Turbine Building Overhead Crane.	10/15/2009
12. Drawing Number 6C721-2100	Plan of Crane Girders and Walkway - Turbine Building Detroit Edison Fermi 2 (includes location of sheared bolt).	08/12/2002
13. CARD 09-27996	Crane and Heavy Lift Inspection-NRC Operating Experience Smart Sample Program.	10/13/2009
14. CARD 05-26142	Maintenance Crane/Hoist Inspection Procedure Changes Required.	11/02/2005
15. CARD 04-23330	Monroe Power Plant Fuel Systems Monorail Hoist Failure.	07/26/2004
16. CARD 05-22527	Review of Crane, Hoisting, Lifting, and Rigging Related Events April 2005.	04/20/2005

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's independent database search found that the operating experience provided by the applicant is bounded by known industry operating experience.

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.M23.

Based on this audit, the staff also verified that the operating experience at the plant is bounded by the operating experience for which the GALL Report program was evaluated. 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.1.24, Internal Surfaces in Miscellaneous Piping and Ducting Components

Summary of Information in the Application. The LRA states that AMP B.1.24, "Internal Surfaces in Miscellaneous Piping and Ducting Components," is a new program that will be consistent with the program elements in GALL Report AMP XI.M38, "Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components," as modified by LR-ISG-2012-02, "Aging Management of Internal Surfaces, Fire Water Systems, Atmospheric Storage Tanks, and Corrosion under Insulation." To verify this claim of consistency, the staff audited the LRA AMP. At the time of the audit, the applicant had not yet fully developed the documents necessary to implement this new program, and the staff's audit addressed only the program elements described in the applicant's program basis document.

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 the keywords: "rust," "pit," "corros," "leak," "microbiologi," "min wall," "MIC," and "wastage."

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

Relevant Documents Reviewed

Document	Title	Revision / Date
1. FERMI-RPT-12-LRD03	Aging Management Program Evaluation Report, Non-Class 1 Mechanical	Revision 2
2. FERMI-RPT-12-LRD09	Operating Experience Review Report – Aging Management Program Effectiveness	Revision 1
3. CARD 12-29798	Buried Pipe Inspections Indicate the Rad Waste Decant Line Has Limited Remaining Service Life	12/6/2012
4. CARD 05-25531	Untimely replacement of EDG 12 Muffler	9/30/2005

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, as modified by LR-ISG-2012-02.

Although the staff verified the program elements to be consistent with those in GALL Report AMP XI.M38, the staff noted an issue that may require an RAI for clarification.

- The applicant's program manages reduction of heat transfer due to fouling for heat exchanger tubes and fins exposed to various air environments, as listed in LRA Table 3.3.2-11. Based on discussions during the audit, some of the associated components are related to room coolers that are within the scope of GL 89-13, "Service Water System Problems Affecting Safety-Related Equipment." The staff noted that GL 89-13 expects heat exchangers to be tested or inspected at least every 5 years, whereas the Internal Surfaces in Miscellaneous Piping and Ducting Components Program includes only a 20 percent sample that is inspected every 10 years. Therefore, it is not clear whether implementation of the Internal Surfaces in Miscellaneous Piping and Ducting Components Program would relax existing current licensing basis inspections for these room coolers.

The LRA states that the program is new and therefore provides no operating experience associated with the program. The operating experience basis document, FERMI-RPT-12-LRD09, states that a search of operating experience associated with ducts and housings did not identify any aging effects beyond those identified in the GALL Report. During the audit of the "operating experience" program element, the staff's independent database search did not identify any plant-specific operating experience that would indicate that the program is not capable of managing the effects of aging for components within the program's scope.

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, as modified by LR-ISG-2012-02.

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.M38, as modified by LR-ISG-2012-02.

Based on this audit, the staff also verified that the operating experience at the plant is bounded by the operating experience for which the GALL Report program was evaluated. 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.1.25, Masonry Wall

Summary of Information in the Application. The LRA states that AMP B.1.25, "Masonry Wall," is an existing program with enhancements that will be 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. Issues identified but not resolved in this report will be addressed in the SER. The scope of this audit report includes enhancements necessary to make the LRA AMP consistent with the corresponding GALL Report AMP. The LRA also states that this program is implemented as part of AMP B.1.42, "Structures Monitoring," and enhancements to the program are included in the enhancements to the Structures Monitoring 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 the turbine building and the reactor building. The staff also conducted an independent search of the applicant's operating experience database using the keywords: "masonry," "crack," "grout," "mortar," "block," "CMU," and "wall."

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

Relevant Documents Reviewed

Document	Title	Revision / Date
1. FERMI-RPT-12-LRD05	Aging Management Program Evaluation Report Civil/Structural, Section 2.0 Background and Section 3.5 Masonry Wall Program	Revision 1 03/05/2014
2. MMR14	Fermi 2 Maintenance Rule Conduct Manual – Structures Monitoring (Section 2 – General Requirements, Section 3.3 Inspection Guidelines, Section 4 Evaluation of Results	Revision 2 01/05/2009
3. FERMI-RPT-12-LRD09	Operating Experience Review Report – Aging Management Program Effectiveness, Section 3.1.22 Masonry Wall Program	Revision 1 03/25/2014
4. DER 89-0453	Deviation Event Report NRC Notice 87-67: Lessons Learned from Regional Inspections of Licensee Actions to IE Bulletin 80-11	06/13/1990
5. TMPE-08-0005	Nuclear Generation Memorandum - Results of Maintenance Rule Periodic Inspection of Existing Structures in Accordance with MMR14	01/09/2008
6. CARD 07-25811	Maintenance Rule Structural Walkdown Findings (Closed)	11/14/2008
7. WO-25823898	Work Order Details: 03-Repair grout and paint	12/09/2008
8. CARD 08-00848	Crack in Wall Masonry on Right Side of Freight Elevator Going to the Ceiling (TB-3 North Isle)	03/13/2009

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," "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 elements of the GALL Report AMP. In addition, the staff found that for the "acceptance criteria" 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 "acceptance criteria" program element of the LRA AMP basis document (FERMI-12-LRD05, Section 3.5) states that potential non-conforming conditions identified during the course of an inspection are noted and evaluated and corrective action will be taken as necessary. Section 4.0 of procedure MMR14 is referenced as the

basis. This section provides qualitative criteria, described in terms of structural function only, for evaluation of inspection results. The GALL Report AMP states that the extent of observed shrinkage and/or separation and cracking of masonry may not invalidate the evaluation basis or impact the wall's intended function. It recommends that further evaluation is conducted if the extent of cracking and loss of material is sufficient to impact the intended function of the wall or invalidate its evaluation basis. It is not clear to the staff that this element of the LRA AMP is consistent with the recommendations in GALL Report AMP XI.S5 because the LRA acceptance criteria do not appear to address the "invalidate evaluation basis" aspect of the GALL Report acceptance criteria.

During the audit of the "operating experience" program element, the staff's independent database search found that the operating experience provided by the applicant is bounded by known industry operating experience (e.g., no previously unknown or recurring aging effects were identified by the applicant or staff).

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," and "monitoring and trending" program elements of the LRA AMP are consistent with the corresponding program elements in GALL Report AMP XI.S5. 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 before consistency can be determined.

Based on this audit, the staff also verified that the operating experience at the plant is bounded by the operating experience for which the GALL Report program was evaluated. 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.1.26, Metal Enclosed Bus Inspection

Summary of Information in the Application. The LRA states that AMP B.1.26, "Metal Enclosed Bus Inspection," is a new program that is consistent with the program elements in the GALL Report AMP XI.E4, "Metal Enclosed Bus." To verify this claim of consistency, the staff audited the LRA AMP. At the time of the audit, the applicant had not yet fully developed the documents necessary to implement this new program, and the staff's audit addressed what was in the applicant's basis document, FERMI-RPT-12-LRD04, "Metal Enclosed Bus Inspection." 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 120 kV switchyard, including the in-scope metal enclosed bus installed between CTG transformer CTG 11-1 and peaker bus 1-2b. The staff also conducted an independent search of the applicant's operating experience database using the keywords: "metal enclosed bus," "loose connections," and "water intrusion."

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

Relevant Documents Reviewed

Document	Title	Revision / Date
1. FERMI-RPT-12-LRD04	Metal Enclosed Bus Inspection	Revision 1
2. FERMI-RPT-12-AME01	Aging Management Review of Electrical Systems	Revision 1
3. 47.000.88	Infrared Inspection	Revision 6
4. CP-EM-346	Vendor Training – Infrared Thermography	Revision 2
5. LRA-E-001-0	Offsite Power Recovery Paths	Revision 0
6. FERMI-RPT-12-LRD05	Aging Management Program Evaluation Report Civil/Structural	Revision 1

The staff conducted its audit of the LRA program elements one through six based on the contents of the new program.

During the 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 bases documents are consistent with the corresponding elements of GALL Report AMP XI.E4, "Metal Enclosed Bus."

For the "parameters monitored or inspected" 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.

- GALL Report AMP XI.E4, "Metal Enclosed Bus," program element "parameters monitored or inspected" states that the external portions of the metal enclosed bus, including accessible gaskets, boots, and sealants, are inspected for hardening and loss of strength due to elastomer degradation. The "detection of aging effects" program element states that accessible elastomers (e.g., gaskets, boots, and sealants) are inspected for degradation including surface cracking, crazing, scuffing, dimensional change, (e.g., "ballooning" and "necking"), shrinkage, discoloration, hardening, and loss of strength.
- Basis Document Fermi RPT-12-LRD04 "Metal Enclosed Bus Inspection," states that it is a new condition monitoring program that is consistent with GALL Report AMP XI.E4, "Metal-Enclosed Bus."
- The staff reviewed the AMP basis document program element "parameters monitored or inspected" and it is not clear to the staff that the program element of the LRA AMP is consistent with the recommendation in the GALL Report AMP since there was no mention of the aging effects of elastomers in the proposed program element. The GALL Report AMP program element states that the external portions of the metal enclosed bus be inspected for hardening and loss of strength due to elastomer degradation.

