Audit and Review Report
for
Plant Aging Management Reviews
and Programs

Millstone Power Station - Units 2 & 3
Docket Nos.: 50-336 & 50-423

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Prepared by
Information Systems Laboratories, Inc.
11140 Rockville Pike
Rockville, MD 20852
Contract No. GS-23F-0060-L

Prepared for
License Renewal and Environmental Impacts Program
Division of Regulatory Improvement Programs
Office of Nuclear Reactor Regulation
U.S. Nuclear Regulatory Commission

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Audit and Review Report for Plant Aging Management Reviews and Programs Millstone Power Station - Units 2 and 3

1. Introduction

By letter dated January 20, 2004, (ADAMS Accession Number ML040280079), Dominion Nuclear Connecticut, Inc. (Dominion, the applicant) submitted to the U.S. Nuclear Regulatory Commission (NRC) its application for renewal of Facility Operating License Numbers DPR-65 and NFP-49 for Millstone Power Station (MPS), Units 2 and 3, respectively. The applicant requested renewal of the operating license for an additional 20 years.

In support of the staff's safety review of the MPS, Units 2 and 3, license renewal application (LRA), between March and June 2004, the License Renewal and Environmental Impacts Program, Section B (RLEP-B), led a project team that audited and reviewed certain aging management reviews (AMRs) and associated aging management programs (AMPs) that were developed by the applicant to support the MPS LRA. The project team included both NRC staff and contractor personnel provided by Information Systems Laboratories, Inc. (ISL), RLEP-B's technical contractor. Attachment 2 lists the project team members as well as other NRC staff and ISL personnel who supported the project team's review.

The project team performed its work in accordance with the requirements of Title 10 of the *Code of Federal Regulations*, Part 54 (10 CFR 54), “Requirements for Renewal of Operating Licenses for Nuclear Power Plants;” the guidance provided in NUREG-1800, “Standard Review Plan for Review of License Renewal Applications for Nuclear Power Plants” (SRP-LR), dated July 2001; the guidance provided in NUREG-1801, “Generic Aging Lessons Learned (GALL) Report,” dated July 2001; and the “Audit and Review Plan for Plant Aging Management Reviews and Programs - Millstone, Units 2 and 3” (ML043490237) (MPS audit and review plan).

Overall, for its assigned scope of work, the project team determined that the applicant's aging management activities and programs will adequately manage the effects of aging on structures and components, so that their intended functions will be maintained consistent with the MPS, Units 2 and 3 current licensing basis (CLB) for the period of extended operation.

This audit and review report documents the results of the project team’s audit and review work. The project team performed its work at NRC Headquarters, Rockville, Maryland; at ISL offices in Rockville, Maryland; and at the applicant's offices at the MPS, Units 2 and 3 plant site in Waterford, Connecticut. The project team conducted on-site visits to the applicant's Waterford, Connecticut offices during the weeks of March 29, May 3, May 10, and June 7, 2004. The project team conducted a public exit meeting at the applicant's Waterford, Connecticut, offices on July 13, 2004. Attachment 2 lists the applicant personnel and other individuals contacted by the project team in support of the work documented in this audit and review report. It also lists those attending the public exit meeting.

2. Background

In 10 CFR 54.4, the scope of license renewal is defined as those systems, structures, and components (SSCs) (1) that are safety-related; (2) whose failure could affect safety-related functions; or (3) that are relied on to demonstrate compliance with the NRC's regulations for fire protection, environmental qualification (EQ), pressurized thermal shock (PTS), anticipated transients without scram (ATWS), and station blackout (SBO). An applicant for a renewed license must review all SSCs within the scope of license renewal to identify those structures and components (SCs) subject to an AMR. The SCs subject to an AMR are those that perform an intended function without moving parts or without a change in configuration or properties, and that are not subject to replacement based on qualified life or specified time period. Pursuant to 10 CFR 54.21(a)(3), an applicant for a renewed license must demonstrate that the effects of aging will be managed in such a way that the intended function or functions of those SCs will be maintained, consistent with the CLB, for the period of extended operation. 10 CFR 54.21(d) requires that the applicant submit a supplement to the updated final safety analysis report (UFSAR) that contains a summary description of the programs and activities for managing the effects of aging.

The SRP-LR provides staff guidance for reviewing applications for license renewal. The GALL Report is a technical basis document. It summarizes staff-approved AMPs for the aging of a large number of SCs that are subject to an AMR. It summarizes the aging management evaluations, programs, and activities credited for managing aging for most of the SCs used by commercial nuclear power plants, and serves as a reference for both the applicant and staff reviewers to quickly identify those AMPs and activities that the staff has determined will provide adequate aging management during the period of extended operation. If an applicant commits to implementing these staff-approved AMPs, the time, effort, and resources used to review an applicant's LRA will be greatly reduced, thereby improving the efficiency and effectiveness of the license renewal review process. The GALL Report identifies (1) SSCs, (2) component materials, (3) the environments to which the components are exposed, (4) the aging effects associated with the materials and environments, (5) the AMPs that are credited with managing the aging effects, and (6) recommendations for further applicant evaluations of aging effects and their management for certain component types.

The GALL Report is treated in the same manner as an approved topical report that is generically applicable. An applicant may reference the GALL Report in its LRA to demonstrate that its programs correspond to those that the staff reviewed and approved in the GALL Report. If the material presented in the LRA is consistent with the GALL Report and is applicable to the applicant's facility, the staff will accept the applicant's reference to the GALL Report. In making this determination, the staff considers whether the applicant has identified specific programs described and evaluated in the GALL Report but does not conduct a review of the substance of the matters described in the GALL Report. Rather, the staff confirms that the applicant verified that the approvals set forth in the GALL Report apply to its programs.

If an applicant takes credit for a GALL program, it is incumbent on the applicant to ensure that the plant program addresses all the program elements (also called attributes) of the referenced GALL program. These elements are described in SRP-LR, Appendix A.1, "Aging Management Review - Generic (Branch Technical Position RLSB-1)." In addition, the conditions at the plant must be bounded by the conditions for which the GALL program was evaluated. The applicant

must certify in its LRA that it completed the verifications and that they are documented and retained in an auditable form.

3. Summary of Information in the MPS License Renewal Application

The MPS LRA closely follows the standard LRA format presented in Nuclear Energy Institute (NEI) guidance, NEI 95-10, "Industry Guideline for Implementing the Requirements of 10 CFR Part 54 – The License Renewal Rule," Revision 3, April 2001. Section 3 of the MPS LRA provides the results of the AMR for SCs that the applicant identified as subject to an AMR.

3.1 MPS Unit 2 LRA Tables

MPS Unit 2 LRA Tables 3.0-1 and 3.0-2 provide descriptions of the internal and external service environments, respectively, used in the AMRs to determine the aging effects requiring management. Results of the AMRs are presented in two table types.

The first table type is Table 3.X.1 where the "3" indicates the table pertaining to the Chapter 3 AMR; the "X" indicates the table number from Volume 1 of the GALL Report (see the definition table below); and the "1" indicates that this is the first table type (Table 1) in Section 3.X. For example, in the reactor coolant system (RCS) subsection, this is Table 3.1.1, and in the engineered safety features subsection, this is Table 3.2.1.

X	Definition
1	Reactor Vessel, Internals, and Reactor Coolant System
2	Engineered Safety Features Systems
3	Auxiliary Systems
4	Steam and Power Conversion Systems
5	Structures and Component Supports
6	Electrical and Instrumentation and Controls

The second table type is Table 3.X.2-Y where "3" again indicates the MPS Unit 2 LRA section number; "X" again indicates the table number from Volume 1 of the GALL Report; the "2" indicates that this is the second table type (Table 2) in Section 3.X; and "Y" indicates the system table number. For example, within the vessel, internals, and reactor coolant system subsection, the AMR results for the reactor vessel are presented in Table 3.1.2-1, and the results for the reactor vessel internals are in Table 3.1.2-2. In the engineered safety features subsection, the containment spray system results are presented in Table 3.2.2-1, and the safety injection system results are in Table 3.2.2-2.

The applicant compared the MPS Unit 2 AMR results with information set forth in the tables of the GALL Report and provided the results of its comparisons in two table types that correlate with the two table types described above.

3.1.1 MPS Unit 2 LRA Table 1

MPS Unit 2 LRA Table 1 provides a summary comparison of how the MPS Unit 2 AMR results align with the corresponding table of Volume 1 of the GALL Report. These tables are essentially the same as Tables 1 through 6 of the GALL Report, except that the "Type" column was replaced by an "Item Number" column, and the "Item Number in GALL" column was replaced by a "Discussion" column. The "Item Number in GALL" column provides a means to identify in MPS Unit 2 LRA Table 2 the corresponding component type in MPS Unit 2 LRA Table 1. The "Discussion" column includes further information. The following are examples of information that might be contained within the "Discussion" column:

(1) information on further evaluation required or reference to the location of that information

(2) the name of a plant-specific program being used

(3) exceptions to the GALL Report assumptions

(4) a discussion of how the line item is consistent with the corresponding line item in the GALL Report, when it may not be obvious

(5) a discussion of how the line item differs from the corresponding line item in the GALL Report, when it may appear to be consistent

Information in the table columns described below is taken directly from Volume 1 of the GALL Report: component, aging effect/mechanism, AMPs, further evaluation recommended. The Discussion column explains, in summary, how the MPS Unit 2 evaluations and programs align with Volume 1 of the GALL Report.

3.1.2 MPS Unit 2 LRA Table 2

MPS Unit 2 LRA Table 2 provides the detailed results of the AMRs for those SCs that are subject to an AMR. There is a Table 2 for each of the AMR systems within a GALL Report system group. For example, the engineered safety features system group contains tables specific to emergency core cooling, containment spray, containment cooling, containment penetrations, and hydrogen control. Table 2 consists of the following nine columns.

Component Type. Column 1 identifies the component types that are subject to an AMR. The component types are listed in alphabetical order. In the structural tables, component types are sub-grouped by material.

Intended Function. Column 2 identifies the license renewal intended functions for the listed component types. Definitions and abbreviations of intended functions are listed in Table 2.0-1 in Section 2 of the MPS Unit 2 LRA.

Material. Column 3 lists the particular materials of construction for the component type being evaluated.

Environment. Column 4 lists the environment to which the component types are exposed. Internal and external service environments are indicated. A description of these environments is provided in Table 3.0-1 and Table 3.0-2, respectively.

Aging Effect Requiring Management. Column 5 lists the aging effects identified as requiring management for the material and environment combinations of each component type.

Aging Management Programs. Column 6 lists the programs used to manage the aging effects requiring management.

NUREG-1801 Volume 2 Item. Column 7 documents identified consistencies of factors listed in Table 2 of the MPS Unit 2 LRA with the GALL Report by noting the appropriate GALL Report item number. Each combination of the following factors listed in Table 2 is compared to the GALL Report to identify those consistencies: component type, material, environment, aging effect requiring management, and AMP. If there is no corresponding item number in the GALL Report for a particular combination of factors, Column 7 is left blank.

Table 1 Item. Column 8 is a cross reference from Table 2 to Table 1. Each combination of the following that has an identified GALL Report item number also has a Table 1 line item reference number: component type, material, environment, aging effect requiring management, and AMP. Column 8 lists the corresponding line item from Table 1. If there is no corresponding item in the GALL Report, Volume 1, Column 8 is left blank.

Notes. Column 9 contains notes that are used to describe the degree of consistency with the line items in the GALL Report. Notes that use letter designations are standard notes based on the letter from A. Nelson, NEI, to P. T. Kuo, NRC, "U.S. Nuclear Industry's Proposed Standard License Renewal Application Format Package, Request NRC Concurrence," dated January 24, 2003 (ML030290201). (Note that the staff concurred in the format of the standardized format for MPS LRAs by letter dated April 7, 2003, from P.T. Kuo, NRC, to A. Nelson, NEI [ML030990052]). Notes that use numeric designators are specific to MPS Unit 2. The letter notes are described in detail in Section 7.2 of this report.

MPS Unit 2 LRA Table 2 contains the AMR results and indicates whether the results correspond to line items in Volume 2 of the GALL Report. Table 2 provides the following information: (1) component type, (2) component intended function, (3) material, (4) environment, (5) aging effect requiring management, and (6) AMPs credited.

Correlations between the combination in MPS Unit 2 LRA Table 2 and a combination for a line item in Volume 2 of the GALL Report are identified by the GALL Report item number in Column 7. If Column 7 is blank, the applicant did not identify a corresponding combination in the GALL Report. If the applicant identified a GALL Report line item, the next column provides a reference to a Table 1 row number. This reference corresponds to the GALL Report, Volume 2, "roll-up" to the GALL Report, Volume 1 tables. Many of the GALL Report evaluations refer to plant-specific programs. In these cases, the applicant considers the MPS Unit 2

evaluation to be consistent with the GALL Report if the other elements are consistent. Any AMP suitable for management of a particular aging effect is considered to be consistent with the GALL program for line items referring to a plant-specific or alternate program if it has been reviewed and determined to be consistent with the seven program elements (attributes) used to review the plant-specific program.

3.2 MPS Unit 3 LRA Tables

MPS Unit 3 LRA Tables 3.0-1 and 3.0-2 provide descriptions of the internal and external service environments, respectively, used in the AMRs to determine the aging effects requiring management. Results of the AMRs are presented in two table types.

The first table type is Table 3.X.1 where the “3” indicates the table pertaining to the Chapter 3 AMR; the “X” indicates the table number from Volume 1 of the GALL Report (see the definition table below); and the “1” indicates that this is the first table type (Table 1) in Section 3.X. For example, in the reactor vessel, internals, and reactor coolant system subsection, this is Table 3.1.1, and in the engineered safety features subsection, this is Table 3.2.1.

X	Definition
1	Reactor Vessel, Internals, and Reactor Coolant System
2	Engineered Safety Features Systems
3	Auxiliary Systems
4	Steam and Power Conversion Systems
5	Structures and Component Supports
6	Electrical and Instrumentation and Controls

The second table type is Table 3.X.2-Y where “3” again indicates the MPS Unit 3 LRA section number; “X” again indicates the table number from Volume 1 of the GALL Report; the “2” indicates that this is the second table type (Table 2) in Section 3.X; and “Y” indicates the system table number. For example, within the vessel, internals, and reactor coolant system subsection, the AMR results for the reactor vessel are presented in Table 3.1.2-1, and the results for the reactor vessel internals are in Table 3.1.2-2. In the engineered safety features subsection, the containment spray system results are presented in Table 3.2.2-1, and the safety injection system results are in Table 3.2.2-2.

The applicant compared the MPS Unit 3 AMR results with information set forth in the tables of the GALL Report and provided the results of its comparisons in two table types that correlate with the two table types described above.

3.2.1 MPS Unit 3 LRA Table 1

MPS Unit 3 LRA Table 1 provides a summary comparison of how the MPS Unit 3 AMR results align with the corresponding table of Volume 1 of the GALL Report. These tables are essentially the same as Tables 1 through 6 of the GALL Report, except that the “Type” column

was replaced by an “Item Number” column, and the “Item Number in GALL” column was replaced by a “Discussion” column. The “Item Number in GALL” column provides a means to identify in MPS Unit 3 LRA Table 2 the corresponding component type in MPS Unit 3 LRA Table 1. The “Discussion” column includes further information. The following are examples of information that might be contained within the “Discussion” column:

(1) information on further evaluation required or reference to the location of that information

(2) the name of a plant-specific program being used

(3) exceptions to the GALL Report assumptions

(4) a discussion of how the line item is consistent with the corresponding line item in the GALL Report, when it may not be obvious

(5) a discussion of how the line item differs from the corresponding line item in the GALL Report, when it may appear to be consistent

Information in the table columns described below is taken directly from Volume 1 of the GALL Report: component, aging effect/mechanism, AMPs, further evaluation recommended. The Discussion column explains, in summary, how the MPS Unit 3 evaluations and programs align with Volume 1 of the GALL Report.

3.2.2 MPS Unit 3 LRA Table 2

MPS Unit 3 LRA Table 2 provides the detailed results of the AMRs for those SCs that are subject to an AMR. There is a Table 2 for each of the AMR systems within a GALL Report system group. For example, the engineered safety features system group contains tables specific to emergency core cooling, containment spray, containment cooling, containment penetrations, and hydrogen control. Table 2 consists of the following nine columns.

Component Type. Column 1 identifies the component types that are subject to an AMR. The component types are listed in alphabetical order. In the structural tables, component types are sub-grouped by material.

Intended Function. Column 2 identifies the license renewal intended functions for the listed component types. Definitions and abbreviations of intended functions are listed in Table 2.0-1 in Section 2 of the MPS Unit 3 LRA.

Material. Column 3 lists the particular materials of construction for the component type being evaluated.

Environment. Column 4 lists the environment to which the component types are exposed. Internal and external service environments are indicated. A description of these environments is provided in Table 3.0-1 and Table 3.0-2, respectively.

Aging Effect Requiring Management. Column 5 lists the aging effects identified as requiring management for the material and environment combinations of each component type.

Aging Management Programs. Column 6 lists the programs used to manage the aging effects requiring management.

NUREG-1801 Volume 2 Item. Column 7 documents identified consistencies of factors listed in Table 2 of the MPS Unit 3 LRA with the GALL Report by noting the appropriate GALL Report item number. Each combination of the following factors listed in Table 2 is compared to the GALL Report to identify those consistencies: component type, material, environment, aging effect requiring management, and AMP. If there is no corresponding item number in the GALL Report for a particular combination of factors, Column 7 is left blank.

Table 1 Item. Column 8 is a cross reference from Table 2 to Table 1. Each combination of the following that has an identified GALL Report item number also has a Table 1 line item reference number: component type, material, environment, aging effect requiring management, and AMP. Column 8 lists the corresponding line item from Table 1. If there is no corresponding item in the GALL Report, Volume 1, Column 8 is left blank.

Notes. Column 9 contains notes that are used to describe the degree of consistency with the line items in the GALL Report. Notes that use letter designations are standard notes based on the letter from A. Nelson, NEI, to P. T. Kuo, NRC, "U.S. Nuclear Industry's Proposed Standard License Renewal Application Format Package, Request NRC Concurrence," dated January 24, 2003 (ML030290201). (Note that the staff concurred in the format of the standardized format for MPS LRAs by letter dated April 7, 2003, from P.T. Kuo, NRC, to A. Nelson, NEI [ML030990052]). Notes that use numeric designators are specific to MPS Unit 3. The letter notes are described in detail in Section 7.2 of this report.

MPS Unit 3 LRA Table 2 contains the AMR results and indicates whether the results correspond to line items in Volume 2 of the GALL Report. Table 2 provides the following information: (1) component type, (2) component intended function, (3) material, (4) environment; (5) aging effect requiring management; and (6) AMPs credited.

Correlations between the combination in MPS Unit 3 LRA Table 2 and a combination for a line item in Volume 2 of the GALL Report are identified by the GALL Report item number in Column 7. If Column 7 is blank, the applicant did not identify a corresponding combination in the GALL Report. If the applicant identified a GALL Report line item, the next column provides a reference to a Table 1 row number. This reference corresponds to the GALL Report, Volume 2, "roll-up" to the GALL Report, Volume 1 tables. Many of the GALL Report evaluations refer to plant-specific programs. In these cases, the applicant considers the MPS Unit 3 evaluation to be consistent with the GALL Report if the other elements are consistent. Any AMP suitable for management of a particular aging effect is considered to be consistent with the GALL program for line items referring to a plant-specific or alternate program if it has been

reviewed and determined to be consistent with the seven program elements (attributes) used to review the plant-specific program.

4. Audit and Review Scope

The AMRs and associated AMPs that the project team reviewed are identified in MPS audit and review plan. The project team examined 26 of the MPS AMPs and associated AMRs. The project team reviewed AMPs and AMRs that the applicant claimed were consistent with the GALL Report. The project team also reviewed certain plant-specific AMPs.

The applicant noted that some of its AMPs, including some that were reviewed by the project team, although described as consistent with the GALL Report, contain some deviations from the GALL Report. These deviations are of two types:

> Exceptions to the GALL Report - Exceptions are specified GALL criteria that the applicant does not intend to meet or implement.
>
> Enhancements to meet the GALL Report - Enhancements are revisions or additions to plant procedures or program activities that the applicant will implement prior to the period of extended operation. Enhancements may expand, but not reduce, the scope of an AMP.

The project team reviewed all of the AMRs in the tables in Chapter 3 of the MPS LRA except those assigned to the Office of Nuclear Reactor Regulation (NRR), Division of Engineering (DE) staff. The items reviewed by the project team were either consistent with the GALL Report, as identified by Notes A through E in the MPS LRA Table 3.X.2-Y (from Column 9 of the Table 2s discussed in Section 3 of this report), or reviewed and accepted by the project team on the basis of an NRC-approved precedent (see Section 5.3 below).

5. Audit and Review Process

The project team followed the process detailed in the MPS audit and review plan. This process is summarized below.

5.1 MPS AMPs

For the MPS AMPs for which the applicant claimed consistency with the AMPs in the GALL Report, the project team determined consistency. The project team reviewed the MPS AMP descriptions and compared seven of the 10 program elements for those AMPs (as defined in Branch Technical Position RLSB-1 of SRP-LR, Appendix A.1) to the corresponding program elements for the GALL AMPs (Attachment 3 shows the 10 program elements from the SRP-LR). As discussed in the MPS audit and review plan, the project team did not review program elements 7, “Corrective Action,” 8, “Confirmation Process,” or 9, “Administrative Controls.” These elements were reviewed by the NRR, Division of Inspection Program Management (DIPM) and the results documented in Section 3 of the safety evaluation report (SER) related to the MPS Units 2 and 3 LRA.

For each MPS AMP that has one or more of the deviations defined in Section 4 of this report, i.e., exception or enhancement, the project team reviewed each deviation to determine whether it was acceptable and whether the MPS AMP, as modified by the applicant, would adequately manage the aging effects for which it is credited. In some cases, the project team identified differences that the applicant did not identify between MPS AMPs credited by the applicant and the GALL AMPs. In these cases, the project team reviewed the difference to determine whether or not it is acceptable, and whether or not the MPS AMP, as modified by the difference, would adequately manage the aging effects.

For those MPS AMPs that are not included in the GALL Report, i.e., those based on an NRC-approved precedent, the project team reviewed the MPS AMP against the seven program elements within its review scope. On the basis of its audit and reviews, the project team determines whether the MPS AMPs would manage the aging effects for which they are credited (see Section 5.3 below).

5.2 MPS AMRs

The AMRs in the GALL Report fall into two broad categories:

> those that the GALL Report concludes are adequate to manage aging of the components referenced in the GALL Report, and
>
> those for which the GALL Report concludes that aging management is adequate, but further evaluation is recommended for certain aspects of the aging management process.

For its AMR reviews, the project team determined that the AMRs reported by the applicant to be consistent with the GALL Report are consistent with the GALL Report and determined that the plant-specific AMRs reported to be justified on the basis of an NRC-approved precedent are technically acceptable and applicable. For component groups evaluated in the GALL Report for which the applicant claims consistency with the GALL Report, and for which the GALL Report recommends further evaluation, the project team reviewed the applicant's evaluation to determine whether it adequately addresses the issues for which the GALL Report recommended further evaluation.

5.3 NRC-Approved Precedents

To help facilitate the staff review of its ~~MPS~~ LRA, an applicant may reference NRC-approved precedents to demonstrate that its non-GALL programs correspond to programs that the staff had approved for other plants during its review of previous applications for license renewal. When an applicant elects to provide precedent information, the project team determines whether the material presented in the precedent is applicable to the applicant's facility, determines whether the plant program is bounded by the conditions for which the precedent was evaluated and approved, and determines that the plant program contains the program elements (or attributes) of the referenced precedent. In general, if the project team determines that these conditions are satisfied, it will use the information in the precedent to frame and focus its review of the applicant's program.

It is important to note that precedent information is not a part of the LRA; it is supplementary information voluntarily provided by the applicant as a reviewer's aid. The existence of a precedent, in and of itself, is not a sufficient basis to accept the applicant's program. Rather, the precedent facilitates the review of the substance of the matters described in the applicant's program. As such, in its documentation of its reviews of programs that are based on precedents, the precedent information is typically implicit in the evaluation rather than explicit. If the project team determines that a precedent identified by the applicant is not applicable to the particular plant program for which it is credited, it refers the program to NRR, Division of Engineering (DE) for review in the traditional manner, i.e., as described in the SRP-LR, without consideration of the precedent information. As noted in Section 4 of this report, the applicant chose to provide precedent information to support its selection of certain MPS programs. Therefore, some of the project team reviews documented in this report considered precedent information in the manner described above.

5.4 UFSAR Supplement

Consistent with the SRP-LR, for the AMRs and associated AMPs that it reviewed, the project team also reviewed the UFSAR supplement that summarizes the applicant's programs and activities for managing the effects of aging for the period of extended operation.

5.5 Documents Reviewed by the Project Team

In performing its work, the project team relied heavily on the MPS LRA, the SRP-LR, and the GALL Report. The project team also examined the applicant's precedent review documents and AMP basis documents (a catalog of the documentation used by the applicant to develop or justify its AMPs), and other applicant documents, including selected implementing procedures, to determine that the applicant's activities and programs will adequately manage the effects of aging on SCs.

Any discrepancies or issues discovered during the audit and review that required a formal response on the docket are documented in this report. If an issue was not docketed or was not resolved prior to issuing this report, a request for additional information (RAI) was prepared by the project team describing the issue and the information needed to disposition the issue. The RAI, if needed, is included and dispositioned in the SER related to the MPS Units 2 and 3 LRA. The list of RAIs associated with the audit and review is provided in Attachment 4 to this report.

Attachment 5 characterizes the nature and extent of the project team's reviews of the applicant's documents and lists the documents reviewed by the project team. During its site visits, the project team also conducted detailed discussions and interviews with the applicant's license renewal project personnel and others with technical expertise relevant to aging management.

5.6 Commitments to be Included in the Safety Evaluation Report

Attachment 6 lists and identifies the commitments made by the applicant that were reviewed by the project team.

6. Exit Meeting

The project team held a public exit meeting with the applicant on July 13, 2004, to discuss the results of its audits and reviews of the AMPs and AMRs assigned to the project team. These discussions reflected the project team's work and its results, as documented in this report.

7. Audit and Review Results

The project team's audit and review activities for the MPS AMPs and AMRs, and its conclusions, are documented below.

7.1 Aging Management Programs

The project team's audit and review activities for the MPS AMPs and its conclusions regarding these programs are documented below. The audit and review was performed in accordance with the guidance contained in the MPS audit and review plan in the manner summarized above.

7.1.1 BATTERY RACK INSPECTIONS PROGRAM (MPS AMP B2.1.1)

In the MPS LRA, Appendix B, Section B2.1.1, the applicant describes MPS AMP B2.1.1, "Battery Rack Inspections Program."

The applicant states that MPS AMP B2.1.1 is a plant-specific program. The applicant credits this program with managing the aging effects for loss of material of such design elements as anchorages, bracing and supports, side and end rails, and spacers between battery cells. Potential degradation of the racks is evaluated for its effect on their structural integrity during a seismic event, and repairs are implemented as necessary.

The project team reviewed the documents listed in Attachment 5 of this report, in whole or in part, including MPS Technical Report MP-LR-3734/MP-LR-4734, "Battery Rack Inspections," Revision 2, dated March 22, 2004, and interviewed the applicant's technical staff.

7.1.1.1 Review of the AMP Against the Program Elements

The project team reviewed MPS AMP B2.1.1 against the AMP elements found in the SRP-LR, Appendix A, Section A.1.2.3 and SRP-LR Table A.1-1. The guidance described in the MPS audit and review plan was followed.

7.1.1.1.1 Scope of Program

The "scope of program" program element criterion in Appendix A.1.2.3.1 of the SRP-LR requires that the program scope include the specific structures and components addressed with this program.

The applicant states in MPS AMP B2.1.1, for the "scope of program" program element, that the battery racks provide support and restraint for various batteries that supply power to equipment in the plant. The applicant states that the battery racks for the following batteries are within the

scope of license renewal for this program: MPS Unit 2 main station batteries, MPS Unit 2 non-safety-grade turbine battery, MPS Unit 2 security diesel generator battery, MPS Unit 3 main station batteries, MPS Unit 3 non-safety-grade battery 5, MPS Unit 3 diesel-driven fire pump batteries, MPS Unit 3 station blackout diesel generator battery, and 345-kilovolt switchyard relaying and control batteries. Seismic design elements such as anchorages (including bolting to the building structure), bracing and supports, side and end rails, and spacers between cells are included as part of this program.

Further, the applicant states in the MPS LRA that the existing battery rack inspection program will be modified to include those battery racks that require monitoring for license renewal, but are not already in the program. The enhancement will be implemented prior to the period of extended operation. This commitment is also identified on the applicant's license renewal commitment list in the MPS LRA, Appendix A, Table A6.0-1, Item 1. The project team finds this enhancement is required and is acceptable as any such changes will provide additional assurance that the effects of aging will be adequately managed.

The project team reviewed and confirmed that this program element satisfies the criterion defined in Appendix A.1.2.3.1 of the SRP-LR. The proposed scope, including the enhancements, identifies the specific components for which the program manages aging. On this basis, the project team finds that the applicant's proposed program scope is acceptable.

7.1.1.1.2 Preventive Actions

The "preventive actions" program element criterion in Appendix A.1.2.3.2 of the SRP-LR is that condition monitoring programs do not rely on preventive actions, and thus, preventive actions need not be provided.

The applicant states in MPS AMP B.2.1.1 that the "preventive actions" program element is not applicable because the battery rack inspection program is an inspection program and no actions will be taken as part of this program to prevent or mitigate aging degradation.

The project team confirmed that the preventive actions program element satisfies the criterion defined in Appendix A.1.2.3.2 of the SRP-LR. The project team did not identify the need for preventive actions for MPS AMP B2.1.1 because it is a condition monitoring program.

7.1.1.1.3 Parameters Monitored/Inspected

The "parameters monitored or inspected" program element criteria in Appendix A.1.2.3.3 of the SRP-LR are

> The parameters to be monitored or inspected should be identified and linked to the degradation of the particular structure and component intended function(s).
>
> For a condition monitoring program, the parameter monitored or inspected should detect the presence and extent of aging effects.

The applicant states in MPS AMP B2.1.1, for the "parameters monitored or inspected" program element, that the battery support racks are visually inspected to ensure that their physical

condition is not degraded (loss of material). Where installed, items such as anchorages (including bolting to the building structure), bracing and supports, side and end rails, and spacers are also inspected.

The project team confirmed this program element satisfies the criteria defined in Appendix A.1.2.3.3 of the SRP-LR. The battery rack inspection program is acceptable because the visual inspections for material loss are intended to detect the presence and extent of aging effects. On this basis, the project team finds that the parameters monitored or inspected program element is acceptable.

7.1.1.1.4 Detection of Aging Effects

The "detection of aging effects" program element criteria in Appendix A.1.2.3.4 of the SRP-LR are

> Provide information that links the parameters to be monitored or inspected to the aging effects being managed.
>
> This program element describes when, where, and how program data are collected (i.e., all aspects of activities to collect data as part of the program).
>
> The method or technique and frequency may be linked to plant-specific or industry-wide operating experience.

The applicant states in MPS AMP B2.1.1 for the "detection of aging effects" program element that

> Battery rack inspections are performed on a periodic basis. Visual inspections identify degradation of the support racks. These inspections include items such as anchorages (including bolting to the building structure), bracing and supports, side and end rails, and spacers. These inspections check for loss of material (such as corrosion) of the support racks.

The existing battery rack inspection program implementing procedures will be modified to include loss of material as a potential aging effect and to provide guidance on the inspection of items (such as anchorages, bracing and supports, side and end rails, and spacers), which contribute to battery rack integrity or seismic design of the battery racks. The enhancement will be implemented prior to the period of extended operation. This commitment is also identified on the applicant's license renewal commitment list in the MPS LRA, Appendix A, Table A6.0-1, Item 2. The project team finds this enhancement is required and is acceptable as any such changes will provide additional assurance that the effects of aging will be adequately managed.

The project team reviewed and confirmed that this program element satisfies the criterion defined in Appendix A.1.2.3.4 of the SRP-LR. The detection of aging effects, including the enhancements, identifies the specific components for which the program manages aging. On this basis, the project team finds that the applicant's detection of aging effects program element is acceptable.

7.1.1.1.5 Monitoring and Trending

The "monitoring and trending" program element criteria in Appendix A, Section A.1.2.3.5 of the SRP-LR are

> Monitoring and trending activities should be described, and they should provide predictability of the extent of degradation and thus effect timely corrective or mitigative actions.
>
> This program element describes how the data collected are evaluated and may also include trending for a forward look. The parameter or indicator trended should be described.

The applicant states in MPS AMP B2.1.1 for the monitoring and trending program element that

> Battery rack inspections determine the extent of aging effects. The material condition of the battery racks is recorded. In accordance with inspection procedures and if acceptance criteria are not met, the corrective action program is employed to evaluate the issue and provide corrective actions in a timely manner. Engineering evaluations assess whether the extent of aging could cause a loss of intended function.

The project team confirmed that this program element satisfies the criteria defined in Appendix A.1.2.3.5 of the SRP-LR. Trending of inspection results will be performed and will enhance the applicant's ability to detect aging effects before there is a loss of intended function. On this basis, the project team finds that the applicant's monitoring and trending program element is acceptable.

7.1.1.1.6 Acceptance Criteria

The "acceptance criteria" program element criteria in Appendix A.1.2.3.6 of the SRP-LR are

> The acceptance criteria of the program and its basis should be described. The acceptance criteria, against which the need for corrective actions will be evaluated, should ensure that the structure and component intended function(s) are maintained under all CLB design conditions during the period of extended operation.
>
> The program should include a methodology for analyzing the results against applicable acceptance criteria.
>
> Qualitative inspections should be performed to same predetermined criteria as quantitative inspections by personnel in accordance with ASME Code and through approved site-specific programs.

The applicant states in MPS AMP B2.1.1 for the acceptance criteria program element that the acceptance criterion for visual inspections is the absence of anomalous indications that are signs of degradation. Engineering evaluations determine whether observed deterioration of

material condition is significant enough to compromise the ability of a battery rack to perform its intended function during a seismic event or maintain its integrity for general operation. Occurrence of degradation that is adverse to quality will be entered into the corrective action system.

The project team confirmed that this program element satisfies the criteria defined in Appendix A.1.2.3.6 of the SRP-LR. Any anomalous indications that are signs of degradation will be evaluated by an engineer to determine whether the observed deterioration of material condition is significant enough to compromise the ability of a battery rack to perform its intended function. If found unacceptable, corrective measures will be implemented. On this basis, the project team finds that the acceptance criteria program element is acceptable.

7.1.1.1.7 Corrective Actions

This program element is reviewed by the NRR DIPM staff and addressed in Section 3 of the SER related to the MPS Units 2 and 3 LRA.

7.1.1.1.8 Confirmation Process

This program element is reviewed by the NRR DIPM staff and addressed in Section 3 of the SER related to the MPS Units 2 and 3 LRA.

7.1.1.1.9 Administrative Controls

This program element is reviewed by the NRR DIPM staff and addressed in Section 3 of the SER related to the MPS Units 2 and 3 LRA.

7.1.1.1.10 Operating Experience

The “operating experience” program element criterion in Appendix A.1.2.3.10 of the SRP-LR states that operating experience should provide objective evidence to support the conclusion that the effects of aging will be managed adequately so that the structure and component intended function(s) will be maintained during the period of extended operation.

The applicant states in the MPS LRA that the inspections and corrective actions have been successful in maintaining battery support rack integrity. Incidents of battery rack corrosion have occurred and corrective action has been taken to repair or replace storage rack components as necessary. Periodic inspections of the support racks help ensure their continued integrity and proper functioning during routine operation, as well as during the limiting condition of a seismic event.

The following example, based on review the applicant’s condition reports generated under the corrective action program, is representative of internal operating experience at MPS and was considered in evaluating the effectiveness of the program.

> The restraining rods between Battery Cells 53 and 54 and between Cells 6 and 7 for the Unit 2 125-volt direct current (DC) Station Battery 'B' were found to be severely corroded, resulting in a significant loss of material. A wet spot was

> observed on the floor between Cells 53 and 54. There was also evidenced of prior leakage on the floor between Cells 6 and 7 in the form of a large stain with a trail leading to the floor drain. This location was not observed to be leaking at the time of the condition report initiation. An automated work order was developed to determine the source of leakage (M2-02-03273), and a trouble report was initiated to repair the restraining rods. The leaking battery cell and the restraining rods were repaired.

On the basis of its review of the above operating experience and on discussions with the applicant's technical staff, the project team concludes that MPS AMP B2.1.1 will adequately manage the aging effects that have been observed at the applicant's plant.

7.1.1.2 UFSAR Supplement

The applicant provides its UFSAR supplements for the battery rack inspections program in the MPS LRA, Appendix A, Section A2.1.1, and states that the program will manage the aging effect of loss material for the station battery support racks within the scope of license renewal. Visual inspections will be performed to ensure the absence of anomalous indications that are signs of degradation. Corrective actions for conditions that are adverse to quality are performed in accordance with the applicant's corrective action program as part of the quality assurance program.

The applicant states, in the MPS LRA, Appendix A, that two commitments are associated with the battery rack inspections program as follows

> The existing battery rack inspection program will be modified to include those battery racks that require monitoring for license renewal, but are not already in the program. The enhancement will be implemented prior to the period of extended operation. This commitment is also identified on the applicant's license renewal commitment list in the MPS LRA, Appendix A, Table A6.0-1, Item 1.
>
> The existing battery rack inspection program implementing procedures will be modified to include loss of material as a potential aging effect and to provide guidance on the inspection of items (such as anchorages, bracing and supports, side and end rails, and spacers), which contribute to battery rack integrity or seismic design of the battery racks. The enhancement will be implemented prior to the period of extended operation. This commitment is also identified on the applicant's license renewal commitment list in the MPS LRA, Appendix A, Table A6.0-1, Item 2.

The project team reviewed the UFSAR supplements and confirms that they provide an adequate summary description of the program, as identified in the SRP-LR UFSAR supplement table and as required by 10 CFR 54.21(d).

7.1.1.3 Conclusion

On the basis of its audit and review of the applicant's program, the project team finds that the applicant has demonstrated that the effects of aging will be adequately managed so that the

intended functions will be maintained consistent with the CLB during the period of extended operation, as required by 10 CFR 54.21(a)(3).

On the basis of its review of the UFSAR supplement for this AMP, the project team also finds that it provides an adequate summary description of the program, as required by 10 CFR 54.21(d).

7.1.2 BORAFLEX MONITORING PROGRAM (MPS AMP B2.1.2)

In the MPS LRA, Appendix B, Section B2.1.2, the applicant states that MPS AMP B2.1.2, "Boraflex Monitoring," is consistent with GALL AMP XI.M22, "Boraflex Monitoring."

7.1.2.1 Program Description

The applicant states, in the MPS LRA, that the Boraflex monitoring program manages the aging effect of change of material properties on the sheets of neutron-absorbing materials affixed inside spent fuel racks at MPS Unit 2. For the Boraflex panels, gamma irradiation and long-term exposure to the wet pool environment cause shrinkage, which results in gap formation, gradual degradation of the polymer matrix, and the release of silica to the spent fuel storage pool water. The resultant loss of boron carbide from the neutron-absorbing sheets reduces the neutron absorption capabilities. The program ensures that periodic testing and monitoring is performed to verify the condition of the neutron-absorbing panels in the spent fuel storage pool.

Boraflex panels are installed in the MPS Unit 3 spent fuel racks but are not credited for neutron absorption and criticality prevention of the spent fuel pool. For that reason, the Boraflex monitoring program at MPS Unit 3 is not included in this AMP.

7.1.2.2 Consistency with the GALL Report

In the MPS Unit 2 LRA, the applicant states that MPS AMP B2.1.2 is consistent with GALL AMP XI.M22.

The project team interviewed the applicant's technical staff and reviewed, in whole or in part, the documents listed in Attachment 5 of this report for MPS AMP B2.1.2, including MPS Technical Report MP-LR-3717/MP-LR-4717, "Boraflex Monitoring," Revision 2, dated March 16, 2004, which provides an assessment of how the GALL AMP elements are addressed by the Boraflex monitoring program.

The project team reviewed the seven program elements (see Section 5.1 of this report) contained in the MPS AMP and associated bases documents against GALL AMP XI.M22 for consistency.

7.1.2.3 Exceptions to the GALL Report

None

7.1.2.4 Enhancements

None

7.1.2.5 Operating Experience

The applicant states, in the MPS LRA, that the existing spent fuel racks were installed in 1986. Because of erosion of the prefabricated sample coupons, MPS Unit 2 began extracting samples from panels in use beginning in May 1997. Shrinkage-induced gap formation remains far below that which is assumed in the criticality analysis. Spent fuel pool silica concentrations have been acceptable.

On the basis of its review of the above operating experience at the applicant's plant and at other nuclear facilities as well as discussions with the applicant's technical staff, the project team concludes that MPS AMP B2.1.2 adequately manages the aging effects that have been observed at the applicant's plant.

7.1.2.6 UFSAR Supplement

The applicant provides its UFSAR supplement for the Boraflex monitoring program in MPS Unit 2 LRA, Appendix A, Section A2.1.2. The applicant states, in MPS LRA Appendix A, that the program manages the aging effect of change of material properties and ensures that periodic testing and monitoring is performed to verify the condition of the neutron-absorbing panels in the spent fuel storage pool. Tests for areal density of B-10, dimensions, and blackness testing are identified. Corrective actions for conditions that are adverse to quality are performed in accordance with the applicant's corrective action program as part of the quality assurance program.

The project team reviewed the UFSAR supplement and confirms that it provides an adequate summary description of the program, as identified in the SRP-LR UFSAR supplement table and as required by 10 CFR 54.21(d).

7.1.2.7 Evaluation

The project team performed a review of the applicable criteria in GALL AMP XI.M22, "Boraflex Monitoring," and the program description and elements for MPS AMP B2.1.2, "Boraflex Monitoring."

Based on its review, the project team concludes that the applicant's Boraflex monitoring program provides reasonable assurance of aging management of change of material properties on the sheets of neutron-absorbing materials affixed inside spent fuel racks at MPS Unit 2 only. The project team finds this AMP acceptable because it conforms to the recommended program description, program elements, and acceptance criteria for the Boraflex monitoring program, as discussed in GALL AMP XI.M22, "Boraflex Monitoring."

The applicant states, in the MPS LRA, that Boraflex panels are installed in the MPS Unit 3 spent fuel racks but the panels are not credited for neutron absorption and criticality prevention of the spent fuel pool. For that reason, the Boraflex monitoring program at MPS Unit 3 is not

included in this AMP. Since the applicant did not credit spent fuel racks for neutron absorption and criticality prevention of the spent fuel pool for MPS Unit 3, the project team agrees that the Boraflex monitoring program is not applicable to MPS Unit 3.

7.1.2.8 Conclusion

On the basis of its audit and review of the applicant's program, the project team finds that those portions of the program for which the applicant claims consistency with the GALL program are consistent with the GALL program. Since the GALL program is acceptable to the staff, the project team concludes that the applicant has demonstrated that the effects of aging will be adequately managed so that the intended functions will be maintained consistent with the CLB during the period of extended operation, as required by 10 CFR 54.21(a)(3).

On the basis of its review of the UFSAR supplement for this AMP, the project team also finds that it provides an adequate summary description of the program, as required by 10 CFR 54.21(d).

7.1.3 BURIED PIPE INSPECTION PROGRAM (MPS AMP B2.1.4)

In the MPS LRA, Appendix B, Section B2.1.4, the applicant states that MPS AMP B2.1.4 "Buried Pipe Inspection Program," is consistent with GALL AMPs XI.M28, "Buried Piping and Tanks Surveillance" and XI.M34, "Buried Piping and Tanks Inspection," with exceptions and enhancements.

7.1.3.1 Program Description

The applicant states, in the MPS LRA, that the buried pipe inspection program manages the aging effect of loss of material through the use of preventive measures, i.e., coating, wrapping, and cathodic protection, and inspections. Though preventive measures were applied to the external surfaces of the buried piping, no credit was taken for these measures in the determination of the aging effects for the underlying materials. The program evaluates the condition of the coatings and/or wraps as an indication of the condition of the underlying materials.

The applicant also states in the MPS LRA that the use of impressed-current cathodic protection for in-scope piping is limited to the MPS Unit 2 off-gas pipeway and the MPS Unit 3 supplementary leak collection and release system piping.

In the MPS LRA, the applicant states that a baseline inspection of the in-scope buried components, located in a damp soil environment, will be performed for a representative sample of each of the following combinations of material and protective measures: Unit 2 - carbon steel/coated, Unit 2 - carbon steel/wrapped, Unit 2 - cast iron/wrapped, Unit 3 - stainless steel/coated, Unit 3 - carbon steel/wrapped, Unit 3 - cast iron/wrapped, and Unit 3 - copper alloy/uncoated.

The program requires that the inspections be completed using available industry guidance such as the National Association of Corrosion Engineers' (NACE) Standard RP-0169, "Control of External Corrosion on Underground or Submerged Metallic Piping Systems," dated 1996.

Furthermore, the applicant states that inspections will also be performed when the buried components are excavated for maintenance or for any other reason which will provide an effective method to evaluate the condition of the buried piping and protective coatings on a continuing basis.

7.1.3.2 Consistency with the GALL Report

In the MPS LRA, the applicant states that MPS AMP B2.1.4 is consistent with GALL AMPs XI.M28 and XI.M34, with exceptions and enhancements.

The project team interviewed the applicant's technical staff and reviewed, in whole or in part, the documents listed in Attachment 5 of this report for MPS AMP B2.1.4, including MPS Technical Report MP-LR-3721/MP-LR-4721, "Buried Piping Inspection Program," Revision 2, dated March 16, 2004, which provides an assessment of how the GALL AMP elements are addressed by the buried pipe inspection program.

The project team reviewed seven program elements (see Section 5.1 of this report) contained in the MPS AMP and associated bases documentation against GALL AMPs XI.M28 and XI.M34 for consistency.

7.1.3.3 Exceptions to the GALL Report

The applicant states, in the MPS LRA, exceptions to the GALL Report elements as follows

Element: 1: Scope of Program
Exception: The National Association of Corrosion Engineers (NACE) Standard RP-0169-96, "Control of External Corrosion on Underground or Submerged Metallic Piping Systems," dated 1996, may not have been utilized during initial installation of the piping in establishing the preventive measures.

Element: 5: Monitoring and Trending
Exception: Coating conductance and current requirement for cathodic protection are not trended versus time. Performance parameters of the impressed current cathodic protection systems are checked either monthly or quarterly and compared to predetermined values to verify proper operation.

The GALL Report identifies the following criteria for the "scope of program" program element associated with the exception taken

> The program relies on preventive measures, such as coatings, wrapping, and cathodic protection, and surveillance, based on NACE Standard RP-0285-95, "Corrosion Control of Underground Storage Tank Systems by Cathodic Protection," dated 1995, and NACE Standard RP-0169-96, to manage the effects of corrosion on the intended function of buried tanks and piping, respectively.

The project team understands that it cannot be documented that NACE Standard RP-0169-96 was utilized during installation of the in-scope buried piping. As an enhancement to the program scope, the applicant will perform baseline inspections of the in-scope buried piping located in a damp soil environment to develop a representative sample of each combination of material and protective measures identified in the program description. The inspections will include piping or valves and will provide an effective method for evaluating the condition of the buried components and protective coatings. The inspections will use available industry guidance such as NACE Standard RP-0169-96. With these inspections, the MPS program for buried piping and valves will meet the intent of the GALL AMP XI.M28 with regard to establishing that the protective measures put in place during construction are effective. The project team finds this exception to be acceptable.

The GALL Report identifies the following criterion for the "monitoring and trending" program element associated with the exception taken

> Monitoring the coating conductance versus time or the current requirement versus time provides an indication of the condition of the coating and cathodic protection system when compared to predetermined values.

The project team finds that the difference between trending of cathodic protection versus time and the checking of impressed cathodic protection system current either monthly or quarterly and comparing these values with predetermined values for proper operation is insignificant since aging effects are typically manifested over several years. A review of the MPS operating experience identified no specific instances where degradation has occurred for the buried piping with cathodic protection. Since the verification of performance parameters of the impressed current cathodic protection system in meeting the predetermined values ensures proper operation, the intent of the GALL program element is satisfied. The project team concludes that the monthly or quarterly periodicity of checking the cathodic protection system against predetermined values adequately manages the aging effects of buried pipe components during the period of extended operation. The project team finds this exception to be acceptable.

7.1.3.4 <u>Enhancements</u>

The applicant states, in the MPS LRA, the enhancements to the GALL Report elements as follows

Elements:	1: Scope of Program 4: Detection of Aging Effects
Enhancement:	A baseline inspection will be performed on a representative sample of different piping materials with different protective measures for the buried piping located in a damp soil environment. The inspections will include a short length of piping and any associated valves for each combination of material and burial condition.
Elements:	1: Scope of Program 4: Detection of Aging Effects

Enhancement: The maintenance and work control procedures will be revised to ensure that inspections of buried components are performed when the piping is excavated during maintenance or for any other reason. These inspections will ensure on a continuing basis that the condition of the buried and protective coating and wrapping remain intact so they will be able to perform their intended function.

The GALL Report identifies the following criteria for the "scope of program" and "detection of aging effects" program elements associated with the enhancement

> The program relies on preventive measures, such as coating, wrapping, and cathodic protection, and surveillance, based on NACE Standard RP-0285-95 and NACE Standard RP-0169-96, to manage the effects of corrosion on the intended function of buried tanks and piping, respectively.
>
> Coatings and wrapping can be damaged during installation or while in service and the cathodic protection system is relied upon to avoid any corrosion at the damaged locations. Degradation of the coatings and wrapping during service will result in the requirement for more current from the cathodic protection rectifier in order to maintain the proper cathodic protect potentials. Any increase in current requirements is an indication of coating and wrapping degradation. A close interval pipe to soil potential survey can be used to locate the locations where degradation has occurred.

As identified in the MPS LRA, the applicant will perform a baseline inspection on a representative sample of different piping materials with different protective measures for the buried piping located in a damp soil environment. The inspections will include a short length of piping and any associated valves for each combination of material and burial condition. The applicant states, in the MPS LRA, that these inspections, using available industry guidance such as NACE Standard RP-0169-96, will provide an effective method to evaluate the condition of the buried piping and protective coatings. With these inspections, the MPS program for buried piping and valves will be consistent with the programs described in GALL AMP XI.M28, "Buried Piping and Tanks Surveillance," with regard to establishing that the protective measures put in place during construction are effective. Components protected by cathodic protection will not be inspected. These inspections will be initiated prior to the period of extended operation. This commitment is identified on the applicant's license renewal commitment list in the MPS LRA, Appendix A, Table A6.0-1, as Item 3. On the basis that these inspections will bring the applicant's program to be consistent with GALL AMP XI.M28, the project team finds this enhancement to be acceptable.

The GALL Report identifies the following criteria for the "scope of program" and "detection of aging effects" program elements associated with the enhancement

> The program relies on preventive measures, such as coating and wrapping and periodic inspection for loss of material caused by corrosion of the external surface of buried carbon steel piping and tanks. Loss of material in these components, which may be exposed to aggressive soil environment, is caused

> by general pitting, crevice corrosion, and microbiologically influenced corrosion (MIC). Periodic inspections are performed when the components are excavated for maintenance or for any other reason. The scope of the program covers buried components that are within the scope of license renewal for the plant.
>
> The periodic inspection of susceptible locations to confirm that coating and wrapping are intact is an effective method to ensure that corrosion of external surfaces has not occurred and the intended function is maintained.

As identified in MPS Technical Report MP-LR-3721/MP-LR-4721, the applicant will revise the maintenance and work control procedures to ensure that inspections of buried components are performed when the piping is excavated during maintenance or for any other reason. The applicant states, in the MPS LRA, that these inspections will ensure on a continuing basis that the condition of the buried and protective coating and wrapping remain intact so they will be able to perform their intended function. With these inspections, the applicant's program for buried piping will be consistent with GALL AMP XI.M34, "Buried Piping and Tanks Inspection." This commitment is identified on the applicant's license renewal commitment list in the MPS LRA, Appendix A, Table A6.0-1, as Item 4. On the basis that these inspections will bring the applicant's program to be consistent with GALL AMP XI.M34, the project team finds this enhancement to be acceptable.

7.1.3.5 Operating Experience

The project team reviewed operating experience for the applicant's buried pipe inspection program. The review indicated the buried pipe inspection program is effective in identifying age-related degradation, implementing repairs, and maintaining the integrity of buried pipe. The following examples, based on review of condition reports generated under the corrective action program, are representative of internal operating experience at MPS and were considered for evaluating the effectiveness of the program.

During performance of cathodic protection system maintenance on rectifiers PO29A and PO29B, the applicant noted that Anode #5 for OG-3 had a low reading of 0.0 amps. As a result, work order M29904199 was developed to perform excavation as required to facilitate the replacement of Anode OG3-5 for the off-gas pipe from Unit 2 to the Unit 1 stack. Contingency plans were made to replace Anodes OG3-5 and OG3-1 through OG3-4, if it was discovered that OG3-5 had been sacrificed. Subsequently, cathodic protection vendor representatives visited the site and performed a walkdown of the off-gas cathodic protection system. Further evaluations and discussions with the applicant's technical personnel included review of photographs of the anodes that were recently replaced at junction box OG3 and a briefing on the recent history of the system. Agreement was reached that a wholesale replacement of all the anodes in the system was not warranted based on the condition of the unearthed anodes at Box OG3.

The applicant states in the MPS LRA that the corrosion mechanisms seen in the MPS firewater piping are similar to those seen in the MPS domestic water (city water) piping. These mechanisms are well known and do not require sampling to determine their cause or extent. Additionally, the fire water system is flow tested every three years, and no significant degradation in overall loop flow has been noted. Further, due to the recent decommissioning of

MPS Unit 1, several parts of the site's firewater above ground piping have been removed and made available for detailed inspection.

All of the Unit 1 piping segments had been in place and filled with water for approximately 30 years. No significant corrosion was identified in the above ground piping. While one piece of unlined 6-inch carbon steel pipe had about ¼-inch of corrosion buildup, this buildup was evaluated and determined to not restrict flow nor challenge the system's pressure boundary.

The rest of the aboveground piping segments inspected were clean. Since the fire pumps are run frequently, the piping associated with the pumps' suction lines and tank recirculation lines was considered subject to corrosion buildup. During the fire tank replacement project, segments of the firewater suction piping and tank recirculation piping were disassembled and inspected. When disassembled, these lines were observed to have a significant corrosion buildup, but this corrosion buildup did not affect pump performance, which was measured using lines that frequently experienced flow. Much of this corroded piping, and the tanks themselves, were replaced as part of the fire tank replacement project.

Internal tank inspections were performed on the Unit 2 emergency diesel generator fuel oil day tanks in January 2002 as required by the tank inspection program. The tanks were drained, the manways opened, and residual oil on the bottom of each tank was removed. The inspections did not discover any reportable conditions and the condition of the tank internals was described as "like new." The tanks were closed and returned to service.

On the basis of its review of the above operating experience and on discussions with the applicant's technical staff, the project team concludes that MPS AMP B2.1.4 adequately manages the aging effects that have been observed at the applicant's plant.

7.1.3.6 UFSAR Supplement

The applicant provides its UFSAR supplements for the buried pipe inspection program in the MPS Unit 2 LRA, Appendix A, Section A.2.1.4 and MPS Unit 3 LRA, Appendix A, Section A2.1.3, which state that the program manages the aging effect of loss of material through the use of preventive measures and inspections. The inspections will be performed when the piping and components are excavated for maintenance or for any other reason. The acceptance criterion for visual inspections is the absence of anomalous indications that are signs of degradation. Corrective actions for conditions that are adverse to quality are performed in accordance with the corrective action program as part of the quality assurance program.

The applicant states, in the MPS LRA, Appendix A, that two commitments are associated with the buried pipe inspection program as follows

> The applicant will perform a baseline inspection on a representative sample of different piping materials with different protective measures for the buried piping located in a damp soil environment. These inspections will be initiated prior to the period of extended operation. This commitment is identified on the applicant's license renewal commitment list in the MPS LRA, Appendix A, Table A6.0-1, as Item 3.

> The applicant will revise the maintenance and work control procedures to ensure that inspections of buried components are performed when the piping is excavated during maintenance or for any other reason. This commitment is identified on the applicant's license renewal commitment list in the MPS LRA, Appendix A, Table A6.0-1, as Item 4.

The project team reviewed the UFSAR supplements and confirms that they provide an adequate summary description of the program, as identified in the SRP-LR UFSAR supplement table and as required by 10 CFR 54.21(d).

7.1.3.7 Evaluation

The project team performed a review of the applicable criteria in GALL AMPs XI.M28, "Buried Piping and Tanks Surveillance" and XI.M34, "Buried Piping and Tanks Inspection" and the program description and elements for MPS AMP B2.1.4, "Buried Pipe Inspection Program."

For the aspects of the program elements that were determined by the applicant to be consistent with the corresponding program elements in GALL AMPs XI.M28 and XI.M34, the project team determined that these program elements for MPS AMP B2.1.4 conform with the applicable program elements and acceptance criteria in GALL AMPs XI.M28, "Buried Piping and Tanks Surveillance" and XI.M34, "Buried Piping and Tanks Inspection." Based on its review of the exceptions and enhancements, the project team concludes that the applicant's buried pipe inspection program provides reasonable assurance of aging management of loss of material through the use of preventive measures, i.e., coating, wrapping, and cathodic protection, and inspections in the in-scope buried components, located in a damp soil environment. The project team finds this AMP acceptable because it conforms to the recommended program description, program elements, and acceptance criteria for buried piping inspection, as discussed in GALL AMPs XI.M28, "Buried Piping and Tanks Surveillance" and XI.M34, "Buried Piping and Tanks Inspection."

Although the applicant cannot document that NACE Standard RP-0169-96 was used to establish preventive measures for the in-scope buried piping at the time it was installed, baseline inspections will be performed on piping and valves located in damp soil. These evaluations will provide an effective means for determining the condition of the components and their wrappings, thus enabling the applicant to meet the intent of GALL AMP XI.M28 with regard to establishing that the protective measures put in place during construction are effective. On this basis, the project team finds this exception to be acceptable.

At MPS, performance parameters of the impressed current cathodic protection systems are checked either monthly or quarterly and compared to predetermined values to verify proper operation. GALL AMP XI.M28 states that coating conductance versus time or current requirement versus time are acceptable monitoring techniques. The project team finds that the difference in comparison approaches is insignificant since aging effects are typically manifested over several years and because the MPS operating experience identified no specific instances where degradation has occurred for the buried piping with cathodic protection. Verification of the performance parameters of the impressed current cathodic protection systems in meeting the predetermined values ensures proper operation, thus enabling the applicant to meet the intent of the GALL AMP. On this basis, the project team finds this exception to be acceptable.

The applicant has committed to enhance the buried pipe inspection program by performing baseline inspections on piping and valves located in damp soil. These evaluations will provide an effective means for determining the condition of the components and their wrappings, thus enabling the applicant to meet the intent of GALL AMP XI.M28 with regard to establishing that the protective measures put in place during construction are effective. This commitment is identified on the applicant's license renewal commitment list in the MPS LRA, Appendix A, Table A6.0-1, as Item 3. On this basis, the project team finds this enhancement to be acceptable.

The applicant has committed to enhance the buried pipe inspection program by revising the maintenance and work control procedures to ensure that inspections of buried components are performed with the piping is excavated during maintenance or for any other reason. This commitment is identified on the applicant's license renewal commitment list in the MPS LRA, Appendix A, Table A6.0-1, as Item 4. On the basis that these inspections will render the applicant's program consistent with GALL AMP XI.M34, the project team finds this enhancement to be acceptable.

The project team identified the following difference regarding the detection of aging effects program element

> The applicant states in the discussion of MPS LRA Table 3.3.1, Item 29 that components (aluminum bronze, brass, cast iron, cast steel) in open-cycle and closed-cycle cooling water systems, and the ultimate heat sink, are subject to loss of material due to selective leaching. Management of this aging effect is assigned to the work control process and buried pipe inspection program.

GALL AMP XI.M.33, "Selective Leaching of Materials," recommends a combination of one-time inspection and hardness measurement. Since selective leaching is a slow acting corrosion process, it is recommended that this be performed as late in the plant life as possible, preferably after 30 years of service.

Selective leaching generally does not cause changes in dimension and is difficult to detect by visual inspection. Hence, a Brinnell hardness test on the inside surfaces of a selected set of components is recommended to determine if selective leaching has occurred. Alternatively, if a component is removed from service for whatever reason, a destructive test could be performed.

The applicant's first enhancement to MPS AMP B2.1.4 states that baseline inspections will be performed on in-scope buried piping, but does not specify the type of inspection. The applicant was asked to justify the type of inspection (only visual), or provide other means of detection such as Brinnell hardness, destructive testing, or other mechanical means such as scraping, chipping, etc.

In a MPS LRA supplement letter dated July 7, 2004 (ML041900407) the applicant stated the following

BURIED PIPE INSPECTION PROGRAM

For MPS Unit 2 Appendix A, Section A2.1.4 (page A-6) and MPS Unit 3 Appendix A, Section A2.1.3 (page A-5)

1. At the end of the “Program Description” section, the applicant added the following

   In addition to visual inspections, the field inspections for loss of material due to selective leaching will include mechanical means, such as resonance when struck by another object, scraping, or chipping.

2. The applicant added the following sentence to the first bulleted commitment after the first sentence

   Inspection for the loss of material due to selective leaching will be performed by visual, and mechanical or other appropriate methods.

3. The applicant added the following sentence to the second bulleted commitment after the first sentence

   These procedures will include the inspection for the loss of material due to selective leaching which will be performed by visual, and mechanical or other appropriate methods.

For MPS Unit 2 and Unit 3, Appendix A, Table A6.0-1, Commitment 3 (pages A-34 and A-33, respectively) the applicant added the following sentence to the end of the commitment

> Inspection for the loss of material due to selective leaching will be performed by visual, and mechanical or other appropriate methods.

For MPS Unit 2 and Unit 3, Appendix A, Table A6.0-1, Commitment 3 (pages A-34 and A-33, respectively) the applicant added the following sentence to the end of the commitment

> These procedures will include the inspection for the loss of material due to selective leaching which will be performed by visual, and mechanical or other appropriate methods.

For MPS Unit 2 and Unit 3, Appendix B, Section B2.1.4, “Program Description” (page B-19), the applicant inserted the following sentence at the end of the section

> In addition to visual inspections, the field inspection for loss of material due to selective leaching will include mechanical means, such as resonance when struck by another object, scraping, or chipping.

For MPS Unit 2 and Unit 3, Appendix B, Section B2.1.4, the following sentence was added to the first enhancement, after the sentence that ends with "NACE Standard RP-0169," (page B-20)

> Inspection for the loss of material due to selective leaching will be performed by visual, and mechanical or other appropriate methods.

For MPS Unit 2 and Unit 3, Appendix B, Section B2.1.4, the following sentence was added to the second enhancement, after the sentence that ends with "or for any other reason," (page B-21)

> These procedures will include the inspection for the loss of material due to selective leaching which will be performed by visual, and mechanical or other appropriate methods.

The project team finds the applicant's response acceptable.

7.1.3.8 Conclusion

On the basis of its audit and review of the applicant's program, the project team finds that those portions of the program for which the applicant claims consistency with the GALL Report are consistent with the GALL Report. In addition, on the basis of its review of the clarifications, exceptions, and enhancements to the GALL Report, the project team finds that the applicant's program provides for adequate management of the aging effects for which the program is credited so that the intended functions will be maintained consistent with the CLB during the period of extended operation, as required by 10 CFR 54.21(a)(3).

On the basis of its review of the UFSAR supplements for this AMP, the project team also finds that they provide an adequate summary description of the program, as required by 10 CFR 54.21(d).

7.1.4 CHEMISTRY CONTROL FOR PRIMARY SYSTEMS PROGRAM (MPS AMP B2.1.5)

In the MPS LRA, Appendix B, Section B2.1.5, the applicant states that MPS AMP B2.1.5, "Chemistry Control for Primary Systems Program," is consistent with GALL AMP XI.M2, "Water Chemistry," with an exception.

7.1.4.1 Program Description

The applicant states, in the MPS LRA, that the chemistry control for primary systems program includes periodic monitoring and control of known detrimental contaminants such as chlorides, fluorides, dissolved oxygen, and sulfate concentration below the levels known to result in loss of material or cracking in accordance with the Electric Power Research Institute (EPRI) Technical Report TR-105714, "PWR Primary Water Chemistry Guidelines," Revision 4, dated March 1999.

The applicant also states, in the MPS LRA, that the chemistry control for primary systems program monitors the fluids within the following systems and components: reactor coolant system, emergency core cooling system (refueling water storage tank and safety injection accumulator tanks), charging and volume control system (boric acid storage tank, letdown demineralizer (Unit 2), and volume control tank (Unit 2)), spent fuel pool cooling and purification system (spent fuel pool demineralizer), sampling system, primary makeup water (primary water storage tank (Unit 2), primary grade water storage tank (Unit 3), and demineralized water storage tank (Unit 3)).

The applicant states, in the MPS LRA, that the monitored chemistry parameters are based on information provided in EPRI TR-105714 and the requirements of the plant technical specifications and the plant technical requirements manual. The monitored parameters include the following items: chlorides, conductivity, dissolved oxygen, fluorides, hydrogen, hydrogen peroxide, lithium, pH, and sulfates. In addition, the applicant states that verification of the effectiveness of the chemistry control for primary systems program is provided by the work control process.

7.1.4.2 Consistency with the GALL Report

In the MPS LRA, the applicant states that MPS AMP B2.1.5 is consistent with GALL AMP XI.M2, with an exception.

The project team interviewed the applicant's technical staff and reviewed, in whole or in part, the documents listed in Attachment 5 of this report for MPS AMP B2.1.5, including MPS Technical Report MP-LR-3702/4702, "Chemistry Control Primary Systems," Revision 2, dated March 16, 2004, which provides an assessment of how the GALL AMP elements are addressed by the chemistry control for primary systems program.

The project team reviewed seven program elements (see Section 5.1 of this report) contained in the MPS AMP and associated bases documentation against the GALL AMP XI.M2 for consistency.

7.1.4.3 Exceptions to the GALL Report

The applicant states, in the MPS LRA, an exception to the GALL Report elements as follows

Element: 1: Scope of Program
Exception: GALL AMP XI.M2 identifies that the applicable EPRI guideline for primary water chemistry systems program is TR-105714, Revision 3 or a later revision approved by the NRC. MPS AMP B2.1.5 is based on Revision 4 of the same EPRI guidance, which has not yet been approved by the NRC.

The GALL Report identifies the following criterion for the "scope of program" program element associated with the exception taken

> Water chemistry control is in accordance with the guidelines in BWRVIP-29 (EPRI TR-103515) for water chemistry in BWRs; EPRI TR-105714, Rev. 3 for

> primary water chemistry in PWRs; EPRI TR-102134, Rev. 3 for secondary water chemistry in PWRs; or later revisions or updates of these reports as approved by the staff.

The applicant states, in the MPS LRA, that the MPS chemistry control for primary systems program is based on EPRI TR-015714, "PWR Primary Water Chemistry Guidelines," Revision 4, dated March, 1999. The later revision incorporates additional industry operating experience not available at the time of the issuance of the earlier revision and is in keeping with the latest industry practice. Further, the later revision is more conservative with regard to monitoring and control of primary chemistry parameters. On the basis that the later revision of the EPRI guidance applies more stringent guidelines than the earlier version, the project team finds this exception to be acceptable.

7.1.4.4 Enhancements

None

7.1.4.5 Operating Experience

The project team reviewed operating experience for the applicant's chemistry control for primary systems program. The applicant states, in the MPS LRA, that the chemistry control for primary systems program is based on the EPRI guidelines to take advantage of industry operating experience as is done in the GALL Report. The project team reviewed condition reports and interviewed the applicant's technical staff, which did not reveal any examples where the loss of intended function occurred as the result of inadequate primary water chemistry controls. The project team determined that the MPS operating experience indicates that the chemistry control for primary systems program creates an environment that minimizes material degradation. The project team's review of the applicant's operating experience indicates that primary water systems chemistry parameters can drift from their acceptable ranges, but the chemistry control for primary systems program is effective in identifying these anomalies, implementing effective corrective action, and trending the parameters. When chemistry results reach a level at which loss of material or cracking could become a concern related to the loss of intended function, immediate corrective actions have been implemented to preclude the necessity for a plant shutdown.

The following representative examples of internal operating experience at MPS are based on the project team's review of plant incident reports and condition reports generated under the corrective action program. These examples were considered in evaluating the effectiveness of the program

> MPS Unit 2 reactor coolant system sulfate concentration was measured (239 parts per billion (ppb)) and verified to be greater than the Action level limits of 150 ppb. Initial investigation determined that the probable cause was resin degradation in the delithiating demineralizer. Immediate corrective actions included securing the delithiating demineralizer and reloading it with new resin. In addition, a long-term corrective action was developed (and completed) to incorporate, into plant procedures, methods of quickly identifying degraded resin following the placement of a demineralizer in service.

During MPS Unit 3's refueling outage 6 refueling operations, water with high silica concentrations due to Boraflex degradation was transported from the spent fuel pool to the refueling water storage tank. As a result, a cleanup evolution using reverse osmosis was implemented. Silica from the tank was reduced from 2.7 parts per million (ppm) to approximately 1.0 ppm in about eight weeks. Additionally, the liquid radwaste treatment system was able to treat colloidal silica/cobalt, and a corrective action was developed to generate engineering work requests to improve radwaste performance.

Subsequent to placing a demineralizer in service in the Unit 2 letdown system, the results of a daily sample indicated that the chloride concentration in the reactor coolant system was 124 ppb. A confirmatory chloride decontamination factor sample across the demineralizer was taken. The results showed influent chlorides of 129 ppb and effluent chlorides of 145 ppb. The demineralizer was secured and effluent chlorides in the letdown system dropped to 14 ppb. The demineralizer resin was replaced. The corrective actions that were implemented included creation of chemistry procedure CP-3806P, sampling flushing reactor coolant system letdown demineralizer, which provides guidance to chemistry technicians for placing a demineralizer in service. The procedure also established specific limits for chlorides, fluorides, lithium, and boron decontamination factors that must be met prior to placing a demineralizer in service.

As a result of plant operating experience, the applicant has developed strategic plans for both MPS Units 2 and 3 to establish goals and objectives for optimizing primary systems water chemistry. From initial start-up until installation of the replacement steam generators in 1992, MPS Unit 2 maintained the primary coolant at a “close to neutral” pH. Lithium hydroxide was used to counteract the chemical effects of boric acid. Subsequent to the steam generator replacement, a modified pH regime was implemented. This program gradually increases the pH of the primary coolant during the fuel cycle. No primary coolant related corrosion concerns have been identified since implementing this program.

Also, following the steam generator replacement, MPS Unit 2 initiated nickel monitoring and clean-up activities during each start-up. Minimizing dissolved nickel concentration in the primary coolant prior to operation can control the amount of nickel deposited in the core and subsequently activated as cobalt (Co)-58.

In the early 1990s, MPS Unit 3 experienced an axial offset anomaly, which was attributed to operation with a lower pH regime than those implemented during previous operating cycles. Subsequently, MPS Unit 3 adopted a modified chemistry control program, which involved operation at a higher primary coolant pH. Since implementing this chemistry program, axial offset anomaly has not been a significant issue for the unit.

On the basis of its review of the above operating experience and on discussions with the applicant’s technical staff, the project team concludes that MPS AMP B2.1.5 adequately manages the aging effects that have been observed at the applicant’s plant.

7.1.4.6 UFSAR Supplement

The applicant provides its UFSAR supplements for the water chemistry control for primary systems program in MPS Unit 2 LRA, Appendix A, Section A2.1.5, and MPS Unit 3 LRA, Appendix A, Section A2.1.4, which state that the program includes periodic monitoring and control of known detrimental contaminants such as chlorides, fluorides, dissolved oxygen, and sulfate concentrations below the levels known to result in loss of material or cracking. Water chemistry control for primary systems is in accordance with the guidelines in EPRI TR-105714, "PWR Primary Water Chemistry Guideline," for primary water chemistry. The acceptance criterion is that the maximum levels for the monitored contaminants are maintained below the system-specific limits. Corrective actions for conditions that are adverse to quality are performed in accordance with the corrective action program as part of the quality assurance program.

The project team reviewed the UFSAR supplements and confirms that they provide an adequate summary description of the program, as identified in the SRP-LR UFSAR supplement table and as required by 10 CFR 54.21(d).

7.1.4.7 Evaluation

The project team performed a review of the applicable criteria in GALL AMP XI.M2, "Water Chemistry," and the program description and elements for MPS AMP B2.1.5, "Chemistry Control for Primary Systems Program."

For the aspects of the program elements that were determined by the applicant to be consistent with the corresponding program elements in GALL AMP XI.M2, the project team determined that these program elements for MPS AMP B2.1.5 conform with the applicable program elements and acceptance criteria in GALL AMP XI.M2, "Water Chemistry." Based on its review of the exception, the project team concludes that the applicant's chemistry control for primary systems program provides reasonable assurance of aging management of loss of material or cracking in the reactor coolant system, emergency core cooling system (refueling water storage tank and safety injection accumulator tanks), charging and volume control system (boric acid storage tank, letdown demineralizer (Unit 2), and volume control tank (Unit 2)), spent fuel pool cooling and purification system (spent fuel pool demineralizer), sampling system, primary makeup water (primary water storage tank (Unit 2), primary grade water storage tank (Unit 3), and demineralized water storage tank (Unit 3)). The project team finds this AMP acceptable because it conforms to the recommended program description, program elements, and acceptance criteria for primary systems water chemistry control, as discussed in GALL AMP XI.M2, "Water Chemistry."

The "scope of program" program element of GALL AMP XI.M2 identifies the applicable revision of EPRI TR-105714 Revision 3 or a later revision approved by the staff. The MPS chemistry control for primary systems program is based on Revision 4 of EPRI TR-105714. The later revision incorporates additional industry operating experience that was not available at the time of issuance of the earlier revision and is in keeping with the latest industry practice. Further, the later revision is more conservative with regard to monitoring and control of primary water chemistry parameters. On this basis, the project team finds this exception to be acceptable.

7.1.4.8 Conclusion

On the basis of its audit and review of the applicant's program, the project team finds that those portions of the program for which the applicant claims consistency with the GALL Report are consistent with the GALL Report. In addition, on the basis of its review of the exception to the GALL Report, the project team finds that the applicant has demonstrated that the effects of aging will be adequately managed so that the intended functions will be maintained consistent with the CLB during the period of extended operation, as required by 10 CFR 54.21(a)(3).

On the basis of its review of the UFSAR supplement for this AMP, the project team also finds that it provides an adequate summary description of the program, as required by 10 CFR 54.21(d).

7.1.5 CHEMISTRY CONTROL FOR SECONDARY SYSTEMS PROGRAM (MPS AMP B2.1.6)

In the MPS LRA, Appendix B, Section B2.1.6, the applicant states that the MPS AMP B2.1.6, "Chemistry Control for Secondary Systems Program," is consistent with GALL AMP XI.M2, "Water Chemistry," with an exception.

7.1.5.1 Program Description

The applicant states, in the MPS LRA, that the chemistry control for secondary systems program includes periodic monitoring and control of known detrimental contaminants such as chlorides, sodium, dissolved oxygen, and sulfate concentration below the levels known to result in loss of material or cracking in accordance with EPRI Technical Report TR-102134, "PWR Secondary Water Chemistry Guidelines," Revision 4, dated November, 1996.

The applicant states, in MPS Technical Report MP-LR-3703/MP-LR-4703, "Chemistry Control for Secondary Systems," Revision 2, dated March 11, 2004, that the chemistry control for secondary systems program ensures that the effects of aging are managed for the main steam, feedwater, and auxiliary feedwater systems, as well as the following plant-specific systems: for MPS Unit 2, sampling, moisture separation and re-heat, condensate, condensate storage and transfer, feedwater heater vents and drains, plant heating and condensate recovery, secondary chemical addition, extraction steam, turbine gland sealing steam, and condensate demineralizer mixed bed; for MPS Unit 3, auxiliary steam, auxiliary boiler condensate and feedwater, reactor plant sampling, steam generator blowdown, and condensate make-up and draw-off.

The applicant also states, in MPS Technical Report MP-LR-3703/MP-LR-4703, that in accordance with EPRI TR-102134, Revision 5, dated May 3, 2000, the monitored parameters include cation conductivity, chloride, copper, dissolved oxygen, hydrazine, iron, lead, pH, sodium, specific conductivity, and sulfate.

Additionally, the applicant states, in MPS Technical Report MP-LR-3703/MP-LR-4703, that verification of the effectiveness of the secondary systems water chemistry program is provided by the work control process, which provides the opportunity to visually inspect the internal surfaces of components during preventive and corrective maintenance activities on an ongoing basis. The work control process involves a sufficient number of components such that it

provides an ongoing representative indication of the integrity of components affected by the chemistry control tasks.

7.1.5.2 Consistency with the GALL Report

In the MPS LRA, the applicant states that MPS AMP B2.1.6 is consistent with GALL AMP XI.M2, with an exception.

The project team interviewed the applicant's technical staff and reviewed, in whole or in part, the documents listed in Attachment 5 of this report for MPS AMP B2.1.6, including MPS Technical Report MP-LR-3703/MP-LR-4703, "Chemistry Control for Secondary Systems," Revision 2, dated March 1, 2004, which provides an assessment of how the GALL AMP elements are addressed by the chemistry control for secondary systems program.

The project team reviewed seven program elements (see Section 5.1 of this report) contained in the MPS AMP and associated bases documentation against GALL AMP XI.M2 for consistency.

7.1.5.3 Exceptions to the GALL Report

The applicant states, in the MPS LRA, an exception to the GALL Report elements as follows

Element: 1: Scope of Program
Exception: This program uses a later revision of the EPRI TR-102134 guidance.

The GALL Report identifies the following criterion for the "scope of program" program element associated with the exception taken

> Water chemistry control is in accordance with the guidelines in BWRVIP-29 (EPRI TR-103515) for water chemistry in BWRs; EPRI TR-105714, Rev. 3 for primary water chemistry in PWRs; EPRI TR-102134, Rev. 3 for secondary water chemistry in PWRs; or later revisions or updates of these reports as approved by the staff.

The applicant states, in the MPS LRA, that the MPS chemistry control for secondary systems program is based on Revision 4 of EPRI TR-102134. The later revision incorporates additional industry operating experience not available at the time of the issuance of the earlier revision and is in keeping with the latest industry practice. Further, the later revision is more conservative with regard to monitoring and control of primary chemistry parameters. On the basis that the later revision of the EPRI guidance applies more stringent guidelines than the earlier version, the project team finds this exception to be acceptable.

7.1.5.4 Enhancements to the GALL Report

None

7.1.5.5 Operating Experience

The project team reviewed operating experience for the applicant's chemistry control for secondary systems program. The applicant states, in the MPS LRA, that the chemistry control for secondary systems program is based on the EPRI guidelines to take advantage of industry operating experience as is done in the GALL Report. The project team reviewed condition reports and interviewed the applicant's technical staff, which did not reveal any examples where the loss of intended function occurred as the result of inadequate secondary systems water chemistry controls. The project team determined that the MPS operating experience indicates that the chemistry control for secondary systems program creates an environment that minimizes material degradation. The project team's review of the applicant's operating experience indicates that chemistry parameters can drift from their acceptable range, but the chemistry control for secondary systems program is effective in identifying these anomalies, implementing corrective action, and trending the parameters. When chemistry results reach a level at which loss of material or cracking could become a concern (i.e., potentially affect the intended function), plant power reductions are implemented until corrective actions are completed.

The following representative examples of internal operating experience at MPS are based on the project team's review of condition reports generated under the corrective action program. These examples were considered in evaluating the effectiveness of the program

> MPS Unit 2 dissolved oxygen increased to 1 ppm due to air ingress to the condensate storage tank (CST), which occurred during filling from vendor make-up water. As an immediate corrective action, the CST oxygen level was further monitored while a nitrogen sparge was performed to ensure that oxygen levels dropped back below the 0.10 ppm limit. The oxygen concentration was successfully brought back below the required limits. Make-up water vendor logs were reviewed to determine the quality of the water during the CST fill. The vendor logs confirmed that because of a chemical addition equipment problem, the dissolved oxygen of the make-up water had spiked during the filling of both the MPS Unit 2 and 3 CSTs. MPS Unit 3 saw no increase in dissolved oxygen during this period. Additional testing confirmed that the volume of air added to the CST most likely came from vendor make-up water.
>
> For MPS Unit 3, dissolved oxygen in the condensate pump discharge increased to 15.2 ppb, as measured by the in-line instrument, and 20 ppb, as measured using Chemets. The "A" condensate pump's mechanical seal was determined to be the source of the leakage. A trouble report was generated to replace the mechanical seals and an approved engineering work request involved design engineering in evaluating the replacement of this type of mechanical seal. The pump vendor was contacted and it was determined that replacing the mechanical seals would prevent air in-leakage. All pump seals were rebuilt/replaced during the spring 1999 refueling outage. Subsequently, a design modification has been performed to replace the seals with a Burgmann mechanical seal as an improved design for preventing air in-leakage. This modification has been implemented on the B condensate pump and the performance is being evaluated by the system

engineer prior to implementing the same design change on the A and C condensate pumps, respectively.