In the LRA, the applicant stated that "there is no operating experience at Fermi 2 involving the aging effects managed by this program." The applicant did not identify any operating experience for this program. During the audit of the "operating experience" program element, the staff's independent database search did not find any operating experience that would not be bounded by known industry operating experience.

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 of GALL Report AMP XI.E4. The staff also identified certain aspects of the "parameters monitored or inspected" 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 at the plant is bounded by the operating experience for which the GALL Report program was evaluated. 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.1.27, Neutron-Absorbing Material Monitoring

Summary of Information in the Application. The LRA states that AMP B.1.27, "Neutron-Absorbing Material Monitoring," is an existing program with enhancements that is consistent with the program elements in GALL Report AMP XI.M40, "Neutron-Absorbing Materials Other than Boraflex." To verify this claim of consistency, the staff audited the LRA AMP. The scope of this audit report includes enhancements necessary to make the LRA AMP consistent with the corresponding GALL Report 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 search of the applicant's operating experience database using the keywords: "Boral," "neutron-absorber," and "coupon."

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

Relevant Documents Reviewed

Document	Title	Revision / Date
1. 57.000.19	Spent Fuel Storage Rack Management Guidelines	Revision 5
2. 82.000.16	High Density Spent Fuel Storage Rack Surveillance Coupon Removal/Installation	Revision 34
3. MQA13	Trending	Revision 9
4. MQA11	Condition Assessment Resolution Document	Revision 35
5. NET-300058-01	Inspection and Testing of Boral Surveillance	

Document	Title	Revision / Date
	Coupon YD610122-1-7 from the Fermi 2 Generating Station	
6. CARD 10-27652	Boral Coupon Test Results	
7. CARD 10-27755	Enhancements to Boral Coupon Surveillance	
8. FERMI-RPT-12-LRD03	Neutron Absorbing Material Monitoring	Revision 2

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's independent database search found that the operating experience provided by the applicant is bounded by known industry operating experience (e.g., no previously unknown or recurring aging effects were identified by the applicant or staff).

The staff also audited the description of the LRA AMP provided in the UFSAR supplement. The staff verified that 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.M40, "Neutron-Absorbing Materials Other than Boraflex." The staff's evaluation of aspects of the program elements associated with enhancements that are not necessary for consistency will be addressed in the SER.

Based on this audit, the staff also verified that the operating experience at the plant is bounded by the operating experience for which the GALL Report program was evaluated. 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.1.28, Non-EQ Cable Connections

Summary of Information in the Application. The LRA states that AMP B.1.28, "Non-EQ Cable Connections," is a new program that is consistent with the program elements in 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. 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 120 kV switchyard, 345 kV switchyard, transformer SS #64, transformer SS #65, and the Division 2 ESS switchgear room in the 3rd floor of the auxiliary building as well as levels 3 and 2 of the reactor building. The staff also conducted an independent search of the applicant's

operating experience database using the keywords: "loose connections," "connections," and "corrosion," as well as documents provided to support the subject LRA AMP.

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

Relevant Documents Reviewed

Document	Title	Revision / Date
1. Drawing 2500-01	One Line Diagram – Plant 4160 V. & 480 V. System Service	Revision AZ 6/22/14
2. Drawing LRA-E-001-0	Offsite Power Recovery Paths	Revision 0 10/3/2012
3. Drawing 4E721-2988-10	3000 Amp & 1200 Amp Bus Tap Box System Service Box 65X	Revision A 2/9/74
4. Drawing 4E721-2988-7	3000 Amp & 1200 Amp Bus Tap Box System Service Box 64	Revision A 2/9/74
5. Drawing 4E721-2988-8	DYH Bus, 3000 Amp to 1200 Amp Bus Tap Box System Service Box 64	Revision AB 11/17/76
6. Drawing 4E721-2988-11	1200 Amp Bus Tap Box System Service Box 65X	Revision A 2/9/74
7. Drawing 6E721-2988-02	Cable Bus Reactor Aux Bldg 4160 V, 480 V Switchgear Rooms 2nd and 3rd Floors	Revision I 7/8/10
8. 47.000.88	Plant Technical Procedures – Fermi 2 Infrared Inspection	Revision 6 8/20/13
9. Work Order 35253609	Perform Infrared Inspection of 2PB2-5 Div 2 130 VDC Dist Panel	5/9/14
10. Work Order 35219249	Perform Infrared Inspection of 64A 4160 V BOP SWGR Bus	5/4/14
11. Work Order 35097157	Perform Infrared Inspection of Recirc MG Regulator Cabinet	1/30/14
12. Work Order 34617947	Perform Infrared Inspection of MPU-4 BOP-2	2/15/14
13. CARD 14-20090	Thermal Anomalies in PRMG set B Voltage regulator	1/23/14
14. CARD 13-28052	Thermal Anomalies in MPU4	11/14/13
15. Work Order R332100100	Inspect & Test 4160 V Switchgear Bus 69K	3/31/12
16. 35.301.001	Plant Technical – Fermi 2 Maintenance Procedure 4160 V Switchgear	Revision 35 4/23/10
17. 35.304.005	Plant Technical – Fermi 2 Maintenance Procedure 480 V Switchgear General Maintenance	Revision 35 4/23/2010

Document	Title	Revision / Date
18. Spec. No 3071-128-EQ	Design Engineering Standard for Cable Connectors and Terminations	Revision AT 8/7/14
19. Spec. No 3071-128-ER	Electrical Engineering Standard for Cable Splices and Joints	Revision AJ 7/14

During the audit of program elements one through six, 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. 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 subject(s) discussed below.

- The applicant stated that one method of testing cable connections relied upon for maintenance is the use of thermography (infrared inspection). The staff reviewed the applicant's thermography procedure 47.000.88. It is not clear to the staff that the thermography inspections are directed to take place under normal full load conditions of the affected electrical connections.
- It is not clear to the staff as to whether the representative sample designated by the applicant adequately addresses the various connection types noted by the staff (per Spec. No. 3071-128-EQ).
- Maintenance Procedures 35.301.001 and 35.301.001 provide values for checking the connection tightness by providing electrical connection torque values. It is not clear to the staff that these procedures are consistent with EPRI Guidance (EPRI TR-104213, "Bolted Joint Maintenance & Applications Guide") concerning re-torqueing of electrical connections.

During the audit of the "operating experience" program element, the staff's independent database search found that the operating experience provided by the applicant is bounded by known industry operating experience (e.g., no previously unknown or recurring aging effects were identified by the applicant or staff). A total of 57 work orders were identified. The review of the identified items did not reveal any significant or unusual operating experience issues.

During the staff walkdown, the staff identified concerns with cable connection maintenance. 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(s) discussed below.

- During the electrical connection walkdown, the staff noted two 3000 amp/1200 amp bus tap boxes located in the Division 2 ESS 4160 V and 480 V switchgear room. It is not clear to the staff whether the connections inside these tap boxes are inspected under the current preventive maintenance procedures. These connections are within the scope of license renewal. The staff is concerned that if the in-scope tap box connections are not inspected or tested under current plant maintenance programs, then a one-time test under LRA AMP B.1.28 performed on a sampling basis may not be adequate to ensure

that either aging of metallic cable connections is not occurring and/or that the existing preventive maintenance program is effective such that a periodic inspection program is not required.

- It is not clear to the staff what routine maintenance is currently performed on the in-scope safety related 4160 V bus (including low side connections of transformer SS #65) electrical connections. The staff concern is that a one-time test under LRA AMP B.1.28 performed on a sampling basis may not be adequate to ensure that either aging of metallic cable connections is not occurring and/or that the existing preventive maintenance program is effective such that a periodic inspection program is not required.
- During the electrical connection walkdown of the 345 kV recovery path, a large number of birds were observed on the cable bus (Calvert bus) installed from SS #65 transformer to 4160 V bus 65 in the auxiliary building. This cable bus is depicted on one-line diagram 6SD721-2500-01 and drawing 6E721-2988-02. The staff is concerned that this cable bus can experience accelerated degradation due to bird debris.

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 for a one-time inspection.

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.E6. 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 found that additional information is required before a determination can be made regarding whether the applicant's operating experience supports the sufficiency of the LRA AMP. 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.1.29, Non-EQ Inaccessible Power Cables (400 V to 13.8 kV)

Summary of Information in the Application. The LRA states that AMP B.1.29, "Non-EQ Inaccessible Power Cables (400 V to 13.8 kV)," is a new program that will be consistent with the program elements in GALL Report AMP XI.E3, "Inaccessible Power Cables Not Subject to 10 CFR 50.49 Environmental Qualification Requirements." To verify this claim of consistency, the staff audited the LRA AMP. At the time of the audit, the applicant had not yet fully developed the documents necessary to implement this new program, and the staff's audit addressed only the AMP program elements described in the applicant's basis document, the referenced supporting documentation, and relevant plant specific operating experience. 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 in-scope manholes. The staff also reviewed additional documentation including corrective actions, engineering design packages, and completed manhole and duct bank modifications. The staff also reviewed manhole construction photographs including as-found and as-left

manhole refurbishment. The staff also conducted an independent search of the applicant's operating experience database using the keywords: "cable," "vault," "manhole," "submerged," "insulation," "jacket," and "duct."

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

Relevant Documents Reviewed

Document	Title	Revision / Date
1. FERMI-RPT-12-AME01	Electrical Screening and Aging Reviews - Sections 3.3.5, 4.1.4.5, 4.7.2 and Attachment 4	Revision 1
2. FERMI-RPT-12-LRD04	Aging Management Program Evaluation Results – Electrical – Non-EQ Inaccessible Power Cable (400 V to 13.8 kV) Program	Revision 1
3. 07-28031	NQA Observations of the Dewatering Efforts for the 120 kV Switchyard Manholes	12/14/2007
4. 07-23319	Degraded Conditions in Electrical Manholes	6/13/2007
5. 07-23463	Degraded Electrical Conditions in Manholes	6/21/2007
6. 08-23283	Degraded Conditions Noted in Underground Duct Banks	5/1/2008
7. 08-27043	Underground Cable Ducts and Manholes	10/23/2008
8. 12-23595	Include LV Power, I&C Cables Between MH16946 & 16947 into the Cable Condition Monitoring Program	12/23/95
9. 0500034/2011005	Fermi Power Plant, Unit 2: Integrated Inspection Report	1/30/2012
10. 0500034/2012005	Fermi Power Plant, Unit 2: Integrated Inspection Report	1/26/2013
11. 0500034/2013005	Fermi Power Plant, Unit 2: Integrated Inspection Report	1/27/2014
12. 07-10001	NQA Surveillance 06-0125 Fermi Vulnerability to Underground Cable failures	1/5/2007
13. 13-26016	Manhole Cover Not Water Tight	6/27/2013
14. EDP-35533	Sump Pump Installation for EF-1, South EF-2 Area Manholes	Revision 0
15. EDP-35532	Sump Pump Discharge Piping Installation for 120 V Area Manholes	Revision A
16. EDP-35534	Sump Pump Installation For N-W EF2 Manholes	Revision 0
17. EDP-35536	Sump Pump Installation for SBO Manholes	Revision A
18. 07-22745	Material Condition of cable Manhole 16955 is Unsatisfactory	5/18/2007
19. PEP-21	Appendix A – Compensatory Pumping Frequency for Manholes with Sump Pumps	Revision 0 9/16/2011

Document	Title	Revision / Date
20. WO#24243797	Manhole Inspections Division 2	5/10/2007
21. GL 2007-01	Inaccessible or Underground Power Cable Failures That Disable Accident Mitigation Systems or Cause Plant Transients	2/7/2007
22. NRC-07-0017	Detroit Edison's 90 Day Response to Generic Letter 2007-01, "Inaccessible or Underground Power Cable Failures That Disable Accident Mitigation Systems or Cause Plant Transients"	5/4/2007
23.	Fermi 2 – Closeout of Generic Letter 2007-01 "Inaccessible or Underground Power Cable Failures That Disable Accident Mitigation Systems or Cause Plant Transients"	10/31/2008
24. FERMI-RPT-12-RD04	Aging Management Program Evaluation Results - Electrical	Revision 1
25. 07-23612	NRC CDBI – Discrepancy Between UFSAR and Edison Specifications for Cables	7/24/2007
26. 11-00013	Manhole 16944 Has High Water Alarm With Sump Pump Running	11/25/2011
27. 11-00014	Manhole 16522 Sump Pump Running Continuously in Auto with level low in Sump	11/25/2011
28. 11-00012	Manhole 16551 High Level Alarm With Pump Running	11/25/2011
29. 07-10001	NQA Surveillance 06-0125 Fermi Vulnerability to Underground Cable Failures	
30. 34472172	Work Order – Perform Annual Water Level Monitoring	10/14/2013
31. MES60	Electrical Cable Monitoring Program	Revision 5 9/2/2011
32. TMIS-07-0084	Benchmark Results – Underground Cable Management	9/14/2007
33. 04-24082	Manholes Installed by SBO Modification Do Not Have Water Removal Capability	9/7/2004
34. 05000341/2011002	Fermi Power Plant, Unit 2, Integrated Inspection Report	5/2/2011
35. 05000341/20110003; 07200071/2010001	Fermi Power Plant, Unit 2, Integrated Inspection Reports	8/1/2012
36. 05000341/2013002	Fermi Power Plant, Unit 2, Integrated Inspection Report	5/6/2013
37. 05000341/2013005	Fermi Power Plant, Unit 2, Integrated Inspection Report	1/27/2014
38. 05000341/2014003	Fermi Power Plant, Unit 2, Integrated Inspection Report	7/25/2014

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's independent database search found that the operating experience provided by the applicant is bounded by known industry operating experience (e.g., no previously unknown or recurring aging effects were identified by the applicant or staff).

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 program elements, "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.E3.

Based on this audit, the staff also verified that the operating experience at the plant is bounded by the operating experience for which the GALL Report program was evaluated. 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.1.30, Non-EQ Instrumentation Circuits Test Review

Summary of Information in the Application. The LRA states that AMP B.1.20, "Non-EQ Instrumentation Circuits Test Review Program," is a new program that will be consistent with the program elements in GALL Report AMP XI.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. At the time of the audit, the applicant had not yet fully developed the documents necessary to implement this new program, and the staff's audit addressed only the AMP program elements described in the applicant's basis document, referenced supporting documentation, and relevant plant specific operating experience. 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 the keywords: "cable," "connector," "termination," "radiation monitoring," "flux monitoring," "insulation," and "jacket."

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

Relevant Documents Reviewed

Document	Title	Revision / Date
1. 10-24025	Area Radiation Monitor (ARM) Detector, Channel 48, Cable Connection Degradation	5/13/2010
2. FERMI RPT-12-LRD09	Operating Experience Review Report – Aging Management Program Effectiveness: 3.2.7 Non-EQ Instrumentation Circuits Test Review Program	Revision 1

Document	Title	Revision / Date
3. FERMI-RPT-12-AME01	Aging Management Review of Electrical Systems - Sections 3.3.4, 4.1.4.4, 4.7.4, and Attachment 3	Revision 1 3/5/2014
4. FERMI-RPT-12-LRD04	Aging Management Program Evaluation Results - Electrical	Revision 1
5. 11-23833	PASS General Area Radiation Monitor and PASS Liquid sampling Radiation detector Cables Deteriorating	4/14/2011
6. 10-00570	Detector cable Insulation Cracked and Cable No Longer Restrained By Connector	5/13/2010
7. 07-20839	System D1100, Process Radiation Monitor Classified as (a)(1) by MRule Expert Panel	
8. 06-23087	Loose Wiring Connection Causing Spurious Alarms	5/3/2006
9. 64.020.105	Fuel Pool Ventilation Exhaust Radiation Monitor, Division 1 Channel A Radiological Calibration	Revision 15 10/14/2007
10. PEP21	Cable Monitoring Notebook	Revision 2 10/21/2011
11. MES60	Engineering Support Conduct Manual – Electrical Cable Monitoring Program	Revision 6 6/20/2013
12. 07-22348	Main Steam Line Radiation Monitor D Self-Test Fault	6/1/2007
13. 05-21965	SS-1 Rad Monitor Control Terminal Failed	3/24/2005

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’s independent database search found that the operating experience provided by the applicant is bounded by known industry operating experience (e.g., no previously unknown or recurring aging effects were identified by the applicant or staff).

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.E2.

Based on this audit, the staff also verified that the operating experience at the plant is bounded by the operating experience for which the GALL Report program was evaluated. 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.1.31, Non-EQ Insulated Cables and Connections

Summary of Information in the Application. The LRA states that AMP B.1.31, "Non-EQ Insulated Cables and Connections," is a new program that is consistent with the program elements in GALL Report AMP XI.E2, "Insulation Material for Electrical Cables and Connections Not Subject to 10 CFR 50.49 Environmental Qualification Requirements." To verify this claim of consistency, the staff audited the LRA AMP. At the time of the audit, the applicant had not yet fully developed the documents necessary to implement this new program, and the staff's audit addressed only the program elements described in the applicant's basis document. 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 the keywords: "cable," "connection," "jacket," and "termination."

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

Relevant Documents Reviewed

Document	Title	Revision / Date
1. EDP-35501	Degraded Cables on Unitized Actuators	
2. PEP21	Cable Monitoring Program Notebook	Revision 2 10/21/11
3. FERMI-RPT-12-LRD04	Aging Management Program Evaluation Results - Electrical	Revision 1
4. MES60	Engineering Support Conduct Manual MES60 - Electrical Cable Monitoring Program	Revision 5 9/2/11
5. 10-29898	Cables for N2100F609 are in intermediate stage of aging	11/1/2010
6. 06-25291	Age Related Degradation of Cables to LP Valve Unitized Actuators	6/16/2006
7. 09-22863	Heat Damaged Cables on N2100F609	4/16/2009
8. 12-24807	Indications That Some BOP cables are Operating Above Calculated Ampacity Limits	5/30/2012
9. FERMI-RPT-12-AME01	Aging Management Review of Electrical Systems – Sections 3.3.1, 4.1.4.1, and 4.7.3.	Revision 1 3/5/2014
10. 10-2394	Document Applicability of INPO Topical Report 10-69, Cable Aging and Monitoring to Fermi	5/11/2014
11. 06-22521	Heat Damage to Control Cable to Motor Operator	4/19/2006
12. 10-23934	Document Applicability of INPO Topical Report 10-69, Cable Aging and Monitoring to FERMI	5/11/2010

Document	Title	Revision / Date
13. 10-23652	Management Request for Independent Gap Analysis Between INPO EFG-16 and MES60 – Electric Cable Monitoring Program	4/30/2010
14. 10-21248	Document GAP Study Between INPO EPEG 16 and the Cable Monitoring Program	2/18/2010

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 element of the GALL Report. 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.