As the result of plant operating experience, the applicant has developed strategic plans for MPS Units 2 and 3 to establish goals and objectives for optimizing secondary systems water chemistry. From initial start-up until installation of the replacement steam generators in 1992, MPS Unit 2 maintained the secondary coolant at a “close to neutral” pH. Lithium hydroxide was used to counteract the chemical effects of boric acid. Subsequent to the steam generator replacement, a modified pH regime was implemented. This program gradually increases the pH of the secondary coolant during the fuel cycle. No secondary coolant related corrosion concerns have been identified since implementing this program.

Also, following the steam generator replacement, MPS Unit 2 initiated nickel monitoring and clean-up activities during each start-up. Minimizing dissolved nickel concentration in the secondary coolant prior to operation can control the amount of nickel deposited in the core and subsequently activated as Co-58.

In the early 1990s, MPS Unit 3 experienced an axial offset anomaly, which was attributed to operation with a lower pH regime than those implemented during previous operating cycles. Subsequently, MPS Unit 3 adopted a modified chemistry control program, which involved operation at a higher secondary coolant pH. Since implementing this chemistry program, axial offset anomaly has not been a significant issue for the unit.

On the basis of its review of the above operating experience and on discussions with the applicant’s technical staff, the project team concludes that MPS AMP B2.1.6 adequately manages the aging effects that have been observed at the applicant’s plant.

7.1.5.6 UFSAR Supplement

The applicant provided its UFSAR supplement for the water chemistry control for secondary systems program in MPS Unit 2 LRA, Appendix A, Section A2.1.6, and MPS Unit 3 LRA, Appendix A, Section A2.1.5, which state that the program includes periodic monitoring and control of known detrimental contaminants such as chlorides, sodium, dissolved oxygen, and sulfate concentrations below the levels known to result in loss of material or cracking. Water chemistry control for the secondary systems is in accordance with the guidelines in EPRI TR-102134, “PWR Secondary Water Chemistry Guidelines,” for secondary water chemistry. The acceptance criterion is that the maximum levels for the monitored contaminants are maintained below the system-specific limits. Corrective actions for conditions that are adverse to quality are performed in accordance with the corrective action program as part of the quality assurance program.

The project team reviewed the UFSAR supplements and confirms that they provide an adequate summary description of the program, as identified in the SRP-LR UFSAR supplement table and as required by 10 CFR 54.21(d).

7.1.5.7 Evaluation

The project team performed a review of the applicable criteria in GALL AMP XI.M2, "Water Chemistry" and the program description and elements for MPS AMP B2.1.6, "Chemistry Control for Secondary Systems Program."

For the aspects of the program elements that were determined by the applicant to be consistent with the corresponding program elements in GALL AMP XI.M2, the project team determined that these program elements for MPS AMP B2.1.6 conform with the applicable program elements and acceptance criteria in GALL AMP XI.M2, "Water Chemistry." Based on its review of the exception, the project team concludes that the applicant's chemistry control for secondary systems program provides reasonable assurance of aging management of loss of material or cracking in the main steam, feedwater, and auxiliary feedwater systems and several plant-specific systems. The project team finds this AMP acceptable because it conforms to the recommended program description, program elements, and acceptance criteria for secondary systems water chemistry control, as discussed in GALL AMP XI.M2, "Water Chemistry."

The "scope of program" program element of GALL AMP XI.M2 identifies the applicable revision of EPRI TR-102134 as Revision 3 or a later revision approved by the staff. The MPS chemistry control for secondary systems program is based on Revision 4 of the EPRI guidance. The later revision incorporates additional industry operating experience that was not available at the time of issuance of the earlier revision and is in keeping with the latest industry practice. Further, the later revision is more conservative with regard to monitoring and control of secondary chemistry parameters. On the basis that the later revision of the EPRI guidance applies more stringent guidelines than the earlier version, the project team finds this exception to be acceptable.

7.1.5.8 Conclusion

On the basis of its audit and review of the applicant's program, the project team finds that those portions of the program for which the applicant claims consistency with the GALL Report are consistent with the GALL Report. In addition, on the basis of its review of the exception to the GALL Report, the project team finds that the applicant has demonstrated that the effects of aging will be adequately managed so that the intended functions will be maintained consistent with the CLB during the period of extended operation, as required by 10 CFR 54.21(a)(3).

On the basis of its review of the UFSAR supplement for this AMP, the project team also finds that it provides an adequate summary description of the program, as required by 10 CFR 54.21(d).

7.1.6 CLOSED-CYCLE COOLING WATER SYSTEM PROGRAM (MPS AMP B2.1.7)

In the MPS LRA, Appendix B, Section B2.1.7, the applicant states that MPS AMP B2.1.7, "Closed-Cycle Cooling Water Systems Program," is consistent with GALL AMP XI.M21, "Closed-Cycle Cooling Water Systems," with an exception. In a MPS LRA supplement letter dated July 7, 2004 (ML041900407), the applicant added an enhancement to MPS AMP B2.1.7.

7.1.6.1 Program Description

The applicant states, in the MPS LRA, that the closed-cycle cooling water (CCCW) system program manages the effects of loss of material through maintenance of process fluid chemistry and performance monitoring of CCCW systems to ensure parameters remain within acceptable limits. The program is based on guidance contained in EPRI Technical Report TR-107396, "Closed Cooling Water Chemistry Guidelines," dated November 1997.

The applicant states, in MPS Technical Report MP-LR-3716/MP-LR-4716, "Closed-Cycle Cooling Water Systems," Revision 2, dated March 9, 2004, that the CCCW system program monitors fluids and components within the following in-scope systems: for MPS Unit 2 - chilled water, reactor building, closed cooling water, emergency diesel generator (jacket cooling water); for MPS Unit 3 - reactor plant component cooling water, emergency diesel generator (jacket cooling water), control building chilled water system, safety injection pumps cooling, and charging pumps cooling.

Additionally, the applicant states, in MPS Technical Report MP-LR-3716/MP-LR-4716, that the CCCW system program monitors only the CCCW side of the heat exchangers that are within the scope of license renewal. The service water system (open-cycle cooling) program monitors the service water side of the heat exchangers.

The applicant also states in MPS Technical Report MP-LR-3716/MP-LR-4716 that the parameters that are currently monitored by the CCCW system program are in accordance with the MPS closed cooling water system chemistry control procedure and EPRI TR-107396. The following parameters are monitored or used as a diagnostic tool as part of this program: adenosine triphosphate, ammonia, chloride, conductivity, copper, dissolved oxygen, fluoride, Freon, gross activity, hydrazine, iron, LCS-60 (as nitrogen dioxide), LCS-1200 (as molybdenum), pH, tolyltriazole, total organic carbon, and total petroleum.

7.1.6.2 Consistency with the GALL Report

In the MPS LRA, the applicant states that MPS AMP B2.1.7 is consistent with GALL AMP XI.M21, with an exception. In a MPS LRA supplement letter dated July 7, 2004 (ML041900407), the applicant added an enhancement to MPS AMP B2.1.7.

The project team interviewed the applicant's technical staff and reviewed, in whole or in part, the documents listed in Attachment 5 of this report for MPS AMP B2.1.7, including MPS Technical Report MP-LR-3716/MP-LR-4716, which provides an assessment of how the GALL AMP elements are addressed by the CCCW system program.

The project team reviewed the seven program elements (see Section 5.1 of this report) contained in the MPS AMP and associated bases documentation against GALL AMP XI.M21 for consistency.

7.1.6.3 Exceptions to the GALL Report

The applicant states, in the MPS LRA, an exception to the GALL Report elements as follows

Elements: 3: Parameters Monitored/Inspected
4: Detection of Aging Effects
5: Monitoring and Trending
6: Acceptance Criteria

Exception: This program does not include performance testing of the CCCW side of heat exchangers.

The GALL Report identifies the following criterion for the "parameters monitored/inspected" program element associated with the exception taken

> The AMP monitors the effects of corrosion by surveillance testing and inspection in accordance with standards in EPRI TR-107396 to evaluate system and component performance. For pumps, the parameters monitored include flow and discharge and suction pressures. For heat exchangers, the parameters monitored include flow, inlet and outlet temperatures, and differential pressure.

The applicant states, in the MPS LRA, that the parameters recommended in the GALL Report for a heat exchanger are not specifically monitored by the CCCW program to indicate corrosion buildup. Instead, the CCCW program relies on the use of corrosion inhibitors to minimize and to maintain heat exchanger performance. The applicant also states, in MPS Technical Report MP-LR-3716/MP-LR-4716, that the heat exchangers for the CCCW system use service water as the cooling medium and are monitored, inspected, and trended on the service side by the service water program, as described in MPS Technical Report, MP-LR-3715/MP-LR-4715, "Service Water System (Open-Cycle Cooling) Program," Revision 2, dated March 13, 2004. The NRC has approved, in Generic Letter (GL) 89-13, "Service Water System Problems Affecting Safety-Related Equipment," dated July 18, 1989, the performance of regular, frequent cleaning of the service water side in lieu of thermal performance testing.

The applicant adds, in MPS Technical Report MP-LR-3716/MP-LR-4716, that MPS maintains low corrosion rates on the closed-cycle cooling water side by using corrosion inhibitors. Operating experience indicates that the corrosion of the CCCW side of the heat exchangers is not a concern. Inspections of the internal piping surfaces, performed by the applicant during normal maintenance activities, indicate that corrosion was not occurring. Volumetric inspections of piping, and eddy current testing and visual inspections of heat exchanger tubes also showed no signs of corrosion activity. Performance testing of the CCCW side of heat exchangers is not performed at MPS.

The GALL Report identifies the following criterion for the "detection of aging effects" program element associated with the exception taken

> Control of water chemistry does not preclude corrosion at locations of stagnant flow conditions or crevices. Degradation of a component due to corrosion would result in degradation of system or component performance. The extent and schedule of inspections and testing in accordance with EPRI TR-107396 assure

> detection of corrosion before the loss of intended function of the component. Performance and functional testing in accordance with EPRI TR-107396, ensures acceptable functioning of the CCCW system or components serviced by the CCCW system. For systems and components in continuous operation, performance adequacy is determined by monitoring data trends for evaluation of heat transfer fouling, pump wear characteristics, and branch flow changes. Components not in operation are periodically tested to ensure operability.

The applicant states, in the MPS LRA, that thermal performance testing of the closed-cycle cooling heat exchangers is not performed, so the parameters specified in GALL AMP XI.M21 are not periodically monitored. The CCCW system program eliminates the need for this monitoring by the use of corrosion inhibitors.

The applicant also states, in MPS Technical Report MP-LR-3716/MP-LR-4716, that the CCCW system program includes both aging effect mitigation activities (chemistry control) and performance monitoring activities, neither of which directly detects aging effects. The identification of out-of-specification water chemistry conditions or declining component performance indicates the potential for component degradation. The applicant adds that monitoring the chemistry of the in-scope CCCW system is generally performed weekly with additional testing performed monthly and/or quarterly. Performance testing of the in-scope pumps is performed quarterly as part of the inservice testing program or diesel engine surveillance. Performance testing of the CCCW side of the heat exchangers is not performed at MPS.

The GALL Report identifies the following criterion for the “monitoring and trending” program element associated with the exception taken

> The frequency of sampling water chemistry varies and can occur on a continuous, daily, weekly, or as needed basis, as indicated by plant operating conditions. Per EPRI TR-107396, performance and functional tests are performed at least every 18 months to demonstrate system operability, and tests to evaluate heat removal capability of the system and degradation of system components are performed every five years. The testing intervals may be adjusted on the basis of the results of the reliability analysis, type of service, frequency of operation, or age of components and systems.

The applicant states, in the MPS LRA, that periodic performance tests are not performed for CCCW system heat exchangers. As a result, monitoring of heat exchanger flow, inlet and outlet temperatures, and differential pressure is not performed and this data is not trended. The CCCW system program relies on the use of corrosion inhibitors to minimize the effects of corrosion and to maintain heat exchanger performance, eliminating the need for periodic performance testing.

The applicant states, in MPS Technical Report MP-LR-3716/MP-LR-4716, that water chemistry parameters are monitored and the results are trended to provide timely indication of abnormal chemistry conditions. Chemistry supervisors and control room personnel are notified and determine the need for additional sampling, analysis, and corrective actions when the established limits are exceeded. If out-of-specification parameters are deemed to promote

accelerated corrosion or produce a component or system failure, a condition report is initiated in accordance with the corrective action program. Trending of chemistry data provides a basis for confirming that sampling frequencies are appropriately set to continue the effective monitoring of chemistry trends. Component performance is also monitored and trended to detect potential degradation before any loss of intended function. If monitored parameters are outside proceduralized ranges or values, chemistry supervisors and control room personnel are notified and a condition report is initiated in accordance with the corrective action program.

During the audit and review, the project team noticed a footnote in the monitoring and trending section of MPS Technical Report MP-LR-3716/MP-LR-4716 which states that, "Heat exchangers cooled by service water are performance monitored, inspected, and trended on the service water side as part of the Technical Report MP-LR-3715/MP-LR-4715, *Service Water System Program*." The project team reviewed MPS Technical Report MP-LR-3715/MP-LR-4715, "Service Water System (Open-cycle Cooling)," Revision 2, dated March 13, 2004, and found that performance testing is done on only some heat exchangers, while the above footnote implies that performance testing is done on all heat exchangers. The project team requested that the applicant clarify this footnote. The applicant concurred with the project team that there was an error in the above mentioned footnote in the CCCW basis document. The applicant revised the footnote to read, "Not all the CCCW heat exchangers. . . ." The project team reviewed the revised document and concludes that concerns related to the footnote in the CCCW basis document are resolved.

In addition, the project team asked the applicant to explain how performance of the heat exchangers will be monitored and trended since the applicant is taking an exception to the heat exchanger performance monitoring approach, as recommended by GALL AMP XI.M21. In its response, the applicant presented a pump summary report for MPS Unit 3, pumps 3CCCP*P1A, B, and C, for the period January 1, 1999 through April 1, 2004; and a pump summary report for MPS Unit 2, pumps P-11A, B, and C, for the period January 1, 1999 through March 31, 2004. The project team reviewed the data and found that no degradation was identified. The project team finds the pump data to be acceptable.

The GALL Report identifies the following criterion for the "acceptance criteria" program element associated with the exception taken

> Corrosion inhibitor concentrations are maintained within the limits specified in the EPRI water chemistry guidelines for CCCW. System and component performance test results are evaluated in accordance with the guidelines of EPRI TR-107396. Acceptance criteria and tolerances are also based on system design parameters and functions.

The applicant states, in the MPS LRA, that periodic performance testing of CCCW system heat exchangers is not performed. Therefore, the analysis and trending of system and component performance test results described in GALL AMP XI.M21 cannot be performed. The applicant also states that lack of negative operating experience indicates that this is acceptable.

Additionally, the applicant states, in MP-LR-3716/MP-LR-4716, that the acceptance criteria reflect EPRI guidelines for parameters in the CCCW systems that have been shown to contribute to component degradation. Adherence to the guidelines minimizes loss of material

and detects potential component degradation before the loss of intended function occurs. The applicant states that system and component performance test results are evaluated in accordance with procedural requirements that meet or exceed EPRI guideline requirements.

During the audit and review, the project team noted that there was not sufficient information available to provide a basis for accepting the applicant's exception as stated in MPS AMP B2.1.7. In subsequent discussions with the project team, the applicant proposed the addition of an enhancement to MPS AMP B2.1.7 and documented the enhancement in a MPS LRA supplement letter dated July 7, 2004 (ML041900407). The applicant commits, in the MPS LRA supplement letter, that baseline inspections of the CCCW side of a sample closed-cycle cooling heat exchanger will be performed to verify that the corrosion control program is acceptable and heat exchanger performance is maintained. On the basis of its review of the CCCW heat exchanger operating data and the additional commitment to perform the inspection described in the enhancement to MPS AMP B2.1.7, the project team finds the exception to be acceptable.

7.1.6.4 Enhancements

The applicant, in a MPS LRA supplement letter dated July 7, 2004 (ML041900407), states an enhancement to the GALL Report elements as follows

Elements:	3: Parameters Monitored/Inspected 4: Detection of Aging Effects 5: Monitoring and Trending
Enhancement:	A baseline visual inspection of the accessible areas of the heat exchanger shell side will be performed prior to the period of extended operation. The inspection will verify that the chemistry control portion of the closed-cycle cooling water system AMP is adequately maintaining the corrosion control of the closed-cycle cooling heat exchangers.

The GALL Report identifies the following criterion for the "parameters monitored/inspected" program element associated with the enhancement

> The AMP monitors the effects of corrosion by surveillance testing and inspection in accordance with standards in EPRI TR-107396 to evaluate system and component performance. . . For heat exchangers, the parameters monitored include flow, inlet and outlet temperatures, and differential pressure.

The applicant states that the parameters, recommended by the GALL Report to be monitored for a heat exchanger, are not specifically monitored by MPS AMP B2.1.7 for corrosion buildup indication. The applicant states, in MPS LRA supplement letter dated July 7, 2004 (ML041900407), that instead, baseline inspections of the CCCW side of a sample of closed-cycle cooling heat exchangers will be performed to verify that the corrosion control program is acceptable and that the heat exchanger performance is maintained. On the basis of its review of the CCCW heat exchanger operating data and the additional commitment to perform the inspection, described in the MPS LRA supplement letter, for MPS AMP B2.1.7, the project team finds the enhancement to be acceptable. The project team finds this enhancement

is required and is acceptable as any such changes will provide additional assurance that the effects of aging will be adequately managed.

The GALL Report identifies the following criterion for the "detection of aging effects" and "monitoring and trending" program elements associated with the enhancement

> Performance and functional testing in accordance with EPRI TR-107396 ensures acceptable functioning of the CCCW system or components serviced by the CCCW system. For systems and components in continuous operation, performance adequacy is determined by monitoring data trends for evaluation of heat transfer fouling, pump wear characteristics, and branch flow changes. Components not in operation are periodically tested to ensure operability.
>
> Per EPRI TR-107396, performance and functional tests are performed at least every 18 months to demonstrate system operability, and tests to evaluate heat removal capability of the system and degradation of system components are performed every five years. The testing intervals may be adjusted on the basis of the results of the reliability analysis, type of service, frequency of operation, or age of components and systems.

The applicant states, in the MPS LRA, that thermal performance testing of the closed-cycle cooling heat exchangers is not performed on most heat exchangers. Instead, the applicant states, in MPS LRA supplement letter dated July 7, 2004 (ML041900407), that baseline inspections of the CCW side of a sample of closed-cycle cooling heat exchangers will be performed to verify that the corrosion control program is acceptable, heat transfer fouling is not occurring, and heat removal capability is maintained. On the basis of its review of the CCCW heat exchanger operating data and the additional commitment to perform the inspection, described in the MPS LRA supplement letter, for MPS AMP B2.1.7, the project team finds the enhancement to be acceptable. The project team finds this enhancement is required and is acceptable as any such changes will provide additional assurance that the effects of aging will be adequately managed.

7.1.6.5 Operating Experience

The project team reviewed operating experience for the applicant's CCCW system program. The applicant states, in the MPS LRA, that operating experience indicates that chemistry parameters and component performance can drift from their acceptable ranges, but that the CCCW system program is effective in identifying these anomalies, implementing corrective action, and trending the parameters. The applicant also states that when chemistry results reach a predetermined level, corrective actions are properly completed to return the parameter to within acceptable limits, or compensatory measures are implemented. Similarly, supervisors and control room personnel are notified when component performance falls outside proceduralized ranges or values, and a condition report is initiated in accordance with the corrective action program. During discussions with the project team, the applicant's technical staff indicated that, to the best of their knowledge, there has not been a loss of intended function for the components managed by the MPS CCCW system program.

The applicant, in MPS AMP B2.1.7, lists the following representative examples of internal operating experience at MPS that were based on the applicant's review of condition reports generated under the corrective action program. These examples were considered in the project team's evaluation of the effectiveness of the program

> The pH for the MPS Unit 3 reactor plant component cooling water system trended high, exceeding the upper specification limit of 9.5. The cause of the pH trend appeared to be the generation of ammonia. Ammonia generation is common in systems that use hydrazine as a corrosion inhibitor. Testing for ammonia was performed, and ammonia levels were measured to be 4 ppm. Specific conductivity trends and computer models of pH were consistent with elevated ammonia in the cooling water. As a corrective action, an ion exchanger was installed, in accordance with MPS Temporary Modification M3-00-017, to remove the ammonia.
>
> A declining pH trend was noticed in the MPS Unit 2 "B" emergency diesel generator jacket cooling water system. The diesel vendor specified a lower pH limit of 8.5. As an immediate corrective action, chemistry supervision was notified. The pH was raised to maintain jacket water to within the vendor-specified control band. The "A" emergency diesel generator cooling water graphs did not exhibit such a trend. Microbiological activity was believed to be the cause for the lowering pH. Microbiological testing did confirm some biological activity, but not in an amount to be of concern. The pH did remain within system specification limits. Microbiological activity was further monitored for any significant changes.
>
> Chill water chlorides and conductivity exhibited an adverse increasing trend. Although system chemistry remained in specification, the chloride concentration was approaching the 2 ppm limit, as discovered during routine weekly sampling of the chill water system. Tube leakage in one or more of the system chillers was the suspected cause. Chill water chlorides were cleaned up using a temporarily installed demineralizer. Both pressure and vacuum testing were performed on the X196A/B chillers without indication of leaks. The system continued to be sampled and cleaned as necessary to ensure that it remained within current chemical specifications.
>
> Sample nondestructive evaluation ultrasonic testing of the MPS Unit 2 reactor building closed cooling water piping in containment resulted in a failed structural evaluation of a 45-degree elbow in a 10-inch return header. A band of pipe wall immediately adjacent to, and downstream of the weld was measured to be below minimum wall thickness requirements. A structural evaluation was performed to evaluate this condition. The degraded condition was found to be caused by a weld fit-up problem and not related to service-induced degradation. Sample expansion ultrasonic testing inspections were performed on an additional five similarly configured locations and all were found to be acceptable. Weld repairs of the 45-degree elbow were completed, and the system was returned to service.

On the basis of its review of the above operating experience and on discussions with the applicant's technical staff, the project team concludes that MPS AMP B2.1.7 adequately manages the aging effects that have been observed at the applicant's plant.

7.1.6.6 UFSAR Supplement

The applicant provides its UFSAR supplement for the CCCW system program in MPS Unit 2 LRA, Appendix A, Section A2.1.7, and MPS Unit 3 LRA, Appendix A, Section A2.1.6, which state that the CCCW system program manages the aging effect of loss of material through the maintenance of process fluid chemistry and performance monitoring of the CCCW system, except the component cooling heat exchanges, to ensure parameters remain within acceptable limits. The program is based directly on guidance contained in EPRI TR-107396. The acceptance criterion is that the maximum levels for the monitored contaminants are maintained below the system-specific limits. Corrective actions for conditions that are adverse to quality are performed in accordance with the corrective action program as part of the quality assurance program.

In a MPS LRA supplement letter dated July 7, 2004 (ML041900407), the applicant states the following:

> The following wording should be inserted at the end of MPS Unit 2, Appendix A, Section A2.1.7 (page A-8) and MPS Unit 3, Appendix A, Section A2.1.6 (page A-6):
>
> "Commitments:
>
> "The following commitment will be implemented prior to the period of extended operation:
>
> - Heat Exchanger Baseline Inspection:
>
> "A baseline visual inspection will be performed of the accessible areas of the shell side (including accessible portions of the exterior side of the tubes) of one:
>
> - MPS Unit 2 Reactor Building Closed Cooling Water heat exchanger,
> - MPS Unit 2 Emergency Diesel Generator Jacket Cooling Water heat exchanger, and
> - MPS Unit 3 Emergency Diesel Generator Jacket Cooling Water heat exchanger.
>
> "This commitment is identified in Appendix A, Table A6.0-1 License Renewal Commitments, Item 29 for Unit 2 and Item 30 for Unit 3."

The project team reviewed the UFSAR supplements with the added commitment and determines that they provide an adequate summary description of the program, as identified in the SRP-LR UFSAR supplement table and as required by 10 CFR 54.21(d).

7.1.6.7 Evaluation

The project team performed a review of the applicable criteria in GALL AMP XI.M21, "Closed-Cycle Cooling Water Systems," and the program description and elements for MPS AMP B2.1.7, "Closed-Cycle Cooling Water System."

For the aspects of the program elements that were determined by the applicant to be consistent with the corresponding program elements in GALL AMP XI.M21, the project team determined that these program elements for MPS AMP B2.1.7 conform with the applicable program elements and acceptance criteria in GALL AMP XI.M21, "Closed-Cycle Cooling Water Systems." Based on its review of the exception and enhancement, the project team concludes that the applicant's CCCW system program provides reasonable assurance of aging management of loss of material in the MPS Unit 2 chilled water, reactor building, closed cooling water, emergency diesel generator (jacket water cooling) in-scope fluids and components; and the MPS Unit 3 reactor plant component cooling water, emergency diesel generator (jacket cooling water), control building chilled water system, safety injection pumps cooling, and charging pumps cooling in-scope fluids and components. The project team finds this AMP acceptable because it conforms to the recommended program description, program elements, and acceptance criteria for CCCW systems, as discussed in GALL AMP XI.M21, "Closed-Cycle Cooling Water Systems."

During the first on-site visit, the project team reviewed the surveillance data and operating history and found them acceptable. However, the project team concluded that there was not sufficient information available to provide a basis for accepting the MPS AMP B2.1.7 exception to GALL AMP XI.M21 as originally presented in the MPS LRA. In subsequent on-site visits and discussions with the project team, the applicant proposed the addition of an enhancement to MPS AMP B2.1.7 and documented the enhancement in a MPS LRA supplement letter dated July 7, 2004 (ML041900407). The applicant commits, in the MPS LRA supplement letter, that baseline inspections of the CCCW side of a sample closed-cycle cooling heat exchanger will be performed to verify that the corrosion control program is acceptable and heat exchanger performance is maintained. The applicant states, in the supplement letter, that this commitment is identified in Appendix A, Table A6.0-1 License Renewal Commitments, Item 29 for MPS Unit 2 and Item 30 for MPS Unit 3. On the basis of its review of the CCCW heat exchanger operating data and the additional commitment to perform the inspection described in the enhancement to MPS AMP B2.1.7, the project team finds the exception and the enhancement to be acceptable.

During the first on-site visit, the project team noticed a footnote in the monitoring and trending section of MPS Technical Report MP-LR-3716/MP-LR-4716 which states that, "Heat exchangers cooled by service water are performance monitored, inspected, and trended on the service water side as part of the Technical Report MP-LR-3715/MP-LR-4715, Service Water System Program." The project team reviewed MPS Technical Report MP-LR-3715/ MP-LR-4715 and found that performance testing is done on only some heat exchangers, while the above footnote implies that performance testing is done on all heat exchangers. The project team requested that the applicant clarify this footnote. In subsequent on-site visits, the applicant concurred with the project team that there was an error in the above mentioned footnote in the CCCW basis document. The applicant revised the footnote to read, "Not all the

CCCW heat exchangers. . . ." The project team reviewed the revised document and concludes that concerns related to the footnote in the CCCW basis document are resolved.

7.1.6.8 Conclusion

On the basis of its audit and review of the applicant's program, the project team finds that those portions of the program for which the applicant claims consistency with the GALL Report are consistent with the GALL Report. In addition, on the basis of its review of the clarifications, exception, and enhancement to the GALL Report, the project team finds that the applicant's program provides for adequate management of the aging effects for which the program is credited so that the intended functions will be maintained consistent with the CLB during the period of extended operation, as required by 10 CFR 54.21(a)(3).

On the basis of its review of the UFSAR supplements for this AMP, the project team also finds that they provide an adequate summary description of the program, as required by 10 CFR 54.21(d).

7.1.7 ELECTRICAL CABLES AND CONNECTORS NOT SUBJECT TO 10 CFR 50.49 ENVIRONMENTAL QUALIFICATION REQUIREMENTS (MPS AMP B2.1.8)

In the MPS LRA, Appendix B, Section B2.1.8, the applicant states that MPS AMP B2.1.8, "Electrical Cables and Connectors Not Subject to 10 CFR 50.49 Environmental Qualification Requirements," is a new program that will be initiated prior to the period of extended operation. The applicant states that this program is consistent with GALL AMP XI.E1, "Electrical Cables and Connections Not Subject to 10 CFR 50.49 Environmental Qualification Requirements," with an enhancement.

7.1.7.1 Program Description

The applicant states, in the MPS LRA, that this program will include electrical cables and connections within the scope of license renewal that are exposed to an adverse localized environment but are not subject to the environmental qualification requirements of 10 CFR 50.49. Connection types within the scope of MPS AMP B2.1.8 include connectors, fuse holders, splices, and terminal blocks. Fuse holders (including fuse clips and fuse blocks) are included consistent with Interim Staff Guidance (ISG)-5, "Identification and Treatment of Electrical Fuse Holders for License Renewal," dated March 10, 2003. Adverse local environments include heat, radiation, or moisture local to the cables or connections. The applicant also states, in the MPS LRA, that this program will manage the aging effects of cracking and embrittlement to ensure that the cables and connections within the scope of the program are capable of performing their intended function. The program will sample and inspect cables and connections from accessible areas having an adverse localized environment, in a manner intended to also represent, with reasonable assurance, cables and connectors in inaccessible areas with an adverse localized environment.

The applicant states, in the MPS LRA, that the inspection plans will be developed using the guidance cited in GALL AMP XI.E1 and articulated in EPRI Technical Report TR-109619, "Guideline for the Management of Adverse Localized Equipment Environments," dated June 1999, IEEE Standard 1205-2000, "IEEE Guide for Assessing, Monitoring, and Mitigating Aging

Effects on Class 1E Equipment Used in Nuclear Power Generating Stations," NUREG/CR-5643, "Insights Gained from Aging Research," dated March 1992, and SAND96-0344, "Aging Management Guideline for Commercial Nuclear Power Plants - Electrical Cable and Terminations," dated September 1996. This program will use a sampling methodology based on a recognized industry or military standard.

7.1.7.2 Consistency with the GALL Report

In the MPS LRA, the applicant states that MPS AMP B2.1.8 will be consistent with GALL AMP XI.E1, with an enhancement.

The project team interviewed the applicant's technical staff and reviewed, in whole or in part, the documents listed in Attachment 5 of this report for MPS AMP B2.1.8, including MPS Technical Report MP-LR-3731/4731, "License Renewal Project Aging Management Program, Electrical Cables & Connectors Not Subject to 10 CFR 50.49 Requirements," Revision 2, dated March 13, 2004, which provides an assessment of how the GALL AMP elements are addressed by the electrical cables and connectors not subject to 10 CFR 50.49 environmental qualification requirements program.

The project team reviewed seven program elements (see Section 5.1 of this report) contained in the MPS AMP and associated bases documentation against GALL AMP XI.E1 for consistency.

7.1.7.3 Exceptions to the GALL Report

None

7.1.7.4 Enhancements

The applicant states, in the MPS LRA, an enhancement to the GALL Report elements as follows

Element:	4: Detection of Aging Effects
Enhancement:	Initial visual inspections for representative samples of accessible non-EQ insulated cables and connections will be performed and applicable fuse holders will be tested between year 30 and the end of the current operating license. Subsequent confirmation of ambient conditions and fuse holder testing will be performed at least once every 10 years during the period of extended operation.

The GALL Report identifies the following criterion for the "detection of aging effects" program element associated with the enhancement

> Conductor insulation aging degradation from heat, radiation, or moisture in the presence of oxygen causes cable and connection jacket surface anomalies. Accessible electrical cables and connections installed in adverse localized environments are visually inspected at least once every 10 years. This is an

> adequate period to preclude failures of the conductor insulation since experience has shown that aging degradation is a slow process. A 10 year inspection frequency will provide two data points during a 20 year period, which can be used to characterize the degradation rate. The first inspection for license renewal is to be completed before the period of extended operation.

In a letter dated March 10, 2003, (ML030690512), the NRC forwarded to the Nuclear Energy Institute (NEI) and Union of Concerned Scientists an interim staff guidance (ISG)-5 for the identification and treatment of electrical fuse holders for license renewal. In ISG-5, the staff indicated that fuse holders should be scoped, screened, and included in the AMR in the same manner as terminal blocks and other types of electrical connections that are currently being treated in the process. Further, this applies to fuse holders that are not part of a larger assembly such as switchgear, power supplies, power inverters, battery chargers, circuit boards, etc. Fuse holders in these types of active components would be considered to be a piece parts of the larger assembly and not subject to an AMR.

Operating experience, as discussed in NUREG-1760, "Aging Assessment of Safety-Related Fuses Used in Low- and Medium-Voltage Applications in Nuclear Power Plants," identified that aging stressors such as vibration, thermal cycling, electrical transients, mechanical stress, fatigue, corrosion, chemical contamination, or oxidation of the connections surfaces can result in fuse holder failure. Visual inspection alone may not be sufficient to detect the aging effects from fatigue, mechanical stress, vibration, or corrosion of the metallic clamps of the fuse holders. Other methods of aging detection may be necessary.

The applicant, in the MPS LRA Table A6.0-1, License Renewal Commitments, Commitment Number 6, committed to evaluate external fuse holders before the beginning of the extended period of operation for possible aging effects. The project team reviewed the applicant's commitment and finds that evaluation of the external fuse holders before the beginning of the extended period of operation is not consistent with the Staff's position as described in ISG-5. Also, in the MPS LRA, the applicant credits MPS AMP B2.1.8, "Electrical Cables and Connectors Not Subject to 10 CFR 50.49 Environmental Qualification Requirement" as the applicable AMP. The project reviewed MPS AMP B2.1.8 and finds that, with respect to fuse holders, MPS AMP B2.1.8 only addresses the aging effects of insulation portions of fuse holders and that it does not address the aging effects from fatigue, mechanical stress, or vibration on the metallic portions of fuse holders. During the audit, the project team requested the applicant to provide an aging management program to address the metallic portion of fuse holders or provide justification of as to why an AMP is not required. **This item is open (Open Item 7.1.7.4-1).**

7.1.7.5 Operating Experience

The project team reviewed operating experience for the applicant's electrical cables and connectors not subject to 10 CFR 50.49 environmental qualification requirements program. The applicant states, in the MPS LRA, that electrical cables and connectors not subject to 10 CFR 50.49 environmental qualification requirements is a new program for which there is no operating experience. The operating experience data associated with implementing MPS AMP B2.1.8 will be addressed in the applicant's corrective action program.

During the audit, in discussions with the project team, the applicant stated that its review of MPS prior operating experience found that no significant non-EQ cable jacket or fuse holder anomalies have been identified that can be attributed to age-related degradation. As a part of the documentation supporting MPS AMP B2.1.8, the applicant screened and compiled condition reports involving cable or connection degradation for MPS Units 2 and 3. The project team reviewed a sample of these condition report summaries, compiled by the applicant, and found the evaluation and disposition of the various conditions as reported therein to be consistent with that conclusion.

On the basis of its review of the above operating experience and on discussions with the applicant's technical staff, the project team concludes that MPS AMP B2.1.8 adequately manages the aging effects that have been observed at the applicant's plant.

7.1.7.6 UFSAR Supplement

The applicant provides its UFSAR supplements for the electrical cables and connectors not subject to 10 CFR 50.49 environmental qualification requirements program in the MPS Unit 2 LRA, Appendix A, Section A.2.1.8 and MPS Unit 3 LRA, Appendix A, Section A2.1.7, which state that this program manages the aging effects of cracking and embrittlement to ensure that electrical cables, connectors, and fuse holders within the scope of license renewal that are exposed to an adverse localized environment (but not subject to the environmental qualification requirements of 10 CFR 50.49) are capable of performing their intended function. The applicant further states that adverse localized environments may be caused by heat, radiation or moisture. The acceptance criterion for the visual inspections of accessible non-environmentally qualified cable jackets and connector coverings is the absence of anomalous indications that are signs of degradation. Corrective actions for conditions that are adverse to quality are performed in accordance with the corrective action program as part of the quality assurance program.

The applicant states, in the MPS LRA, Appendix A, that two commitments are associated with the electrical cables and connectors not subject to 10 CFR 50.49 environmental qualification requirements program as follows

> The applicant will implement the program consistent with GALL AMP XI.E1, "Electrical Cables and Connections Not Subject to 10 CFR 50.49 Environmental Qualification Requirements," as supplemented by NRC ISG-5, "Identification and Treatment of Electrical Fuse Holders for License Renewal." This is identified on the applicant's license renewal commitment list in the MPS LRA, Appendix A, Table A6.0-1, Item 5.
>
> Fuse holders meeting the requirements will be evaluated prior to the period of extended operation for possible aging effects requiring management. The fuse holder will either be replaced, modified to minimize the aging effects, or this program will manage the aging effects. This program will consider the aging stressors for the metallic clips. This is identified on the applicant's license renewal commitment list in the MPS LRA, Appendix A, Table A6.0-1, Item 6.

The project team reviewed the UFSAR supplements and the applicant's commitment and finds that evaluation of the external fuse holders before the beginning of the extended period of

operation is not consistent with the Staff's position as described in ISG-5. The project team concludes that pending the resolution of **<Open Item 7.1.7.4-1**, the application provide an adequate summary description of the program, as identified in the SRP-LR UFSAR supplement table and as required by 10 CFR 54.21(d).

7.1.7.7 Evaluation

The project team performed a review of the applicable criteria in GALL AMP XI.E1, "Electrical Cables and Connections Not Subject to 10 CFR 50.49 Environmental Qualification Requirements," and the program description and elements for MPS AMP B2.1.8, "Electrical Cables and Connectors Not Subject to 10 CFR 50.49 Environmental Qualification Requirements."

For the aspects of the program elements that were determined by the applicant to be consistent with the corresponding program elements in GALL AMP XI.E1, the project team determined that these program elements for MPS AMP B2.1.8 conform with the applicable program elements and acceptance criteria in GALL AMP XI.E1, "Electrical Cables and Connections Not Subject to 10 CFR 50.49 Environmental Qualification Requirements." Based on its review, the project team concludes that, **pending resolution of Open Item 7.1.7.4-1**, the applicant's program for electrical cables and connections not subject to 10 CFR 50.49 environmental qualification requirements provides reasonable assurance of aging management of cracking and embrittlement of electrical cables and connections, within the scope of license renewal that are exposed to an adverse localized environment (but not subject to the environmental qualification requirements of 10 CFR 50.49). The project team finds this AMP acceptable because it conforms to the recommended program description, program elements, and acceptance criteria for electrical cables and connections, as discussed in GALL AMP XI.E1, "Electrical Cables and Connections Not Subject to 10 CFR 50.49 Environmental Qualification Requirements."

7.1.7.8 Conclusion

On the basis of its audit and review of the applicant's program, the project team finds that, **pending resolution of Open Item 7.1.7.4-1**, the applicant's program provides adequate management of the aging effects for which the program is credited so that the intended functions will be maintained consistent with the CLB during the period of extended operation, as required by 10 CFR 54.21(a)(3).

On the basis of its review of the UFSAR supplements for this AMP, the project team also finds that they provide an adequate summary description of the program, as required by 10 CFR 54.21(d).

7.1.8 ELECTRICAL CABLES NOT SUBJECT TO 10 CFR 50.49 ENVIRONMENTAL QUALIFICATION REQUIREMENTS USED IN INSTRUMENTATION CIRCUITS (MPS AMP B2.1.9)

In the MPS LRA, Appendix B, Section B2.1.9, the applicant states that MPS AMP B2.1.9 "Electrical Cables Not Subject to 10 CFR 50.49 Environmental Qualification Requirements Used in Instrumentation Circuits," is consistent with GALL AMP XI.E2, "Electrical Cables Not Subject

to 10 CFR 50.49 Environmental Qualification Requirements Used in Instrumentation Circuits," with an enhancement.

7.1.8.1 Program Description

The applicant states, in the MPS LRA, that the program includes instrumentation cable and connectors used in circuits with sensitive low-level signals (such as nuclear instrumentation and radiation monitoring), within the scope of license renewal, that are exposed to an adverse localized environment but are not subject to the environmental qualification requirements of 10 CFR 50.49. Adverse local environments include heat, radiation, or moisture local to the cables or connectors. The program manages the aging effects of cracking and embrittlement to ensure that the cables and connectors within the scope of the program are capable of performing their intended functions. For cables within the scope of MPS AMP B2.1.9 that are energized during calibration of the associated instrumentation, the program relies on in-situ calibration data and results from surveillance required by technical specifications for the instrumentation. Surveillance of this type includes channel calibrations, channel functional testing, and channel checks. For these low-signal, high-impedance channels, the applicant expects to detect reduced insulation resistance during calibration. In addition, troubleshooting of these instrumentation channels includes visual inspection of cables and connections.

The applicant states, in the MPS LRA, that for instrument channels within the scope of MPS AMP B2.1.9 where the applicant does not perform in-situ calibration, such as for certain area radiation monitors, the applicant will monitor cable degradation by an alternate method that tests the cable. The applicant states, in MPS Technical Report MP-LR-3740/4740, "License Renewal Project Position Paper, In-Scope Non-Environmentally Qualified Instrumentation Circuits with Sensitive Low-Level Signals," Revision 1, dated December 10, 2003, that appropriate tests would be used to determine the cable insulation condition, such as insulation resistance tests or time domain reflectometry. The test program will be developed using the guidance cited in GALL AMP XI.E2 and articulated in EPRI TR-109619, IEEE Std 1205-2000, NUREG/CR-5643, and SAND96-0344.

7.1.8.2 Consistency with the GALL Report

In the MPS LRA, the applicant states that MPS AMP B2.1.9 is consistent with GALL AMP XI.E2, with an enhancement.

The project team interviewed the applicant's technical staff and reviewed, in whole or in part, the documents listed in Attachment 5 of this report for MPS AMP B2.1.9, including MPS Technical Report, MP-LR-3916/4916, "Electrical Cables and Connectors not Subject to 10 CFR 50.49 EQ Requirements Used in Instrumentation Circuits," Revision 2, dated March 13, 2004, which provides an assessment of the how the GALL AMP elements are addressed by the electrical cables not subject to 10 CFR 50.49 environmental qualification requirements used in instrumentation circuits program.

The project team reviewed seven program elements (see Section 5.1 of this report) contained in the MPS AMP and associated bases documentation against the GALL AMP XI.E2 for consistency.

7.1.8.3 Exceptions to the GALL Report

None

7.1.8.4 Enhancements

The applicant states, in the MPS LRA, an enhancement to the GALL Report elements as follows

Elements:	1: Scope of Program 4: Detection of Aging Effects
Enhancement:	Procedures will be developed to employ an alternate testing methodology to confirm the condition of cables and connectors in circuits that have sensitive, low-level signals and where the instrumentation is not calibrated in-situ, such as the MPS area radiation monitors.

The GALL Report identifies the following criteria for the "scope of program" and "detection of aging effects" program elements associated with the enhancement

> This program applies to electrical cables used in circuits with sensitive, low-level signals such as radiation monitoring and nuclear instrumentation that are within the scope of license renewal.
>
> Calibration provides sufficient indication of the need for corrective actions by monitoring key parameters and providing trending data based on acceptance criteria related to instrumentation loop performance. The normal calibration frequency specified in the plant technical specifications provides reasonable assurance that severe aging degradation will be detected prior to loss of the cable intended function. The first tests for license renewal are to be completed before the period of extended operation.

As stated in the MPS LRA, for instrumentation equipment in circuits that have sensitive, low-level signals, and where in-situ calibration is not performed, the applicant will develop procedures that use an alternate test method to confirm the condition of the cables and connectors. The testing may include insulation resistance tests, time domain reflectometry tests, or other testing judged to be effective in determining cable insulation conditions. The tests will be completed prior to the period of extended operation and every 10 years thereafter. This is identified on the applicant's license renewal commitment list in the MPS LRA, Appendix A, Table A6.0-1, Item 7.

The applicant states that MPS AMP B2.1.9 is consistent with the program as modified in staff's draft ISG-15. ISG-15 requires that "review of calibration results or findings of surveillance program can provide an indication of the existence of aging effects based on acceptance criteria related to instrumentation circuit performance. By reviewing the results obtained during normal calibration or surveillance, an applicant may detect severe aging degradation prior to the loss of the cable and connection intended function. The first review will be completed before the end of the initial 40-year license term and at least 10 years thereafter. All calibration or

surveillance results that fail to meet acceptance criteria will be reviewed for aging effects when the results are available." The project team reviewed MPS AMP B2.1.9. The project team finds that the applicant's program does not require a review of calibration or surveillance results for indication of cable degradation. Since the enhancement, as proposed by the applicant, is not consistent with the staff's ISG-15, the project team requested that the applicant revise MPS AMP B2.1.9 to include this requirement or provide justification of why the review of calibration or surveillance results is not necessary.

In a supplemental letter dated December 3, 2004 (ML043450341), the applicant provided its response. The applicant states that to clarify the monitoring of aging effect for instrumentation cables that are tested in situ, the following commitment will be added to the MPS LRA Appendix A, "FSAR Supplement" Section A2.1.9 for Unit 2 and Section A2.1.8 for Unit 3.

> Review of Surveillance Test Results for Cables Tested In Situ
>
> "Calibration results for cables tested in situ will be reviewed to detect severe aging degradation of the cable insulation. The initial review will be completed prior to the period of extended operation and will include at least 5 years of surveillance test data for each cable reviewed. Subsequent reviews will be performed on a period not to exceed 10 years.
>
> This commitment is identified in Appendix A, Table A6.0 -1 License Renewal Commitments, Item [32 for Unit 2] [Item 33 for Unit 3]."

An additional item will be added to Unit 2 and Unit 3 Appendix A "FSAR Supplement," Table A6.0 -1 as follows:

> Item: "32" (Unit 2) and "33" (Unit 3)
>
> Commitment: "Calibration results for cables tested in situ will be reviewed to detect severe aging degradation of the cable insulation. The initial review will be completed prior to entering the period of extended operation and will include at least 5 years of surveillance test data for each cable reviewed. Subsequent reviews will be performed on a period not to exceed 10 years."
>
> Source: "Electrical Cables Not Subject to 10 CFR 50.49 Environmental Qualification Requirements Used in Instrumentation Circuits"
>
> Schedule: "Prior to Period of Extended Operation Not to Exceed a 10 Year Frequency Thereafter."

On the basis of its review of the applicant's response, the project team finds the applicant's response acceptable because the applicant has committed to review calibration or surveillance results for indication of cable degradation and conform with the requirement with ISG-15.

The project team concludes that this enhancement is acceptable because the alternate testing methodology will be in place, prior to the period of extended operation. The project team also finds by reviewing the results obtained during normal calibration or surveillance, that the

applicant can detect severe aging degradation prior to the loss of the cable and connection intended function.

7.1.8.5 Operating Experience

The project team reviewed operating experience for the applicant's electrical cables not subject to 10 CFR 50.49 environmental qualification requirements used in instrumentation circuits program. The review indicated that this program is effective in identifying age-related degradation, implementing repairs, and maintaining the integrity of instrumentation components. The applicant states, in the MPS LRA, that its review of MPS prior operating experience has not identified any age-related degradation of instrumentation cables. As a part of the documentation supporting this AMP, the applicant reviewed condition reports involving cable or connection degradation for both units, and presented examples they considered in evaluating the effectiveness of the program. The project team reviewed the condition reports referenced in MPS Technical Report MP-LR-3740/4740 and found the evaluation and disposition of the conditions as reported therein to be consistent with that conclusion.

The alternate cable testing that the applicant proposes as an enhancement, to be used when in-situ calibration is not performed, is a new part of the program, so no operating experience associated with this aspect of the program was available to the project team. The operating experience data associated with implementing MPS AMP B2.1.9 will be addressed in the applicant's corrective action program.

On the basis of its review of the above operating experience and on discussions with the applicant's technical staff, the project team concludes that MPS AMP B2.1.9 adequately manages the aging effects that have been observed at the applicant's plant.

7.1.8.6 UFSAR Supplement

The applicant provides its UFSAR supplements for the electrical cables not subject to 10 CFR 50.49 environmental qualification requirements used in instrumentation circuits in the MPS Unit 2 LRA, Appendix A, Section A.2.1.9 and the MPS Unit 3 LRA, Appendix A, Section A2.1.8, which state that the program manages the aging effects of cracking and embrittlement for electrical cables within the scope of license renewal that are used in circuits with sensitive, low-level signals, such as radiation monitoring and nuclear instrumentation (but not subject to the environmental qualification requirements of 10 CFR 50.49), and are installed in adverse localized environments caused by heat, radiation, or moisture. The acceptance criterion for the calibration readings is the loop-specific tolerances established in technical specifications and surveillance procedures. Where calibration of the instrumentation is not performed in-situ, the acceptance criteria for each test are defined by the specific type of test performed and the specific cable tested. Corrective actions for conditions that are adverse to quality are performed in accordance with the corrective action program as part of the quality assurance program.

The applicant states, in the MPS LRA, Appendix A, that a commitment is associated with the electrical cables not subject to 10 CFR 50.49 environmental qualification requirements used in instrumentation circuits program as follows

> Procedures will be developed to employ an alternate testing methodology to confirm the condition of cables and connectors in circuits that have sensitive, low-level signals and where the instrumentation is not calibrated in-situ, such as the MPS area radiation monitors. This is identified on the applicant's license renewal commitment list in the MPS LRA, Appendix A, Table A6.0-1, Item 7.

In the MPS LRA supplemental letter dated December 3, 2004 (ML043450341), the applicant states that it would add to the FSAR supplement the following:

> "Calibration results for cables tested in situ will be reviewed to detect severe aging degradation of the cable insulation. The initial review will be completed prior to the period of extended operation and will include at least 5 years of surveillance test data for each cable reviewed. Subsequent reviews will be performed on a period not to exceed 10 years.

The project team reviewed the UFSAR supplements and the supplemental letter, the project team confirms that the UFSAR supplements provide an adequate summary description of the program, as identified in the SRP-LR UFSAR supplement table and as required by 10 CFR 54.21(d).

7.1.8.7 Evaluation

The project team performed a review of the applicable criteria in GALL AMP XI.E2, "Electrical Cables Not Subject to 10 CFR 50.49 Environmental Qualification Requirements Used in Instrumentation Circuits," and the program description and elements for MPS AMP B2.1.9.

For the aspects of the program elements that were determined by the applicant to be consistent with the corresponding program elements in GALL AMP XI.E2, the project team determined that these program elements for MPS AMP B2.1.9 conform with the applicable program elements and acceptance criteria in GALL AMP XI.E2, "Electrical Cables Not Subject to 10 CFR 50.49 Environmental Qualification Requirements Used in Instrumentation Circuits." Based on its review, the project team concludes that, with the enhancement identified by the applicant, the applicant's program for electrical cables not subject to 10 CFR 50.49 environmental qualification requirements used in instrumentation circuits provides reasonable assurance of aging management of cracking and embrittlement in the cables and connectors within the scope of the program. The project team finds this AMP acceptable because it conforms to the recommended program description, program elements, and acceptance criteria for electrical cables, as discussed in GALL AMP XI.E2, "Electrical Cables Not Subject to 10 CFR 50.49 Environmental Qualification Requirements Used in Instrumentation Circuits."

In the MPS LRA, the applicant has committed to develop procedures that use an alternate test method to confirm the condition of the cables and connectors for instrumentation equipment in circuits that have sensitive, low-level signals where in-situ calibration is not performed. The testing may include insulation resistance tests, time domain reflectometry tests, or other testing judged to be effective in determining cable insulation conditions. The tests will be completed prior to the period of extended operation and every 10 years thereafter. This is identified on the applicant's license renewal commitment list in the MPS LRA, Appendix A, Table A6.0-1, Item 7.

On the basis that the applicant committed to review the calibration or surveillance results which would detect severe aging degradation prior to the loss of the cable and connection intended function. In addition, the applicant's alternate testing methodology will be in place, prior to the period of extended operation, to ensure that the condition of the insulation is adequate to enable the instrumentation cables and connectors to perform their intended functions. The project team finds incorporating this enhancement is acceptable as any such changes will provide additional assurance that the effects of aging will be adequately managed.

7.1.8.8 Conclusion

On the basis of its audit and review of the applicant's program, the project team finds that those portions of the program for which the applicant claims consistency with the GALL Report are consistent with the GALL Report. In addition, on the basis of its review of the enhancement to the GALL Report, the project team finds that the applicant's program provides for adequate management of the aging effects for which the program is credited so that the intended functions will be maintained consistent with the CLB during the period of extended operation, as required by 10 CFR 54.21(a)(3).

On the basis of its review of the UFSAR supplements for this AMP, the project team also finds that they provide an adequate summary description of the program, as required by 10 CFR 54.21(d).

7.1.9 FIRE PROTECTION PROGRAM (MPS AMP B2.1.10)

In MPS LRA, Appendix B, Section, B.2.1.10, the applicant states that MPS AMP B2.1.10, "Fire Protection Program," is consistent with GALL AMPs XI.M26, "Fire Protection," and XI.M27, "Fire Water System," and with the revised guidance described in NRC ISG-04, "Aging Management of Fire Protection Systems for License Renewal," dated December 3, 2002, with an exception and enhancements.

7.1.9.1 Program Description

The applicant states, in the MPS LRA, that the fire protection program manages the aging effects of loss of material, cracking, and change of material properties for plant fire protection features and components. The program manages these aging effects through the use of periodic inspections and tests.

The program also manages the aging effects for the diesel-driven fire pump fuel supply line, the reactor coolant pump oil collection systems, and 10 CFR 50 Appendix R, "Fire Protection Program for Nuclear Power Facilities Operating Prior to January 1, 1979," support equipment.

The halon/carbon dioxide fire suppression system is included in the scope of the license renewal program. However, the applicant states, in the MPS LRA, that no aging effects requiring management were identified for this system.

Visual inspection of fire protection piping internal surfaces that are exposed to water is performed when the system is opened for maintenance and/or repair. The work control

process provides guidance for the performance of internal inspections of fire protection piping and components whenever the system is entered for maintenance or repair.

7.1.9.2 Consistency with the GALL Report

In the MPS LRA, the applicant states that MPS AMP B2.1.10 is an existing program that is consistent with GALL AMPs XI.M26 and XI.M27, and the revised GALL AMP XI.M27 described in NRC ISG-04, with an exception and enhancements.

The project team interviewed the applicant's technical staff and reviewed, in whole or in part, the documents listed in Attachment 5 of this report for MPS AMP B2.1.10, including MPS Technical Report MP-LR-3720/MP-LR-4720, "Fire Protection Program," Revision 2, dated March 9, 2004, which provides an assessment of how the GALL AMP elements are addressed by the fire protection program.

The project team reviewed seven program elements (see Section 5.1 of this report) contained in the MPS AMP and associated bases documents against the GALL AMPs XI.M.26 and XI.M.27 for consistency.

7.1.9.3 Exceptions to the GALL Report

The applicant states, in the MPS LRA, one exception to the GALL Report elements as follows

Element: 1: Scope of Program
Exception: The AMR for the MPS fire protection systems did not identify any aging effects requiring management for the halon and carbon dioxide systems.

The GALL Report identifies the following criterion for the "scope of program" element associated with the exception taken

> [XI.M26] For operating plants, the AMP also includes management of the aging effects on the intended function of the halon/carbon dioxide fire suppression system.

During its initial review of the applicant's exception, the project team found that it did not have sufficient information concerning the AMR for halon/carbon dioxide system components to make a decision on the acceptability of the applicant's exception. However, a subsequent project team review determined that the internal environments of these components are air or gas. Dry air/gas environments do not have aging effects associated with metallic components. On this basis, the project team finds that the aging management guidance for the halon and carbon dioxide systems included in GALL AMP XI.M26 is not applicable and the exception is therefore acceptable.

7.1.9.4 Enhancements

The applicant states, in the MPS LRA, two enhancements to the GALL Report elements as follows

Element:	4: Detection of Aging Effects
Enhancement:	Baseline inspection of buried fire protection piping and component - a baseline visual inspection will be performed on a representative sample of the buried fire protection piping and components whose internal surfaces are exposed to raw water to confirm there is no degradation. This commitment is also identified on the applicant's license renewal commitment list in the MPS Units 2 and 3 LRA, Appendix A, Table A6.0-1, Item 8.
Element:	2: Preventive Actions 4: Detection of Aging Effects
Enhancement:	Testing or replacing a representative sample of sprinkler heads that have been in service for 50 years is not specifically included in the MPS fire protection program. Licensee follow-up action items have been initiated to ensure that a representative sample of sprinkler heads will be tested, or all affected sprinkler heads will be replaced in accordance with the requirements of the National Fire Protection Association (NFPA) Code 25, Section 2.3.3.1. This commitment is also identified on the applicant's license renewal commitment list in the MPS Units 2 and 3 LRA, Appendix A, Table A6.0-1, Item 9.

The GALL Report identifies the following criterion for the "detection of aging effects" program element associated with the first enhancement

> [XI.M27] Visual inspection of fire protection system internals will be used for monitoring the age-related degradation of system piping and component internals.

The ISG-4 provides additional guidance as follows

> However, internal inspections performed during each refueling cycle by disassembling portions of the fire protection system piping, as stated in GALL AMP XI.M27, may not be the most effective means to detect this aging effect. Each time the system is opened, oxygen is introduced into the system and this accelerates the potential for general corrosion. Therefore, the staff recommends that the applicant perform a baseline pipe wall thickness evaluation of the fire protection piping using a non-intrusive means of evaluating wall thickness, such as volumetric inspection, to detect this aging effect before the current license term expires.

The applicant states, in the MPS LRA, that it will evaluate, develop, and implement appropriate activities (e.g., baseline inspections) for assessing the buried fire water system piping to identify or preclude wall thinning due to internal corrosion prior to the period of extended operation. Consistent with the ISG-4, the applicant states that subsequent inspections may be required based on engineering evaluation. The project team finds this enhancement is required and is acceptable as any such changes to the fire protection program will provide additional assurance that the effects of aging will be adequately managed.

The GALL Report identifies the following criteria for the "preventive actions" and "detection of aging effects" program elements associated with the second enhancement

> [XI.M26 and XI.M27] This program element identifies methods or techniques to ensure appropriate fire prevention measures are maintained and no significant degradation occurs. [XI.M27] To ensure no significant corrosion, MIC, or biofouling has occurred in water-based fire protection systems, periodic flushing, system performance testing, and inspections are conducted.
>
> [XI.M26 and XI.M27] This program element identifies methods or techniques to ensure timely detection of aging effects. [XI.M27] Sprinkler systems are inspected once every refueling outage to ensure that signs of degradation, such as corrosion, are detected in a timely manner.

The ISG-4 provides additional guidance as follows

> NFPA 25, 1999 Edition, Section 2.3.3.1, "Sprinklers," states, where sprinklers have been in place for 50 years, they shall be replaced or representative samples from one or more sample areas shall be submitted to a recognized testing laboratory for field service testing. NFPA 25 also contains guidance to perform this sampling every 10 years after the initial field service testing.
>
> The 50-year service life of sprinkler heads does not necessarily occur at the 50th year of operation in terms of licensing. The service life is defined from the time the sprinkler system is installed and functional. The staff recommends, in accordance with NFPA 25, that sprinkler head testing should be performed at year 50 of sprinkler system service life, not at year 50 of plant operation, with subsequent sprinkler head testing every 10 years thereafter.

The project team noted that the applicant states, in the MPS LRA, that it has included follow-up items to accommodate the requirements of NFPA 25 but does not, in the MPS LRA, clearly state when the MPS fire protection program will identify and test, or replace, sprinkler heads. The project team requested that the applicant clarify this enhancement. In a MPS LRA supplement letter dated July 7, 2004 (ML041900407) the applicant stated the following

> The commitment regarding sprinkler head testing or replacement should have the wording "The first tests will be completed prior to the sprinkler heads achieving 50 years of service life. The frequency of subsequent tests will not exceed a 10 year interval." inserted after the words "Testing a representative sample of fire protection sprinkler heads or replacing those that have been in service for 50 years will be included in the Fire Protection Program." This commitment appears in the MPS Unit 2 LRA and the MPS Unit 3 LRA in the following locations:
>
> MPS Unit 2 Appendix B, Section B2.1.10 (page B-38)
> MPS Unit 3 Appendix B, Section B2.1.10 (page B-38)

The project team finds that this enhancement is consistent with the recommendations set forth in ISG-4. On that basis, the project team finds this enhancement is required and is acceptable as any such changes to the fire protection program will provide additional assurance that the effects of aging will be adequately managed.

7.1.9.5 Operating Experience

The project team reviewed operating experience for the applicant's fire protection program. The review indicated that the fire protection program is effective in identifying age-related degradation, implementing repairs, and maintaining the integrity of the fire protection system components.

In the MPS LRA, the applicant states that component inspections and surveillance tests are performed in compliance with the applicable sections of the corresponding technical requirements manuals and in accordance with approved station procedures. Surveillance tests have been performed routinely and have been successful in identifying fire protection suppression system degradation. Station operating experience indicates that while degradation has occurred, the MPS fire protection program has been effective in identifying any anomalies, implementing corrective actions, and trending the parameters. When inspection results have exceeded allowable values, corrective actions have been implemented to ensure the continued capability of the system to perform its intended functions.

The following examples were considered by the project team in its review of the effectiveness of the MPS fire protection program

> During the performance of a surveillance procedure, two intake structure fire penetration seals failed to meet the surveillance acceptance criteria. As a result, repairs to the seals were initiated in accordance with applicable seal design details and the seal repair procedure. In addition, the inspection group of penetration seals was increased by 10 percent in accordance with the technical requirements and no additional failures were identified.
>
> A fire door was found to have a degraded laminate on the outside upper right hand corner. The door, identified as a non-rated, non-technical requirements fire door assembly, was a halon boundary. The door and frame had been previously evaluated as acceptable. However, the door, in its potentially degraded condition, was re-evaluated. It was determined that the door would still perform its required function.
>
> While performing a fire door inspection surveillance, a through penetration hole was identified. The hole, measuring approximately six to eight inches in length and approximately 1/8-inch wide, was discovered between the upper west portion of the door frame and the wall. The deficiency was corrected.
>
> The corrosion mechanisms seen in firewater piping are similar to those seen in the domestic water (city water) piping. These mechanisms are well known and do not require sampling to determine their cause or extent. Additionally, the firewater system is flow tested every three years, and no significant degradation

> in overall loop flow has been noted. Further, due to the recent permanent shutdown of MPS Unit 1, several parts of the site's firewater aboveground piping have been removed and made available for detailed inspection.
>
> All of the MPS Unit 1 piping segments had been in place and filled with water for approximately 30 years. While one piece of unlined six-inch carbon steel pipe had about ¼ inch of corrosion buildup, this buildup was evaluated and determined to not restrict flow nor challenge the system's pressure boundary. No significant corrosion was identified in the aboveground piping. The remainder of the aboveground piping segments inspected were clean.
>
> Since the fire pumps are run frequently, the piping associated with the pumps' suction lines and tank recirculation lines was considered subject to corrosion buildup. During the fire tank replacement project, segments of the firewater suction piping and tank recirculation piping were disassembled and inspected. When disassembled, these lines were observed to have a significant corrosion buildup. Much of this corroded piping, and the tanks themselves, were replaced as part of the fire tank replacement project.

On the basis of its review of the above operating experience and on discussions with the applicant's technical staff, the project team concludes that MPS AMP B2.1.10 adequately manages the aging effects that have been observed at the applicant's plant.

7.1.9.6 UFSAR Supplement

The applicant provides its UFSAR supplements for the fire protection program in the MPS Unit 2 LRA, Appendix A, Section A2.1.10, and the MPS Unit 3 LRA, Appendix A, Section A2.1.9, which state that the program manages the aging effects of loss of material, cracking, and change of material properties for plant fire protection features and components. The program manages these aging effects through the use of periodic inspections and tests. The program also manages the aging effects for the diesel-driven fire pump fuel supply line, the reactor coolant pump oil collection systems, and Appendix R support equipment.

The acceptance criterion for visual inspections is the absence of anomalous indications that are signs of degradation. For fire barriers and fire doors, the sizes for breaks, holes, cracks, spalling gaps, and/or clearances are in accordance with the limits established in the inspection procedures. For fire protection equipment performance tests (i.e., flow and pressure tests), acceptance criteria are provided in the appropriate surveillance procedures. Additionally, the fire protection water system pressure is continuously monitored to be above the minimum setpoint. Corrective actions for conditions that are adverse to quality are performed in accordance with the corrective action program as part of the quality assurance program.

The applicant states, in MPS LRA Appendix A, that two commitments are associated with the fire protection program as follows

> A baseline visual inspection will be performed on a representative sample of the buried fire protection piping and components whose internal surfaces are exposed to raw water to confirm there is no degradation. This commitment is

> also identified on the applicant's license renewal commitment list in the MPS LRA, Appendix A, Table A6.0-1, Item 8.
>
> Testing or replacing a representative sample of sprinkler heads that have been in service for 50 years is not specifically included in the MPS fire protection program. Licensee follow-up action items have been initiated to ensure that a representative sample of sprinkler heads will be tested, or all affected sprinkler heads will be replaced in accordance with the requirements of the NFPA Code 25, Section 2.3.3.1. This commitment is also identified on the applicant's license renewal commitment list in the MPS LRA, Appendix A, Table A6.0-1, Item 9.

In a MPS LRA supplement letter dated July 7, 2004 (ML041900407) the applicant stated the following

> The commitment regarding sprinkler head testing or replacement should have the wording "The first tests will be completed prior to the sprinkler heads achieving 50 years of service life. The frequency of subsequent tests will not exceed a 10 year interval." inserted after the words "Testing a representative sample of fire protection sprinkler heads or replacing those that have been in service for 50 years will be included in the Fire Protection Program." This commitment appears in the MPS Unit 2 LRA and the MPS Unit 3 LRA in the following locations:
>
> MPS Unit 2 Appendix A, Section A2.1.10 (page A-11)
> MPS Unit 3 Appendix A, Section A2.1.9 (page A-9)
>
> Additionally, the wording "Not to Exceed a 10 Year Interval Thereafter" should be inserted in the Schedule column of Appendix A, Table A6.0-1, Commitment 9 in the MPS Unit 2 LRA (page A-35) and the MPS Unit 3 LRA (page A-34).

The project team reviewed the UFSAR supplements and concurs that they provide an adequate summary description of the program, as identified in the SRP-LR UFSAR supplement table and as required by 10 CFR 54.21(d).

7.1.9.7 Evaluation

The project team performed a review of the applicable criteria in GALL AMPs XI.M26, "Fire Protection," and XI.M27, "Fire Water System," and the program description and elements for MPS AMP B2.1.10.

For the aspects of the program elements that were determined by the applicant to be consistent with the corresponding program elements in GALL AMPs XI.M26 and XI.M27, the project team determined that these program elements for MPS AMP B2.1.10 conform with the applicable program elements and acceptance criteria in GALL AMPs XI.M26, "Fire Protection," and XI.M27, "Fire Water System." Based on its review of the exception and enhancements, the project team concludes that the applicant's fire protection system program provides reasonable assurance of aging management of loss of material, cracking, and change of material properties in fire protection features and components. The project team finds this AMP

acceptable because it conforms to the recommended program description, program elements, and acceptance criteria for fire protection systems, as discussed in GALL AMPs XI.M26, "Fire Protection," and XI.M27, "Fire Water System," and the revised guidance presented in ISG-4.

During its initial review of the applicant's exception, the project team found that it did not have sufficient information concerning the AMR for halon/carbon dioxide system components to make a decision on the acceptability of the applicant's exception. However, a subsequent project team review determined that the internal environments of these components are air or gas. Dry air/gas environments do not have aging effects associated with metallic components. On this basis, the project team finds that the aging management guidance for the halon and carbon dioxide systems included in GALL AMP XI.M26 is not applicable and the exception is therefore acceptable.

The applicant states, in the MPS LRA, that it will evaluate, develop, and implement appropriate activities (e.g., baseline inspections) for assessing the buried firewater system piping to identify or preclude wall thinning due to internal corrosion prior to the period of extended operation. Consistent with the ISG-4, the applicant states that subsequent inspections may be required based on engineering evaluation. This commitment is also identified on the applicant's license renewal commitment list in the MPS LRA, Appendix A, Table A6.0-1, Item 8. The project team finds this enhancement is required and is acceptable.

The applicant commits, in the MPS LRA, to an enhancement that will provide for testing or replacing a representative sample of sprinkler heads that have been in service for 50 years. Licensee follow-up action items have been initiated to ensure that a representative sample of sprinkler heads will be tested, or all affected sprinkler heads will be replaced in accordance the requirements of NFPA 25, Section 2.3.3.1. This commitment is also identified on the applicant's license renewal commitment list in the MPS LRA, Appendix A, Table A6.0-1, Item 9.

During the June 2004 site visit, the project team found the commitment concerning the testing or replacement of sprinkler heads required additional changes to clarify the testing frequency, and requested that the applicant submit the revised enhancement. In a MPS LRA supplement letter dated July 7, 2004 (ML041900407) the applicant stated the following

> The commitment regarding sprinkler head testing or replacement should have the wording "The first tests will be completed prior to the sprinkler heads achieving 50 years of service life. The frequency of subsequent tests will not exceed a 10 year interval." inserted after the words "Testing a representative sample of fire protection sprinkler heads or replacing those that have been in service for 50 years will be included in the Fire Protection Program." This commitment appears in the MPS Unit 2 LRA and the MPS Unit 3 LRA in the following locations:
>
> MPS Unit 2 Appendix A, Section A2.1.10 (page A-11)
> MPS Unit 2 Appendix B, Section B2.1.10 (page B-38)
> MPS Unit 3 Appendix A, Section A2.1.9 (page A-9)
> MPS Unit 3 Appendix B, Section B2.1.10 (page B-38)

Additionally, the wording "Not to Exceed a 10 Year Interval Thereafter" should be inserted in the Schedule column of Appendix A, Table A6.0-1, Commitment 9 in the MPS Unit 2 LRA (page A-35) and the MPS Unit 3 LRA (page A-34).

The project team finds this enhancement, as revised in the supplement letter, is required and is acceptable.

7.1.9.8 Conclusion

On the basis of its audit and review of the applicant's program, the project team finds that those portions of the program for which the applicant claims consistency with the GALL Report are consistent with the GALL Report. In addition, on the basis of its review of the clarifications, exceptions, and enhancements to the GALL Report, the project team finds that the applicant's program provides for adequate management of the aging effects for which the program is credited so that the intended functions will be maintained consistent with the CLB during the period of extended operation, as required by 10 CFR 54.21(A)(3).

On the basis of its review of the UFSAR supplements for this AMP, the project team also finds that they provide an adequate summary description of the program, as required by 10 CFR 54.21(d).

7.1.10 FLOW-ACCELERATED CORROSION (MPS AMP B2.1.11)

In the MPS LRA, Appendix B, Section B2.1.11, the applicant states that MPS AMP B2.1.11, "Flow-Accelerated Corrosion," is consistent with GALL AMP XI.M17, "Flow-Accelerated Corrosion," with an exception.

7.1.10.1 Program Description

The applicant states, in the MPS LRA, that the flow-accelerated corrosion (FAC) program manages the aging effect of loss of material in accordance with the EPRI's guidelines defined in the Nuclear Safety Analysis Center (NSAC) Report NSAC-202L, "Recommendation for an Effective Flow Accelerated Corrosion Program," Revision 1, dated November 1996. The FAC program includes controls to assure that the structural integrity of carbon steel and low-alloy steel piping and components is maintained.

The applicant further states, in the MPS LRA, that specific procedures and methods satisfy NRC Bulletin 87-01, "Thinning of Pipe Wall in Nuclear Power Plants," dated July 9, 1987, and NRC GL- 89-08, "Erosion/Corrosion-Induced Pipe Wall Thinning," dated May 2, 1989. The program predicts, detects, and monitors FAC as identified by wall thinning (loss of material) in plant piping and components.

7.1.10.2 Consistency with the GALL Report

In the MPS LRA, the applicant states that MPS AMP B2.1.11 is consistent with the GALL AMP XI.M17, with an exception.

The project team interviewed the applicant's technical staff and reviewed, in whole or in part, the documents listed in Attachment 5 of this report for MPS AMP B2.1.11, including MPS Technical Report MP-LR-3712/MP-LR-4712, "Flow-Accelerated Corrosion," Revision 2, dated March 16, 2004, which provides an assessment of how the GALL AMP elements are addressed by the FAC program.

The project team reviewed seven program elements (see Section 5.1 of this report) contained in the MPS AMP and associated bases documentation against GALL AMP XI.M17 for consistency.

7.1.10.3 Exceptions to the GALL Report

The applicant states, in the MPS LRA, an exception to the GALL Report elements as follows

> Element: 1: Scope of Program
> Exception: GALL AMP XI.M17 identifies NSAC-202L, "Recommendation for an Effective Flow-Accelerated Corrosion Program," Revision 2. The MPS program is based on Revision 1 of the same guidance.

The GALL Report identifies the following criterion for the "scope of program" program element associated with the exception taken

> The FAC program, described by the EPRI guidelines in NSAC-202L-R2, includes procedures or administrative controls to assure that the structural integrity of all carbon steel lines containing high-energy fluids (two phase as well as single phase) is maintained.

The applicant states, in the MPS LRA, that it reviewed the differences between the two revisions of NSAC-202L and concluded that no changes that are relevant to the MPS FAC program were made from Revision 1 to Revision 2.

The project team reviewed NSAC-202L and relevant current EPRI technical documents, and interviewed the applicant's technical staff. On the basis of these reviews and interviews, the project team concludes that the differences between the two revisions are not applicable to the MPS FAC program and, therefore, finds this exception to be acceptable.

7.1.10.4 Enhancements to the GALL Report

None

7.1.10.5 Operating Experience

The project team reviewed operating experience for the applicant's FAC program. The number of planned and unplanned replacements has generally trended downward over the past several years due to the establishment of the FAC program and following the recommendations identified in NSAC-202L.

The applicant states, in the MPS LRA, that operating experience indicates that while wall thinning has occurred since implementation of the FAC program, the FAC inspection activities have effectively identified degraded components for repair or replacement. These corrective actions have been effective in maintaining the integrity of FAC-susceptible components.

On the basis of its review of the above operating experience and on discussions with the applicant's technical staff, the project team concludes that MPS AMP B2.1.11 adequately manages the aging effects that have been observed at the applicant's plant.

7.1.10.6 UFSAR Supplement

The applicant provides its UFSAR supplements for the FAC program in the MPS Unit 2 LRA, Appendix A, Section A2.1.11 and the MPS Unit 3 LRA, Appendix A, Section A2.1.10, which state that the program manages the aging effect of loss of material in accordance with the EPRI guidelines defined in NSAC-202L. The program includes controls to assure that the structural integrity of carbon steel and low-alloy steel piping and components is maintained. The engineering evaluations determine if a component needs to be repaired/replaced or is acceptable for continued operation until the next scheduled inspection. Corrective actions for conditions that are adverse to quality are performed in accordance with the corrective action program as part of the quality assurance program.

The project team reviewed the UFSAR supplements and confirms that they provide an adequate summary description of the program, as identified in the SRP-LR UFSAR supplement table and as required by 10 CFR 54.21(d).

7.1.10.7 Evaluation

The project team performed a review of the applicable criteria in GALL AMP XI.M17, "Flow-Accelerated Corrosion" and the program description and elements for MPS AMP B2.1.11.

For the aspects of the program elements that were determined by the applicant to be consistent with the corresponding program elements in GALL AMP XI.M17, the project team determined that these program elements for MPS AMP B2.1.11 conform with the applicable program elements and acceptance criteria in GALL AMP XI.M17, "Flow-Accelerated Corrosion." Based on its review of the exception, the project team concludes that the applicant's FAC program provides reasonable assurance of aging management of loss of material in plant piping and components within the scope of this AMP. The project team finds this AMP acceptable because it conforms to the recommended program description, program elements, and acceptance criteria for detecting loss of material in plant piping and components, as discussed in GALL AMP XI.M17, "Flow-Accelerated Corrosion."

In the MPS LRA, the applicant states that GALL AMP XI.M17 identifies NSAC-202L, Revision 2, but the MPS program is based on Revision 1 of the same guidance. The project team reviewed NSAC-202L and relevant current EPRI technical documents, and interviewed the applicant's technical staff. On the basis of these reviews and interviews, the project team concludes that the differences between the two revisions are not applicable to the MPS FAC program and, therefore, finds this exception to be acceptable.

7.1.10.8 Conclusion

On the basis of its audit and review of the applicant's program, the project team finds that those portions of the program for which the applicant claims consistency with the GALL Report are consistent with the GALL Report. In addition, on the basis of its review of the exception to the GALL Report, the project team finds that the applicant has demonstrated that the effects of aging will be adequately managed so that the intended functions will be maintained consistent with the CLB during the period of extended operation, as required by 10 CFR 54.21(a)(3).

On the basis of its review of the UFSAR supplements for this AMP, the project team also finds that they provide an adequate summary description of the program, as required by 10 CFR 54.21(d).

7.1.11 FUEL OIL CHEMISTRY PROGRAM (MPS AMP B2.1.12)

In the MPS LRA, Appendix B, Section B2.1.12, the applicant states that MPS AMP B2.1.12, "Fuel Oil Chemistry," is consistent with GALL AMP XI.M30, "Fuel Oil Chemistry," with exceptions.

7.1.11.1 Program Description

The applicant states, in the MPS LRA, that the fuel oil chemistry program activities control the aging effect of loss of material by monitoring and controlling fuel oil quality to ensure that it is compatible with the materials of construction for in-scope components containing diesel fuel oil. Poor fuel oil quality could lead to (1) degradation of fuel oil storage tanks or (2) accumulations of particulate or biological growth that could interfere with the operation of plant equipment. Fuel oil quality limits are established to ensure the operability of the respective diesels, and compliance with applicable technical specifications and technical requirements, and to reduce the likelihood of loss of material within the fuel oil systems.

In MPS Technical Report MP-LR-3723/MP-LR-4723, "Fuel Oil Chemistry," Revision 2, dated March 15, 2004, the applicant states that the fuel oil chemistry program involves the sampling and testing of fuel oil used for equipment that is within the scope of license renewal. Testing is performed to ensure the acceptability of fuel oil quality, thus maintaining the integrity of the fuel oil system. The fuel oil chemistry sampling and testing activities mitigate the aging effect of loss of material in the fuel oil system. The effectiveness of the fuel oil chemistry program for in-scope tanks is verified by the tank inspection program, and by the work control process for other diesel fuel system components. These programs provide input to the corrective action program if aging effects are identified. The corrective action program evaluates the cause and extent of the condition and, if required, recommends enhancements to ensure continued effectiveness of the fuel oil chemistry program.

7.1.11.2 Consistency with the GALL Report

In the MPS LRA, the applicant states that MPS AMP B2.1.12 is consistent with GALL AMP XI.M30, with exceptions.

The project team interviewed the applicant's technical staff and reviewed, in whole or in part, the documents listed in Attachment 5 of this report for MPS AMP B2.1.12, including Technical Report MP-LR-3723/MP-LR-4723, which provides an assessment of how the GALL AMP elements are addressed by the fuel oil chemistry program.

The project team reviewed seven program elements (see Section 5.1 of this report) contained in the MPS AMP and associated bases documentation against GALL AMP XI.M30 for consistency.

7.1.11.3 Exceptions to the GALL Report

The applicant states, in the MPS LRA, exceptions to the GALL Report elements as follows

Elements: 2: Preventive Actions
4: Detection of Aging Effects
5: Monitoring and Trending
Exception: This program does not include the addition of biocides, stabilizers, or corrosion inhibitors.

Elements: 2: Preventive Actions
4: Detection of Aging Effects
5: Monitoring and Trending
Exception: Sampling and testing of the fuel and dewatering of the security diesel fuel oil storage tank is performed semi-annually.

Elements: 3: Parameters Monitored/Inspected
6: Acceptance Criteria
Exception: This program uses an unmodified ASTM D 2276 Method A for the determination of particulate.

Element: 4: Detection of Aging Effects
Exception: The in-scope tanks are included in the tank inspection program, which provides for ultrasonic testing activities based on the evaluation of the conditions found during visual inspections.

Element: 2: Preventive Actions
Exception: This program cannot perform dewatering of the MPS Unit 2 emergency diesel day tanks because the bottom drains are located in the side of the tanks.

Elements: 3: Parameters Monitored/Inspected
6: Acceptance Criteria
Exception: The MPS Unit 3 technical specifications require the use of American Society for Testing and Materials (ASTM) Standard D 1796 for the determination of water and sediment contamination in the diesel fuel.

The GALL Report identifies the following criteria for the "preventive actions," "detection of aging effects," and "monitoring and trending" program elements associated with the first and second exceptions taken

> The quality of fuel oil is maintained by additions of biocides to minimize biological activity, stabilizers to prevent biological breakdown of the diesel fuel, and corrosion inhibitors to mitigate corrosion. Periodic cleaning of a tank allows removal of sediments, and periodic draining of water collected at the bottom of a tank minimizes the amount of water and the length of contact time. Accordingly, these measures are effective in mitigating corrosion inside diesel fuel oil tanks. Coatings, if used, prevent or mitigate corrosion by protecting the internal surfaces of the tank from contact with water and microbiological organisms.
>
> Degradation of the diesel fuel oil tank cannot occur without exposure of the tank internal surfaces to contaminants in the fuel oil, such as water and microbiological organisms. Compliance with diesel fuel oil standards and periodic multi-level sampling provide assurance that fuel oil contaminants are below acceptable levels. Internal surfaces of tanks that are drained for cleaning are visually inspected to detect potential degradation. However, corrosion may occur at locations in which contaminants may accumulate, such as a tank bottom, and an ultrasonic thickness measurement of the tank bottom surface ensures that significant degradation is not occurring.
>
> Water and biological activity or particulate contamination concentrations are monitored and trended at least quarterly. Based on industry operating experience, quarterly sampling and analysis of fuel oil provide for timely detection of conditions conducive to corrosion of the internal surface of the diesel fuel oil tank before the potential loss of its intended function.

The applicant states, in the MPS LRA, that the fuel oil chemistry program does not include the addition of biocides, stabilizers, or corrosion inhibitors. MPS operating experience and sample results confirm that microbiologically influenced corrosion (MIC) and breakdown of the fuel oil have not been issues requiring the use of fuel oil additives. On the basis of its review of the MPS operating experience and determination that mitigation of the effects of MIC and fuel oil breakdown has not necessitated the use of fuel oil additives at MPS, the project team finds the first exception to be acceptable.

The applicant states, in MPS Technical Report MP-LR-3723/MP-LR-4723, that although the MPS Unit 3 emergency diesel fuel tanks and the station blackout storage tanks are coated, these coatings are not credited for preventive actions for the purpose of license renewal. The applicant states that the fuel oil tanks are included in the tank inspection program and are subjected to a 10-year draining, cleaning, and inspection activity. The applicant has committed to adding the diesel fire pump fuel oil tank and the security diesel fuel oil storage tank to the tank inspection program, so that they undergo the semi-annual tank inspection and cleaning in order to mitigate corrosion at the bottom of the tanks. The project team reviewed four work orders that documented that the security diesel fuel oil storage tank was tested and dewatered on a semi-annual basis beginning in July 2002. The results indicate that no water has been found.

The GALL AMP XI.M30 detection of aging effects program element recommends periodic, multilevel sampling and visual inspection of the internal surfaces of the tanks that are drained for cleaning. In addition, the GALL AMP XI.M30 monitoring and trending program element recommends that water and biological activity or particulate contamination concentrations are monitored and trended at least quarterly. In MPS Technical Report MP-LR-3723/MP-LR-4723, the applicant states that loss of material is an aging effect that is detected through condition monitoring via periodic tank inspection activities. In addition, the applicant states that implementation of new fuel oil testing and periodic multilevel surveillance for fuel oil quality in the various storage tanks is accomplished using MPS surveillance procedures and automated work orders. Periodic sampling and testing is performed monthly for the MPS Unit 3 emergency diesel fuel oil storage tanks, quarterly for most of the in-scope tanks, and semi-annually for the security diesel fuel oil storage tank. The project team requested that the applicant add justification for this exception to the GALL Report (e.g., the size of the tank, negligible water accumulation due to the location of the tank outlet piping connection, and the frequency of fuel oil testing) to basis document MPS Technical Report MP-LR-3723/MP-LR-4723.

In a subsequent on-site visit, the applicant presented the project team with Revision 3 of MPS Technical Report MP-LR-3723/MP-LR-4723, dated April 16, 2004, which provides justification for size and frequency of testing. However, Revision 3 to MPS Technical Report MP-LR-3723/MP-LR-4723 does not acknowledge that there would be negligible accumulation in the tank due to the location of the tank outlet. During its review of the tank drawings, the applicant confirmed that the outlet is on the bottom of the side of the tank and not directly on the bottom of the tank. Therefore, the applicant did not make the statement that there would be a negligible amount of accumulation in the tank. The project team reviewed the examples of operating experience regarding the “like new” condition of the tank internals and the lack of water found in the fuel oil tanks and discussed the examples with the applicant. On the basis of its review of this operating experience and the clarifications provided by the applicant in MPS Technical Report MP-LR-3723/MP-LR-4723, Revision 3, the project team finds the second exception to be acceptable.

The GALL Report identifies the following criteria for the “parameters monitored/inspected” and “acceptance criteria” program elements associated with the third exception taken

> For determination of particulates, modified ASTM D 2276, Method A, is used. The modification consists of using a filter with a pore size of 3.0 micrometers (Fm), instead of 0.8 Fm. These are the principal parameters relevant to tank structural integrity.
>
> Modified ASTM D 2276, Method A, is used for determination of particulates. The modification consists of using a filter with a pore size of 3.0 Fm, instead of 0.8 Fm.

The applicant states, in the MPS LRA, that MPS AMP B2.1.12 does not use the modified ASTM Standard D 2276, Method A, for determination of particulates. The unmodified version of the same standard is used. The unmodified version is considered to be more conservative than the modified version because it uses a smaller filter pore size. On the basis that the applicant uses

a more conservative version of the ASTM standard for the determination of particulates, the project team finds the third exception to be acceptable.

The GALL Report identifies the following criterion for the "detection of aging effects" program element associated with the fourth exception taken

> Degradation of the diesel fuel oil tank cannot occur without exposure of the tank internal surfaces to contaminants in the fuel oil, such as water and microbiological organisms. Compliance with diesel fuel oil standards and periodic multilevel sampling provide assurance that fuel oil contaminants are below acceptable levels. Internal surfaces of tanks that are drained for cleaning are visually inspected to detect potential degradation. However, corrosion may occur at locations in which contaminants may accumulate, such as a tank bottom, and an ultrasonic thickness measurement of the tank bottom surface ensures that significant degradation is not occurring.

In MPS Technical Report MPR-LR-3723/MP-LR-4723, the applicant states that loss of material is detected through condition monitoring via periodic tank inspections. However, the ultrasonic thickness measurement of the tanks is not addressed in this report. The applicant states, in the MPS LRA, that the in-scope tanks are included in the tank inspection program, which provides for ultrasonic testing activities based on an evaluation of the conditions found during visual inspections. On the basis that the tank inspection program provides an adequate means for evaluating the integrity of the tank internals, the project team finds the fourth exception to be acceptable.

The GALL Report identifies the following criterion for the "preventive actions" program element associated with the fifth exception taken

> The quality of fuel oil is maintained by additions of biocides to minimize biological activity, stabilizers to prevent biological breakdown of the diesel fuel, and corrosion inhibitors to mitigate corrosion. Periodic cleaning of a tank allows removal of sediments, and periodic draining of water collected at the bottom of a tank minimizes the amount of water and the length of contact time. Accordingly, these measures are effective in mitigating corrosion inside diesel fuel oil tanks. Coatings, if used, prevent or mitigate corrosion by protecting the internal surfaces of the tank from contact with water and microbiological organisms.

The applicant states, in the MPS LRA, that the fuel oil chemistry program cannot perform dewatering of the MPS Unit 2 emergency diesel day tanks because the bottom drains are located on the side of the tanks. However, the applicant also states that the tanks are inspected and cleaned as required by the tank inspection program. The project team reviewed the examples of operating experience regarding the "like new" condition of the tank internals and the lack of water found in the fuel oil tanks and discussed these findings with the applicant. On the basis of its review of the operating experience and discussion with the applicant, the project team concludes that corrosion caused by prolonged water contact with tank bottoms is not an aging effect of significance for the MPS Unit 2 emergency diesel day tanks and, therefore, finds the fifth exception to be acceptable.

The GALL Report identifies the following criteria for the "parameters monitored/inspected" and "acceptance criteria" program elements associated with the sixth exception taken

> The AMP monitors fuel oil quality and the levels of water and microbiological organisms in the fuel oil, which cause the loss of material of the tank internal surfaces. The ASTM Standard D 4057 is used for guidance on oil sampling. The ASTM Standards D 1796 and D 2709 are used for determination of water and sediment contamination in diesel fuel.
>
> The ASTM Standards D 1796 and D 2709 are used for guidance on the determination of water and sediment contamination in diesel fuel.

The applicant states, in the MPS LRA, that the MPS Unit 3 technical specifications require the use of ASTM Standard D 1796 for the determination of water and sediment contamination in the diesel fuel. The fuel oil chemistry program is a common program for both MPS Units 2 and 3 and the fuel oil for both units is procured to the same specification. The project team's review of the ASTM Standards D 1796 and D 2709 reveals that ASTM D 1796 is acceptable for the fuel oil used at MPS. On the basis of its review, the project team finds the sixth exception to be acceptable.

7.1.11.4 Enhancements

None

7.1.11.5 Operating Experience

The project team reviewed operating experience for the applicant's fuel oil chemistry program. The applicant states, in the MPS LRA, that operating experience indicates that while fuel oil deliveries from commercial vendors and tank samples do not always meet MPS quality specifications, fuel oil chemistry activities are effective in identifying any anomalies, implementing corrective actions, and trending the parameters. When chemistry results have exceeded allowable values, corrective actions have been implemented to ensure that the quality of the fuel oil in the storage tanks has not been compromised and that the continued use of the fuel oil in the other tanks is considered based on the extent of condition requirements of the corrective action program. The applicant further states that no failures of fuel oil system components were identified at MPS due to contamination or water-induced degradation.

In the MPS LRA, the applicant provides the following representative examples of plant-specific operating experience, which are based on a review of condition reports generated under the corrective action program. These examples were considered in the project team's evaluation of the effectiveness of the program:

> Upon delivery of fuel oil for use in the MPS Unit 2 diesel fuel oil storage tank, the tanker truck was sampled in accordance with station procedures. The verification analysis conducted by the offsite laboratory indicated unsatisfactory results for API gravity and kinematic viscosity. Consequently, the delivery was not accepted for use in the diesel fuel oil storage tank. A new delivery of fuel oil was initiated. As a follow-up action, a purchase order was developed for a new

vendor. The quality of the fuel oil procured from the new vendor was tracked and trended to establish confidence that the vendor consistently provided a product meeting MPS requirements. The trended information confirmed satisfactory vendor compliance.

While performing monthly fuel oil storage tank dewatering, slight rust and gritty sediment was observed being pumped out of the 'A' fuel oil storage tank. Additionally, "fungi looking chunks" were observed, in the 'B' fuel oil storage tank effluent, that disappeared as soon as it reached the roto-flex pump. Investigation revealed that the particulate resulted from rust and grit on the top of the dewatering tube and was not representative of the tank's contents as a whole. Particulate testing was also performed and, based on the results, it was believed that the particulate was not biological in nature. To confirm the results, a sample was obtained from the fuel oil storage tank and was tested for biological growth. The results confirmed the preliminary conclusion that no biological growths were present.

To establish baseline data prior to placing the fuel oil heater in service, a tank bottom sample was drawn using the tank dewatering pump. The sample measured 19 milligrams per liter (mg/l) for particulates. These results were in excess of the 10 mg/l guideline specified for the emergency diesel storage tank and used for the station blackout diesel fuel oil storage tank. A review of the condition was conducted by engineering. It was noted that the sample results were below the generally accepted maximum limit for fuel oil particulates of 20-25 mg/l. No criteria had been established for the sampling used for data gathering. A follow-up sampling was conducted, resulting in a particulate level of 1.4 mg/l. This value was within specified limits for the emergency diesel storage tank. The investigation determined that the fuel oil was acceptable for use. Additional corrective actions implemented included modification of the sampling methodology, establishment of a particulate limit for the station blackout diesel fuel oil storage tank, and establishment of a 10-year preventive maintenance activity to drain and clean the station blackout diesel fuel oil storage tank.

Internal tank inspections were performed on the MPS Unit 2 emergency diesel generator fuel oil day tanks (T48A and T48B) in January 2002, as required by the tank inspection program. These tanks have been in service since plant startup and were inspected in 1988. The tanks were drained, the manways opened, and residual oil on the bottom of the tank was removed. The internal tank inspections were performed in accordance with the tank inspection program procedure, MPS EN 21154A. The inspections included a visual inspection of the accessible tank seam welds for cracking, distortion, corrosion, or other evidence of deterioration; visual inspection of the accessible tank walls, head, and bottom for cracking, distortion, corrosion pitting, or other evidence of deterioration; and visual inspection of accessible tank internal nozzles for cracking, erosion, corrosion, or other evidence of deterioration. The inspections did not discover any reportable conditions and the condition of the tank internals was described as "like new." The tanks were closed and returned to service.

On the basis of its review of the above operating experience and on discussions with the applicant's technical staff, the project team concludes that MPS AMP B2.1.12 adequately manages the aging effects that have been observed at the applicant's plant.

7.1.11.6 UFSAR Supplement

The applicant provides its UFSAR supplements for the fuel oil chemistry program in the MPS Unit 2 LRA, Appendix A, Section A2.1.12, and the MPS Unit 3 LRA, Appendix A, Section A2.1.11, which state that the fuel oil chemistry program manages the aging effect of loss of material by monitoring and controlling fuel oil quality to ensure that it is compatible with the materials of construction for in-scope components containing diesel fuel oil. The acceptance criterion adheres to the specific guidelines and limits defined in related plant procedures for parameters that have been shown to contribute to component degradation. Corrective actions for conditions that are adverse to quality are performed in accordance with the corrective action program as part of the quality assurance program.

During its first on-site visit, the project team reviewed the UFSAR supplements and requested that the applicant revise the Appendix A description to include references to the applicable ASTM standards as identified in the SRP-LR UFSAR supplement table and as required by 10 CFR 54.21(d). In a MPS LRA supplement letter dated July 7, 2004 (ML041900370), the applicant states the following

> To document the industry standards that were the basis for the fuel oil chemistry program, the following wording should be inserted after the first paragraph of MPS Unit 2 Appendix A, Section A2.1.12 (page A-11) and MPS Unit 3 Appendix A, Section A2.1.11 (page A-10).
>
> The fuel oil chemistry program uses the following industry standards as the basis for the program:
>
> ASTM Standard D 1796
> ASTM Standard D 2276 (unmodified)
> ASTM Standard D 4057

The project team reviewed the UFSAR supplements, as modified by the MPS LRA supplement letter dated July 7, 2004 (ML041900407), and confirms that they provide an adequate summary description of the program, as identified in the SRP-LR UFSAR supplement table and as required by 10 CFR 54.21(d).

7.1.11.7 Evaluation

The project team performed a review of the applicable criteria in GALL AMP XI.M30, "Fuel Oil Chemistry," and the program description and elements for MPS AMP B2.1.12, "Fuel Oil Chemistry."

For the aspects of the program elements that were determined by the applicant to be consistent with the corresponding program elements in GALL AMP XI.M30, the project team determined that these program elements for MPS AMP B2.1.12 conform with the applicable program

elements and acceptance criteria in GALL AMP XI.M30, "Fuel Oil Chemistry." Based on its review of the exceptions, the project team concludes that the applicant's fuel oil chemistry program provides reasonable assurance of aging management of loss of material by monitoring and controlling fuel oil quality to ensure that it is compatible with the materials of construction for in-scope components containing diesel fuel oil. The project team finds this AMP acceptable because it conforms to the recommended program description, program elements, and acceptance criteria for fuel oil chemistry, as discussed in GALL AMP XI.M30, "Fuel Oil Chemistry."

In the MPS LRA, the applicant presented six exceptions to the GALL Report elements. The applicant states, in the MPS LRA, that because MPS has not experienced tank degradation caused by MIC or fuel oil breakdown, the applicant does not add biocides, stabilizers, or corrosion inhibitors to its fuel oil as is recommended in GALL AMP XI.M30. On the basis of its review of the MPS operating experience the project team finds the first exception to be acceptable.

The applicant states, in the MPS LRA, that it samples and tests the fuel, and dewaters the security diesel fuel oil storage tank semi-annually, not quarterly as is recommended in GALL AMP XI.M30. The project team requested, and received further information from the applicant regarding the tank size and justification for frequency of testing. On the basis of its review of the MPS operating experience and the clarifications provided by the applicant in MPS Technical Report MP-LR-3723/MP-LR-4723, Revision 3, the project team finds the second exception to be acceptable.

The applicant states, in the MPS LRA, that its program uses unmodified ASTM Standard D 2276, Method A, for particulate determinations and GALL AMP XI.M30 recommends use of modified ASTM Standard D 2276, Method A. The unmodified version of the standard specifies a smaller filter pore size than does the modified version. On the basis that the applicant uses a more conservative version of the ASTM standard for the determination of particulates, the project team finds the third exception to be acceptable.

The applicant states, in the MPS LRA, that in-scope tanks are visually inspected as part of the fuel oil chemistry program and, based on the evaluation of conditions found, ultrasonic testing would be performed under the applicant's tank inspection program. GALL AMP XI.M30 recommends that ultrasonic testing be performed as part of the fuel oil chemistry program. On the basis that the tank inspection program provides an adequate means for evaluating the integrity of the tank internals, the project team finds the fourth exception to be acceptable.

The applicant states, in the MPS LRA, that the MPS Unit 2 emergency diesel day tanks cannot be dewatered because the bottom drains are located in the side of the tanks. GALL AMP XI.M30 states that periodic draining of water collected at the bottom of a tank minimizes the amount of water and the length of contact time. On the basis of its review of the operating experience and discussion with the applicant, the project team concludes that corrosion caused by prolonged water contact with tank bottoms is not an aging effect of significance for the MPS Unit 2 emergency diesel day tanks and, therefore, finds the fifth exception to be acceptable.

The applicant states, in the MPS LRA, that MPS Unit 3 technical specifications use ASTM Standard D 1976 for determining the extent of water and sediment contamination in diesel fuel.

GALL AMP XI.M30 recommends use of both ASTM Standard D 1976 and D 2709 for making these determinations. The project team's review of the ASTM Standards D 1796 and D 2709 reveals that ASTM D 1796 is acceptable for the fuel oil used at MPS. On the basis of its review, the project team finds the sixth exception to be acceptable.

During the audit and review, the project team requested that the applicant provide a completed fuel oil analysis datasheet, showing parameters tested and test results, for MPS Unit 2 emergency diesel generator fuel oil storage tank. The applicant provided the project team with MPS Unit 2 diesel fuel tank sample numbers 961, 962, and 963, which include the following tested parameters: particles, viscosity, water and sediment (by volume), and cetane index. The project team concluded that all parameters were within the specification limits.

The project team also inquired if any of the coated tanks had shown an aging effect. The applicant provided the project team with work order, MPS work order M3-91-16140, which was performed in 1996 and documented finding blisters in the coating on tank 3-EGF*TK1A. The project team concluded that the blisters were reported as repaired and cleaned. Therefore, the project team finds its concerns related to the management of aging effects for coated tanks resolved.

7.1.11.8 Conclusion

On the basis of its audit and review of the applicant's program, the project team finds that those portions of the program for which the applicant claims consistency with the GALL Report are consistent with the GALL Report. In addition, on the basis of its review of the exceptions to the GALL Report, the project team finds that the applicant has demonstrated that the effects of aging will be adequately managed so that the intended functions will be maintained consistent with the CLB during the period of extended operation, as required by 10 CFR 54.21(a)(3).

On the basis of its review of the UFSAR supplements for this AMP, as modified by the MPS LRA supplement letter dated July 7, 2004 (ML041900407), the project team also finds that they provide an adequate summary description of the program, as required by 10 CFR 54.21(d).

7.1.12 GENERAL CONDITION MONITORING (MPS AMP B2.1.13)

In the MPS LRA, Appendix B, Section B2.1.13, the applicant describes MPS AMP B2.1.13, "General Condition Monitoring."

The applicant states that MPS AMP B2.1.13 is an existing plant-specific program. The applicant credits this program with managing the aging effects for loss of material, cracking, and change of material properties on the external surfaces of components. The external surfaces of structures and components are monitored for signs of aging that can be detected via visual observations. General condition monitoring includes the observations that are made during focused inspections performed on a periodic basis for plant components and structures, including those within the scope of license renewal. The results of the monitoring activities provide the basis for initiating required corrective action in a timely manner.

The project team reviewed the documents listed in Attachment 5 of this report, in whole or in part, including MPS Technical Report MP-LR-3736/4736, “General Condition Monitoring Activities,” Revision 2, dated March 16, 2004, and interviewed the applicant's technical staff.

7.1.12.1 Review of the AMP Against the Program Elements

The project team reviewed MPS AMP B2.1.13 against the AMP elements found in the SRP-LR, Appendix A, Section A.1.2.3 and SRP-LR Table A.1-1. The guidance described in the MPS audit and review plan was followed.

7.1.12.1.1 Scope of Program

The “scope of program” program element criterion in Appendix A.1.2.3.1 of the SRP-LR requires that the program scope include the specific structures and components addressed with this program.

The applicant states, in MPS AMP B2.1.13, that the general condition monitoring program detects aging effects by visual inspections of the exterior surface of plant equipment, whether it is constructed of metal, concrete, or polymers.

The project team reviewed and confirmed that this program element satisfies the criterion defined in Appendix A.1.2.3.1 of the SRP-LR. The proposed scope identifies the specific components for which the program manages aging. On this basis, the project team finds that the applicant’s proposed program scope is acceptable.

7.1.12.1.2 Preventive Actions

The “preventive actions” program element criterion in Appendix A.1.2.3.2 of the SRP-LR is that condition monitoring programs do not rely on preventive actions, and thus, preventive actions need not be provided.

The applicant states, in MPS AMP B2.1.13, that the “preventive actions” program element is not applicable because the general condition monitoring program is an inspection program and no actions will be taken as part of this program to prevent or mitigate aging degradation.

The project team confirmed that the preventive actions program element satisfies the criterion defined in Appendix A.1.2.3.2 of the SRP-LR. The project team did not identify the need for preventive actions for MPS AMP B2.1.13 because it is a condition monitoring program.

7.1.12.1.3 Parameters Monitored/Inspected

The “parameters monitored or inspected” program element criteria in Appendix A.1.2.3.3 of the SRP-LR are

> The parameters to be monitored or inspected should be identified and linked to the degradation of the particular structure and component intended function(s).

> The parameters monitored should be the specific parameters being controlled to achieve prevention or mitigation of aging effects.
>
> For a condition monitoring program, the parameter monitored or inspected should detect the presence and extent of aging effects.

The applicant states, in MPS AMP B2.1.13 for the "parameters monitored/inspected" program element, that system engineer walkdown inspections monitor the materiel condition of plant systems, structures, and components during normal operation, shutdown conditions, and refueling outages. Inspectors look for the following types of degradation or adverse conditions during visual inspections: worn, flaking, or rusted painted surfaces; excessive rust, material wastage or signs of degradation, cracking or aging on equipment surfaces; leaks, including evidence of boric acid; damaged or degraded hangers and supports; signs of general corrosion on machined or sliding surfaces with close tolerances; signs of unusual concrete or grout deterioration, erosion, corrosion, chipping, cracking, or spalling on equipment foundations; and loose, corroded, stressed, seized, or rusted skids, foundations, supports, hangers, and fasteners.

During performance of radiologically controlled area surveys, health physics personnel look for evidence of boron precipitation and active radioactive system leaks.

During their rounds, plant equipment operators monitor the material condition of plant systems, structures, and components in all modes of operation. During visual inspections, plant equipment operators look for evidence of system leakage, including evidence of boric acid; evidence of groundwater intrusion or leakage; loose or missing pipe hangers; evidence of degradation (e.g., excessive corrosion or scaling); and signs of unusual concrete or grout deterioration, erosion, corrosion, chipping, cracking, or spalling.

The general condition monitoring program also credits visual inspection for the detection of changes in material properties in elastomers in the ventilation systems (MPS LRA Table 3.3.1, Item 02) and in support members (MPS LRA Table 3.5.1, Item 29). During the audit and review, it was not clear to the project team how visual inspections would be used to monitor this aging effect. In a subsequent on-site visit, the applicant stated that the change of material properties for these elastomer components is visually observable by evidence of cracking and crazing, discoloration, distortion, evidence of swelling, tackiness, evaluation of resilience and indentation recovery, etc. These conditions are observable during the general condition monitoring activities performed by the system engineers as part of comprehensive inspections performed monthly, and by the plant equipment operators during daily inspections of plant areas to verify component or system operation. The project team reviewed the document change request that will add the details for the visual inspection of elastomers to MPS Technical Report MP-LR-3723/MP-LR-4736, Revision 2. The applicant states, in the MPS LRA, that the procedures and training for personnel performing general condition monitoring inspections and walkdowns will be enhanced to identify the requirements for the inspection of aging effects. This will provide a reasonable assurance that changes in material properties of elastomer components will be adequately managed. This commitment is identified on the applicant's license renewal commitment list in the MPS LRA, Appendix A, Table 6.0-1, Item 10. Based on discussions with plant staff and the review of the MPS LRA commitment and

document change request, the project team concurs that change in material properties can be visually observed.

The project team confirmed that this program element satisfies the criteria defined in Appendix A.1.2.3.3 of the SRP-LR. The general condition monitoring program is acceptable because the visual inspections for material loss, cracking, and change in material properties are intended to detect the presence and extent of aging effects. On this basis, the project team finds that the parameters monitored or inspected program element is acceptable.

7.1.12.1.4 Detection of Aging Effects

The "detection of aging effects" program element criteria in Appendix A.1.2.3.4 of the SRP-LR are

> Provide information that links the parameters to be monitored or inspected to the aging effects being managed.
>
> Describe when, where, and how program data are collected (i.e., all aspects of activities to collect data as part of the program).
>
> Link the method or technique and frequency, if applicable, to plant-specific or industry-wide operating experience.
>
> Provide the basis for the inspection population and sample size when sampling is used to inspect a group of SCs. The inspection population should be based on such aspects of the SCs as a similarity of materials of construction, fabrication, procurement, design, installation, operating environment, or aging effects.

The applicant states, in MPS AMP B2.1.13, for the "detection of aging effects" program element, that the external condition of components and structures is determined by visual inspection. These inspections provide information to help manage the aging effects of loss of material, cracking, and change in material properties.

The applicant also states, in MPS AMP B2.1.13, that visual monitoring of the systems, structures, and components in normally accessed areas is performed in accordance with the guidance provided in administrative and surveillance procedures. The inspection frequency varies from twice a day to once per refueling outage, in accordance with applicable station procedures.

The general condition monitoring program also credits visual inspection for the detection of changes in material properties in elastomers in the ventilation systems (MPS LRA Table 3.3.1, Item 02) and in support members (Table 3.5.1, Item 29). During the audit and review, it was not clear to the project team how visual inspections would be used to monitor this aging effect. In a subsequent project team visit to the plant, the applicant stated that the change of material properties for these elastomer components is visually observable by evidence of cracking and crazing, discoloration, distortion, evidence of swelling, tackiness, evaluation of resilience and indentation recovery, etc. These conditions are observable during the general condition monitoring activities performed by the system engineers as part of comprehensive inspections

performed monthly, and by the plant equipment operators during daily inspections of plant areas to verify component or system operation. The project team reviewed the document change request that will add the details for the visual inspection of elastomers to MPS Technical Report MP-LR-3723/MP-LR-4736, Revision 2. The applicant states, in the MPS LRA, that the procedures and training for personnel performing general condition monitoring inspections and walkdowns will be enhanced to identify the requirements for the inspection of aging effects. This will provide a reasonable assurance that changes in material properties of elastomer components will be adequately managed. This commitment is identified on the applicant's license renewal commitment list in the MPS LRA, Appendix A, Table 6.0-1, Item 10. Based on discussions with plant staff and the review of the MPS LRA commitment and document change request, the project team concurs that change in material properties can be visually observed.

The project team reviewed and confirmed that this program element satisfies the criteria defined in Appendix A.1.2.3.4 of the SRP-LR. The detection of aging effects identifies the specific components for which the program manages aging. On this basis, the project team finds that the applicant's detection of aging effects program element is acceptable.

7.1.12.1.5 Monitoring and Trending

The "monitoring and trending" program element criteria in Appendix A.1.2.3.5 of the SRP-LR are

> Monitoring and trending activities should be described, and they should provide predictability of the extent of degradation and thus effect timely corrective or mitigative actions.
>
> This program element describes how the data collected are evaluated and may also include trending for a forward look. The parameter or indicator trended should be described.

The applicant states, in MPS AMP B2.1.13, for the "monitoring and trending" program element, that observations of significant degradation are identified for engineering evaluation and documented in accordance with governing procedures. Additionally, system health reports provide a quarterly engineering perspective on system conditions and provide an effective tool by which management can focus attention and resources on systems that do not meet performance goals.

The applicant also states that degradation due to boric acid corrosion is monitored and trended by the activities in the general condition monitoring program in conjunction with the corrective action program. When degradation is identified through general condition monitoring, the corrective action program is utilized to track the specific issue, provide corrective actions, and trend the general issue.

The project team confirmed that this program element satisfies the criteria defined in Appendix A.1.2.3.5 of the SRP-LR. Trending of the inspection results will be performed and will enhance the applicant's ability to detect aging effects before there is a loss of intended function.

On this basis, the project team finds that the applicant's monitoring and trending program element is acceptable.

7.1.12.1.6 Acceptance Criteria

The "acceptance criteria" program element criteria in Appendix A.1.2.3.6 of the SRP-LR are

> The acceptance criteria of the program and its basis should be described. The acceptance criteria, against which the need for corrective actions will be evaluated, should ensure that the structure and component intended function(s) are maintained under all CLB design conditions during the period of extended operation.
>
> The program should include a methodology for analyzing the results against applicable acceptance criteria.
>
> Qualitative inspections should be performed to same predetermined criteria as quantitative inspections by personnel in accordance with ASME Code and through approved site specific programs.

The applicant states, in MPS AMP B2.1.13 for the "acceptance criteria" program element that, the acceptance criterion for visual inspections is the absence of any visual indication of external degradation. Evaluations of anomalies found during general condition monitoring activities determine whether analysis, repair, or further inspection is required. Degraded conditions that are adverse to quality are entered into the corrective action program.

The general condition monitoring program also credits visual inspection for the detection of changes in material properties in elastomers in the ventilation systems (MPS LRA Table 3.3.1, Item 02) and in support members (Table 3.5.1, Item 29). During the audit and review, it was not clear to the project team how visual inspections would be used to monitor this aging effect. In a subsequent on-site visit, the applicant stated that the change of material properties for these elastomer components is visually observable by evidence of cracking and crazing, discoloration, distortion, evidence of swelling, tackiness, evaluation of resilience and indentation recovery, etc. These conditions are observable during the general condition monitoring activities performed by the system engineers as part of comprehensive inspections performed monthly, and by the plant equipment operators during daily inspections of plant areas to verify component or system operation. The project team reviewed the document change request that will add the details for the visual inspection of elastomers to MPS Technical Report MP-LR-3723/MP-LR-4736, Revision 2. The applicant states, in the MPS LRA, that the procedures and training for personnel performing general condition monitoring inspections and walkdowns will be enhanced to identify the requirements for the inspection of aging effects. This will provide a reasonable assurance that changes in material properties of elastomer components will be adequately managed. This commitment is identified on the applicant's license renewal commitment list in the MPS LRA, Appendix A, Table 6.0-1, Item 10. Based on discussions with plant staff and the review of the MPS LRA commitment and document change request, the project team concurs that change in material properties can be visually observed.

The project team confirmed that this program element satisfies the criteria defined in Appendix A.1.2.3.6 of the SRP-LR. Any anomalous indications that are signs of degradation will be evaluated to determine whether the observed deterioration of material condition is significant enough to compromise the ability of the in-scope structures and components to perform their intended functions. If found unacceptable, corrective measures will be implemented. On this basis, the project team finds that the applicant's acceptance criteria program element is acceptable.

7.1.12.1.7 Corrective Actions

This program element is reviewed by the NRR DIPM staff and addressed in Section 3 of the SER related to the MPS Units 2 and 3 LRA.

7.1.12.1.8 Confirmation Process

This program element is reviewed by the NRR DIPM staff and addressed in Section 3 of the SER related to the MPS Units 2 and 3 LRA.

7.1.12.1.9 Administrative Controls

This program element is reviewed by the NRR DIPM staff and addressed in Section 3 of the SER related to the MPS Units 2 and 3 LRA.

7.1.12.1.10 Operating Experience

The "operating experience" program element criterion in Appendix A.1.2.3.10 of the SRP-LR states that operating experience should provide objective evidence to support the conclusion that the effects of aging will be managed adequately so that the structure and component intended function(s) will be maintained during the period of extended operation.

The applicant states, in MPS AMP B2.1.13 for the "operating experience" program element, that the effects of aging are found in normally accessed areas during routine work tasks, walkdowns, and inspections. Engineering evaluations and corrective actions are implemented, as necessary, to correct conditions that are adverse to quality. Management of degradation due to aging effects is not typically required and minor degradation is resolved through the work control process. Additionally, inspection results from reviews by outside organizations are used to help confirm that plant integrity and material condition are maintained.

The project team's review of station operating experience indicates that while degradation has occurred, routine work tasks, walkdowns and inspection activities have been effective in identifying anomalies and implementing corrective actions. When inspection results have warranted, corrective actions have been implemented to ensure that the structures and components continue to perform their intended function.

No operating experience was identified that allowed the project team to conclude that general condition monitoring activities have been effective in managing changes in the material properties of elastomers in the ventilation systems or in support structures and components. However, as part of the commitment identified in MPS LRA Appendix A, Table 6.0-1, Item 10,

the procedures and training for personnel performing general condition monitoring inspections and walkdowns will be enhanced to identify the requirements for the inspection of aging effects. This will provide a reasonable assurance that changes in material properties of elastomer components will be adequately managed.

On the basis of its review of the above operating experience and on discussions with the applicant's technical staff, the project team concludes that MPS AMP B2.1.12 will adequately manage the aging effects that have been observed at the applicant's plant.

7.1.12.2 UFSAR Supplement

The applicant provides its UFSAR supplements for the general condition monitoring program in the MPS Unit 2 LRA, Appendix A, Section A.2.1.13, and the MPS Unit 3 LRA, Appendix A, Section A.2.1.12, which state that the program manages the aging effects of loss of material, change of material properties, and cracking on the external surfaces of components. It is performed in accessible plant areas for components and structures including those within the scope of license renewal and involves visual inspections for evidence of age-related degradation. The acceptance criterion for visual inspections is the absence of anomalous indications that are signs of degradation. Corrective actions for conditions that are adverse to quality are performed in accordance with the corrective action program as part of the quality assurance program.

The applicant states, in MPS LRA Appendix A, that one commitment is associated with the general condition monitoring program as follows

> The procedures and training for personnel performing general condition monitoring inspections and walkdowns will be enhanced to identify the requirements for the inspection of aging effects. This commitment is identified on the applicant's license renewal commitment list in the MPS LRA, Appendix A, Table 6.0-1, Item 10.

The project team reviewed the UFSAR supplements and confirms that they provide an adequate summary description of the program, as identified in the SRP-LR supplement table and as required by 10 CFR 54.21(d).

7.1.12.3 Conclusion

On the basis of its audit and review of the applicant's program and clarification as provided above, the project team finds that the applicant has demonstrated that the effects of aging will be adequately managed so that the intended functions will be maintained consistent with the CLB during the period of extended operation, as required by 10 CFR 54.21(a)(3).

On the basis of its review of the UFSAR supplements for this AMP, the project team also finds that they provide an adequate summary description of the program, as required by 10 CFR 54.21(d).

7.1.13 INACCESSIBLE MEDIUM VOLTAGE CABLES NOT SUBJECT TO 10 CFR 50.49 ENVIRONMENTAL QUALIFICATION REQUIREMENTS (MPS AMP B2.1.14)

In the MPS LRA, Appendix B, Section B2.1.14, the applicant states that MPS AMP B2.1.14, "Inaccessible Medium Voltage Cables Not Subject to 10 CFR 50.49 Environmental Qualification Requirements," is consistent with GALL AMP XI.E3, "Inaccessible Medium Cables Not Subject to 10 CFR 50.49 Environmental Qualification Requirements," with one exception and one enhancement.

7.1.13.1 Program Description

The applicant states, in the MPS LRA, that the inaccessible medium voltage cables not subject to 10 CFR 50.49 environmental qualification requirements program manages the aging effect of formation of water trees and ensures that inaccessible medium voltage cables within the scope of license renewal that have been submerged and exposed to significant voltage will remain capable of performing their intended function. Exposure to both conditions is necessary for age-related degradation of insulation resulting from water treeing. MPS AMP B2.1.14 considers the combined effects of submergence (i.e., significant moisture exposure) and significant voltage exposure, using the definitions for these exposures as defined in GALL AMP XI.E3. The MPS program identifies areas where the potential for submergence exists, and relies upon inspection and pumping of cable vaults, manholes, and handholes to prevent significant moisture exposure. The inspections verify that the cables, including those protected by conduit, are not submerged and that no evidence of cable submergence since the last inspection is detected.

The MPS structures monitoring program ensures that underground cable enclosures such as vaults, manholes, and handholes containing in-scope medium voltage cables, which could potentially become submerged, are pumped and inspected at specified frequencies. Pumping frequencies are adjusted as necessary to ensure that cables do not become submerged between preventive maintenance activities. The project team reviewed MPS Technical Report MP-LR-3728/4728, "Structures Monitoring Program," Revision 2, dated March 16, 2004, which describes preventive maintenance work orders associated with the MPS structures monitoring program.

The applicant states, in MPS Technical Report MP-LR-3728/4728, that if in-scope medium voltage cables are found to have been exposed to significant moisture under significant voltage conditions, the structures monitoring program personnel will coordinate with engineering to ensure that the cables are evaluated to assess any potential impact on the integrity of the insulation.

GALL AMP XI.E3 stipulates that any tests that might be performed will be proven tests for detecting deterioration of the insulation due to wetting, and will be acceptable to the nuclear industry and the NRC. Examples of possible test methods considered power factor, partial discharge, or polarization index, as described in EPRI Technical Report TR-103834-P1-2, "Effects of Moisture on the Life of Power Plant Cables," dated August 1994, or other appropriate testing.

The applicant states, in the MPS LRA, that the program will consider the technical information and guidance cited in GALL AMP XI.E3 that is provided by: EPRI TR-109619, IEEE Std 1205-2000, NUREG/CR-5643, and SAND96-0344.

7.1.13.2 Consistency with the GALL Report

In the MPS LRA, the applicant states that MPS AMP B2.1.14 is consistent with GALL AMP XI.E3, with one exception and one enhancement.

The project team interviewed the applicant's technical staff and reviewed, in whole or in part, the documents listed in Attachment 5 of this report for MPS AMP B2.1.14, including MPS Technical Report MP-LR-3731/4741, "Inaccessible Medium Voltage Cables Not Subject to 10 CFR 50.49 Requirements," Revision 2, dated March 16, 2004, which provides an assessment of how the GALL AMP elements are addressed by the inaccessible medium voltage cables not subject to 10 CFR 50.49 environmental qualification requirements program.

The project team reviewed the seven program elements (see Section 5.1 of this report) contained in the MPS AMP and associated basis documents against GALL AMP XI.E3 for consistency.

7.1.13.3 Exceptions to the GALL Report

The applicant states, in the MPS LRA, an exception to the GALL Report elements as follows

Elements: 1: Scope of Program
3: Parameters Monitored/Inspected
4: Detection of Aging Effects

Exception: Should evidence of submerged medium voltage cables with significant voltage be identified, an engineering evaluation will be performed to determine the appropriate actions to fully address the identified condition of the cables, including the identification of testing requirements as necessary, and the corresponding test frequency.

The GALL Report identifies the following criterion for the "scope of program" program element associated with the exception taken

> This program applies to inaccessible (e.g., in conduit or direct buried) medium-voltage cables within the scope of license renewal that are exposed to significant moisture simultaneously with significant voltage.

The GALL Report identifies the following criterion for the "parameters monitored/inspected" program element associated with the exception taken

> In-scope, medium-voltage cables exposed to significant moisture and significant voltage are tested to provide an indication of the condition of the conductor insulation.

The GALL Report identifies the following criteria for the "detection of aging effects" program element associated with the exception taken

> In-scope, medium-voltage cables exposed to significant moisture and significant voltage are tested at least once every 10 years. The first tests for license renewal are to be completed before the period of extended operation.

The project team noted that inaccessible medium-voltage cables may be exposed to condensation and wetting in inaccessible locations, such as conduits, cable trenches, cable troughs, and duct banks. When an energized medium-voltage cable is exposed to wet conditions for which it is not designed, water treeing or a decrease in the dielectric strength of the conductor insulation can occur. Water trees occur when the insulating materials are exposed to long-term, continuous electric stress and moisture; these water trees eventually result in breakdown of the dielectric and ultimate failure. The growth and propagation of water trees is somewhat unpredictable.

The applicant states, in MPS AMP B2.1.14, that this program uses periodic actions, such as pumping and inspection of cable vaults (manholes), to prevent cables from being submerged. In the event that submerged cables are found, an engineering evaluation will be performed and the appropriate testing required will be specified, as necessary to confirm the condition of the cable insulation. GALL AMP XI.E3 states that in-scope, inaccessible medium-voltage cables exposed to significant moisture (periodic exposure to moisture that last more than few days (emphasize added) and significant voltage are tested at least once every 10 years to provide indication of the cable insulation condition. During the audit, the project team requested that the applicant provide the frequency of manholes inspection and technical justification of how visual inspections are adequate to conclude that the cables are not subject to significant moisture that lasts more than few days.

In a supplemental letter dated December 3, 2004 (ML043450341), the applicant provides its response. The applicant states, in its response, that it has identified two MPS Unit 3 duct lines with low points that are susceptible to moisture accumulation. These two duct lines contain 26 in-scope medium voltage cables. No similar duct lines were identified for MPS Unit 2. Prior to the period of extended operation, these cables will be tested to demonstrate that water treeing will not prevent the cables from performing their intended function.

Further, the applicant states that the other duct banks for both MPS units are not susceptible to moisture accumulation due to the slope of the embedded conduit between manholes and the inspections performed by MPS AMP B.2.1.23, "Structures Monitoring Program." The duct banks consist of 5-inch Schedule 40 PVC pipe embedded in reinforced concrete, which is founded on dense soil over bedrock. The applied contact pressure by the duct banks is well below the allowed bearing pressure of the supporting material resulting in insignificant settlement (Ref. Unit 2 FSAR Section 2.7.5.2). Therefore, the duct banks will maintain the design cable run slope to their respective termination points in manholes or buildings and the structures monitoring program inspections will identify any water intrusion.

For the cable in these duct banks, the design, in conjunction with the structures monitoring program inspections, ensures that any cable that becomes submerged will be identified by the structures monitoring program inspections. The inaccessible medium voltage cables not

subject to 10 CFR 50.49 environmental qualification requirements program currently addresses the testing of cables that have been submerged. For the cables that have not been submerged, the aging effect of water treeing is precluded and testing is not required.

To implement the testing of inaccessible medium voltage cables identified in the two Unit 3 duct lines with low points that are susceptible to moisture accumulation, the applicant will add the following commitment to the MPS LRA Appendix A, "FSAR Supplement" Unit 2, Section A2.1.14 and Unit 3, Section A2.1.13:

> Testing of Inaccessible Medium Voltage Cables:
>
> "The Unit 3 duct lines # 929 (SBO Diesel to Unit 3 4.16kV Normal Switchgear) and # 973 (RSST 3RTX-XSR-B to 6.9kV Normal Switchgear Bus 35A, 35B, 35C and 35D) have low points that are susceptible to moisture accumulation. Prior to the period of extended operation, the in scope cables in these two duct lines will be tested to demonstrate that water treeing will not prevent the cables from performing their intended function. Subsequent testing will be performed on a frequency not to exceed a 10-year interval.

This commitment is identified in Appendix A, Table A6.0 -1 License Renewal Commitments as Item [33 for Unit 2] [34 for Unit 3].

An additional item will be added to Unit 2 and Unit 3 Appendix A "FSAR Supplement", Table A6.0 -1 as follows:

Item: "33" (Unit 2) and "34" (Unit 3)

> Commitment: "The in scope cables in Unit 3 duct lines # 929 (SBO Diesel to Unit 3 4.16kV Normal Switchgear) and # 973 (RSST 3RTXXSR-B to 6.9kV Normal Switchgear Bus 35A, 35B, 35C and 35D) will be tested to demonstrate that water treeing will not prevent the cables from performing their intended function."
>
> Source: "Inaccessible Medium Voltage Cables Not Subject to 10 CFR 50.49 Environmental Qualification Requirements"
>
> Schedule: "Prior to Period of Extended Operation Not to Exceed a 10 Year Frequency Thereafter."

The project team reviewed the applicant's response. The project team finds, other than the duct lines #929 and #973 (26 cables) which the applicant committed to test, that the slope of these duct banks between manholes and the inspection performed, as required by the applicant's structures monitoring program, are not adequate to preclude significant moisture for these duct banks. It was not clear to the project team how the applicant's structures monitoring program will identify water intrusion in these duct banks because these banks are underground and are not accessible.

Periodic actions are taken to prevent cables from being exposed to significant moisture, such as inspection of water collection in cable manholes and conduit, and draining the water, as needed. However, those actions are not sufficient to assure that water is not trapped else where in the raceways. For example, if duct bank conduit has low points in the routing, there could potentially be long term submergence at these low points. In addition, concrete raceways may crack due to soil settling over a long period of time and that the conduit between manhole covers may not be water tight. Additionally, in certain areas, the water table is high in seasonal cycles and therefore, the raceways may get refilled with water soon after purging. Further, the potential uncertainties involved with water trees exist even with duct banks that are sloped to minimize water accumulation. Experience has shown that insulation degradation will occur if the cables are exposed to 100 percent relative humidity. Periodically removal of water in manholes is required to minimize the potential for insulation degradation. In addition to removal of water, in-scope, medium-voltage cables exposed to significant moisture and significant voltage must be tested to provide an indication of the condition of the conductor insulation. The specific type of test performed will be determined prior to the initial test and is to be a proven test for detecting deterioration of the insulation material due to wetting.

On the basis of its review, the project team finds that the slope of these duct banks between manholes and the inspection performed, as required by the applicant's structures monitoring program, are not adequate to preclude significant moisture for these duct banks and not adequate to prevent cables from being subject to water trees due significant moisture and significant voltage. The project team determined that inaccessible medium voltage cables not subject to 10 CFR 50.49 environmental qualification requirement program at MPS is not consistent with GALL AMP XI.E3. In a MPS LRA supplement letter dated January 11, 2005 (ML050190289), the applicant states that it has decided to perform testing of a representative sample of inaccessible medium-voltage cables. The applicant states that the following commitment will be added to its LRA Appendix A, "FSAR Supplement" Unit 2 Section A2.1.14 and Unit 3 Section A2.1.13:

> "Sample Testing of Inaccessible Medium Voltage Cables "Prior to the period of extended operation, a representative sample of inscope medium voltage cables will be tested to demonstrate that water treeing will not prevent the cables from performing their intended function. This sample testing is in addition to the testing specified in the previous commitment. Subsequent testing will be performed on a frequency not to exceed a 10-year interval.
>
> This commitment is identified in Appendix A, Table A6.0 -1 License Renewal Commitments as Item [34 for Unit 2] [35 for Unit 3]."
>
> An additional item will be added to Millstone Power Station Unit 2 and Unit 3 Appendix A "FSAR Supplement", Table A6.0 -1 as follows:
>
> Item: "34" (Unit 2) and "35" (Unit 3)
>
> Commitment: "In addition to the testing specified in Commitment [33 for Unit 2] [34 for Unit 3], a representative sample of in-scope medium voltage cables will be tested to demonstrate that water treeing will not prevent the cables from performing their intended function."

> Source: "Inaccessible Medium Voltage Cables Not Subject to 10 CFR 50.49 Environmental Qualification Requirements."
>
> Schedule: "Prior to Period of Extended Operation Not to Exceed a 10 Year Frequency Thereafter."

The project team reviewed the applicant response and finds it acceptable because in addition to inspect manholes and draining water, as needed, the applicant will also test a representative sample of inaccessible medium-voltage cables which would provide an indication of the condition of the cable insulation.

7.1.13.4 Enhancements

The applicant states, in the MPS LRA, an enhancement to the GALL Report elements as follows

Elements:	1: Scope of Program 4: Detection of Aging Effects
Enhancement:	Engineering will identify testing requirements, as necessary, to confirm the condition of the cable insulation for inaccessible medium-voltage cables having significant voltage and having been submerged. If cables have become submerged during the period of extended operation, engineering will evaluate to determine the appropriate testing, as necessary, to be performed during the corresponding ten-year interval. Any tests performed will be proven tests for detecting deterioration of the insulation due to wetting. This commitment is identified on the applicant's license renewal commitment list in the MPS LRA, Appendix A, Table A6.0-1, Item 11.

The GALL Report identifies the following criterion for the "scope of program" program element associated with the enhancement

> The program applies to inaccessible (e.g., in conduit or direct buried) medium-voltage cables within the scope of license renewal that are exposed to significant moisture simultaneously with significant voltage.

The GALL Report identifies the following criteria for the "detection of aging effects" program element associated with the enhancement

> In-scope, medium-voltage cables exposed to significant moisture and significant voltage are tested at least once every 10 years. The first tests for license renewal are to be completed before the period of extended operation. The program applies to inaccessible (e.g., in conduit or direct buried) medium-voltage cables within the scope of license renewal that are exposed to significant moisture simultaneously with significant voltage.

The applicant states, in MPS LRA, that the enhancement uses periodic action, such as pumping to prevent cable vaults from being submerged and inspections to determine that cables are not submerged. In the event that submerged cables are found, an engineering evaluation will be perform and the appropriate testing required will be specified, as necessary to confirm the condition of the cable insulation. The project team finds that periodic action, as suggested by the applicant's program, may not be sufficient as compared to GALL AMP XI.E3. In a MPS LRA supplement letter dated January 11, 2005 (ML050190289), the applicant committed to inspect manholes and test a representative sample of inaccessible medium-voltage cables to provide an indication of the condition of cable insulation. The project team reviewed the applicant's response and finds the applicant's response acceptable.

7.1.13.5 Operating Experience

The project team reviewed operating experience for the applicant's inaccessible medium voltage cables not subject to 10 CFR 50.49 environmental qualification requirements program. The applicant stated during audit discussions that there was minimal plant-specific operating experience regarding the testing of non-environmentally qualified, medium-voltage cables to confirm the condition of insulation after submergence. The applicant states that it recently established the periodic pumping and inspections of cable vaults, manholes, and handholes based on industry operating experience with submerged cables and the recognition of water treeing as an aging effect. The operating experience data associated with implementing this aspect of MPS AMP B2.1.14 is being addressed in the MPS corrective action program.

The project team's review of MPS prior operating experience included the applicant's evaluation of condition reports addressing issues identified in NRC Information Notice 2002-12, "Submerged Safety-Related Electrical Cables," dated March 2002. Initial investigations by the applicant determined that some manholes containing safety-related cables had the potential for cable submergence. Each unit identified seven manholes with this potential vulnerability. The MPS Unit 3 manholes had been governed by a preventive maintenance program whereby they were being routinely inspected and pumped out as necessary. Through this program, the applicant concluded that the MPS Unit 3 cables had not been submerged.

MPS Unit 2 did not have a similar preventive maintenance program. Therefore the applicant concluded that the MPS Unit 2 cables in question might have been submerged. To address this concern, the applicant identified the specific safety-related cables and reviewed the applicable purchase specifications, manufacturers' specifications, and qualification records. The applicant also inspected the cables for indications of degradation resulting from submergence, but found none. The applicant's engineering evaluation determined that the cables were acceptable for continued use. The applicant added the MPS Unit 2 manholes to a preventive maintenance program requiring periodic inspection and pumpout (if necessary) of the manholes.

On the basis of its review of the above operating experience and on discussions with the applicant's technical staff, the project team concludes that MPS AMP B2.1.14 adequately manages the aging effects that have been observed at the applicant's plant.

7.1.13.6 UFSAR Supplement

The applicant provides its UFSAR supplements for the inaccessible medium voltage cables not subject to 10 CFR 50.49 environmental qualification requirements program in MPS Unit 2 LRA, Appendix A, Section A.2.1.14 and MPS Unit 3 LRA, Appendix A, Section A2.1.13, which state that the program manages the aging effect of formation of water trees and ensures that inaccessible medium-voltage (2kV to 15kV) electrical cables within the scope of license renewal (but not subject to the environmental qualification requirements of 10 CFR 50.49) that have been submerged, remain capable of performing their intended function. The acceptance criterion for the visual inspections is that in-scope-medium-voltage cables have not been submerged. The acceptance criterion for testing, if determined to be necessary based on an engineering evaluation, will be defined in accordance with the specific type of test identified. Corrective actions for conditions that are adverse to quality are performed in accordance with the corrective action program as part of the quality assurance program.

In a supplemental letter dated December 3, 2004 (ML043450341), the applicant states that, to implement the testing of inaccessible medium voltage cables identified in the two MPS Unit 3 duct lines with low points that are susceptible to moisture accumulation, the following commitment will be added to MPS LRA Appendix A, "FSAR Supplement" Unit 2, Section A2.1.14 and Unit 3, Section A2.1.13:

Testing of Inaccessible Medium Voltage Cables:

> "The Unit 3 duct lines # 929 (SBO Diesel to Unit 3 4.16kV Normal Switchgear) and # 973 (RSST 3RTX-XSR-B to 6.9kV Normal Switchgear Bus 35A, 35B, 35C and 35D) have low points that are susceptible to moisture accumulation. Prior to the period of extended operation, the in scope cables in these two duct lines will be tested to demonstrate that water treeing will not prevent the cables from performing their intended function. Subsequent testing will be performed on a frequency not to exceed a 10-year interval.

The project team reviewed the UFSAR supplements and the clarifications provided in the MPS LRA supplement letters. The project team concludes that they provide an adequate summary description of the program, as identified in the SRP-LR UFSAR supplement table and as required by 10 CFR 54.21(d).

7.1.13.7 <u>Evaluation</u>

The project team performed a review of the applicable criteria in GALL AMP XI.E3, "Inaccessible Medium Cables Not Subject to 10 CFR 50.49 Environmental Qualification Requirements," and the program description and elements for MPS AMP B2.1.14, "Inaccessible Medium Voltage Cables Not Subject to 10 CFR 50.49 Environmental Qualification Requirements."

For the aspects of the program elements that were determined by the applicant to be consistent with the corresponding program elements in GALL AMP XI.E3, the project team determined that these program elements for MPS AMP B.2.1.14 conform with the applicable program elements and acceptance criteria in GALL AMP XI.E3, "Inaccessible Medium Cables Not Subject to 10 CFR 50.49 Environmental Qualification Requirements." Based on its review, the project team concludes that the applicant's inaccessible medium voltage cables not subject to

10 CFR 50.49 environmental qualification requirements program provides reasonable assurance of aging management of water treeing in inaccessible non-environmentally qualified, medium-voltage cables subject to simultaneous significant submergence and voltage conditions. The project team finds this program acceptable because it conforms to the recommended program description, program elements, and acceptance criteria for evaluation and testing of medium-voltage cables in similar environments, as discussed in GALL AMP XI.E3, "Inaccessible Medium Cables not Subject to 10 CFR 50.49 Environmental Qualification Requirements."

7.1.13.8 Conclusion

On the basis of its audit and review of the applicant's program, the project team finds that those portions of the program for which the applicant claims consistency with the GALL Report are consistent with the GALL Report. In addition, on the basis of its review of the clarifications, exceptions, and enhancements to the GALL Report, the project team finds the applicant's program provides adequate management of the aging effects for which the program is credited so that the intended functions will be maintained consistent with the CLB during the period of extended operation, as required by 10 CFR 54.21(a)(3).

On the basis of its review of the UFSAR supplements for this AMP, the project team also finds that they provide an adequate summary description of the program, as required by 10 CFR 54.21(d).

7.1.14 INFREQUENTLY ACCESSED AREAS INSPECTION PROGRAM (MPS AMP B2.1.15)

In the MPS LRA, Appendix B, Section B2.1.15, the applicant describes MPS AMP B2.1.15, "Infrequently Accessed Areas Inspection Program."

The applicant states, in the MPS LRA, that MPS AMP B2.1.15 is a new plant-specific program. The applicant credits this program with managing the aging effects for loss of material, change in material properties, and cracking using visual inspections of the external surfaces of structures and components. All areas not normally accessible for inspection and evaluation, and that contain structures or components subject to aging management, have been identified for inclusion in the program.

The applicant states, in the MPS LRA, that a baseline inspection of in-scope structures and components will be performed. An engineering evaluation of the inspection results will be used to determine whether additional inspections of SCs in the infrequently accessed areas inspection program are required.

The project team reviewed the documents listed in Attachment 5 of this report, in whole or in part, including MPS Technical Report MP-LR-3732/MP-LR-4732, "Infrequently Accessed Areas Inspection Areas," Revision 2, dated March 16, 2004, and interviewed the applicant's technical staff.

7.1.14.1 Review of the AMP Against the Program Elements

The project team reviewed MPS AMP B2.1.15 against the AMP elements found in the SRP-LR, Appendix A, Section A.1.2.3 and SRP-LR Table A.1-1. The guidance described in the MPS audit and review plan was followed.

7.1.14.1.1 Scope of Program

The "scope of program" program element criterion in Appendix A.1.2.3.1 of the SRP-LR requires that the program scope include the specific structures and components addressed with this program.

The applicant states, in MPS AMP B2.1.15 for the "scope of program" program element, that the following infrequently accessed areas of the plant are in scope of this program: MPS Unit 2 and Unit 3 intake structure circulating water bays (below the floor and above the water); MPS Unit 2 bypass line (interior of the concrete pipe); MPS Unit 3 auxiliary building heat exchanger room at elevation 4'6"; MPS Unit 3 service water pipe enclosure in the control building; MPS Unit 3 regenerative heat exchanger room in containment; MPS Unit 3 auxiliary building to fuel building pipe tunnel; MPS Unit 3 containment enclosure building (supplementary leak collection and release system duct); MPS Unit 3 area between the reactor vessel and neutron shield tank in containment; MPS Unit 3 emergency diesel generator cubicles upper level area; MPS Unit 3 cable spreading area, north and south electrical tunnels, tops of the switchgear rooms; MPS Unit 3 recirculation tempering line (interior of concrete pipe) and associated valve pit; and MPS stack.

The project team reviewed and confirmed that this program element satisfies the criterion defined in Appendix A.1.2.3.1 of the SRP-LR. The proposed scope identifies the specific components for which the program manages aging. On this basis, the project team finds that the applicant's proposed program scope is acceptable.

7.1.14.1.2 Preventive Actions

The "preventive actions" program element criterion in Appendix A.1.2.3.2 of the SRP-LR is that condition monitoring programs do not rely on preventive actions, and thus, preventive actions need not be provided.

The applicant states in MPS AMP B2.1.15 that the "preventive actions" program element is not applicable because the infrequently accessed areas inspection program is an inspection program and no actions will be taken as part of this program to prevent or mitigate aging degradation.

The project team confirmed that the preventive actions program element satisfies the criterion defined in Appendix A.1.2.3.2 of the SRP-LR. The project team did not identify the need for preventive actions for MPS AMP B.2.1.15 because it is a condition monitoring program.

7.1.14.1.3 Parameters Monitored/Inspected

The "parameters monitored or inspected" program element criteria in Appendix A.1.2.3.3 of the SRP-LR are

> The parameters to be monitored or inspected should be identified and linked to the degradation of the particular structure and component intended function(s).
>
> For a condition monitoring program, the parameter monitored or inspected should detect the presence and extent of aging effects.

The applicant states, in MPS AMP B2.1.15 for the "parameters monitored or inspected" program element, that infrequently accessed areas will undergo visual inspections to identify degradation or adverse conditions that include component leakage; rust or corrosion products; peeling, bubbling, or flaking coatings; indications of chemical attack; corroded fasteners; deformed or mispositioned piping and cable supports; and cracking of concrete, supports, or sealant.

The project team confirmed that this program element satisfies the criteria defined in Appendix A.1.2.3.3 of the SRP-LR. The infrequently accessed areas inspection program is acceptable because the visual inspections for loss of material, change in material properties, and cracking are intended to detect the presence and extent of aging effects. On this basis, the project team finds that the parameters monitored or inspected program element is acceptable.

7.1.14.1.4 Detection of Aging Effects

The "detection of aging effects" program element criteria in Appendix A.1.2.3.4 of the SRP-LR are

> Provide information that links the parameters to be monitored or inspected to the aging effects being managed.
>
> This program element describes when, where, and how program data are collected (i.e., all aspects of activities to collect data as part of the program).
>
> The method or technique and frequency may be linked to plant-specific or industry-wide operating experience.

The applicant states, in MPS AMP B2.1.15 for the "detection of aging effects" program element, that the external conditions of structures and components located in the infrequently accessed areas are determined by visual inspection. These inspections detect the aging effects of loss of material, cracking, and change of material properties. An inspection plan will be developed and inspections in infrequently accessed areas will be performed prior to the period of extended operation. The inspections will assess the aging of in-scope components and structures located in the infrequently accessed areas identified above. An engineering evaluation of the inspection results will determine the need for subsequent inspections.

The project team reviewed and confirmed that this program element satisfies the criteria defined in Appendix A.1.2.3.4 of the SRP-LR. The use of visual inspection of the external condition of infrequently accessed structures, supports, piping, and equipment is consistent with industry practices, and is considered by the project team to be a reasonable means of detecting loss of material, cracking, and change in material properties before the loss of

intended function. On this basis, the project team finds that the applicant's detection of aging effects program element is acceptable.

7.1.14.1.5 Monitoring and Trending

The "monitoring and trending" program element criteria in Appendix A.1.2.3.5 of the SRP-LR are

> Monitoring and trending activities should be described, and they should provide predictability of the extent of degradation and thus effect timely corrective or mitigative actions.
>
> This program element describes how the data collected are evaluated and may also include trending for a forward look. The parameter or indicator trended should be described.

The applicant states, in MPS AMP B2.1.15 for the "monitoring and trending" program element, that monitoring of the structures and components in infrequently accessed areas will be accomplished through the performance of baseline inspections. These inspections will be conducted prior to the period of extended operation. Inspection results will be documented for engineering evaluation and retention.

The project team confirmed that this program element satisfies the criteria in Appendix A.1.2.3.5 of the SRP-LR. The applicant committed to conducting one-time inspections prior to the end of the current operating license term and will document the results for evaluation and retention. If degradation is identified, it will be evaluated and corrected in accordance with the applicant's corrective action program. Trending is currently not part of this program and none is required by current industry practices for visual inspection activities in similar applications. On this basis, the project team finds that the applicant's monitoring and trending program element is acceptable.

7.1.14.1.6 Acceptance Criteria

The "acceptance criteria" program element criteria in Appendix A.1.2.3.6 of the SRP-LR are

> The acceptance criteria of the program and its basis should be described. The acceptance criteria, against which the need for corrective actions will be evaluated, should ensure that the SC intended function(s) is maintained under all CLB design conditions during the period of extended operation.
>
> The program should include a methodology for analyzing the results against applicable acceptance criteria.
>
> Qualitative inspections should be performed to the same predetermined criteria as quantitative inspections by personnel in accordance with the ASME Code and through approved site-specific programs.

The applicant states, in MPS AMP B2.1.15 for the "acceptance criteria" program element, that the acceptance criterion for visual inspections is the absence of anomalous indications that are signs of degradation. Engineering evaluations determine whether observed deterioration of material condition is significant enough to compromise the ability of infrequently accessed areas to perform their intended function during a seismic event or maintain their integrity for general operation. Degradation that is adverse to quality will be entered into the corrective action system.

The project team confirmed that this program element satisfies the criteria defined in Appendix A.1.2.3.6 of the SRP-LR. Any anomalous indications that are signs of degradation will be evaluated by an engineer to determine whether the observed deterioration of material condition is significant enough to compromise the ability of a SC in an infrequently accessed area to perform its intended function. If found unacceptable, corrective measures will be implemented. On this basis, the project team finds that the acceptance criteria program element is acceptable.

7.1.14.1.7 Corrective Actions

This program element is reviewed by the NRR DIPM staff and addressed in Section 3 of the SER related to the MPS Units 2 and 3 LRA.

7.1.14.1.8 Confirmation Process

This program element is reviewed by the NRR DIPM staff and addressed in Section 3 of the SER related to the MPS Units 2 and 3 LRA.

7.1.14.1.9 Administrative Controls

This program element is reviewed by the NRR DIPM staff and addressed in Section 3 of the SER related to the MPS Units 2 and 3 LRA.

7.1.14.1.10 Operating Experience

The "operating experience" program element criterion in Appendix A.1.2.3.10 of the SRP-LR states that operating experience should provide objective evidence to support the conclusion that the effects of aging will be managed adequately so that the SC intended function(s) will be maintained during the period of extended operation.

The applicant states, in MPS AMP B2.1.15, that the infrequently accessed areas inspection program is a new program for which there is no operating experience.

The project team finds that the one-time baseline inspections of infrequently accessed areas are consistent with years of industry practice that has been effective in maintaining similar SCs and, therefore, can reasonably be expected to be effective at maintaining the intended functions of the SCs that are within the scope of this evaluation for the period of extended operation.

On the basis of its review of the above operating experience and on discussions with the applicant's technical staff, the project team concludes that MPS AMP B.2.1.15 will adequately manage the aging effects that have been observed at the applicant's plant.

7.1.14.2 UFSAR Supplement

The applicant provides its UFSAR supplements for the infrequently accessed areas inspection program in MPS Unit 2 LRA, Appendix A, Section A2.1.15, and MPS Unit 3 LRA, Appendix A, Section A2.1.14, which state that the program will manage the aging effects of loss of material, change in material properties, and cracking. Visual inspections will be performed to ensure the absence of anomalous indications that are signs of degradation. The acceptance criterion for the visual inspections is the absence of anomalous indications that are signs of degradation. Corrective actions for conditions that are adverse to quality are performed in accordance with the corrective action program as part of the quality assurance program.

The applicant states, in MPS LRA Appendix A, that one commitment is associated with the infrequently accessed areas inspection program as follows

> The infrequently accessed areas inspection program will be initiated prior to the period of extended operation. This commitment is identified on the applicant's license renewal commitment list in the MPS LRA, Appendix A, Table 6.0-1, Item 12.

The project team reviewed the UFSAR supplements and confirms that they provide an adequate summary description of the program, as identified in the SRP-LR UFSAR supplement table and as required by 10 CFR 54.21(d).

7.1.14.3 Conclusion

On the basis of its audit and review of the applicant's program, the project team finds that the applicant has demonstrated that the effects of aging will be adequately managed so that the intended functions will be maintained consistent with the CLB during the period of extended operation, as required by 10 CFR 54.21(a)(3).

On the basis of its review of the UFSAR supplements for this AMP, the project team also finds that they provide an adequate summary description of the program, as required by 10 CFR 54.21(d).

7.1.15 INSERVICE INSPECTION PROGRAM: CONTAINMENT INSPECTIONS (MPS AMP B2.1.16)

In the MPS LRA, Appendix B, Section, B.2.1.16, the applicant states that MPS AMP B.2.1.16, "Inservice Inspection Program: Containment Inspections," is consistent with GALL AMPs XI.S1, "ASME Section XI, Subsection IWE," XI.S2, "ASME Section XI, Subsection IWL," and XI.S4, "10 CFR Part 50, Appendix J," with exceptions.

7.1.15.1 Program Description

The applicant states, in the MPS LRA, that the inservice inspection program: containment inspections program manages the aging effects of change of material properties, cracking, and loss of material. The program is consistent with the ASME "Boiler and Pressure Vessel Code," Section XI, Subsections IWE and IWL, and 10 CFR 50.55a(b)(2), which provide the criteria for inservice inspections of containment structural components. ASME Section XI, Subsection IWE specifies the examination requirements for steel containments (Class MC) and the steel liners of concrete containments (Class CC), including their integral attachments. ASME Section XI, Subsection IWL specifies the examination requirements for reinforced and prestressed concrete containments (Class CC).

The scope of Subsection IWE and IWL examinations includes the surface areas and components identified in IWE-1231 and IWL-1210. Exempted or inaccessible areas as allowed by Subsections IWE and IWL are specifically identified by the program.

The applicant states, in the MPS LRA that, the prestressed, post-tensioned concrete containment is assessed per the examination requirements of ASME Section XI, Subsection IWL, Examination Category L-B for unbonded post-tensioning systems. Examination requirements similar to those specified in Subsection IWL are also identified in MPS technical specifications in order to meet the requirements of Regulatory Guide 1.35, "Inservice Inspection of Ungrouted Tendons in Prestressed Concrete Containments," Revision 3, dated July 1990.

Appendix J leakage rate testing is included as part of MPS AMP B.2.1.16. The program implements Type A tests to measure the overall primary containment integrated leakage rate.

Prestress on the MPS Unit 2 containment tendons is expected to decrease over the life of the unit as a result of such factors as elastic deformation, creep and shrinkage of concrete, anchorage seating losses, tendon wire friction, stress relaxation, and corrosion. The evaluation of containment tendon examination and surveillance test results is considered a time-limited aging analysis (TLAA) for license renewal. This TLAA is addressed in the MPS Unit 2 LRA, Section 4.5, and is reviewed by NRR DE staff and addressed in Section 4 of the SER related to the MPS Units 2 and 3 LRA.

7.1.15.2 Consistency with the GALL Report

In the MPS LRA, the applicant states that MPS AMP B.2.1.16 is consistent with GALL AMPs XI.S1, XI.S2, and XI.S4, with exceptions.

The project team interviewed the applicant's technical staff and reviewed, in whole or in part, the documents listed in Attachment 5 of this report for MPS AMP B.2.1.16, including MPS Technical Report MP-LR-3726/MP-LR-4726, "Inservice Inspection-Containment Inspection," Revision 2, dated March 16, 2004, which provides an assessment of how the GALL AMP elements are addressed by the inservice inspection program: containment inspections program.

The project team reviewed seven program elements (see Section 5.1 of this report) contained in the MPS AMP and associated bases documents against GALL AMPs XI.S1, XI.S2, and XI.S4 for consistency.

7.1.15.3 Exceptions to the GALL Report

The applicant states, in the MPS LRA, two exceptions to the GALL Report elements as follows

Elements: 1: Scope of Program
3: Parameters Monitored/Inspected
4: Detection of Aging Effects
5: Monitoring and Trending
6: Acceptance Criteria

Exception: GALL AMPs XI.S1 and XI.S2 cover both the 1992 Edition with the 1992 Addenda and the 1995 Edition with the 1996 Addenda of ASME Section XI, as approved in 10 CFR 50.55a. The MPS ASME Section XI, Subsections IWE/IWL inservice inspection program complies with ASME Section XI, 1998 Edition with no addenda. Significant changes have been made to Subsections IWE/IWL between these respective Code editions.

Element: 1: Scope of Program

Exception: The MPS inservice inspection program: containment inspections program credits only the Type A integrated leak rate test to manage the effects of aging.

The GALL Report identifies the following criteria for the "scope of program" element associated with the first exception taken

> [XI.S1] The components within the scope of Subsection IWE are Class MC pressure-retaining components (steel containments) and their integral attachments; metallic shell and penetration liners of Class CC containments and their integral attachments; containment seals and gaskets; containment pressure-retaining bolting; and metal containment surface areas, including welds and base metal.
>
> [XI.S2] The components within the scope of Subsection IWL are reinforced concrete and unbonded post-tensioning systems of Class CC containments, as defined by CC-1000. Subsection IWL exempts from examination portions of the concrete containment that are inaccessible (e.g., concrete covered by liner, foundation material, or backfill, or obstructed by adjacent structures or other components).

The GALL Report identifies the following criterion for the "parameters monitored or inspected" program element associated with the first exception taken

> [XI.S1] Table IWE-2500-1 specifies seven categories for examination. The first six examination categories (E-A through E-G) constitute the inservice inspection requirements of IWE. Examination category E-P references 10 CFR 50, Appendix J, leak rate testing. Appendix J leak rate testing is evaluated as a separate AMP for license renewal in GALL AMP XI.S4.

The GALL Report identifies the following criteria for the “detection of aging effects” program element associated with the first exception taken

> [XI.S1] Regarding the extent of examination, all accessible surfaces receive a visual examination such as general visual, VT-1, or VT-3. IWE-1240 requires augmented examinations (examination category E-C) of containment surface areas subject to degradation. A VT-1 visual examination is performed for areas accessible from both sides, and volumetric (ultrasonic thickness measurement) examination is performed for areas accessible from only one side.
>
> [XI.S2] Regarding detection methods for aging effects, all concrete surfaces receive a visual VT-3C examination. Selected areas, such as those that indicate suspect conditions and areas surrounding tendon anchorages, receive a more rigorous VT-1 or VT-1C examination.

The GALL Report identifies the following criterion for the “monitoring and trending” program element associated with the first exception taken

> [XI.S1] With the exception of inaccessible areas, all surfaces are monitored by virtue of the examination requirements on a scheduled basis. IWE-2430 specifies expansion of the inspection scope when degradation exceeding the acceptance criteria is found. When component examination results require evaluation of flaws, evaluation of areas of degradation, or repairs, and the component is found to be acceptable for continued service, the areas containing such flaws, degradation, or repairs shall be reexamined during the next inspection period, in accordance with examination category E-C. When these reexaminations reveal that the flaws, areas of degradation, or repairs remain essentially unchanged for three consecutive inspection periods, these areas no longer require augmented examination in accordance with examination category E-C.

The GALL Report identifies the following criterion for the “acceptance criteria” program element associated with the first exception taken

> [XI.S1] Table IWE-3410-1 presents criteria to evaluate the acceptability of the containment components for service following the preservice examination and each inservice examination.

The project team noted that the MPS ASME Section XI, Subsections IWE and IWL inservice inspection program complies with an edition of Section XI approved by the NRC for use at MPS. The NRC mandated that all operating reactor licensees bring their Code of record uniformly compliant with the ASME Section XI, 1998 Edition with no addenda, which is current with programs such as the Program Demonstration Initiative (66 FR 40626).

On the basis that the Code edition of record for MPS is a later version of the ASME Section XI Code that also meets the intent of the GALL Report, the project team finds the first exception to be acceptable.

The GALL Report identifies the following criterion for the "scope of program" element associated with the second exception taken

> [XI.S4] The scope of the containment leakage rate testing program includes all pressure-retaining components. Two types of tests are implemented. Type A tests are performed to measure the overall primary containment integrated leakage rate. Type B tests are performed to measure local leakage rates across each pressure-containing or leakage-limiting boundary for containment penetrations. Type A and B tests described in 10 CFR 50, Appendix J, are acceptable methods for performing these leakage rate tests. Leakage testing for containment isolation valves (normally performed under Type C tests), if not included under this program, is included under leakage rate testing programs for systems containing the isolation valves.

The applicant states in the MPS LRA that MPS AMP B2.1.16 credits only Type A integrated leak rate testing to manage the effects of aging. However, the project team noted that the Type B test is a local leak rate test intended to measure leakage of containment penetrations whose design incorporates resilient seals and gaskets, including air locks door seals and equipment hatch gaskets. The project team found that not crediting the Type B test in accordance with the guidance in GALL AMP XI.S.4 is unacceptable and requested additional clarifications from the applicant regarding how the aging effects on resilient seals and gaskets, including air locks door seals and equipment hatch gaskets, will be managed at MPS. In a MPS LRA supplement letter dated July 7, 2004 (ML041900407), the applicant stated the following

> For MPS Unit 2 and Unit 3 Appendix B, Section B2.1.16 (page B-63), the fourth paragraph should read:
>
> "The Containment Appendix J Leakage Rate Test Program implements Type A tests to measure the overall primary Containment integrated leakage rate (ILRT) and Type B tests to detect and measure local leakage across each pressure-containing or leakage limiting boundary for Containment penetrations, airlock doors and hatches, whose design incorporates a resilient seal, gasket or expansion bellows, and for electrical penetrations."
>
> For MPS Unit 2 and Unit 3 Appendix B, Section B2.1.16, Exception 2: XI.S4 - Leak Rate Testing (page B-67), the exception wording should read:
>
> "The NUREG-1801, Section XI.S4 discusses 10CFR50 Appendix J, Type A Integrated Leak Rate Testing (ILRT) as well as Type B and C Local Leak Rate Testing (LLRT). The Inservice Inspection Program: Containment Inspections credits only the Type A ILRT and Type B LLRT to manage the effects of aging identified in the NUREG-1 801 program element, Detection of Aging Effects.
>
> Program Elements Affected
> <u>Scope of Program</u>
> "This program element identifies three types of leak rate testing (Type A, B and C) as defined by 10 CFR 50, Appendix J. The Inservice Inspection Program:

> Containment Inspections utilizes only the Type A integrated leak rate testing and Type B local teak rate tests to manage the effects of aging."

On the basis that the exception, as revised by the supplement letter, credits both Types A and B testing for management of aging effects for license renewal, the project team finds this exception to be acceptable.

7.1.15.4 Enhancements

None

7.1.15.5 Operating Experience

The project team reviewed operating experience for the applicant's inservice inspection program: containment inspections program. The applicant states, in the MPS LRA, that operating experience indicates that the inspection and corrective action activities have successfully maintained the integrity of in-scope components. Any degradation of the containment found during inspections has been noted and corrected, as necessary, to preclude adverse effects on plant safety and operability. The following representative examples of internal operating experience at MPS were considered in the project team's evaluation of the effectiveness of the program.

> Groundwater issues were identified and documented for MPS Unit 2 during the 1996 building structure visual examination. Additionally, during the NRC maintenance rule inspection, an open item was identified and documented regarding the long-term effects of water intrusion on containment structure rebar and the containment liner. During the investigation, experts were consulted to determine potential rebar, liner, and concrete damage. A vendor was chosen to perform non-destructive tests and detailed visual inspections. The inspections were reviewed with the NRC structures lead and determined to be acceptable. A report was received from the vendor documenting the condition of the anchor plate, liner, and concrete. This report was based on torque checks of anchor plates, ultrasonic testing of the containment liner, and overall visual inspections inside and outside containment. There were no indications of abnormal deterioration and no further actions were required.
>
> Significant progress continues to be made in correcting material condition and structural deficiencies. The maintenance rule program has identified peeling paint, corrosion, efflorescence (on ceilings, floors, and walls), and groundwater intrusion in the containment tendon gallery. Repairs have been tracked with automated work orders. Containment structural integrity was determined to be acceptable in 1998, and since that time the condition of the tendon gallery has improved. The water intrusion has decreased. The structural condition remains acceptable.
>
> The inspection report MPS Engineering File Number 354, "25th Year Physical Surveillance of Unit 2 Containment Building Post-Tensioning at the Millstone Power Station," Revision 1, dated August 15, 2003, identified that the losses in

> tendon forces were less than expected for a plant of this age, and concluded that the containment structure has experienced no abnormal degradation of the post-tensioning system. A regression analysis of the tendon forces, which predicts that the values will remain above minimum design requirements well beyond the next surveillance interval, is included in the report.

On the basis of its review of the above operating experience and discussions with the applicant's technical staff, the project team concludes that MPS AMP B.2.1.16 adequately manages the aging effects that have been observed at the applicant's plant.

7.1.15.6 UFSAR Supplement

The applicant provides its UFSAR supplements for the inservice inspection program: containment inspections program in MPS Unit 2 LRA, Appendix A, Section A2.1.16, and MPS Unit 3 LRA, Appendix A, Section A2.1.15, which state that the program manages the aging effects of loss of material, change of material properties, and cracking. The program is consistent with ASME Section XI, Subsections IWE and IWL, and 10 CFR 50.55a(b)(2), which provide the criteria for inservice inspection containment inspections.

The applicant states, in the MPS LRA, that 10 CFR 50, Appendix J, leakage rate testing is included as part of the inservice inspection program: containment inspections program. The Appendix J program implements Type A tests to measure the overall primary containment integrated leakage rate.

The applicant states, in the MPS LRA, that acceptance criteria for examinations performed in accordance with this MPS AMP are based on the applicable regulations and standards. Corrective actions for conditions that are adverse to quality are performed in accordance with the corrective action program as part of the quality assurance program.

The project team found the applicant's omission of 10 CFR 50, Appendix J, Type B leakage rate testing from the scope of MPS AMP B2.1.16 to be inconsistent with the guidance in the GALL Report, and requested clarification from the applicant on how the leakage testing for containment penetrations whose design incorporates resilient seals and gaskets, including air locks door seals and equipment hatch gaskets, would be addressed at MPS. In a MPS LRA supplement letter dated July 7, 2004 (ML041900407), the applicant stated the following

> MPS Unit 2 Appendix A, Section A2.1.16 (page A-14) and Unit 3 Appendix A, Section A2.1.15 (page A-13), the third paragraph should state:
>
> "The Containment Appendix J Leakage Rate Test Program implements Type A and B tests to measure the overall primary Containment integrated leakage rate."

The project team reviewed the UFSAR supplements, as revised by the supplement letter, and confirms that they provide an adequate summary description of the program, as identified in the SRP-LR UFSAR supplement table and as required by 10 CFR 54.21(d).

7.1.15.7 Evaluation

The project team performed a review of the applicable criteria in GALL AMPs XI.S1, "ASME Section XI, Subsection IWE," XI.S2, "ASME Section XI, Subsection IWL," and XI.S4, "10 CFR Part 50, Appendix J," and the program description and elements for MPS AMP B2.1.16.

For the aspects of the program elements that were determined by the applicant to be consistent with the corresponding program elements in GALL AMPs XI.S1, XI.S2, and XI.S4, the project team determined that these program elements for MPS AMP B2.1.16 conform with the applicable program elements and acceptance criteria in GALL AMPs XI.S1, "ASME Section XI, Subsection IWE," XI.S2, "ASME Section XI, Subsection IWL," and XI.S4, "10 CFR Part 50, Appendix J." Based on its review of the exceptions, the project team concludes that the applicant's inservice inspection program: containment inspections program provides reasonable assurance of aging management of change of material properties, cracking, and loss of material in the MPS containments and steel liner, including the integral attachments. The project team finds this AMP acceptable because it conforms to the recommended program description, program elements, and acceptance criteria for containment inservice inspections and leakage rate testing, as discussed in GALL AMPs XI.S1, "ASME Section XI, Subsection IWE," XI.S2, "ASME Section XI, Subsection IWL," and XI.S4, "10 CFR Part 50, Appendix J."

The applicant states, in the MPS LRA, two exceptions to the GALL Report. The first exception addresses the fact that GALL AMPs XI.S1 and XI.S2 cover both the 1992 Edition with the 1992 Addenda and the 1995 Edition with the 1996 Addenda of ASME Section XI, as approved in 10 CFR 50.55a. The MPS ASME Section XI, Subsections IWE/IWL inservice inspection program complies with ASME Section XI, 1998 Edition with no addenda. On the basis that the NRC-approved Code edition of record for MPS is a later version of the ASME Section XI Code that also meets the intent of the GALL Report, the project team finds the first exception to be acceptable.