- LRA AMP B.1.31, "Non-EQ Insulated Cables and Connections," states in the program description that adverse localized environments will be determined based on a plant spaces approach. Basis document, "FERMI-RPT-12-LRD04, "Aging Management Program Evaluation Results – Electrical," also states in the program description that an adverse localized is a plant-specific condition that will be determined based on a plant spaces approach. In addition, the AMP basis document, under program element "parameters monitored or inspected," also states that, "The adverse localized environment is a plant-specific condition that will be determined based on a plant spaces approach."

  GALL Report AMP XI.E1, "Insulation Material for Electrical Cables and Connections Not Subject to 10 CFR 50.49 Environmental Qualification Requirements," states, "Adverse localized environments can be identified through the use of an integrated approach. This approach may include, but is not limited to, (a) the review of Environmental Qualification (EQ) zone maps that show radiation levels and temperatures for various plant areas, (b) consultations with plant staff who are cognizant of plant conditions, (c) utilization of infrared thermography to identify hot spots on a real-time basis, and (d) the review of relevant plant-specific and industry operating experience." Clarification is needed on the applicant's use of a "plant spaces approach" in identifying adverse localized environments, operating experience, and its consistency with GALL Report AMP XI.E1.

During the audit of the "operating experience" program element, the staff's independent database search found that the operating experience provided by the applicant is bounded by known industry operating experience (e.g., no previously unknown or recurring aging effects were identified by the applicant or staff).

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.

<u>Audit Results</u>. 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.E1. The staff also identified certain aspects of the "parameters monitored or inspected" 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 at the plant is bounded by the operating experience for which the GALL Report program was evaluated. In addition, the staff verified that the description provided in the UFSAR supplement is consistent with the description provided in SRP-LR Table 3.0-1, "FSAR Supplement for Aging Management of Applicable Systems."

LRA AMP B.1.32, Oil Analysis

Summary of Information in the Application. The LRA states that AMP B.1.32, "Oil Analysis," is an existing program with enhancements 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. The scope of this audit report includes enhancements necessary to make the LRA AMP consistent with the corresponding GALL Report 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 a walkdown of the chemistry laboratory. The staff also conducted an independent search of the applicant's operating experience database using the keywords: "fouling," "samples," and "lubricate."

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

Relevant Documents Reviewed

Document	Title	Revision / Date
1. CARD 11-29661	CTG 11-1 demulsibility characteristic of lube oil sample is out of specification	10/26/2011
2. CARD 10-25611	Contaminant Found in EDG 12 Crankcase Oil Sample	07/02/2010
3. CARD 09-20718	Copper in East CRD Gearbox Lubricating Oil on Increasing Trend	02/04/2009
4. CARD 12-21327	Slight Decrease in EDG 11 lube oil pressure	02/17/2012
5. CARD 08-25580	High Wear on RCIC Pump Oil Samples	08/28/2008
6. CARD 12-26097	Revise Specifications 3071-128-EQ. ER ET and Maintenance Procedure 35.CON.027	07/19/2012
7. CARD 10-21441	PM E902, Flush RCIC EG-R not needed	02/16/2010
8. FERMI-RPT-12-LRD03	Aging Management Program Evaluation Report Non-Class 1 Mechanical	Revision 2
9. FERMI-RPT-12-LRD09	Operating Experience Review Report- Aging Management Program Effectiveness	Revision 1
10. DCR 10-0414	Predictive Maintenance Program	Revision 1

Document	Title	Revision / Date
11. DCR 88-4979	Water and Sediment in Lubricating and Fuel Oils by Centrifuge Method	Revision 1
12. DCR 051598	Color and Appearance Test for Oils	Revision 5
13. DCR 09-1073	Water Separability of Oils	Revision 3
14. DCR 06-2276	HIAC/ROYCO Automatic Particle Size Analyzer	Revision 10
15. DCR 10-1587	Trending	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 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's independent database search found that the operating experience provided by the applicant is bounded by known industry operating experience.

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. The staff's evaluation of aspects of the program elements associated with enhancements that are not necessary for consistency will be addressed in the SER.
Based on this audit, the staff also verified that the operating experience at the plant is bounded by the operating experience for which the GALL Report program was evaluated. 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.1.33, One-Time Inspection

Summary of Information in the Application. The LRA states that AMP B.1.33, "One-Time Inspection," is a new program that will be 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. At the time of the audit, the applicant had not yet fully developed the documents necessary to implement this new program, and the staff's audit addressed only the program elements described in the applicant's basis document.

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 the keywords: "corros," "crack," "foul," and "loss of material."

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

Relevant Documents Reviewed

Document	Title	Revision / Date
1. FERMI-RPT-12-LRD03	Aging Management Program Evaluation Report, Non-Class 1 Mechanical, Section 3.4, "One-Time Inspection"	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.

In the LRA, the applicant stated that "[t]his inspection program applies to potential aging effects for which there is no operating experience at Fermi 2 indicating the need for an aging management program." Therefore, the applicant did not identify any operating experience. During the audit of the "operating experience" program element, the staff's independent database search did not find any operating experience that would not be bounded by known industry operating experience.

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 at the plant is bounded by the operating experience for which the GALL Report program was evaluated. 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.1.34, One-Time Inspection - Small-Bore Piping

Summary of Information in the Application. The LRA states that AMP B.1.34, "One-Time Inspection - 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 search of the applicant's operating experience database using the keywords: "weld," "cracking," "crack," "failure," "socket," "butt," "thermal," "fatigue," and "leakage."

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

Relevant Documents Reviewed

Document	Title	Revision / Date
1. FERMI-RPT-12-LRD02	Aging Management Program Evaluation Report Class 1 Mechanical	Revision 1
2. FERMI-RPT-12-LRD09	Operating Experience Review Report – Aging Management Program Effectiveness	Revision 1
3. FERMI-RPT-12-LRD08	Operating Experience Review Report	Revision 1
4. CARD 04-25140	Steam Leak on 2 inch Weldolet on East End of Heat Exchanger	11/05/2004
5. CARD 08-21104	Bent Vent Line off of RCIC Pump Discharge	02/14/2008
6. CARD 08-21170	NDE of Socket Fillet Weld (3/4" sockolet to pipe fillet weld)	02/18/2008
7. CARD 14-22693	Leakage Identified during RPV Pressure Test E1100f116A (Threaded Cap)	03/22/2014

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 an RAI for the subject discussed below.

- During the audit, the staff noted that the LRA does not provide the weld population for the applicant's in-scope small-bore piping. The GALL Report AMP, "detection of aging effects" program element recommends that, for a one-time inspection to detect cracking due to thermal or mechanical cycling or due to stress corrosion cracking, volumetric examinations should be performed at sufficient number of locations to ensure an adequate sample size. It is not clear to the staff how the inspection sample size would be calculated, since the population of Class 1 small-bore butt welds and socket welds within scope of the program are not provided in the LRA.

During the audit of the "operating experience" program element, the staff's independent database search found that the operating experience provided by the applicant is bounded by known industry operating experience.

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.

<u>Audit Results</u>. 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 and evaluation is required before consistency can be determined.

Based on this audit, the staff also verified that the operating experience at the plant is bounded by the operating experience for which the GALL Report program was evaluated. 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.1.36, Protective Coating Monitoring and Maintenance

Summary of Information in the Application. The LRA states that AMP B.1.36, "Protective Coating Monitoring and Maintenance," is an existing program with enhancements 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 report includes enhancements necessary to make the LRA AMP consistent with the corresponding GALL Report 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 search of the applicant's operating experience database using the keywords: "coating," "torus," and "Service Level 1."

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

Relevant Documents Reviewed

Document	Title	Revision / Date
1. Fermi-RPT-12-LRD05	Protective Coating Monitoring and Maintenance Program	
2. CARD 03-12878	Revise PM to Inspect AUX BLR Stack for Wall Thinning (Closed)	
3. CARD 03-12847	Revise PM to Inspect Aux BLR Stack for wall thinning	
4. CARD 04-26143	Degraded Protective Coatings in Torus Vent Header	
5. CARD 04-26144	Evaluate Degraded Coatings in Drywell Basement	
6. CARD 04-26062	Degraded Protective Coating in Drywell Basement Area	
7. CARD 05-25459	Protective Coating Deficiencies Noted During IWE Inspections of Torus Exterior	
8. CARD 07-26887	Degraded Protective Coating in Drywell	
9. CARD 08-21804	Repair of Degrade Protective Coatings in Torus	
10. CARD 09-22447	Torus Interior Degraded Coating Repairs	
11. CARD 09-22973	Torus Coating Degraded on RHR Test Return Line	

Document	Title	Revision / Date
12. CARD 07-26785	NRC Identified Issues in Torus	
13. WO 27262434	Repair Degraded Coatings inside Torus	
14. WO 27001052	Areas of loose coating found	
15. CARD 09-27158	Repeated Wetting and Drying Has Degraded the Torus' Protective Coating	
16. CARD 10-30087	Loose Flaking/Coatings Inside Torus	
17. WO 30368456	Torus Vapor Space Coating Inspections and Repairs	
18. 3071-359	Design Specification for Field Painting Level I Steel and Concrete Coating Inside Drywell	Revision B
19. DECO-12-2191	Enrico Fermi Atomic Power Plant Unit No 2. Evaluation of Containment Coatings	Revision 4 06/1985
20. 35.CON.002	QA Level I Protective Coating Systems	Revision 31
21. 43.000.019	Primary Containment Inspection	Revision 5
22. MQA10	Quality Assurance Program Applicability	Revision 8
23. MQA11	Condition Assessment Resolution Document	Revision 36
24.	Containment ISI Section XI IWE Program Owner Input	03/27/2013
25.	IWE Primary Containment Inspection Program 2nd Quarter 2013 Program Health Report	

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's independent database search found that the operating experience provided by the applicant is bounded by known industry operating experience (e.g., no previously unknown or recurring aging effects were identified by the applicant or staff).