The second exception stated by the applicant in the MPS LRA credits the MPS AMP with performing only Type A leakage rate testing, while the GALL Report guidance specifies Types A and B testing. The project team found that not crediting the Type B test in accordance with the guidance in GALL AMP XI.S4 is unacceptable and requested additional clarifications from the applicant regarding how the aging effects on resilient seals and gaskets, including air locks door seals and equipment hatch gaskets, will be managed at MPS. Document Modification Record (DMR) 3571 and DMR 3572 were initiated by the applicant to revise MPS AMP B2.1.16 and MP-LR-3726/MP-LR-4726. In a MPS LRA supplement letter dated July 7, 2004 (ML041900407), the applicant stated the following

> MPS Unit 2 Appendix A, Section A2.1.16 (page A-14) and Unit 3 Appendix A, Section A2.1.15 (page A-13), the third paragraph should state:
>
> "The Containment Appendix J Leakage Rate Test Program implements Type A and B tests to measure the overall primary Containment integrated leakage rate."
>
> For MPS Unit 2 and Unit 3 Appendix B, Section B2.1.16 (page B-63), the fourth paragraph should read:

"The Containment Appendix J Leakage Rate Test Program implements Type A tests to measure the overall primary Containment integrated leakage rate (ILRT) and Type B tests to detect and measure local leakage across each pressure-containing or leakage limiting boundary for Containment penetrations, airlock doors and hatches, whose design incorporates a resilient seal, gasket or expansion bellows, and for electrical penetrations."

For MPS Unit 2 and Unit 3 Appendix B, Section B2.1.16, Exception 2: XI.S4 - Leak Rate Testing (page B-67), the exception wording should read:

"The NUREG-1801, Section XI.S4 discusses 10CFR50 Appendix J, Type A Integrated Leak Rate Testing (ILRT) as well as Type B and C Local Leak Rate Testing (LLRT). The Inservice Inspection Program: Containment Inspections credits only the Type A ILRT and Type B LLRT to manage the effects of aging identified in the NUREG-1 801 program element, Detection of Aging Effects.

Program Elements Affected
Scope of Program
"This program element identifies three types of leak rate testing (Type A, B and C) as defined by 10 CFR50, Appendix J. The Inservice Inspection Program: Containment Inspections utilizes only the Type A integrated leak rate testing and Type B local teak rate tests to manage the effects of aging."

As revised by the supplement letter, the project team finds this exception consistent with the GALL Report and, therefore, acceptable.

7.1.15.8 Conclusion

On the basis of its audit and review of the applicant's program, the project team finds that those portions of the program for which the applicant claims consistency with the GALL Report are consistent with the GALL Report. In addition, on the basis of its review of the exceptions to the GALL Report, the project team finds that the applicant has demonstrated that the effects of aging will be adequately managed so that the intended functions will be maintained consistent with the CLB during the period of extended operation, as required by 10 CFR 54.21(a)(3).

On the basis of its review of the UFSAR supplements for this AMP, the project team also finds that they provide an adequate summary description of the program, as required by 10 CFR 54.21(d).

7.1.16 INSERVICE INSPECTION PROGRAM: REACTOR VESSEL INTERNALS (MPS AMP B2.1.17)

In the MPS LRA, Appendix B, Section B2.1.17, the applicant states that MPS AMP B2.1.17, "Inservice Inspection Program: Reactor Vessel Internals," is consistent with GALL AMPs XI.M12, "Thermal Aging Embrittlement of Cast Austenitic Stainless Steel (CASS)," XI.M13, "Thermal Aging and Neutron Irradiation Embrittlement of Cast Austenitic Stainless Steel (CASS)," and XI.M16, "PWR Vessel Internals," with exceptions and enhancements.

7.1.16.1 Program Description

The applicant states, in the MPS LRA, that the inservice inspection program: reactor vessel internals program manages the aging effects of loss of material, cracking, loss-of-preload, change in dimension, and loss of fracture toughness (which presents itself as cracking due to embrittlement) through the use of inspections. The stainless steel and nickel-based alloy internals components susceptible to stress corrosion cracking, irradiation-assisted stress corrosion cracking, primary water stress corrosion cracking, void swelling, fretting wear, stress relaxation, and neutron irradiation embrittlement that support the intended function of the reactor vessel in a passive manner are in scope for MPS AMP B2.1.17. Reactor vessel internals components made from cast austenitic stainless steel (CASS) are in scope for this program and additionally are susceptible to thermal aging embrittlement. The inclusion of CASS components precludes the need for susceptibility screening (based on casting method, molydenum content, and ferrite content) to determine applicability of the identified aging mechanisms. The reactor vessel internals components that are in scope for MPS AMP B2.1.17 include the interior of the reactor vessel, integrally welded core support structure and interior attachments to the reactor vessel, and removable core support structures. Examinations conducted under MPS AMP B2.1.17 include inservice inspections performed in accordance with ASME Section XI, Class 1, examination categories B-N-1, B-N-2, and B-N-3 for accessible reactor vessel internals surfaces, and augmented examinations not required by ASME Section XI.

7.1.16.2 Consistency with the GALL Report

In the MPS LRA, the applicant states that MPS AMP B2.1.17 is consistent with GALL AMPs XI.M12, XI.M13, and XI.M16, with exceptions and enhancements.

The project team interviewed the applicant's technical staff and reviewed, in whole or in part, the documents listed in Attachment 5 of this report for MPS AMP B2.1.17, including MPS Technical Report MP-LR-3711/MP-LR-4711, "Inservice Inspection: Reactor Vessel Internals," Revision 2, dated March 13, 2004, which provides an assessment of how the GALL AMP elements are addressed by the inservice inspection program: reactor vessel internals program.

The project team reviewed seven program elements (see Section 5.1 of this report) contained in the MPS AMP and associated bases documentation against GALL AMPs XI.M12, XI.M13, and XI.M16 for consistency.

7.1.16.3 Exceptions to the GALL Report

The applicant states, in the MPS LRA, exceptions to the GALL Report elements as follows

Element:	1: Scope of Program 3: Parameters Monitored/Inspected 4: Detection of Aging Effects
Exception:	MPS is following industry efforts to determine the necessary steps for managing age-related degradation of potentially susceptible components and will implement the appropriate recommendations resulting from this guidance. This commitment is identified on the applicant's license

renewal commitment list in the MPS Units 2 and 3 LRA, Appendix A, Table 6.0-1, Item 13.

Element: 4: Detection of Aging Effects
Exception: The applicant's program uses ASME Section XI, 1989 Edition with no addenda.

The GALL Report identifies the following criteria for the "scope of program" and "parameters monitored/inspected" program elements associated with the first exception taken

> [XI.M12] For potentially susceptible materials, the program consists of either enhanced volumetric examination to detect and size cracks or plant- or component-specific flaw tolerance evaluation.
>
> [XI.M13] For potentially susceptible materials, the program consists of either a supplemental examination of the affected component based on the neutron fluence to which the component has been exposed or component-specific evaluation to determine the component's susceptibility to loss of fracture toughness due to thermal aging, irradiation embrittlement, or void swelling.
>
> [XI.M16] The program consists of the following elements: (a) identify the most susceptible or limiting items, (b) develop appropriate inspection techniques to permit detection and characterizing the feature (cracks) of interest and demonstrate the effectiveness of the proposed technique, and (c) implement the inspection during the license renewal term. For example, appropriate inspection techniques may include enhancing visual VT-1 examinations for non-bolted components and demonstrated acceptable inspection methods for bolted components.
>
> The program monitors the effects of cracking on the intended function of the component by detection and sizing of cracks by augmentation of inservice inspections in accordance with the requirements of ASME Code, Section XI, Table IWB 2500-1.

The GALL Report identifies the following criteria for the "detection of aging effects" program element associated with the first exception taken

> [XI.M13] The inspection technique is capable of detecting the critical flaw size with adequate margin. One example of a supplemental examination is enhancement of the visual VT-1 examination of Section XI IWA-2210. A description of such an enhanced visual examination could include the ability to achieve a 0.0005-inch resolution.
>
> [XI.M16] Visual VT-3 examination is to be augmented to detect tight or fine cracks. Also, historically, the VT-3 examinations have not identified bolt cracking because cracking occurs at the juncture of the bolt head and shank, which is not accessible for visual inspection. This AMP recommends more stringent

> inspections, such as enhanced visual VT-1 examinations or ultrasonic methods of volumetric inspection, for certain selected components and locations.
>
> The inspection technique is capable of detecting the critical flaw size with adequate margin. One example of a supplemental examination is enhancement of the visual VT-1 examination of Section XI IWA-2210. A description of such an enhanced visual examination could include the ability to achieve a 0.0005-in resolution. For bolted components, augmented inservice inspection is to include other demonstrated acceptable inspection methods to detect cracks between the bolt head and the shank. Alternatively, the applicant may perform a component-specific evaluation, including a mechanical loading assessment to determine the maximum tensile loading on the component during ASME Code Level A, B, C, and D conditions. If the loading is compressive or low enough (<5 kips per square inch) to preclude fracture, the supplemental inspection of the component is not required.

The project team is aware of the uncertainty that currently exists relative to the prediction of void swelling in PWR environments. This uncertainty is based on the fact that existing void swelling data have been obtained from materials that were not irradiated in a PWR environment. Void swelling is a complex function of neutron flux, operating temperature, operating stress, material composition, and the material fabrication process. The EPRI materials research project - reactor internals issue task group and the Westinghouse Owners Group are currently addressing the issues of change in dimension (void swelling), loss of fracture toughness, cracking, and, for baffle and former assembly bolts, the loss of preload.

The project team asked the applicant for clarification on how the program will address recommendations that result from ongoing industry efforts to address this issue. The applicant submitted a MPS LRA supplement letter, dated July 7, 2004 (ML041900407), that clarifies the MPS LRA commitment concerning MPS AMP B2.1.17 as follows

> "The revised program description, including a comparison to the 10 program elements of the NUREG-1801 program, will be submitted to the NRC for approval." should be inserted at the end of the commitment. This commitment appears in the MPS Unit 2 LRA and the Unit 3 LRA in the following locations:
>
> MPS Unit 2, Appendix A, Table A6.0-1, Commitment 13 (page A-36)
> MPS Unit 2, Appendix B, Section B2.1.17 (pages B-70, B-71)
>
> MPS Unit 3, Appendix A, Table A6.0-1, Commitment 13 (page A-35)
> MPS Unit 3, Appendix B, Section B2.1.17 (pages B-70, B-71)

The supplement letter ensures that a program description, including the applicant's treatment of each affected program element, will be developed and submitted to the NRC for review and approval once the industry has developed its position to address the reactor vessel internals issues. Based on this clarification of the applicant's commitment to incorporate industry recommendations when available, the project team finds the applicant's first exception to be acceptable.

The GALL Report identifies the following criteria for the "detection of aging effects" program element associated with the second exception taken

> [XI.M16] Vessel internal components are inspected in accordance with the requirements of ASME Section XI, Subsection IWB, examination category B-N-3 for all accessible surfaces of the reactor core support structure that can be removed from the vessel.

The project team reviewed the applicable sections of the ASME Code and concludes that both the 1989 Edition and the1995 Edition and addenda referenced in the GALL Report identify visual VT-3 as the applicable ASME Section XI examination requirement for Category B-N-3 PWR internals. On this basis, the project team finds the applicant's second exception to be acceptable.

7.1.16.4 Enhancements to the GALL Report

The applicant states, in the MPS Unit 3 LRA, the enhancements to the GALL Report as follows

Element:	1: Scope of Program
Enhancement:	Augmented inspections of the MPS Unit 3 core barrel holddown spring will be performed. This is identified on the applicant's license renewal commitment list in the MPS Unit 3 LRA, Appendix A, Table A6.0-1, Item 14.
Element	4: Detection of Aging Effects
Enhancement:	The program will incorporate revised surveillance techniques to detect gross indication of loss of preload as an aging effect for the MPS Unit 3 core barrel holddown spring. This is identified on the applicant's license renewal commitment list in the MPS Unit 3 LRA, Appendix A, Table A6.0-1, Item 14.

The GALL Report identifies the following criterion for the "scope of program" program element associated with the first enhancement

> The program consists of the following elements: (a) identify the most susceptible or limiting items, (b) develop appropriate inspection techniques to permit detection and characterizing of the feature (cracks) of interest and demonstrate the effectiveness of the proposed technique, and (c) implement the inspection during the license renewal term.

The applicant states, in the MPS LRA, that MPS Unit 3 will perform augmented inspections to manage the aging effect for the core barrel holddown spring. The project team reviewed this commitment and determined this is consistent with GALL Report's recommendation. Therefore, the project team finds incorporating this enhancement is acceptable as any such changes will provide additional assurance that the effects of aging will be adequately managed.

The GALL Report identifies the following criterion for the "detection of aging effects" program element associated with the second enhancement

> The extent and schedule of the inspection and test techniques prescribed by the AMP are designed to maintain structural integrity and ensure the aging effects will be discovered and repaired before the loss of intended function.

The applicant states, in the MPS LRA, that the MPS Unit 3 program will incorporate revised surveillance techniques to detect gross indication of loss of preload as an aging effect for the MPS Unit 3 core barrel holddown spring. The project team reviewed this commitment and determined this is consistent with GALL Report's recommendation and will ensure that the aging effects for the MPS Unit 3 core barrel holddown spring are discovered and repaired before the loss of intended function. Therefore, the project team finds incorporating this enhancement is acceptable as any such changes will provide additional assurance that the effects of aging will be adequately managed.

7.1.16.5 Operating Experience

The project team reviewed operating experience for the applicant's inservice inspection program: reactor vessel internals program. The review indicated that this program is in compliance with the inspection requirements of ASME Section XI and has identified no issues related to age degradation of in-scope MPS reactor vessel internals components.

On the basis of its review of the above operating experience and on discussions with the applicant's technical staff, the project team concludes that MPS AMP B2.1.17 adequately manages the aging effects that have been observed at the applicant's plant.

7.1.16.6 UFSAR Supplement

The applicant provides it UFSAR supplements for the inservice inspection program: reactor vessel internals program in MPS Unit 2 LRA, Appendix A, Section A2.1.17, and MPS Unit 3 LRA, Appendix A, Section A2.1.16, which state that the program manages the effects of aging for those reactor internals that are susceptible to loss of material, cracking, loss of pre-load, change in dimension, and loss of fracture toughness (which presents itself as cracking due to embrittlement). The acceptance criteria for examinations performed in accordance with the inservice inspection program: reactor vessel internals program are based on the applicable regulations and acceptance standards. Corrective actions for conditions that are adverse to quality are performed in accordance with the corrective action program as part of the quality assurance program.

The applicant states, in MPS LRA Appendix A, that two commitments are associated with the inservice inspection program: reactor vessel internals program as follows:

> The applicant will follow the industry efforts to determine the necessary steps for managing age-related degradation of potentially susceptible components and will implement the appropriate recommendations resulting from this guidance. This commitment is identified on the applicant's license renewal commitment list in the MPS LRA, Appendix A, Table 6.0-1, Item 13.
>
> MPS Unit 3 will perform augmented inspections to manage the aging effect of loss of preload for the core barrel holddown spring. This is identified on the

applicant's license renewal commitment list in the MPS Unit 3 LRA, Appendix A, Table A6.0-1, Item 14.

In response to a project team request for clarification of the applicant's commitment to revise the program and submit the revised program to the NRC for approval, the applicant issued a MPS LRA supplement letter, dated July 7, 2004 (ML041900407), that clarifies the MPS LRA commitment concerning MPS AMP B2.1.17 as follows

> "The revised program description, including a comparison to the 10 program elements of the NUREG-1801 program, will be submitted to the NRC for approval." should be inserted at the end of the commitment. This commitment appears in the MPS Unit 2 LRA and the Unit 3 LRA in the following locations:
>
> MPS Unit 2, Appendix A, Section A2.1.17 (pages A-15, A-16)
> MPS Unit 2, Appendix A, Table A6.0-1, Commitment 13 (page A-36)
>
> MPS Unit 3, Appendix A, Section A2.1.16 (page A-14)
> MPS Unit 3, Appendix A, Table A6.0-1, Commitment 13 (page A-35)

The project team reviewed the UFSAR supplements and the supplement letter and confirms that they provide an adequate summary description of the program, as identified in the SRP-LR UFSAR supplement table and as required by 10 CFR 54.21(d).

7.1.16.7 Evaluation

The project team performed a review of the applicable criteria in GALL AMPs XI.M12, "Thermal Aging Embrittlement of Cast Austenitic Stainless Steel (CASS)," XI.M13, "Thermal Aging and Neutron Irradiation Embrittlement of Cast Austenitic Stainless Steel (CASS)," and XI.M16, "PWR Vessel Internals," and the program description and elements for MPS AMP B2.1.17.

For the aspects of the program elements that were determined by the applicant to be consistent with the corresponding program elements in GALL AMPs XI.M12, XI.M13, and XI.M16, the project team determined that these program elements for MPS AMP B2.1.17 conform with the applicable program elements and acceptance criteria in GALL AMPs XI.M12, "Thermal Aging Embrittlement of Cast Austenitic Stainless Steel (CASS)," XI.M13, "Thermal Aging and Neutron Irradiation Embrittlement of Cast Austenitic Stainless Steel (CASS)," and XI.M16, "PWR Vessel Internals." Based on its review of the exceptions and enhancements, the project team concludes that the applicant's inservice inspection program: reactor vessel internals program provides reasonable assurance of aging management of loss of material, cracking, loss-of-preload, change in dimension, and loss of fracture toughness in reactor vessel internals stainless steel, nickel-based alloy, and CASS components within the scope of this program. The project team finds this AMP acceptable because it conforms to the recommended program description, program elements, and acceptance criteria for inservice inspection of reactor vessel internals, as discussed in GALL AMPs XI.M12, "Thermal Aging Embrittlement of Cast Austenitic Stainless Steel (CASS)," XI.M13, "Thermal Aging and Neutron Irradiation Embrittlement of Cast Austenitic Stainless Steel (CASS)," and XI.M16, "PWR Vessel Internals."

The applicant states, in the MPS LRA, an exception to the effect that the program will follow industry efforts on issues including change in dimension (void swelling), loss of fracture toughness, cracking, and, for baffle and former assembly bolts, the loss of preload. When available, the applicant will incorporate industry recommendations on how to best manage these aging effects into the MPS AMP. This commitment is identified on the applicant's license renewal commitment list in the MPS LRA, Appendix A, Table 6.0-1, Item 13. The project team requested clarification on how the revised program would be incorporated into the MPS LRA. In response to the project team's request, the applicant issued a MPS LRA supplement letter, dated July 7, 2004 (ML041900407), that states in part, "The revised program description, including a comparison to the 10 program elements of the NUREG-1801 program, will be submitted to the NRC for approval." The applicant states, in the MPS LRA supplement letter, that the revised commitment is to be included in Appendix A and Appendix B of the MPS LRA. The project team finds this to be acceptable.

The applicant states, in the MPS LRA, an exception to the effect that MPS AMP B2.1.17 is based on an earlier version (1989) of the ASME Code than that recommended in GALL AMP XI.M16 (1995 through 1996 addenda). Based on the fact that both versions of the ASME Section XI Code identify visual VT-3 as the examination method for Category B-N-3 PWR vessel internals, the project team finds this to be acceptable.

The applicant states, in the MPS LRA, that MPS AMP B2.1.17 will include as an enhancement augmented inspections to detect gross indications of loss of preload for the MPS Unit 3 core barrel holddown spring. This is identified on the applicant's license renewal commitment list in the MPS Unit 3 LRA, Appendix A, Table A6.0-1, Item 14. The project team reviewed this commitment and determined this is consistent with GALL Report's recommendation and will ensure that the aging effects for the Unit 3 core barrel holddown spring are discovered and repaired before the loss of intended function. On this basis, the project team finds this to be acceptable.

7.1.16.8 Conclusion

On the basis of its audit and review of the applicant's program, the project team finds that those portions of the program for which the applicant claims consistency with the GALL Report are consistent with the GALL Report. In addition, on the basis of its review of the clarifications, exceptions, and enhancements to the GALL Report, the project team finds that the applicant's program provides for adequate management of the aging effects for which the program is credited so that the intended functions will be maintained consistent with the CLB during the period of extended operation, as required by 10 CFR 54.21(a)(3).

On the basis of its review of the UFSAR supplements for this AMP, the project team also finds that they provide an adequate summary description of the program, as required by 10 CFR 54.21(d).

7.1.17 INSERVICE INSPECTION PROGRAM: SYSTEMS, COMPONENTS AND SUPPORTS (MPS AMP B2.1.18)

In the MPS LRA, Appendix B, Section B2.1.18, the applicant states that MPS AMP B2.1.18, "Inservice Inspection Program: Systems, Components & Supports" is consistent with GALL

AMPs XI.M1, “ASME Section XI Inservice Inspection, Subsection IWB, IWC, and IWD,” XI.M3, “Reactor Head Closure Studs,” XI.M11, “Ni-Alloy Nozzles and Penetrations,” XI.M12, “Thermal Aging Embrittlement of Cast Austenitic Stainless Steel (CASS),” and XI.S3, “ASME Section XI Inservice Inspection, Subsection IWF,” with exceptions.

7.1.17.1 Program Description

The applicant states, in the MPS LRA, that the inservice inspection program: systems, components, and supports is an existing program that was developed to comply with the requirements of ASME Section XI. The ASME Code provides the requirements for inservice inspection, repair, and replacement of all Class 1, 2, and 3 components and associated component supports. For license renewal, the MPS program is credited with managing the effects of aging for only Class 1 and specific Class 2 components (on the secondary side of the steam generators as determined through the AMR process), and for Class 1, 2, and 3 component supports. MPS AMP B2.1.18 manages the aging effects of cracking, loss of fracture toughness, loss of material, and loss of preload.

The applicant states, in the MPS LRA, that the program addresses the inservice inspection requirements for reactor vessel closure bolting, including those associated with detection of aging effects and those associated with performing the preventive measures presented in Regulatory Guide 1.165, “Identification and Characterization of Seismic Sources and Determination of Safe Shutdown Earthquake Ground Motion,” dated March 1997.

ISG-12, “Addition of Generic Aging Lessons Learned (GALL) Aging Management Program (AMP) XI.M35, “One-Time Inspection of Small-Bore Piping, for License Renewal,” dated November 3, 2003, addresses cracking of small-bore Class 1 piping as a result of thermal fatigue or stress corrosion cracking. ISG-12 states that for plants that have not experienced cracking of small-bore Class 1 piping, a one-time inspection is an acceptable method to confirm that these aging effects are not occurring. However, if a plant has experienced cracking in small-bore Class 1 piping resulting from these aging effects, periodic inspections may be necessary as a plant-specific AMP. Although cracking of small-bore Class 1 piping from thermal fatigue or stress corrosion cracking has not been a problem, the applicant has included small-bore piping in the MPS risk-informed inservice inspection (RI-ISI) programs. Based on risk significance (determined by an evaluation of the consequence of failure) and on the probability of failure, a volumetric, surface, or VT-2 visual examination is performed for specific small-bore pipe welds and base metal areas as defined in the unit-specific RI-ISI inspection plans. These examination methods detect cracking and leakage resulting from thermal fatigue, cyclic loading, stress corrosion cracking, and primary water stress corrosion cracking.

Industry programs are currently investigating aging effects applicable to nickel-based alloys (i.e., primary water stress corrosion cracking in Alloy 600 base metal and Alloy 82/182 weld metals) and are attempting to identify appropriate aging management activities to manage these aging effects. The applicant states, in the MPS LRA, that it will follow these industry efforts and will implement the appropriate recommendations resulting from this guidance. This commitment is identified on the applicant’s license renewal commitment list in the MPS Unit 2 LRA, Appendix A, Table A6.0-1, Item 14, and MPS Unit 3 LRA, Appendix A, Table A6.0-1, Item 15. This issue is reviewed by NRR DE staff and is beyond the scope of this report.

The applicant states, in the MPS LRA, that for potentially susceptible CASS materials, either enhanced volumetric examinations or a unit- or component-specific flaw tolerance evaluation (considering reduced fracture toughness and unit-specific geometry and stress information) will be used to demonstrate that the thermally embrittled material has adequate fracture toughness.

The applicant states, in the MPS LRA, that as a result of NRC Bulletin 88-09, "Thimble Tube Thinning in Westinghouse Reactors," dated July 26, 1988, MPS Unit 3 actively manages incore thimble tube degradation through performance of eddy current testing during each outage.

The applicant states, in the MPS LRA, that the ASME Class 2 and Class 3 components that are not in the scope of MPS AMP B2.1.18 will continue to be inspected during the period of extended operation as part of the ASME Section XI inservice inspection program. However, the project team noted that the applicant has opted to use other appropriate preventive and condition monitoring programs, such as the general condition monitoring, to manage the effects of aging for these components.

7.1.17.2 Consistency with the GALL Report

In the MPS LRA, the applicant states that MPS AMP B2.1.18 is consistent with GALL AMPs XI.M1, XI.M3, XI.M11, XI.M12, and XI.S3, with exceptions.

The project team interviewed the applicant's technical staff and reviewed, in whole or in part, the documents listed in Attachment 5 of this report for MPS AMP B2.1.18, including MPS Technical Report MP-LR-3701/MP-LR-4701, "Inservice Inspection Program: Systems, Components & Supports," Revision 2, dated March 11, 2004, which provides an assessment of how the GALL AMP elements are addressed by the inservice inspection program: systems, components and supports program.

The project team reviewed seven program elements (see Section 5.1 of this report) contained in the MPS AMP and associated bases documentation against GALL AMPs XI.M1, XI.M12, and XI.S3 for consistency. The project team did not perform evaluation for this MPS AMP against GALL AMP XI.M3 and XI.M11. This portion of this MPS AMP is reviewed by NRR DE and is documented in the safety evaluation report (SER) related to the MPS Units 2 and 3 LRA.

7.1.17.3 Exceptions to the GALL Report

The applicant states, in the MPS LRA, exceptions to the GALL Report as follows

Element: 1: Scope
Exception: The RI-ISI program is credited to inspect specific Class 1 piping (including piping exempt from current requirements) on a risk-informed basis. The RI-ISI program is only applicable to the non-destructive examination requirements for ASME Section XI examination category B-F and B-J type welds and, for MPS Unit 3 only, base metal locations. For these locations, examination requirements are determined on a component-specific basis.

For MPS license renewal the program has been credited to manage the effects of aging for only Class 1 and specific Class 2 components (on the secondary side of the steam generators) as determined through the AMR process.

Element: 3: Parameters Monitored/Inspected
4: Detection of Aging Effects
5: Monitoring and Trending

Exception: For the MPS Units 2 and 3 Class 1 examination category B-F and B-J type welds and, for Unit 3 only, base metal locations, inspection, examination, and additional examination requirements have been developed on a component-specific, risk-informed basis as part of an integrated approach for risk-informed analyses.

The GALL Report identifies the following criterion for the "scope of program" program element associated with the first exception taken

> [XI.M1] The program element does not recognize RI-ISI programs as an acceptable alternative to the current ASME Section XI inservice inspection requirements.

The applicant states, in the MPS LRA, that MPS Unit 2 has submitted a request to implement an RI-ISI program and MPS Unit 3 has received approval from the NRC to implement an RI-ISI program. The process of developing the scope for the RI-ISI programs includes not only an evaluation of risk significance and failure probability, but also considers operating experience. RI-ISI implementation will reduce the risk and failure probability. The inspection and examination requirements, examination methods, and inspection extent and frequency are determined on a component-specific, risk-informed basis as part of an integrated approach for risk-informed analyses. The project team reviewed the "Millstone Nuclear Power Station, Unit No. 3 - Risk-Informed Inservice Inspection Program Plan - Request for Relief from American Society of Mechanical Engineers (ASME) Code, Section XI," dated March 12, 2002 (ML020570312), and determined that the method used for reduction in risk provides sufficient justification for this exception. The RI-ISI program is a living program that requires updating and expansion based on industry and site specific inspection findings. At present, a RI-ISI program is approved for use on an ASME Code ISI interval specific basis. Therefore, the applicant will have to request approval to use the RI-ISI for the specific intervals during the period of extended operation in accordance with the appropriate ASME Code of record for the fifth and sixth inservice inspection intervals as referenced in 10 CFR 50.55a twelve months prior to the inspection interval. Therefore, the staff finds that the ASME Code Section XI as referenced in 10 CFR 50.55a twelve months prior to each inspection interval of extended operation as modified by a staff approved or authorized RI-ISI program is acceptable for the period of extended operation.

The GALL Report identifies the following criterion for the "parameters monitored/inspected" program element associated with the second exception taken

> [XI.M1] The program element refers to ASME Section XI, Table IWB-2500-1 for the identification of examination and inspection requirements for Class 1 components.

The GALL Report identifies the following criterion for the "detection of aging effects" program element associated with the second exception taken

> [XI.M1] The examination methods are based on the requirements in ASME Section XI, Table IWB-2500-1 for Class 1 components.

The GALL Report identifies the following criteria for the "monitoring and trending" program element associated with the second exception taken

> [XI.M1] The inspection extent and frequency are based on IWB-2500, which provides for timely detection of degradation for Class 1 components. Indications during examination which exceed acceptance standards are to be extended to include additional examinations in accordance with IWB-2430 for Class 1 components.

The applicant states, in the MPS LRA, that MPS Unit 2 has submitted a request to implement an RI-ISI program and MPS Unit 3 has received approval from the NRC to implement an RI-ISI program. The process of developing the scope for the RI-ISI programs includes not only an evaluation of risk significance and failure probability, but also considers operating experience. RI-ISI implementation will reduce the risk and failure probability. The inspection and examination requirements, examination methods, and inspection extent and frequency are determined on a component-specific, risk-informed basis as part of an integrated approach for risk-informed analyses. The project team reviewed the MPS Unit 3 Risk-Informed Inservice Inspection Program Plan (ML020570312), and determined that the reduction in risk provides sufficient justification for this exception. The RI-ISI program is a living program that requires updating and expansion based on industry and site specific inspection findings. At present, a RI-ISI program is approved for use on an ASME Code ISI interval specific basis. Therefore, the applicant will have to request approval to use the RI-ISI for the specific intervals during the period of extended operation in accordance with the appropriate ASME Code of record for the fifth and sixth inservice inspection intervals as referenced in 10 CFR 50.55a twelve months prior to the inspection interval. Therefore, the staff finds that the ASME Code Section XI as referenced in 10 CFR 50.55a twelve months prior to each inspection interval of extended operation as modified by a staff approved or authorized RI-ISI program is acceptable for the period of extended operation.

7.1.17.4 Enhancements

None

7.1.17.5 Operating Experience

The project team reviewed operating experience for the applicant's inservice inspection program: systems, components, and supports program. The applicant states, in the MPS LRA, that the program identifies examples to demonstrate how the portions of the inservice

inspection program related to GALL AMPs XI.M1 and XI.S3 are adequate to manage the aging effects during the extended period of operation. These examples were considered during the project team's evaluation of MPS AMP B2.1.18.

The applicant states, in the MPS LRA, that the portion of the inservice inspection program related to GALL AMP XI.M12 is new and will be implemented prior to the period of extended operation. The applicant states, in the MPS LRA, that no MPS plant-specific operating experience exists for thermal aging embrittlement of CASS. The applicant also states in the MPS LRA that its program for thermal aging embrittlement of CASS was developed using research data obtained on both laboratory-aged and service-aged materials.

On the basis of its review of the above operating experience and discussions with the applicant's technical staff, the project team concludes that MPS AMP B2.1.18 adequately manages the aging effects that have been observed at the applicant's plant.

7.1.17.6 UFSAR Supplement

The applicant provides it UFSAR supplements for the inservice inspection program: systems, components, and supports program in MPS Unit 2 LRA, Appendix A, Section A2.1.18, and MPS Unit 3 LRA, Appendix A, Section A2.1.17, which state that this is an existing program that was developed to comply with the requirements of ASME Section XI. For license renewal, the MPS program has been credited to manage the effects of aging for only Class 1 and specific Class 2 components (on the secondary side of the steam generators as determined through the AMR process) and for Class 1, 2, and 3 component supports. The MPS program manages the aging effects of cracking, loss of fracture toughness, loss of material, and loss of pre-load. The acceptance criteria for examinations performed in accordance with this program are based on the applicable regulations and acceptance standards. Corrective actions for conditions that are adverse to quality are performed in accordance with the corrective action program as part of the quality assurance program.

The applicant states, in MPS LRA Appendix A, that one commitment is associated with the inservice inspection program: systems, components, and supports program as follows

> The applicant will follow industry efforts currently investigating aging effects applicable to nickel-based alloys (i.e., primary water stress corrosion cracking in Alloy 600 base metal and Alloy 82/182 weld metals) and identifying appropriate aging management activities to manage these aging effects, and will implement the appropriate recommendations resulting from this guidance. This commitment is identified on the applicant's license renewal commitment list in the MPS Unit 2 LRA, Appendix A, Table A6.0-1, Item 14, and MPS Unit 3 LRA, Appendix A, Table A6.0-1, Item 15.

The project team reviewed the UFSAR supplements and, based on that review, requested that the applicant provide clarification of how the program will manage thermal embrittlement of CASS. In response to the project team's request, the applicant issued a MPS LRA supplement letter, dated July 7, 2004 (ML041900407), which states that

> For MPS Unit 2 Appendix A, Section A2.1.18 (page A-17) and MPS Unit 3 Appendix A, Section A2.1.17 (page A-16), the following wording, providing an additional commitment for monitoring the reduction in fracture toughness, should be inserted at the end of the commitments:
>
> Monitoring Fracture Toughness
>
> "For potentially susceptible CASS materials, either enhanced volumetric examinations or a unit or component specific flaw tolerance evaluation (considering reduced fracture toughness and unit specific geometry and stress information) will be used to demonstrate that the thermally-embrittled material has adequate fracture toughness in accordance with NUREG-1801 Section XI.M12.3."

This commitment is identified on the applicant's license renewal commitment list in the MPS Unit 2 LRA, Appendix A, Table A6.0-1, Item 27, and MPS Unit 3 LRA, Appendix A, Table A6.0-1, Item 28.

The project team reviewed the UFSAR supplements and the MPS LRA supplement letter and confirms that they provide an adequate summary description of the program, as identified in the SRP-LR UFSAR supplement table and as required by 10 CFR 54.21(d).

7.1.17.7 Evaluation

The project team performed a review of the applicable criteria in GALL AMPs XI.M1, "ASME Section XI Inservice Inspection, Subsection IWB, IWC, and IWD," XI.M12, "Thermal Aging Embrittlement of Cast Austenitic Stainless Steel (CASS)," and XI.S3, "ASME Section XI Inservice Inspection, Subsection IWF," and the program description and elements for MPS AMP B2.1.18.

The project team did not perform evaluation for MPS AMP B2.1.18 against GALL AMP XI.M3 and XI.M11. This portion of this MPS AMP is reviewed by NRR DE and is documented in the safety evaluation report (SER) related to the MPS Units 2 and 3 LRA.

For the aspects of the program elements that were determined by the applicant to be consistent with the corresponding program elements in GALL AMPs XI.M1, XI.M12, and XI.S3, the project team determined that these program elements for MPS AMP B2.1.18 conform with the applicable program elements and acceptance criteria in GALL AMPs XI.M1, "ASME Section XI Inservice Inspection, Subsection IWB, IWC, and IWD," XI.M12, "Thermal Aging Embrittlement of Cast Austenitic Stainless Steel (CASS)," and XI.S3, "ASME Section XI Inservice Inspection, Subsection IWF." Based on its review of the exceptions, the project team concludes that the applicant's inservice inspection program: systems, components, and supports program provides reasonable assurance of aging management of cracking, loss of fracture toughness, loss of material, and loss of preload in Class 1 and specific Class 2 components (on the secondary side of the steam generators as determined through the AMR process), and Class 1, 2, and 3 component supports. The project team finds MPS AMP B2.1.18 acceptable because it conforms to the recommended program description, program elements, and acceptance criteria for inservice inspections of systems, components, and structural supports, as discussed in

GALL AMPs XI.M1, "ASME Section XI Inservice Inspection, Subsection IWB, IWC, and IWD," XI.M12, "Thermal Aging Embrittlement of Cast Austenitic Stainless Steel (CASS)," and XI.S3, "ASME Section XI Inservice Inspection, Subsection IWF."

The applicant states, in the MPS LRA, that its program utilizes a RI-ISI methodology to develop unit-specific inspection and examination requirements, examination methods, inspection extent, and frequencies for Category B-F (pressure-retaining dissimilar metal welds) and B-J (pressure-retaining welds in piping) components. MPS Units 2 and 3 have included small-bore Class 1 piping in their respective RI-ISI programs. The process of developing the scope for each RI-ISI program includes not only an evaluation of risk significance and failure probability, but also considers operating experience. RI-ISI implementation will reduce the risk and failure probability.

The project team reviewed the MPS Unit 3 Risk-Informed Inservice Inspection Program Plan (ML020570312) and determined that the applicant used RI-ISI methodology to sample the small-bore Class 1 pipe welds and base metal areas subject to volumetric examination. The project team concluded that this approach is consistent with the ISG-12 guidance and the GALL Report one-time inspection recommendation for small-bore piping. The applicant issued a MPS LRA supplement letter, dated July 7, 2004 (ML041900407), which states that the volumetric examination method was used in the small-bore Class 1 pipe welds. The project team finds this acceptable.

The MPS Unit 2 RI-ISI program plan, which has not received approval from the NRC, is followup item 7.1.17-1 which will be closed with NRC approval of the plan. Pending satisfactory resolution of the followup item, the project team finds this exception to be acceptable.

In the MPS LRA, the applicant credits its TLAA leak-before-break (LBB) evaluation with addressing GALL AMP XI.M12 recommended plant- or component-specific flaw tolerance evaluation. The project team reviewed MPS Technical Report MP-LR-3014/MP-LR-4014, "Leak-Before-Break (LBB)," Revision 1, dated March 31, 2004, and concludes that the LBB analysis is not a flaw tolerance evaluation. The project team discussed this finding with the applicant, who agreed with the project team's finding. In response to the project team's finding, the applicant issued a MPS LRA supplement letter, dated July 7, 2004 (ML041900407), which states that

> For MPS Unit 2 Appendix A, Section A2.1.18 (page A-17) and MPS Unit 3 Appendix A, Section A2.1.17 (page A-16), the following wording, providing an additional commitment for monitoring the reduction in fracture toughness, should be inserted at the end of the commitments:
>
> Monitoring Fracture Toughness
> "For potentially susceptible CASS materials, either enhanced volumetric examinations or a unit or component specific flaw tolerance evaluation (considering reduced fracture toughness and unit specific geometry and stress information) will be used to demonstrate that the thermally-embrittled material has adequate fracture toughness in accordance with NUREG-1801 Section XI.M12.3. This commitment is identified in Appendix A, Table A6.0-1 License Renewal Commitments, Items [27 for Unit 2] [28 for Unit 3]."

Additionally, a new commitment should be added to Appendix A, Table A6.0-1 for each unit as follows:

Item: 27 (MPS Unit 2), 28 (MPS Unit 3)
Commitment: The commitment will be worded as identified above.
Source: ISI: Systems, Components and Supports
Schedule: Prior to the Period of Extended Operation.

To reflect this additional commitment in the Inservice Inspection Program: Systems, Components And Supports, the wording in MPS Unit 2 Appendix B, Section B2.1.18 (page B-75) and MPS Unit 3 Appendix B, Section B2.1.18 (page B-75) "In accordance with NUREG-1801 Section XI.M12, the potential for thermal aging embrittlement of CASS components is addressed through the performance of plant-specific or component-specific evaluations to assess whether the material has adequate fracture toughness." should be replaced with "For potentially susceptible CASS materials, either enhanced volumetric examinations or a unit or component specific flaw tolerance evaluation (considering reduced fracture toughness and unit specific geometry and stress information) will be used to demonstrate that the thermally-embrittled material has adequate fracture toughness in accordance with NUREG-1801 Section XI.M12.3. This commitment is identified in Appendix A, Table A6.0-1 License Renewal Commitments, Items [27 for Unit 2] [28 for Unit 3]."

For MPS Unit 2 and Unit 3 Appendix B, Section B2.1.17 (page B-72), the last sentence of the discussion under XI.M12 - Parameters Monitored/Inspected should be replaced with:

"For potentially susceptible CASS materials, either enhanced volumetric examinations or a unit or component specific flaw tolerance evaluation (considering reduced fracture toughness and unit specific geometry and stress information) will be used to demonstrate that the thermally-embrittled material has adequate fracture toughness in accordance with NUREG-1801 Section XI.M12.3. This commitment is captured under the ISI: Systems, Components, and Supports and is identified in Appendix A, Table A6.0-1 License Renewal Commitments, Items [27 for Unit 2] [28 for Unit 3]."

GALL AMP XI.S3 recommends specific percentages of Class 1, 2, and 3 ASME Section XI, Subsection IWF supports to be examined at each inspection interval that are based on later editions of the ASME Code than that used to develop the MPS inservice inspection program. When asked by the project team to justify the use of the earlier edition of the Code, the applicant stated that the percentages of MPS Units 2 and 3 Subsection IWF supports examined by the MPS AMP are based on ASME Code Case N-491-1 (Table -2500-1), which establishes the same percentages as those in the later editions of the Code and acceptable in the GALL Report. The applicant states, in the MPS LRA, that ASME Code Case "N-491" was used to obtain a relief request for IWF supports examinations. The project team reviewed MPS Technical Report MP-LR-3701/MP-LR-4701 and identified that ASME Code Case "N-491-1" was used to obtain a relief request. To clarify this, the applicant submitted a MPS LRA supplement letter, dated July 7, 2004 (ML041900407), which states that the revision for the

referenced ASME Code Case, "N-491" should be replaced with "N-491-1" in MPS Unit 2 and Unit 3 Appendix B, Section B2.1.18 (page B-76). The project team finds this to be acceptable.

7.1.17.8 Conclusion

On the basis of its audit and review of the applicant's program, the project team finds that those portions of the program for which the applicant claims consistency with the GALL Report are consistent with GALL Report. In addition, on the basis of its review of the exceptions to the GALL Report, the project team finds that the applicant has demonstrated that the effects of aging will be adequately managed so that the intended functions will be maintained consistent with the CLB during the period of extended operation, as required by 10 CFR 54.21(a)(3).

On the basis of its review of the UFSAR supplements for this AMP, the project team also finds that they provide an adequate summary description of the program, as required by 10 CFR 54.21(d).

7.1.18 INSPECTION ACTIVITIES: LOAD HANDLING CRANES AND DEVICES (MPS AMP B2.1.19)

In the MPS LRA, Appendix B, Section B2.1.19, the applicant states that MPS AMP B2.1.19, "Inspection Activities: Load Handling Cranes and Devices Program," is consistent with GALL AMP XI.M23, "Inspection of Overhead Heavy Load [Related to Refueling] Handling Systems," with enhancements.

7.1.18.1 Program Description

The applicant states, in the MPS LRA, that the inspection activities: load handling cranes and devices program manages the aging effect of loss of material for the load handling cranes and devices within the scope of license renewal. The in-scope load handling cranes and devices are either safety-related or seismically designed to ensure that they will not adversely impact safety-related components during or subsequent to a seismic event.

Load handling cranes and devices inspections address the overall condition of the crane or device, including checking the condition of the structural members (i.e., rails, girders, etc.) and fasteners on the crane or device, the runways along which the crane or device moves, and the base plates and anchorages for the runways and monorails.

7.1.18.2 Consistency with the GALL Report

In the MPS LRA, the applicant states that MPS AMP B2.1.19 is an existing program that is consistent with GALL AMP XI.M23, with enhancements.

The project team interviewed the applicant's technical staff and reviewed, in whole or in part, the documents listed in Attachment 5 of this report for MPS AMP B2.1.19, including MPS Technical Report MP-LR-3718/MP-LR-4718, "Inspection Activities: Load Handling Cranes and Devices," Revision 2, dated March 13, 2004, which provides an assessment of how the GALL AMP elements are addressed by the inspection activities: load handling cranes and devices program.

The project team reviewed seven program elements (see Section 5.1 of this report) contained in the MPS AMP and associated bases documents against GALL AMP XI.M.23 for consistency.

7.1.18.3 Exceptions to the GALL Report

None

7.1.18.4 Enhancements

The applicant states, in the MPS LRA, the enhancements to the GALL Report elements as follows

Element:	1: Scope of Program
Enhancement:	The existing inspection program will be modified to include those lifting devices that require monitoring for license renewal, but are not already included in the program. This enhancement will be implemented prior to the period of extended operation. This commitment is also identified on the applicant's license renewal commitment list in the MPS Unit 2 LRA, Appendix A, Table A6.0-1, Item 15, and the MPS Unit 3 LRA, Appendix A, Table A6.0-1, Item 16.
Element:	4: Detection of Aging Effects
Enhancement:	Implementing procedures and documentation will be modified to include visual inspections for the loss of material on the crane and trolley structural components and the rails in the scope of license renewal added by the first enhancement. This enhancement will be implemented prior to the period of extended operation. This commitment is also identified on the applicant's license renewal commitment list in the MPS Unit 2 LRA, Appendix A, Table A6.0-1, Item 16, and the MPS Unit 3 LRA, Appendix A, Table A6.0-1, Item 17.

The GALL Report identifies the following criterion for the "scope of program" program element associated with the first enhancement

> The program manages the effects of general corrosion on the crane and trolley structural components for those cranes in the scope of 10 CFR 54.4 (License Renewal) and the effects of wear on the rails in the rail system.

The project team noted that the inspection activities: load handling cranes and devices program does not currently include all lifting devices required for license renewal. The applicant has initiated followup items to ensure that this program will be modified to include those lifting devices required for license renewal but not already managed by the program. Although this enhancement comprises more than the list of items specifically identified in the scope for GALL AMP XI.M23, the project team determined that this enhancement will bring the applicant's program into agreement with the intent of GALL AMP XI.M23 program element. On

this basis, the project team finds incorporating the first enhancement is acceptable as any such changes will provide additional assurance that the effects of aging will be adequately managed.

The GALL Report identifies the following criteria for the "detection of aging effects" program element associated with the second enhancement

> Crane rails and structural components are visually inspected on a routine basis for degradation. Functional tests are also performed to assure their integrity.

The project team noted that MPS AMP B2.1.19 implementing procedures and documentation do not currently provide all of the inspection criteria required to manage aging effects for lifting devices. The applicant has initiated followup items to ensure that the MPS lifting and handling program implementing procedures and/or automated work orders are modified, or new ones created, to provide the required structural inspection guidance for monitoring the effects of aging. Evidence of aging effects that are potentially adverse to quality are entered into the corrective action program.

The project team finds that the applicant's proposed changes to the implementing procedures and documentation for the inspection criteria will ensure that degradation of the lifting devices is identified before there is a loss of intended function. On this basis, the project team finds this enhancement to be acceptable since it will bring the applicant's program into agreement with the GALL Report.

7.1.18.5 Operating Experience

The project team reviewed operating experience for the applicant's inspection activities: load handling cranes and devices program. The review indicated the inspection activities: load handling cranes and devices program is effective in identifying and implementing repairs, and maintaining the integrity of load handling cranes and devices.

The applicant states, in the MPS LRA, that during the operating history of MPS, anomalous conditions with cranes and lifting devices have been identified. These anomalies have included principally administrative or operational issues. None of these issues has resulted from age-related degradation and they are not a concern associated with license renewal. However, in the few instances where inspection results have indicated signs of potential degradation, corrective actions have been implemented to ensure the continued capability of the system to perform its intended functions.

The following representative examples of internal operating experience are based on a review of condition reports and were considered by the project team in its evaluation of the effectiveness of the program

> A loose bolting connection was observed on the supporting girders of the spent fuel cask crane. The extent of the condition was evaluated and determined not to affect the load-carrying capacity of the crane assembly because the nuts were only loose and not "backed-off." Therefore, the structural capacity of the joint was determined to still be available. The bolting connections were subsequently retorqued.

> During an inspection of the polar crane, two bolts were found to be loose. The loose fasteners were replaced in accordance with non-conformance report 296-247.

On the basis of its review of the above operating experience and discussions with the applicant's technical staff, the project team concludes that MPS AMP B.2.1.19 adequately manages the aging effects that have been observed at the applicant's plant.

7.1.18.6 UFSAR Supplement

The applicant provides its UFSAR supplements for the inspection activities: load handling cranes and devices program in the MPS Unit 2 LRA, Appendix A, Section A2.1.19 and the MPS Unit 3 LRA, Appendix A, Section A2.1.18, which state that the program manages the aging effect of loss of material for the load handling cranes and devices within the scope of license renewal. The in-scope load handling cranes and devices are either safety-related or seismically designed to ensure that they will not adversely impact safety-related components during or subsequent to a seismic event.

The applicant states, in the MPS LRA, that the program addresses the overall condition of the crane or device, including checking the condition of the structural members (i.e., rails, girders, etc.) and fasteners on the crane or device, the runways along which the crane or device moves, and the base plates and anchorages for the runways and monorails.

The acceptance criterion for visual inspections is the absence of anomalous indications that are signs of degradation. Corrective actions for conditions that are adverse to quality are performed in accordance with the corrective action program as part of the quality assurance program.

The applicant commits, in the MPS LRA, to implement two enhancements prior to the period of extended operation as follows

> The existing inspection program will be modified to include those lifting devices that require monitoring for license renewal, but are not already included in the program. This commitment is also identified on the applicant's license renewal commitment list in the MPS Unit 2 LRA, Appendix A, Table A6.0-1, Item 15, and the MPS Unit 3 LRA, Appendix A, Table A6.0-1, Item 16.
>
> Implementing procedures and documentation will be modified to include visual inspections for the loss of material on the crane and trolley structural components and the rails in the scope of license renewal added by the first enhancement. This commitment is also identified on the applicant's license renewal commitment list in the MPS Unit 2 LRA, Appendix A, Table A6.0-1, Item 16, and the MPS Unit 3 LRA, Appendix A, Table A6.0-1, Item 17.

The project team reviewed the UFSAR supplements and concurs that they provide an adequate summary description of the program, as identified in the SRP-LR UFSAR supplement table and as required by 10 CFR 54.21(d).

7.1.18.7 Evaluation

The project team performed a review of the applicable criteria in GALL AMP XI.M23, "Inspection of Overhead Heavy Load [Related to Refueling] Handling Systems," and the program description and elements for MPS AMP B2.1.19.

For the aspects of the program elements that were determined by the applicant to be consistent with the corresponding program elements in GALL AMP XI.M23, the project team determined that these program elements for MPS AMP B2.1.19 conform with the applicable program elements and acceptance criteria in GALL AMP XI.M23, "Inspection of Overhead Heavy Load [Related to Refueling] Handling Systems." Based on its review, the project team concludes that, with the enhancements identified by the applicant, the applicant's inspection activities: load handling cranes and devices program provides reasonable assurance of aging management of loss of material in load handling cranes and devices. The project team finds this AMP acceptable because it conforms to the recommended program description, program elements, and acceptance criteria for load handling cranes and devices inspection programs, as discussed in GALL AMP XI.M23, "Inspection of Overhead Heavy Load [Related to Refueling] Handling Systems."

The applicant states, in the MPS LRA, that two enhancements associated with this program will be implemented prior to the period of extended operation. The applicant's first enhancement commits to modify the existing inspection program to include those lifting devices that require monitoring for license renewal, but are not already included in the program. This commitment is also identified on the applicant's license renewal commitment list in the MPS Unit 2 LRA, Appendix A, Table A6.0-1, Item 15, and the MPS Unit 3 LRA, Appendix A, Table A6.0-1, Item 16. The project team determined that this enhancement will bring the applicant's program into agreement with the intent of GALL AMP XI.M23 scope of program element and, on this basis, finds the enhancement to be acceptable.

The applicant's second enhancement commits to modify the implementing procedures and documentation to include visual inspections for the loss of material on the in-scope crane and trolley structural components and rails added by the first enhancement. This commitment is also identified on the applicant's license renewal commitment list in the MPS Unit 2 LRA, Appendix A, Table A6.0-1, Item 16, and the MPS Unit 3 LRA, Appendix A, Table A6.0-1, Item 17. The project team determined that this enhancement will bring the applicant's program into agreement with GALL AMP XI.M23 and, on this basis, finds the enhancement to be acceptable.

7.1.18.8 Conclusion

On the basis of its audit and review of the applicant's program, the project team finds that those portions of the program for which the applicant claims consistency with the GALL Report are consistent with the GALL Report. In addition, on the basis of its review of the enhancements to the GALL Report, the project team finds that the applicant's program provides for adequate management of the aging effects for which the program is credited so that the intended functions will be maintained consistent with the CLB during the period of extended operation, as required by 10 CFR 54.21(a)(3).

On the basis of its review of the UFSAR supplements for this AMP, the project team also finds that they provide an adequate summary description of the program, as required by 10 CFR 54.21(d).

7.1.19 SERVICE WATER SYSTEM (OPEN-CYCLE COOLING) (MPS AMP B2.1.21)

In the MPS LRA, Appendix B, Section B2.1.21, the applicant states that MPS AMP B2.1.21, "Service Water System (Open-Cycle Cooling)," is consistent with GALL AMP XI.M20, "Open-Cycle Cooling Water System," with exceptions.

7.1.19.1 Program Description

The applicant states, in the MPS LRA, that the service water systems for MPS Units 2 and 3 are open-cycle, once-through cooling systems that are subject to the requirements of NRC GL 89-13, "Service Water System Problems Affecting Safety-Related Equipment," dated July 1989. The applicant uses the surveillance and control techniques recommended by GL 89-13 to manage the effects of aging on the MPS service water systems. The program addresses the aging effects of corrosion (including MIC), erosion, protective coating failure, silting, and biofouling of service water piping and components.

7.1.19.2 Consistency with the GALL Report

In the MPS LRA, the applicant states that MPS AMP B2.1.21 is consistent with GALL AMP XI.M20, with exceptions.

The project team interviewed the applicant's technical staff and reviewed, in whole or in part, the documents listed in Attachment 5 of this report for MPS AMP B2.1.21, including MPS Technical Report MP-LR-3715/MP-LR-4715, "Service Water System (Open-Cycle Cooling)," Revision 2, dated March 13, 2004, which provides an assessment of how the GALL AMP elements are addressed by the service water system (open-cycle cooling) program.

The project team reviewed seven program elements (see Section 5.1 of this report) contained in the MPS AMP and associated bases documentation against GALL AMP XI.M20 for consistency.

7.1.19.3 Exceptions to the GALL Report

The applicant states, in the MPS LRA, exceptions to the GALL Report elements as follows

Element:	1: Scope of Program 4: Detection of Aging Effects 5: Monitoring and Trending
Exception:	MPS Unit 2 relies on frequent, regular inspection and cleaning of heat exchangers, in lieu of thermal performance testing. Fouling determinations are made based on established differential pressure limits (fixed or derived from curves) under maximum service water flow conditions.

Element: 1: Scope of Program
4: Detection of Aging Effects
5: Monitoring and Trending
Exception: The reactor plant component cooling system heat exchangers and containment recirculation coolers are not testable.

Elements: 2: Preventive Actions
Exception: Generally, the redundant cooling loops for the service water system are rotated into service on a regular basis; therefore, flushing and testing requirements do not apply. The only exceptions are the MPS Unit 3 containment recirculation coolers and the service water supply piping to these heat exchangers.

The GALL Report identifies the following criteria for the "scope of program," "detection of aging effects," and "monitoring and trending" program elements associated with the first exception taken

> Thermal performance testing is an effective method for assessing the effects of aging on heat exchangers.

The project team determined that frequent, regular inspections and cleaning is allowed by GL 89-13 and meets the intent of the GALL Report for ensuring that heat exchangers are capable of performing their intended function of heat transfer during the period of extended operation. On the basis of a review of GL 89-13 and interviews with the applicant's technical staff, the project team determined that this exception is consistent with the CLB and therefore finds the first exception to be acceptable.

The GALL Report identifies the following criteria for the "scope of program," "detection of aging effects," and "monitoring and trending" program elements associated with the second exception taken

> Thermal performance testing is an effective method for assessing the effects of aging on heat exchangers.

The project team determined that the containment recirculation coolers are maintained in a dry lay-up condition and the service water supply to these heat exchangers is flushed on a semi-annual basis, greatly reducing the possibility of biofouling and potential reduction in heat transfer rate. The reactor plant component cooling system heat exchangers are cleaned on the tube side and inspected annually. As with the other service water heat exchangers, trending and assessments of biofouling are performed for the reactor plant component cooling system heat exchangers to detect the presence of macro-fouling, and the necessary actions are taken to preclude fouling and reduction in heat transfer rate. On the basis of a review of GL 89-13 and interviews with the applicant's technical staff, the project team determined that this exception is consistent with the CLB and therefore finds the second exception to be acceptable.

The GALL Report identifies the following criterion for the "preventive actions" program element associated with the third exception taken

> The GALL Report discusses flushing and testing requirements in accordance with GL 89-13 for infrequently used cooling loops.

The project team agrees with the applicant that because the containment recirculation coolers are maintained in a dry lay-up condition, no mechanism exists for tube-side fouling and the ability of the coolers to perform their intended function is maintained. The applicant states, in the MPS LRA, that the service water supply piping to these heat exchangers is flushed on a semi-annual basis. On the basis of a review of GL 89-13 and interviews with the applicant's technical staff, the project team determined that this exception is consistent with the CLB and therefore finds the third exception to be acceptable.

7.1.19.4 Enhancements

None

7.1.19.5 Operating Experience

The project team reviewed the operating experience for the applicant's service water system (open-cycle cooling) program. The applicant states, in the MPS LRA, that repairs and design changes have been implemented to replace degraded portions of the service water systems. Continuing adherence to existing service water system inspection and testing procedures provides reasonable assurance that deficiencies will be identified and corrected so that the service water components remain capable of performing their intended functions.

On the basis of its review of the above operating experience and discussions with the applicant's technical staff, the project team concludes that MPS AMP B2.1.21 adequately manages the aging effects that have been observed at the applicant's plant.

7.1.19.6 UFSAR Supplement

The applicant provides its UFSAR supplements for the service water system (open-cycle cooling) program in MPS Unit 2 LRA, Appendix A, Section A2.1.21, and MPS Unit 3 LRA, Appendix A, Section A2.1.20, which state that the program manages the aging effects of loss of material and buildup of deposits. The program implements the NRC guidelines in GL 89-13, which include (a) surveillance and control of biofouling, (b) regular inspection and cleaning of heat exchangers (in lieu of thermal performance testing), (c) routine inspection and a maintenance program to ensure that corrosion (including MIC), erosion, protective coating failure, silting, and biofouling do not degrade the performance of safety-related systems serviced by the service water system, (d) a system walkdown inspection to ensure compliance with the CLB, and (e) a review of maintenance, operating, and training practices and procedures. The acceptance criterion for visual inspections is the absence of anomalous indications that are signs of degradation. Corrective actions for conditions that are adverse to quality are performed in accordance with the corrective action program as part of the quality assurance program.

The project team reviewed the UFSAR supplements and confirms that they provide an adequate summary description of the program, as identified in the SRP-LR UFSAR supplement table and as required by 10 CFR 54.21(d).

7.1.19.7 Evaluation

The project team performed a review of the applicable criteria in GALL AMP XI.M20, "Open-Cycle Cooling Water System," and the program description and elements for MPS AMP B2.1.21.

For the aspects of the program elements that were determined by the applicant to be consistent with the corresponding program elements in GALL AMP XI.M20, the project team determined that these program elements for MPS AMP B2.1.21 conform with the applicable program elements and acceptance criteria in GALL AMP XI.M20, "Open-Cycle Cooling Water System." Based on its review of the exceptions, the project team concludes that the applicant's service water system (open-cycle cooling) program provides reasonable assurance of aging management of corrosion (including MIC), erosion, protective coating failure, silting, and biofouling in service water piping and components. The project team finds MPS AMP B2.1.21 acceptable because it conforms to the recommended program description, program elements, and acceptance criteria for open-cycle cooling service water system programs, as discussed in GALL AMP XI.M20, "Open-Cycle Cooling Water System."

The applicant states two exceptions related to heat exchanger thermal performance testing recommendations in the GALL Report. Because the applicant's inspection and cleaning practices meet the requirements in GL 89-13, which meets the intent of GALL AMP XI.M20, the project team finds these exceptions to be acceptable.

The applicant states, in the MPS LRA, that generally, the redundant cooling loops for the service water system are rotated into service on a regular basis; therefore, the flushing and testing recommendations in the GALL Report do not apply to those portions of the MPS open-cycle cooling water systems. The applicant states, in the MPS LRA, that the Unit 3 containment recirculation coolers and the service water supply piping to these heat exchangers are not rotated into service on a regular basis. The project team agrees with the applicant that because the containment recirculation coolers are maintained in a dry lay-up condition, no mechanism exists for tube-side fouling and the ability of the coolers to perform their intended function is maintained. The applicant states, in the MPS LRA, that the service water supply piping to these heat exchangers is flushed on a semi-annual basis. The project team finds the exception to be acceptable.

7.1.19.8 Conclusion

On the basis of its audit and review of the applicant's program, the project team finds that those portions of the program for which the applicant claims consistency with the GALL Report are consistent with the GALL Report. In addition, on the basis of its review of the exceptions to the GALL Report, the project team finds that the applicant has demonstrated that the effects of aging will be adequately managed so that the intended functions will be maintained consistent with the CLB during the period of extended operation, as required by 10 CFR 54.21(a)(3).

On the basis of its review of the UFSAR supplements for this AMP, the project team also finds that they provide an adequate summary description of the program, as required by 10 CFR 54.21(d).

7.1.20 STRUCTURES MONITORING PROGRAM (MPS AMP B2.1.23)

In the MPS LRA, Appendix B, Section B2.1.23, the applicant states that MPS AMP B2.1.23 "Structures Monitoring Program," is consistent with GALL AMPs XI.S5, "Masonry Wall Program," XI.S6, "Structures Monitoring Program," and XI.S7, "NRC Regulatory Guide (RG) 1.127, Inspection of Water Control Structures Associated with Nuclear Power Plants," with enhancements.

7.1.20.1 Program Description

The applicant states, in the MPS LRA, that the structures monitoring program manages the aging effects of cracking, loss of material, and change of material properties. The program monitors those structures and structural support systems that are in the scope of license renewal. The majority of these structures and structural support systems are monitored under 10 CFR 50.65, as addressed in RG 1.160, "Monitoring the Effectiveness of Maintenance at Nuclear Power Plants," Revision 2, dated March 1997, and NUMARC 93-01, "Industry Guideline for Monitoring the Effectiveness of Maintenance at Nuclear Power Plants," Revision 2, dated April 1996. These two documents provide guidance for development of licensee-specific programs to monitor the condition of structures and structural components within the scope of the maintenance rule, such that there is no loss of structure or structural component intended function. The remaining structures in the scope of license renewal (such as non-safety-related buildings and enclosures, duct banks, valve pits and trenches, high-energy line break barriers, and flood gates) are also monitored to ensure there is no loss of intended function.

The applicant states, in the MPS LRA, that the scope of the structures monitoring program includes all masonry walls and water-control structures identified as performing intended functions in accordance with 10 CFR 54.4.

The applicant states, in the MPS LRA, that the structures monitoring program does not include the inspection of the supports specifically inspected per the requirements of the inservice inspection program: systems, components, and supports program, or inspection of the structural condition of the hangers and supports incorporated into the general condition monitoring program.

The applicant states, in the MPS LRA, that the structures monitoring program takes no credit for coatings applied to external surfaces of structural members in the determination of the aging effects for the underlying materials. The structures monitoring program does, however, evaluate the condition of the coatings as an indication of the condition of the underlying materials.

7.1.20.2 Consistency with the GALL Report

In the MPS LRA, the applicant states that MPS AMP B2.1.23 is consistent with GALL AMPs XI.S5, "Masonry Wall Program," XI.S6, "Structures Monitoring Program," and XI.S7, "RG 1.127, Inspection of Water Control Structures Associated with Nuclear Power Plants," with enhancements.

The project team interviewed the applicant's technical staff and reviewed, in whole or in part, the documents listed in Attachment 5 of this report for MPS AMP B2.1.23, including MPS Technical Report MP-LR-3728/MP-LR-4728, "Structures Monitoring Program," Revision 2, dated March 16, 2004, which provides an assessment of how the GALL AMP elements are addressed by the structures monitoring program.

The project team reviewed seven program elements (see Section 5.1 of this report) contained in the MPS AMP and associated bases documentation against GALL AMPs XI.S5, XI.S6, and XI.S7 for consistency.

7.1.20.3 Exceptions to the GALL Report

None

7.1.20.4 Enhancements

The applicant states, in the MPS LRA, the enhancements to the GALL Report elements as follows

Elements:	3: Parameters Monitored/Inspected 4: Detection of Aging Effects 6: Acceptance Criteria
Enhancement:	The applicant will revise program procedures to include American Concrete Institute (ACI) Standard 349.3R-96, "Evaluation of Existing Nuclear Safety Related Concrete Structures," dated 1996, and American Nuclear Standards Institute/American Society of Civil Engineers (ANSI/ASCE) Standard 11-90, "Guideline for Structural Condition Assessment of Existing Buildings," dated 1990, as references and input documents for the inspection program. This is identified on the applicant's license renewal commitment list in the MPS Unit 2 LRA, Appendix A, Table A6.0-1, Item 17, and the MPS Unit 3 LRA, Appendix A, Table A6.0-1, Item 18.
Element:	1: Scope of Program
Enhancement:	The implementing engineering procedures will be modified to include all additional structures inspections required for license renewal. This is identified on the applicant's license renewal commitment list in the MPS Unit 2 LRA, Appendix A, Table A6.0-1, Item 18, and the MPS Unit 3 LRA, Appendix A, Table A6.0-1, Item 19.
Elements:	3: Parameters Monitored/Inspected 4: Detection of Aging Effects
Enhancement:	Additional groundwater samples will be taken to establish a baseline with regard to the aggressiveness of the water and its effect on concrete structures. This is identified on the applicant's license renewal commitment list in the MPS Unit 2 LRA,

Appendix A, Table A6.0-1, Item 19, and the MPS Unit 3 LRA, Appendix A, Table A6.0-1, Item 20.

Element: 3: Parameters Monitored/Inspected
Enhancement: The structures monitoring program procedures will be modified so that the electrical engineering staff will be alerted if medium-voltage cables in scope of license renewal have been found to be exposed to significant moisture during structures inspections. This is identified on the applicant's license renewal commitment list in the MPS Unit 2 LRA, Appendix A, Table A6.0-1, Item 20, and the MPS Unit 3 LRA, Appendix A, Table A6.0-1, Item 21.

Element: 3: Parameters Monitored/Inspected
Enhancement: The maintenance and work control procedures will be revised to take advantage of inspection opportunities for structures required for license renewal and identified as "inaccessible." This is identified on the applicant's license renewal commitment list in the MPS Unit 2 LRA, Appendix A, Table A6.0-1, Item 21, and the MPS Unit 3 LRA, Appendix A, Table A6.0-1, Item 22.

The GALL Report identifies the following criteria for the "parameters monitored or inspected," "detection of aging effects," and "acceptance criteria" program elements associated with the first enhancement

> [XI.S6] Parameters monitored or inspected are to be commensurate with industry codes, standards, and guidelines, and are to also consider industry and plant-specific operating experience. Although not required, ACI 349.3R-96 and ANSI/ASCE 11-90 provide an acceptable basis for selection of parameters to be monitored or inspected for concrete and steel structural elements and for steel liners, joints coatings, and waterproofing membranes (if applicable).
>
> [XI.S6] For each structure/aging effect combination, the inspection methods, inspection schedule, and inspector qualifications are selected to ensure that aging degradation will be detected and quantified before there is loss of intended functions.
>
> [XI.S6] For each structure/aging effect combination, the acceptance criteria are selected to ensure that the need for corrective actions will be identified before loss of intended functions. Acceptance criteria are to be commensurate with industry codes, standards, and guidelines, and are to also consider industry and plant-specific operating experience. Although not required, ACI 349.3R-96 provides an acceptable basis for developing acceptance criteria for concrete structural elements, steel liners, joints, coatings, and waterproofing membranes. The plant-specific structures monitoring program is to contain sufficient detail on acceptance criteria to conclude that this program attribute is satisfied.

The project team reviewed MPS Technical Report MP-LR-3728/MP-LR-4728, in which the applicant states that it will revise program procedures to include ACI 349.3R-96 and ANSI/ASCE 11-90 as references and input documents for the structures monitoring program. The existing program procedures generally follow the recommendations of ACI 349.3R-96 and ANSI/ASCE 11-90. However, these two documents were not specifically used or referenced in the development of the current program procedures. The applicant states, in the MPS LRA, that these revisions will be initiated prior to the period of extended operation. Based on the fact that this enhancement will bring the applicant's program into agreement with GALL AMP XI.S6 program elements, the project team finds incorporating the first enhancement is acceptable as any such changes will provide additional assurance that the effects of aging will be adequately managed.

The GALL Report identifies the following criterion for the "scope of program" program element associated with the second enhancement

> [XI.S6] The applicant specifies the structure/aging effect combinations that are managed by its structures monitoring program.

The project team reviewed MPS Technical Report MP-LR-3728/MP-LR-4728, in which the applicant states that the implementing engineering procedures will be modified to include all additional structures inspections required for license renewal. The structures monitoring program does not currently monitor all structures required for license renewal. In addition, the applicant states, in MPS Technical Report MP-LR-3728/MP-LR-4728, that the structures monitoring program does not currently identify certain types of structural members (concrete beams, columns, etc.) and structural components (flood barriers, stairs, sumps, etc.) that are subject to inspection. In order to ensure that all in-scope structural members and components are addressed, the program procedures shall be further clarified and enhanced so that all in-scope structural members and components are identified. The applicant states, in the MPS LRA, that the procedures will be revised prior to the period of extended operation. Based on the fact that this enhancement will bring the applicant's program into agreement with the GALL AMP XI.S6 program element, the project team finds incorporating the second enhancement is acceptable as any such changes will provide additional assurance that the effects of aging will be adequately managed.

The GALL Report identifies the following criteria for the "parameters monitored or inspected" and "detection of aging effects" program elements associated with the third enhancement

> [XI.S6] For each structure/aging effect combination, the specific parameters monitored or inspected are selected to ensure that aging degradation leading to loss of intended functions will be detected and the extent of degradation can be determined.
>
> [XI.S6] For each structure/aging effect combination, the inspection methods, inspection schedule, and inspector qualifications are selected to ensure that aging degradation will be detected and quantified before there is loss of intended functions.

The project team reviewed MPS Technical Report MP-LR-3728/MP-LR-4728, in which the applicant states that groundwater samples will be collected to establish a baseline with regard to the aggressiveness of the water and its effect on concrete structures. The applicant states in MPS Technical Report MP-LR-3728/MP-LR-4728, that additional samples need to be taken on a periodic basis, considering seasonal variations, to ensure that the groundwater is not of a nature that could cause the below-grade concrete to degrade. The applicant states, in the MPS LRA, that the samples will be taken prior to the period of extended operation. Based on the fact that this enhancement will bring the applicant's program into agreement with the GALL AMP XI.S6 program elements, the project team finds incorporating the third enhancement is acceptable as any such changes will provide additional assurance that the effects of aging will be adequately managed.

The GALL Report identifies the following criterion for the "parameters monitored or inspected" program element associated with the fourth enhancement

> [XI.S6] For each structure/aging effect combination, the specific parameters monitored or inspected are selected to ensure that aging degradation leading to loss of intended functions will be detected and the extent of degradation can be determined.

The project team reviewed MPS Technical Report MP-LR-3728/MP-LR-4728, in which the applicant states that the structures monitoring program procedures will be modified so that the electrical engineering staff will be alerted if, during structures inspections, in-scope medium-voltage cables are found to have been exposed to significant moisture. Water intrusion can occur within the in-scope structures due to groundwater inleakage or leakage of a plant system. The applicant states, in the MPS LRA, that the procedures will be revised prior to the period of extended operation. Based on the fact that this enhancement will bring the applicant's program into agreement with the GALL AMP XI.S6 program element, the project team finds incorporating the fourth enhancement is acceptable as any such changes will provide additional assurance that the effects of aging will be adequately managed.

The GALL Report identifies the following criterion for the "detection of aging effects" program element associated with the fifth enhancement

> [XI.S6] For each structure/aging effect combination, the inspection methods, inspection schedule, and inspector qualifications are selected to ensure that aging degradation will be detected and quantified before there is loss of intended functions.

The project team reviewed MPS Technical Report MP-LR-3728/MP-LR-4728, in which the applicant states that the maintenance and work control procedures will be revised to take advantage of inspection opportunities for structures required for license renewal and identified as "inaccessible." As inaccessible areas become accessible by such means as excavation or installation of shielding or for any other reason, additional inspections of those areas will be performed. As determined by the corrective action program, engineering evaluation of the examination results will determine the need for any subsequent inspections. The applicant states, in the MPS LRA, that this enhancement will be implemented prior to the period of extended operation. Based on the fact that this enhancement will bring the applicant's program

into agreement with the GALL AMP XI.S6 program element, the project team finds incorporating the fifth enhancement is acceptable as any such changes will provide additional assurance that the effects of aging will be adequately managed.

7.1.20.5 Operating Experience

The project team reviewed operating experience for the applicant's structures monitoring program. The review indicated the structures monitoring program is effective in identifying structural degradation, implementing corrective actions, and trending the parameters. When degradation has been identified, corrective actions have been implemented to ensure that the integrity of the affected structure is maintained.

The following examples, based on the applicant's review of condition reports generated under the corrective action program, are representative of internal operating experience at MPS Units 2 and 3 and were considered by the project team in its determination of the effectiveness of the program.

> During the applicant's performance of the 10 CFR 50.65 maintenance rule-required baseline condition assessment inspections for in-scope structures, in accordance with common engineering procedure, "Condition Monitoring of Maintenance Rule In-Scope Structures," 261 items were identified and documented in the MPS Unit 2 "10 CFR 50.65 Maintenance Rule Plant Structures Baseline Condition Assessment Report." All of the findings from this inspection were categorized according to procedural guidelines with a resulting 98 priority 2 items and 163 priority 3 items. The findings were further categorized as 190 building-structure related, and 71 non-building-structure related. For the priority 2 items, which were determined to potentially "deteriorate to an unacceptable condition if not corrected prior to the next scheduled examination" (3-year inspection cycle), trouble reports were generated. The deficiencies reported by the inspection personnel were walked down and re-examined by the technical support systems engineer for MPS Unit 2 structures. All items were verified to be non-functional failures, attributed to being the result of expected "in use" service and normal aging. Automated work orders for each building were initiated for required repair activities. The applicant's maintenance rule expert panel was briefed regarding the initiation of the automated work orders and the completed work.
>
> An inspection of the seismic support for piping between the service water strainer (3SWP*STR1C) and the associated service water pump strainer backwash valve (3SWP*MOV24C) revealed that the concrete base was cracking and the support was coming out of its anchorage. Areas of loose grout were found under the support plate and evidence of cracking was found along the seam where it met the floor. Design engineering and civil engineering staff inspected the affected component for similar failures as well as all other support plates in the service water cubicles, and no failures were found. It was determined that, while cracking and degradation of concrete and grout can occur at accelerated rates when exposed to saltwater with hypochlorite, the failure was due to a defect in the original installation. As part of the corrective action plan,

the degraded seismic support was repaired and supports for all equipment and components commonly subjected to service water saltwater exposure were inspected by design engineering and civil engineering staff. As a result of this inspection, nine additional items were identified as degraded (none seriously), and work orders were generated to effect repairs.

While conducting MPS Unit 3 maintenance rule baseline structural condition walkdowns, the six ventilation exhaust hoods on the turbine building roof were observed to be experiencing severe corrosion. The corrosion had led to considerable loss of material at or near the base and reinforcement areas of the hoods. Pending potential future replacement of the hoods, repair activities were initiated to stabilize the equipment, as detailed in minor modification DM3-00-073-00. These activities included cleaning the hoods down to the base metal, painting and coating all surfaces, and installing stainless steel stiffener brackets and skirts. To monitor their condition, the hoods were inspected approximately six months later. The as-found condition was good, with no further significant degradation identified.

Industry operating experience identified examples where safety-related cables had potentially become submerged. Initial investigation at MPS determined that some electrical manholes containing safety-related cables had the potential for submergence. MPS Units 2 and 3 each identified seven manholes that were potentially susceptible to this problem.

The MPS Unit 3 manholes were already routinely inspected (and pumped out if required) as part of the preventive maintenance program. The cables in these manholes had not been submerged. The MPS Unit 2 investigation revealed that the manholes containing safety-related cables had not been part of a similar preventive maintenance program and may have become submerged. The specific safety-related cables were identified, and a review was conducted of the manufacturers, purchase specifications, and qualification records. The cables were inspected for evidence of degradation due to submergence, and no evidence of degradation was found. An engineering evaluation determined that the installed cables were acceptable for continued use. An additional action was taken to add the MPS Unit 2 manholes to a preventive maintenance program in which the manholes are inspected and pumped out on a regular periodicity.

On the basis of its review of the above operating experience and on discussions with the applicant's technical staff, the project team concludes that MPS AMP B2.1.23 adequately manages the aging effects that have been observed at the applicant's plant.

7.1.20.6 UFSAR Supplement

The applicant provides its UFSAR supplements for the structures monitoring program in MPS Unit 2 LRA, Appendix A, Section A2.1.23, and MPS Unit 3 LRA, Appendix A, Section A2.1.22, which state that the program manages the aging effects of loss of material, change of material properties, and cracking by monitoring structures and structural supports that are in the scope of license renewal. The acceptance criterion for visual inspections is the absence of anomalous

indications that are signs of degradation. Corrective actions for conditions that are adverse to quality are performed in accordance with the corrective action program as part of the quality assurance program.

The applicant states, in MPS LRA Appendix A, that five commitments are associated with the structures monitoring program as follows

> The program procedures will be revised to include ACI Standard 349.3R-96, "Evaluation of Existing Nuclear Safety Related Concrete Structures," dated 1996, and ANSI/ASCE Standard 11-90, "Guideline for Structural Condition Assessment of Existing Buildings," dated 1990, as references and input documents for the inspection program. This is identified on the applicant's license renewal commitment list in the MPS Unit 2 LRA, Appendix A, Table A6.0-1, Item 17, and the MPS Unit 3 LRA, Appendix A, Table A6.0-1, Item 18.
>
> The implementing engineering procedures will be modified to include all additional structures inspections required for license renewal. This is identified on the applicant's license renewal commitment list in the MPS Unit 2 LRA, Appendix A, Table A6.0-1, Item 18, and the MPS Unit 3 LRA, Appendix A, Table A6.0-1, Item 19.
>
> Additional groundwater samples will be taken to establish a baseline with regard to the aggressiveness of the water and its effect on concrete structures. This is identified on the applicant's license renewal commitment list in the MPS Unit 2 LRA, Appendix A, Table A6.0-1, Item 19, and the MPS Unit 3 LRA, Appendix A, Table A6.0-1, Item 20.
>
> The structures monitoring program procedures will be modified so that the electrical engineering staff will be alerted if medium-voltage cables in scope of license renewal have been found to be exposed to significant moisture during structures inspections. This is identified on the applicant's license renewal commitment list in the MPS Unit 2 LRA, Appendix A, Table A6.0-1, Item 20, and the MPS Unit 3 LRA, Appendix A, Table A6.0-1, Item 21.
>
> The maintenance and work control procedures will be revised to take advantage of inspection opportunities for structures required for license renewal and identified as "inaccessible." This is identified on the applicant's license renewal commitment list in the MPS Unit 2 LRA, Appendix A, Table A6.0-1, Item 21 and the MPS Unit 3 LRA, Appendix A, Table A6.0-1, Item 22.

The project team reviewed the UFSAR supplements and confirms that they provide an adequate summary description of the program, as identified in the SRP-LR UFSAR supplement table and as required by 10 CFR 54.21(d).

7.1.20.7 <u>Evaluation</u>

The project team performed a review of the applicable criteria in GALL AMPs XI.S5, "Masonry Wall Program," XI.S6, "Structures Monitoring Program," and XI.S7, "RG 1.127, Inspection of

Water Control Structures Associated with Nuclear Power Plants," and the program description and elements for MPS AMP B2.1.23.

For the aspects of the program elements that were determined by the applicant to be consistent with the corresponding program elements in GALL AMPs XI.S5, XI.S6, and XI.S7, the project team determined that these program elements for MPS AMP B2.1.23 conform with the applicable program elements and acceptance criteria in GALL AMPs XI.S5, "Masonry Wall Program," XI.S6, "Structures Monitoring Program," and XI.S7, "RG 1.127, Inspection of Water Control Structures Associated with Nuclear Power Plants." Based on its review, the project team concludes that, with the enhancements identified by the applicant, the applicant's structures monitoring program provides reasonable assurance of aging management of cracking, loss of material, and change in material properties in in-scope structures and structural supports. The project team finds this AMP acceptable because it conforms to the recommended program description, program elements, and acceptance criteria for structures monitoring programs, as discussed in GALL AMPs XI.S5, "Masonry Wall Program," XI.S6, "Structures Monitoring Program," and XI.S7, "RG 1.127, Inspection of Water Control Structures Associated with Nuclear Power Plants."

In the MPS LRA, the applicant states that its structures monitoring program will be enhanced for license renewal. The enhancements, as described in the MPS LRA, include modifications and revisions to various plant procedures to ensure that code citations are consistent with those recommended in the GALL Report and that every opportunity to inspect in-scope components and inaccessible areas of the plant is used, as well as taking baseline groundwater samples, all of which will bring the applicant's program into agreement with the GALL AMP XI.S6 program elements. The project team finds incorporating these enhancements is acceptable as any such changes will provide additional assurance that the effects of aging will be adequately managed.

7.1.20.8 Conclusion

On the basis of its audit of the applicant's program, the project team finds that those portions of the program for which the applicant claims consistency with the GALL Report are consistent with the GALL Report. In addition, on the basis of its review of the enhancements to the GALL Report, the project team finds that the applicant's program provides for adequate management of the aging effects for which the program is credited so that the intended functions will be maintained consistent with the CLB during the period of extended operation, as required by 10 CFR 54.21(a)(3).

On the basis of its review of the UFSAR supplements for this AMP, the project team also finds that they provide an adequate summary description of the program, as required by 10 CFR 54.21(d).

7.1.21 TANK INSPECTION PROGRAM (MPS AMP B2.1.24)

In the MPS LRA, Appendix B, Section B2.1.24, the applicant states that MPS AMP B2.1.24 "Tank Inspection Program," is consistent with GALL AMP XI.M29, "Aboveground Carbon Steel Tanks," with enhancements.

7.1.21.1 Program Description

The applicant states, in the MPS LRA, that the tank inspection program manages the aging effect of loss of material through periodic internal and external tank inspections. The program includes inspections of the sealant and caulking in and around the tank and concrete foundation, and evaluations to monitor the condition of coatings, linings, and structural elements to prevent deterioration of the tanks to unacceptable levels. The program also includes performance of volumetric examinations of inaccessible locations, such as the external surfaces of tank bottoms. The acceptance criterion for visual inspections of paint, coatings, sealant, caulking, and structural elements is the absence of anomalous indications that are signs of degradation. Thickness measurements of the tank walls and bottoms are evaluated against design thickness, established baseline values, or loss of material allowances.

7.1.21.2 Consistency with the GALL Report

In the MPS LRA, the applicant states that MPS AMP B2.1.24 is consistent with GALL AMP XI.M29, with enhancements.

The project team interviewed the applicant's technical staff and reviewed, in whole or in part, the documents listed in Attachment 5 of this report for MPS AMP B2.1.24, including MPS Technical Report MP-LR-3722/MP-LR-4722, "Tank Inspection Program," Revision 2, dated March 16, 2004, which provides an assessment of how the GALL AMP elements are addressed by the tank inspection program.

The project team reviewed seven program elements (see Section 5.1 of this report) contained in the MPS AMP and associated bases documentation against GALL AMP XI.M29 for consistency.

7.1.21.3 Exceptions to the GALL Report

None

7.1.21.4 Enhancements

Elements:	1: Scope of Program 3: Parameters Monitored/Inspected 4: Detection of Aging Effects 6: Acceptance Criteria
Enhancement:	Inspections of sealants and caulking used for moisture intrusion prevention in and around aboveground tanks will be performed. This is identified on the applicant's license renewal commitment list in the MPS Unit 2 LRA, Appendix A, Table A6.0-1, Item 22, and the MPS Unit 3 LRA, Appendix A, Table A6.0-1, Item 23.
Elements:	4: Detection of Aging Effects 5: Monitoring and Tending 6: Acceptance Criteria
Enhancement:	Non-destructive volumetric examinations of inaccessible locations, such as the external surfaces of tank bottoms for those tanks that require aging management for license renewal, will be performed.

	This is identified on the applicant's license renewal commitment list in the MPS Unit 2 LRA, Appendix A, Table A6.0-1, Item 23, and the MPS Unit 3 LRA, Appendix A, Table A6.0-1, Item 24.
Elements:	1: Scope of Program
Enhancement:	The Unit 2 security diesel fuel oil tank and the Unit 3 diesel fire pump fuel oil tank will be added to the list of in-scope components for this program. This is identified on the applicant's license renewal commitment list in the MPS Unit 2 LRA, Appendix A, Table A6.0-1, Item 24, and the MPS Unit 3 LRA, Appendix A, Table A6.0-1, Item 25.

The GALL Report identifies the following criteria for the "scope of program," "parameters monitored or inspected," "detection of aging effects," and "acceptance criteria" program elements associated with the first enhancement

> The AMP consists of (a) preventive measures to mitigate corrosion by protecting the external surfaces of carbon steel tanks protected with paint or coatings and (b) periodic system walkdowns to manage the effects of corrosion on the intended function of these tanks. Plant walkdowns cover the entire outer surface of the tank up to its surface in contact with soil or concrete.
>
> The AMP utilizes periodic plant system walkdowns to monitor degradation of coatings, sealants, and caulking because it is a condition directly related to the potential loss of materials.
>
> Degradation of exterior carbon steel surfaces cannot occur without degradation of paint or coatings on the outer surface and of sealant and caulking at the interface between the component and concrete. Periodic system walkdowns to confirm that the paint, coating, sealant, and caulking are intact is an effective method to manage the effects of corrosion on the external surface of the component.
>
> Any degradation of paint, coating, sealant, and caulking is to be reported and will require further evaluation. Degradation consists of cracking, flaking, or peeling of paint or coatings, and drying, cracking, or missing sealant and caulking. Thickness measurements of the tank bottom are evaluated against the design thickness and corrosion allowance.

The project team reviewed MPS Technical Report MP-LR-3722/MP-LR-4722, in which the applicant states that it will perform appropriate inspections of sealants and caulkings used for moisture intrusion prevention in and around aboveground tanks. The applicant states, in the MPS LRA, that these inspections will be initiated prior to the period of extended operation. On the basis that this enhancement will bring the applicant's program into agreement with the GALL AMP XI.M29 program elements, the project team finds incorporating the first enhancement is acceptable as any such changes will provide additional assurance that the effects of aging will be adequately managed.

The GALL Report identifies the following criteria for the "detection of aging effects," "monitoring and trending," and "acceptance criteria" program elements associated with the second enhancement

> Degradation of exterior carbon steel surfaces cannot occur without degradation of paint or coatings on the outer surface and of sealant and caulking at the interface between the component and concrete. Periodic system walkdowns to confirm that the paint, coating, sealant, and caulking are intact is an effective method to manage the effects of corrosion on the external surface of the component. However, corrosion may occur at inaccessible locations, such as the tank bottom surface, and thickness measurement of the tank bottom is to be taken to ensure that significant degradation is not occurring and the component intended function will be maintained during the extended period of operation.
>
> The effects of corrosion on the aboveground external surface are detectable by visual techniques. Based on operating experience, plant system walkdowns during each outage provide for timely detection of aging effects. The effects of corrosion of the underground external surface are detectable by thickness measurement of the tank bottom and are monitored and trended if significant material loss is detected.
>
> Any degradation of paint, coating, sealant, and caulking is reported and will require further evaluation. Degradation consists of cracking, flaking, or peeling of paint or coatings, and drying, cracking, or missing sealant and caulking. Thickness measurements of the tank bottom are evaluated against the design thickness and corrosion allowance.

The project team reviewed MPS Technical Report MP-LR-3722/MP-LR-4722, in which the applicant states that it will perform non-destructive volumetric examinations of inaccessible locations, such as the external surfaces of tank bottoms for those tanks that require aging management for license renewal. The applicant states, in the MPS LRA, that these volumetric examinations will be performed prior to the period of extended operation and will be performed on a frequency consistent with scheduled tank internals inspection activities. On the basis that this enhancement will bring the applicant's program into agreement with the GALL AMP XI.M29 program elements, the project team finds incorporating the second enhancement is acceptable as any such changes will provide additional assurance that the effects of aging will be adequately managed.

The GALL Report identifies the following criterion for the "scope of program" program element associated with the third enhancement

> The program consists of (a) preventive measures to mitigate corrosion by protecting the external surfaces of carbon steel tanks protected with paint or coatings and (b) periodic system walkdowns to manage the effects of corrosion on the intended function of these tanks.

The project team reviewed MPS Technical Report MP-LR-3722/MP-LR-4722, in which the applicant states that it will add the MPS Unit 2 security diesel fuel oil tank and the MPS Unit 3

diesel fire pump fuel oil tank to the list of in-scope tanks for the tank inspection program and will include the tanks on the respective inspection plans. Although these two tanks have been identified as in scope for license renewal, the applicant noted in MPS Technical Report MP-LR-3722/MP-LR-4722 that the tanks are not currently identified on the respective tank inspection plans, EN 21154A (for MPS Unit 2) and EN 31154 (for MPS Unit 3). On the basis that this enhancement will bring the applicant's program into agreement with the GALL AMP XI.M29 program elements, the project team finds incorporating the third enhancement is acceptable as any such changes will provide additional assurance that the effects of aging will be adequately managed.

7.1.21.5 Operating Experience

The project team reviewed operating experience for the applicant's tank inspection program. The review indicated the tank inspection program is effective in identifying age-related degradation, implementing repairs, and maintaining the integrity of aboveground tanks. The following examples, based on review of condition reports generated under the corrective action program, are representative of internal operating experience at MPS Units 2 and 3 and were considered by the project team in its evaluation of the effectiveness of the program.

> Internal tank inspections were performed on the MPS Unit 2 emergency diesel generator fuel oil day tanks in January 2002, as required by the tank inspection program. The tanks were drained, the manways opened, and residual oil on the bottom of each tank was removed. The inspections did not discover any reportable conditions and the condition of the tank internals was described as "like new." The tanks were closed and returned to service.
>
> During an inspection of the "A" firewater tank, significant loss of material was identified on the internal tank surface. The tank was taken out of service and further visual and ultrasonic testing examinations were performed. As a result of the examinations, it was determined that both firewater tanks, while operable, would require replacement. The tanks were subsequently replaced with internally coated tanks.
>
> During an inspection of the MPS Unit 3 CST, water was found to be slowly leaking from the tank. Recent inspections of the tank had detected only occasional wetness. Internal operating experience had identified that the bottom of a similarly designed tank (the condensate surge tank) already had been replaced. The condensate surge tank did not have a barrier installed between the aluminum tank bottom and the sand that forms part of the basemat. An engineering evaluation concluded that the CST and condensate surge tank were both built at the same time using a similar design. As a result of the investigation and previous operating experience, a design change package was developed to replace the CST bottom.

On the basis of its review of the above operating experience and on discussions with the applicant's technical staff, the project team concludes that MPS AMP B2.1.24 adequately manages the aging effects that have been observed at the applicant's plant.

7.1.21.6 UFSAR Supplement

The applicant provides its UFSAR supplements for the tank inspection program in MPS Unit 2 LRA, Appendix A, Section A2.1.24, and MPS Unit 3 LRA, Appendix A, Section A2.1.23, which state that the program manages the aging effect of loss of material through periodic internal and external tank inspections. The program includes inspections of the sealant and caulking in and around the tank and the concrete foundation and evaluations to monitor the condition of coatings, linings, and structural elements, to prevent deterioration of the tanks to unacceptable levels. The program also includes volumetric examination of inaccessible locations, such as the external surfaces of tank bottoms. The acceptance criterion for visual inspections of paint, coatings, sealant, caulking, and structural elements is the absence of anomalous indications that are signs of degradation. Thickness measurements of the tank walls and bottoms are evaluated against design thickness, established baseline values, or loss of material allowances. Corrective actions for conditions that are adverse to quality are performed in accordance with the corrective action program as part of the quality assurance program.

The applicant states, in MPS LRA Appendix A, that three commitments are associated with the tank inspection program as follows

> Inspections of sealants and caulking used for moisture intrusion prevention in and around aboveground tanks will be performed. This is identified on the applicant's license renewal commitment list in the MPS Unit 2 LRA, Appendix A, Table A6.0-1, Item 22, and the MPS Unit 3 LRA, Appendix A, Table A6.0-1, Item 23.
>
> Non-destructive volumetric examinations of inaccessible locations, such as the external surfaces of tank bottoms for those tanks that require aging management for license renewal, will be performed. This is identified on the applicant's license renewal commitment list in the MPS Unit 2 LRA, Appendix A, Table A6.0-1, Item 23, and the MPS Unit 3 LRA, Appendix A, Table A6.0-1, Item 24.
>
> The Unit 2 security diesel fuel oil tank and the Unit 3 diesel fire pump fuel oil tank will be added to the list of in-scope components for this program. This is identified on the applicant's license renewal commitment list in the MPS Unit 2 LRA, Appendix A, Table A6.0-1, Item 24, and the MPS Unit 3 LRA, Appendix A, Table A6.0-1, Item 25.

The project team reviewed the UFSAR supplements and confirms that they provide an adequate summary description of the program, as identified in the SRP-LR UFSAR supplement table and as required by 10 CFR 54.21(d).

7.1.21.7 Evaluation

The project team performed a review of the applicable criteria in GALL AMP XI.M29, "Aboveground Carbon Steel Tanks," and the program description and elements for MPS AMP B2.1.24.

For the aspects of the program elements that were determined by the applicant to be consistent with the corresponding program elements in GALL AMP XI.M29, the project team determined that these program elements for MPS AMP B2.1.24 conform with the applicable program elements and acceptance criteria in GALL AMP XI.M29, "Aboveground Carbon Steel Tanks." Based on its review, the project team concludes that, with the enhancements identified by the applicant, the applicant's tank inspection program provides reasonable assurance of aging management of loss of material in in-scope tank coatings, and sealant and caulking in and around the tanks and concrete foundations. The project team finds this AMP acceptable because it conforms to the recommended program description, program elements, and acceptance criteria for tank inspection programs, as discussed in GALL AMP XI.M29, "Aboveground Carbon Steel Tanks."

In the MPS LRA, the applicant states that its structures monitoring program will be enhanced for license renewal. The enhancements, as described in MPS Technical Report MP-LR-3728/MP-LR-4728, include inspections of caulking and sealant used to prevent moisture intrusion in and around aboveground tanks, non-destructive volumetric examinations of inaccessible locations (i.e., external surfaces of tank bottoms), and adding the MPS Unit 2 security diesel fuel oil day tank and MPS Unit 3 diesel fire pump fuel oil tank to the list of in-scope tanks. Based on the fact that these enhancements will bring the applicant's program into agreement with the GALL AMP XI.M29 program elements, the project team finds them to be acceptable.

7.1.21.8 Conclusion

On the basis of its audit and review of the applicant's program, the project team finds that those portions of the program for which the applicant claims consistency with the GALL Report are consistent with the GALL Report. In addition, on the basis of its review of the enhancements to the GALL Report, the project team finds that the applicant's program provides for adequate management of the aging effects for which the program is credited so that the intended functions will be maintained consistent with the CLB during the period of extended operation, as required by 10 CFR 54.21(a)(3).

On the basis of its review of the UFSAR supplements for this AMP, the project team also finds that they provide an adequate summary description of the program, as required by 10 CFR 54.21(d).

7.1.22 WORK CONTROL PROCESS (MPS AMP B2.1.25)

In the MPS LRA, Appendix B, Section B2.1.25, the applicant describes MPS AMP B2.1.25, "Work Control Process."

The applicant states that MPS AMP B2.1.25 is a plant-specific program. The applicant credits the work control process as means for planning and conducting maintenance activities to manage the aging effects on system components, commodities, and adjacent piping, and structures within the scope of license renewal. Preventive and corrective maintenance activities are planned and conducted in accordance with MPS's work control process.

The applicant states, in the MPS LRA, that the work control process is used to manage the aging effects of buildup of deposits, change of material properties, cracking, and loss of material for components and plant commodities within the scope of license renewal. Maintenance activities performed under the work control process provide an opportunity to visually inspect system components, commodities, and adjacent piping, and plant structures. Adjacent piping, including surfaces immediately adjacent to a component, is accessible for visual inspection through the component. Plant structures are accessible when an area next to a structure is excavated for other maintenance work. The work control process also provides opportunities to collect oil and engine coolant fluid samples for subsequent analysis of contaminants and chemical properties, which could either indicate or affect aging. The work control process tracks and documents the performance of inspection and surveillance activities, such as Appendix R fire cage inspections and pump-down and inspection of underground electrical cable enclosures. Maintenance activities performed through the work control process also verify the effectiveness of the chemistry control for primary systems, chemistry control for secondary systems, and fuel oil chemistry programs.

The project team reviewed the documents listed in Attachment 5 of this report, in whole or in part, including MPS Technical Report, MP-LR-3733/MP-LR-4733, "Work Control Process," Revision 2, dated March 22, 2004, and MPS Technical Report, MP-LR-3700/MP-LR-4700, "Material Aging Effects Report (MAER)," Revision 4, dated January 22, 2004, and interviewed the applicant's technical staff.

7.1.22.1 Review of the AMP Against the Program Elements

The project team reviewed MPS AMP B2.1.25 against the AMP elements found in SRP-LR, Appendix A, Section A.1.2.3, and SRP-LR Table A.1-1. The guidance described in the MPS audit and review plan was followed.

7.1.22.1.1 Scope of Program

The "scope of program" program element criterion in Appendix A.1.2.3.1 of the SRP-LR requires that the program scope include the specific structures and components addressed with this program.

The applicant states, in MPS AMP B2.1.25 for the "scope of program" program element, that the program encompasses performance testing and maintenance activities (preventive and corrective) that are planned and conducted in accordance with the work control process. These activities provide an opportunity to perform and document visual inspections of the internal and external surfaces of various material and environment combinations of plant components and commodities within the scope of license renewal, including visual examination of the internal and external surfaces of plant components, visual examination of plant commodities, performance (periodic) tests of mechanical components, routine maintenance sampling of motor lubricating oil and engine coolant, recurring inspection and surveillance activities, equipment monitoring, and data trending and analysis. Activities performed by the work control process also verify the effectiveness of other aging management programs.

The applicant states, in the MPS LRA, that the program will be enhanced such that changes will be made to maintenance and work control procedures to ensure that inspections of plant

components and commodities will be appropriately and consistently performed and documented for aging effects during maintenance activities. This is identified on the applicant's license renewal commitment list in the MPS Unit 2 LRA, Appendix A, Table A6.0-1, Item 31, and the MPS Unit 3 LRA, Appendix A, Table A6.0-1, Item 32.

The project team requested that the applicant provide additional information to confirm that all of the component groups listed in Section 3 of the MPS Units 2 and 3 LRA that credit the work control process program are covered by the planned maintenance portion (i.e., preventive maintenance, predictive analysis, periodic surveillance) of the work control process program such that these components will be periodically inspected during the period of extended operation.

In a MPS LRA supplement letter, dated July 7, 2004 (ML041900407), the applicant states the following in response to the project team's request

> The following wording should be added to MPS Unit 2 and Unit 3 Appendix B, Section B2.1.25 (page B-112):
>
> Enhancement 2 - Verification of Program Scope
>
> A review of the Work Control Process inspection opportunities for each material and environment group, supplemental to the initial review conducted during the development of the LRA, will be performed. Baseline inspections will be performed for the material and environment combinations that have not been inspected as part of the Work Control Process. This commitment is identified in Appendix A, Table A6.0-1 License Renewal Commitments, Items [31 for MPS Unit 2] [32 for MPS Unit 3].
>
> This commitment will be implemented prior to the period of extended operation.

The applicant states in MPS Technical Report MP-LR-3733/MP-LR-4733 that selective leaching is an aging mechanism that causes an aging effect of change in material properties. However, in the MPS Technical Report MP-LR-3410, "Closed-Cooling Water System AMR," Revision 3, June 18, 2004, the applicant states that selective leaching is an aging mechanism under the aging effect of loss of material. In MPS Technical Report MP-LR-3410 the applicant also references MPS Technical Report MP-LR-3700/MP-LR-4700, which considers selective leaching under loss of material. The project team requested that the applicant resolve the difference in how selective leaching is considered between the AMP and the AMR Technical Reports. The project team noted that the GALL Report also considers selective leaching as an aging mechanism under the loss of material aging effect. During the plant visit, the applicant stated to the project team that the "change of material properties" aging effect for the work control process AMP will be changed to "loss of material" to be consistent with MPS Technical Report MP-LR-3700/MP-LR-4700 and MPS Technical Report MP-LR-3410. The project team reviewed the change document to MPS Technical Report MP-LR-3733/MP-LR-4733, identifying the change to include selective leaching as an aging mechanism under the loss of material aging effect, and finds the change to be acceptable.

The project team reviewed and confirmed that this program element, as modified, satisfies the criterion defined in Appendix A.1.2.3.1 of the SRP-LR. The proposed scope, including the enhancements and basis document change, identifies the specific components for which the program manages aging. On this basis, the project team finds that the applicant's proposed program scope is acceptable.

7.1.22.1.2 Preventive Actions

The "preventive actions" program element criterion in Appendix A.1.2.3.2 of the SRP-LR is that the activities for prevention and mitigation programs should be described.

The applicant states in MPS AMP B2.1.25 for the "preventive actions" program element that the inspection activities conducted as part of the work control process program are designated as condition monitoring, the testing activities of the work control process program are designated as performance monitoring, and the chemistry control activities, in conjunction with the maintenance sampling activities, are designated as preventive actions.

The project team confirmed that this program element satisfies the criterion defined in Appendix A.1.2.3.2 of the SRP-LR. The absence of preventive actions in the condition and performance monitoring portions of the program is consistent with the requirements of the SRP-LR. Description of the chemistry control activities and sampling activities as preventive is appropriate. On this basis, the project team finds the preventive actions program element is acceptable.

7.1.22.1.3 Parameters Monitored/Inspected

The "parameters monitored or inspected" program element criteria in Appendix A.1.2.3.3 of the SRP-LR are

> The parameters to be monitored or inspected should be identified and linked to the degradation of the particular structure and component intended function(s).
>
> The parameters monitored should be the specific parameters being controlled to achieve prevention or mitigation of aging effects.

The applicant states in MPS AMP B2.1.25 for the "parameters monitored or inspected" program element that visual inspections of the internal and external surfaces of plant components and plant commodities are performed during the performance of maintenance to determine the presence of cracking, loss of material, and buildup of deposits. Lubricating oil and engine coolant samples are analyzed to detect contaminants that may indicate an environment that can lead to material degradation.

The work control process program credits visual inspection for the detection of changes in material properties in rubber in steam generator nozzle dams and holddown rings (Table 3.1.2-4), elastomers in ventilation systems (MPS LRA Table 3.3.1, Item 02), rubber expansion joints in the condensate system (Table 3.4.2-4), O-rings and gaskets in structures and component supports (Table 3.5.1, Item 06), the spent fuel pool gate seal (Table 3.5.2-3), fire/environmental qualification barrier penetration seals (Table 3.5.2-26), components (doors

and barrier penetration seals) and concrete structures in fire protection (Table 3.3.1-20), and gaskets (in junction, terminal, and pull boxes) (Table 3.5.2-26).

The project team could not determine how visual inspections could be used to manage this aging effect and requested further clarification from the applicant. The applicant stated to the project team that the change of material properties for these elastomer components is visually observable by such conditions as evidence of cracking and crazing, discoloration, distortion, evidence of swelling, tackiness, evaluation of resilience and indentation recovery, etc. These conditions are observable during the internal inspections performed as part of the work control process program. The project team reviewed the document change request that will add the details for the visual inspection of elastomers to MPS Technical Report MP-LR-3733/ MP-LR-4733, "Work Control Process," Revision 2. The project team finds that change of material properties could be observable visually as clarified by the applicant.

MPS AMP B2.1.25 identifies the use of lubricating oil analysis to detect contaminants. The project team requested that the applicant provide information to show that oil sampling is performed to specific industry standards and that the samples are representative, and to identify the basis for the frequency of sampling and present operating experience to demonstrate that the sampling is effective in detecting contaminants. The applicant stated to the project team that the governing procedures for oil sampling at MPS are MPS procedures CBM-103 "Oil Sampling" and CBM-106 "Oil Analysis." Frequencies for sampling are established based on equipment operating schedules, operating history, etc. The sampling procedures include a check for the presence of water. Corrective actions are determined to resolve abnormal indications. The project team reviewed these procedures and finds the information presented therein to be acceptable.

The project team reviewed MPS Technical Report MP-LR-3925/MP-LR-4925, "Position Paper - Work Control Inspection Opportunities," Revision 0, dated January 28, 2004, to confirm how often each material/environment combination and component group was included in the work control process program to ensure that ample opportunities exist for inspection of these components. The project team finds that the parameters monitored by the work control process program are appropriate for detecting the aging effects managed by the program as well as characterization of their extent.

The project team confirmed that this program element satisfies the criteria defined in Appendix A.1.2.3.3 of the SRP-LR. On the basis of interviews with the applicant's technical staff and the enhancement to the scope of program element (see Section 7.1.22.1 of this report), the project team finds that the applicant's parameters monitored or inspected program element is acceptable.

7.1.22.1.4 <u>Detection of Aging Effects</u>

The "detection of aging effects" program element criteria in Appendix A.1.2.3.4 of the SRP-LR are

> Provide information that links the parameters to be monitored or inspected to the aging effects being managed.

> Describe when, where, and how program data are collected (i.e., all aspects of activities to collect data as part of the program).
>
> Link the method or technique and frequency, if applicable, to plant-specific or industry-wide operating experience.
>
> Provide the basis for the inspection population and sample size when sampling is used to inspect a group of structures and components. The inspection population should be based on such aspects of the SCs as a similarity of materials of construction, fabrication, procurement, design, installation, operating environment, or aging effects.

The applicant states, in MPS AMP B2.1.25 for the "detection of aging effects" program element, that cracking, loss of material, buildup of deposits, and changes of material properties are the aging effects that are monitored by visual inspections of the internal and external surfaces of structural and mechanical components, and plant commodities. The results of analyses of lubricating oil and engine coolant samples provide indication of any adverse environment that could lead to material degradation.

The work control process credits visual inspection for the detection of changes in material properties in rubber in steam generator nozzle dams and holddown rings (Table 3.1.2-4), elastomers in ventilation systems (Table 3.3.1, Item 02), rubber expansion joints in the condensate system (Table 3.4.2-4), O-rings and gaskets in structures and component supports (Table 3.5.1, Item 06), the spent fuel pool gate seal (Table 3.5.2-3), fire/environmental qualification barrier penetration seals (Table 3.5.2-26), components (doors and barrier penetration seals) and concrete structures in fire protection (Table 3.3.1-20), and gaskets (in junction, terminal, and pull boxes) (Table 3.5.2-26).

The project team could not determine how visual inspections could be used to manage this aging effect and requested further clarification from the applicant. The applicant stated to the project team that the change of material properties for these elastomer components is visually observable by such conditions as evidence of cracking and crazing, discoloration, distortion, evidence of swelling, tackiness, evaluation of resilience and indentation recovery, etc. These conditions are observable during the internal inspections performed as part of the work control process program. The project team reviewed the document change request that will add the details for the visual inspection of elastomers to MPS Technical Report MP-LR-3733/ MP-LR-4733, "Work Control Process," Revision 2. The project team finds that change of material properties could be observable visually as clarified by the applicant.

The applicant states, in the MPS LRA, that selective leaching was not identified during the applicant's aging management reviews as an aging mechanism requiring management. However, the MPS LRA Table 3.3.1, states that components (aluminum bronze, brass, cast iron, cast steel) in open- and closed-cycle cooling water systems and the ultimate heat sink are subject to loss of material due to selective leaching. The applicant identifies, in MPS LRA Table 3.3.1, the work control process and buried pipe inspection programs to manage selective leaching. In discussions between the project team and the applicant, the applicant stated that the purpose of crediting MPS AMP B2.1.25 with managing the effects of selective leaching was to provide an accounting of which GALL AMPs were being implemented at MPS, and that the

wording in MPS LRA Table 3.3.1 was not intended to indicate that selective leaching does not require management at MPS.

GALL AMP XI.M.33, "Selective Leaching of Materials," recommends a combination of one-time inspection and hardness measurement to manage selective leaching. Since selective leaching is a slow-acting corrosion process, it is recommended that this should be performed as late in the plant life as possible, preferably after 30 years of service.

Selective leaching generally does not cause changes in dimension and is difficult to detect by visual inspection. Hence, the GALL Report recommends a Brinnell hardness test be performed on the inside surfaces of a selected set of components to determine if selective leaching has occurred. Alternatively, if a component is removed from service for whatever reason, a destructive test could be performed.

The applicant states, in the MPS LRA, that the work control process program credits visual inspection only for detection of selective leaching. The project team asked the applicant to justify the use of visual inspection only, or to provide other means of detection such as, Brinnell hardness, destructive testing, or other mechanical means such as scraping, chipping, etc.

In a MPS LRA supplement letter dated July 7, 2004 (ML041900407), the applicant states the following

> For MPS Unit 2 and Unit 3 Appendix B, Section B2.1.25, Detection of Aging Effects (page B-109), the following should be inserted after the first sentence:
>
> "When performing field inspections for loss of material due to selective leaching, visual inspections will include mechanical means, such as resonance when struck by another object, scraping, or chipping."
>
> For MPS Unit 2 and Unit 3 Appendix B, Section B2.1.25, new Enhancement 3 should be added and read (page B-112), as follows:
>
> Enhancement 3: Selective Leaching Inspections
>
> Using the Work Control Process, a baseline inspection for the loss of material due to selective leaching will be performed on a representative sample of locations for susceptible materials by visual, and mechanical or other appropriate methods prior to entering the period of extended operation.
>
> This commitment is identified in Appendix A, Table A6.0-1 License Renewal commitments, Item 30 (MPS Unit 2) and 31 (MPS Unit 3).
>
> This enhancement will be implemented prior to the period of extended operation.
>
> Program Elements Affected
>
> Detection of Aging Effects

> The NUREG-1801 program element identifies that the program should detect aging effects before there is a loss of structure or component intended function. The baseline inspection for selective leaching will provide reasonable assurance that the loss of material aging effect, due to selective leaching, will be detected before there is a loss of intended function.

The project team finds the revisions to the MPS LRA, as presented in the supplement letter, to be acceptable.

The results of analyses of lubricating oil and engine coolant samples provide indication of any adverse environment that could lead to material degradation. The applicant's work control process program, as described in the MPS LRA, identifies the use of lubricating oil analysis to detect contaminants. The project team requested that the applicant provide information to show that oil sampling is performed to specific industry standards and that the samples are representative, and to identify the basis for the frequency of sampling and present operating experience to demonstrate that the sampling is effective in detecting contaminants. The applicant stated to the project team that the governing procedures for oil sampling at MPS are MPS procedures CBM-103 and CBM-106. Frequencies for sampling are established based on equipment operating schedules, operating history, etc. The sampling procedures include a check for the presence of water. Corrective actions are determined to resolve abnormal indications. The project team reviewed these procedures and finds the information presented therein to be acceptable.

The staff reviewed and confirmed that this program element, as modified, satisfies the criteria defined in Appendix A.1.2.3.4 of the SRP-LR with enhancements, revisions, and clarifications as identified above. The measurements and inspections use a frequency and sample size based on operating experience to detect the presence and extent of aging effects. On this basis, the project team finds that the detection of aging effects program element is acceptable.

7.1.22.1.5 <u>Monitoring and Trending</u>

The "monitoring and trending" program element criteria in Appendix A.1.2.3.5 of the SRP-LR are

> Monitoring and trending activities should be described, and they should provide predictability of the extent of degradation and thus effect timely corrective or mitigative actions.
>
> This program element describes how the data collected are evaluated and may also include trending for a forward look. The parameter or indicator trended should be described.

The applicant states, in MPS AMP B2.1.25 for the "monitoring and trending" program element, that frequencies of preventive maintenance work activities vary, with some activities being performed only during refueling outages. Monitoring these activities involves reviews of the documentation generated by the work control process program, including completed procedures and technical reviews of engineering evaluations. In addition, as delineated in MPS procedure CBM-105, "Preventive Maintenance Program," Revision 4, March 18, 2002, reviews

and evaluations are conducted for changes to preventive maintenance work activities, including deferrals, missed implementation dates, and frequency changes, as well as additions, revisions, or deletions. The applicant states, in the MPS LRA, that the reviews are conducted by system engineers, preventive maintenance coordinators, and affected program owners, as appropriate.

In the MPS LRA, the applicant states that an integral function of the work control process program is to maintain a component work history database to support long-term equipment reliability monitoring, trending, and analysis. The work history database is maintained and accessible.

In the MPS LRA, the applicant states that maintenance and work control procedures ensure that inspections of plant components and plant commodities will be appropriately and consistently performed and documented during maintenance activities.

The project team confirmed that this program element satisfies the criteria defined in Appendix A.1.2.3.5 of the SRP-LR. Trending of inspection results will be performed and will enhance the applicant's ability to detect aging effects before there is a loss of intended function. On this basis, the project team finds that the applicant's monitoring and trending program element is acceptable.

7.1.22.1.6 Acceptance Criteria

The "acceptance criteria" program element criteria in Appendix A.1.2.3.6 of the SRP-LR are

> The acceptance criteria of the program and its basis should be described. The acceptance criteria, against which the need for corrective actions will be evaluated, should ensure that the structure and component intended function(s) are maintained under all CLB design conditions during the period of extended operation.
>
> The program should include a methodology for analyzing the results against applicable acceptance criteria.
>
> Qualitative inspections should be performed to the same predetermined criteria as quantitative inspections by personnel in accordance with the ASME Code and through approved site-specific programs.

The applicant states, in MPS AMP B2.1.25 for the "acceptance criteria" program element, that the acceptance criterion for visual inspections is the absence of anomalous signs of degradation. The acceptance criteria for testing or sampling are specified in the various station procedures and/or vendor technical manuals or recommendations. Evidence of aging effects that are potentially adverse to quality is entered into the corrective action program and engineering evaluations are performed as necessary to determine whether the observed condition is acceptable without repair, or if repair or replacement is necessary.

The project team confirmed that this program element satisfies the criteria defined in Appendix A.1.2.3.6 of the SRP-LR. Appropriate criteria are in place and any evidence of aging effects potentially adverse to quality will be adequately documented and appropriate action

taken per the MPS corrective action program. On this basis, the project team finds that the acceptance criteria program element is acceptable.

7.1.22.1.7 Corrective Actions

This program element is reviewed by the NRR DIPM staff and addressed in Section 3 of the SER related to the MPS Units 2 and 3 LRA.

7.1.22.1.8 Confirmation Process

This program element is reviewed by the NRR DIPM staff and addressed in Section 3 of the SER related to the MPS Units 2 and 3 LRA.

7.1.22.1.9 Administrative Controls

This program element is reviewed by the NRR DIPM staff and addressed in Section 3 of the SER related to the MPS Units 2 and 3 LRA.

7.1.22.1.10 Operating Experience

The “operating experience” program element criterion in Appendix A.1.2.3.10 of the SRP-LR states that operating experience should provide objective evidence to support the conclusion that the effects of aging will be managed adequately so that the structure and component intended function(s) will be maintained during the period of extended operation.

The applicant states in MPS AMP B2.1.25 that the MPS work control process activities that involve component inspections, performance testing, and fluid sampling are performed routinely. The applicant has reviewed site-specific work history data to confirm that an adequate number of inspection opportunities are afforded by the work control program. The applicant also states in the MPS LRA that the plant corrective action program, which captures internal and external plant operating experience issues, provides reasonable assurances that operating experience will be reviewed in the future to provide objective evidence to support the conclusion that the effects of aging will be managed adequately.

The project team reviewed an assessment based on observations made during industry group evaluations (e.g., Institute of Nuclear Power Operations) regarding the station's operation and material condition. Based on the project team’s review of that assessment and of station-specific operating experience, the project team finds that the work control process program has been effective in identifying anomalies, implementing appropriate corrective actions, and trending parameters. When inspection results have indicated signs of degradation, corrective actions have been implemented to ensure the continued capability of the system to perform its intended functions.

On the basis of its review of the above operating experience and on discussions with the applicant’s technical staff, the project team finds that MPS AMP B2.1.25 will adequately manage the aging effects that have been observed at the applicant’s plant.

7.1.22.2 UFSAR Supplement

The applicant provides its UFSAR supplements for the work control process program in the MPS Unit 2 LRA, Appendix A, Section A2.1.25, and the MPS Unit 3 LRA, Appendix A, Section A2.1.25, which state that the program integrates and coordinates the combined efforts of maintenance, engineering, operations, and other support organizations to manage maintenance activities. The program manages the aging effects of loss of material, change of material properties, cracking, and buildup of deposits for components and plant commodities within the scope of license renewal. The acceptance criterion for visual inspections is the absence of anomalous signs of degradation. The acceptance criteria for testing or sampling are specified in the various station procedures and/or vendor technical manuals or recommendations. Corrective actions for conditions that are adverse to quality are performed in accordance with the corrective action program as part of the quality assurance program.

The applicant states, in the MPS LRA, Appendix A, that one commitment is associated with the work control process program as follows

> The program will be enhanced such that changes will be made to maintenance and work control procedures to ensure that inspections of plant components and commodities will be appropriately and consistently performed and documented for aging effects during maintenance activities. This is identified on the applicant's license renewal commitment list in the MPS LRA, Appendix A, Table A6.0-1 as Item 25 (Unit 2) and Item 26 (Unit 3).

In the MPS LRA, the work control process program credits visual inspection only for detection of selective leaching. The project team asked the applicant to justify the use of visual inspection only, or to provide other means of detection such as, Brinnell hardness, destructive testing, or other mechanical means such as scraping, chipping, etc.

In a MPS LRA supplement dated July 7, 2004 (ML041900407), the applicant states the following

> For MPS Unit 2 Appendix A, Section A2.1.25 (page A-23) and MPS Unit 3 Appendix A, Section A2.1.25 (page A-23)
>
> 1. At the end of the Program Description section, the following should be added:
>
> > "In addition to visual inspections, the field inspection for loss of material due to selective leaching will include mechanical means, such as resonance when struck by another object, scraping, or chipping."
>
> 2. As the second bulleted Commitment, the following should be added:
>
> > Selective Leaching Inspection
> >
> > Using the Work Control Process, a baseline inspection for the loss of material due to selective leaching will be performed on a representative sample of locations for susceptible materials by visual, and mechanical or other appropriate methods prior to entering the period of extended operation. This commitment is identified in Appendix A, Table A6.0-1

License Renewal Commitments, Item 30 (MPS Unit 2) and 31 (MPS Unit 3).

The project team reviewed the UFSAR supplement and the additional information as identified in the MPS LRA supplement letter, and confirms that it provides an adequate summary description of the program, as identified in the SRP-LR UFSAR supplement table and as required by 10 CFR 54.21(d).

7.1.22.3 Conclusion

On the basis of its audit and review of the applicant's program, the project team finds that the applicant has demonstrated that the effects of aging will be adequately managed so that the intended functions will be maintained consistent with the CLB during the period of extended operation, as required by 10 CFR 54.21(a)(3).

On the basis of its review of the UFSAR supplements for this AMP, the project team also finds that they provide an adequate summary description of the program, as required by 10 CFR 54.21(d).

7.1.23 ELECTRICAL EQUIPMENT QUALIFICATION (MPS AMP B3.1)

In the MPS LRA, Appendix B, Section B3.1, the applicant states that MPS AMP B3.1, “Electrical Equipment Qualification,” is an existing program that is consistent with GALL AMP X.E1, “Environmental Qualification of Electrical Components.”

7.1.23.1 Program Description

The applicant states, in the MPS LRA, that the electrical equipment qualification program includes certain electrical components that are important to safety, pursuant to 10 CFR 50.49, and could be exposed to post-accident environmental conditions. The program manages thermal, radiation, and cyclical component aging by using aging evaluations based on 10 CFR 50.49, which establishes the methods of demonstrating qualification for aging and accident conditions. Equipment qualification is supported by controlled equipment qualification records, test report assessments, and associated design documents.

The applicant states, in the MPS LRA, that the electrical equipment qualification program includes preventive maintenance and surveillance activities as well as monitoring of ambient operating conditions. These activities are intended to provide a basis for extending qualified life of electrical equipment through re-analysis. The program determines the need for in-scope electrical component replacement or refurbishment, and the required frequency.

The applicant states, in the MPS LRA, that it evaluates plant modifications through the design control process to ensure compliance with the requirements of 10 CFR 50.49. The environmental qualification of electrical equipment is reevaluated as necessary to account for configuration changes associated with modifications.

The applicant states, in the MPS LRA, that re-analyses of aging evaluations to extend the qualified life of 10 CFR 50.49 components are performed as a part of the applicant’s equipment

qualification program. The program includes the program elements identified in GALL AMP X.E1. The applicant states that the re-analyses will be completed in sufficient time to ensure that any necessary refurbishment, requalification, or replacement of electrical equipment will be done prior to the extended period of operation.

7.1.23.2 Consistency with the GALL Report

In the MPS LRA, the applicant states that MPS AMP B3.1 is consistent with GALL AMP X.E1.

The project team interviewed the applicant's technical staff and reviewed, in whole or in part, the documents listed in Attachment 5 of this report for MPS AMP B3.1, including MPS Technical Report MP-LR-3739/4739, "License Renewal Project Aging Management Program, Electrical Equipment Qualification," Revision 2, dated March 13, 2004, which provides an assessment of how the GALL AMP elements are addressed by the electrical equipment qualification program.

The project team reviewed the seven program elements (see Section 5.1 of this report) contained in the MPS AMP and associated bases documents against GALL AMP X.E1 for consistency.

7.1.23.3 Exceptions to the GALL Report

None

7.1.23.4 Enhancements to the GALL Report

None

7.1.23.5 Operating Experience

The applicant states, in the MPS LRA, that its review of plant-specific operating experience identified no specific examples of age-related degradation for environmentally qualified components.

In discussions with the project team, the applicant states that its review included condition reports associated with the equipment qualification programs for MPS Units 2 and 3. The applicant provided the project team with operating experience examples considered by the applicant to be representative. These examples were used by the project team in its evaluation of the operating experience program element for MPS AMP B3.1.

The condition reports involved equipment qualification program improvements, radiation dose calculations, and thermal life calculation methods. The project team reviewed the condition report summaries presented in MPS Technical Report MP-LR-3739/4739 and found the evaluation and disposition of the conditions as reported therein to be consistent with that conclusion.

On the basis of its review of the above operating experience and discussions with the applicant's technical staff, the project team concludes that MPS AMP B3.1 adequately manages the aging effects that have been observed at the applicant's plant.

7.1.23.6 UFSAR Supplement

The applicant provides its UFSAR supplements for the electrical equipment qualification program in MPS Units 2 and 3 LRA, Appendix A, Sections A.3.3 and A4.1 (time-limited aging analyses support programs), which state that the program addresses the requirements pertaining to the environmental qualification of electrical equipment as embodied in 10 CFR 50.49. The categories of electrical equipment addressed by the program include safety-related (Class 1E) electrical equipment, non-safety-related electrical equipment whose failure could prevent the satisfactory accomplishment of a safety function by safety-related equipment, and certain post-accident monitoring equipment. Aging evaluations for electrical equipment that specify a qualification of 40 years or greater are considered to represent a time-limited aging analysis. Environmental qualification of electrical equipment will be adequately managed for the period of extended operation.

The project team reviewed the UFSAR supplements and confirms that they provide an adequate summary description of the program, as identified in the SRP-LR UFSAR supplement table and as required by 10 CFR 54.21(d).

7.1.23.7 Evaluation

The project performed a review of the applicable criteria in GALL AMP X.E1, "Environmental Qualification of Electrical Components," and the program description and elements for MPS AMP B3.1.

Based on its review, the project team concludes that the applicant's electrical equipment qualification program provides reasonable assurance of aging management of thermal, radiation, and cyclical component aging in certain electrical components that are important to safety, pursuant to 10 CFR 50.49, and could be exposed to post-accident environmental conditions. The project team finds MPS AMP B3.1 acceptable because it conforms to the recommended program description, program elements, and acceptance criteria for electrical equipment qualification, as discussed in GALL AMP X.E1, "Environmental Qualification of Electrical Components."

7.1.23.8 Conclusion

On the basis of its audit and review of the applicant's program, the project team finds that those portions of the program for which the applicant claims consistency with the GALL Report are consistent with the GALL Report. Since the GALL Report is acceptable to the staff, the project team concludes that the applicant has demonstrated that the effects of aging will be adequately managed so that the intended functions will be maintained consistent with the CLB during the period of extended operation, as required by 10 CFR 54.21(a)(3).

On the basis of its review of the UFSAR supplements for this AMP, the project team also finds that they provide an adequate summary description of the program, as required by 10 CFR 54.21(d).

7.1.24 METAL FATIGUE OF REACTOR COOLANT PRESSURE BOUNDARY (MPS AMP B3.2)

In the MPS LRA, Appendix B, Section B3.2, the applicant states that MPS AMP B.3.2, "Metal Fatigue of Reactor Coolant Pressure Boundary," is consistent with GALL AMP X.M1, "Metal Fatigue of Reactor Coolant Pressure Boundary."

7.1.24.1 Program Description

The applicant states, in the MPS LRA, that the metal fatigue of reactor coolant pressure boundary program is an existing program that includes preventive measures to mitigate fatigue cracking caused by anticipated cyclic strains in metal components of the reactor coolant pressure boundary. This is accomplished by monitoring and tracking the number of critical thermal and pressure transients for selected reactor coolant system components to ensure the number of design transient cycles is not exceeded during the operating life. Based on design basis screening criteria, a list of fatigue-sensitive components for each MPS unit was developed and is maintained. Fatigue-sensitive components include the charging nozzle, emergency core cooling system safety injection nozzles, pressurizer surge nozzle, and pressurizer spray nozzle.

The project team notes that a significant issue associated with metal fatigue is the effect of a water environment on the design basis curves. NUREG/CR-6260, "Application of NUREG/CR-5999 Interim Fatigue Curves to Selected Nuclear Power Plant Components," dated March 1995, provides specific guidance to address environmental effects and recommendations for sample selection of those critical components in high-fatigue usage locations that should be monitored. Formulas for calculating the environmental correction factors for carbon and low-alloy steel, and stainless steel are contained in NUREG/CR-6583, "Effects of LWR Coolant Environments on Fatigue Design Curves of Carbon and Low-Alloy Steels," dated March 1998, and NUREG/CR-5704, "Effects of LWR Coolant Environments on Fatigue Design Curves of Austenitic Stainless Steels," dated April 1999, respectively.

The applicant states, in the MPS LRA, that it has ensured that the environmental effects on fatigue-sensitive locations are addressed for the period of extended operation. For MPS Unit 3 only, specific locations were identified with a cumulative use factor (CUF) greater than 1.0. The effects of environmentally assisted fatigue for those specific locations with a CUF greater than 1.0 will be managed by this program.

7.1.24.2 Consistency with the GALL Report

In the MPS LRA, the applicant states that MPS AMP B3.2 is consistent with GALL AMP X.M1.

The project team interviewed the applicant's technical staff and reviewed, in whole or in part, the documents listed in Attachment 5 of this report for MPS AMP B3.2, including MPS Technical Report MP-LR-3737/4737, "Metal Fatigue of Reactor Coolant Pressure Boundary,"

Revision 2, dated March 11, 2004, which provides an assessment of how the GALL AMP elements are addressed by the metal fatigue of reactor coolant pressure boundary program.

The project team reviewed the seven program elements (see Section 5.1 of this report) contained in the MPS AMP and associated bases documents against GALL AMP X.M1 for consistency.

7.1.24.3 Exceptions to the GALL Report

None

7.1.24.4 Enhancements

None

7.1.24.5 Operating Experience

In the MPS LRA, the applicant describes a condition report, M2-97-2031, "Auxiliary Spray Use Resulted in Violation of the 350EF Technical Specification Limit," which was considered by the project team in its evaluation of the operating experience for the applicant's metal fatigue of reactor coolant pressure boundary program. M2-97-2031 states that

> A review of past spray cycles at MPS Unit 2 showed that 24 auxiliary spray actuations exceeded the technical specification limit of 350EF. The auxiliary spray line has 187 feet of stagnant piping at ambient temperature. The temperature indicator used to monitor whether heat-up and cooldown rates are exceeded is located downstream of the regenerative heat exchanger and upstream of isolation valve 2-CH-517. Thus, this indicator had been inappropriate for determining the auxiliary spray temperature when letdown is not isolated. The appropriate procedures were revised to use containment ambient temperature to correctly indicate spray temperature when initiating auxiliary spray. Licensee event report (LER) 97-022-02 was transmitted to the NRC on November 26, 1997 under Letter B16849 (ACN 9712010238). An evaluation of the out-of-limit temperature differential identified in the LER was completed and documented in calculation B2-221-210GP (change notices 1 and 2). The results of the evaluation demonstrated that the structural integrity of the affected components had been maintained even after the increased temperature differentials were considered.
>
> However, the evaluation determined that the original design compliance analysis did not consider the auxiliary spray actuation transients as specified in the design specification. Additionally, testing at a number of plants following issuance of NRC Bulletin 88-08, "Thermal Stresses in Piping Connected to Reactor Coolant Systems," dated June 22, 1988, revealed thermal stratification in the horizontal piping just above the pressurizer. The new design transient needed to be addressed. A new condition report (M2-98-3483) identified this new condition and required revision to the existing analysis to demonstrate design compliance. When the existing analysis was revised, insufficient margin remained for the

> most limiting component (an auxiliary spray to main spray specially forged tee connection). A design modification package was generated to replace those components that were not within the applicable design requirements. This piping was subsequently replaced in accordance with design change request M2-98105.

On the basis of its review of the above operating experience at the applicant's plant and at other nuclear facilities as well as discussions with the applicant's technical staff, the project team concludes that MPS AMP B3.2 adequately manages the aging effects that have been observed at the applicant's plant.

7.1.24.6 UFSAR Supplement

The applicant provides its UFSAR supplements for the metal fatigue of reactor coolant pressure boundary program in the MPS Unit 2 LRA, Appendix A, Section A3.2, and the MPS Unit 3 LRA, Appendix A, Section A4.2, which state that the program is accomplished by monitoring and tracking the number of critical thermal and pressure transients for selected reactor coolant system components to ensure the number of design transient cycles is not exceeded during the plant operating life. The program also addressed the effect of reactor coolant environment on component fatigue life by assessing the influence of the reactor water environment on a sample of critical components that include those components identified in NUREG/CR-6260. The program states those fatigue-sensitive locations have been evaluated using the methods identified in NUREG/CR-6583.

Based on the project team's review of the operating experience, it was determined that the fatigue failure locations at MPS are not those identified in NUREG/CR-6260, and that further clarification was needed on the applicant's approach for managing environmentally assisted fatigue. The project team requested that the applicant provide clarification on these two issues. In response, the applicant issued a MPS LRA supplement letter, dated July 7, 2004 (ML041900407), which states as follows

> The following wording, providing an additional commitment for monitoring environmentally assisted fatigue, should be inserted at the end of Unit 2 and Unit 3 Appendix A, Section A3.2.3 (page A-27):
>
> "MPS will follow industry efforts that will provide specific guidance to license renewal applicants for evaluating the environmental effects of fatigue on applicable locations, other than those identified in NUREG/CR-6260. MPS will also implement the appropriate recommendations resulting from this guidance. This commitment is identified in Appendix A, Table A6.0-1 License Renewal Commitments, Items [28 for Unit 2] [29 for Unit 3]."
>
> Additionally, a new item should be added to Appendix A, Table A6.0-1 for each unit. For Unit 2, it would be Commitment 28 (page A-39). For Unit 3, it would be Commitment 29 (page A-38). The commitment will be worded as identified above with a schedule of "Prior to the Period of Extended Operation."

> "If the specific locations are not repaired, replaced, or successfully re-analyzed, a modified inspection program description, including a comparison to the 10 program elements of the NUREG-1801 program, will be submitted to the NRC for approval." should be inserted at the end of the commitment in Unit 3 Appendix A, Section A3.2.3, (page A-27) and Unit 3 Appendix A, Table A6.0-1, Commitment 27, (page A-38).

The project team reviewed the UFSAR supplements as amended by the supplement letter and confirmed that they provide an adequate summary description of the program, as identified in the SRP-LR UFSAR supplement table and as required by 10 CFR 54.21(d).

7.1.24.7 Evaluation

The project team performed a review of the applicable criteria in GALL AMP X.M1, "Metal Fatigue of Reactor Coolant Pressure Boundary," and the program description and elements for MPS AMP B3.2.

Based on its review, the project team concludes that the applicant's metal fatigue of reactor coolant pressure boundary program, as modified by the supplement letter, provides reasonable assurance of aging management of fatigue cracking in metal components in the reactor coolant pressure boundary. The project team finds MPS AMP B.3.2 acceptable because it conforms to the recommended program description, program elements, and acceptance criteria for metal fatigue evaluation programs, as discussed in GALL AMP X.M1, "Metal Fatigue of Reactor Coolant Pressure Boundary."

The project team's review of the operating experience determined that the fatigue failure locations at MPS are not those identified in NUREG/CR-6260, and that further clarification was needed on the applicant's approach for managing environmentally assisted fatigue. The project team requested that the applicant provide clarification on these two issues. In response, the applicant issued a MPS LRA supplement letter, dated July 7, 2004 (ML041900407), which adds new commitments (28 for MPS Unit 2, 29 for MPS Unit 3) to MPS LRA, Appendix A, Table A6.0-1 and modifies the UFSAR supplement text accordingly.

7.1.24.8 Conclusion

On the basis of its audit and review of the applicant's program, the project team finds that those portions of the program for which the applicant claims consistency with the GALL Report are consistent with GALL Report. Since the GALL Report is acceptable to the staff, the project team concludes that the applicant has demonstrated that the effects of aging will be adequately managed so that the intended functions will be maintained consistent with the CLB during the period of extended operation, as required by 10 CFR 54.21(a)(3).

On the basis of its review of UFSAR supplements for this AMP, the project team also finds that they provide an adequate summary description of the program, as required by 10 CFR 54.21(d).

7.2 Aging Management Review Results for Millstone Power Station Unit 2

The project team's audit and review activities for the MPS Unit 2 AMRs and its conclusions regarding these reviews are documented below.

For its AMR reviews, the project team verified that the AMRs reported by the applicant to be consistent with the GALL Report are consistent with the GALL Report and verified that the plant-specific AMRs reported to be justified on the basis of an NRC-approved precedent are technically acceptable and applicable. For component groups evaluated in the GALL Report for which the applicant claimed consistency with the GALL Report, and for which the GALL Report recommended further evaluation, the project team reviewed the applicant's evaluation to determine whether or not it adequately addressed the issues for which the GALL Report recommended further evaluation.

The AMRs reviewed by the project team in Tables 3.X.2-Y in Chapter 3 of the MPS Unit 2 LRA were either consistent with the GALL Report, or those justified by the applicant on the basis of an NRC-approved precedent. In MPS Unit 2 LRA Tables 3.X.2-Y, in addition to the notes, the applicant provides a summary of AMRs for the applicable systems which included SCs, associated materials, environment, aging effect requiring management, and an AMP for each line item. The notes describe how the information in the tables aligns with the information in the GALL Report. Those that are defined in the GALL Report are assigned letters and are described below. Those defined by the applicant are assigned numbers and defined in the MPS Unit 2 LRA.

> Note A indicates that the AMR line item is consistent with the GALL Report for component, material, environment, and aging effect. In addition, the AMP is consistent with the AMP identified in the GALL Report.
>
> Note B indicates that the AMR line item is consistent with the GALL Report for component, material, environment, and aging effect. In addition, the AMP takes some exceptions to the AMP identified in the GALL Report. The project team verified that the identified exceptions to the GALL AMPs are acceptable.
>
> Note C indicates that the component for the AMR line item is different, but consistent with the GALL Report for material, environment, and aging effect. This note indicates that the applicant was unable to find a listing of some system components in the GALL Report. However, the applicant identified a different component in the GALL Report that had the same material, environment, aging effect, and AMP as the component that was under review. The project team verified that the AMR line item of the different component was applicable to the component under review.
>
> Note D indicates that the component for the AMR line item is different, but consistent with the GALL Report for material, environment, and aging effect. In addition, the AMP takes some exceptions to the AMP identified in the GALL Report. The project team reviewed these line items to verify consistency with the GALL Report. The project team verified that the AMR line item of the different component was applicable to the component under review. The project team verified that the identified exceptions to the GALL AMPs are acceptable.

Note E indicates that the AMR line item is consistent with the GALL Report for material, environment, and aging effect, but a different AMP is credited. The project team reviewed these line items to verify consistency with the GALL Report.

Note F indicates that the material is not in the GALL Report for the identified component.

Note G indicates that the environment is not in the GALL Report for the identified component and material.

Note H indicates that the aging effect is not in the GALL Report for component, material, and environment combination.

Note I indicates that the aging effect in the GALL Report for the identified component, material, and environment combination is not applicable

Note J indicates that neither the identified component nor the material and environment combination is evaluated in the GALL Report.

Any discrepancies or issues discovered by the project team during the audit and review that required a response on the docket are documented in this report. If an issue was not docketed or was not resolved prior to issuing this report, it was identified as an open item to be dispositioned in the SER related to the MPS Units 2 and 3 LRA. For some open items, an RAI was prepared by the project team describing the issue and the information needed to disposition the issue. The RAI will be included and dispositioned in the SER related to the MPS Units 2 and 3 LRA. The list of open items and RAIs associated with the audit and review is provided in Attachment 4 to this report.

The project team conducted an audit and review of the information provided in the MPS Unit 2 LRA and program bases documents, which are available at the applicant's engineering office. On the basis of its audit and review, the project team found that the applicable aging effects were identified, the appropriate combination of materials and environments were listed, and acceptable AMPs were specified.

On the basis of its audit and review, the project team concluded that the applicant demonstrated that the effects of aging will be adequately managed so that the intended functions will be maintained consistent with the CLB for the period of extended operation, as required by 10 CFR 54.21(a)(3).

The reviews of MPS Unit 2 LRA Sections 3.1 through 3.6 that were performed by the project team are documented below.

7.2.1 MPS Unit 2 LRA Section 3.1 - Aging Management of Reactor Vessel, Internals, and Reactor Coolant System

In MPS Unit 2 LRA Section 3.1, the applicant provides the results of its AMRs for the reactor vessel, internals, and reactor coolant system components.

In the MPS Unit 2 LRA Tables 3.1.2-1 through 3.1.2-4 (Table 2s), the applicant provides a summary of the AMRs for component types associated with the (1) reactor vessel; (2) reactor vessel internals; (3) reactor coolant system; (4) steam generators. The summary information for each component type included intended function; material; environment; aging effect requiring management; AMPs; the GALL Report Volume 2 item; cross reference to the MPS Unit 2 LRA Table 3.1.1 (Table 1); and generic and plant-specific notes related to consistency with the GALL Report.

Also, the applicant identified for each component type in the MPS Unit 2 LRA Table 3.1.1 (Table 1) those components where further evaluation is recommended, those for which no further evaluation is required, and those that are not applicable to MPS Unit 2 together with the basis for their exclusion.

Additionally, the applicant identified, in the MPS Unit 2 LRA Tables 3.1.2-1 through 3.1.2-4, which AMR results it considered to be consistent with the GALL Report (table column Notes A through E) and which it justified on a different basis.

The AMRs that are within the scope of the project team audit and review are identified on copies of the MPS Unit 2 LRA Tables 3.1.2-1 through 3.1.2-4 which are included as an appendix to the MPS Units 2 and 3 audit and review plan.

The project team conducted its audit and review in accordance with SRP-LR Section 3.1.3 and the MPS Units 2 and 3 audit and review plan. The project team interviewed the applicant's technical staff and reviewed, in whole or in part, the documents listed in Attachment 5 of this report for Section 3.1, including MPS Unit 2 Technical Reports, LR-3501, "AMR for Reactor Vessel," Rev. 2, MP-LR-3502, "AMR for Steam Generator," Rev. 2, MP-LR-3503, "AMR for Reactor Vessel Internal," Rev. 2, and MP-LR-3402, "AMR for Reactor Coolant System," Rev. 3, which provides the AMR results for the reactor vessel, internals, and reactor coolant system components.

7.2.1.1 Aging Management Review Results That Are Consistent With the GALL Report, for Which No Further Evaluation Is Required

For aging management evaluations that the applicant states are consistent with the GALL Report and for which further evaluation is not recommended, the project team conducted its audit and review to determine if the applicant's reference to the GALL Report in the MPS Unit 2 LRA is acceptable.

The project team reviewed the MPS Unit 2 LRA to confirm that the applicant (1) provides a brief description of the system, components, materials, and environment; (2) states that the applicable aging effects have been reviewed and are evaluated in the GALL Report; and (3) identifies those aging effects for the reactor vessel, internals, and reactor coolant system components that are subject to an AMR.

7.2.1.1.1 Loss of Fracture Toughness Due to Thermal Aging Embrittlement

In the discussion section of Table 3.1.1, Item 24 of the MPS Unit 2 LRA, the applicant states that loss of fracture toughness is not an aging effect requiring management for applicable

CASS piping and components. During the audit and review, the project team asked the applicant for clarification as to why loss of fracture toughness is not an aging effect requiring management. The applicant replied that loss of fracture toughness of the CASS piping is not an aging effect requiring management because the results of a leak-before-break (LBB) analysis demonstrated that there was a large margin between detectable flaw size and flaw instability. The project team reviewed the applicant's TLAA Report, MP-LR-3014/4014, "Leak-Before-Break," Rev. 1, and found that the LBB analysis is not a flaw tolerance evaluation as specified by the GALL Report. The applicant agreed that the LBB analysis cannot be used to manage the loss of fracture toughness due to thermal aging embrittlement. The applicant submitted a LRA supplement letter dated July 7, 2004 (ML041900407) and stated, in response to Audit Items 42 and 19, as follows:

> Note "6" for Unit 2 Tables 3.1.2-1 through 3.1.2-4 (Pages 3-101), should state the following:
>
> "For potentially susceptible CASS materials, either enhanced volumetric examinations or a unit or component specific flaw tolerance evaluation (considering reduced fracture toughness and unit specific geometry and stress information) will be used to demonstrate that the thermally-embrittled material has adequate fracture toughness in accordance with NUREG-1801 Section XI.M12."
>
> 'Loss of Fracture Toughness' as an aging effect for component groups 'Pipe (Safe Ends for SI and SDC)', 'Pipe (Surge Line Piping and Fittings)', and 'Pressurizer (Safe End for PZR Surge Nozzle)' should be added in Unit 2 Table 3.1.2-3, (pages 3-72, 74, and 77, respectively). The 'Loss of Fracture Toughness' is managed by the inservice inspection program: systems, components and supports and corresponds to GALL Item IV.C2.1-f. The Notes for these entries are "A,6" and the 'Table 1 Item' is "3.1.1-24". The material for the pressurizer component (identified above) will designate that it is CASS material. NOTE: Only the 'Loss of Fracture Toughness' entry will have Note "6" listed for the above component groups.
>
> The "Discussion" column in Unit 2 Table 3.1.1, Item 24, (page 3-31) should have been read as follows:
>
> Consistent with NUREG-1801. Loss of Fracture Toughness is managed with the Inservice Inspection Program: Systems, Components and Supports and this program takes some exception to the NUREG-1801 AMP.
>
> Additionally, a new commitment, Item 27, should be added to Appendix A, Table A6.0-1 as follows and will be implemented prior to the period of extended operation:
>
> For potentially susceptible CASS materials, either enhanced volumetric examinations or a unit or component specific flaw tolerance evaluation (considering reduced fracture toughness and unit specific geometry and stress information) will be used to demonstrate that the thermally-embrittled material

> has adequate fracture toughness in accordance with NUREG-1801 Section XI.M12.

The applicant modified the corresponding MPS Unit 2 LRA basis documents and MPS Unit 2 LRA to reflect the audit findings. The project team reviewed the applicant's LRA supplement and concludes that the applicant appropriately addressed the aging mechanism with above mentioned new commitment, as recommended in the GALL Report.

7.2.1.1.2 Wall Thinning Due to Flow-Accelerated Corrosion

7.2.1.1.2.1 Steam Generator Steam Nozzle Flow Restrictor and Steam Nozzle

On page 3-95 of the MPS Unit 2 LRA, the applicant states that wall thinning due to flow-accelerated corrosion in steam generator flow restrictor exposed to steam is managed using MPS AMP B2.1.11, "Flow-Accelerated Corrosion." During the audit and review, the project team asked the applicant to clarify how the flow restrictor is being managed using the flow-accelerated corrosion (FAC) program (Audit Item 81). The applicant replied that FAC concerns for the flow restrictor (restricting venturi) are addressed by video inspection and venturi ID measurements performed as part of MSP AMP B2.1.22, "Steam Generator Structural Integrity," and not part of the FAC program. The applicant stated that it will provide clarification in a LRA supplement. Furthermore, the applicant stated that the steam nozzle flow restrictor is fabricated from carbon steel and is integral to the steam nozzle. The steam nozzle itself is not subjected to direct steam flow and, therefore, does not have FAC concerns.

By letter dated July 7, 2004 (ML041900407), the applicant submitted its LRA supplement letter. In its response, the applicant stated that the FAC AMP should be replaced with MPS AMP B2.1.22, "Steam Generator Structural Integrity" for the 'Steam Nozzle Flow Restrictor' component group in MPS Unit 2 Table 3.1.2-4 (page 3-95). Also, the Note "D" should be "E" for the same entry. In addition, the "Discussion" column in MPS Unit 2 LRA Table 3.1.1, Item 3.1.1-25 (page 3-31), should replace "Flow-Accelerated Corrosion program" with the following:

> Flow-Accelerated Corrosion program for all items except the steam nozzle flow restrictor which is managed by the Steam Generator Structural Integrity Program AMP.

The project team reviewed the applicant's procedure, VPROC ENG00-2-013,"BWI Replacement Steam Generator Secondary Side Inspection Procedure," Rev. 001, and verified that inspections of the SG flow restrictors are performed using this procedure. In addition, the applicant utilizes the charged-coupled device (CCD) camera to inspect the steam nozzle venturies and utilizes the video probe to inspect steam nozzle venturies.

For loss of material in a steam environment for the carbon steel steam nozzle and safe end component group, in MPS Unit 2 LRA Table 3.1.2-4 (page 3-94), the applicant credits both the chemistry control for secondary systems program and the FAC program. In its letter dated July 7, 2004 (ML041900407), the applicant states that the FAC program was inadvertently listed as an aging management program for the steam nozzle and safe end component group (Audit Item 81-2). The project team reviewed the applicant's response and concludes that the

chemistry control for secondary systems program alone is adequate to manage this aging effect.

On the basis of its review, the project team concludes that the applicant appropriately addressed the aging mechanism, as recommended by the GALL Report.

7.2.1.1.2.2 Steam Generator Feedwater Nozzle Thermal Sleeve

In MPS Unit 2 LRA Table 3.1.2-4 (page 3-89), the applicant states that wall thinning due to FAC in steam generator feedwater thermal sleeve exposed to treated water is managed using MPS AMP B2.1.11, “Flow-Accelerated Corrosion.” During the audit and review, the project team asked the applicant to clarify how the thermal sleeve is being managed using the FAC program (Audit Item 124). The applicant replied that there is an inner 16 inch diameter, schedule 80 carbon steel thermal sleeve (shield) at the feedwater inlet nozzle. Because of the external nozzle, UT examination is not being performed on the thermal sleeve (shield) itself. The applicant initiated CR-04-04878 to address the need for establishing proper monitoring for wall thickness as part of the FAC program. On the basis of its review, the project team concludes that the applicant’s response is acceptable.

7.2.1.1.3 Loss of Material Due to Wear; Loss of Preload Due to Stress Relaxation; Crack Initiation and Growth Due to Cyclic Loading and/or Stress Corrosion Cracking

In MPS Unit 2 LRA Table 3.1.1, Item 26 (page 3-31), the applicant states that cracking and loss of preload are managed using MPS AMP B2.1.18, “Inservice Inspection Program: Systems, Components and Supports.” Also, the applicant states that loss of material due to wear is not an aging effect requiring management for this bolting.

The project team noted that SRP-LR Table 3.1-1 recommended GALL AMP XI.M18, “Bolting Integrity,” for managing closure bolting in a high pressure or high temperature system for loss of material due to wear; loss of preload due to stress relaxation; crack initiation and growth due to cyclic loading and/or SCC.

The project team questioned the applicant on whether all of the resolutions of the generic safety issue for bolting, as stated in NUREG-1339, are addressed. By letter dated December 3, 2004 (ML043450341), the applicant submitted its LRA supplement. In its response, the applicant stated that it has developed a specific bolting integrity aging management program that addresses degradation of bolting at MPS.

By letter dated January 11, 2005 (ML050190289), the applicant submitted its bolting aging management roll-up item. In its response, the applicant replaces the existing information in the “Discussion” column of Unit 2 LRA Table 3.1.1, Item 26 with “consistent with the NUREG-1801."

The project team reviewed the applicant’s response and finds this acceptable since it is consistent with the GALL Report. The bolting integrity program is reviewed by NRR DE and its evaluation is documented in Section 3 of the SER related to the MPS Units 2 and 3 LRA.

7.2.1.1.4 Loss of Fracture Toughness Due to Neutron Irradiation Embrittlement, and Void Swelling

In MPS Unit 2 LRA Table 3.1.1, Item 43 (page 3-35), the applicant states that loss of fracture toughness is managed using MPS AMP B2.1.17, "Inservice Inspection Program: Reactor Vessel Internals." Also, the applicant states that MPS AMP B2.1.5, "Chemistry Control for Primary Systems Program" is not credited to manage these aging effects, but is applied to all reactor vessel internals components as a corrosion mitigation program.

The project team reviewed the inservice inspection program: reactor vessel internals program and the chemistry control for primary systems program and its evaluation is documented in Section 7.1.16 and Section 7.1.4 of this report, respectively. On the basis of its review, the project team agrees with the applicant that the chemistry control for primary systems program is a corrosion mitigation program and the program also applies to all reactor vessel internal components. Therefore, the project team concludes that the applicant's proposed program is adequate to manage loss of fracture toughness due to neutron irradiation embrittlement and void swelling.

The project team finds that, based on the programs identified above, the applicant has demonstrated that the effects of aging will be adequately managed so that the intended functions will be maintained consistent with the CLB during the period of extended operation, as required by 10 CFR 54.21(a)(3).

On the basis of its audit and review, the project team determined that for all other AMRs not requiring further evaluation, as identified in LRA Table 3.1.1 (Table 1), the applicant's references to the GALL Report are acceptable and no further project team review is required.

7.2.1.2 Aging Management Review Results That Are Consistent With the GALL Report, for Which Further Evaluation Is Recommended

For some line items consistent with the GALL Report in the MPS Unit 2 LRA Tables 3.1.2-1 through 3.1.2-4, the GALL Report recommends further evaluation. When further evaluation is recommended, the project team reviewed these further evaluations provided in MPS Unit 2 LRA Section 3.1.2.2 against the criteria provided in the SRP-LR Section 3.1.2.2. The following provides the project team's assessments of these evaluations. These project team assessments are applicable to each Table 2 line item in LRA Section 3.1 citing the item in Table 1.

The MPS Unit 2 LRA sections, identified in MPS Unit 2 LRA Table 3.1.1, where further evaluation is recommended, are discussed below.

7.2.1.2.1 Cumulative Fatigue Damage (MPS Unit 2 LRA Section 3.1.2.2.1)

MPS Unit 2 LRA, Section 3.1.2.2.1 is reviewed by NRR DE staff and addressed in Section 4.3 of the SER related to the MPS Units 2 and 3 LRA.

7.2.1.2.2 Loss of Material Due to Pitting and Crevice Corrosion (MPS Unit 2 LRA Section 3.1.2.2.2)

The project team reviewed MPS Unit 2 LRA Section 3.1.2.2.2 against the criteria in SRP-LR Section 3.1.2.2.2.

In MPS Unit 2 LRA Section 3.1.2.2.2, the applicant addresses loss of material of steam generator assemblies due to pitting and crevice corrosion.

SRP-LR Section 3.1.2.2.2 states that loss of material due to pitting and crevice corrosion could occur in the steam generator shell assembly. The existing program relies on control of water chemistry to mitigate corrosion and ISI to detect cracking due to loss of material. NRC Information Notice (IN) 90-04, "Cracking of the Upper Shell-to-Transition Cone Girth Welds in Steam Generators," states that if general corrosion pitting of the shell exists, the existing program may not be sufficient. In that case, the GALL Report recommends augmented inspections to manage the aging effect.

The AMPs recommended by the GALL Report for managing the aging of steam generator assemblies due to pitting and crevice corrosion are GALL AMP XI.M1, "ASME Section XI Inservice Inspection, Subsections IWB, IWC, and IWD," to detect loss of material and GALL AMP XI.M2, "Water Chemistry," to mitigate corrosion. The GALL Report also recommends a plant-specific program to conduct augmented inspections.

In the MPS Unit 2 LRA, the applicant credits MPS AMP B.2.18, "Inservice Inspection Program: Systems, Components and Supports," and MPS AMP B.2.1.5, "Chemistry Control for Primary Systems," for managing loss of material due to pitting and crevice corrosion for the internal surfaces of the steam generator shell. The project team evaluated these programs and its evaluation is documented in Section 7.1.17 and Section 7.1.4 of this report, respectively.

The project team reviewed IN 90-04, which identifies the need to augment inspections beyond the requirements of ASME Section XI if general corrosion pitting of the steam generator shell is known to exist in order to differentiate isolated cracks for inherent geometric conditions. In the MPS Unit 2 LRA, the applicant states that it replaced the MPS Unit 2 steam generators in 1992. The project team reviewed operating experience which indicated that no pitting corrosion of the steam generator shell has been detected to date and that water chemistry has been maintained for these new steam generators per EPRI guidelines. The project team finds that the augmented inspections as recommended by NRC IN 90-04, as referenced in the SRP-LR, do not currently apply to the MPS Unit 2 steam generators.

Since pitting corrosion has not been detected on the steam generator shell since installation, the project team finds that augmented inspections are not required and that the current water chemistry control and inservice inspection programs adequately manage this aging effect.

The project team finds that, based on the programs identified above, the applicant has demonstrated that the effects of aging will be adequately managed so that the intended functions will be maintained consistent with the CLB during the period of extended operation, as required by 10 CFR 54.21(a)(3).

7.2.1.2.3 Loss of Fracture Toughness Due to Neutron Irradiation Embrittlement (MPS Unit 2 LRA Section 3.1.2.2.3)

The project team reviewed MPS Unit 2 LRA Section 3.1.2.2.3 against the criteria contained in SRP-LR Section 3.1.2.2.3.

In MPS Unit 2 LRA Section 3.1.2.2.3, the applicant addresses (1) loss of fracture toughness due to neutron irradiation embrittlement for ferritic materials that have a neutron fluence of greater than 10^{17} n/cm^2 at the end of the license renewal term, and (2) loss of fracture toughness due to irradiation embrittlement of the reactor vessel beltline materials. In addition, the applicant states that (3) the baffle/former bolts are not used in the reactor vessel internals and the discussion in this paragraph of NUREG-1800 is not applicable to MPS Unit 2.

SRP-LR Section 3.1.2.2.3 states that certain aspects of neutron irradiation embrittlement are TLAAs as defined in 10 CFR 54.3 and that TLAAs are required to be evaluated in accordance with 10 CFR 54.2.(c)(1). Second, SRP-LR Section 3.1.2.2.3 states that loss of fracture toughness due to neutron irradiation embrittlement could occur in the reactor vessel. A reactor vessel materials surveillance program monitors neutron irradiation embrittlement of the reactor vessel. Reactor vessel surveillance programs are plant-specific, depending on matters such as the composition of limiting materials, availability of surveillance capsules, and projected fluence levels. In accordance with 10 CFR Part 50, Appendix H, an applicant is required to submit its proposed withdrawal schedule for approval prior to implementation. Finally, the SRP-LR Section 3.1.2.2.3 statement that loss of fracture toughness due to neutron irradiation embrittlement and void swelling could occur in Westinghouse and B&W baffle/former bolts is not applicable to MPS Unit 2 because MPS Unit 2 reactor vessel internals do not include baffle/former bolts.

The AMP recommended by the GALL Report for managing loss of fracture toughness due to neutron irradiation embrittlement in the reactor vessel is GALL AMP XI.M31, “Reactor Vessel Surveillance,” which complies with the requirements of 10 CFR Part 50, Appendices G and H, and 10 CFR Part 50.61.

The applicant states, in the MPS Unit 2 LRA, that loss of fracture toughness due to neutron irradiation embrittlement for ferritic materials is a TLAA, as described in Section 4.2 of the MPS Unit 2 LRA. This TLAA is reviewed by NRR DE staff and addressed in Section 4 of the SER related to the MPS Units 2 and 3 LRA.

The applicant states, in the MPS Unit 2 LRA, that loss of fracture toughness due to irradiation embrittlement of the reactor vessel beltline materials is managed by MPS AMP B2.1.20, “Reactor Vessel Surveillance.” This program includes a plant-specific material surveillance program which monitors the effect of operational fluence levels on material specimens (surveillance capsules) located in the reactor vessel during power operations. These surveillance capsules are periodically withdrawn and analyzed. The reactor vessel surveillance program is reviewed by NRR DE staff and is addressed in Section 3 of the SER related to the MPS Units 2 and 3 LRA.

The project team finds that the applicant’s AMR results are consistent with the GALL Report and that the applicant has demonstrated that the programs to manage the effects of aging will

be adequate to maintain the intended functions consistent with the CLB during the period of extended operation, as required by 10CFR 54.21(a)(3).

7.2.1.2.4 Crack Initiation and Growth Due to Thermal and Mechanical Loading or Stress Corrosion Cracking (MPS Unit 2 LRA Section 3.1.2.2.4)

The project team reviewed MPS Unit 2 LRA Section 3.1.2.2.4 against the criteria contained in SRP-LR Section 3.1.2.2.4.

In MPS Unit 2 LRA Section 3.1.2.2.4, the applicant addresses the potential for crack initiation and growth due to thermal and mechanical loading or stress corrosion cracking (SCC, including intergranular SCC) that could occur in small-bore RCS and connected system piping less than 4-inch nominal pipe size (NPS 4).

SRP-LR Section 3.1.2.2.4 states that the GALL Report recommends that a plant-specific destructive examination or a nondestructive examination (NDE) that permits inspection of the inside surfaces of the piping be conducted to ensure that cracking has not occurred and the component intended function will be maintained during the period of extended operation. The applicant should verify that service-induced weld cracking is not occurring in small-bore piping less than NPS 4. A one-time inspection of a sample of locations is an acceptable method to ensure that the aging effect is not occurring and the component's intended function will be maintained during the period of extended operation. Per ASME Section XI, 1995 Edition, Examination Category B-J or B-F, small-bore piping, defined as piping less than NPS 4, does not receive volumetric inspection.

The AMPs recommended by the GALL Report are GALL AMP XI.M1, "ASME Section XI Inservice Inspection, Subsections IWB, IWC, and IWD," to detect loss of material, and GALL AMP XI.M2, "Water Chemistry," to mitigate SCC.

In the MPS Unit 2 LRA, the applicant credits MPS AMP B2.1.18, "Inservice Inspection Program: Systems, Components and Supports," and MPS AMP B2.1.5, "Chemistry Control for Primary Systems," to mitigate cracking of reactor coolant piping. The project team evaluated these programs and its evaluation is documented in Section 7.1.17 and Section 7.1.4 of this report, respectively.

To address the GALL Report recommendation that a plant-specific destructive examination or a NDE that permits inspection of the inside surfaces of the piping be conducted, the applicant states, in the MPS Unit 2 LRA, that it has implemented a RI-ISI methodology at MPS Unit 2 to select RCS piping welds for inspection in lieu of the requirements specified in ASME Section XI. To address the GALL Report recommendation for a one-time inspection of small-bore piping less than NPS 4, the applicant indicated in the MPS Unit 2 LRA that small-bore pipe butt-welded connections are included in the final weld selection for performance of volumetric examination. The project team verified that the applicant used the RI-ISI process to determine the most susceptible locations for performing the volumetric examination and did not eliminate small-bore pipe welds.

The project team reviewed and verified that the applicant's RI-ISI plan will perform volumetric examination, which is recommended to address cracking for small-bore Class 1 piping per

ISG-12, "One-Time Inspection of Small-Bore Piping," on elements not currently required to be volumetrically examined. The project team finds that the applicant, based on the programs identified above, appropriately evaluated AMR results involving current inspection methods, as detailed in the inservice inspection program, and as supplemented by the water chemistry control, for managing cracking of small-bore piping systems.

The project team finds that the applicant's AMR results are consistent with the GALL Report, and that the applicant has demonstrated that the effects of aging will be adequately managed so that the intended functions will be maintained consistent with the CLB during the period of extended operation, as required by 10 CFR 54.21(a)(3).

7.2.1.2.5 Crack Growth Due to Cyclic Loading (MPS Unit 2 LRA Section 3.1.2.2.5)

MPS Unit 2 LRA, Section 3.1.2.2.5, is reviewed by NRR DE staff and addressed in Section 4 of the SER related to the MPS Units 2 and 3 LRA.

7.2.1.2.6 Changes in Dimension Due to Void Swelling (MPS Unit 2 LRA Section 3.1.2.2.6)

The project team reviewed MPS Unit 2 LRA Section 3.1.2.2.6 against the criteria in SRP-LR Section 3.1.2.2.6.

In MPS Unit 2 LRA Section 3.1.2.2.6, the applicant addresses changes in dimension due to void swelling that could occur in reactor internals components.

SRP-LR Section 3.1.2.2.6 states that the GALL Report recommends that changes in dimension due to void swelling in reactor internals components be evaluated to ensure that this aging effect is adequately managed. The GALL Report recommends that a plant-specific AMP be evaluated to manage the effects of changes in dimension due to void swelling and the loss of fracture toughness associated with swelling.

The applicant states that the void swelling of reactor vessel internals is managed by MPS AMP B2.1.17, "Inservice Inspection Program: Reactor Vessel Internals." The applicant has committed to further understanding of this aging effect through industry programs to provide additional bases for supplemental examinations or component-specific evaluations.