The staff also audited the description of the LRA AMP provided in the UFSAR supplement. The staff verified that 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.S8.

Based on this audit, the staff also verified that the operating experience at the plant is bounded by the operating experience for which the GALL Report program was evaluated. 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.1.37, Reactor Head Closure Studs

Summary of Information in the Application. The LRA states that AMP B.1.37, "Reactor Head Closure Studs Program," is an existing program with an exception and enhancements that is consistent with the program elements in GALL Report AMP XI.M3, "Reactor Head Closure Stud Bolting." To verify this claim of consistency, the staff audited the LRA AMP. The scope of this audit report includes enhancements necessary to make the LRA AMP consistent with the corresponding GALL Report AMP. This audit report does not consider the sufficiency of the exception, 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 the keywords: "bolt," "bolting," "closure stud," "stress corrosion cracking," "wear," and "cracking."

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

Relevant Documents Reviewed

Document	Title	Revision / Date
1. FERMI-RPT-12-LRD02	Aging Management Program Evaluation Report Class 1 Mechanical – Reactor Head Closure Studs	Revision 1
2. FERMI-RPT-12-LRD09	Operating Experience Review Report - Aging Management Program Effectiveness Section 3.1.9 Reactor Head Closure Studs	Revision 1
3. DSN 35.710.026	Reactor Vessel Reassembly	Revision 16
4. DNS F2S82-5866	Preservice Inspection of RPV Studs and Nuts	10/8/1982
5. FNP2-B6.20-0001	UT Examination, Closure Head Stud in Place	11/6/2010
6. GE RF-11-04	Bolting Visual Examination Report	03/27/2006
7. CARD 12-23778	Condition Assessment Resolution Document, Stud Elongation Readings Out of Spec	4/25/2012
8. CARD 06-22792	Condition Assessment Resolution Document, RPV Head Was Cocked While Lowering on RPV Guidepins	04/26/2006
9. CARD 12-22362	Condition Assessment Resolution Document, Lost Screw during RPV Head De-tensioning	03/28/2012

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. Aspects of the "preventive actions" and "corrective actions" program elements of the LRA AMP associated with the

exception were not evaluated during this audit. Aspects of these program elements that are not associated with the exception were evaluated and are described below.

During the audit, the staff verified that the "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. The staff also verified that aspects of the "preventive actions" and "corrective actions" program elements not associated with the exception are consistent with the corresponding program elements of the GALL Report AMP. The staff's evaluation of aspects of these program elements associated with the exception will be addressed in the SER.

During the audit of the "operating experience" program element, the staff's independent database search found that the operating experience provided by the applicant is bounded by known industry operating experience.

The staff also audited the description of the LRA AMP provided in the UFSAR supplement. The staff verified that 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," "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. The staff also verified that for the "corrective actions," and "preventive actions" program elements, the aspects of the LRA AMP program elements not associated with the exceptions are consistent with the corresponding program elements in GALL Report AMP XI.M3. The staff's evaluation of aspects of the program elements associated with exceptions will be addressed in the SER.

Based on this audit, the staff also verified that the operating experience at the plant is bounded by the operating experience for which the GALL Report program was evaluated. 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.1.38, Reactor Vessel Surveillance

Summary of Information in the Application. The LRA states that AMP B.1.38, "Reactor Vessel Surveillance," is an existing program with enhancement and exception that is consistent with the program elements in GALL Report AMP XI.M31, "Reactor Vessel Surveillance." 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 report includes the enhancement necessary to make the LRA AMP consistent with the corresponding GALL Report AMP. The exception to the GALL Report AMP 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 the keywords: "weld," "plate," "vessel," "neutron," "irradiation," "embrittlement," and "surveillance program."

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

Relevant Documents Reviewed

Document	Title	Revision / Date
1. FERMI-RPT-12-LRD02	Aging Management Program Evaluation Report Class 1 Mechanical, Section 4.10, "Reactor Vessel Surveillance"	Revision 1
2. FERMI-RPT-12-LRD09	Operating Experience Review Report – Aging Management Program Effectiveness, Section 3.1.28, "Reactor Vessel Surveillance Program"	Revision 1
3. FERMI-RPT-12-LRD06	TLAA and Exemption Evaluation Results	Revision 1 03/14/2014
4.	NRC Letter to Detroit Edison Company, Fermi 2 – Issuance of Amendment Re: Implementation of the BWRVIP RPV ISP to Address the Requirements of Appendix H to 10 CFR Part 50 (TAC No. MB5840)	01/30/2003
5. MES23	Fermi 2 Engineering Support Conduct Manual, Inservice Inspection and Testing, Section 3.9, "Reactor Vessel Material Surveillance"	Revision 18 12/21/2012
6. NRC-05-0001	DTE Energy Letter to the NRC, Proposed Licensed Amendment Request to Revise the Reactor Coolant System Pressure and Temperature Limit Curves in Technical Specifications 3.4.10	03/17/2005
7. CARD 11-30644	Technical Specification Curves for Pressure/Temperature for Core Critical and Core Not Critical Determined to be Non-Conservative	12/01/2011
8. NRC-13-0026	DTE Energy Letter to the NRC, Response to Request for Additional Information Regarding the Proposed License Amendment to Relocate the Pressure and Temperature Curves to a Pressure Temperature Limits Report	07/09/2013
9. NEDC-33785P	GE Hitachi Report, DTE Energy/Enrico Fermi Power Plant 2 Pressure and Temperature Limits Report Up To 24 and 32 Effective Full-Power Years	Revision 1 June 2013
10.	NRC Letter to DTE Energy, Fermi 2 – Issuance of Amendment Re: Relocation of Pressure and Temperature Curves to a Pressure Temperature Limits Report (TAC No. MF0446)	02/04/2014
11. GE Hitachi Nuclear Energy 0000-0145-9377-R0	Fermi-2 Fluence Report to Support P-T Curve Evaluation	Revision 0 April 2012
12. GE Hitachi Nuclear Energy 0000-0144-4325-R2	Pressure-Temperature Curves and RPV Fracture Toughness Evaluation for DTE Energy Fermi Unit 2	Revision 2 December 2013

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. Aspects of the "detection of aging effects" program element of the LRA AMP associated with the exception were not evaluated during this audit. Aspects of this program element that are not associated with the exception were evaluated and are described below.

During the audit, the staff verified that the “scope of program,” “preventive actions,” “parameters monitored or inspected,” and “acceptance criteria” program elements of the LRA AMP are consistent with the corresponding elements of the GALL Report AMP. The staff also verified that aspects of the “detection of aging effects” program element not associated with the exception are consistent with the corresponding program elements in the GALL Report AMP. The staff’s evaluation of aspects of this program element associated with the exception will be addressed in the SER.

In addition, the staff found that for the “monitoring and trending” program element associated with the program enhancement, 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 program enhancement states that the applicant will revise its procedures to ensure that new fluence projections through the period of extended operation and the latest vessel beltline adjusted reference temperature tables are provided to the Boiling Water Reactor Vessel Internals Project prior to the period of extended operation (i.e., prior to September 20, 2024). The staff noted that the applicant’s program is an existing program and upon receipt of renewed license the program should continue to provide adequate fracture toughness and dosimetry data throughout the license renewal term. However, the LRA states that the applicant’s enhancement will be implemented prior to the period of extended operation, but not within a specific time period upon receipt of renewed license. The staff finds that the enhancement regarding data sharing is important to maintain the effectiveness of the Integrated Surveillance Program (ISP) and, therefore, it is necessary to implement the program enhancement within a specific time period upon receipt of renewed license unless adequate justification is provided.

During the audit of the “operating experience” program element, the staff’s independent database search found that the operating experience provided by the applicant is bounded by known industry operating experience (e.g., no previously unknown or recurring aging effects were identified by the applicant or staff).

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.

- As previously discussed, the “monitoring and trending” program element is associated with the program enhancement. The staff finds that it is necessary to revise the description of the program enhancement in the UFSAR supplement in such a manner to implement the enhancement within a specific time period upon receipt of renewed license unless adequate justification is provided.

<u>Audit Results</u>. Based on this audit, the staff verified that the “scope of program,” “preventive actions,” “parameters monitored or inspected,” and “acceptance criteria” program elements of the LRA AMP are consistent with the corresponding program elements in GALL Report AMP XI.M31. The staff also verified that for the “detection of aging effects” program element, the aspects of the LRA AMP program element not associated with the exception are consistent

with the corresponding program element in GALL Report AMP XI.M31. The staff's evaluation of aspects of the program element associated with the exception will be addressed in the SER. The staff also identified certain aspects of the "monitoring and trending" program element of the LRA AMP associated with the program enhancement, 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 at the plant is bounded by the operating experience for which the GALL Report program was evaluated. In addition, the staff identified a need for additional information regarding the adequacy of the program description in the UFSAR supplement.

LRA AMP B.1.39, 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.1.39, "RG 1.127, Inspection of Water-Control Structures Associated with Nuclear Power Plants," is an existing program with enhancements that will be 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. Issues identified but not resolved in this report will be addressed in the SER. The scope of this audit report includes enhancements necessary to make the LRA AMP consistent with the corresponding GALL Report 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 the RHR complex, general service water pumphouse, and shore barrier. The staff also conducted an independent search of the applicant's operating experience database using the keywords: "RHR," "RHR complex," "RHR service water," "general service water pumphouse," "pumphouse," and "shore barrier."