The project team reviewed the inservice inspection program: reactor vessel internals program and its evaluation is documented in Section 7.1.16 of this report. The project team finds that this program will be consistent with GALL AMP XI.M13, "Thermal Aging and Neutron Embrittlement of Cast Austenitic Stainless Steel (CASS)," and GALL AMP XI.M16, "PWR Vessel Internals."

The project team finds the applicant's approach for managing changes in dimension due to void swelling acceptable because the approach will be based on the guidelines developed by the ongoing industry activities related to void swelling. The applicant has committed to implement the appropriate recommendations resulting from the industry efforts. The applicant also committed, through a LRA supplement letter dated July 7, 2004 (ML041900407), that the revised program description, including a comparison to the 10 program elements of the

NUREG-1801 program, will be submitted to the NRC for approval prior to the period of extended operation.

The project team finds that the effects of aging will be adequately managed so that the intended functions will be maintained consistent with the CLB during the period of extended operation, as required by 10 CFR 54.21(a)(3).

7.2.1.2.7 Crack Initiation and Growth Due to Stress Corrosion Cracking or Primary Water Stress Corrosion Cracking (MPS Unit 2 LRA Section 3.1.2.2.7)

The project team reviewed MPS Unit 2 LRA Section 3.1.2.2.7 against the criteria in SRP-LR Section 3.1.2.2.7, which recommends plant-specific programs to address these aging mechanisms.

In MPS Unit 2 LRA Section 3.1.2.2.7, the applicant addresses (1) crack initiation and growth due to SCC and primary water stress corrosion cracking (PWSCC) in the pressurizer (spray head assembly/nozzle assembly). Reactor vessel items included in this grouping are the lower shell and bottom head cladding, surveillance capsule holders, core stabilizing lugs, core stop lugs, and the flow baffle and skirt. Steam generator items included in this grouping are the tube plate cladding, channel head divider plate, and primary instrument nozzles; (2) crack initiation and growth due to SCC in the pressurizer surge line piping, fittings and pipe (safe ends for safety injection (SI) and shutdown cooling (SDC)) fabricated of CASS; and (3) crack initiation and growth due to PWSCC in nickel-based alloy components such as the pressurizer instrumentation nozzles, heater sheaths and sleeves, and thermal sleeves.

SRP-LR Section 3.1.2.2.7 states that

> Crack initiation and growth due to SCC and PWSCC could occur in core support pads (or core guide lugs), instrument tubes (bottom head penetrations), pressurizer spray heads, and nozzles for the steam generator instruments and drains. The GALL Report recommends further evaluation to ensure that these aging effects are adequately managed. The GALL Report recommends that a plant-specific AMP be evaluated because existing programs may not be capable of mitigating or detecting crack initiation and growth due to SCC.
>
> Crack initiation and growth due to SCC could occur in CASS RCS piping and fittings and pressurizer surge line nozzles. The GALL Report recommends further evaluation of piping that does not meet either the reactor water chemistry guidelines of EPRI TR-105714 or material guidelines of NUREG-0313, "Technical Report on Material Selection and Processing Guidelines for BWR Coolant Pressure Boundary Piping," Revision 2, dated January 1988.
>
> Crack initiation and growth due to PWSCC could occur in pressurizer instrumentation penetrations and heater sheaths and sleeves made of nickel alloys. The existing program relies on ASME Section XI inservice inspection and on control of water chemistry to mitigate PWSCC. However, the existing program should be augmented to manage the effects of SCC on the intended function of nickel-alloy components. The GALL Report recommends that the

applicant provide a plant-specific AMP or participate in industry programs to determine appropriate AMPs for PWSCC of the Alloy 182 weld.

The applicant credits the following plant-specific programs for each of the three SRP-LR criteria:

Cracking of nickel-based alloy components due to PWSCC is managed by the nickel-based alloys (i.e., PWSCC in Alloy 600 base metal and Alloy 82/182 weld metals) aging management activities, which are part of MPS AMP B2.1.18, “Inservice Inspection Program: Systems, Components and Supports,” supplemented by MPS AMP B2.1.5, ”Chemistry Control for Primary Systems Program.” Additionally, EPRI, through its material reliability program (MRP) and in conjunction with the PWR Owners Groups, is developing a strategic plan to manage and mitigate cracking of nickel-based alloy items. The applicant states that the guidance developed by the MRP will be used to identify the appropriate aging management activities and will implement the appropriate recommendations resulting from this guidance as described in the License renewal Commitment, Item 14.

Crack initiation and growth due to SCC at welded connections, including the pressurizer surge line and fittings and pipe safe ends for SI and SDC, is managed by MPS AMP B2.1.5, “Chemistry Control for Primary Systems Program,” and MPS AMP B2.1.18, ”Inservice Inspection Program: Systems, Components and Supports.”

The programs credited for the management of PWSCC of these nickel-based alloy items are the nickel-based alloys (i.e., PWSCC in Alloy 600 base metal and Alloy 82/182 weld metals) aging management activities, which are part of MPS AMP B2.1.18, ”Inservice Inspection Program: Systems, Components and Supports,” and MPS AMP B2.1.5,” Chemistry Control for Primary Systems Program.” As described above, the applicant committed to participate in the nickel-based alloys industry programs to identify appropriate aging management activities and will implement the appropriate recommendations from the guidance developed by industry programs.

The project team’s evaluation of the chemistry control for primary systems program and the inservice inspections programs: systems, components and supports program is documented in Section 7.1.4 and Section 7.1.17 of this report, respectively.

The nickle-based alloys aging management activity is part of MPS AMP B2.1.18, “Inservice Inspection Program: Systems, Components and Supports,” and the staff’s evaluation of the nickel-based alloys (i.e., PWSCC in Alloy 600 base metal and Alloy 82/182 weld metals) aging management is documented in Section 3 of the SER related to the MPS Units 2 and 3 LRA.

The project team finds that the applicant appropriately evaluated AMR results which address these aging mechanisms, as recommended by the GALL Report.

The project team finds that the applicant has demonstrated that the effects of aging will be adequately managed so that the intended functions will be maintained consistent with the CLB during the period of extended operation, as required by 10 CFR 54.21(a)(3).

7.2.1.2.8 Crack Initiation and Growth Due to Stress Corrosion Cracking or Irradiation-Assisted Stress Corrosion Cracking (MPS Unit 2 LRA Section 3.1.2.2.8)

The project team reviewed MPS Unit 2 LRA Section 3.1.2.2.8 against the criteria in SRP-LR Section 3.1.2.2.8.

In MPS Unit 2 LRA Section 3.1.2.2.8, the applicant addresses crack initiation and growth due to SCC or irradiation-assisted stress corrosion cracking (IASCC) that could occur in baffle/former bolts in the reactor. The applicant states that MPS Unit 2 reactor vessel internals do not include baffle/former bolts and that the discussion in this paragraph of the SRP-LR is not applicable to MPS Unit 2.

SRP-LR Section 3.1.2.2.8 states that crack initiation and growth due to SCC or IASCC could occur in baffle/former bolts in the reactors. The GALL Report recommends further evaluation to ensure that these aging effects are adequately managed.

On the basis that the baffle/former bolts are not part of the MPS Unit 2 design of reactor vessel internals, the project team finds that this aging effect is not applicable to MPS Unit 2.

7.2.1.2.9 Loss of Preload Due to Stress Relaxation (MPS Unit 2 LRA Section 3.1.2.2.9)

The project team reviewed MPS Unit 2 LRA Section 3.1.2.2.9 against the criteria in SRP-LR Section 3.1.2.2.9.

In MPS Unit 2 LRA Section 3.1.2.2.9, the applicant states that baffle/former bolts are not used in the reactor vessel internals and that the discussion in this paragraph of the SRP-LR is not applicable to MPS Unit 2.

SRP-LR Section 3.1.2.2.9 states that loss of preload due to stress relaxation could occur in baffle/former bolts in the reactor. The GALL Report recommends a plant-specific AMP to ensure that this aging effect is adequately managed.

On the basis that the baffle/former bolts are not part of the MPS Unit 2 design of reactor vessel internals, the project team finds that this aging effect is not applicable to MPS Unit 2.

7.2.1.2.10 Loss of Section Thickness Due to Erosion (MPS Unit 2 LRA Section 3.1.2.2.10)

The project team reviewed MPS Unit 2 LRA Section 3.1.2.2.10 against the criteria in SRP-LR Section 3.1.2.2.10.

In MPS Unit 2 LRA Section 3.1.2.2.10, the applicant states that the MPS Unit 2 steam generators do not have feedwater impingement plates and that the discussion in this paragraph of the SRP-LR is not applicable to MPS Unit 2.

SRP-LR Section 3.1.2.2.10 states that loss of section thickness due to erosion could occur in steam generator feedwater impingement plates and supports. The GALL Report recommends further evaluation of a plant-specific AMP to ensure that this aging effect is adequately managed.

On the basis that feedwater impingement plates are not part of the MPS Unit 2 steam generator design, the project team finds that this aging effect is not applicable to MPS Unit 2.

7.2.1.2.11 Crack Initiation and Growth Due to Primary Water Stress Corrosion Cracking, Outside Diameter Stress Corrosion Cracking, or Intergranular Attack or Loss of Material Due to Wastage and Pitting Corrosion or Loss of Section Thickness Due to Fretting and Wear or Denting Due to Corrosion of Carbon Steel Tube Support Plate (MPS Unit 2 LRA Section 3.1.2.2.11)

The project team reviewed MPS Unit 2 LRA Section 3.1.2.2.11 against the criteria in SRP-LR Section 3.1.2.2.11.

In MPS Unit 2 LRA Section 3.1.2.2.11, the applicant addresses crack initiation and growth due to PWSCC, outside diameter SCC, or intergranular attack (IGA) or loss of material due to wastage and pitting corrosion or deformation due to corrosion that could occur in nickel-based alloy components of the steam generator tube plugs.

For the tube component type of nickle-based alloy material in a treated water environment, the plant-specific note in the MPS Unit 2 LRA Table 3.1.2.4 (page 3-97), indicates that the material for this component is not addressed by the GALL Report. Furthermore, these tubes are fabricated from Alloy 690. The applicant also states that Alloy 690 is a high-chromium nickel-based alloy that is more resistant to SCC than Alloy 600. For that reason, the applicant states that the material match was not made to the GALL Report items that referenced Alloy 600 material. Therefore, the tubes discussion is not address in this section, but is addressed in Section 7.2.1.3 of this report.

SRP-LR Section 3.1.2.11 states that crack initiation and growth due to PWSCC, outside diameter SCC, or IGA or loss of material due to wastage and pitting corrosion or deformation due to corrosion could occur in Alloy 600 components of the steam generator tubes, repair sleeves, and plugs. All PWR licensees have committed voluntarily to a steam generator degradation management program described in NEI 97-06, "Steam Generator Program Guidelines." These guidelines are currently under NRC staff review. The GALL Report recommends that an AMP based on the recommendations of staff-approved NEI 97-06 guidelines, or other alternate regulatory bases for steam generator degradation management, should be developed to ensure that this aging effect is adequately managed.

The SRP-LR also states that crack initiation and growth due to PWSCC, outside diameter SCC, or IGA or loss of material due to wastage and pitting corrosion or deformation due to corrosion could occur in nickel-based alloy components of the steam generator tubes and plugs.

To manage the effects of aging, the applicant credits MPS AMP B2.1.23, “Steam Generator Structural Integrity,” supplemented by MPS AMP B2.1.5, “Chemistry Control for Primary

Systems Program," and MPS AMP B2.1.6, "Chemistry Control for Secondary Systems Program." The NRR DE staff's evaluation of the steam generator structural integrity program is documented in Section 3.0 of the SER related to the MPS Units 2 and 3 LRA. The project team reviewed the chemistry control for primary systems and chemistry control for secondary systems programs and its evaluations are documented in Section 7.1.4 and Section 7.1.5 of this report, respectively. For general and pitting corrosion and for the assessment of tube integrity, and plugging or repair criteria of flawed tubes, the steam generator structural integrity program acceptance criteria are in accordance with NEI 97-06 guidelines.

On the basis of its review of the primary and secondary water chemistry control, the project team finds that the applicant appropriately evaluated AMR results involving plant-specific programs to address these aging mechanisms, as recommended in the GALL Report.

7.2.1.2.12 Loss of Section Thickness Due to Flow-Accelerated Corrosion (MPS Unit 2 LRA Section 3.1.2.2.12)

The project team reviewed MPS Unit 2 LRA Section 3.1.2.2.12 against the criteria in SRP-LR Section 3.1.2.2.12.

In MPS Unit 2 LRA Section 3.1.2.2.12, the applicant states that the steam generator tube support lattice bars are constructed of stainless steel. Therefore, loss of section thickness of these bars is not an applicable aging effect for MPS Unit 2.

SRP-LR Section 3.1.2.2.12 states the loss of section thickness due to FAC could occur in tube support lattice bars made of carbon steel. The GALL Report recommends that a plant-specific AMP be evaluated and, on the basis of the guidelines of NRC Generic Letter 97-06, an inspection program for steam generator internals be developed to ensure that this aging effect is adequately managed.

On the basis that carbon steel tube support lattice bars are not part of the MPS Unit 2 steam generator design, the project team finds that this aging effect is not applicable to MPS Unit 2.

7.2.1.2.13 Ligament Cracking Due to Corrosion (MPS Unit 2 LRA Section 3.1.2.2.13)

The project team reviewed MPS Unit 2 LRA Section 3.1.2.2.13 against the criteria in SRP-LR Section 3.1.2.2.13.

In MPS Unit 2 LRA Section 3.1.2.2.13, the applicant states that tube support plates are not used in the steam generators. Therefore, ligament cracking due to corrosion is not an applicable aging effect for MPS Unit 2.

SRP-LR Section 3.1.2.2.13 states that ligament cracking due to corrosion could occur in carbon steel components in the steam generator tube support plate. All PWR licensees have committed voluntarily to a steam generator degradation management program described in NEI 97-06; these guidelines are currently under NRC staff review. The GALL Report recommends that an AMP based on the recommendations of staff-approved NEI 97-06 guidelines, or other alternate regulatory basis for steam generator degradation management, be developed to ensure that this aging effect is adequately managed.

On the basis that tube support plates are not used in the steam generators at MPS Unit 2, the project team finds that this aging effect is not applicable to MPS Unit 2.

On the basis that tube support plates are not used in the SGs at MPS Unit 2, the project team finds that this aging effect is not applicable to MPS Unit 2.

7.2.1.2.14 Loss of Material Due to Flow-Accelerated Corrosion (MPS Unit 2 LRA Section 3.1.2.2.14)

The project team reviewed MPS Unit 2 LRA Section 3.1.2.2.14 against the criteria in SRP-LR Section 3.1.2.2.14.

SRP-LR Section 3.1.2.2.14 states that loss of material due to FAC could occur in the feedwater inlet ring and supports. As noted in Combustion Engineering (CE) IN 90-04, NRC IN 91-19, "Steam Generator Feedwater Distribution Piping Damage," and LER 50-362/90-05-01, this form of degradation has been detected only in certain CE System 80 steam generators. The GALL Report recommends further evaluation to ensure that this aging effect is adequately managed. The GALL Report recommends that a plant-specific AMP be evaluated because existing programs may not be capable of mitigating or detecting loss of material due to FAC.

The project team noted, in MPS Unit 2 LRA Table 3.1.2-4 (page 3-88), that for loss of material of the feedwater inlet ring and the support component type of carbon steel exposed internally to a treated water environment, the applicant credits the chemistry control for secondary systems program. The project team asked the applicant to clarify why the FAC program is not assigned to this component (Audit Item 82-1).

The applicant responded in its MPS LRA supplement letter dated July 7, 2004 (ML041900407), that the FAC program should be added for the feedwater inlet ring and support component type. In addition, the GALL Report item match for this entry should be IV.D1.3-a with Note B. Also, the 'Table 1 Item' entry should be 3.1.1-21. Furthermore, the applicant states that MPS Unit 2 LRA Section 3.1.2.2.14 (page 3-20) and MPS Unit 2 LRA Table 3.1.1, the discussion column for Item 3.1.1-21 (page 3-30) ,should state:

> Although the Unit 2 steam generators are not CE System 80 steam generators, the feedwater inlet ring is included in the Flow Accelerated Corrosion program.

The project team requested that the applicant clarify how the FAC inspection of the steam generator feedwater ring would be performed. The applicant responded that FAC inspection of the feedwater inlet is performed using the program generic FAC inspection techniques for gridding and UT.

On the basis of its review, the project team finds that the applicant has demonstrated that the effect of aging will be adequately managed so that the intended function will be maintained consistent with the CLB for the period of extended operation, as required by 10 CFR 54.21(a)(3).

7.2.1.3 Aging Management Review Results That Are Not Consistent with the GALL Report or Are Not Addressed in the GALL Report

In MPS Unit 2 LRA Tables 3.1.2-1 through 3.1.2-4, the project team reviewed additional details of the results of the AMRs for material, environment, aging effect requiring management, and AMP combinations that are not consistent with the GALL Report or are not addressed in the GALL Report.

7.2.1.3.1 Reactor Vessel - Summary of Aging Management (MPS Unit 2 LRA Table 3.1.2-1)

The project team reviewed Table 3.1.2-1 of the MPS Unit 2 LRA, which summarizes the results of AMR evaluations for the reactor vessel component groups.

In MPS Unit 2 LRA Table 3.1.2-1, the applicant identified no aging effects for the following stainless steel and nickel-based alloy reactor vessel component types - control element drive mechanism (CEDM) head penetration nozzle, CEDM head penetration nozzle flange, CEDM pressure housings, head vent pipe, and instrument tubes - exposed externally to air. Air is not identified in the GALL Report as an environment for these components and materials.

On the basis of its review of current industry research and operating experience, the project team finds that dry air on metal will not result in aging that will be of concern during the period of extended operation. These RCS components are exposed to high-temperature internal flow, which creates a dry air environment. Stainless steel and nickel -based alloy components in a dry air environment are not susceptible to general corrosion that would affect their intended function. Therefore, the project team concludes that there are no applicable aging effects requiring management for metal in a dry air environment.

In MPS Unit 2 LRA Table 3.1.2-1, the applicant proposes to manage loss of material for the following stainless steel, nickel-based alloy, and low-alloy steel clad with stainless steel component types of the reactor vessel - core stabilizing lugs and core stop lugs, flow skirt flow baffle, and surveillance capsule holders; CEDM head penetration nozzle, CEDM head penetration nozzle flange, CEDM pressure housings, CEDM head dome, CEDM head flange, instrument tubes, instrument tube flange and studs/nuts/washers, head vent pipe, primary inlet/outlet nozzle and safe end, bottom head, upper shell, and vessel flange and core support ledge - exposed internally to treated, borated water using MPS AMP B2.1.5, “Chemistry Control for Primary Systems Program.” The project team accepted the chemistry control for primary systems program and its evaluation of this program is documented in Section 7.1.4 of this report.

In MPS Unit 2 LRA Table 3.1.2-1, for each of these same component and material combinations, the applicant is also managing cracking using MPS AMP B2.1.5, “Chemistry Control for Primary Systems Program,” and MPS AMP B2.1.18, “Inservice Inspection Program: Systems, Components and Supports.” MPS AMP B2.1.18 is also credited with managing PWSCC in Alloy 600 base metal and Alloy 82/182 weld metals. The project team accepted the chemistry control for primary systems program and the inservice inspection program: systems, components and supports program and its evaluation of these programs is documented in Section 7.1.4 and Section 7.1.17 of this report, respectively. The Alloy 600 base metal and Alloy 82/182 weld metals PWSCC management portion of the AMP is reviewed by NRR DE and its evaluation of this program is documented in Section 3.0 of the SER related to the

MPS Units 2 and 3 LRA. The project team finds that the applicant manages cracking in a manner consistent with the GALL Report.

On the basis that cracking of stainless steel, nickel-based alloy, and low-alloy steel clad with stainless steel is being managed by the water chemistry control and inservice inspection programs, and the effects of pitting and crevice corrosion on stainless steel and nickel-based alloy components are not significant in chemically treated, borated water, the project team finds that management of loss of material using water chemistry control is adequate.

The project team finds that the applicant has demonstrated that the effects of aging will be adequately managed so that the intended functions will be maintained consistent with the CLB during the period of extended operation, as required by 10 CFR 54.21(a)(3).

7.2.1.3.2 Reactor Vessel Internals - Summary of Aging Management (MPS Unit 2 LRA Table 3.1.2-2)

The project team reviewed the MPS Unit 2 LRA Table 3.1.2-2, which summarizes the results of AMR evaluations for the reactor vessel internals component groups.

In MPS Unit 2 LRA Table 3.1.2-2, the applicant proposes to manage loss of material for the following stainless steel component types of the reactor vessel internals system - control element assembly (CEA) shroud assembly components such as CEA shroud extension shaft guides, CEA shrouds - dual, CEA shrouds - single, core shroud assembly, core shroud tie rods, core support barrel, core support barrel alignment keys, core support barrel snubber assemblies, core support barrel upper flange, core support columns, core support plate, expansion compensating ring, fuel alignment pins, fuel alignment plate, fuel alignment plate guide lugs and guide lug inserts, incore instrumentation (ICI) support plate and guide tubes, lower support structure beam assemblies, and upper guide structure support plate - exposed internally to treated, borated water using MPS AMP B2.1.5, “Chemistry Control for Primary Systems Program.” The project team accepted the chemistry control for primary systems program and its evaluation of this program is documented in Section 7.1.4 of this report.

In MPS LRA Table 3.1.2-2, for each of these same component and material combinations, the applicant is also managing cracking using MPS AMP B2.1.5, “Chemistry Control for Primary Systems Program,” and MPS AMP B2.1.17, “Inservice Inspection Program: Reactor Vessel Internals.” MPS AMP B2.1.17 credits the ASME Section XI, Subsection IWB, Category B-N-3 inservice inspections and additional examinations based on future industry developments. The project team reviewed the embrittlement effects on CASS portion of the inservice inspection program: reactor vessel internal program and its evaluation of this part of the program is documented in Section 7.1.16 of this report. The evaluation of aging management of such issues as void swelling (change in dimensions), stress corrosion cracking (PWSCC and intergranular stress corrosion cracking (IGSCC)) and loss of preload for the reactor vessel internals components are reviewed by NRR DE and its evaluation is documented in Section 3 of the SER related to the MPS Units 2 and 3 LRA. The project team finds that the applicant manages cracking in a manner consistent with the GALL Report. In addition, the project team reviewed the applicable part of MPS AMP B2.1.18, “Inservice Inspection Program: Systems, Components and Supports,” which discusses the ASME Section XI, Subsection IWB, Category B-N-3 portion of the inservice inspection program. The project team accepted the

inservice inspection program: systems, components and supports program and its evaluation of this program is documented in Section 7.1.17 of this report.

On the basis that cracking of stainless steel is being managed by the water chemistry control and inservice inspection programs, and the effects of pitting and crevice corrosion on stainless steel components are not significant in chemically treated, borated water, the project team finds that management of loss of material using water chemistry control is adequate.

The GALL Report recommends a loose parts monitoring program to manage loss of mechanical closure integrity for CEA shroud extension shaft guides, cylinders, and bases; shroud base; shroud flow channel; shroud flow channel cap; shroud shaft retention pin; shroud retention block; spanner nuts; shroud fasteners; guide tubes; ICI thimble support plate assembly; ICI support plate, grid, lifting support, lifting plate, column, plates, funnel; pad, ring, nipple, hex bolt, spacer; and threaded rod, hex jam nut, thimble support nut, cap screws, reactor vessel internals.

In the MPS Unit 2 LRA, the applicant proposes to manage this aging effect using the MPS AMP B2.1.17, "Inservice Inspection Program: Reactor Vessel Internals." The project team reviewed and accepted the inservice inspection program: reactor vessel internals program and its evaluation of this program is documented in Section 7.1.16 of this report.

On the basis that the inservice inspection program: reactor vessel internals program detects aging effects prior to the loss of mechanical integrity of these components, the project team finds that the use of this program in lieu of a loose parts monitoring program is acceptable.

The project team finds that the applicant has demonstrated that the effects of aging will be adequately managed so that the intended functions will be maintained consistent with the CLB during the period of extended operation, as required by 10 CFR 54.21(a)(3).

7.2.1.3.3 Reactor Coolant System - Summary of Aging Management (MPS Unit 2 LRA Table 3.1.2-3)

The project team reviewed the MPS Unit 2 LRA Table 3.1.2-3, which summarizes the results of AMR evaluations for the RCS component group.

In MPS Unit 2 LRA Table 3.1.2-3, the applicant identified no aging effects for the following stainless steel, nickel-based alloy, and carbon steel component types for the RCS - flow orifices, piping, tubing, valve; pressurizer nozzles, safe ends and instruments and heaters (sheaths and sleeves), manway cover and insert; quench tank, reactor coolant pump (RCP) seal coolers, RCP thermal barriers, RCP casing, RCP rupture disks - exposed externally to air. Air is not identified in the GALL Report as an environment for these components and materials.

The applicant states, in the MPS Unit 2 LRA, that the RCS stainless steel components are externally insulated. The applicant's UFSAR concludes (page 5-6) that the use of external thermal insulation on RCS components in conformance with RG 1.36, "Nonmetallic Thermal Insulation for Austenitic Stainless Steel," dated October 1973, provides reasonable assurance that the reactor coolant pressure boundary material will be adequately protected from conditions that would lead to loss of integrity from stress corrosion. Based on its review of the

applicant's UFSAR, the project team agrees with the applicant that the RCS stainless steel components are adequately protected from conditions that could lead to loss of integrity from stress corrosion.

On the basis of its review of current industry research and operating experience, the project team finds that dry air on metal will not result in aging that will be of concern during the period of extended operation. These RCS components are exposed to high-temperature internal flow, which creates a high-temperature dry air environment, and general corrosion is not likely to occur under such an environment. Additionally, stainless steel and nickel-based alloy in a dry air environment are not susceptible to general corrosion that would affect the intended function of components. The only carbon steel component is the pressurizer manway and insert, which is inspected each time the manway is opened. Therefore, the project team concludes that there are no applicable aging effects requiring management for metal in a dry air environment.

In MPS Unit 2 LRA Table 3.1.2-3, the applicant identified the RCP seal cooler inner tube exposed to borated treated water as subject to cracking which is being managed by MPS AMP B2.1.5, "Chemistry Control for Primary Systems Program." During the audit and review, the project team asked the applicant what other means are used to manage cracking and to explain the consequence of the inner tube cracking on safety functions (Audit Item 152). The applicant responded that in the event cracking does occur, the radiation monitors in the reactor building closed cooling water (RBCCW) system will detect activity and a corrective action report will be initiated to correct the condition. The applicant also stated to the project team that a plant modification has been implemented to address the inter-system loss of coolant accident (LOCA) concern of the RCP seal cooler (inner tube) failing. Furthermore, the applicant's UFSAR Section 9.4.3.2 describes the relief valves that were added to protect the RBCCW system from an inter-system LOCA from a RCP seal cooler (inner tube) failure.

In a MPS LRA supplement letter dated July 7, 2004 (ML04100407), the applicant stated that for RCP seal cooler (inner tube) exposed to treated water subject to cracking, which is being managed by MPS AMP B2.1.5, "Chemistry Control for Primary Systems Program," the GALL Report match for the RCP seal cooler (inner tube) (MPS Unit 2 LRA page 3-82) should be changed to "None." In addition, Note E will be changed to Note H and a new plant specific note will be added that states the following:

> Cracking of the component group "RCP Seal Cooler (Inner Tube)" is managed by Primary Water Chemistry. However, there are additional means for detecting cracking. The additional means consist of monitoring the radiation monitors in the RBCCW System and chemistry sampling of the RBCCW.

On the basis that inservice inspection is not feasible, the project team reviewed the applicant's UFSAR and determined that the applicant has demonstrated that the cracking will be adequately managed by the primary water chemistry control program and radiation monitoring in the RBCCW system.

In MPS Unit 2 LRA Table 3.1.2-3 (page 3-83), the applicant states that the CASS RCP thermal barrier exposed to treated water with aging effect of cracking is to be managed by the chemistry control for primary systems program and the inservice inspection program: systems, components and supports program. The project team asked the applicant to clarify which part

of the inservice inspection program is being credited with managing the aging effect for the RCP thermal barrier. The applicant responded that it was confirmed with the inservice inspection coordinator that the inservice inspection program does not perform examinations associated with the thermal barriers. The work control process program is credited for managing the effects of aging for the RCP thermal barriers. The reactor coolant pumps are refurbished, designated as spares, and reinstalled during future outages. Examples of work orders are identified where, through the work control process program, the thermal barriers associated with spare RCPs are blown down of the closed cooling water and a sample of the closed cooling water is taken. The cited examples are automated work orders M3-97-17720 through M3-97-17723.

The applicant submitted a MPS LRA supplement letter, dated July 7, 2004 (ML04100407), which states as follows in response to the project team's request for clarification (Audit Item 97):

> Note 6 should be added for MPS Unit 2 LRA Table 3.1.2-3 (page 3-83) for the RCS component group 'RCP Thermal Barriers' and aging effect 'Loss of Fracture Toughness.' The Note for this item is revised by Item 42-1 of this clarification letter and is applicable to this component because it is CASS material.
>
> The "Inservice Inspection Program: Systems, Components and Supports" should be replaced by the "Work Control Process" for MPS Unit 2 LRA Table 3.1.2-3 (page 3-83), for the RCS component group 'RCP Thermal Barriers' and aging effect 'Cracking.' The Note for this item should be "E" in the MPS Unit 2 LRA. Also, the "Discussion" column in MPS Unit 2 Table 3.1.1, Item 3.1.1-36 (page 3-33), should read as follows:
>
>> Not consistent with NUREG-1801. Cracking is managed with the Chemistry Control for Primary Systems program and the Inservice Inspection Program: Systems, Components and Supports except for the RCP Thermal Barriers, which are managed with chemistry, and the Work Control Process. These programs take some exceptions to the NUREG-1801 AMPs.

The project team reviewed the work control process program and MPS Specification SP-EE-364, "Specification for Refurbishment of a Millstone Unit 2 Reactor Coolant Pump Motor," Revision 1, dated July 7, 1996, and determined that the applicant has demonstrated that the effects of aging of RCP thermal barriers will be adequately managed.

In MPS Unit 2 LRA Table 3.1.2-3 (page 3-79), the applicant states that for the pressurizer spray head assembly/nozzle assembly component type of nickel-based alloy material in a treated water and steam environment, the applicant credits the chemistry control for primary systems program to manage cracking. The project team asked the applicant to provide justification regarding how PWSCC can be managed by the chemistry control for primary systems program alone. The applicant responded that it intends to replace the Unit 2 pressurizer during the Fall 2006 refueling outage. The replacement will be fabricated with PWSCC resistant materials as described in a letter dated June 3, 2004 (ML041610373).

The project team reviewed the letter and determined that the aging effect of PWSCC will be eliminated on the basis of replacing new pressurizer with PWSCC resistant materials.

7.2.1.3.4 Steam Generator - Summary of Aging Management (MPS Unit 2 LRA Table 3.1.2-4)

The project team reviewed Table 3.1.2-4 of the MPS Unit 2 LRA, which summarizes the results of AMR evaluations for the steam generator component groups.

In MPS Unit 2 LRA Table 3.1.2-4, the applicant identified no aging effects for the following nickel-based alloy, low-alloy steel, and carbon steel component types of the steam generator - primary instrument nozzles, primary manway cover and diaphragm, secondary manway and handhole covers, secondary side nozzles, safe ends, transition cone, upper and lower shell - exposed externally to air. Air is not identified in the GALL Report as an environment for these components and materials.

On the basis of its review of the current industry research and operating experience, the project team finds that dry air on metal will not result in aging that will be of concern during the period of extended operation. The external environments being referred to are typical of ambient air which is reactor building air environment. Significant corrosion of low-alloy steel requires an electrolytic environment, and a simultaneous presence of oxygen and moisture. Without the presence of the aggressive environment, low-alloy steel components will experience insignificant amounts of corrosion, and no aging effects are applicable to this component/commodity group. Nickel-based alloy and stainless steels are not susceptible to significant general corrosion that would affect the intended function of components. Therefore, the project team concludes that there are no applicable aging effects requiring management for metal in a dry air environment.

In MPS Unit 2 LRA Table 3.1.2-4, the applicant proposes to manage loss of material for the following stainless steel, carbon steel, low-alloy steel, and nickel-based alloy component types of the steam generator - divider plate; feedwater inlet ring and support; feedwater nozzle and safe end; feedwater nozzle thermal sleeve; lower head; primary manway cover and diaphragm; primary nozzle and safe end (and cladding); secondary manway and handcover; secondary side nozzle (except steam and feedwater); shroud; steam nozzle and safe end; steam nozzle flow restrictor; top head; tube support lattice bars; tube support lattice support rings; tubesheet (and cladding); steam generator tube plugs; and steam generator U-tubes - exposed to treated water/steam, and borated water using the water chemistry control programs. Additionally, the tubesheet, steam generator U-tubes, and tube support lattice support rings also are managed by the steam generator structural integrity program. The project team accepted MPS AMP B2.1.5, “Chemistry Control for Primary Systems Program,” and MPS AMP B2.1.6,”Chemistry Control for Secondary Systems Program,” and its evaluation of these AMPs is documented in Section 7.1.5 and Section 7.1.6 of this report, respectively. The steam generator structural integrity program is reviewed by NRR DE and is evaluated in Section 3 of the SER related to the MPS Units 2 and 3 LRA.

On the basis of industry operating experience with this material and use of a water chemistry control program consistent with the GALL Report, the project team finds this acceptable.

In the MPS Unit 2 LRA Table 3.1.2-4, the applicant proposes to manage cracking for the following stainless steel component types of the steam generator - divider plate, primary manway cover, and diaphragm - exposed to borated water using water chemistry control programs. The applicant states that the divider plate and primary manway are not inspected under the inservice inspection program; however, the components are inspected each time the manway is opened. The project team reviewed the applicant's specification SP-21172, "Inservice Inspection of SGs," and determined that the applicant adequately manages the aging effect.

The project team finds that management of cracking in low-alloy steel and carbon steel exposed to treated water using water chemistry control verified by inservice inspection is acceptable, as recommended by the GALL Report.

The project team finds that management of cracking in stainless steel exposed to treated water using water chemistry control is acceptable, as recommended by the GALL Report.

All other AMRs assigned to the project team in LRA Tables 3.1.2-1 through 3.1.2-4 were evaluated. The project team finds them to be acceptable.

7.2.2 MPS Unit 2 LRA Section 3.2 - Aging Management of Engineered Safety Features Systems

In MPS Unit 2 LRA Section 3.2, the applicant provides the results of its AMRs for components for the engineered safety features systems.

In MPS Unit 2 LRA Tables 3.2.2-1 through 3.2.2-5 (Table 2s), the applicant provides a summary of the AMRs for component types associated with the following systems: (1) containment spray; (2) safety injection; (3) refueling water storage tank and containment sump; (4) shutdown cooling; and (5) spent fuel pool cooling. The summary information for each component type included intended function; material; environment; aging effect requiring management; AMPs; the GALL Report Volume 2 item, cross reference to the MPS Unit 2 LRA Table 3.2.1 (Table 1); and generic and plant-specific notes related to consistency with the GALL Report.

Also, the applicant identified for each component type in MPS Unit 2 LRA Table 3.2.1 (Table 1) those components where further evaluation is recommended, those for which no further evaluation is required, and those that are not applicable to MPS Unit 2, together with the basis for their exclusion.

Additionally, the applicant identified in MPS Unit 2 LRA Tables 3.2.2-1 through 3.2.2-5 which AMR results it considered to be consistent with the GALL Report (table column Notes A through E) and which it justified on a different basis.

The AMRs that are within the scope of the project team audit and review are identified on copies of the MPS Unit 2 LRA Tables 3.2.2-1 through 3.2.2-5 which are included as an appendix to the MPS Units 2 and 3 audit and review plan.

The project team conducted its audit and review in accordance with SRP-LR Section 3.2.3 and the MPS Units 2 and 3 audit and review plan. The project team interviewed the applicant's technical staff and reviewed, in whole or in part, the documents listed in Attachment 5 of this report for Section 3.2, including MPS Unit 2 Technical Report, MP-LR-3412/MP-LR-4412, "AMR for Engineered Safety Features," Revision 4, June 18, 2004 and Revision 3, June 18, 2003, respectively, which provide the AMR results for the engineered safety features systems.

7.2.2.1 Aging Management Review Results That Are Consistent With the GALL Report, for Which No Further Evaluation Is Required

For aging management evaluations that the applicant states are consistent with the GALL Report and for which further evaluation is not recommended, the project team conducted its audit and review to determine if the applicant's reference to the GALL Report in the MPS Unit 2 LRA is acceptable.

The project team reviewed the MPS Unit 2 LRA and the information in the MPS LRA supplement letter dated January 11, 2005 (ML050190289), to confirm that the applicant (1) provides a brief description of the system, components, materials, and environment; (2) states that the applicable aging effects have been reviewed and are evaluated in the GALL Report; and (3) identifies those aging effects for the engineered safety features system components that are subject to an AMR.

7.2.2.1.1 Loss of Material Due to Boric Acid Corrosion

In MPS Unit 2 LRA Table 3.2.1, Item 3.2.1-17, the applicant states that loss of material due to boric acid corrosion is managed by MPS AMP B2.1.3, "Boric Acid Corrosion Program," and MPS AMP B2.1.13, "General Condition Monitoring Program." The boric acid corrosion program includes specific inspections of reactor coolant pressure boundary and supporting system components. The boric acid corrosion program is reviewed by NRR DE and is evaluated in Section 3 of the SER related to the MPS Units 2 and 3 LRA.

The general condition monitoring program provides inspections for management of loss of material due to boric acid corrosion beyond the scope of the boric acid corrosion program. During the audit and review, the project team asked the applicant for clarification regarding how loss of material for components not normally visible, or in infrequently accessed areas are managed by this program. Further clarification was requested on how identification, documentation, evaluation, and trending of boric acid leakage is performed under this program. The applicant stated to the project team that the general condition monitoring program is an extension of the boric acid corrosion program in that general condition monitoring program inspections identify borated water leakage and then, through the corrective action program, the leak is assigned and evaluated by the boric acid corrosion program. When borated water leakage is identified by the general condition monitoring program, a condition report is written to identify the leak. During the daily review of the new condition reports, the leak is assigned to the boric acid corrosion program where it gets fully evaluated and repaired as required. This is the same process used to identify leaks in the boric acid corrosion program.

In the MPS Unit 2 LRA, the applicant states that for those areas identified as infrequently accessed areas, for the purposes of detecting boric acid leakage, entry into the area is

performed often enough (at least once per refueling interval) to credit the general condition monitoring program. The one exception is the Unit 3 demineralizer cubicles area. However, for this area, a video inspection is performed at least once every 10 years to verify the integrity of the equipment. There is reasonable assurance that this inspection interval will detect borated water leakage prior to the loss of intended function of the affected equipment. In addition, the inspection opportunities for the these cubicles will probably be more frequent than once every 10 years due to the need to perform corrective maintenance, filter changeout, etc. The MPS Unit 3 areas accessed at least once per refueling interval are typically performed by operations during tagouts, health physics during general area surveys or a survey performed for upcoming work in the area, or during containment walkdowns as part of the boric acid corrosion program. No infrequently accessed areas with systems containing borated water are identified for MPS Unit 2. The project team's evaluation of the general condition monitoring program is documented in Section 7.1.12 of this report. Based on the applicant's response and review of the general condition monitoring program, the project team concludes that this program is acceptable for managing loss of material since visual inspection of external surfaces is performed during various walkdowns performed by plant personnel to look for boron buildup and/or boric acid leaks.

On the basis of its audit and review, the project team determined that for AMRs not requiring further evaluation, as identified In MPS Unit 2 LRA Table 3.2.1 (Table 1), the applicant's references to the GALL Report are acceptable and no further project team review is required.

7.2.2.1.2 Loss of Material Due to General Corrosion; Crack Initiation and Growth Due to Cyclic Loading and/or Stress Corrosion Cracking

In MPS Unit 2 LRA Table 3.2.1, Item 3.2.1-18, the applicant states that bolting in the engineered safety features systems is not subject to wetted conditions, therefore, loss of material due to general corrosion is not expected. Additionally, cracking for bolting in engineered safety features systems is not identified as an aging effect requiring management.

The project team noted that SRP-LR Table 3.2-1 recommended GALL AMP XI.M18, "Bolting Integrity," for managing closure bolting in a high-pressure or high-temperature system for loss of material due to general corrosion, crack initiation and growth due to cyclic loading and/or SCC.

The project team questioned the applicant on whether all of the resolutions of the generic safety issue for bolting, as stated in NUREG-1339, are addressed. By letter dated December 3, 2004 (ML043450341), the applicant submitted its LRA supplement. In its response, the applicant stated that it has developed a specific bolting integrity aging management program that addresses degradation of bolting at MPS.

By letter dated January 11, 2005 (ML050190289), the applicant submitted its bolting aging management roll-up item. In its response, the applicant replaced the existing information in the "Discussion" column of Unit 2 LRA Table 3.2.1, Item 18 with "consistent with the NUREG-1801."

The project team reviewed the applicant's response and finds this acceptable since it is consistent with the GALL Report. The bolting integrity program is reviewed by NRR DE and its evaluation is documented in Section 3 of the SER related to the MPS Units 2 and 3 LRA.

On the basis of its audit and review, the project team determined that for AMRs not requiring further evaluation, as identified in MPS Unit 2 LRA Table 3.2.1 (Table 1), the applicant's references to the GALL Report are acceptable and no further project team review is required.

7.2.2.2 Aging Management Review Results That Are Consistent With the GALL Report, for Which Further Evaluation Is Recommended

For some line items consistent with the GALL Report in MPS Unit 2 LRA Tables 3.2.2-1 through 3.2.2-5, the GALL Report recommends further evaluation. When further evaluation is recommended, the project team reviewed these further evaluations provided in MPS Unit 2 LRA Section 3.2.2.2 against the criteria provided in the SRP-LR Section 3.2.2.2. The following provides the project team's assessments of these evaluations. These project team assessments are applicable to each Table 2 line item in Section 3.2 citing the item in Table 1.

The MPS Unit 2 LRA sections identified in MPS Unit 2 LRA Table 3.2.1 for which further evaluation is recommended are discussed below.

7.2.2.2.1 Cumulative Fatigue Damage (MPS Unit 2 LRA Section 3.2.2.2.1)

MPS Unit 2 LRA Section 3.2.2.2.1 is reviewed by NRR DE staff and addressed in Section 4 of the SER related to the MPS Units 2 and 3 LRA.

7.2.2.2.2 Loss of Material Due to General Corrosion (MPS Unit 2 LRA Section 3.2.2.2.2)

The project team reviewed MPS Unit 2 LRA Section 3.2.2.2.2 against the criteria in SRP-LR Section 3.2.2.2.2.

In MPS Unit 2 LRA Section 3.2.2.2.2, the applicant addresses loss of material due to general corrosion that could occur in the containment spray, containment isolation valves and associated piping, and the external surfaces of carbon steel components.

SRP-LR Section 3.2.2.2.2.2 states that loss of material due to general corrosion could occur in the containment spray, containment isolation valves and associated piping, and the external surfaces of carbon steel components. The GALL Report recommends further evaluation on a plant-specific basis to ensure that the aging effect is adequately managed.

The applicant states, in the MPS Unit 2 LRA, that for loss of material from internal surfaces, this item applies to carbon steel containment spray headers, nozzles, and valves and to carbon steel containment isolation piping and valves. The containment spray headers, nozzles, and valves and containment isolation components in the engineered safety features systems are constructed of stainless steel and are not subject to loss of material due to general corrosion. Containment isolation components associated with other plant systems are evaluated for the effects of aging along with the host system to which they are assigned.

For loss of material from external surfaces, this item applies to carbon steel engineered safety features components. Loss of material from external surfaces due to general corrosion is applicable to carbon steel (including cast iron and low-alloy steel) components in an air environment when exposed to intermittent wetting conditions. For these components, loss of

material from external surfaces is managed by MPS AMP B2.1.13, “General Condition Monitoring”

The project team concludes that loss of material due to general corrosion does not apply to stainless steel components.

The project team reviewed the general condition monitoring program and its evaluation is documented in Section 7.1.12 of this report. The project team finds that the general condition monitoring program is acceptable for managing loss of material due to general corrosion on external surfaces of carbon steel components since visual inspections will be performed on external surfaces to detect any sign of aging degradation.

On the basis of their review of the general condition monitoring program, the project team finds that the applicant has appropriately evaluated AMR results involving management of the loss of material due to general corrosion, as recommended in the GALL Report.

7.2.2.2.3 Local Loss of Material Due to Pitting and Crevice Corrosion (MPS Unit 2 LRA Section 3.2.2.2.3)

The project team reviewed MPS Unit 2 LRA Section 3.2.2.2.3 against the criteria in SRP-LR Section 3.2.2.2.3.

In MPS Unit 2 LRA Section 3.2.2.2.3, the applicant addresses local loss of material from pitting and crevice corrosion that could occur in the containment spray components, containment isolation valves and associated piping, the buried portion of the refueling water tank external surface.

SRP-LR Section 3.2.2.2.3.2 states that local loss of material from pitting and crevice corrosion could occur in the containment spray components, containment isolation valves and associated piping, and the buried portion of the refueling water tank external surface. The GALL Report recommends further evaluation to ensure that the aging effect is adequately managed.

The applicant states, in the MPS Unit 2 LRA, that containment isolation components are potentially subject to a loss of material due to pitting and crevice corrosion. Loss of material for these components is managed by MPS AMP B2.1.5, “Chemistry Control for Primary Systems Program.”

Also, the external bottom surface of the RWST is potentially subject to a loss of material due to pitting and crevice corrosion. Loss of material of the external surface of the RWST bottom is managed by MPS AMP B2.1.24, “Tank Inspection Program.”

The applicant states, in the MPS LRA, that the chemistry control for primary systems program is consistent with the GALL Report with an exception. The project team reviewed the chemistry control for primary systems program, with the exception, and its evaluation is documented in Section 7.1.4 of this report. The exception relates to a later revision of the EPRI guidelines. On the basis of its review, the project team finds the chemistry control for primary systems program acceptable for managing this aging effect for the above components.

The project team reviewed the tank inspection program, which includes an enhancement to measure wall thickness to detect significant loss of material of the RWST bottom surface, and its evaluation is documented in Section 7.1.21 of this report. On the basis of its review, the project team finds the program acceptable for managing loss of material due to pitting and crevice corrosion.

7.2.2.2.4 Local Loss of Material Due to Microbiologically Influenced Corrosion (MPS Unit 2 LRA Section 3.2.2.2.4)

The project team reviewed MPS Unit 2 LRA Section 3.2.2.2.4 against the criteria in SRP-LR Section 3.2.2.2.4.

In MPS Unit 2 LRA Section 3.2.2.2.4, the applicant addresses local loss of material due to MIC.

SRP-LR Section 3.2.2.2.4 states that local loss of material due to MIC could occur in containment isolation valves and associated piping in systems that are not addressed in other chapters of the GALL Report. The GALL Report recommends further evaluation to ensure that the aging effect is adequately managed.

The applicant states, in the MPS Unit 2 LRA, that the containment isolation components are potentially subject to a loss of material due to MIC. Loss of material for these components is managed by MPS AMP B2.1.5, “Chemistry Control for Primary Systems Program.”

The applicant states, in the MPS Unit 2 LRA, that the chemistry control for primary systems program is consistent with the GALL Report with an exception. The project team reviewed the chemistry control for primary systems program and its evaluation is documented in Section 7.1.4 of this report. The exception relates to a later revision of the EPRI guidelines. On the basis of its review, the project team finds the chemistry control for primary systems program acceptable for managing this aging effect.

7.2.2.2.5 Changes in Material Properties Due to Elastomer Degradation (MPS Unit 2 LRA Section 3.2.2.2.5)

The project team reviewed MPS Unit 2 LRA Section 3.2.2.2.5 against the criteria in SRP-LR Section 3.2.2.2.5.

In MPS Unit 2 LRA Section 3.2.2.2.5, the applicant addresses the changes in properties due to elastomer degradation that could occur in seals associated with the standby gas treatment system ductwork and filters. The standby gas treatment system applies to BWRs only.

SRP-LR Section 3.2.2.2.5 states that the changes in properties due to elastomer degradation could occur in seals associated with the standby gas treatment system ductwork and filters. The GALL Report recommends further evaluation to ensure that the aging effect is adequately managed.

The applicant states that this issue applies to BWRs only.

The project team finds that this aging effect is applicable to BWRs only and is not applicable to MPS Unit 2.

7.2.2.2.6 Local Loss of Material Due to Erosion (MPS Unit 2 LRA Section 3.2.2.2.6)

The project team reviewed MPS Unit 2 LRA Section 3.2.2.2.6 against the criteria in SRP-LR Section 3.2.2.2.6.

In MPS Unit 2 LRA Section 3.2.2.2.6, the applicant addresses local loss of material due to erosion that could occur in the HPSI miniflow orifice.

SRP-LR Section 3.2.2.2.6 states that local loss of material due to erosion could occur in the HPSI pump miniflow orifice. This aging mechanism and its effect will apply only to pumps that are normally used as charging pumps in the chemical and volume control systems. The GALL Report recommends further evaluation to ensure that the aging effect is adequately managed.

The applicant states, in the MPS Unit 2 LRA, that the normal charging function is accomplished with positive displacement charging pumps. The centrifugal high-pressure safety injection pumps are not used for normal charging. Therefore, this issue is not applicable to MPS Unit 2.

Since this aging effect would apply to high head charging pumps only, the project team finds that loss of material due to erosion is not applicable to positive displacement charging pumps.

7.2.2.2.7 Buildup of Deposits Due to Corrosion (MPS Unit 2 LRA Section 3.2.2.2.7)

The project team reviewed MPS Unit 2 LRA Section 3.2.2.2.7 against the criteria in SRP-LR Section 3.2.2.2.7.

In MPS Unit 2 LRA Section 3.2.2.2.7, the applicant addresses the plugging of components due to general corrosion that could occur in the spray nozzles and flow orifices of the drywell and suppression chamber spray system. The drywell and suppression chamber spray system applies to BWRs only.

SRP-LR Section 3.2.2.2.7 states that the plugging of components due to general corrosion could occur in the spray nozzles and flow orifices of the drywell and suppression chamber spray system of BWRs.

The applicant states that this aging effect applies to BWRs only.

The project team finds that this aging effect is not applicable to MPS Unit 2.

7.2.2.2.8 Quality Assurance for Aging Management of Non-safety-related Components (MPS Unit 2 LRA Section 3.2.2.2.8)

MPS Unit 2 LRA Section 3.2.2.2.8 is reviewed by NRR DIPM staff and addressed in Section 3 of the SER related to the MPS Units 2 and 3 LRA.

7.2.2.3 Aging Management Review Results That Are Not Consistent with the GALL Report or Are Not Addressed in the GALL Report

In MPS Unit 2 LRA Tables 3.2.2-1 through 3.2.2-5, the project team reviewed additional details of the results of the AMRs for material, environment, aging effect requiring management, and AMP combinations that are not consistent with the GALL Report or are not addressed in the GALL Report.

7.2.2.3.1 Containment Spray - Aging Management Evaluation (MPS Unit 2 LRA Table 3.2.2-1)

The project team reviewed Table 3.2.2-1 of the MPS Unit 2 LRA, which summarizes the results of AMR evaluations for the containment spray system component groups.

The applicant, in the MPS Unit 2 LRA, has identified no aging effect for low-alloy and stainless steel components exposed to air, including bolting, orifice, piping, pump casing, tubing, spray nozzles, and valve component types. Air is not identified in the GALL Report as an environment for these components and materials.

On the basis of its review of current industry research and operating experience, the project team finds that air on low-alloy and stainless steel components will not result in aging that will be of concern during the period of extended operation. The external environments being referred to is typical of ambient air, e.g., under a shelter, indoor, or air-conditioned enclosure or room. Significant amounts of corrosion of low-alloy steel requires an electrolytic environment, and a simultaneous presence of oxygen and moisture. Without the presence of the aggressive environment, therefore, low-alloy steel components will experience insignificant amounts of corrosion, and no aging effects would be applicable to this component/commodity group. Wrought austenitic stainless steels are not susceptible to significant general corrosion that would affect the intended function of components. Therefore, the project team concludes that there are no applicable aging effects requiring management for metal in an air environment.

In the MPS Unit 2 LRA, the applicant proposes to manage loss of material of stainless steel orifice, piping, pump casing, tubing, and valve component types exposed to treated water (chemically treated borated water) using only MPS AMP B2.1.5, “Chemistry Control for Primary Systems Program,” which is consistent with GALL AMP XI.M2, “Water Chemistry,” with an exception. The project team reviewed the chemistry control for primary systems program and its evaluation is documented in Section 7.1.4 of this report. The exception relates to a later revision of the EPRI guidelines. The project team finds that because the effects of pitting and crevice corrosion on stainless steel components are not significant in chemically treated borated water, inspection of selected components to verify the absence of loss of material is not required. On the basis of its review, the project team finds the chemistry control for primary systems program acceptable for managing this aging effect.

7.2.2.3.2 Safety Injection - Aging Management Evaluation (MPS Unit 2 LRA Table 3.2.2-2)

The project team reviewed Table 3.2.2-2 of the MPS Unit 2 LRA, which summarizes the results of AMR evaluations for the safety injection system component groups.

The applicant identified no aging effect for carbon steel, stainless steel, and CASS components exposed to air, including flow elements, flow orifices, pipe, pumps, tubing, valves, and safety injection tanks (carbon steel with SS clad) component types. Air is not identified in the GALL Report as an environment for these components and materials.

On the basis of its review of current industry research and operating experience, the project team finds that air on metal will not result in aging that will be of concern during the period of extended operation. The external environments being referred to is typical of ambient air, e.g., under a shelter, indoor, or air-conditioned enclosure or room. Significant amounts of corrosion of carbon steel require an electrolytic environment, and a simultaneous presence of oxygen and moisture. Significant corrosion of carbon steel in an ambient air environment also requires the components to be subject to condensation. Without the presence of the aggressive environment, therefore, carbon steel components will experience insignificant amounts of corrosion, and no aging effects would be applicable to this component/commodity group. Wrought austenitic stainless steels, and (CASS) are not susceptible to significant general corrosion that would affect the intended function of components. Therefore, the project team concludes that there are no applicable aging effects requiring management for metal in an air environment.

In the MPS Unit 2 LRA, the applicant identified no aging effects for stainless steel components exposed internally to gas, including pipe, and safety injection tanks (carbon steel with SS clad) component types. Gas is not identified in the GALL Report as an environment for these components and materials.

On the basis of its review of current industry research and operating experience, the project team finds that an internal environment of gas (which is similar to air) on metal will not result in aging that will be of concern during the period of extended operation. Therefore, the project team did not identify any concerns with the applicant's conclusions that there are no applicable aging effects requiring management for metal in a gas environment.

7.2.2.3.3 <u>Refueling Water Storage Tank and Containment Sump - Aging Management Evaluation (MPS Unit 2 LRA Table 3.2.2-3 and Table 3.2.2-3a)</u>

The project team reviewed Table 3.2.2-3 of the MPS Unit 2 LRA and Table 3.2.2-3a of the MPS LRA supplement letter dated January 11, 2005 (ML050190289), which summarizes the results of AMR evaluations for the refueling water storage tank (RWST) and containment sump component groups.

In the MPS Unit 2 LRA and the MPS LRA supplement letter, the applicant identified no aging effect for carbon steel, low-alloy steel, and stainless steel components exposed to air, including bolting, encapsulation piping and valves, pipe, rupture discs, trisodium phosphate dodecahydrate (TSP) basket, tubing, valves, RWST circulating pump, RWST heat exchanger (channel head), and RWST heat exchanger (shell) component types. Air is not identified in the GALL Report as an environment for these components and materials.

On the basis of its review of current industry research and operating experience, the project team finds that air on metal will not result in aging that will be of concern during the period of extended operation. The external environments being referred to is typical of ambient air, e.g.,

under a shelter, indoor, or air-conditioned enclosure or room. Significant amounts of corrosion of carbon or low-alloy steel require an electrolytic environment, and a simultaneous presence of oxygen and moisture. Significant corrosion of carbon steel in an ambient air environment also requires the components to be subject to condensation. Without the presence of the aggressive environment, therefore, carbon or low-alloy steel components will experience insignificant amounts of corrosion, and no aging effects would be applicable to this component/commodity group. Wrought austenitic stainless steels are not susceptible to significant general corrosion that would affect the intended function of components. Therefore, the project team concludes that it did not identify any concerns with the applicant's conclusions that there are no applicable aging effects requiring management for metal in an air environment.

In the MPS Unit 2 LRA, the applicant proposes to manage loss of material of stainless steel vortex breakers component types exposed to treated water (chemically treated borated water) using MPS AMP B2.1.5, "Chemistry Control for Primary Systems Program," which is consistent with GALL AMP XI.M2, "Water Chemistry," with an exception. The project team reviewed the chemistry control for primary systems program and its evaluation is documented in Section 7.1.4 of this report. The exception relates to a later revision of the EPRI guidelines. The project team finds that because the effects of pitting and crevice corrosion on stainless steel components are not significant in chemically treated borated water, inspection of selected components to verify the absence of loss of material is not required. On the basis of its review, the project team finds the chemistry control for primary systems program acceptable for managing this aging effect.

In the MPS Unit 2 LRA, the applicant proposes to manage loss of material of stainless steel pipe, tubing, and valve component types exposed to atmosphere/weather using MPS AMP B2.1.13, "General Condition Monitoring Program." The applicant states that this is a plant-specific program. The project team reviewed the general condition monitoring program and its evaluation of this program is documented in Section 7.1.12 of this report. On the basis of its review, the project team finds that the general condition monitoring program is acceptable for managing loss of material due to pitting and crevice corrosion since visual inspections will be performed on external surfaces to detect any sign of aging degradation.

In the MPS Unit 2 LRA, the applicant proposes to manage loss of material of carbon steel encapsulation piping and valve component group exposed internally to moisture-laden air and/or intermittently wetted environment using MPS AMP B2.1.25, "Work Control Process." The applicant states that this is a plant-specific program. The project team reviewed the work control process program and its evaluation is documented in Section 7.1.22 of this report. The project team finds that visual inspections of the internal surfaces of plant components and plant commodities are performed during the performance of maintenance, in accordance with the work control process program, to determine the presence of loss of material. The project team concludes that the work control process program is acceptable for managing loss of material due to general corrosion since visual inspections will be performed on internal surfaces of components to detect any sign of aging degradation.

7.2.2.3.4 Shutdown Cooling - Aging Management Evaluation (MPS Unit 2 LRA Table 3.2.2-4)

The project team reviewed Table 3.2.2-4 of the MPS Unit 2 LRA, which summarizes the results of AMR evaluations for the shutdown cooling system component groups.

In the MPS Unit 2 LRA, the applicant identified no aging effect for carbon steel, stainless steel, and CASS components exposed to air, including carry-over tank, filters/strainers, flexible hose, flow elements, pipe, restricting orifice, tubing, vacuum flask, vacuum pump, valves, shutdown cooling heat exchangers component types. Air is not identified in the GALL Report as an environment for these components and materials.

On the basis of its review of current industry research and operating experience, the project team finds that air on metal will not result in aging that will be of concern during the period of extended operation. The external environments being referred to is typical of ambient air, e.g., under a shelter, indoor, or air-conditioned enclosure or room. Significant amounts of corrosion of carbon steel require an electrolytic environment, and a simultaneous presence of oxygen and moisture. Significant corrosion of carbon steel in an ambient air environment also requires the components to be subject to condensation. Without the presence of the aggressive environment, therefore, carbon steel components will experience insignificant amounts of corrosion, and no aging effects would be applicable to this component/commodity group. Wrought austenitic stainless steels, and cast austenitic stainless steel (CASS) are not susceptible to significant general corrosion that would affect the intended function of components. Therefore, the project team concludes that it did not identify any concerns with the applicant's conclusions that there are no applicable aging effects requiring management for metal in an air environment.

In the MPS Unit 2 LRA, the applicant identified no aging effect for stainless steel components exposed internally to air, including carry-over tank, filter/strainer, flexible hoses, vacuum flask, vacuum pump component types. Air is not identified in the GALL Report as an environment for these components and materials.

On the basis of its review of current industry research and operating experience, the project team finds that air on metal will not result in aging that will be of concern during the period of extended operation. Wrought austenitic stainless steels are not susceptible to significant general corrosion that would affect the intended function of components. Therefore, the project team concludes that it did not identify any concerns with the applicant's conclusions that there are no applicable aging effects requiring management for metal in an air environment.

In the MPS Unit 2 LRA, the applicant proposes to manage loss of material of stainless steel shutdown cooling heat exchangers (tubing) component types exposed to treated water using MPS AMP B2.1.25, "Work Control Process." The project team reviewed the work control process program and its evaluation is documented in Section 7.1.22 of this report. The project finds that the work control process program provides the opportunity to visually inspect the internal surfaces of components during preventive and corrective maintenance activities on an ongoing basis. The work control process program provides input to the corrective action program if aging effects are identified. On the basis of its review, the project team concludes

that the work control process program is acceptable for managing the aging effects of loss of materials.

7.2.2.3.5 Spent Fuel Pool Cooling - Aging Management Evaluation (MPS Unit 2 LRA Table 3.2.2-5 and Table 3.2.2-5a)

The project team reviewed Table 3.2.2-5 of the MPS Unit 2 LRA and Table 3.2.2-5a of the MPS LRA supplement letter dated January 11, 2005 (ML050190289), which summarizes the results of AMR evaluations for the spent fuel pool cooling system component groups.

In the MPS Unit 2 LRA and the MPS LRA supplement letter dated January 11, 2005 (ML050190289), the applicant identified no aging effect for low-alloy and stainless steel components exposed to air, including expansion joints, flow elements, pipe, pumps, spent fuel pool heat exchangers (channel head), tubing, valves, filters, and mixing tank component types. Air is not identified in the GALL Report as an environment for these components and materials.

On the basis of its review of current industry research and operating experience, the project team finds that air on low-alloy and stainless steel components will not result in aging that will be of concern during the period of extended operation. The external environment being referred to is typical of ambient air, e.g., under a shelter, indoor, or air-conditioned enclosure or room. Significant amounts of corrosion of low-alloy steel requires an electrolytic environment, and a simultaneous presence of oxygen and moisture. Without the presence of the aggressive environment, therefore, low-alloy steel components will experience insignificant amounts of corrosion, and no aging effects would be applicable to this component/commodity group. Wrought austenitic stainless steels are not susceptible to significant general corrosion that would affect the intended function of components. Therefore, the project team concludes that it did not identify any concerns with the applicant's conclusions that there are no applicable aging effects requiring management for metal in an air environment.

In the MPS Unit 2 LRA, the applicant proposes to manage loss of material of stainless steel expansion joints, flow elements, pipe, pumps, spent fuel pool heat exchangers (channel head) component types exposed to treated water (chemically treated borated water) using only MPS AMP B2.1.5, "Chemistry Control for Primary Systems Program," which is consistent with GALL AMP XI.M2, "Water Chemistry," with an exception. The project team reviewed the chemistry control for primary systems program and its evaluation is documented in Section 7.1.4 of this report. The exception relates to a later revision of the EPRI guidelines. The project team finds that because the effects of pitting and crevice corrosion on stainless steel components are not significant in chemically treated borated water, inspection of selected components to verify the absence of loss of material is not required. On the basis of its review, the project team concludes that the chemistry control for primary systems program is acceptable for managing this aging effect.

However, for other stainless steel components exposed to treated water, the applicant considered them consistent with the GALL Report, since a different component type was referenced with a different program, identifying it as LRA Table Note E. During the site audit, the project team asked the applicant to provide the basis for considering some components with the same material, environment, aging effect combination as consistent with the GALL Report, referencing LRA Table Note E, and others as not consistent with GALL Report,

referencing LRA Table Note H. For example, in the MPS Unit 2 LRA Table 3.2.2-5, page 3-138, the applicant states that for a pipe component type exposed to treated water and subject to loss of material, this component, material and environment combination is not consistent with the GALL Report (i.e., LRA Table Note H). On the other hand, in MPS Unit 2 LRA Table 3.2.2-5, page 3-140, the applicant states that for tubing and valve component types exposed to treated water and subject to loss of material (same material, environment, and aging effect combination), this is consistent with the GALL Report Item VII.C2.2-a (i.e., LRA Table Note E). The applicant submitted a LRA supplement letter, dated July 7, 2004 (ML041900407), and stated, in response to Audit Item 54, that the note should have been Note H for all of these component types, and references to the GALL Report item and Table 1 item should be removed from Table 2. The project team reviewed the applicant's response and concludes that the applicant's response is acceptable.

7.2.3 MPS Unit 2 LRA Section 3.3 - Aging Management of Auxiliary Systems

In MPS Unit 2 LRA Section 3.3, the applicant provides the results of its AMRs for components for the auxiliary systems.

In MPS Unit 2 LRA Tables 3.3.2-1 through 3.3.2-41 (Table 2s), the applicant provides a summary of the AMRs for component types associated with the following systems: (1) circulating water; (2) screen wash; (3) service water; (4) sodium hypochlorite; (5) reactor building closed cooling water; (6) chilled water; (7) instrument air; (8) nitrogen; (9) station air; (10) chemical and volume control; (11) sampling; (12) primary makeup water; (13) access control area air conditioning; (14) main condensers evacuation; (15) containment air recirculation and cooling; (16) containment and enclosure building purge; (17) containment penetration cooling; (18) containment post; (19) control room air conditioning; (20) control element drive mechanism cooling; (21) diesel generator ventilation; (22) ESF room air recirculation; (23) enclosure building filtration; (24) fuel handling area ventilation; (25) main exhaust ventilation; (26) non-radioactive area ventilation; (27) process and area radiation monitoring; (28) radwaste area ventilation; (29) turbine building ventilation; (30) vital switchgear ventilation; (31) Unit 2 fire protection; (32) Unit 3 fire protection; (33) domestic water; (34) diesel generator; (35) diesel generator fuel oil; (36) station blackout diesel generator; (37) security; (38) clean liquid waste processing; (39) gaseous waste processing; (40) post accident sampling; and (41) station sumps and drains. The summary information for each component type included intended function; material; environment; aging effect requiring management; AMPs; the GALL Report Volume 2 item; cross reference to the MPS Unit 2 LRA Table 3.3.1 (Table 1); and generic and plant-specific notes related to consistency with the GALL Report.

Also, the applicant identified for each component type in MPS Unit 2 LRA Table 3.3.1 (Table 1) those components where further evaluation is recommended, those for which no further evaluation is required, and those that are not applicable to MPS Unit 2 together with the basis for their exclusion.

Additionally, the applicant identified in MPS Unit 2 LRA Tables 3.3.2-1 through 3.3.2-41, which AMR results it considered to be consistent with the GALL Report (table column Notes A through E) and which it justified on a different basis.

The AMRs that are within the scope of the project team audit and review are identified on copies of the MPS Unit 2 LRA Tables 3.3.2-1 through 3.3.2-41 which are included as an appendix to the MPS Units 2 and 3 audit and review plan.

The project team conducted its audit and review in accordance with SRP-LR Section 3.3.3 and the MPS Units 2 and 3 audit and review plan.

7.2.3.1 Aging Management Review Results That Are Consistent With the GALL Report, for Which No Further Evaluation Is Required

For aging management evaluations that the applicant states are consistent with the GALL Report and for which further evaluation is not recommended, the project team conducted its audit and review to determine if the applicant's reference to the GALL Report in the MPS Unit 2 LRA is acceptable.

The project team reviewed the MPS Unit 2 LRA and the information in the MPS LRA supplement letter dated January 11, 2005 (ML050190289) to confirm that the applicant (1) provides a brief description of the system, components, materials, and environment; (2) states that the applicable aging effects requiring management have been reviewed and are evaluated in the GALL Report; and (3) identifies those aging effects for the auxiliary system components that are subject to an AMR.

7.2.3.1.1 Loss of Material Due to Boric Acid Corrosion

In the discussion section of MPS Unit 2 LRA Table 3.3.1, Item 3.3.1-14, the applicant states that loss of material due to boric acid corrosion is managed by MPS AMP B2.1.3, " Boric Acid Corrosion Program," and MPS AMP B2.1.13, " General Condition Monitoring Program." The boric acid corrosion program includes specific inspections of reactor coolant pressure boundary and supporting systems components. The boric acid corrosion program is reviewed by NRR DE and is evaluated in Section 3 of the SER related to the MPS Units 2 and 3 LRA.

In the MPS Unit 2 LRA, the applicant states that the general condition monitoring program provides inspections for management of loss of material due to boric acid corrosion beyond the scope of the boric acid corrosion program. The project team asked the applicant for clarification on how loss of material for components not normally visible, or in infrequently accessed areas are managed by this program. Further clarification was requested on how identification, documentation, evaluation, and trending of boric acid leakage is performed under this program. The applicant stated to the project team that the general condition monitoring program is an extension of the boric acid corrosion program in that the general condition monitoring program identifies borated water leakage during inspections and then, through the corrective action program, the leak is assigned and evaluated by the boric acid corrosion program. When borated water leakage is identified by the general condition monitoring program, a condition report is written to identify the leak. During the daily review of the new condition reports, it is assigned to the boric acid corrosion program where it gets fully evaluated and repaired as required. This is the same process used to identify leaks in the boric acid corrosion program.

For those areas identified as infrequently accessed areas, for the purposes of detecting boric acid leakage, entry into the area is performed often enough (at least once per refueling interval) to credit the general condition monitoring program. The one exception is the Unit 3 demineralizer cubicles area. However, for this area, a video inspection is performed at least once per 10 years to verify the integrity of the equipment. There is reasonable assurance that this inspection interval will detect borated water leakage prior to the loss of intended function of the affected equipment. In addition, the inspection opportunities for these cubicles will probably be more frequent than once per 10 years due to the need to perform corrective maintenance, filter changeout, etc. The Unit 3 areas accessed at least once per refueling interval are typically performed by operations during tagouts, health physics during general area surveys or a survey performed for upcoming work in the area, or during containment walkdowns as part of the boric acid corrosion program. No infrequently accessed areas with systems containing borated water are identified by the applicant for Unit 2.

The project team's evaluation of the general condition monitoring program is documented in Section 7.1.12 of this report. On the basis of its review, the project team finds that this program is acceptable for managing loss of material since visual inspection of external surfaces is performed during various walkdowns performed by plant personnel to look for boron buildup and/or boric acid leaks.

7.2.3.1.2 Loss of Material Due to General, Pitting, and Crevice Corrosion, and MIC

In MPS Unit 2 LRA Table 3.3.2-30 (page 3-274), the applicant lists both MPS AMP B2.1.25, "Work Control Process," and MPS AMP B.2.1.7, "Closed Water Cooling Systems," for loss of material exposed internally to treated water for the DC switchgear cooling coils. During the audit and review, the applicant was asked to clarify which AMP is credited. In a MPS LRA supplement letter dated July 7, 2004 (ML041900407), the applicant stated, in response to Audit Item 73, that MPS AMP B2.1.25, "Work Control Process," was inadvertently listed as an AMP for managing loss of material in treated water environment for the DC switchgear air conditioning unit cooling coils component group. The project team reviewed that applicant's response and finds it acceptable.

7.2.3.1.3 Loss of Material Due to General, Pitting, and Galvanic Corrosion, MIC, and Biofouling; Buildup of Deposit Due to Biofouling

In the discussion section of MPS Unit 2 LRA Table 3.3.1, Item 3.3.1-17 (page 3-195), the applicant states that loss of material for components in a open-cycle cooling water environment is managed by MPS AMP B2.1.21, "Service Water System (Open-Cycle Cooling) Program." However, Item 3.3.1-17 does not address buildup of deposits as an aging effect managed by the service water system (open-cycle cooling) program for the heat exchanger tubes and lined piping in sea water environment. In a MPS LRA supplement letter dated July 7, 2004 (ML041900407), the applicant stated, in response to Audit Item 101, that in MPS Unit 2 LRA Table 3.3.1, Item 3.3.1-17, the first sentence in the discussion should include "and Buildup of Deposits" after "Loss of Material." The project team reviewed that applicant's response and finds it acceptable.

7.2.3.1.4 Loss of Material Due to Wear, Hardening and Shrinkage

In the discussion section of MPS Unit 2 LRA Table 3.3.1, Item 3.3.1-20, the applicant states that loss of material due to wear is not an applicable aging effect for components (doors and barrier penetration seals) in the fire protection system. Fire doors could see wear on hinges, locks, etc., due to periodic opening and closing. This could cause loss of material and impact on the intended function of fire doors. During the audit and review, the project team asked the applicant to provide justification as to why this aging effect was not included. The applicant stated that fire doors are passive features to seal passageways through fire-rated barriers. Fire doors are equipped with hardware and attachment/closure devices that perform their intended function with moving parts and/or change of configuration and are considered to be active components. As such, wear of the hardware, appurtenances, and attachment/closure mechanisms is not considered to be an aging effect, but rather a consequence of frequent or rough usage. The applicant restated that the conclusions in the MPS Unit 2 LRA remain valid and unchanged. However, the applicant initiated revisions to MPS Unit 2 Technical Report, MP-LR-3654, “Miscellaneous Structural Commodities-Unit 2," Revision 2, dated December 31, 2003, to incorporate, in Section 2.0, the above evaluation for wear of the hinges and locks for the fire doors. The project team finds the response acceptable.

7.2.3.1.5 Loss of Material Due to Selective Leaching

In the discussion section of MPS Unit 2 LRA Table 3.3.1, Item 3.3.1-29, the applicant states that loss of material due to selective leaching is managed using MPS AMP B2.1.25, “Work Control Process,” and MPS AMP B2.1.4, “Buried Pipe Inspection Program.” The applicant states that these two programs are not consistent with GALL AMP XI.M33, “Selective Leaching,” in that the GALL program recommends a one-time visual inspection and hardness measurement of selected components that may be susceptible to selective leaching to determine whether loss of material due to selective leaching is occurring, and whether the process will affect the ability of the components to perform their intended function for the period of extended operation. However, the work control process program and the buried pipe inspection program perform only routine visual inspection (which is more than a one-time inspection) when the opportunity arises, but do not perform hardness testing.

Since selective leaching generally does not cause changes in dimension and is difficult to detect by visual inspection alone, the project team asked the applicant to justify the use of visual inspection only, or provide other means of detection (Brinnell hardness, destructive testing) or other mechanical means (scraping, chipping, etc.) The project team’s evaluation of the applicant’s response is documented in the evaluation of the work control process program and the buried pipe inspection program in Section 7.1.22 and Section 7.1.3 of this report, respectively.

In MPS Unit 2 Technical Report, MP-LR-3733, “Work Control Process,” the applicant states that selective leaching is an aging mechanism that causes an aging effect of change in material properties. However, in MPS Unit 2 Technical Report, MP-LR-3410, “Closed Water System AMR,” the applicant states that selective leaching is an aging mechanism under the aging effect of loss of material. MPS Unit 2 Technical Report, MP-LR-3410 also references MPS Unit 2 Technical Report, MP-LR-3700, “Material Aging Effect Report,” which considers selective

leaching under loss of material. The project team noted there is a discrepancy as to how selective leaching is considered between the AMP and the AMR technical reports.

During the audit and review, the applicant was requested by the project team to provide a rationale for considering selective leaching as causing change in material properties, which is generally an aging effect associated with non-metallic, elastomer type materials. The applicant concurred that in MPS Unit 2 Technical Report, MP-LR-3733, it should have associated selective leaching with the aging effect of loss of material. The project team reviewed the change document to Technical Report MP-LR-3733/MP-LR-4733, which identifies the change to include selective leaching under the “loss of material” aging effect. On the basis of its review, the project team finds this acceptable.

In a MPS LRA supplement letter dated July 7, 2004 (ML041900407), the applicant stated, in response to Audit Item 142, that MPS Unit 2 LRA Table 3.3.2-32 (pages 3-286 through 3-297) should state “3.3.1-29" for the second 'Table 1 Item' listed for components with cast iron/raw water and copper alloy/raw water material/environment combinations. The 'NUREG-1801 Volume 2 Item' column for the affected component groups should be "VII.C1.2-a" except for the 'Pipe' and 'Tubing' component groups, which should be "VII.C1.1-a." The project team reviewed the applicant’s response and finds that it is acceptable.

In MPS Unit 2 LRA Table 3.3.2-41(page 3-333), for station sumps and drains system, for loss of material of cast iron pumps and copper alloy valve components in a raw water environment, the applicant only references MPS Unit 2 LRA Table 3.3.1, Item 3.3.1-17. Item 3.3.1-17 only addresses loss of material due to miscellaneous corrosion, but not for selective leaching. During the audit and review, the applicant was requested to provide a rationale for not considering loss of material due to selective leaching. In a MPS LRA supplement letter dated July 7, 2004 (ML041900407), the applicant stated, in response to Audit Item 145, that MPS Unit 2 LRA Table 3.3.2-41should have additional information for the component groups 'pumps' (cast iron/raw water) and 'valves' (copper alloy/raw water). Specifically, each component group should have an additional entry for the 'Aging Management Program,' 'NUREG-1801 Volume 2 Item,' 'Table 1 Item,' and 'Notes' columns which adds the entries "Work Control Process,” "VII.C1.5-a" for pumps and "VII.C1.2-a" for valves, "3.3.1-29," and "E,” respectively. Since the applicant concurs that MPS Unit 2 LRA Table 3.3.1, Item 3.3.1-29 is applicable, the project team finds the response acceptable.

During the audit and review, the project team questioned why various portions of the fire protection system and diesel generator system were not included within the scope of license renewal and subject to an AMR. In its MPS LRA supplement letter dated July 7, 2004 (ML041900370), the applicant added several components in the fire protection system and diesel generator system that are subject to an AMR. The addition of these components did not result in the addition of material/environment combinations or AMPs for the fire protection system and diesel generator system AMR. The project team finds this material/environment/aging effect/AMP combination to be acceptable. The staff's evaluation of the scope of the fire protection system and diesel generator system is documented in Section 2.3.3.32 and Section 2.3.3.34, respectively, of the SER related to the MPS Units 2 and 3 LRA.

7.2.3.1.6 Loss of Material Due to General Corrosion; Crack Initiation and Growth Due to Cyclic Loading and Stress Corrosion Cracking

In the discussion section of MPS Unit 2 LRA Table 3.3.1, Item 3.3.1-24, the applicant states that closure bolting in the auxiliary systems is not subject to wetted conditions, therefore, loss of material due to general corrosion is not expected. Additionally, cracking for bolting in auxiliary systems is not identified as an aging effect requiring management.

During the review, the project team noted that SRP-LR Table 3.3-1 recommended GALL AMP XI.M18, “Bolting Integrity,” for managing closure bolting for loss of material due to general corrosion; crack initiation and growth due to cyclic loading and/or SCC.

The project team questioned the applicant whether all of the resolutions of the generic safety issue for bolting, as stated in NUREG-1339, are addressed. By letter dated December 3, 2004 (ML043450341), the applicant submitted its LRA supplement. In its response, the applicant stated that it has developed a specific bolting integrity aging management program that addresses degradation of bolting at MPS.

By letter dated January 11, 2005 (ML050190289), the applicant submitted its bolting aging management roll-up item. In its response, the applicant replaces the existing information in the “Discussion” column of Unit 2 LRA Table 3.3.1, Item 24 with “consistent with the NUREG-1801."

The project team reviewed the applicant’s response and finds this acceptable since it is consistent with the GALL Report. The bolting integrity program is reviewed by NRR DE and its evaluation is documented in Section 3 of the SER related to the MPS Units 2 and 3 LRA.

On the basis of its audit and review, the project team determined that for AMRs not requiring further evaluation, as identified in MPS Unit 2 LRA Table 3.3.1 (Table 1), the applicant’s references to the GALL Report are acceptable and no further project team review is required.

7.2.3.2 Aging Management Review Results That Are Consistent With the GALL Report, for Which Further Evaluation Is Recommended

For some line items consistent with the GALL Report in MPS Unit 2 LRA Tables 3.3.2-1 through 3.3.2-41, the GALL Report recommends further evaluation. When further evaluation is recommended, the project team reviewed these further evaluations provided in MPS Unit 2 LRA Section 3.3.2.2 against the criteria provided in SRP-LR Section 3.3.2.2. The following provides the project team’s assessments of these evaluations. These project team assessments are applicable to each Table 2 line item in LRA Section 3.3, citing the item in Table 1.

The MPS Unit 2 LRA sections, identified in MPS Unit 2 LRA Table 3.3.1, for which further evaluation is recommended are discussed below.

7.2.3.2.1 Loss of Material Due to General, Pitting, and Crevice Corrosion (MPS Unit 2 LRA Section 3.3.2.2.1)

The project team reviewed MPS Unit 2 LRA Section 3.3.2.2.1 against the criteria in SRP-LR Section 3.3.2.2.1.

In MPS Unit 2 LRA Section 3.3.2.2.1, the applicant addresses loss of material in components of the spent fuel pool system.

SRP-LR Section 3.3.2.2.1 states that loss of material due to general, pitting, and crevice corrosion could occur in the channel head and access cover, tubes, and tube sheets of the heat exchanger in the spent fuel pool cooling and cleanup system. The water chemistry program relies on monitoring and control of reactor water chemistry based on EPRI TR-105714 guidelines for primary water chemistry and TR-102134 for secondary water chemistry to manage the effects of loss of material from general, pitting, or crevice corrosion. However, high concentrations of impurities at crevices and locations of stagnant flow conditions could cause general, pitting, or crevice corrosion. Therefore, verification of the effectiveness of the water chemistry control program should be performed to ensure that corrosion is not occurring. The GALL Report recommends further evaluation of programs to manage loss of material from general, pitting, and crevice corrosion to verify the effectiveness of the water chemistry program. A one-time inspection of select components at susceptible locations is an acceptable method for ensuring that corrosion is not occurring and that the component's intended function will be maintained during the period of extended operation.