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

Relevant Documents Reviewed

Document	Title	Revision / Date
1. FERMI-RPT-12-LRD05	Aging Management Program Evaluation Report Civil/Structural	Revision 1 03/05/2014
2. MMR-14	Fermi 2 Maintenance Rule Conduct Manual – Structures Monitoring	Revision 2 01/05/2009
3. 3071-099	Project Specification - Structural Steel	Revision B 06/21/1983
4. 35.000.240	Fermi 2 Maintenance Procedure – Bolting and Torquing	Revision 41 12/14/2009
5. FERMI-RPT-12-LRD09	Operating Experience Review Report – Aging Management Program Effectiveness RG. 1.127	Revision 1 03/25/2014

Document	Title	Revision / Date
6. TMPE-08-0005	Memorandum - Results of Maintenance Rule Periodic Inspection of Existing Structures in Accordance with MMR14 with Completed MMR14001 Structural Walkdown Checklist	01/09/2008
7. TMPE-02-0122	Baseline Structures Inspection for Maintenance Rule	04/05/2002
8. TMPE-12-0066	2012 Maintenance Rule Focused Self-Assessment Report	07/06/2012
9. CARD 14-21178	EDG 12 Service Water Pump Has Some Mass Loss on Bolts and Flanges	02/15/2014
10. CARD 09-26756	NRC Question - Investigate RHR Complex North Wall Condition	09/01/2009
11. CARD 14-21175	Div. 1 EESW Pump Column Flange and Bolting Missing Some Mass	02/15/2014
12.	Perform Div. 1 RHR Reservoir Zebra Mussel and Ball Valve Inspection	02/08/2014
13. 43.000.001	Shore Barrier Surveillance	07/10/2014
14. CARD 14-27002	MMR14 Structures Monitoring Walkdown – CTG Findings	09/09/2014
15.	Drawings 6C721-0044, 045, 046, 047, 048	03/19/2014
16.	“Baseline Structures Inspection” Report	04/16/1997
17. 43.000.001	Shore Barrier Surveillance	Revision 24 03/13/2002
18.	RG 1.127 Water Control System Program Owner Interview	03/22/2013
19. CARD 07-27267	Support W-R30-N5177-G14 has one anchor nut missing	11/12/2007
20. CARD 07-26112	Maintenance Rule structural walkdown finding	10/23/2007
21.	WO-26166643	11/21/2007
22.	WO-25883684	10/15/2007

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,” 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 “parameters monitored or inspected,” “detection of aging effects,” 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 “parameters monitored or inspected,” “detection of aging effects,” and “acceptance criteria” program elements of GALL Report AMPs XI.S6 and XI.S7, explicitly address the aging management of high-strength (measured yield strength greater than or equal to 150 ksi) structural bolts greater than 1 inch in diameter. The GALL Report recommends that visual inspections of high-strength structural bolts be supplemented with volumetric or surface examinations to detect cracking. It is not clear if there are high-strength structural bolts used in Fermi 2 structures (other than ASTM A325, F1852, and A490 used in civil structures) and, if used, whether the “parameters monitored or inspected,” “detection of aging effects,” and “acceptance criteria” program elements of LRA Sections B.1.42 and B.1.39, are consistent with the recommendations in GALL Report AMPs XI.S6 and XI.S7 regarding the provision to monitor for stress corrosion cracking in high-strength structural bolts greater than 1 inch in diameter through supplemental volumetric or surface examinations to detect cracking.
- The “detection of aging effects” program element of the LRA AMP states that inspection of water-control structures will be performed on an interval not to exceed 5 years. The GALL Report AMP recommends periodic inspections to be performed at least once every 5 years. The GALL Report also recommends that the program should include provisions for increased inspection frequency if the extent of the degradation is such that the structure or component may not meet its design basis if allowed to continue uncorrected until the next normally scheduled inspection. It is not clear to the staff that the “detection of aging effects” program element is consistent with the recommendations in GALL Report AMP XI.S7 because no discussion regarding the provision for increased inspection frequency was provided by the applicant’s AMP.
- As described in the LRA AMP “program description” in relation to the “detection of aging effects” program element, the program “performs periodic visual examinations to monitor the condition of water-control structures and structural components, including … steel piles required for the stability of the shore barrier”. The GALL Report AMP recommends visual inspections to detect degradation of water-control structures. However, during its onsite audit, the staff noted that the applicant does not plan to perform visual inspections of the submerged steel piles at the shore barrier. It is not clear how the effects of aging of the steel piles will be adequately managed during the period of extended operation.

During the audit of the “operating experience” program element, the staff’s independent database search found that the operating experience provided by the applicant is bounded by known industry operating experience.

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,” and “monitoring and trending” program elements of the LRA AMP are consistent with the corresponding program elements in GALL Report AMP XI.S7. The staff also identified certain aspects of the “parameters monitored or inspected,” “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 at the plant is bounded by the operating experience for which the GALL Report program was evaluated. 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.1.40, Selective Leaching

Summary of Information in the Application. The LRA states that AMP B.1.40, "Selective Leaching," is a new program that will be 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. At the time of the audit, the applicant had not yet fully developed the documents necessary to implement this new program, and the staff's audit addressed only the program elements described in the applicant's Aging Management Program Evaluation Report.

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 the keywords: "dealloy," "dealum," "dezinc," "degraph," "leach," and "graphit."

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

Relevant Documents Reviewed

Document	Title	Revision / Date
1. FERMI-RPT-12-LRD03	Fermi 2 License Renewal Project Aging Management Program Evaluation Report Non-Class 1 Mechanical	Revision 2
2. FERMI-RPT-12-LRD09	Fermi 2 License Renewal Project Operating Experience Review Report - Aging Management Program Effectiveness	Revision 1
3. CARD 06-27257	Condition Assessment Resolution Document Evaluate OE 23553 on BNL Inline check valves	11/10/2006

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's independent database search found that the operating experience provided by the applicant is bounded by known industry operating experience. The staff determined that the lack of relevant operating experience identified by the applicant and confirmed by the staff's independent database search is sufficient to allow the staff to verify that the LRA AMP, when implemented by the applicant, will be sufficient to detect and manage the effects of aging.

During the audit of "operating experience" program element, the staff made the following observation:

- The staff reviewed CARD 06-27257 documenting the licensee's response to an industry operating experience report regarding wall thinning and porosity due to de-aluminification (i.e., selective leaching) of inline check valves operating in the service

water system and constructed of aluminum bronze. In response to this report, the licensee conducted a component search and identified 8 similar components and found that they are not susceptible to the same kind of failure due to being constructed of stainless steel and installed in a clean air application.

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.33.

Based on this audit, the staff also verified that the operating experience at the plant is bounded by the operating experience for which the GALL Report program was evaluated. 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.1.41, Service Water Integrity

Summary of Information in the Application. The LRA states that AMP B.1.41, "Service Water Integrity," 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 report includes enhancements necessary to make the LRA AMP consistent with the corresponding GALL Report 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 inspected portions of the emergency equipment service water, residual heat removal service water, and the emergency diesel generator service water systems within the RHR complex. The staff also conducted an independent search of the applicant's operating experience database using the keywords: "biofoul," "biological," "blockage," "cavitat," "cooler," "erosi," "foul," "heat sink," "heat exch," "heat trans," "mic," "sediment," "service water," and "through wall."

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

Relevant Documents Reviewed

Document	Title	Revision / Date
1. FERMI-RPT-12-LRD03	Aging Management Program Evaluation Report, Non-Class 1 Mechanical, Section 4.12, Service Water Integrity	Revision 2
2. FERMI-RPT-12-LRD09	Operating Experience Review Report – Aging Management Program Effectiveness, Section 3.1.30, Service Water Integrity	Revision 1
3. NRC-90-0012	Fermi 2 Response to Generic Letter 89-13	1/26/1990

Document	Title	Revision / Date
4. MES52	Engineering Support Conduct Manual, GL 89-13 Safety-Related Service Water Monitoring Program	Revision 5
5. MES54	Engineering Support Conduct Manual Heat Exchanger Component Monitoring Program	Revision 3
6. SIA Rpt 1301233.401	GL 89-13 Internal Corrosion Inspections on RHRSW System	3/14/2014
7. SIA Rpt 1000128.405	Life Cycle Management and Buried Piping Evaluation Report for Fermi-2 Nuclear Generating Station	10/30/2012
8. CARD 14-20240	Water Leak Observed from D2 RHRSW	1/13/2014
9. CARD 11-20137	GL 89-13 SRSW Assessment Enhancement for RHR Heat Exchanger	1/6/2011
10. CARD 09-24571	Ultimate Heat Sink Self-Assessment Deficiency	6/12/2009
11. CARD 09-20096	Engineering Calculations Not in Place for Heat Exchangers with Tubes Plugged	1/7/2009
12. CARD 04-24254	Higher than Expected Pressure Drops in Div 1 & 2 EESW	9/16/2004
13. B134060100	Heat Exchanger Inspection Report, RHR Div 1	3/29/2009
14. B861060100	Heat Exchanger Inspection Report, RHR Div 2	9/11/2007
15. E1156 B001A, B, & B002A, B	Maintenance Strategy for RHR Mechanical Draft Cooling Towers, SE, SW, NE, NW	5/22/2014

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. However, 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.

- For the “detection of aging effects” program element, FERMI-RPT-12-LRD03, “Aging Management Program Evaluation Report, Non-Class 1 Mechanical, Section 4.12, Service Water Integrity,” states that the program manages loss of material for components and fouling of heat exchangers. It is not clear whether the LRA identifies all of these aging effects because, in addition to fouling of heat exchangers, the applicant has detected fouling of spray nozzles in the RHR cooling towers. LRA Table 3.3.2-3, “Service Water Systems,” lists loss of material as the only aging effect for these nozzles.

During the audit of the “operating experience” program element, the staff’s independent database search found that the operating experience provided by the applicant is bounded by known industry operating experience (e.g., no previously unknown or recurring aging effects were identified by the applicant or staff).