Further, SRP-LR Section 3.3.2.2.1 states that loss of material due to pitting and crevice corrosion could occur in the filter housing, valve bodies, and nozzles of the ion exchanger in the spent fuel pool cooling and cleanup system. The water chemistry program relies on monitoring and control of reactor water chemistry based on EPRI TR-105714 guidelines for primary water chemistry and TR-102134 for secondary water chemistry to manage the effects of loss of material from pitting or crevice corrosion. However, high concentrations of impurities at crevices and locations of stagnant flow conditions could cause pitting or crevice corrosion. Therefore, verification of the effectiveness of the chemistry control program should be performed to ensure that corrosion is not occurring. The GALL Report recommends further evaluation of programs to manage loss of material from pitting and crevice corrosion to verify the effectiveness of the water chemistry program. A one-time inspection of select components at susceptible locations is an acceptable method to ensure that corrosion is not occurring and that the component's intended function will be maintained during the period of extended operation.

The AMP recommended by the GALL Report is GALL AMP XI.M2, “Water Chemistry,” for management of loss of material due to general, pitting, and crevice corrosion.

The applicant states, in the MPS Unit 2 LRA, that per the GALL Report, this item applies to spent fuel pool cooling and cleanup carbon steel components with elastomer linings. The spent fuel pool cooling system at MPS does not contain carbon steel components with elastomer linings. Therefore, this item is not applicable. The applicant included the spent fuel pool cooling system in MPS Unit 2 LRA Section 3.2, “Engineered Safety Features Systems.” The project team reviewed the MPS Unit 2 LRA Table 3.2.2-5 AMR for the spent fuel pool cooling

system and verified that the system did not contain carbon steel components with elastomer linings. On the basis of its review, the project team finds this line item not applicable for components in the spent fuel pool cooling system.

However, these components are fabricated from stainless steel material. As stated in Section 7.2.2.3.5 of this report, the applicant proposes to manage loss of material of stainless steel expansion joints, flow elements, pipe, pumps, and spent fuel pool heat exchangers (channel head) component types exposed to chemically treated borated water using only MPS AMP B2.1.5, "Chemistry Control for Primary Systems Program," which is consistent with GALL AMP XI.M2, "Water Chemistry," with an exception. The project team reviewed the chemistry control for primary systems program and its evaluation is documented in Section 7.1.4 of this report. The exception relates to use of a later, non-NRC approved revision of the EPRI guidelines. The project team finds that because the effects of pitting and crevice corrosion on stainless steel components are not significant in chemically treated borated water, inspection of selected components to verify the absence of loss of material is not required. On the basis of its review, the project team finds that the chemistry control for primary systems program is acceptable for managing this aging effect.

The project team finds that the applicant has demonstrated that the effects of aging for components of the spent fuel pool cooling system subject to loss of material will be adequately managed so that the intended functions will be maintained consistent with the CLB during the period of extended operation, as required by 10 CFR 54.21(a)(3).

7.2.3.2.2 Hardening and Cracking or Loss of Strength Due to Elastomer Degradation or Loss of Material Due to Wear (MPS Unit 2 LRA Section 3.3.2.2.2)

The project team reviewed MPS Unit 2 LRA Section 3.3.2.2.2 against the criteria in SRP-LR Section 3.3.2.2.2.

In MPS Unit 2 LRA Section 3.3.2.2.2, the applicant addresses the potential for degradation of elastomers in collars and seals in spent fuel pool cooling system and ventilation systems.

SRP-LR Section 3.3.2.2.2 states that hardening and cracking due to elastomer degradation could occur in elastomer linings of the filter, valve, and ion exchangers in spent fuel pool cooling and cleanup systems. Hardening and loss of strength due to elastomer degradation could occur in the collars and seals of the duct and in the elastomer seals of the filters in the control room area, auxiliary and radwaste area, and primary containment heating and ventilation systems, and in the collars and seals of the duct in the diesel generator building ventilation system. Loss of material due to wear could occur in the collars and seals of the duct in the ventilation systems. The GALL Report recommends further evaluation to ensure that these aging effects are adequately managed.

The applicant states, in the MPS Unit 2 LRA, that the spent fuel pool cooling system does not contain carbon steel components with elastomer linings. Therefore, this item is not applicable. The applicant has included the spent fuel pool cooling system in MPS Unit 2 LRA Section 3.2, "Engineered Safety Features Systems." The project team reviewed the MPS Unit 2 Table 3.2.2-5 AMR for spent fuel pool cooling system and verified that the system did not contain

carbon steel components with elastomer linings. On the basis of its review, the project team finds that this line item is not applicable for components in spent fuel pool cooling system.

The applicant states, in the MPS Unit 2 LRA, that elastomers are used in ventilation systems components and are evaluated for cracking and change of material properties due to thermal and radiation exposure. The applicant credits MPS AMP B2.1.25, "Work Control Process," and MPS AMP B2.1.13, "General Condition Monitoring Program," for managing age-related degradation of elastomers used in ventilation systems components. The work control process program provides the opportunity to visually inspect the internal surfaces of components during preventive and corrective maintenance activities on an ongoing basis. Also, this program provides input to the corrective action program if aging effects are identified. The project team accepted the work control process program for managing the aging effects of cracking and change in material properties and its evaluation of this program is documented in Section 7.1.22 of this report. The project team also accepted the general condition monitoring program for managing cracking and change of material properties since visual inspections will be performed on external surfaces to identify any sign of aging degradation. The project team's evaluation of the general condition monitoring program is documented in Section 7.1.12 of this report.

In MPS Unit 2 LRA Section 3.2.2.2.2, the applicant states that loss of material due to wear is not an aging effect requiring management for the elastomers in the ventilation systems. During the audit and review, the project team inquired on the applicant's assertion. The rationale offered by the applicant was that the elastomers in the ventilation systems are not subject to motions which could result in wear. The project team finds that the applicant's justification is acceptable.

The project team finds that the applicant has demonstrated that the effects of aging will be adequately managed so that the intended functions will be maintained consistent with the CLB during the period of extended operation, as required by 10 CFR 54.21(a)(3).

7.2.3.2.3 Cumulative Fatigue Damage (MPS Unit 2 LRA Section 3.3.2.2.3)

MPS Unit 2 LRA Section 3.3.2.2.3 is reviewed by NRR DE staff and addressed in Section 4 of the SER related to the MPS Units 2 and 3 LRA.

7.2.3.2.4 Crack Initiation and Growth Due to Cracking or Stress Corrosion Cracking (MPS Unit 2 LRA Section 3.3.2.2.4)

The project team reviewed MPS Unit 2 LRA Section 3.3.2.2.4 against the criteria in SRP-LR Section 3.3.2.2.4.

In MPS Unit 2 LRA Section 3.3.2.2.4, the applicant addresses the potential for cracking in the high-pressure pumps of the chemical and volume control system (CVCS).

SRP-LR Section 3.3.2.2.4 addresses crack initiation and growth due to cracking in the high-pressure pumps in the CVCS. The GALL Report recommends further evaluation to ensure that these aging effects are adequately managed.

The applicant states, in the MPS Unit 2 LRA, that cracking is not identified as an aging effect requiring management for the CVCS high-pressure pump casing. The high-pressure pump casing is constructed of stainless steel and operates at temperatures less than 140EF. SCC is applicable to stainless steel components in aqueous environments that experience operating temperatures greater than 140EF.

The applicant states that based upon industry experience, a temperature criterion of greater than 140EF is used as the threshold for susceptibility of austenitic stainless steels to SCC. No instances were identified that would bring this temperature threshold into question. On the basis of its review, the project team finds the applicant's statement reasonable and acceptable because the applicant's bases for excluding the aging effects of cracking in the MPS Unit 2 CVCS high-pressure pump casing are consistent with industry and site operating experience.

The project team finds that the applicant has demonstrated that the effects of aging will be adequately managed so that the intended functions will be maintained consistent with the CLB during the period of extended operation, as required by 10 CFR 54.21(a)(3).

7.2.3.2.5 Loss of Material Due to General, Microbiologically Influenced, Pitting, and Crevice Corrosion (MPS Unit 2 LRA Section 3.3.2.2.5)

The project team reviewed MPS Unit 2 LRA Section 3.3.2.2.5 against the criteria in SRP-LR Section 3.3.2.2.5.

In MPS Unit 2 LRA Section 3.3.2.2.5, the applicant addresses the loss of material from corrosion that could occur on internal and external surfaces of components exposed to air and the associated range of atmospheric conditions.

SRP-LR Section 3.3.2.2.5 states that loss of material due to general, pitting, and crevice corrosion could occur in the piping and filter housing and supports in the control room area, auxiliary and radwaste area, primary containment heating and ventilation systems, piping of the diesel generator building ventilation system, aboveground piping and fittings, valves, and pumps in the diesel fuel oil system, and in the diesel engine starting air, combustion air intake, and combustion air exhaust subsystems in the emergency diesel generator system. Loss of material due to general, pitting, and crevice corrosion, and MIC could occur in the duct fittings, access doors and closure bolts, equipment frames, and duct housing. Loss of material due to pitting and crevice corrosion could occur in the heating/cooling coils of the air handler units, and due to general corrosion could occur on the external surfaces of all carbon steel SCs, including bolting, exposed to operating temperatures less than 212°F in the ventilation systems. The GALL Report recommends further evaluation to ensure that these aging effects are adequately managed.

The applicant states that MPS AMP B2.1.10, "Fire Protection Program," MPS AMP B2.1.24, "Tank Inspection Program," and MPS AMP B2.1.25, "Work Control Process," manage loss of material due to general corrosion, MIC, pitting, and crevice corrosion for the internal surfaces of ducts, piping, filter housings, compressed air systems components, and fuel oil systems components. Loss of material for external surfaces of carbon steel components is effectively managed by MPS AMP B2.1.3, "General Condition Monitoring," MPS AMP B2.1.10, "Fire Protection Program," MPS AMP B2.1.23, "Structures Monitoring Program," and

MPS AMP B2.1.24, “Tank Inspection Program.” Also, the applicant states that MPS AMP B2.1.15, “Infrequently Accessed Areas Inspection Program,” manages this aging effect for components in infrequently accessed areas.

The project team identified a discrepancy between MPS Unit 2 LRA Table 3.3.2-31,”Auxiliary Systems - Unit 2 Fire Protection,” and MPS Unit 2 LRA Table 3.3.2-32, “Auxiliary Systems - Unit 3 Fire Protection.” In MPS Unit 2 LRA Table 3.3.2-31(page 3-281), the applicant states, for carbon steel pipe exposed internally to moist air, that the fire protection program is used for managing the aging effects of loss of material. In MPS Unit 2 LRA Table 3.3.2-32 (page 3-291), the applicant credits the work control process program to manage loss of material and references MPS Unit 2 Table 3.3.1, Item 3.3.1-05. During the audit and review, the applicant was requested to clarify which is correct. In a MPS LRA supplement letter dated July 7, 2004 (ML014900407), the applicant stated, in response to Audit Item 122, that MPS Unit 2 LRA Table 3.3.2-32, the "Work Control Process" AMP for the carbon steel 'Pipe' component group exposed internally to air environment should be replaced with the "Fire Protection Program” AMP. The “NUREG-1801" item should be “VII.H2.3-a” and the “Notes” should be “C, 2.” The project team reviewed the applicant’s response and finds it to be acceptable.

The project team reviewed the work control process program and its evaluation is documented in Section 7.1.22 of this report. The work control process program provides the opportunity to visually inspect the internal surfaces of components during preventive and corrective maintenance activities on an ongoing basis. The work control process program provides input to the corrective action program if aging effects are identified. On the basis of its review, the project team finds the work control process program acceptable for managing the aging effects of loss of materials due to general corrosion, MIC, pitting, and crevice corrosion for the internal surfaces of ducts, piping, filter housings, compressed air systems components, and fuel oil systems components.

The project team reviewed the fire protection program and its evaluation is documented in Section 7.1.9 of this report. The fire protection program is consistent with GALL AMPs XI.M.26, “Fire Protection,” and XI.M.27, “Fire Water System.” On the basis of its review, the project team finds that the fire protection program is acceptable for managing loss of material since visual inspections will be performed on internal surfaces to detect any sign of aging degradation when the system is opened for maintenance and/or repair.

The project team reviewed the tank inspection program and its evaluation is documented in Section 7.1.21 of this report. The tank inspection program is consistent with GALL AMP XI.M.29, “Aboveground Carbon Steel Tanks.” On the basis of its review, the project team finds that the tank Inspection program is acceptable for managing loss of material due to general corrosion since wall thickness measurements will be performed on the lower portion of the tank.

The project team reviewed the general condition monitoring program and its evaluation is documented in Section 7.1.12 of this report. The general condition monitoring program uses visual inspections to detect evidence of degradation or adverse conditions in accessible plant areas. System engineers perform comprehensive visual inspections during walkdowns of plant systems and components during normal operation and during refueling outages; plant

equipment operators perform equipment and structures inspections twice a day to maintain awareness of system and plant operation and material condition during normal operation and refueling outages. On the basis of its review, the project team finds that the general condition monitoring program is acceptable for managing loss of materials since visual inspections will be performed on external surfaces to detect any sign of aging degradation.

The structures monitoring program manages the aging effects of cracking, loss of material, and change of material properties by monitoring structures and structural support systems that are within the scope of license renewal. The majority of these structures and structural support systems are monitored under 10 CFR 50.65 as addressed in RG 1.160, Revision 2, and NUMARC 93-01, Revision 2. These two documents provide guidance for development of licensee-specific programs to monitor the condition of structures and structural components within the scope of the Maintenance Rule, such that there is no loss of structure or structural component intended function. The remaining structures within the scope of license renewal (such as non-safety related buildings and enclosures, duct banks, valve pits and trenches, high-energy line break barriers, and flood gates) are also monitored to ensure there is no loss of intended function. The project team reviewed the structures monitoring program and its evaluation is documented in Section 7.1.20 of this report. On the basis of its review, the project team finds that the structures monitoring program is acceptable for managing loss of material since visual inspections will be performed on external surfaces to detect any sign of aging degradation.

The project team reviewed the infrequently accessed areas inspection program and its evaluation is documented in Section 7.1.14 of this report. The infrequently accessed areas inspection program is a new, plant-specific program that manages the aging effects of loss of material using visual inspections of the external surfaces of SCs. The program encompasses infrequently accessed areas of the plant which contain in-scope equipment. All areas not normally accessible for inspection and evaluation, and that contain SCs subject to aging management, have been identified for inclusion in the program. On the basis of its review, the project team finds that the infrequently accessed areas inspection program is acceptable for managing loss of material due to general corrosion on external surfaces of carbon steel components, since visual inspections will be performed on external surfaces to detect any sign of aging degradation in the service water system.

During the audit and review, the project team questioned why various portions of the diesel generator system were not included within the scope of license renewal and subject to an AMR. In its MPS LRA supplement letter dated July 7, 2004 (ML041900370), the applicant added several components in the diesel generator system to those that are subject to an AMR. The addition of these components did not result in the addition of material/environment combinations or AMPs for the diesel generator system AMR for components addressed by MPS LRA Section 3.3.2.2.5. The project team finds this material/environment/aging effect/AMP combination to be acceptable. The staff's evaluation of the scope of the diesel generator system is documented in Section 2.3.3.34 of the SER related to the MPS Units 2 and 3 LRA.

The project team finds that the applicant has demonstrated that the effects of aging will be adequately managed so that the intended functions will be maintained consistent with the CLB during the period of extended operation, as required by 10 CFR 54.21(a)(3).

7.2.3.2.6 Loss of Material Due to General, Galvanic, Pitting, and Crevice Corrosion (MPS Unit 2 LRA Section 3.3.2.2.6)

The project team reviewed MPS Unit 2 LRA Section 3.3.2.2.6 against the criteria in SRP-LR Section 3.3.2.2.6.

In MPS Unit 2 LRA Section 3.3.2.2.6, the applicant addresses further evaluation of programs to manage loss of material in the RCP oil collection system to verify the effectiveness of the fire protection program.

SRP-LR Section 3.3.2.2.6 states that loss of material due to general, galvanic, pitting, and crevice corrosion could occur in tanks, piping, valve bodies, and tubing in the RCP oil collection system in fire protection. The fire protection program relies on a combination of visual and volumetric examinations, in accordance with the guidelines of 10 CFR 50 Appendix R and Branch Technical Position 9.5-1, to manage loss of material from corrosion. However, corrosion may occur at locations where water from wash downs may accumulate. Therefore, verification of the effectiveness of the program should be performed to ensure that corrosion is not occurring. The GALL Report recommends further evaluation of programs to manage loss of material due to general, galvanic, pitting, and crevice corrosion to verify the effectiveness of the program. A one-time inspection of the bottom half of the interior surface of the RCP oil collection system tank is an acceptable method to ensure that corrosion is not occurring and that the component's intended function will be maintained during the period of extended operation.

The applicant states, in the MPS Unit 2 LRA, that loss of material is managed for the components associated with the RCP oil collection system by MPS AMP B2.1.24, “Tank Inspection Program,” which subjects the RCP oil collection tanks to periodic internal and external inspections. Additionally, during containment close-out activities, the RCP oil collection tanks are visually inspected and verified to be empty.

The project team reviewed the tank inspection program, which is consistent with GALL AMP XI.29, “Aboveground Carbon Steel Tanks,” and its evaluation is documented in Section 7.1.21 of this report. Since the tank inspection program includes volumetric examinations for wall thickness measurement of the RCP oil collection tank, the project team finds the program acceptable for managing loss of material due to general, galvanic, pitting, and crevice corrosion.

The applicant references MPS Unit 2 LRA Table 3.3.1, Item 3.3.1-06 (page 3-190), for components exposed internally to lube oil (Note 14) and loss of material aging effect combination in MPS Unit 2 LRA Table 3.3.2-32, and credits the work control process program. In the discussion of Item 3.3.1- 06, the applicant states that the loss of material aging effect is managed by the tank inspection program. The project team noted that there is no mention in the discussion about the work control process program. In a MPS LRA supplement letter dated July 7, 2004 (ML041900407), the applicant stated, in response to Audit Item 143, that MPS Unit 2 LRA Table 3.3.1, Item 3.3.1-06, should include the following words between the second and third sentences:

> For the non-tank components, loss of material is managed by the work control process program.

Additionally, the applicant stated in the MPS LRA supplement letter that MPS Unit 2 LRA Section 3.3.2.2.6 (page 3-184) should include the following words at the end of the first sentence:

> For the non-tank components, loss of material is managed by the work control process program.

The project team reviewed the work control process program and its evaluation is documented in Section 7.1.22 of this report. The project team finds that the work control process program provides the opportunity to visually inspect the internal surfaces of components during preventive and corrective maintenance activities on an ongoing basis. It also provides input to the corrective action program if aging effects are identified. On the basis of its review, the project team finds the work control process program acceptable for managing the aging effects of loss of material.

The project team finds that the applicant has demonstrated that the effects of aging will be adequately managed so that the intended functions will be maintained consistent with the CLB during the period of extended operation, as required by 10 CFR 54.21(a)(3).

7.2.3.2.7 Loss of Material Due to General, Pitting, Crevice, and Microbiologically Influenced Corrosion and Biofouling (MPS Unit 2 LRA Section 3.3.2.2.7)

The project team reviewed MPS Unit 2 LRA Section 3.3.2.2.7 against the criteria in SRP-LR Section 3.3.2.2.7.

In MPS Unit 2 LRA Section 3.3.2.2.7, the applicant addresses further evaluation of programs to manage loss of material in the diesel fuel oil system to verify the effectiveness of the diesel fuel monitoring activities.

SRP-LR Section 3.3.2.2.7 states that loss of material due to general, pitting, and crevice corrosion, MIC, and biofouling could occur in the internal surface of tanks in the diesel fuel oil system and due to general, pitting, and crevice corrosion and MIC in the tanks of the diesel fuel oil system in the emergency diesel generator system. The existing AMP relies on the fuel oil chemistry program for monitoring and control of fuel oil contamination in accordance with the guidelines of ASTM Standards D4057, D1796, D2709, and D2276 to manage loss of material due to corrosion or biofouling. Corrosion or biofouling may occur at locations where contaminants accumulate. Verification of the effectiveness of the chemistry control program should be performed to ensure that corrosion is not occurring. The GALL Report recommends further evaluation of programs to manage corrosion/biofouling to verify the effectiveness of the program. A one-time inspection of selected components at susceptible locations is an acceptable method to ensure that corrosion is not occurring and that the component's intended function will be maintained during the period of extended operation.

The AMPs recommended by the GALL Report are GALL AMP XI.M30, “Fuel Oil Chemistry,” and GALL AMP XI.M32, “One Time Inspection,” for management of this aging effect.

The applicant states, in the MPS Unit 2 LRA, that MPS AMP B2.1.12, "Fuel Oil Chemistry," manages loss of material for diesel fuel oil tanks and other components in the diesel generator fuel oil system, the security system, and the station blackout diesel generator system. In lieu of a one-time inspection program as described in SRP-LR Section 3.3.2.2.7, the applicant states in MPS Unit 2 LRA Section 3.3.2.2.7 that MPS AMP B2.1.25, "Work Control Process," will be used to provide confirmation of the effectiveness of the fuel oil chemistry program, and that tank inspections performed under the applicant's MPS AMP B2.1.24, "Tank Inspection Program," provide additional confirmation that the fuel oil chemistry program is effective for managing aging effects for applicable tanks.

The project team reviewed the fuel oil chemistry program and its evaluation is documented in Section 7.1.11 of this report. The fuel oil chemistry program monitors and controls fuel oil quality to ensure that it is compatible with the materials of construction, to manage the conditions that cause general corrosion, pitting, and MIC of fuel tank internal surfaces; establish fuel oil quality limits; and sample and test fuel oil used for equipment within the scope of license renewal. On the basis of its review, the project team finds the fuel oil chemistry program to be acceptable.

The project team reviewed the work control process program and its evaluation is documented in Section 7.1.22 of this report. The work control process program provides the opportunity to visually inspect the internal surfaces of components during preventive and corrective maintenance activities on an ongoing basis. The work control process program provides input to the corrective action program if aging effects are identified. On the basis of its review, the project team finds that the work control process program is acceptable for use in providing confirmation of the effectiveness of the fuel oil chemistry program.

The project team reviewed the tank inspection program and its evaluation is documented in Section 7.1.21 of this report. The tank inspection program is consistent with GALL AMP XI.M.29, "Aboveground Carbon Steel Tanks." On the basis of its review, the project team finds that the tank inspection program is acceptable for providing additional confirmation that the fuel oil chemistry program is effective for managing aging effects for applicable tanks.

The project team finds that the applicant has demonstrated that the effects of aging will be adequately managed so that the intended functions will be maintained consistent with the CLB during the period of extended operation, as required by 10 CFR 54.21(a)(3).

7.2.3.2.8 Quality Assurance for Aging Management of Non-safety-related Components (MPS Unit 2 LRA Section 3.3.2.2.8)

MPS Unit 2 LRA Section 3.3.2.2.8 is reviewed by NRR DIPM staff and addressed in Section 3 of the SER related to the MPS Units 2 and 3 LRA.

7.2.3.2.9 Crack Initiation and Growth Due to Stress Corrosion Cracking and Cyclic Loading (MPS Unit 2 LRA Section 3.3.2.2.9)

The project team reviewed MPS Unit 2 LRA Section 3.3.2.2.9 against the criteria in SRP-LR Section 3.3.2.2.9.

In MPS Unit 2 LRA Section 3.3.2.2.9, the applicant addresses further evaluation of programs to manage cracking in the CVCS to verify the effectiveness of the water chemistry control program.

SRP-LR Section 3.3.2.2.9 states that crack initiation and growth due to SCC and cyclic loading could occur in the channel head and access cover, tube sheet, tubes, shell and access cover, and closure bolting of the regenerative heat exchanger and in the channel head and access cover, tube sheet, and tubes of the letdown heat exchanger in the CVCS. The water chemistry program relies on monitoring and control of water chemistry based on the EPRI TR-105714 guidelines for primary water chemistry to manage the effects of crack initiation and growth due to SCC and cyclic loading. Verification of the effectiveness of the chemistry control program should be performed to ensure that crack initiation and growth are not occurring. The GALL Report recommends further evaluation to manage crack initiation and growth from SCC and cyclic loading for these systems to verify the effectiveness of the water chemistry program. A one-time inspection of select components and susceptible locations is an acceptable method to ensure that crack initiation and growth are not occurring and that the component's intended function will be maintained during the period of extended operation.

The AMPs recommended by the GALL Report are GALL AMP X1.M2, "Water Chemistry," and a plant-specific verification program for management of this aging effect.

The applicant states, in the MPS Unit 2 LRA, that cracking due to SCC for the regenerative and letdown heat exchangers is managed by MPS AMP B2.1.5, "Chemistry Control for Primary Systems Program." Verification of the effectiveness of the chemistry control program is provided by MPS AMP B2.1.25, "Work Control Process." The work control process program provides the opportunity to visually inspect the internal surfaces of components during preventive and corrective maintenance activities on an ongoing basis. The work control process program provides input to the corrective action program if aging effects are identified. The corrective action program would evaluate the cause and extent of a condition and, if required, recommend enhancements to ensure continued effectiveness of the chemistry control for primary systems program.

The project team reviewed the chemistry control for primary systems program and its evaluation is documented in Section 7.1.4 of this report. The chemistry control for primary systems program is consistent with GALL AMP XI.M2, "Water Chemistry," with an acceptable exception. The exception relates to use of a later, non-NRC approved revision of the EPRI guidelines. On the basis of its review, the project team finds that the chemistry control for primary systems program is acceptable for managing this aging effect.

The project team reviewed the work control process program and its evaluation is documented in Section 7.1.22 of this report. The project team finds that visual inspections of the internal surfaces of plant components and plant commodities are performed during the performance of maintenance, in accordance with the work control process program, to determine the presence of crack initiation and growth. On the basis of its review, the project team finds that the work control process program is acceptable for managing crack initiation and growth since visual inspections will be performed on internal surfaces of components to detect any sign of aging degradation.

The project team finds that the applicant has demonstrated that the effects of aging for crack initiation and growth will be adequately managed so that the intended functions will be maintained consistent with the CLB during the period of extended operation, as required by 10 CFR 54.21(a)(3).

7.2.3.2.10 Reduction of Neutron-Absorbing Capacity and Loss of Material Due to General Corrosion (MPS Unit 2 LRA Section 3.3.2.2.10)

The project team reviewed MPS Unit 2 LRA Section 3.3.2.2.10 against the criteria in SRP-LR Section 3.3.2.2.10.

In MPS Unit 2 LRA Section 3.3.2.2.10, the applicant addresses reduction of neutron-absorbing capacity and loss of material due to general corrosion, which could occur in the neutron-absorbing sheets of the spent fuel storage rack in the spent fuel storage.

SRP-LR Section 3.3.2.2.10 states that reduction of neutron-absorbing capacity and loss of material due to general corrosion could occur in the neutron-absorbing sheets of the spent fuel storage rack in the spent fuel storage. The GALL Report recommends further evaluation to ensure that these aging effects are adequately managed.

The applicant states, in the MPS Unit 2 LRA, that Boral is not used in the spent fuel pool for neutron absorption. Therefore, this item is not applicable. Since Boral is not used at MPS Unit 2, the project team concurs that this line item is not applicable

7.2.3.2.11 Loss of Material Due to General, Pitting, Crevice, and Microbiologically Influenced Corrosion (MPS Unit 2 LRA Section 3.3.2.2.11)

The project team reviewed MPS Unit 2 LRA Section 3.3.2.2.11 against the criteria in SRP-LR Section 3.3.2.2.11.

In MPS Unit 2 LRA Section 3.3.2.2.11, the applicant addresses the potential for loss of material in buried piping of the service water and diesel fuel oil systems.

SRP-LR Section 3.3.2.2.11 states that loss of material due to general, pitting, and crevice corrosion and MIC could occur in the underground piping and fittings in the open-cycle cooling water system (service water system) and in the diesel fuel oil system. The buried piping and tanks inspection program relies on industry practice, frequency of pipe excavation, and operating experience to manage the effects of loss of material from general, pitting, and crevice corrosion and MIC. The effectiveness of the buried piping and tanks inspection program should be verified to evaluate an applicant's inspection frequency and operating experience with buried components, ensuring that loss of material is not occurring.

The AMP recommended by the GALL Report is GALL AMP XI.M34, “Buried Piping and Tanks Inspection.”

The applicant states, in the MPS Unit 2 LRA, that loss of material for buried piping and valves in the service water system, and in the Unit 2 fire protection system, Unit 3 fire protection system,

and enclosure building filtration system, is managed by MPS AMP B2.1.4, "Buried Pipe Inspection Program."

In the MPS Unit 2 LRA, the applicant states that as part of the buried pipe inspection program, a baseline inspection of representative in-scope buried piping is performed, which provides an effective method for detection of aging effects. In addition, inspections are performed when the buried components are excavated for maintenance or any other reason and provide an effective method to evaluate the condition of the buried piping and protective coatings. Operating experience with age-related degradation of buried piping is limited and no failures of in-scope buried piping have been identified.

Also, the applicant states that there is no buried piping in the diesel fuel oil systems.

The project team reviewed the buried pipe inspection program and its evaluation is documented in Section 7.1.3 of this report. The project team finds that the buried pipe inspection program is consistent with GALL AMP XI.M28, "Buried Piping and Tanks Surveillance," and GALL AMP XI.M34, "Buried Piping and Tanks Inspection," with exceptions and enhancements. The project team also finds the exceptions and enhancements to be acceptable. The project team reviewed the plant operating experience and found that the program is effective in identifying age-related degradation, implementing repairs, and maintaining the integrity of buried pipe. On the basis of its review, the project team finds that the buried pipe inspection program is acceptable for managing the aging effects of loss of material in buried piping and fittings.

The project team finds that the applicant has demonstrated that the effects of aging for loss of material will be adequately managed so that the intended functions will be maintained consistent with the CLB during the period of extended operation, as required by 10 CFR 54.21(a)(3).

7.2.3.3 Aging Management Review Results That Are Not Consistent with the GALL Report or Are Not Addressed in the GALL Report

In MPS Unit 2 LRA Tables 3.3.2-1 through 3.3.2-41, the project team reviewed additional details of the results of the AMRs for material, environment, aging effect requiring management, and AMP combinations that are not consistent with the GALL Report or are not addressed in the GALL Report. The project team also reviewed additional systems and components, provided in MPS LRA supplement letters dated November 9, 2004 (ML043200606) and January 11, 2005 (ML050190289).

7.2.3.3.1 Circulating Water - Aging Management Evaluation (MPS Unit 2 LRA Table 3.3.2-1)

The project team reviewed Table 3.3.2-1 of the MPS Unit 2 LRA, which summarizes the results of AMR evaluations for the circulating water system component groups.

In the MPS Unit 2 LRA, the applicant proposes to manage loss of material of stainless steel pipe and valve component types exposed to atmosphere/weather using MPS AMP B2.1.13, "General Condition Monitoring," which is a plant-specific program. The project team reviewed

the general condition monitoring program and its evaluation is documented in Section 7.1.12 of this report. On the basis of its review, the project team finds that the general condition monitoring program is acceptable for managing loss of material due to pitting and crevice corrosion since visual inspections will be performed on external surfaces to detect any sign of aging degradation.

In the MPS Unit 2 LRA, the applicant identified no aging effects for rubber expansion joints exposed to air. The applicant states in MPS Unit 2 Technical Report, MP-LR-3403, "Open Water," Section 4.2.2, that change of material properties due to thermal exposure and irradiation and cracking due to irradiation of rubber components in air are aging effects that do not require aging management for the components in this system.

The project team reviewed the current industry research and operating experience. On the basis of its review, the project team finds that no aging effect for rubber expansion joints in air is acceptable, since these components are not exposed to high levels of ultraviolet radiation, ozone, or temperatures greater than 95°F.

In the MPS Unit 2 LRA, the applicant identified no aging effects for rubber expansion joints exposed to sea water. The applicant states in MPS Unit 2 Technical Report, MP-LR-3403, Section 4.2.2, that change of material properties and cracking due to thermal exposure of rubber components in sea water are aging effects that do not require aging management for the components in this system.

On the basis of current industry research and operating experience, the threshold temperature for applying the aging effects of cracking and change of material properties to elastomers is 95EF. For MPS Unit 2, the surface temperature of the rubber expansion joints in the open water systems will never exceed 95EF, since the internal water (raw water from the Long Island Sound) is significantly less than 95EF. On the basis of its review, the project team finds that no aging effect for this item is acceptable, since these components are not exposed to temperatures greater than 95°F.

7.2.3.3.2 <u>Screen Wash - Aging Management Evaluation (MPS Unit 2 LRA Table 3.3.2-2)</u>

The project team reviewed Table 3.3.2-2 of the MPS Unit 2 LRA, which summarizes the results of AMR evaluations for the screen wash system component groups.

In the MPS Unit 2 LRA, the applicant proposes to manage loss of material of stainless steel tubing and valves and copper alloys strainers and valve component types exposed to atmosphere/weather using MPS AMP B2.1.13, "General Condition Monitoring," which is a plant-specific program. The project team reviewed the general condition monitoring program and its evaluation is documented in Section 7.1.12 of this report. On the basis of its review, the project team finds that the general condition monitoring program is acceptable for managing loss of material on external surfaces of the stainless steel components (due to pitting and crevice corrosion) and copper alloys components (due to general corrosion), since visual inspections will be performed on external surfaces to detect any sign of aging degradation.

In the MPS Unit 2 LRA, the applicant identified no aging effects for fiberglass piping component types exposed to air. The applicant states in MPS Unit 2 Technical Report, MP-LR-3403,

Section 4.2.5, that reduced strength due to ozone exposure of non-metallic is possible in an air environment. The applicant explains that the fiberglass components exposed to air in this system are not located near high-voltage electrical equipment. Therefore, ozone exposure is not a potential aging mechanism, and review of operating experience has identified no concerns related to the occurrence of ozone exposure in the open water systems for this evaluation.

On the basis of its review of the applicant's technical report, current industry research and operating experience, the project team finds that reduced strength due to ozone for fiberglass components in air environment is not an aging effect that requires aging management.

In the MPS Unit 2 LRA, the applicant identified no aging effects for fiberglass piping component types exposed to sea water. The applicant states in MPS Unit 2 Technical Report, MP-LR-3403, Section 4.2.5, that exposure to ultraviolet radiation and ozone can cause damage to the chemical structure of the epoxy matrix of fiberglass. The earliest signs of this effect can be changes in color, and surface cracking or crazing. Fiberglass exposed to direct sun or high levels of ozone that might be found in conjunction with high-voltage electrical equipment would be most prone to this effect.

On the basis of its review of the applicant's technical report, current industry research, and operating experience, the project team concurs that the fiberglass components in sea water environment are not exposed to high levels of ultraviolet radiation or ozone. Therefore, the project team finds that cracking in fiberglass components in sea water is not an aging effect that requires aging management.

In the MPS Unit 2 LRA, the applicant identified no aging effects for polyvinyl chloride (PVC) valve component types exposed to air and sea water. Current industry research and operating experience reviews have identified instances of PVC degradation resulting from exposure to direct sunlight and exposure to ozone from high voltage. The MPS Unit 2 Technical Report, MP-LR-3700, "Material Aging Effect Review," identifies the aging effect of reduced strength due to ozone exposure for PVC components exposed to sea water, and reduced strength due to ozone exposure or ultraviolet exposure for PVC components exposed to air. The AMR evaluated PVC components for the above aging effects and concluded that no aging management was required. This conclusion was based on the fact that the PVC components are not exposed to direct sunlight and are not exposed to high levels of ozone, since they are not in close proximity to high-voltage electrical equipment.

On the basis of its review of the applicant's technical report, current industry research, and operating experience, the project team concurs with the applicant and finds that reduced strength PVC components in an air or sea water environment is not an aging effect that requires aging management.

7.2.3.3.3 <u>Service Water - Aging Management Evaluation (MPS Unit 2 LRA Table 3.3.2-3)</u>

The project team reviewed Table 3.3.2-3 of the MPS Unit 2 LRA, which summarizes the results of AMR evaluations for the service water system component groups.

In MPS Unit 2 LRA Table 3.3.2-3, the applicant proposes to manage buildup of deposits for carbon steel pipe and strainers, and cast iron pipes component types exposed to sea water using MPS AMP B2.1.21, "Service Water System (Open-Cycle Cooling)," which is consistent with GALL AMP XI.M20, "Open-Cycle Cooling Water System." However, buildup of deposits due to biofouling is not identified in the GALL Report as an aging effect for the pipes and strainers component types.

The applicant states, in MPS Unit 2 Technical Report, MP-LR-3403, Section 4.2.1, that the carbon steel and cast iron material lined piping interfaces with sea water and is subject to macro-fouling, silting, and sedimentation. Therefore, buildup of deposits is a potential aging effect that requires aging management for these components.

The applicant states in MPS Unit 2 LRA Appendix C (page C-24) that buildup of deposits due to biofouling is an aging effect requiring management for heat exchanger tubes, tube sheets, and lined components. The applicant states that lined piping was included because piping can contribute to heat exchanger fouling since small segments of the coating can become detached and foul associated heat exchangers. Buildup of deposits does not directly affect the pressure boundary of the lined piping. However, prolonged operation with deteriorated coatings would lead to loss of material. For this reason, both buildup of deposits and loss of material are managed by the service water system (open cycle cooling) aging management activity. Specifically, internal visual inspections of the service water piping are periodically performed.

During the audit and review, the project team asked the applicant to provide justification as to why buildup of deposits is not applied to stainless steel service water filters/strainers since filtration is an intended function. The applicant responded that the stainless steel service water filters/strainers are not lined. Although filtration is an intended function, clogging of the filter is an expected service condition and does not result from age-related degradation. The stainless steel service water filters/strainers in question are equipped with differential pressure gauges and are periodically cleaned based on differential pressure.

The project team reviewed the service water system (open-cycle cooling) program and its evaluation is documented in Section 7.1.19 of this report. On the basis of its review of the applicant's program and technical report, together with current industry research and operating experience, the project team finds that the service water program is acceptable for managing buildup of deposits for the lined components, since internal visual inspections of the service water components will be periodically performed to detect any sign of deposit build up.

In the MPS Unit 2 LRA, the applicant proposes to manage loss of material of copper alloy tubing and valve external surfaces caused by borated water leakage using MPS AMP B2.1.13, "General Condition Monitoring," which is a plant-specific program. The project team reviewed the general condition monitoring program and its evaluation is documented in Section 7.1.12 of this report. On the basis of its review, the project team finds use of the general condition monitoring program in lieu of the boric acid corrosion program is acceptable for managing loss of material due to borated acid leakage on external surfaces of copper alloy components in this system, since visual inspections will be performed on external surfaces to detect any sign of aging degradation.

In MPS Unit 2 LRA Table 3.3.2-3, the applicant proposes to manage loss of material for nickel-based alloy expansion joints and tubing exposed to sea water using MPS AMP B2.1.21, "Service Water System (Open-Cycle Cooling)," which is consistent with GALL AMP XI.M20, "Open-Cycle Cooling Water System." However, loss of material for nickel-based component types in treated water as a component, material, environment, and aging effect combination is not identified in the GALL Report.

The applicant states in MPS Unit 2 Technical Report, MP-LR-3403, Section 4.2.2, that the nickel-based alloys, related to pitting, in sea water are exposed to low-flow conditions with an aggressive environment. Therefore, pitting corrosion is a potential aging mechanism.

The project team reviewed the service water system (open-cycle cooling) program and its evaluation is documented in Section 7.1.19 of this report. The project team finds that the service water system (open-cycle cooling) program is acceptable for managing loss of material (due to pitting corrosion) of nickel-based alloy components in a sea water environment for this system, since this program implements the intent of GL 89-13.

In the MPS Unit 2 LRA, the applicant proposes to manage loss of material of stainless steel and copper alloy **pipe, tubing, valves, filter/strainers, flow elements, flow indicators, flow orifices, pumps, and restricted orifices component types** exposed to a moisture-laden air and/or intermittently wetted environments using MPS AMP B2.1.13, "General Condition Monitoring," which is a plant-specific program. The environments are not in the GALL Report for this component type and material.

The project team reviewed the general condition monitoring program and its evaluation is documented in Section 7.1.12 of this report. The project team finds that the general condition monitoring program is acceptable for managing loss of material due to pitting and crevice corrosion since visual inspections will be performed on external surfaces to detect any sign of aging degradation.

In the MPS Unit 2 LRA, the applicant identified no aging effects for the fiberglass service water pump motor protective tank exposed to air. The applicant states in MPS Unit 2 Technical Report, MP-LR-3403, Section 4.2.5, that reduced strength due to ozone exposure of non-metallic components is possible in an air environment. The applicant explains that the fiberglass components exposed to air in this system are not located near high-voltage electrical equipment. Therefore, ozone exposure is not a potential aging mechanism, and review of operating experience has identified no concerns related to the occurrence of ozone exposure in the open water systems for this evaluation.

On the basis of its review of the applicant's technical report, current industry research, and operating experience, the project team concurs and finds that reduced strength due to ozone for fiberglass components in air environment is not an aging effect that requires aging management.

In the MPS Unit 2 LRA, the applicant identified no aging effects for rubber expansion joints exposed to air. The applicant states in MPS Unit 2 Technical Report, MP-LR-3403, Section 4.2.2, that change of material properties due to thermal exposure and irradiation, and

cracking due to irradiation of rubber components in air are aging effects that do not require aging management for the components in this system.

On the basis of its review of the applicant's technical report, current industry research, and operating experience, the project team concurs and finds that no aging effect for rubber expansion joints in air is acceptable, since these components are not exposed to high levels of ultraviolet radiation, ozone, or temperatures greater than 95°F.

In the MPS Unit 2 LRA, the applicant identified no aging effects for rubber expansion joints exposed to sea water. The applicant states in MPS Unit 2 Technical Report, MP-LR-3403, Section 4.2.2, that change of material properties and cracking due to thermal exposure of rubber components in sea water are aging effects that do not require aging management for the components in this system.

On the basis of current industry research and operating experience, the threshold temperature for applying the aging effects of cracking and change of material properties to elastomers is 95EF. For MPS Unit 2, the surface temperature of the rubber expansion joints in the open water systems will never exceed 95EF, since the internal water (raw water from the Long Island Sound) is significantly less than 95EF. On the basis of its review, the project team finds no aging effect for this item is acceptable, since these components are not exposed to temperatures greater than 95°F.

7.2.3.3.4 Sodium Hypochlorite - Aging Management Evaluation (MPS Unit 2 LRA Table 3.3.2-4)

The project team reviewed Table 3.3.2-4 of the MPS Unit 2 LRA, which summarizes the results of AMR evaluations for the sodium hypochlorite system component groups.

In the MPS Unit 2 LRA, the applicant proposes to manage loss of material of stainless steel valve component types exposed to a moisture-laden air and/or intermittently wetted environments using MPS AMP B2.1.13, "General Condition Monitoring," which is a plant-specific program. The environments are not in the GALL Report for this component type and material. The project team reviewed the general condition monitoring program and its evaluation is documented in Section 7.1.12 of this report. The project team finds that the general condition monitoring program is acceptable for managing loss of material due to pitting and crevice corrosion since visual inspections will be performed on external surfaces to detect any sign of aging degradation.

In the MPS Unit 2 LRA, the applicant identified no aging effects for PVC pipes and valves exposed to air or in a sea water environment. Current industry research and operating experience reviews have identified instances of PVC degradation resulting from exposure to direct sunlight and exposure to ozone from high voltage. MPS Unit 2 Technical Report, MP-LR-3700,"Material Aging Effects Report," identifies the aging effect of reduced strength due to ozone exposure for PVC components exposed to sea water, and reduced strength due to ozone exposure or ultraviolet exposure for PVC components exposed to air. The applicant states that it evaluated PVC components for the above aging effects and concluded that no aging management was required. This conclusion was based on the fact that the PVC

components are not exposed to direct sunlight and are not exposed to high levels of ozone, since they are not in close proximity to high-voltage electrical equipment.

On the basis of its review of the applicant's technical report, current industry research, and operating experience, the project team finds that reduced strength of PVC components in air or a sea water environment is not an aging effect that requires aging management.

7.2.3.3.5 Reactor Building Closed Cooling Water - Aging Management Evaluation (MPS Unit 2 LRA Table 3.3.2-5)

The project team reviewed Table 3.3.2-5 of the MPS Unit 2 LRA, which summarizes the results of AMR evaluations for the reactor building closed cooling water (RBCCW) system component groups.

In the MPS Unit 2 LRA, the applicant proposes to manage loss of material for RBCCW heat exchanger copper alloy tubes in treated water using MPS AMP B2.1.25, "Work Control Process," which is a plant-specific program. The project team reviewed the work control process program and its evaluation is documented in Section 7.1.22 of this report. Visual inspections of the internal surfaces of plant components and plant commodities are performed during the performance of maintenance, in accordance with the work control process program, to determine the presence of loss of material. The project team finds that the work control process program is acceptable for managing loss of material due to general corrosion since visual inspections will be performed on the external surfaces of heat exchanger tubes to detect any sign of aging degradation.

In the MPS Unit 2 LRA, the applicant proposes to manage loss of material of copper alloy valve external surfaces caused by borated water leakage using MPS AMP B2.1.13, "General Condition Monitoring," which is a plant-specific program. The project team reviewed the general condition monitoring program and its evaluation is documented in Section 7.1.12 of this report. The project team finds that the use of the general condition monitoring program in lieu of the boric acid corrosion program is acceptable for managing loss of material due to borated acid leakage on external surfaces of copper alloy components in this system, since visual inspections will be performed on external surfaces to detect any sign of aging degradation.

In the MPS Unit 2 LRA, the applicant proposes to manage loss of material of stainless steel and copper alloy valves, flow elements, flow indicators, flow orifices, flow switches, and tubing component types exposed to a moisture-laden air and/or intermittently wetted environments using MPS AMP B2.1.13, "General Condition Monitoring," which is a plant-specific program. The project team reviewed the general condition monitoring program and its evaluation is documented in Section 7.1.12 of this report. The project team finds that the general condition monitoring program is acceptable for managing loss of material due to pitting and crevice corrosion since visual inspections will be performed on external surfaces to detect any sign of aging degradation.

7.2.3.3.6 Chilled Water - Aging Management Evaluation (MPS Unit 2 LRA Table 3.3.2-6)

The project team reviewed Table 3.3.2-6 of the MPS Unit 2 LRA, which summarizes the results of AMR evaluations for the chilled water system component groups.

In the MPS Unit 2 LRA, the applicant proposes to manage loss of material of carbon steel chiller water surge tank component groups exposed internally to moisture-laden air and/or an intermittently wetted environment using MPS AMP B2.1.25, “Work Control Process,” which is a plant-specific program. The project team reviewed the work control process program and its evaluation is documented in Section 7.1.22 of this report. Visual inspections of the internal surfaces of plant components and plant commodities are performed during the performance of maintenance, in accordance with the work control process program, to determine the presence of loss of material. The project team finds that the work control process program is acceptable for managing loss of material due to general corrosion since visual inspections will be performed on internal surfaces of components to detect any sign of aging degradation.

In the MPS Unit 2 LRA, the applicant proposes to manage loss of material of copper alloy tubing and valve external surfaces caused by borated water leakage using MPS AMP B2.1.13, “General Condition Monitoring,” which is a plant-specific program. The project team reviewed the general condition monitoring program and its evaluation is documented in Section 7.1.12 of this report. The project team finds that the use of the general condition monitoring program in lieu of the boric acid corrosion program is acceptable for managing loss of material due to borated acid leakage on the external surfaces of copper alloy components in this system, since visual inspections will be performed on external surfaces to detect any sign of aging degradation.

In the MPS Unit 2 LRA, the applicant proposes to manage loss of material of stainless steel and copper alloy tubing, valves, level indicators, flow elements, moisture indicators, and pumps component types exposed to a moisture-laden air and/or intermittently wetted environments using MPS AMP B2.1.13, “General Condition Monitoring,” which is a plant-specific program. The project team reviewed the general condition monitoring program and its evaluation is documented in Section 7.1.12 of this report. The project team finds that the general condition monitoring program is acceptable for managing loss of material due to pitting and crevice corrosion since visual inspections will be performed on the external surfaces to detect any sign of aging degradation.

In the MPS Unit 2 LRA, the applicant identified no aging effects for carbon steel, stainless steel, cast iron, and copper alloy components exposed internally environment of gas for chilled water shell and tubes, chilled water evaporators tubes, compressor casings, filter/strainers, level indicators, moisture indicators, and valve component types. Gas is not identified in the GALL Report as an environment for these components and materials.

On the basis of its review of current industry research and operating experience, the project team finds that an internal environment of gas (which is similar to air) on metal will not result in aging effects that will be of concern during the period of extended operation. Therefore, the project team finds that there are no applicable aging effects requiring management for metal in a gas environment.

7.2.3.3.7 Instrument Air - Aging Management Evaluation (MPS Unit 2 LRA Table 3.3.2-7 and Table 3.3.2-7a)

The project team reviewed Table 3.3.2-7 of the MPS Unit 2 LRA and Table 3.3.2-7a of the MPS LRA supplement letter dated January 11, 2005 (ML050190289), which summarizes the results of AMR evaluations for the instrument air system component groups. The project team reviewed, in whole or in part, MPS Unit 2 Technical Report, MP-LR-3401, "License Renewal Project, Aging Management Review, Air and Gas Systems," Revision 2, dated December 29, 2003, which provides the AMR results for the air and gas systems.

In the MPS Unit 2 LRA, the applicant proposes to manage loss of material of copper alloy pipe, regulators, tubing, and valve component types exposed to a borated water leakage external environment using MPS AMP B2.1.13, "General Condition Monitoring," which is a plant-specific program. However, the GALL Report specifies GALL AMP XI.M10, "Boric Acid Corrosion," to manage this aging effect. The applicant states, in Note 1, that the boric acid corrosion program includes specific inspections of reactor coolant pressure boundary and supporting systems components.

The project team reviewed the general condition monitoring program and its evaluation is documented in Section 7.1.12 of this report. The project team finds that the general condition monitoring program provides inspections for the management of loss of material due to boric acid corrosion beyond the scope of the boric acid corrosion program. Also, visual inspection of external surfaces is performed during various walkdowns by plant personnel to look for boron buildup and/or boric acid leaks. On the basis of its review, the project team finds that this program is acceptable for managing loss of material of copper alloy pipe, tubing, and valve component types exposed to a borated water leakage external environment.

In the MPS Unit 2 LRA and the MPS LRA supplement letter dated January 11, 2005 (ML050190289), the applicant identified no aging effects for carbon steel, stainless steel, copper alloys, and PVC components exposed internally and externally to air, including accumulators (reserve air bottles), pipe, valves, hoses, regulators, tubing, tubing (stored tubing and fittings), compressor aftercoolers (shell), compressors and containment instrument air receiver tank component types. Air is not identified in the GALL Report as an environment for these components and materials.

On the basis of its review of current industry research and operating experience, the project team finds that air on metal will not result in aging that will be of concern during the period of extended operation. The external environments being referred to are typical of ambient air, e.g., under a shelter, indoor, or air-conditioned enclosure or room. Significant corrosion of carbon steel requires an electrolytic environment, and a simultaneous presence of oxygen and moisture. Without the presence of the aggressive environment, carbon steel components will experience insignificant amounts of corrosion, and no aging effects are applicable to this component/commodity group. Wrought austenitic stainless steels and copper alloys are not susceptible to significant general corrosion that would affect the intended function of components. PVC is impervious to air. Therefore, the project team finds that there are no applicable aging effects requiring management for metal in an air environment.

7.2.3.3.8 Nitrogen - Aging Management Evaluation (MPS Unit 2 LRA Table 3.3.2-8 and Table 3.3.2-8a)

The project team reviewed Table 3.3.2-8 of the MPS Unit 2 LRA and Table 3.3.2-8a of the MPS LRA supplement letter dated January 11, 2005 (ML050190289), which summarizes the results of AMR evaluations for the nitrogen system component groups. The project team reviewed, in whole or in part, MPS Unit 2 Technical Report, MP-LR-3401, Revision 2, which provides the AMR results for the air and gas systems.

In the MPS Unit 2 LRA and the MPS LRA supplement letter dated January 11, 2005 (ML050190289), the applicant identified no aging effects for stainless steel components exposed externally to air, including pipe, valves, and flow indicator component types. Air is not identified in the GALL Report as an environment for these components and materials.

On the basis of current industry research and operating experience, the project team finds that air on metal will not result in aging that will be of concern during the period of extended operation. The external environments being referred to are typical of ambient air, e.g., under a shelter, indoor, or air-conditioned enclosure or room. Wrought austenitic stainless steels are not susceptible to significant general corrosion that would affect the intended function of components. Therefore, the project team finds that there are no applicable aging effects requiring management for metal in an air environment.

In the MPS Unit 2 LRA and the MPS LRA supplement letter dated January 11, 2005 (ML050190289), the applicant identified no aging effects for stainless steel components exposed internally to gas for pipe, valves and flow indicator component types. Gas is not identified in the GALL Report as an environment for these components and materials.

On the basis of its review of current industry research and operating experience, the project team finds that an internal environment of gas (nitrogen, which is an inert gas) on metal will not result in aging that will be of concern during the period of extended operation. Therefore, the project team finds that there are no applicable aging effects requiring management for metal in a gas environment.

7.2.3.3.9 Station Air - Aging Management Evaluation (MPS Unit 2 LRA Table 3.3.2-9 and Table 3.3.2-9a)

The project team reviewed Table 3.3.2-9 of the MPS Unit 2 LRA and Table 3.3.2-9a of the MPS LRA supplement letter dated January 11, 2005 (ML050190289), which summarizes the results of AMR evaluations for the station air system component groups. The project team reviewed, in whole or in part, MPS Unit 2 Technical Report, MP-LR-3401, Revision 2, which provides the AMR results for the air and gas systems.

In the MPS Unit 2 LRA and the MPS LRA supplement letter dated January 11, 2005 (ML050190289), the applicant identified no aging effects for carbon steel, copper alloys, and cast iron components exposed externally to air, including pipe, valves, air compressor aftercoolers (shell), air compressor intercoolers (shell), and compressors component types. Air is not identified in the GALL Report as an environment for these components and materials.

On the basis of its review of current industry research and operating experience, the project team finds that air on metal will not result in aging that will be of concern during the period of extended operation. The external environments being referred to are typical of ambient air, e.g., under a shelter, indoor, or air-conditioned enclosure or room. Significant corrosion of carbon steel requires an electrolytic environment, and a simultaneous presence of oxygen and moisture. Carbon steel and cast iron components that are exposed externally to a sheltered air environment and not exposed to moisture-laden air or intermittent wetting will experience insignificant amounts of corrosion, and no aging effects are applicable to this component/commodity group. Copper alloys are not susceptible to significant general corrosion that would affect the intended function of components. Therefore, the project team finds that there are no applicable aging effects requiring management for metal in an air environment.

In the MPS Unit 2 LRA, the applicant proposes to manage loss of material of copper alloy pipe and valve component types exposed to a borated water leakage external environment using MPS AMP B2.1.13, "General Condition Monitoring," which is a plant-specific program. In addition, the applicant states that the boric acid corrosion program includes specific inspections of reactor coolant pressure boundary and supporting systems components. The project team reviewed the general condition monitoring program and its evaluation is documented in Section 7.1.12 of this report. The general condition monitoring program performs inspections for management of loss of material due to boric acid corrosion beyond the scope of the boric acid corrosion program. The project team finds that this program is acceptable for managing loss of material since visual inspections of external surfaces are performed during various walkdowns by plant personnel to look for boron buildup and/or boric acid leaks.

7.2.3.3.10 Chemical and Volume Control - Aging Management Evaluation (MPS Unit 2 LRA Table 3.3.2-10)

The project team reviewed Table 3.3.2-10 of the MPS Unit 2 LRA, which summarizes the results of AMR evaluations for the CVCS component groups.

In the MPS Unit 2 LRA, the applicant identified no aging effects for carbon steel, cast iron, and stainless steel components exposed to air, including boric acid tanks, filter/strainer, flow elements, flow indicators, letdown heat exchangers (channel head), level indicators, pipe, pulsation dampers, pumps, regenerative heat exchangers (channel head), regenerative heat exchangers (shell), suction stabilizers, sump tanks, tubing, valves, volume control tank, filters/strainers (housing- charging pump lube oil), lube oil reservoirs (charging pump), and pumps (charging pump lube oil) component types. Air is not identified in the GALL Report as an environment for these components and materials.

On the basis of its review of current industry research and operating experience, the project team finds that air on metal will not result in aging that will be of concern during the period of extended operation. The external environments being referred to are typical of ambient air, e.g., under a shelter, indoor, or air-conditioned enclosure or room. Significant corrosion of carbon steel and cast iron requires an electrolytic environment, and a simultaneous presence of oxygen and moisture. Without the presence of the aggressive environment, low-alloy steel components will experience insignificant amounts of corrosion, and no aging effects are applicable to this component/commodity group. Wrought austenitic stainless steels are not susceptible to significant general corrosion that would affect the intended function of

components. Therefore, the project team finds that there are no applicable aging effects requiring management for metal in an air environment.

In the MPS Unit 2 LRA, the applicant proposes to manage loss of material of stainless steel, carbon steel, cast iron, and copper alloy filter/strainer (housing - charging pump lube oil), lube oil reservoirs (charging pump), pumps (charging pump lube oil), tubing, tubing (charging pump lube oil), and valve component types exposed internally and externally to an environment of oil using MPS AMP B2.1.25, "Work Control Process." The work control process program provides the opportunity to visually inspect the internal surfaces of components during preventive and corrective maintenance activities on an ongoing basis. Oil samples are analyzed periodically for contaminants for indication of degradation. The work control process program provides input to the MPS Unit 2 corrective action program if aging effects are identified.

The project team finds the work control process program acceptable for managing the aging effect of loss of material. The project team's evaluation of the work control process program is documented in Section 7.1.22 of this report.

In the MPS Unit 2 LRA, the applicant identified no aging effects for stainless steel components exposed internally environment of gas for pipe, pulsation dampers, tubing, and valve component types. Gas is not identified in the GALL Report as an environment for these components and materials.

On the basis of its review of current industry research and operating experience, the project team finds that an internal environment of gas (which is similar to air) on metal will not result in aging that will be of concern during the period of extended operation. Therefore, the project team finds that there are no applicable aging effects requiring management for metal in a gas environment.

7.2.3.3.11 <u>Sampling - Aging Management Evaluation (MPS Unit 2 LRA Table 3.3.2-11and LRA Table 3.3.2-11a)</u>

The project team reviewed Table 3.3.2-11 of the MPS Unit 2 LRA and Table 3.3.2-11a of the MPS LRA supplement letter dated January 11, 2005 (ML050190289), which summarizes the results of AMR evaluations for the sampling system component groups.

In the MPS Unit 2 LRA and the MPS LRA supplement letter dated January 11, 2005 (ML050190289), the applicant identified no aging effects for low-alloy steel and stainless steel bolting, pipe tubes, valves and secondary sample station/sink component types exposed externally to air. Air is not identified in the GALL Report as an environment for these components and materials.

On the basis of its review of current industry research and operating experience, the project team finds that an internal environment of air on metal will not result in aging that will be of concern during the period of extended operation. Therefore, the project team finds that there are no applicable aging effects requiring management for metal in an air environment.

In the MPS LRA supplement letter dated January 11, 2005 (ML050190289), the applicant identified no aging effects for copper alloys components exposed internally to gas for sample

chiller (tubes) component types. Gas is not identified in the GALL Report as an environment for these components and materials.

On the basis of its review of current industry research and operating experience, the project team finds that an internal environment of gas (nitrogen, which is an inert gas) on metal will not result in aging that will be of concern during the period of extended operation. Therefore, the project team finds that there are no applicable aging effects requiring management for metal in a gas environment.

7.2.3.3.12 Primary Makeup Water - Aging Management Evaluation (MPS Unit 2 LRA Table 3.3.2-12 and Table 3.3.2-12a)

The project team reviewed Table 3.3.2-12 of the MPS Unit 2 LRA and Table 3.3.2-12a of the MPS LRA supplement letter dated January 11, 2005 (ML050190289), which summarizes the results of AMR evaluations for the primary makeup water system component groups.

In the MPS Unit 2 LRA and the MPS LRA supplement letter dated January 11, 2005 (ML050190289), the applicant identified no aging effects for low-alloy steel and stainless steel bolting, pipe, flow elements, primary water head tank, pumps, tubing, valves, deaerator transfer pump and make-up water vacuum deaerator component types exposed externally to air. Aging effects for these combinations of components, material, and environment are not identified in the GALL Report.

On the basis of its review of current industry research and operating experience, the project team finds that an internal environment of air on metal will not result in aging that will be of concern during the period of extended operation. Therefore, the project team finds that there are no applicable aging effects requiring management for metal in an air environment.

In the MPS LRA supplement letter dated January 11, 2005 (ML050190289), the applicant proposes to manage loss of material of stainless steel for primary water storage tank component types exposed to a atmosphere/weather environment using MPS AMP B2.1.13, “General Condition Monitoring Program,” which is a plant-specific program. The project team reviewed the general condition monitoring program and its evaluation is documented in Section 7.1.12 of this report. The project team finds that the general condition monitoring program is acceptable for managing loss of material due to pitting and crevice corrosion since visual inspections will be performed on external surfaces to detect any sign of aging degradation.

7.2.3.3.13 Access Control Area Air Conditioning - Aging Management Evaluation (MPS Unit 2 LRA Table 3.3.2-13 and Table 3.3.2-13a)

The project team reviewed Table 3.3.2-13 of the MPS Unit 2 LRA and Table 3.3.2-13a of the MPS LRA supplement letter dated January 11, 2005 (ML050190289), which summarizes the results of AMR evaluations for the access control area air conditioning system component groups.

In the MPS Unit 2 LRA and the MPS LRA supplement letter dated January 11, 2005 (ML050190289), the applicant identified no aging effects for carbon steel damper housings and

access control area A/C unit (housing) components type exposed internally and externally to air environment that is not intermittently wetted.

The applicant states, in the MPS Unit 2 LRA, that surfaces of carbon steel components located within structures have not experienced corrosion degradation that would affect the components' intended functions due to humidity in the absence of cyclic or intermittent wetting conditions, such as condensation. The applicant interprets the GALL Report environment termed 'warm, moist air' to be air with an undefined relative humidity level, and not a wetted environment. Since the MPS Unit 2 AMR approach considers loss of material only in a moisture-laden air and/or intermittently wetted environment, the GALL Report items were determined to be not applicable.

The project team reviewed the MPS Unit 2 operating experience as a confirmation of the validity of the AMR approach for corrosion in an air environment. The operating experience reviews did not find significant corrosion of ventilation system components (other than cooling coils and associated components) due to the air environment. The project team finds that, based on the absence of significant corrosion, 'moist air' alone does not result in corrosion for these components. On the basis of its review, the project team finds that there are no aging effects requiring management for metal in an air environment.

7.2.3.3.14 Main Condensers Evacuation - Aging Management Evaluation (MPS Unit 2 LRA Table 3.3.2-14 and Table 3.3.2-14a)

The project team reviewed Table 3.3.2-14 of the MPS Unit 2 LRA and Table 3.3.2-14a of the MPS LRA supplement letter dated January 11, 2005 (ML050190289), which summarizes the results of AMR evaluations for the main condensers evacuation system component groups.

In the MPS Unit 2 LRA and the MPS LRA supplement letter dated January 11, 2005 (ML050190289), the applicant identified no aging effects for carbon steel components exposed externally to air, including damper housing, ductwork, fan/blower housing, pipe, valves, filter/strainers, flow orifices, flow switches, and steam jet aor ejector vent condenser (shell) component types. Air is not identified in the GALL Report as an environment for these components and materials.

On the basis of its review of current industry research and operating experience, the project team finds that air on metal will not result in aging that will be of concern during the period of extended operation. The external environments being referred to are typical of ambient air, e.g., under a shelter, indoor, or air-conditioned enclosure or room. Significant corrosion of carbon and low-alloy steel requires an electrolytic environment, and a simultaneous presence of oxygen and moisture. Without the presence of the aggressive environment, low-alloy steel components will experience insignificant amounts of corrosion, and no aging effects are applicable to this component/commodity group. Wrought austenitic stainless steels and CASS are not susceptible to significant general corrosion that would affect the intended function of components. Therefore, the project team finds that there are no aging effects requiring management for metal in an air environment.

7.2.3.3.15 Containment Air Recirculation and Cooling - Aging Management Evaluation (MPS Unit 2 LRA Table 3.3.2-15)

The project team reviewed Table 3.3.2-15 of the MPS Unit 2 LRA, which summarizes the results of AMR evaluations for the containment air recirculation and cooling system component groups.

In the MPS Unit 2 LRA, the applicant identified no aging effects for carbon steel and stainless steel HVAC components exposed internally or externally to air that is not intermittently wetted, including containment air recirculation cooling unit housings, damper housings, ductwork, fan/blower housing, pipe, flow elements, tubing, and valve component types.

The applicant states, in the MPS Unit 2 LRA, that surfaces of carbon steel and stainless steel components located within structures have not experienced corrosion degradation that would affect the intended function of components due to humidity in the absence of cyclic or intermittent wetting conditions, such as condensation. The applicant interprets the GALL Report environment termed 'warm, moist air' to be air with an undefined relative humidity level, and not a wetted environment. Since the MPS Unit 2 AMR approach considers loss of material only in a moisture-laden air and/or intermittently wetted environment, the GALL Report items were determined to be not applicable.

The project team reviewed the MPS Unit 2 operating experience as a confirmation of the validity of the AMR approach for corrosion in an air environment. The operating experience reviews did not find significant corrosion of ventilation system components (other than cooling coils and associated components) due to the air environment. The project team finds that, based on the absence of significant corrosion, 'moist air' alone does not result in corrosion for these components. On the basis of its review, the project team finds that there are no aging effects requiring management for metal in an air environment.

7.2.3.3.16 Containment and Enclosure Building Purge - Aging Management Evaluation (MPS Unit 2 LRA Table 3.3.2-16)

The project team reviewed Table 3.3.2-16 of the MPS Unit 2 LRA, which summarizes the results of AMR evaluations for the containment and enclosure building purge system component groups.

In the MPS Unit 2 LRA, the applicant identified no aging effects for carbon steel HVAC components exposed internally or externally to air that is not intermittently wetted, including damper housings, ductwork, pipe, and valve component types.

The applicant states, in the MPS Unit 2 LRA, that surfaces of carbon steel components located within structures have not experienced corrosion degradation that would affect the intended function of components due to humidity in the absence of cyclic or intermittent wetting conditions, such as condensation. The applicant interprets the GALL Report environment termed 'warm, moist air' to be air with an undefined relative humidity level, and not a wetted environment. Since the MPS Unit 2 AMR approach considers loss of material only in a moisture-laden air and/or intermittently wetted environment, the GALL Report items were determined to be not applicable.

The project team reviewed MPS Unit 2 operating experience as a confirmation of the validity of the AMR approach for corrosion in an air environment. The operating experience reviews did not find significant corrosion of ventilation system components (other than cooling coils and associated components) due to the air environment. The project team finds that, based on the absence of significant corrosion, 'moist air' alone does not result in corrosion for these components. On the basis of its review, the project team finds that there are no aging effects requiring management for metal in an air environment.

7.2.3.3.17 Containment Penetration Cooling - Aging Management Evaluation (MPS Unit 2 LRA Table 3.3.2-17)

The project team reviewed Table 3.3.2-17 of the MPS Unit 2 LRA, which summarizes the results of AMR evaluations for the containment penetration cooling system component groups.

In the MPS Unit 2 LRA, the applicant identified no aging effects for carbon steel HVAC components exposed internally and externally to air that is not intermittently wetted, including damper housings, ductwork, and fan/blower housing component types.

The applicant states, in the MPS Unit 2 LRA, that surfaces of carbon steel components located within structures have not experienced corrosion degradation that would affect the intended function of components due to humidity in the absence of cyclic or intermittent wetting conditions, such as condensation. The applicant interprets the GALL Report environment termed 'warm, moist air' to be air with an undefined relative humidity level, and not a wetted environment. Since the MPS Unit 2 AMR approach considers loss of material only in a moisture-laden air and/or intermittently wetted environment, the GALL Report items were determined to be not applicable.

The project team reviewed MPS Unit 2 operating experience as a confirmation of the validity of the AMR approach for corrosion in an air environment. The operating experience reviews did not find significant corrosion of ventilation system components (other than cooling coils and associated components) due to the air environment. The project team finds that, based on the absence of significant corrosion, 'moist air' alone does not result in corrosion for these components. On the basis of its review, the project team finds that there are no aging effects requiring management for metal in an air environment.

7.2.3.3.18 Containment Post-Accident Hydrogen Control - Aging Management Evaluation (MPS Unit 2 LRA Table 3.3.2-18)

The project team reviewed Table 3.3.2-18 of the MPS Unit 2 LRA, which summarizes the results of AMR evaluations for the containment post-accident hydrogen control system component groups.

In the MPS Unit 2 LRA, the applicant identified no aging effects for carbon steel and stainless steel HVAC components exposed internally and externally to air that is not intermittently wetted, including fan/blower housing, pipe, tubing, valves, detection chamber, flexible hose, flow elements, hydrogen recombiner housings, and flow orifices component types.

The applicant states, in the MPS Unit 2 LRA, that surfaces of carbon steel and stainless steel components located within structures have not experienced corrosion degradation that would affect the intended function of components due to humidity in the absence of cyclic or intermittent wetting conditions, such as condensation. The applicant interprets the GALL Report environment termed 'warm, moist air' to be air with an undefined relative humidity level, and not a wetted environment. Since the MPS Unit 2 AMR approach considers loss of material only in a moisture-laden air and/or intermittently wetted environment, the GALL Report items were determined to be not applicable.

The project team reviewed the MPS Unit 2 operating experience as a confirmation of the validity of the AMR approach for corrosion in an air environment. The operating experience reviews did not find significant corrosion of ventilation system components (other than cooling coils and associated components) due to the air environment. The project team finds that, based on the absence of significant corrosion, 'moist air' alone does not result in corrosion for these components. On the basis of its review, the project team finds that there are no aging effects requiring management for metal in an air environment.

7.2.3.3.19 Control Room Air Conditioning - Aging Management Evaluation (MPS Unit 2 LRA Table 3.3.2-19)

The project team reviewed Table 3.3.2-19 of the MPS Unit 2 LRA, which summarizes the results of AMR evaluations for the control room air conditioning system component groups.

In the MPS Unit 2 LRA, the applicant identified no aging effects for carbon steel HVAC components exposed internally or externally to air that is not intermittently wetted, including compressor casings, control room air handling units (housing), control room filter banks, damper housings, ductwork, fan/blower housings (air-cooled condenser unit), fan/blower housings (control room air handling unit), pipe, valves, and smoke detectors component types.

The applicant states, in the MPS Unit 2 LRA, that surfaces of carbon steel components located within structures have not experienced corrosion degradation that would affect the intended function of components due to humidity in the absence of cyclic or intermittent wetting conditions, such as condensation. The applicant interprets the GALL Report environment termed 'warm, moist air' to be air with an undefined relative humidity level, and not a wetted environment. Since the MPS Unit 2 AMR approach considers loss of material only in a moisture-laden air and/or intermittently wetted environment, the GALL Report items were determined to be not applicable.

The project team reviewed MPS Unit 2 operating experience as a confirmation of the validity of the AMR approach for corrosion in an air environment. The operating experience reviews did not find significant corrosion of ventilation system components (other than cooling coils and associated components) due to the air environment. The project team finds that, based on the absence of significant corrosion, 'moist air' alone does not result in corrosion for these components. On the basis of its review, the project team finds that there are no aging effects requiring management for metal in an air environment.

In the MPS Unit 2 LRA, the applicant identified no aging effects for copper alloy HVAC components exposed internally or externally to air that is not intermittently wetted, including

compressor casings (air cooled compressor), filter/dryer, moisture indicator, muffler, pipe, tubing, and valve component types.

The applicant states, in the MPS Unit 2 LRA, that surfaces of copper alloy components located within structures have not experienced corrosion degradation that would affect the intended function of components due to humidity in the absence of cyclic or intermittent wetting conditions, such as condensation. The applicant interprets the GALL Report environment termed 'warm, moist air' to be air with an undefined relative humidity level, and not a wetted environment. Since the MPS Unit 2 AMR approach considers loss of material only in a moisture-laden air and/or intermittently wetted environment, the GALL Report items were determined to be not applicable.

The project team reviewed the MPS Unit 2 operating experience as a confirmation of the validity of the AMR approach for corrosion in an air environment. The operating experience reviews did not find significant corrosion of ventilation system components (other than cooling coils and associated components) due to the air environment. The project team finds that, based on the absence of significant corrosion, 'moist air' alone does not result in corrosion for these components. On the basis of its review, the project team finds that there are no aging effects requiring management for metal in an air environment.

In the MPS Unit 2 LRA, the applicant identified no aging effects for copper alloy components exposed internally environment of gas for compressor casings, compressor casings (air-cooled condenser), control room air handling units (coils), filter/dryer, moisture indicator, mufflers, pipe, tubing, and valve component types. Gas is not identified in the GALL Report as an environment for these components and materials.

On the basis of its review of current industry research and operating experience, the project team finds that an internal environment of gas (which is similar to air) on metal will not result in aging that will be of concern during the period of extended operation. Therefore, the project team finds that there are no applicable aging effects requiring management for metal in a gas environment.

During the audit and review, the project team questioned why various portions of the control room air conditioning system were not included within the scope of license renewal and subject to an AMR. In its MPS LRA supplement letter dated July 7, 2004 (ML041900370), the applicant added several components to the control room air conditioning system components that are subject to an AMR. The addition of these components did not result in the addition of material/environment combinations or AMPs for the control room air conditioning system AMR. The project team finds this material/environment/aging effect/AMP combination to be acceptable. The staff's evaluation of the scope of the control room air conditioning system AMR is documented in Section 2.3.3.19 of the SER related to the MPS Units 2 and 3 LRA.

7.2.3.3.20 Control Element Drive Mechanism Cooling - Aging Management Evaluation (MPS Unit 2 LRA Table 3.3.2-20)

The project team reviewed Table 3.3.2-20 of the MPS Unit 2 LRA, which summarizes the results of AMR evaluations for the CEDM cooling system component groups.

In the MPS Unit 2 LRA, the applicant proposes to manage loss of material of stainless steel CEDM cooling coils component groups exposed internally to moisture-laden air and/or an intermittently wetted environment using MPS AMP B2.1.25, “Work Control Process,” which is a plant-specific program.

The project team reviewed the work control process program and its evaluation is documented in Section 7.1.22 of this report. Visual inspections of the internal surfaces of plant components and plant commodities are performed during the performance of maintenance, in accordance with the work control process program, to determine the presence of loss of material. The project team finds that the work control process program is acceptable for managing loss of material due to general corrosion since visual inspections will be performed on internal surfaces of components to detect any sign of aging degradation.

7.2.3.3.21 Diesel Generator Ventilation - Aging Management Evaluation (MPS Unit 2 LRA Table 3.3.2-21)

The project team reviewed Table 3.3.2-21 of the MPS Unit 2 LRA, which summarizes the results of AMR evaluations for the diesel generator ventilation system component groups.

In the MPS Unit 2 LRA, the applicant identified no aging effects for carbon steel HVAC components exposed internally or externally to air that is not intermittently wetted, including damper housings, ductwork, and fan/blower housing component types.

The applicant states, in the MPS Unit 2 LRA, that surfaces of carbon steel components located within structures have not experienced corrosion degradation that would affect the intended function of components due to humidity in the absence of cyclic or intermittent wetting conditions, such as condensation. The applicant interprets the GALL Report environment termed 'warm, moist air' to be air with an undefined relative humidity level, and not a wetted environment. Since the MPS Unit 2 AMR approach considers loss of material only in a moisture-laden air and/or intermittently wetted environment, the GALL Report items were determined to be not applicable.

The project team reviewed MPS Unit 2 operating experience as a confirmation of the validity of the AMR approach for corrosion in an air environment. The operating experience reviews did not find significant corrosion of ventilation system components (other than cooling coils and associated components) due to the air environment. The project team finds that, based on the absence of significant corrosion, 'moist air' alone does not result in corrosion for these components. On the basis of its review, the project team finds that there are no aging effects requiring management for metal in an air environment.

7.2.3.3.22 ESF Room Air Recirculation - Aging Management Evaluation (MPS Unit 2 LRA Table 3.3.2-22)

The project team reviewed Table 3.3.2-22 of the MPS Unit 2 LRA, which summarizes the results of AMR evaluations for the ESF room air recirculation system component groups.

In the MPS Unit 2 LRA, the applicant identified no aging effects for carbon steel HVAC components exposed internally and externally to air that is not intermittently wetted, including

damper housings, ductwork, fan/blower housing, ESF room air recirculation unit housings, and pipe component types.

The applicant states, in the MPS Unit 2 LRA, that surfaces of carbon steel components located within structures have not experienced corrosion degradation that would affect the intended function of components due to humidity in the absence of cyclic or intermittent wetting conditions, such as condensation. The applicant interprets the GALL Report environment termed 'warm, moist air' to be air with an undefined relative humidity level, and not a wetted environment. Since the MPS Unit 2 AMR approach considers loss of material only in a moisture-laden air and/or intermittently wetted environment, the GALL Report items were determined to be not applicable.

The project team reviewed the MPS Unit 2 operating experience as a confirmation of the validity of the AMR approach for corrosion in an air environment. The operating experience reviews did not find significant corrosion of ventilation system components (other than cooling coils and associated components) due to the air environment. The project team finds that, based on the absence of significant corrosion, 'moist air' alone does not result in corrosion for these components. On the basis of its review, the project team finds that there are no aging effects requiring management for metal in an air environment.

7.2.3.3.23 Enclosure Building Filtration - Aging Management Evaluation (MPS Unit 2 LRA Table 3.3.2-23)

The project team reviewed Table 3.3.2-23 of the MPS Unit 2 LRA, which summarizes the results of AMR evaluations for the enclosure building filtration system component groups.

In the MPS Unit 2 LRA, the applicant identified no aging effects for carbon and stainless steel HVAC components exposed internally or externally to air that is not intermittently wetted, including damper housing, ductwork, enclosure building filtration filter bank housing, fan/blower housing, pipe, valves, and flow elements component types.

The applicant states, in the MPS Unit 2 LRA, that surfaces of carbon and stainless steel components located within structures have not experienced corrosion degradation that would affect the intended function of components due to humidity in the absence of cyclic or intermittent wetting conditions, such as condensation. The applicant interprets the GALL Report environment termed 'warm, moist air' to be air with an undefined relative humidity level, and not a wetted environment. Since the MPS Unit 2 AMR approach considers loss of material only in a moisture-laden air and/or intermittently wetted environment, the GALL Report items were determined to be not applicable.

The project team reviewed the MPS Unit 2 operating experience as a confirmation of the validity of the AMR approach for corrosion in an air environment. The operating experience reviews did not find significant corrosion of ventilation system components (other than cooling coils and associated components) due to the air environment. The project team finds that, based on the absence of significant corrosion, 'moist air' alone does not result in corrosion for these components. On the basis of its review, the project team finds that there are no aging effects requiring management for metal in an air environment.

In the MPS Unit 2 LRA, the applicant identified no aging effects for copper alloy HVAC components exposed internally or externally to air that is not intermittently wetted, including tubing and valve component types.

The applicant states, in the MPS Unit 2 LRA, that surfaces of copper alloy components located within structures have not experienced corrosion degradation that would affect the intended function of components due to humidity in the absence of cyclic or intermittent wetting conditions, such as condensation. The applicant interprets the GALL Report environment termed 'warm, moist air' to be air with an undefined relative humidity level, and not a wetted environment. Since the MPS Unit 2 AMR approach considers loss of material only in a moisture-laden air and/or intermittently wetted environment, the GALL Report items were determined to be not applicable.

The project team reviewed the MPS Unit 2 operating experience as a confirmation of the validity of the AMR approach for corrosion in an air environment. The operating experience reviews did not find significant corrosion of ventilation system components (other than cooling coils and associated components) due to the air environment. The project team finds that, based on the absence of significant corrosion, 'moist air' alone does not result in corrosion for these components. On the basis of its review, the project team finds that there are no aging effects requiring management for metal in an air environment.

7.2.3.3.24 Fuel Handling Area Ventilation - Aging Management Evaluation (MPS Unit 2 LRA Table 3.3.2-24)

The project team reviewed Table 3.3.2-24 of the MPS Unit 2 LRA, which summarizes the results of AMR evaluations for the fuel handling area ventilation system component groups.

In the MPS Unit 2 LRA, the applicant identified no aging effects for carbon and stainless steel HVAC components exposed internally or externally to air that is not intermittently wetted, including damper housing, ductwork, pipe, valves, and flow elements component types.

The applicant states, in the MPS Unit 2 LRA, that surfaces of carbon and stainless steel components located within structures have not experienced corrosion degradation that would affect the intended function of components due to humidity in the absence of cyclic or intermittent wetting conditions, such as condensation. The applicant interprets the GALL Report environment termed 'warm, moist air' to be air with an undefined relative humidity level, and not a wetted environment. Since the MPS Unit 2 AMR approach considers loss of material only in a moisture-laden air and/or intermittently wetted environment, the GALL Report items were determined to be not applicable.