The staff also audited the description of the LRA AMP provided in the UFSAR supplement. The staff verified that 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," 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 "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 at the plant is bounded by the operating experience for which the GALL Report program was evaluated. 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.1.42, Structures Monitoring

Summary of Information in the Application. The LRA states that AMP B.1.42, "Structures Monitoring," is an existing program with enhancements that will be consistent with the program elements in GALL Report AMP XI.S6, "Structures 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 report includes enhancements necessary to make the LRA AMP consistent with the corresponding GALL Report 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 the turbine building, the reactor building (includes the spent fuel pool), the RHR complex and the CTG tank foundation. The staff also conducted an independent search of the applicant's operating experience database using the keywords: "leach," "leak," "crack," "spall," "freeze," "thaw," "concrete," "degrade," "corrosion," and "groundwater."

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

Relevant Documents Reviewed

Document	Title	Revision / Date
1. FERMI-RPT-12-LRD05	Aging Management Program Evaluation Report Civil/Structural, Section 3.4 Structures Monitoring Program	Revision 1 03/05/2014
2. MMR-14	Fermi 2 Maintenance Rule Conduct Manual – Structures Monitoring	Revision 2 01/05/2009
3. 3071-099	Project Specification - Structural Steel	Revision B 06/21/1983
4. 35.000.240	Fermi 2 Maintenance Procedure – Bolting and Torquing	Revision 41 12/14/2009

Document	Title	Revision / Date
5. FERMI-RPT-12-LRD09	Operating Experience Review Report – Aging Management Program Effectiveness – 3.1.31 Structures Monitoring Program	Revision 1 3/25/14
6. TMPE-08-0005	Memorandum - Results of Maintenance Rule Periodic Inspection of Existing Structures in Accordance with MMR14 with Completed MMR14001 Structural Walkdown Checklist	01/09/2008
7. TMPE-02-0122	Baseline Structures Inspection for Maintenance Rule	04/05/2002
8. TMPE-12-0066	2012 Maintenance Rule Focused Self-Assessment Report	07/06/2012
9. CARD 14-26270	MMR14 Structures Monitoring Walkdown – Turbine Building Basement Findings	08/06/2014
10. CARD 09-26756	NRC Question - Investigate RHR Complex North Wall Condition	09/01/2009
11. CARD 13-25947	Low Concrete Air Content	08/23/2013
12. CARD 10-22385	White Mineral Deposit found in Walls	03/19/2010
13. CARD 12-27792	Calcium, Deposits found in RB Sub-Basement and HPCI Room during Fukushima Walkdown	09/20/2012
14. CARD 14-27002	MMR14 Structures Monitoring Walkdown – CTG Findings	9/9/2014
15. CARD 08-20999	Concrete Spalling on RB 1 Ceiling with Rebar Exposed	6/23/2008
16.	"Baseline Structures Inspection" Report	04/16/1997

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" 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," "parameters monitored or inspected," "detection of aging effects," 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 "preventive actions," "parameters monitored or inspected," and "detection of aging effects" program elements of GALL Report AMP XI.S6 explicitly address the aging management of ASTM A325, ASTM F1852, and ASTM A490 structural bolting. The staff noted that the corresponding elements, with enhancements, of the LRA AMP basis document address ASTM A325 and A490 bolting, but made no mention of ASTM F1852 bolting. It is not clear to the staff that the above mentioned program elements of the LRA AMP are consistent with the recommendations in the GALL Report AMP because there was no mention of ASTM F1852 bolting.
- The "preventive actions," "parameters monitored or inspected" and "detection of aging effects" program elements of the GALL Report AMP recommends monitoring

high-strength bolting greater than 1 inch in diameter for stress corrosion cracking and supplementing visual inspection with volumetric or surface examinations to detect SCC. The corresponding program elements of the LRA AMP basis document for the Structures Monitoring Program state that plant procedures prevent the use of molybdenum disulfide as a lubricant for bolting, and therefore [high-strength] structural bolting is not susceptible to SCC. This explanation seems to be used as the basis for not supplementing visual examinations of high-strength bolting greater than 1 inch in diameter with volumetric or surface examination as recommended in the GALL Report AMP. The staff notes that the use of molybdenum disulfide is not the only contributor to SCC of high-strength bolts. Also, it is not clear from the LRA program basis document whether high-strength structural bolts are used in Fermi 2 structures and whether molybdenum disulfide lubricants have been used at Fermi 2 before plant procedures were revised to prohibit its use. The staff needs additional information to verify consistency with the GALL Report AMP because is not clear if there are high-strength structural bolts used in Fermi 2 structures and, if used, whether the program elements are consistent with the recommendations in GALL Report AMP XI.S6 and XI.S7 regarding the provision to monitor for SCC through supplemental volumetric or surface examinations to detect cracking.

- The “detection of aging effects” program element in the LRA AMP basis document states that underground (inaccessible areas) of concrete structures are subject to an aggressive groundwater/soil environment. The GALL Report AMP recommends a plant-specific program to manage concrete aging effects for inaccessible areas subject to an aggressive groundwater/soil environment. The “detection of aging effects” program element of the LRA AMP includes an enhancement to revise plant procedures to perform opportunistic inspections of inaccessible areas if it becomes accessible for some reason, and additionally, perform inspections of inaccessible areas in environments where observed conditions in accessible areas exposed to the same environment indicate significant degradation. The staff needs additional information to verify consistency with the GALL Report for the detection of aging effects in inaccessible, below-grade concrete structural elements exposed to an aggressive groundwater/soil environment because the proposed enhancement to the Structures Monitoring Program does not appear to be consistent with the GALL Report recommendations for either an aggressive or non-aggressive water/soil environment. Further, the enhancement for inspections of inaccessible areas based on observations of accessible areas *with the same environment* appears to limit the scope of inaccessible areas that will be inspected because certain environment conditions may not exist for both accessible and inaccessible areas (i.e., a soil type environment may exist for an inaccessible area and not for an accessible area).
- The LRA AMP includes enhancements to the “parameters monitored or inspected,” “detection of aging effects,” and “acceptance criteria” program elements to revise procedures to meet the guidelines provided in American Concrete Institute (ACI) 349.3R to demonstrate consistency with the GALL Report with regard to selection of parameters monitored, personnel qualifications requirements, and prescribing quantitative acceptance criteria. The program basis document for the LRA AMP references the 1996 edition of ACI 349.3R. However, the GALL Report AMP XI.S6 is based on, and references, the 2002 edition of ACI 349.3R. It is not clear to the staff that the use of the 1996 edition of ACI 349.3R is consistent with the GALL Report because there are substantive differences between the 2002 edition and 1996 edition of ACI 349.3R that introduce potential inconsistencies.

During the audit, the staff made the following observations:

- The staff performed a walkdown of the turbine building basement and observed leaching of concrete. The staff reviewed CARD Nos. 10-22385, 12-27792, and 09-26756, which document the presence of leaching in the RHR complex, auxiliary building basement, and reactor building sub-basement. The applicant determined that leaching is due to groundwater in-leakage and that the identified condition does not affect the structural integrity of the structures. However, there is no discussion in LRA AMP operating experience about leaching issues identified at the plant and no discussion about the evaluation performed that documents the impact of observed leaching on the intended function of the concrete and rebar. Additionally, the staff is not clear how LRA Table 3.5.1, item 47, which states that "leaching has not been observed on accessible portions of concrete at Fermi 2," is consistent with the GALL Report recommendation when the operating experience provided by the applicant during the audit documents the presence of leaching in structures.
- During the staff's independent database search of operating experience, the staff reviewed CARD No. 13-25947 and noted that the applicant practice to reject concrete with air entrainment outside the 4.5 percent to 7.5 percent range due to inadequate air entrainment content is consistent with the GALL Report recommendation of adequate air content for concrete exposed to cycles of freezing and thawing. The SRP-LR states that the Structures Monitoring Program may not be sufficient to manage loss of material and cracking due to freeze-thaw for plants located in moderate to severe weathering conditions. However, a plant-specific program is not required if documented evidence confirms that the existing concrete has air content between 3 and 8 percent and inspections have not identified degradation related to freeze-thaw.

During the audit of the "operating experience" program element, the staff's independent database search found that the operating experience provided by the applicant is bounded by known industry operating experience (e.g., no previously unknown or recurring aging effects were identified by the applicant or staff).

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," and "monitoring and trending" program elements of the LRA AMP are consistent with the corresponding program elements in GALL Report AMP XI.S6. The staff also identified certain aspects of the "preventive actions," "parameters monitored or inspected," "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 at the plant is bounded by the operating experience for which the GALL Report program was evaluated. 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.1.43, Water Chemistry Control – BWR

Summary of Information in the Application. The LRA states that AMP B.1.43, "Water Chemistry Control – BWR," 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.

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 the keywords: "chloride," conductivity," "dissolved oxygen," "HWC," "hydrogen water chem," "iron," "moly," "noble," and "zinc."

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

Relevant Documents Reviewed

Document	Title	Revision / Date
1.	Fermi 2 Nuclear Plant Quarterly Chemistry Health Report Second Quarter 2014	
2.	Fermi 2 Nuclear Plant Quarterly Chemistry Health Report (End of Year Synopsis) (1/01/2012 to 12/31/2012)	
3. Fermi-RPT-12-LRD03	Aging Management Program Evaluation Report, Non-Class 1 Mechanical, Section 4.13, "Water Chemistry Control – BWR"	Revision 2
4. Fermi-RPT-12-LRD09	Operating Experience Review Report – Aging Management Program Effectiveness, Section 3.1.32, "Water Chemistry Control – BWR Program"	Revision 1
5. COS 007	Fermi 2 Strategic Water Chemistry Plan	Revision 4
6. CHS-PRI-01	Fermi 2 – Chemistry Specification: Condensate	Revision 21
7. CHS-PRI-02	Fermi 2 – Chemistry Specification: Control Rod Drive	Revision 6
8. CHS-PRI-03	Fermi 2 – Chemistry Specification: Feedwater	Revision 13
9. CHS-PRI-04	Fermi 2 – Chemistry Specification: Main Steam	Revision 6
10. CHS-PRI-06	Fermi 2 – Chemistry Specification: Reactor Water	Revision 21
11. CHS-PRI-07	Fermi 2 – Chemistry Specification: Torus/RHR	Revision 5
12. CARD 07-22666	Forward Pump Drain (FPD) Total Iron Adverse Trend, Impacting Final Feedwater (FFW) Total Iron	05/15/2007
13. CARD 08-26150	Perform Gap Analysis against New BWRVIP 190, "BWR Water Chemistry Guidelines"	09/19/2008
14. CARD 09-25161	Increased Trend in Forward Pumped Drain Iron	07/02/2009
15. CARD 10-20712	Potential Flow Accelerated Corrosion Found in Shell of MSRs	01/27/2010

Document	Title	Revision / Date
16. CARD 10-31980	Chemistry Excursion following CFD H placed in service	12/18/2010
17. CARD 11-20394	Review Fermi 2 Chemistry Specifications against BWRVIP-190 Interim Guidance	01/13/2011
18. CARD 11-21607	Condenser Leak SW Hotwell Quad 2/10-11/2011	02/11/2011
19. CARD 11-21911	Revise Chemistry Specifications to Align with On-Line Noble Metal Chem Requirements	02/18/2011
20. CARD 14-23161	Reactor Coolant Sulfate Excursion when East Heater Feed Pump Started	04/06/2014
21. CARD 14-23200	Reactor coolant Sulfate excursion exceeding Action Level 1 after placing CFD G in service	04/08/2014
22. CARD 14-23162	RF16 startup chemistry excursions forms for Action Level 1 out of specs	04/06/2014

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, the staff made the following observation:

- In Section 4.13 of Fermi-RPT-LRD03, Revision 2, the applicant refers to its commitment to implement the "BWROG [boiling water reactor owner's group] Chemistry Guidelines." In the UFSAR, it states that the Water Chemistry Program is based on "General Electric Water Quality Document 22A2747." In addition, the UFSAR states that the licensee conforms to Regulatory Guide 1.56, which, although it has been withdrawn by the NRC, endorsed BWRVIP-130. However, in the LRA, the applicant states that it is consistent with GALL Report AMP XI.M2, which recommends the use of BWRVIP-190. Based on this information, the staff was unclear about whether the applicant is currently using BWRVIP-190.
- The applicant explained that General Electric Water Quality Document 22A2747 was the early basis for the Fermi 2 Water Chemistry Program. Later, the BWR Owners Group developed guidelines for BWR plant water chemistry. Such guidelines are now issued through the BWRVIP program. BWRVIP-130, which was issued in 2004, was subsequently modified and issued as EPRI 1016579, otherwise known as "BWRVIP-190: BWR Vessel and Internals Project, BWR Water Chemistry Guidelines—2008 Revision."
- The staff reviewed the Fermi 2 Water Chemistry Specifications and the Strategic Water Chemistry Plan. The staff noticed that these documents contain the guidance, "needed" statements, good practices, and Action Levels recommended in BWRVIP-190. The staff confirmed that the applicant's Water Chemistry Control – BWR Program is consistent with the guidance in BWRVIP-190, and therefore, is consistent with GALL Report AMP XI.M2.

During the audit of the "operating experience" program element, the staff's independent database search found that the operating experience provided by the applicant is bounded by known industry operating experience.

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.M2.

Based on this audit, the staff also verified that the operating experience at the plant is bounded by the operating experience for which the GALL Report program was evaluated. 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.1.44, Water Chemistry Control – Closed Treated Water Systems

Summary of Information in the Application. The LRA states that AMP B.1.44, "Water Chemistry Control – Closed Treated Water Systems," is an existing program with enhancements 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. The scope of this audit report includes enhancements necessary to make the LRA AMP consistent with the corresponding GALL Report 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 search of the applicant's operating experience database using the keywords: "chemistry," "corrosion," "loss of material," "oxygen," "pitting," and "cracking."

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

Documents Reviewed

Document	Title	Revision / Date
1. COS 007	Fermi 2 Strategic Water Chemistry Plan	Revision 4 08/20/2009
2. FERMI-RPT-AMC02	Aging Management Review of the Water Control Structures	Revision 1 03/20/14
3. EPRI 1007820	Closed Cooling Water Chemistry Guidelines	Revision 1 April 2004
4. 77.000.53	Chemical Addition to the EDG Jacket Cooling Water Systems	Revision 14 10/05/2011
5. 78.000.77	Turbine Building Closed Cooling Water System Chemical Treatment	Revision 9 07/31/2009

Document	Title	Revision / Date
6. 78.000.78	Supplemental Cooling Chilled Water System Chemical Treatment	Revision 7 07/17/2009
7. 78.000.79	Reactor Building Closed Cooling Water and Emergency Equipment Cooling Water System	Not Available
8. FERMI-RPT-12-LRD03	Aging Management Program Evaluation Report Non-Class 1 Mechanical	Revision 2
9. MES54	Heat Exchanger Component Monitoring Program	Revision 3 09/07/2010
10. 77.000.71	Corrosion Coupon Evaluation and Operation of the Corrater in-Line Corrosion Rate Monitors	Revision 13 11/06/2009
11. MCE03	Fermi 2 Chemistry and Environmental Monitoring Conduct Manual – Chemistry Sampling and Analysis	Revision 11 12/28/2009
12. CARD 05-20359	Replace EDG 13 Jacket Coolant	01/21/2005
13. CARD 05-26353	High Dissolved Oxygen in TBCCW due to High Makeup Rate	11/11/2005
14. CARD 08-24046	TBCCW Shows Intermittent High Out of Specification Dissolved Oxygen	06/19/2008
15. CARD 09-23909	Increase in TBCCW Dissolved Oxygen Following Change of Inservice Starting Air Compressors	05/15/2009
16. CARD 09-23333	Microbiologically-Induced Corrosion (MIC)	04//27/2009
17. NPRP-13-0077	Corrosion Rate Trending	07/08/2012

The staff conducted its audit of LRA program elements one through six based on the contents of the existing program as modified by the applicant's 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 its review, the staff noted that the water testing frequency for the control center heating, ventilation, and air conditioning chill water system is currently done annually, whereas the GALL Report AMP states that the testing frequency should not be greater than quarterly unless justified with an additional analysis. Although the program basis documentation did not address this difference, the staff concluded that the difference between the current testing frequency and the frequency recommended in the GALL Report AMP would be resolved during implementation of the enhancement.

During the audit of the "operating experience" program element, the staff's independent database search found that the operating experience provided by the applicant is bounded by known industry operating experience. 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.M21A.

Based on this audit, the staff also verified that the operating experience at the plant is bounded by the operating experience for which the GALL Report program was evaluated. In addition, the staff verified that the description provided in the UFSAR supplement is consistent with the description provided in the SRP-LR.

Staff Review of Select AMR Items Associated with Elastomeric and Polymeric Components

Summary of Information in the Application. During the audit, the staff reviewed plant documentation associated with the following AMR items:

- LRA Table 3.3.2-6, "Compressed Air Systems," cites elastomeric flex-connections exposed to indoor air (external).
- LRA Table 3.3.2-12, "Control Center Heating, Ventilation and Air Conditioning System," cites a graphite rupture disc exposed to indoor air (external) and gas (internal).
- LRA Table 3.4.2-3-7, "Circulating Water System, Nonsafety-Related Components Affecting Safety-Related Systems," cites plastic piping exposed to raw water with no aging effect requiring management and no AMP.

Audit Acitivies. During its audit, the staff interviewed the applicant's staff and reviewed onsite documents provided by the applicant.

The table below lists the documents that were reviewed by the staff and were found relevant to the review of these AMR items. These documents were provided by the applicant.

Relevant Documents Reviewed

Document	Title	Revision / Date
1. 6M721-5841-1	Condensate Water Box Drain Down System Turbine Building Basement	Revision B
2. FERMI-RPT-12-AMM21	Aging Management Review of the Compressed Air Systems	Revision 0
3. FERMI-RPT-12-AMM29	Aging Management Review of the Control Room HVAC Systems	Revision 2
4. Stock Code 550-1258	Spare Parts Reference System for rupture disk	

Audit Results. During the audit, the staff made the following observations:

- The staff reviewed drawing 6M721-5841-1 and identified that the plastic piping exposed to raw water in LRA Table 3.4.2-3-7 is constructed of polyvinyl chloride.
- The staff reviewed report FERMI-RPT-12-AMM21 and identified that the elastomeric flex-connections exposed to indoor air in LRA Table 3.3.2-6 consist of flexible elastomeric hoses.

- The staff reviewed report FERMI-RPT-12-AMM29 and identified that the graphite rupture disc exposed to indoor air (external) and gas (internal) is a Mersen Bursting Disc, with a plant-specific stock code of 550-1258.
- The staff reviewed Stock Code 550-1258 and identified that the graphite rupture disc exposed to indoor air (external) and gas (internal) is a 2-inch disc with a temperature rating of 70 degrees Fahrenheit, a maximum burst pressure of 15.75 psig, and a minimum burst pressure of 14.25 psig with a capacity of 1110 cubic feet per minute (cfm). The material for the disc is graphilor® with a Trane part number DSK0091.