The project team reviewed the MPS Unit 2 operating experience as a confirmation of the validity of the AMR approach for corrosion in an air environment. The operating experience reviews did not find significant corrosion of ventilation system components (other than cooling coils and associated components) due to the air environment. The project team finds that, based on the absence of significant corrosion, 'moist air' alone does not result in corrosion for these components. On the basis of its review, the project team finds that there are no aging effects requiring management for metal in an air environment.

7.2.3.3.25 Main Exhaust Ventilation - Aging Management Evaluation (MPS Unit 2 LRA Table 3.3.2-25)

The project team reviewed Table 3.3.2-25 of the MPS Unit 2 LRA, which summarizes the results of AMR evaluations for the main exhaust ventilation system component groups.

In the MPS Unit 2 LRA, the applicant identified no aging effects for carbon and stainless steel HVAC components exposed internally or externally to air that is not intermittently wetted, including damper housing, ductwork, filter bank housing, pipe, tubing, and valve component types.

The applicant states, in the MPS Unit 2 LRA, that surfaces of carbon and stainless steel components located within structures have not experienced corrosion degradation that would affect the intended function of components due to humidity in the absence of cyclic or intermittent wetting conditions, such as condensation. The applicant interprets the GALL Report environment termed 'warm, moist air' to be air with an undefined relative humidity level, and not a wetted environment. Since the MPS Unit 2 AMR approach considers loss of material only in a moisture-laden air and/or intermittently wetted environment, the GALL Report items were determined to be not applicable.

The project team reviewed the MPS Unit 2 operating experience as a confirmation of the validity of the AMR approach for corrosion in an air environment. The operating experience reviews did not find significant corrosion of ventilation system components (other than cooling coils and associated components) due to the air environment. The project team finds that, based on the absence of significant corrosion, 'moist air' alone does not result in corrosion for these components. On the basis of its review, the project team finds that there are no aging effects requiring management for metal in an air environment.

In the MPS Unit 2 LRA, the applicant identified no aging effects for copper alloy HVAC components exposed internally or externally to air that is not intermittently wetted, including the tubing component type.

The applicant states, in the MPS Unit 2 LRA, that surfaces of copper alloy components located within structures have not experienced corrosion degradation that would affect the intended function of components due to humidity in the absence of cyclic or intermittent wetting conditions, such as condensation. The applicant interprets the GALL Report environment termed 'warm, moist air' to be air with an undefined relative humidity level, and not a wetted environment. Since the MPS Unit 2 AMR approach considers loss of material only in a moisture-laden air and/or intermittently wetted environment, the GALL Report items were determined to be not applicable.

The project team reviewed the MPS Unit 2 operating experience as a confirmation of the validity of the AMR approach for corrosion in an air environment. The operating experience reviews did not find significant corrosion of ventilation system components (other than cooling coils and associated components) due to the air environment. The project team finds that, based on the absence of significant corrosion, 'moist air' alone does not result in corrosion for these components. On the basis of its review, the project team finds that there are no aging effects requiring management for metal in an air environment.

7.2.3.3.26 Non-Radioactive Area Ventilation - Aging Management Evaluation (MPS Unit 2 LRA Table 3.3.2-26)

The project team reviewed Table 3.3.2-26 of the MPS Unit 2 LRA, which summarizes the results of AMR evaluations for the non-radioactive area ventilation system component groups.

In the MPS Unit 2 LRA, the applicant identified no aging effects for carbon steel HVAC components exposed internally or externally to air that is not intermittently wetted, including damper housings, ductwork, and fan/blower housing component types.

The applicant states, in the MPS Unit 2 LRA, that surfaces of carbon steel components located within structures have not experienced corrosion degradation that would affect the intended function of components due to humidity in the absence of cyclic or intermittent wetting conditions, such as condensation. The applicant interprets the GALL Report environment termed 'warm, moist air' to be air with an undefined relative humidity level, and not a wetted environment. Since the MPS Unit 2 AMR approach considers loss of material only in a moisture-laden air and/or intermittently wetted environment, the GALL Report items were determined to be not applicable.

The project team reviewed the MPS Unit 2 operating experience as a confirmation of the validity of the AMR approach for corrosion in an air environment. The operating experience reviews did not find significant corrosion of ventilation system components (other than cooling coils and associated components) due to the air environment. The project team finds that, based on the absence of significant corrosion, 'moist air' alone does not result in corrosion for these components. On the basis of its review, the project team finds that there are no aging effects requiring management for metal in an air environment.

7.2.3.3.27 Process and Area Radiation Monitoring - Aging Management Evaluation (MPS Unit 2 LRA Table 3.3.2-27)

The project team reviewed Table 3.3.2-27 of the MPS Unit 2 LRA, which summarizes the results of AMR evaluations for the process and area radiation monitoring system component groups.

In the MPS Unit 2 LRA, the applicant identified no aging effects for carbon and stainless steel HVAC components exposed internally or externally to air that is not intermittently wetted, including bolting, pipe, tubing, valves, fan blower housing, filter housing, and radiation detectors component types.

The applicant states, in the MPS Unit 2 LRA, that surfaces of carbon and stainless steel components located within structures have not experienced corrosion degradation that would affect the intended function of components due to humidity in the absence of cyclic or intermittent wetting conditions, such as condensation. The applicant interprets the GALL Report environment termed 'warm, moist air' to be air with an undefined relative humidity level, and not a wetted environment. Since the MPS Unit 2 AMR approach considers loss of material only in a moisture-laden air and/or intermittently wetted environment, the GALL Report items were determined to be not applicable.

The project team reviewed the MPS Unit 2 operating experience as a confirmation of the validity of the AMR approach for corrosion in an air environment. The operating experience reviews did not find significant corrosion of ventilation system components (other than cooling coils and associated components) due to the air environment. The project team finds that, based on the absence of significant corrosion, 'moist air' alone does not result in corrosion for these components. On the basis of its review, the project team finds that there are no aging effects requiring management for metal in an air environment.

During the audit and review, the project team questioned why various portions of the process and area radiation monitoring system were not included within the scope of license renewal and subject to an AMR. In its MPS LRA supplement letter dated July 7, 2004 (ML041900370), the applicant added several components to the process and area radiation monitoring system list of components that are subject to an AMR. The addition of these components did not result in the addition of material/environment combinations or AMPs for the process and area radiation monitoring system AMR. The project team finds this material/environment/aging effect/AMP combination to be acceptable. The staff's evaluation of the scope of the process and area radiation monitoring system AMR is documented in Section 2.3.3.27 of the SER related to the MPS Units 2 and 3 LRA.

7.2.3.3.28 Radwaste Area Ventilation - Aging Management Evaluation (MPS Unit 2 LRA Table 3.3.2-28)

The project team reviewed Table 3.3.2-28 of the MPS Unit 2 LRA, which summarizes the results of AMR evaluations for the radwaste area ventilation system component groups.

In the MPS Unit 2 LRA, the applicant identified no aging effects for carbon steel HVAC components exposed internally or externally to air that is not intermittently wetted, including damper housings and ductwork component types.

The applicant states, in the MPS Unit 2 LRA, that surfaces of carbon steel components located within structures have not experienced corrosion degradation that would affect the intended function of components due to humidity in the absence of cyclic or intermittent wetting conditions, such as condensation. The applicant interprets the GALL Report environment termed 'warm, moist air' to be air with an undefined relative humidity level, and not a wetted environment. Since the MPS Unit 2 AMR approach considers loss of material only in a moisture-laden air and/or intermittently wetted environment, the GALL Report items were determined to be not applicable.

The project team reviewed the MPS Unit 2 operating experience as a confirmation of the validity of the AMR approach for corrosion in an air environment. The operating experience reviews did not find significant corrosion of ventilation system components (other than cooling coils and associated components) due to the air environment. The project team finds that, based on the absence of significant corrosion, 'moist air' alone does not result in corrosion for these components. On the basis of its review, the project team finds that there are no aging effects requiring management for metal in an air environment.

7.2.3.3.29 Turbine Building Ventilation - Aging Management Evaluation (MPS Unit 2 LRA Table 3.3.2-29)

The project team reviewed Table 3.3.2-29 of the MPS Unit 2 LRA, which summarizes the results of AMR evaluations for the turbine building ventilation system component groups.

In the MPS Unit 2 LRA, the applicant identified no aging effects for carbon steel HVAC components exposed internally or externally to air that is not intermittently wetted, including the damper housings component type.

The applicant states, in the MPS Unit 2 LRA, that surfaces of carbon steel components located within structures have not experienced corrosion degradation that would affect the intended function of components due to humidity in the absence of cyclic or intermittent wetting conditions, such as condensation. The applicant interprets the GALL Report environment termed 'warm, moist air' to be air with an undefined relative humidity level, and not a wetted environment. Since the MPS Unit 2 AMR approach considers loss of material only in a moisture-laden air and/or intermittently wetted environment, the GALL Report items were determined to be not applicable.

The project team reviewed the MPS Unit 2 operating experience as a confirmation of the validity of the AMR approach for corrosion in an air environment. The operating experience reviews did not find significant corrosion of ventilation system components (other than cooling coils and associated components) due to the air environment. The project team finds that, based on the absence of significant corrosion, 'moist air' alone does not result in corrosion for these components. On the basis of its review, the project team finds that there are no aging effects requiring management for metal in an air environment.

7.2.3.3.30 Vital Switchgear Ventilation - Aging Management Evaluation (MPS Unit 2 LRA Table 3.3.2-30)

The project team reviewed Table 3.3.2-30 of the MPS Unit 2 LRA, which summarizes the results of AMR evaluations for the vital switchgear ventilation system component groups.

In the MPS Unit 2 LRA, the applicant identified no aging effects for carbon steel and cast iron HVAC components exposed internally and externally to air that is not intermittently wetted, including damper housings, DC switchgear air conditioning unit housings, ductwork, fan/blower housings, motor control center (MCC) air conditioning unit housing, pipe, valves, vital switchgear cooling unit housings, and West 480V LCR cooling unit housings component types.

The applicant states, in the MPS Unit 2 LRA, that surfaces of carbon steel and cast iron components located within structures have not experienced corrosion degradation that would affect the intended function of components due to humidity in the absence of cyclic or intermittent wetting conditions, such as condensation. The applicant interprets the GALL Report environment termed 'warm, moist air' to be air with an undefined relative humidity level, and not a wetted environment. Since the MPS Unit 2 AMR approach considers loss of material only in a moisture-laden air and/or intermittently wetted environment, the GALL Report items were determined to be not applicable.

The project team reviewed the MPS Unit 2 operating experience as a confirmation of the validity of the AMR approach for corrosion in an air environment. The operating experience reviews did not find significant corrosion of ventilation system components (other than cooling coils and associated components) due to the air environment. The project team finds that, based on the absence of significant corrosion, 'moist air' alone does not result in corrosion for these components. On the basis of its review, the project team finds that there are no aging effects requiring management for metal in an air environment.

In the MPS Unit 2 LRA, the applicant identified no aging effects for copper alloy HVAC components exposed externally to air that is not intermittently wetted, including MCC air conditioning units (accumulator), MCC air conditioning units (distributor), MCC air conditioning units (evaporator coil), MCC air conditioning units (filter/dryer), MCC air conditioning units (receiver), MCC air conditioning units (sight glass housing), MCC air conditioning units (tubing), and MCC air conditioning units (valves) component types.

The applicant states, in the MPS Unit 2 LRA, that surfaces of copper alloy components located within structures have not experienced corrosion degradation that would affect the intended function of components due to humidity in the absence of cyclic or intermittent wetting conditions, such as condensation. The applicant interprets the GALL Report environment termed 'warm, moist air' to be air with an undefined relative humidity level, and not a wetted environment. Since the MPS Unit 2 AMR approach considers loss of material only in a wetted environment, the GALL Report items were determined to be not applicable.

The project team reviewed the MPS Unit 2 operating experience as a confirmation of the validity of the AMR approach for corrosion in an air environment. The operating experience reviews did not find significant corrosion of ventilation system components (other than cooling coils and associated components) due to the air environment. The project team finds that, based on the absence of significant corrosion, 'moist air' alone does not result in corrosion for these components. On the basis of its review, the project team finds that there are no aging effects requiring management for metal in an air environment.

In the MPS Unit 2 LRA, the applicant identified no aging effects for copper alloy components exposed internally environment of gas for MCC air conditioning units (accumulator), MCC air conditioning units (distributor), MCC air conditioning units (evaporator coil), MCC air conditioning units (condenser coil), MCC air conditioning units (filter/dryer), MCC air conditioning units (receiver), MCC air conditioning units (sight glass housing), MCC air conditioning units (tubing), and MCC air conditioning units (valves) component types. Gas is not identified in the GALL Report as an environment for these components and materials.

On the basis of its review of current industry research and operating experience, the project team finds that an internal environment of gas (which is similar to air) on metal will not result in aging that will be of concern during the period of extended operation. Therefore, the project team finds that there are no applicable aging effects requiring management for metal in a gas environment.

7.2.3.3.31 Unit 2 Fire Protection - Aging Management Evaluation (MPS Unit 2 LRA Table 3.3.2-31)

The project team reviewed Table 3.3.2-31 of the MPS Unit 2 LRA, which summarizes the results of AMR evaluations for the Unit 2 fire protection system component groups.

In the MPS Unit 2 LRA, the applicant identified no aging effects for carbon steel, stainless steel, cast iron, copper alloy, and PVC components exposed to air, including flame arrestors, flex connections, flow indicators, flow orifices, nozzles, pipe, pumps, retard chambers, sprinkler heads, strainers, tubing, valves, and water motor gongs component types. Air is not identified in the GALL Report as an environment for these components and materials.

On the basis of its review of current industry research and operating experience, the project team finds that air on metal will not result in aging that will be of concern during the period of extended operation. The external environments being referred to are typical of ambient air, e.g., under a shelter, indoor, or air-conditioned enclosure or room. Significant corrosion of carbon steel and cast iron requires an electrolytic environment, and a simultaneous presence of oxygen and moisture. Without the presence of the aggressive environment, low-alloy steel components will experience insignificant amounts of corrosion, and no aging effects are applicable to this component/commodity group. Wrought austenitic stainless steels and copper alloy are not susceptible to significant general corrosion that would affect the intended function of components. PVC is impervious to an air environment. Therefore, the project team finds that there are no applicable aging effects requiring management for metal in an air environment.

In the MPS Unit 2 LRA, the applicant proposes to manage loss of material of stainless steel drip pans and tubing component types exposed externally to a moisture-laden air and/or intermittently wetted environment using MPS AMP B2.1.13, “General Condition Monitoring Program,” which is a plant-specific program. The project team reviewed the general condition monitoring program and its evaluation is documented in Section 7.1.12 of this report. The project team finds that the general condition monitoring program is acceptable for managing loss of material due to pitting and crevice corrosion since visual inspections will be performed on external surfaces to detect any sign of aging degradation.

In the MPS Unit 2 LRA, the applicant proposes to manage loss of material of copper alloy pipe, tubing, and valve component types exposed to a borated water leakage external environment using MPS AMP B2.1.13, “General Condition Monitoring,” which is a plant-specific program. However, the GALL Report specifies GALL AMP XI.M10, “Boric Acid Corrosion,” to manage this aging effect. The applicant states in Note 1 that the boric acid corrosion program includes specific inspections of reactor coolant pressure boundary and supporting systems components. The project team reviewed the general condition monitoring program and its evaluation is documented in Section 7.1.12 of this report. The project team finds that the general condition monitoring program provides inspections for management of loss of material due to boric acid corrosion beyond the scope of the boric acid corrosion program. Also, visual inspection of external surfaces is performed during various walkdowns by plant personnel to look for boron buildup and/or boric acid leaks. On the basis of its review, the project team finds that this program is acceptable for managing loss of material of copper alloy pipe, tubing, and valve component types exposed to a borated water leakage external environment.

In the MPS Unit 2 LRA, the applicant identified no aging effects for carbon and stainless steels, PVC, and copper alloy components exposed internally to an environment of air or gas, including flex connections, flow orifices, nozzles, pipe, sprinkler heads, tubing, valves, and water motor gongs component types. Gas is not identified in the GALL Report as an environment for these components and materials. However, the project team identified a discrepancy between Unit 2 fire protection system sprinkler heads and Unit 3 fire protection sprinkler heads in that the sprinkler heads in Unit 3 were in a moist air environment and had an aging effect of loss of materials. In a MPS LRA supplement letter dated July 7, 2004 (ML041900407), the applicant stated, in response to Audit Item 122, that the Unit 2 fire protection system, as presented in Unit 2 LRA Table 3.3.2-31 (page 3-282), Note 2 (subject to moisture-laden air and/or intermittently wetted environment), should be included with the copper alloy 'Sprinkler Head' component group exposed internally to an air environment for the Unit 2 fire protection system. The aging effect of "loss of material" should be added to this component group. The fire protection program will manage these aging effects. The project team finds the applicant's response to be acceptable.

On the basis of its review of current industry research and operating experience, the project team finds that an internal environment of gas (which is similar to air) on metal will not result in aging that will be of concern during the period of extended operation. Therefore, the project team finds that there are no applicable aging effects requiring management for metal components in a gas environment.

The applicant, in the MPS Unit 2 LRA, proposes to manage loss of material of copper alloy pipe, tubing, and valve component types exposed externally to a moisture-laden air and/or intermittently wetted environment using MPS AMP B2.1.10, "Fire Protection Program," which is consistent with GALL AMP XI.M26, "Fire Protection," and GALL AMP XI.M27, "Fire Water System." The project team reviewed the fire protection program and its evaluation is documented in Section 7.1.9 of this report. On the basis of its review, the project team finds that the fire protection program is acceptable for managing loss of material since visual inspections will be performed on internal surfaces to detect any sign of aging degradation during maintenance activities.

In the MPS Unit 2 LRA, the applicant proposes to manage loss of material of stainless steel flex connections component type exposed internally to an environment of oil using MPS AMP B2.1.25, "Work Control Process." The project team reviewed the work control process program and its evaluation is documented in Section 7.1.22 of this report. The work control process program provides the opportunity to visually inspect the internal surfaces of components during preventive and corrective maintenance activities on an ongoing basis. Oil samples are analyzed periodically for contaminants that are an indication of degradation. The work control process program provides input to the MPS Unit 2 corrective action program if aging effects are identified. The project team finds the work control process program acceptable for managing the aging effect of loss of material.

7.2.3.3.32 Unit 3 Fire Protection - Aging Management Evaluation (MPS Unit 2 LRA Table 3.3.2-32)

The project team reviewed Table 3.3.2-32 of the MPS Unit 2 LRA, which summarizes the results of AMR evaluations for the Unit 3 fire protection system component groups.

In the MPS Unit 2 LRA, the applicant identified no aging effects for carbon steel, stainless steel, cast iron, copper alloy, and PVC components exposed to air, including carbon dioxide (CO_2) tank cooling coils, coolant heat exchangers, flex hoses, flex connections, flow switches, instrument snubbers, nozzles, restricting orifices, sprinkler heads, tubing, valves, flow indicators, housing, diesel fuel storage tank, ductwork, exhaust silencer, expansion tank overflow container, RCP oil collection tanks, flame arrestors, heater unit, hydropneumatic tank, lube oil cooler, odorizer, oil mist recovery unit, oil reservoir, pipe, pumps, vacuum limiter, and water manifold component types. Air is not identified in the GALL Report as an environment for these components and materials.

On the basis of its review of current industry research and operating experience, the project team finds that air on metal will not result in aging that will be of concern during the period of extended operation. The external environments being referred to are typical of ambient air, e.g., under a shelter, indoor, or air-conditioned enclosure or room. Significant corrosion of carbon steel and cast iron requires an electrolytic environment, and a simultaneous presence of oxygen and moisture. Without the presence of the aggressive environment, carbon steel and cast iron components will experience insignificant amounts of corrosion, and no aging effects are applicable to this component/commodity group. Wrought austenitic stainless steels and copper alloy are not susceptible to significant general corrosion that would affect the intended function of components. PVC is impervious to an air environment. Therefore, the project team finds that there are no applicable aging effects requiring management for metal in an air environment.

However, MPS Unit 2 LRA, Table 3.3.2-32, auxiliary systems - Unit 3 fire protection (page 3-296), for external surfaces of copper alloy valves in environment of air, did not include the aging effect of loss of material as in Unit 2 Table 3.3.2-31, auxiliary systems - Unit 2 fire protection (page 3-285). In a MPS LRA supplement letter dated July 7, 2004 (ML041900407), the applicant stated, in response to Audit Item 122, that for the Unit 3 fire protection system, as presented in Unit 2 Table 3.3.2-32 (page 3-296), Note 2 (subject to moisture-laden air and/or intermittently wetted environment), should be included with the copper alloy 'valves' component group exposed to air environment for MPS Unit 2 LRA, Table 3.3.2-32, auxiliary systems - Unit 3 fire protection (page 3-296). The aging effect of "loss of material" should be added to this component group. The fire protection program will manage this aging effect. The project team reviewed the applicant's response and finds the response to be acceptable.

In the MPS Unit 2 LRA, the applicant proposes to manage loss of material of copper alloy filter/strainer component type exposed externally to a moisture-laden air and/or intermittently wetted environment using MPS AMP B2.1.13, "General Condition Monitoring," which is a plant-specific program. The project team reviewed the general condition monitoring program and its evaluation is documented in Section 7.1.12 of this report. The project team finds that the general condition monitoring program is acceptable for managing loss of material due to

pitting and crevice corrosion since visual inspections will be performed on external surfaces to detect any sign of aging degradation.

In the MPS Unit 2 LRA, the applicant identified no aging effects for carbon and stainless steels, PVC, and copper alloy components exposed internally to air or gas for CO_2 storage tank, CO_2 tank cooling coils, damper housing, fan/blower housing, ductwork flex hoses and connections, nozzles, odorizers, restricting orifices, tubing, and valve component types. Gas is not identified in the GALL Report as an environment for these components and materials.

On the basis of its review of current industry research and operating experience, the project team finds an internal environment of gas (which is similar to air) on metal will not result in aging that will be of concern during the period of extended operation. Therefore, the project team finds that there are no applicable aging effects requiring management for metal in a gas environment.

In the MPS Unit 2 LRA, the applicant proposes to manage loss of material of copper alloy sprinkler heads exposed externally to a moisture-laden air and/or intermittently wetted environment using MPS AMP B2.1.10, “Fire Protection Program,” which is consistent with GALL AMP XI.M26, “Fire Protection,” and GALL AMP XI.M27, “Fire Water System.” The project team reviewed the fire protection program and its evaluation is documented in Section 7.1.9 of this report. The project team finds that the fire protection program is acceptable for managing loss of material since visual inspections will be performed on internal surfaces to detect any sign of aging degradation during maintenance activities.

In the MPS Unit 2 LRA, the applicant proposes to manage loss of material of stainless steel tubing component type exposed internally to oil using MPS AMP B2.1.25, “Work Control Process.” The project team reviewed the work control process program and its evaluation is documented in Section 7.1.22 of this report. The work control process program provides the opportunity to visually inspect the internal surfaces of components during preventive and corrective maintenance activities on an ongoing basis. Oil samples are analyzed periodically for contaminants that are an indication of degradation. The work control process program provides input to the MPS Unit 2 corrective action program if aging effects are identified. The project team finds the work control process program acceptable for managing the aging effect of loss of material.

In the MPS Unit 2 LRA, the applicant proposes to manage loss of material of copper alloy and stainless steel tubing and restricting orifices component types exposed internally to oil (fuel oil) using MPS AMP B2.1.12, “Fuel Oil Chemistry.” The project team reviewed the fuel oil chemistry program and its evaluation is documented in Section 7.1.11 of this report. The fuel oil chemistry program is consistent with GALL AMP XI.M30, “Fuel Oil Chemistry,” with acceptable exceptions. On the basis of its review, the project team finds the program acceptable for managing the aging effects of loss of material. The effectiveness of the fuel oil chemistry program is verified by MPS AMP B2.1.25, “Work Control Process.” The project team reviewed the work control process program and its evaluation is documented in Section 7.1.22 of this report. The project team finds that the work control process program is acceptable for managing loss of material due to general corrosion since visual inspections will be performed on internal surfaces of components to detect any sign of aging degradation.

During the audit and review, the project team questioned why various portions of the fire protection system were not included within the scope of license renewal and subject to an AMR. In its MPS LRA supplement letter dated July 7, 2004 (ML041900370), the applicant added several components to the fire protection system that are subject to an AMR. The addition of these components did not result in the addition of material/environment combinations or AMPs for the fire protection system AMR. The project team finds this material/environment/aging effect/AMP combination to be acceptable. The staff's evaluation of the scope of the fire protection system is documented in Section 2.3.3.32 of the SER related to the MPS Units 2 and 3 LRA.

7.2.3.3.33 Domestic Water - Aging Management Evaluation (MPS Unit 2 LRA Table 3.3.2-33 and Table 3.3.2-33a)

The project team reviewed Table 3.3.2-33 of the MPS Unit 2 LRA and Table 3.3.2-33a of the MPS LRA supplement letter dated January 11, 2005 (ML050190289), which summarizes the results of AMR evaluations for the domestic water system component groups.

In the MPS Unit 2 LRA, the applicant proposes to manage loss of material of copper alloy pipe and valve component types exposed externally to a moisture-laden air and/or intermittently wetted environment using MPS AMP B2.1.13, “General Condition Monitoring,” which is a plant-specific program. The project team reviewed the general condition monitoring program and its evaluation is documented in Section 7.1.12 of this report. The project team finds that the general condition monitoring program is acceptable for managing loss of material due to pitting and crevice corrosion since visual inspections will be performed on external surfaces to detect any sign of aging degradation.

In the MPS Unit 2 LRA, the applicant identified no aging effects for stainless steel and PVC components exposed to air, including pipe and valve component types. Air is not identified in the GALL Report as an environment for these components and materials. In addition, in the MPS LRA supplement letter dated January 11, 2005 (ML050190289), the applicant identified no aging effects for carbon steel components exposed to air, including domestic water hot water tank component types. Air is not identified in the GALL Report as an environment for these components and materials.

On the basis of its review of current industry research and operating experience, the project team finds that air on metal will not result in aging that will be of concern during the period of extended operation. The external environments being referred to are typical of ambient air, e.g., under a shelter, indoor, or air-conditioned enclosure or room. Wrought austenitic stainless steels are not susceptible to significant general corrosion that would affect the intended function of components. PVC is impervious to an air environment. Therefore, the project team finds that there are no applicable aging effects requiring management for metal in an air environment.

In the MPS Unit 2 LRA, the applicant identified no aging effects for PVC pipe component type in sea water environment. Operating experience reviews have identified instances of PVC degradation resulting from exposure to direct sunlight and exposure to ozone from high voltage. Since these PVC components are not exposed to direct sunlight and are not exposed to high

levels of ozone, the project team concurs that there are no aging effects for PVC pipe components in a sea water environment.

7.2.3.3.34 Diesel Generator - Aging Management Evaluation (MPS Unit 2 LRA Table 3.3.2-34)

The project team reviewed Table 3.3.2-34 of the MPS Unit 2 LRA, which summarizes the results of AMR evaluations for the diesel generator system component groups. The project team reviewed, in whole or in part, MPS Unit 2 Technical Report, MP-LR-3414, "License Renewal Project Aging Management Review, Diesel and Support Systems, Millstone Power Station - Unit 2," Revision 3, dated February 27, 2004, which provides the AMR results for the diesel generator and support systems.

In the MPS Unit 2 LRA, the applicant proposes to manage loss of material of stainless steel, carbon steel, cast iron, and copper alloy lube oil heat exchangers (shell), lube oil heaters, oil pans, pipe, pumps, turbochargers, valves, filter/strainers, lube oil heat exchangers (tubes), lube oil heat exchangers (tube sheet), tubing, and valve component types exposed internally or externally to an environment of oil using MPS AMP B2.1.25, "Work Control Process." The project team reviewed the work control process program and its evaluation is documented in Section 7.1.22 of this report. The work control process program provides the opportunity to visually inspect the internal surfaces of components during preventive and corrective maintenance activities on an ongoing basis. Oil samples are analyzed periodically for contaminants that are an indication of degradation. The work control process program provides input to the MPS Unit 2 corrective action program if aging effects are identified. The project team finds the work control process program acceptable for managing the aging effect of loss of material.

In the MPS Unit 2 LRA, the applicant proposes to manage loss of material of copper alloy air cooling heat exchangers (tubes) and jacket water heat exchangers (tubes) component types exposed to treated water using MPS AMP B2.1.25, "Work Control Process," which is a plant-specific program. The project team reviewed the work control process program and its evaluation is documented in Section 7.1.22 of this report. The work control process program provides the opportunity to visually inspect the internal surfaces of components during preventive and corrective maintenance activities on an ongoing basis. The work control process program provides input to the MPS Unit 2 corrective action program if aging effects are identified. The project team finds the work control process program acceptable for managing the aging effect of loss of material.

In the MPS Unit 2 LRA, the applicant identified no aging effects for carbon steel, stainless steel, cast iron, copper alloy, and aluminum components exposed internally and externally to air, including filter/strainers, air cooling heat exchanger (shell), air intercoolers (shell), air start distributors, jacket water expansion tanks, jacket water heat exchangers (shell), lube oil heat exchangers (shell), lube oil heaters, oil pans, pipe, pumps, stand-by jacket coolant heaters, starting air tanks, turbochargers, valves, air cooling heat exchangers (channel), governor hydraulic oil boosters, jacket water heat exchangers (channel), level indicators, lube oil heat exchangers (channel), tubing, expansion joints, and flow orifices component types. Air is not identified in the GALL Report as an environment for these components and materials.

On the basis of its review of current industry research and operating experience, the project team finds that air on metal will not result in aging that will be of concern during the period of extended operation. The external environments being referred to are typical of ambient air, e.g., under a shelter, indoor, or air-conditioned enclosure or room. Significant corrosion of carbon steel and cast iron requires an electrolytic environment, and a simultaneous presence of oxygen and moisture. Without the presence of the aggressive environment, carbon steel and cast iron components will experience insignificant amounts of corrosion, and no aging effects are applicable to this component/commodity group. Wrought austenitic stainless steels, copper alloy, and aluminum are not susceptible to significant general corrosion that would affect the intended function of components. Therefore, the project team finds that there are no applicable aging effects requiring management for metal in an air environment.

7.2.3.3.35 Diesel Generator Fuel Oil - Aging Management Evaluation (MPS Unit 2 LRA Table 3.3.2-35)

The project team reviewed Table 3.3.2-35 of the MPS Unit 2 LRA, which summarizes the results of AMR evaluations for the diesel generator fuel oil system component groups. The project team reviewed, in whole or in part, MPS Technical Report, MP-LR-3414, Revision 3, which provides the AMR results for the diesel generator and support systems.

In the MPS Unit 2 LRA, the applicant proposes to manage loss of material of copper alloy, carbon steel, and stainless steel pumps, tubing, valves, and filter/strainers component types exposed internally to fuel oil using MPS AMP B2.1.12, “Fuel Oil Chemistry.” The applicant states in MPS LRA Section 3.3.2.2.7 that MPS AMP B2.1.25, “Work Control Process,” will be used to provide confirmation of the effectiveness of the fuel oil chemistry program.

The project team reviewed the fuel oil chemistry program and its evaluation is documented in Section 7.1.11 of this report. The fuel oil chemistry program monitors and controls fuel oil quality to ensure that it is compatible with the materials of construction, to manage the conditions that cause general corrosion, pitting, and MIC of fuel tank internal surfaces; establishes fuel oil quality limits; and samples and tests fuel oil used for equipment within the scope of license renewal. On the basis of its review, the project team finds the fuel oil chemistry program acceptable for managing this aging effect.

The project team reviewed the work control process program and its evaluation is documented in Section 7.1.22 of this report. The work control process program provides the opportunity to visually inspect the internal surfaces of components during preventive and corrective maintenance activities on an ongoing basis. The work control process program provides input to the MPS Unit 2 corrective action program if aging effects are identified. The project team finds the work control process program acceptable for confirming the effectiveness of the fuel oil chemistry program.

In the MPS Unit 2 LRA, the applicant identified no aging effects for carbon steel, stainless steel, cast iron, copper alloy, and aluminum components exposed internally or externally to air, including flame arrestors, clean oil storage tanks, diesel oil supply tanks, level indicators, pipe, pumps, valves, filter/strainers, and tubing component types. Air is not identified in the GALL Report as an environment for these components and materials.

On the basis of its review of current industry research and operating experience, the project team finds that air on metal will not result in aging that will be of concern during the period of extended operation. The external environments being referred to are typical of ambient air, e.g., under a shelter, indoor, or air-conditioned enclosure or room. Significant corrosion of carbon steel and cast iron requires an electrolytic environment, and a simultaneous presence of oxygen and moisture. Without the presence of the aggressive environment, carbon steel and cast iron components will experience insignificant amounts of corrosion, and no aging effects are applicable to this component/commodity group. Wrought austenitic stainless steels, copper alloy, and aluminum are not susceptible to significant general corrosion that would affect the intended function of components. Moreover, the diesel fuel oil tank is supported on saddle-type steel supports and is not in contact with concrete or soil. Therefore, the project team finds that there are no applicable aging effects requiring management for metal in an air environment.

7.2.3.3.36 Station Blackout Diesel Generator - Aging Management Evaluation (MPS Unit 2 LRA Table 3.3.2-36)

The project team reviewed Table 3.3.2-36 of the MPS Unit 2 LRA, which summarizes the results of AMR evaluations for the SBO diesel generator system component groups. The project team reviewed, in whole or in part, MPS Unit 2 Technical Report, MP-LR-3414, Revision 3, which provides the AMR results for the diesel generator and support systems.

In the MPS Unit 2 LRA, the applicant proposes to manage cracking of stainless steel expansion tanks, pipe, tubing, and valve component types exposed internally to treated water using MPS AMP B2.1.25, “Work Control Process,” which is a plant-specific program. The project team reviewed the work control process program and its evaluation is documented in Section 7.1.22 of this report. The work control process program provides the opportunity to visually inspect the internal surfaces of components during preventive and corrective maintenance activities on an ongoing basis. The work control process program provides input to the MPS Unit 2 corrective action program if aging effects are identified. The project team finds the work control process program acceptable for managing the aging effect of cracking.

In the MPS Unit 2 LRA, the applicant proposes to manage loss of material of stainless steel, carbon steel, and cast iron flow indicators, lube oil coolers (channel), oil sumps, pipe, silencers, pumps, turbo chargers, lube oil coolers (tubes), lube oil coolers (tube sheet), radiators, lubricators, restricting orifices, tubing, and valve component types exposed internally or externally to oil using MPS AMP B2.1.25, “Work Control Process,” which is a plant-specific program. The project team reviewed the work control process program and its evaluation is documented in Section 7.1.22 of this report. The work control process program provides the opportunity to visually inspect the internal surfaces of components during preventive and corrective maintenance activities on an ongoing basis. Oil samples are analyzed periodically for contaminants for indication of degradation. The work control process program provides input to the MPS Unit 2 corrective action program if aging effects are identified. The project team finds the work control process program acceptable for managing the aging effect of loss of material.

In the MPS Unit 2 LRA, the applicant proposes to manage loss of material of stainless steel fuel heaters, tubing, and valve component types exposed internally to fuel oil using MPS AMP B2.1.12, “Fuel Oil Chemistry.” The applicant states in MPS Unit 2 LRA Section 3.3.2.2.7 that

MPS AMP B2.1.25, “Work Control Process,” will be used to provide confirmation of the effectiveness of the fuel oil chemistry program. The project team reviewed the fuel oil chemistry program and its evaluation is documented in Section 7.1.11 of this report. The fuel oil chemistry program monitors and controls fuel oil quality to ensure that it is compatible with the materials of construction, to manage the conditions that cause general corrosion, pitting, and MIC of fuel tank internal surfaces; establishes fuel oil quality limits; and samples and tests fuel oil used for equipment within the scope of license renewal. On the basis of its review, the project team finds the fuel oil chemistry program acceptable for managing this aging effect.

The project team reviewed the work control process program and its evaluation is documented in Section 7.1.22 of this report. The work control process program provides the opportunity to visually inspect the internal surfaces of components during preventive and corrective maintenance activities on an ongoing basis. Oil samples are analyzed periodically for contaminants for indication of degradation. The work control process program provides input to the MPS Unit 2 corrective action program if aging effects are identified. The project team finds the work control process program acceptable for confirming the effectiveness of the fuel oil chemistry program.

In the MPS Unit 2 LRA, the applicant proposes to manage loss of material of stainless steel expansion tanks and valve component types exposed to atmosphere/weather using MPS AMP B2.1.13, “General Condition Monitoring,” which is a plant-specific program. The project team reviewed the general condition monitoring program and its evaluation is documented in Section 7.1.12 of this report. The project team finds that the general condition monitoring program is acceptable for managing loss of material due to pitting and crevice corrosion since visual inspections will be performed on external surfaces to detect any sign of aging degradation.

In the MPS Unit 2 LRA, the applicant proposes to manage loss of material of stainless steel valve component group exposed internally to moisture-laden air and/or an intermittently wetted environment using MPS AMP B2.1.25, “Work Control Process,” which is a plant-specific program. The project team reviewed the work control process program and its evaluation is documented in Section 7.1.22 of this report. Visual inspections of the internal surfaces of plant components and plant commodities are performed during the performance of maintenance, in accordance with the work control process program, to determine the presence of loss of material. The project team finds that the work control process program is acceptable for managing loss of material due to pitting and crevice corrosion since visual inspections will be performed on internal surfaces of components to detect any sign of aging degradation.

In the MPS Unit 2 LRA, the applicant identified no aging effects for carbon steel, stainless steel, cast iron, and aluminum components exposed internally or externally to air, including filter/strainers, radiators, aftercoolers, aspirators, flow Indicators, fuel heaters, fuel oil day tanks, immersion heaters, injectors, lube oil coolers (channel), lube oil coolers (shell), oil sumps, pipe, silencers, pump, turbochargers, air receivers, expansion joints, lubricators, pulsation dampeners, restricting orifices, tubing, and valve component types. Air is not identified in the GALL Report as an environment for these components and materials.

On the basis of its review of current industry research and operating experience, the project team finds that air on metal will not result in aging that will be of concern during the period of

extended operation. The external environments being referred to are typical of ambient air, e.g., under a shelter, indoor, or air-conditioned enclosure or room. Significant corrosion of carbon steel and cast iron requires an electrolytic environment, and a simultaneous presence of oxygen and moisture. Without the presence of the aggressive environment, carbon steel and cast iron components will experience insignificant amounts of corrosion, and no aging effects are applicable to this component/commodity group. Wrought austenitic stainless steels, and aluminum are not susceptible to significant general corrosion that would affect the intended function of components. Therefore, the project team concurs that there are no applicable aging effects requiring management for metal in an air environment.

In the MPS Unit 2 LRA, the applicant identified no aging effects for rubber expansion joints exposed to air. Based on industry research and operating experience, change of material properties due to thermal exposure and irradiation and cracking due to irradiation of rubber components in air is contingent on radiation levels, ambient temperatures, and exposure to ultraviolet radiation and ozone.

On the basis of its review, the project team concurs with the applicant's finding that no aging effect for rubber expansion joints in air is applicable, since these components are not exposed to high levels of ultraviolet radiation, ozone, or temperatures greater than 95°F.

In the MPS Unit 2 LRA, the applicant identified no aging effect for aluminum filter/strainers component type exposed internally to lubricating oil. MPS Unit 2 Technical Report, MP-LR-3414, Revision 3, did not specifically evaluate aging effects for aluminum exposed internally to oil. During the audit and review, the project team requested that the applicant provide a basis for its conclusion that there are no aging effects requiring management for this combination of component, material, and environment. The applicant states that the material aging effect report (MAER) was used as the basis. The project team reviewed the applicant's MAER and finds that additional information regarding the basis was necessary. The applicant revised its MAER and Technical Report, MP-LR-3414 to include the basis. The project team reviewed the basis and finds it acceptable. In addition, the applicant states that, in a lubricating oil environment, significant corrosion is only expected where the water can settle or pool. Due to the differential densities of lubricating oil and water, water will tend to separate and settle in low flow or stagnant areas where the flow velocity is insufficient to flush the water through the system. Lube oil systems are assumed to be free of water contamination as their initial condition. Lube oil systems are typically closed systems that have little potential for ingress of contaminants unless a component failure occurs. License renewal does not assume component failures as a means to establish the conditions necessary for aging to occur. For example, tube failures in lube oil coolers are not assumed. Therefore, water contamination of lube oil is event-driven, and would be addressed by corrective maintenance. For license renewal purposes, lube oil is therefore assumed to be free of water contamination. On the basis of its review, the project team concurs that there are no applicable aging effects requiring management for aluminum in a fuel oil environment.

In the MPS Unit 2 LRA, the applicant identified no aging effects for aluminum radiators component type exposed externally to atmosphere/weather. MPS Unit 2 Technical Report, MP-LR-3414, Revision 3, did not specifically evaluate aging effects for aluminum in an external environment of atmosphere/weather. During the audit and review, the project team requested that the applicant provide a basis for its conclusion that there are no aging effects requiring

management for this combination of component, material, and environment. The applicant stated to the project team that the technical report was revised to add the following statement:

> Industry experience identified a potential conflict with the MAER with regard to aluminum in an air environment. St. Lucie identified corrosion problems with the aluminum and copper components associated with the cooling fins of a radiator in a cooling water system. The St. Lucie evaluation identified that it was an unusual occurrence since aluminum elsewhere in the plant did not demonstrate similar problems. Accordingly, and in conjunction with the MAER basis, operating experience was used to validate that no problems of this type had occurred at MPS Unit 2.

The project team reviewed the revised technical report and operating experience. On the basis of its review, the project team finds that there are no applicable aging effects requiring management for aluminum in an atmosphere/weather environment.

7.2.3.3.37 Security - Aging Management Evaluation (MPS Unit 2 LRA Table 3.3.2-37)

The project team reviewed Table 3.3.2-37 of the MPS Unit 2 LRA, which summarizes the results of AMR evaluations for the security system component groups. The project team reviewed, in whole or in part, MPS Unit 2 Technical Report, MP-LR-3414, Revision 3, which provides the AMR results for the diesel generator and support systems.

In the MPS Unit 2 LRA, the applicant proposes to manage loss of material of carbon steel, cast iron, and copper alloy coolers (shell), fan/blower housings, heaters, oil pans, pipe, pump, valves, filter\strainers, coolers (tubes), and coolers (tube sheet) component types exposed internally or externally to lubricating oil using MPS AMP B2.1.25, “Work Control Process.” The project team reviewed the work control process program and its evaluation is documented in Section 7.1.22 of this report. The work control process program provides the opportunity to visually inspect the internal surfaces of components during preventive and corrective maintenance activities on an ongoing basis. Oil samples are analyzed periodically for contaminants for indication of degradation. The work control process program provides input to the MPS Unit 2 corrective action program if aging effects are identified. The project team finds the work control process program acceptable for managing the aging effect of loss of material.

In the MPS Unit 2 LRA, the applicant proposes to manage loss of material of copper alloy pipe, tubing, and valve component types exposed internally to fuel oil using MPS AMP B2.1.12, “Fuel Oil Chemistry.” The applicant states in MPS Unit 2 LRA Section 3.3.2.2.7 that MPS AMP B2.1.25, “Work Control Process,” will be used to provide confirmation of the effectiveness of the fuel oil chemistry program. The project team reviewed the fuel oil chemistry program and its evaluation is documented in Section 7.1.11 of this report. The fuel oil chemistry program monitors and controls fuel oil quality to ensure that it is compatible with the materials of construction, to manage the conditions that cause general corrosion, pitting, and MIC of fuel tank internal surfaces; establishes fuel oil quality limits; and samples and tests fuel oil used for equipment within the scope of license renewal. The project team finds the fuel oil chemistry program acceptable.

The project team reviewed the work control process program and its evaluation is documented in Section 7.1.22 of this report. The project team finds the work control process program provides the opportunity to visually inspect the internal surfaces of components during preventive and corrective maintenance activities on an ongoing basis. It also provides input to the MPS Unit 2 corrective action program if aging effects are identified. On the basis of its review, the project team concludes that the work control process program is acceptable for confirming the effectiveness of the fuel oil chemistry program.

In the MPS Unit 2 LRA, the applicant identified no aging effects for carbon steel, cast iron, and copper alloy components exposed internally or externally to air, including coolers (channel head), coolers (shell), diesel fuel oil storage tank, fan/blower housings, filter/strainers, heaters, oil pans, pipe, pumps, valves, filter/strainers, tubing, and radiators component types. Air is not identified in the GALL Report as an environment for these components and materials.

On the basis of its review of current industry research and operating experience, the project team finds that air on metal will not result in aging that will be of concern during the period of extended operation. The external environments being referred to are typical of ambient air, e.g., under a shelter, indoor, or air-conditioned enclosure or room. Significant corrosion of carbon steel and cast iron requires an electrolytic environment, and a simultaneous presence of oxygen and moisture. Without the presence of the aggressive environment, carbon steel and cast iron components will experience insignificant amounts of corrosion, and no aging effects are applicable to this component/commodity group. Copper alloys are not susceptible to significant general corrosion that would affect the intended function of components. Therefore, the project team finds that there are no applicable aging effects requiring management for metal in an air environment.

In the MPS Unit 2 LRA, the applicant identified no aging effects for the aluminum radiators component type exposed externally to air. MPS Unit 2 Technical Report, MP-LR-3414, Revision 3, did not specifically evaluate aging effects for aluminum in an external environment of air. During the audit and review, the project team requested that the applicant provide a basis for its conclusion that there are no aging effects requiring management for this combination of component, material, and environment. The applicant stated to the project team that the technical report was revised to add the following statement:

> Industry experience identified a potential conflict with the MAER with regard to aluminum in an air environment. St. Lucie identified corrosion problems with the aluminum and copper components associated with the cooling fins of a radiator in a cooling water system. The St. Lucie evaluation identified that it was an unusual occurrence since aluminum elsewhere in the plant did not demonstrate similar problems. Accordingly, and in conjunction with the MAER basis, operating experience was used to validate that no problems of this type had occurred at MPS Unit 2.

The project team reviewed the revised technical report and operating experience. On the basis of its review, the project team finds that there are no applicable aging effects requiring management for aluminum in an air environment.

7.2.3.3.38 Clean Liquid Waste Processing - Aging Management Evaluation (MPS Unit 2 LRA Table 3.3.2-38 and Table 3.3.2-38a)

The project team reviewed Table 3.3.2-38 of the MPS Unit 2 LRA and Table 3.3.2-38a of the MPS LRA supplement letter dated January 11, 2005 (ML050190289), which summarizes the results of AMR evaluations for the clean liquid waste processing system component groups.

In the MPS Unit 2 LRA, the applicant credits MPS AMP B2.1.6, "Chemistry Control Program for Secondary Systems," for managing the loss of material aging effect for the carbon steel degasifier preheater shell component type exposed internally to steam. The applicant states that the environment is not in the GALL Report for this component type and material. The applicant states that the chemistry control for secondary systems program provides reasonable assurance that water quality is compatible with the materials of construction in the plant systems and equipment in order to minimize loss of material and cracking. The program provides an environment that minimizes material degradation, maintains material integrity, and reduces the amount of corrosion product that could interfere with equipment operation and heat transfer. The applicant states that the chemistry control for secondary systems program is based on EPRI guidelines provided in TR-102134, "PWR Secondary Water Chemistry Guidelines." These guidelines reflect industry operating experience to optimize plant chemistry control.

The project team reviewed the chemistry control for secondary systems program and its evaluation is documented in Section 7.1.5 of this report. The project team finds that this program is consistent with GALL AMP XI.M2 with acceptable exceptions.

On the basis of its review of current industry research, operating experience, and MPS Unit 2 Technical Report, MP-LR-3400, "AMR Steam and Power Conversion," Revision 3, the project team finds that the chemistry control for secondary systems program is acceptable for managing loss of material due to general corrosion and crevice corrosion of carbon steel components in steam, since this program provides an environment that minimizes material degradation, maintains material integrity, and reduces the amount of corrosion.

In the MPS Unit 2 LRA, the applicant proposes to manage loss of material of stainless steel primary drain tank and quench cooler tubes and tube sheet component types exposed to treated water using MPS AMP B2.1.25, "Work Control Process," which is a plant-specific program. The project team reviewed the work control process program and its evaluation is documented in Section 7.1.22 of this report. The work control process program provides the opportunity to visually inspect the internal surfaces of components during preventive and corrective maintenance activities on an ongoing basis. The work control process program provides input to the MPS Unit 2 corrective action program if aging effects are identified. The project team finds the work control process program acceptable for managing the aging effect of loss of material.

In the MPS Unit 2 LRA and the MPS LRA supplement letter dated January 11, 2005 (ML050190289), the applicant proposes to manage loss of material of the stainless steel primary drain tank and equipment drain tank component type exposed internally to moisture-laden air and/or an intermittently wetted environment using MPS AMP B2.1.25, "Work Control Process," which is a plant-specific program. The project team reviewed the work

control process program is its evaluation is documented in Section 7.1.22 of this report. Visual inspections of the internal surfaces of plant components and plant commodities are performed during the performance of maintenance, in accordance with the work control process program, to determine the presence of loss of material. The project team finds that the work control process program is acceptable for managing loss of material due to general corrosion since visual inspections will be performed on internal surfaces of components to detect any sign of aging degradation.

In the MPS LRA supplement letter dated January 11, 2005 (ML050190289), the applicant proposes to manage loss of material of the stainless steel for the degasifier vent condenser (shell) and the degasifiers exposed to treated water and steam environment using MPS AMP B2.1.5, "Chemistry Control for Primary Systems Program." The project team reviewed the chemistry control for primary systems program and its evaluation is documented in Section 7.1.4 of this report. The project team finds that this program is consistent with GALL AMP XI.M2, "Water Chemistry," with an acceptable exception. Since this program is consistent with the GALL Report recommendation for other components with the same material, environment, and aging effect, the project team finds this to be acceptable.

In the MPS Unit 2 LRA and the MPS LRA supplement letter dated January 11, 2005 (ML050190289), the applicant identified no aging effects for carbon steel and stainless steel components exposed to sheltered air environment for degasifier effluent cooler shell and degasifier preheater shells, degasifier aftercooler helicoil tubes, flow elements, primary drain tank, and quench tank cooler shell, pipe, primary drain tank, pumps, strainers, tubing, valves, conductivity element, degasifier vent condenser (shell), degasifiers, equipment drain sump tank, flexible hoses and flow indicators component types. Air is not identified in the GALL Report as an environment for these components and materials.

On the basis of its review of current industry research and operating experience, the project team finds that an internal environment of air on metal will not result in aging that will be of concern during the period of extended operation. Therefore, the project team finds that there are no applicable aging effects requiring management for metal in an air environment.

7.2.3.3.39 <u>Gaseous Waste Processing - Aging Management Evaluation (MPS Unit 2 LRA Table 3.3.2-39)</u>

The project team reviewed Table 3.3.2-39 of the MPS Unit 2 LRA, which summarizes the results of AMR evaluations for the gaseous waste processing system component groups.

In the MPS Unit 2 LRA, the applicant identified no aging effects for carbon steel components exposed to air, including aftercoolers (shell), pipe, valves, and waste gas compressor seal coolers component types. Air is not identified in the GALL Report as an environment for these components and materials.

On the basis of its review of current industry research and operating experience, the project team finds that air on metal will not result in aging that will be of concern during the period of extended operation. The external environments being referred to are typical of ambient air, e.g., under a shelter, indoor, or air-conditioned enclosure or room. Significant corrosion of carbon steel requires an electrolytic environment, and a simultaneous presence of oxygen and

moisture. Without the presence of the aggressive environment, carbon steel components will experience insignificant amounts of corrosion, and no aging effects are applicable to this component/commodity group. Therefore, the project team finds that there are no applicable aging effects requiring management for metal in an air environment.

In the MPS Unit 2 LRA, the applicant proposes to manage loss of material of stainless steel aftercoolers (tubes), aftercoolers (tube sheet), pipe, and valve component types exposed internally to moisture-laden air and/or an intermittently wetted environment using MPS AMP B2.1.25, "Work Control Process," which is a plant-specific program. The project team reviewed the work control process program and its evaluation is documented in Section 7.1.22 of this report. Visual inspections of the internal surfaces of plant components and plant commodities are performed during the performance of maintenance, in accordance with the work control process program, to determine the presence of loss of material. The project team finds that the work control process program is acceptable for managing loss of material due to pitting and crevice corrosion since visual inspections will be performed on internal surfaces of components to detect any sign of aging degradation.

7.2.3.3.40 Post-Accident Sampling - Aging Management Evaluation (MPS Unit 2 LRA Table 3.3.2-40)

The project team reviewed Table 3.3.2-40 of the MPS Unit 2 LRA, which summarizes the results of AMR evaluations for the post-accident sampling system component groups.

In the MPS Unit 2 LRA, the applicant has identified no aging effects for **low-alloy steel and stainless steel components** exposed to air, including **bolting, flushing accumulators, nitrogen accumulators, filter/strainers, flow elements, pumps, reservoir, sample chambers, tubing, and** valve component types. Air is not identified in the GALL Report as an environment for these components and materials.

On the basis of its review of current industry research and operating experience, the project team finds that air on metal will not result in aging that will be of concern during the period of extended operation. The external environments being referred to are typical of ambient air, e.g., under a shelter, indoor, or air-conditioned enclosure or room. Without the presence of an aggressive environment, low-alloy steel components will experience insignificant amounts of corrosion, and no aging effects are applicable to this component/commodity group. Wrought austenitic stainless steels are not susceptible to significant general corrosion that would affect the intended function of components. Therefore, the project team finds that there are no applicable aging effects requiring management for metal in an air environment.

In the MPS Unit 2 LRA, the applicant proposes to manage loss of material of stainless steel flushing accumulators, sample chambers, reservoir, pumps, tubing, and valve component types exposed internally to moisture-laden air and/or an intermittently wetted environment using MPS AMP B2.1.25, "Work Control Process," which is a plant-specific program. The project team reviewed the work control process program and its evaluation is documented in Section 7.1.22 of this report. Visual inspections of the internal surfaces of plant components and plant commodities are performed during the performance of maintenance, in accordance with the work control process program, to determine the presence of loss of material. The project team finds that the work control process program is acceptable for managing loss of material due to

general corrosion since visual inspections will be performed on internal surfaces of components to detect any sign of aging degradation.

In the MPS Unit 2 LRA, the applicant identified no aging effects for **stainless steel components exposed internally to gas for nitrogen accumulators, tubing, and** valve component types. Gas is not identified in the GALL Report as an environment for these components and materials.

On the basis of its review of current industry research and operating experience, the project team finds that an internal environment of gas (which is similar to air) on metal will not result in aging that will be of concern during the period of extended operation. Therefore, the project team concurs that there are no applicable aging effects requiring management for metal in a gas environment.

7.2.3.3.41 Station Sumps and Drains - Aging Management Evaluation (MPS Unit 2 LRA Table 3.3.2-41 and Table 3.3.2-41a)

The project team reviewed Table 3.3.2-41 of the MPS Unit 2 LRA and Table 3.3.2-41a of the MPS LRA supplement letter dated January 11, 2005 (ML050190289), which summarizes the results of AMR evaluations for the station sumps and drains system component groups.

In the MPS Unit 2 LRA and the MPS LRA supplement letter dated January 11, 2005 (ML050190289), the applicant identified no aging effects for carbon and stainless steel, cast iron, and PVC components exposed to air, including piping, pumps, tubing, valves, collection section tank, flow indicators, and filters component types. Air is not identified in the GALL Report as an environment for these components and materials.

On the basis of its review of current industry research and operating experience, the project team finds that air on metal will not result in aging that will be of concern during the period of extended operation. The external environments being referred to are typical of ambient air, e.g., under a shelter, indoor, or air-conditioned enclosure or room. Significant corrosion of carbon steel and cast iron requires an electrolytic environment, and a simultaneous presence of oxygen and moisture. Without the presence of the aggressive environment, carbon steel and cast iron components will experience insignificant amounts of corrosion, and no aging effects are applicable to this component/commodity group. Wrought austenitic stainless steels are not susceptible to significant general corrosion that would affect the intended function of components. PVC is impervious to an air environment. Therefore, the project team concurs that there are no applicable aging effects requiring management for metal in an air environment.

In the MPS Unit 2 LRA and the MPS LRA supplement letter dated January 11, 2005 (ML050190289), the applicant proposes to manage loss of material of the copper alloy valve component types and of stainless steel collection section tank component types exposed internally to moisture-laden air and/or an intermittently wetted environment using MPS AMP B2.1.25, “Work Control Process,” which is a plant-specific program. The project team reviewed the work control process program and its evaluation is documented in Section 7.1.22 of this report. Visual inspections of the internal surfaces of plant components and plant commodities are performed during the performance of maintenance, in accordance with the work control process program, to determine the presence of loss of material. The project team finds that the work control process program is acceptable for managing loss of material due to pitting and

crevice corrosion since visual inspections will be performed on internal surfaces of components to detect any sign of aging degradation.

In the MPS Unit 2 LRA and the MPS LRA supplement letter dated January 11, 2005 (ML050190289), the applicant identified no aging effects for PVC material of pipe and filters component type in a raw water environment. Operating experience reviews have identified instances of PVC degradation resulting from exposure to direct sunlight and exposure to ozone from high voltage. Since these PVC components are not exposed to direct sunlight and are not exposed to high levels of ozone, the project team concurs that there are no aging effects for PVC material of pipe and filters component types in a raw water environment.

Operating experience reviews have identified instances of PVC degradation resulting from exposure to direct sunlight and exposure to ozone from high voltage. Since these PVC components are not exposed to direct sunlight and are not exposed to high levels of ozone, the project team concurs that there are no aging effects for PVC pipe components in sea water environment.

7.2.3.3.42 Table 1: Auxiliary Systems - Aerated Liquid Radwaste - Aging Management Evaluation

In the MPS LRA supplement letter of November 9, 2004 (ML043200606), the applicant identified no aging effects for stainless steel exposed to air, including conductivity element, flow elements, flow indicator, pipe, pumps, tubing, and valve component types. Air is not identified in the GALL Report as an environment for these components and materials.

On the basis of current industry research and operating experience, stainless steels exposed externally to air are not susceptible to significant general corrosion that would affect the intended function of components. Therefore, the project team finds that there are no applicable aging effects for stainless steel components in an air environment.

7.2.3.3.43 Table 2: Auxiliary Systems - Solid Waste Processing - Aging Management Evaluation

In the MPS LRA supplement letter of November 9, 2004 (ML043200606), the applicant identified no aging effects for stainless steel exposed to air, including flow indicator, pipe, pumps, spent resin fill head tank, tubing, and valve component types. Air is not identified in the GALL Report as an environment for these components and materials.

On the basis of current industry research and operating experience, stainless steels exposed externally to air are not susceptible to significant general corrosion that would affect the intended function of components. Therefore, the project team finds that there are no applicable aging effects for stainless steel components in an air environment.

7.2.3.3.44 Table 3: Auxiliary Systems - Turbine Building Closed Cooling Water - Aging Management Evaluation

In the MPS LRA supplement letter of November 9, 2004 (ML043200606), the applicant states that loss of material of chemical addition tank, flexible hoses, flow elements, flow orifices and

tubing of stainless steel exposed to moisture-laden air and/or intermittently wetted environment in the auxiliary system is managed using MPS AMP B.2.1.13, “General Condition Monitoring.”

The project team reviewed the general condition monitoring and its evaluation is documented in Section 7.1.12 of this report. The project team finds that this program is acceptable for managing loss of material since visual inspection of external surfaces is performed during various walkdowns.

In the MPS LRA supplement letter of November 9, 2004 (ML043200606), the applicant identified no aging effects for copper alloys exposed to gas in for the chiller condensers (tubes) component types. Gas is not identified in the GALL Report as an environment for these components and materials.

On the basis of current industry research and operating experience, copper alloys exposed externally to gas are not susceptible to significant general corrosion that would affect the intended function of components.

In the MPS LRA supplement letter of November 9, 2004 (ML043200606), the applicant stated that loss of material of TBCCW heat exchangers (tubes) of copper alloys stainless steel in treated water environment in the auxiliary system is managed using MPS AMP B.2.1.25, “Work Control Process.”

The project team reviewed the work control process and its evaluation is documented in Section 7.1.22 of this report. The work control process program performs maintenance activities to provide visual inspection and tracks the performance of inspection and surveillance activities. On this basis, the project team finds that the management of cracking for these components is adequate.

7.2.3.3.45 Table 4: Auxiliary Systems - Water Box Priming - Aging Management Evaluation

In the MPS LRA supplement letter of November 9, 2004 (ML043200606), the applicant identified no aging effects for copper alloys and stainless steel exposed to indoor air environment and are not intermittently wetted for the filler/strainers, flow orifices, flow switches, pipe, and valve component types.

On the basis of current industry research and operating experience, copper alloys and stainless steel exposed externally to indoor air environment and are not intermittently wetted are not susceptible to significant general corrosion that would affect the intended function of components.

7.2.4 MPS Unit 2 LRA Section 3.4 - Aging Management of Steam and Power Conversion Systems

In MPS Unit 2 LRA Section 3.4, the applicant provided the results of its AMRs for components for the steam and power conversion systems.

In the MPS Unit 2 LRA Tables 3.4.2-1 through 3.4.2-12 (Table 2s), the applicant provides a summary of the AMRs for component types associated with the (1) main steam; (2) extraction steam; (3) feedwater; (4) condensate; (5) condensate storage and transfer; (6) condensate

demin mixed bed; (7) auxiliary feedwater; (8) feedwater heater vents and drains; (9) moisture separation and reheat; (10) plant heating and condensate recovery; (11) secondary chemical feed; and (12) turbine gland sealing. The summary information for each component type included intended function; material; environment; aging effect requiring management; AMPs; the GALL Report Volume 2 item; cross reference to the LRA Table 3.4.1 (Table 1); and generic and plant-specific notes related to consistency with the GALL Report.

Also, the applicant identified for each component type in the MPS Unit 2 LRA Table 3.4.1 (Table 1) those components where further evaluation is recommended, and those for which no further evaluation is required, and those that are not applicable to MPS Unit 2 together with the basis for their exclusion.

Additionally, the applicant identified in the MPS Unit 2 LRA Tables 3.4.2-1 through 3.4.2-12, which AMR results it considered to be consistent with the GALL Report (table column Notes A through E) and which it justified on a different basis.

The AMRs that are within the scope of the project team audit and review are identified on copies of the MPS Unit 2 LRA Tables 3.4.2-1 through 3.4.2-12 which are included as an appendix to the MPS Units 2 and 3 audit and review plan.

The project team conducted its audit and review in accordance with SRP-LR Section 3.4.3 and the MPS Units 2 and 3 audit and review plan. The project team interviewed the applicant's technical staff and reviewed, in whole or in part, the documents listed in Attachment 5 of this report for Section 3.4, including MPS Unit 2 Technical Report, MP-LR-3400, "License Renewal Project - Aging Management Review for Steam and Power Conversion System - Unit 2," dated February 26, 2004, which provides the AMR results for the steam and power conversion systems.

7.2.4.1 Aging Management Review Results That Are Consistent With the GALL Report, for Which No Further Evaluation Is Required

For aging management evaluations that the applicant states are consistent with the GALL Report and for which further evaluation is not recommended, the project team conducted its audit and review to determine if the applicant's reference to the GALL Report in the MPS Unit 2 LRA is acceptable.

The project team reviewed the MPS Unit 2 LRA and the information in the MPS LRA supplement letter dated January 11, 2005 (ML050190289), to confirm that the applicant (1) provides a brief description of the system, components, materials, and environment; (2) states that the applicable aging effects have been reviewed and are evaluated in the GALL Report; and (3) identifies those aging effects for the steam and power conversion system components that are subject to an AMR.

7.2.4.1.1 Loss of Material Due to Boric Acid Corrosion

In the discussion section of Table 3.4.1, Item 13, of the MPS Unit 2 LRA, the applicant states that loss of material due to boric acid corrosion is managed by MPS AMP B2.1.3, "Boric Acid Corrosion" and MPS AMP B2.1.13, "General Condition Monitoring." The boric acid corrosion program includes specific inspections of steam and power conversion and supporting systems

components. The boric acid corrosion program is reviewed by NRR DE staff and is addressed in Section 3 of the SER related to the MPS Units 2 and 3 LRA.

The applicant states, in the MPS Unit 2 LRA, that the general condition monitoring program provides inspections for management of loss of material due to boric acid corrosion beyond the scope of the boric acid corrosion program. During the audit and review, the project team requested the applicant to provide clarification regarding how loss of material for components not normally visible, or in infrequently accessed areas, are manage using this program. Further clarification was requested regarding the identification, documentation, evaluation, and trending of boric acid leakage performance under this program. The applicant stated that the general condition monitoring program is an extension of the boric acid corrosion program in that it identifies borated water leakage during the performance of the inspections performed by the general condition monitoring program and then, through the applicant's corrective action program, the leak is assigned and evaluated under the boric acid corrosion program. When borated water leakage is identified by the general condition monitoring program, a condition report is written to identify the leak. During the daily review of new condition reports, it is assigned to the boric acid corrosion program where it gets fully evaluated and repaired, as required. This is the same process used to identify leaks in the boric acid corrosion program.

The project team reviewed the general condition monitoring program and its evaluation is documented in Section 7.1.12 of this report. On the basis of its review, the project team concludes that this program, in addition to the boric acid corrosion program, is acceptable for managing loss of material due to boric acid corrosion since visual inspection of external surfaces is performed during various walkdowns performed by plant personnel to look for boron buildup and/or boric acid leaks.

7.2.4.1.2 Loss of Material Due to General Corrosion; Crack Initiation and Growth Due to Cyclic Loading and/or Stress Corrosion Cracking

In the discussion section of Table 3.4.1, Item 8, of the MPS Unit 2 LRA, the applicant states that loss of material due to general corrosion, crack initiation and growth due to cyclic loading and/or stress corrosion cracking (SCC), for closure bolting in high-pressure or high-temperature systems components, in the steam and power conversion systems are not subject to wetted conditions, therefore, loss of material due to general corrosion is not expected. Additionally, cracking for bolting in steam and power conversion systems is not identified as an aging effect requiring management. However, SRP-LR Table 3.4-1, stipulates that the AMR evaluations consider crack initiations and growth due to cyclic loading for components closure bolting in high pressure or hi-temperature systems and that the applicant could manage the aging effects via GALL AMP XI.M18, "Bolting Integrity."

The applicant states, in the MPS Unit 2 LRA, that SCC is an aging mechanism that requires the simultaneous action of a corrosive environment, a sustained tensile stress, and a susceptible material. Elimination of any one of these elements will eliminate the susceptibility to SCC. Further, the applicant states that steam and power conversion systems bolting is fabricated to ASTM A194, Grade B7 standard, is not high yield strength (>150 ksi), and is not subjected to adverse environment that could result in SCC. Therefore, cracking is not an aging effect requiring management.

The project team noted that SCC could occur in corrosive environment and that the environment does not have to be in a wetted condition. The project team questioned the applicant whether the good bolting practices, bolting preload considerations, and proper sealant and lubricant, as stated in NUREG-1339, are followed. By letter dated December 3, 2004 (ML043450341), the applicant submitted its LRA supplement. In its response, the applicant stated that it has developed a specific bolting integrity aging management program that addresses degradation of bolting at MPS.

By letter dated January 11, 2005 (ML050190289), the applicant submitted its bolting aging management roll-up item. In its response, the applicant replaces the existing information in the "Discussion" column of Unit 2 LRA Table 3.4.1, Item 8 with "consistent with the NUREG-1801."

The project team reviewed the applicant's response and finds this acceptable since it is consistent with the GALL Report. The bolting integrity program is reviewed by NRR DE and its evaluation is documented in Section 3 of the SER related to the MPS Units 2 and 3 LRA.

7.2.4.1.3 Loss of Material Due to General (Carbon Steel Only) Pitting and Crevice Corrosion

In the discussion section of Table 3.4.1, Item 10, of MPS Unit 2 LRA, the applicant states that for components in a treated water environment other than closed-cycle cooling water, loss of material is managed by the chemistry control for secondary systems or the work control process.

The GALL Report identifies that further evaluation is required for components managed by water chemistry program in the steam and power conversion system. During the audit and review, the project team requested that the applicant provide clarification why those components that are managed by the chemistry control program do not require further evaluation.

The applicant states that GALL Report, Item VIII.E.4-a, which references GALL AMP XI.M2 "Water Chemistry," should have been chosen for these components, along with a Note D to indicate that the component is different than the component described in the NUREG-1801. The further evaluation recommended, associated with GALL Report Item VIII.E.4-a in MPS Unit 2 LRA Table 3.4.1, Item 3.4.1-02, is addressed in MPS Unit 2 LRA Section 3.4.2.2.2.

The applicant also states, in the MPS Unit 2 LRA, that the effectiveness of MPS AMP B2.1.6, "Chemistry Control for Secondary Systems Program" is confirmed by MPS AMP B2.1.25, "Work Control Process." The work control process program provides the opportunity to visually inspect the internal surfaces of components during preventive and corrective maintenance activities on an ongoing basis. The work control process program provides input to the corrective action program if and when aging effects are identified. The corrective action program evaluates the cause and extent of the condition and, if required, recommends enhancements to ensure continued effectiveness of the chemistry control for secondary systems program. The project team finds the applicant's response acceptable and is consistent with the GALL Report.

On the basis of its audit and review, the project team determined that for AMRs not requiring further evaluation, as identified in the MPS Unit 2 LRA Table 3.4.1 (Table 1), the applicant's references to the GALL Report are acceptable and no further project team review is required.

7.2.4.2 Aging Management Review Results That Are Consistent With the GALL Report, for Which Further Evaluation Is Recommended

For some line items consistent with the GALL Report in the MPS Unit 2 LRA Tables 3.4.2-1 through 3.4.2-12, (Table 2s), the GALL Report recommends further evaluation. When further evaluation is recommended, the project team reviewed the applicant's evaluations provided in MPS Unit 2 LRA Sections 3.4.2.2 against the criteria provided in the SRP-LR Section 3.4.2.2. The following provides the project team's assessments of these evaluations. These project team assessments are applicable to each Table 2 line item in Section 3.4 citing the item in Table 1.

The MPS Unit 2 LRA sections identified in MPS Unit 2 LRA Table 3.4.1, where further evaluation is recommended are discussed below.

7.2.4.2.1 Cumulative Fatigue Damage (MPS Unit 2 LRA Section 3.4.2.2.1)

MPS Unit 2 LRA, Section 3.4.2.2.1 is reviewed by the NRR DE staff and addressed in Section 4 of the SER related to the MPS Units 2 and 3 LRA.

7.2.4.2.2 Loss of Material Due to General (Carbon Steel Only), Pitting, and Crevice Corrosion (MPS Unit 2 LRA Section 3.4.2.2.2)

The project team reviewed the MPS Units 2 LRA Section 3.4.2.2.2 against the criteria in SRP-LR Section 3.4.2.2.2.

SRP-LR Section 3.4.2.2.2 states that management of loss of material due to general, pitting, and crevice corrosion should be evaluated further for carbon steel piping and fittings, valve bodies and bonnets, pump casings, pump suction and discharge lines, tanks, tubesheets, channel heads, and shells except for main steam system components and for loss of material due to pitting and crevice corrosion for stainless steel tanks and heat exchanger/cooler tubes. The water chemistry program relies on monitoring and control of water chemistry based on the guidelines in EPRI guideline TR-102134 for secondary water chemistry to manage the effects of loss of material due to general, pitting, or crevice corrosion. However, corrosion may occur at locations of stagnant flow conditions. Therefore, the effectiveness of the chemistry control program should be verified to ensure that corrosion is not occurring. The GALL Report recommends further evaluation of programs to manage loss of material due to general, pitting, and crevice corrosion to verify the effectiveness of the water chemistry program. A one-time inspection of select components and susceptible locations is an acceptable method to ensure that corrosion is not occurring and that the component's intended function will be maintained during the period of extended operation.

The AMPs recommended by the GALL Report are GALL AMP XI.M2, "Water Chemistry" and GALL AMP XI.M32, "One Time Inspection," for management of this aging effect.

The applicant states, in the MPS Unit 2 LRA, that the loss of material due to general corrosion, pitting, and crevice corrosion in the steam and power conversion system components is managed by control of water chemistry through MPS AMP B2.1.6, “Chemistry Control for Secondary Systems.” The applicant also states that in lieu of a one-time inspection, MPS AMP B2.1.25, “Work Control Process” is used to provide confirmation of the effectiveness of the chemistry control for secondary systems program. The work control process provides the opportunity to visually inspect the internal surfaces of components during preventive and corrective maintenance activities on an ongoing basis and provides input to the corrective action program if aging effects are identified. The corrective action program would evaluate the cause and extent of the condition and, if required, recommend enhancements to ensure continued effectiveness of the chemistry control for secondary systems program.

The project team reviewed the chemistry control for secondary systems and its evaluation is documented in Section 7.1.5 of this report. In addition, in response to the project team’s query regarding the one-time inspection, the applicant states that the work control process program provides more opportunities for inspection of signs of aging than would a one-time inspection program. In addition, it provides confirmation of chemistry control effectiveness on a continuing basis, rather than a single point in time afforded by a one-time inspection program. The applicant confirmed that indications of age-related degradation would be evaluated and the extent of the condition be determined through the corrective action system. Enhancements to water chemistry control programs and follow-up inspections would be initiated, as necessary, to provide effective management of aging effects.

The project team reviewed the information provided in the MPS Unit 2 LRA and concurs that the applicant’s approach is consistent with GALL AMP XI.M32, “One-time Inspection,” which states: "An alternate acceptable program may include routine maintenance or a review of repair records to confirm that these components have been inspected for aging degradation and significant aging degradation has not occurred and thereby verify the effectiveness of the existing AMPs.” Also, the project team reviewed operating experience associated with the work control process program as it applied to the steam and power conversion system. Specifically, MPS Unit 2 Technical Report, MP-LR-3925/4925, “Work Control Inspection Opportunities,” which provides the results of a plant-wide review of maintenance history for a 10-year period. The project team finds that more than 50 work control related inspection opportunities were listed against the steam and power conversion system for which the project team found to be more than adequate to provide confirmation of the effectiveness of the chemistry control for secondary systems program.

The project team finds that the applicant has demonstrated that the effects of aging for loss of material will be adequately managed so that the intended functions will be maintained consistent with the CLB during the period of extended operation, as required by 10 CFR 54.21(a)(3).

7.2.4.2.3 <u>Loss of Material Due to General, Pitting, and Crevice Corrosion, Microbiologically Influenced Corrosion, and Biofouling (MPS Unit 2 Section 3.4.2.2.3)</u>

The project team reviewed MPS Unit 2 LRA Section 3.4.2.2.3 against the criteria in SRP-LR Section 3.4.2.2.3.

SRP-LR Section 3.4.2.2.3 states that loss of material due to general corrosion, pitting and crevice corrosion, microbiologically influenced corrosion (MIC), and biofouling could occur in carbon steel piping and fittings for untreated water from the backup water supply in the PWR auxiliary feedwater system. The GALL Report recommends further evaluation to ensure that these aging effects are adequately managed. Acceptance criteria are described in Branch Technical Position RLSB-1 (Appendix A.1, of this standard review plan).

The applicant states, in MPS Unit 2 LRA Section 3.4.2.2.3, that the backup water supply for the auxiliary feedwater system is the MPS Unit 2 fire protection system. The backup water source is maintained isolated from the auxiliary feedwater system by two normally closed valves. A tell-tale drain valve between the two closed valves is left open to ensure that leakage past the closed valves can be detected, thus ensuring that untreated water from the fire protection system does not enter the auxiliary feedwater pumps suction piping. The applicant also states that the backup water supply piping and components were evaluated to be satisfactory for the effects of aging with the Unit 2 fire protection system.

During the audit and review, the project team reviewed MPS Unit 2 piping and instrumentation diagram (reference drawings: Unit 2: 25203-26011, Sheet 1 of 6, Fire Protection System), and finds that there was effective isolation to ensure that untreated water from the fire protection system does not enter the auxiliary feedwater pumps suction piping.

Since the untreated water environment is isolated from the auxiliary feedwater pumps suction piping, this aging effect is not applicable to auxiliary feedwater pumps suction piping. On this basis, the project team concludes that this item is acceptable.

7.2.4.2.4 <u>Loss of Material Due To General Corrosion (MPS Unit 2 LRA Section 3.4.2.2.4)</u>

The project team reviewed MPS Unit 2 LRA Section 3.4.2.2.4 against the criteria in SRP-LR Section 3.4.2.2.4.

SRP-LR Section 3.4.2.2.4 states that loss of material due to general corrosion could occur on the external surfaces of all carbon steel SCs, including closure boltings, exposed to operating temperature less than 212EF. The GALL Report recommends further evaluation to ensure that this aging effect is adequately managed.

The applicant states, in the MPS Unit 2 LRA, that general corrosion is applicable to carbon steel, low-alloy steel, and cast iron components in an air environment only when it is exposed to intermittent wetting. The applicant also states that loss of material due to general corrosion of external surfaces is managed by MPS AMP B2.1.13, “General Condition Monitoring.”

The project team reviewed the general condition monitoring program and its evaluation is documented in Section 7.1.12 of this report. On the basis of its review, the project team concludes that this program is acceptable for managing loss of material since visual inspection of external surfaces is performed during various walkdowns.

7.2.4.2.5 Loss of Material due to General, Pitting, Crevice Corrosion, and Microbiologically Influenced Corrosion (MPS Unit 2 LRA Section 3.4.2.2.5.1 and 3.4.2.2.5.2)

The project team reviewed the MPS Unit 2 LRA Sections 3.4.2.2.5.1 and 3.4.2.2.5.2 against the criteria in SRP-LR Section 3.4.2.2.5.

The applicant states, in the MPS Unit 2 LRA Sections 3.4.2.2.5.1 and 3.4.2.2.5.2, that the auxiliary feedwater pumps are not equipped with oil coolers and that there are no underground, carbon steel components associated with the auxiliary feedwater system, and therefore, this item is not applicable.

SRP-LR Section 3.4.2.2.5 addresses loss of material due to general corrosion (carbon steel only), pitting and crevice corrosion, and MIC which could occur in stainless steel and carbon steel shells, tubes, and tubesheets within the bearing oil coolers (for steam turbine pumps) in the auxiliary feedwater system. The GALL Report recommends further evaluation to ensure that these aging effects are adequately managed.

SRP-LR 3.4.2.2.5 also addresses loss of material due to general corrosion, pitting and crevice corrosion, and MIC, which could occur in underground piping and fittings and emergency condensate storage tank in the auxiliary feedwater system and the underground condensate storage tank in the condensate system.

On the basis that the auxiliary feedwater pumps are not equipped with oil coolers and that there are no buried components in steam and power conversion systems at MPS Unit 2, the project team finds that this aging effect is not applicable to MPS Unit 2.

7.2.4.2.6 Quality Assurance for Aging Management of Non-Safety-Related Components (MPS Unit 2 LRA Section 3.4.2.2.6)

MPS Unit 2 LRA Section 3.4.2.2.6 is reviewed by the NRR DIPM staff and addressed in Section 3 of the SER related to the MPS Units 2 and 3 LRA.

7.2.4.3 Aging Management Review Results That Are Not Consistent with the GALL Report or Are Not Addressed in the GALL Report

In the MPS Units 2 LRA Tables 3.4.2-1 through 3.4.2-12, the project team reviewed additional details of the AMRs for material, environment, aging effect requiring management, and AMP combinations that are not consistent with the GALL Report or are not addressed in the GALL Report. The project team also reviewed additional systems and components, provided by MPS LRA supplement letters dated November 9, 2004 (ML043200606) and January 11, 2005 (ML050190289).

7.2.4.3.1 Main Steam - Aging Management Evaluation (MPS Unit 2 LRA Table 3.4.2-1 and 3.4.2-1a)

The project team reviewed Table 3.4.2-1 of the MPS Unit 2 LRA and Table 3 3.4.2-1a of the MPS LRA supplement letter dated January 11, 2005 (ML050190289), which summarizes the results of AMR evaluations for the main steam system component groups.

In MPS Unit 2 LRA Table 3.4.2-1, the applicant identified no aging effects for the following carbon steel, and low alloy steel main steam component types - condensing pots, moisture separators/reheaters (shell), pipe, steam traps, strainers, turbine casings, valves (atmospheric dumps and main steam safety/relief), steam generator blowndown tank - exposed externally to air.

During the audit and review, the project team requested that the applicant provides clarification as to why there are no aging effects for these components. The applicant states that the steam and power conversion systems components are normally operated at high temperatures (greater than 212EF) and the external surface of the component was determined to be dry. The applicant also states that these components are located inside buildings and because of the high operating temperature, would not be subject to condensation. These components were determined not to be susceptible to loss of material due to corrosion based on the dry environment, as described in MPS Unit 2 LRA Appendix C, Section C3.7.15.

The project team expressed concern regarding possible long-term shutdown such as the plant shutdown in the '90s. The applicant states that the only potential source of wetting of the external surfaces for these components, in a sheltered environment, is condensation. However, intermittent wetting conditions would not be expected during out-of-service periods for these components because for condensation to occur, the surface temperature of the components would have to decrease below the dew point of the ambient environment. These normally high temperature components are located in buildings with warm to hot temperatures and they are insulated. Therefore, conditions for condensation are not expected even when the components are out-of-service for long periods of time.

Since the external surface temperature for these main steam system components is high enough to preclude condensation and these components are not exposed to the intermittent wetting, the project team finds there are no applicable aging effects for the above-mentioned components.

In MPS Unit 2 LRA Table 3.4.2-1, the applicant identified no aging effects for the following stainless steel main steam component types - expansion joints, flexible hoses, flow elements, flow orifices, tubing, and valves - exposed externally to air.

On the basis of current industry research and operating experience, stainless steels exposed externally to air are not susceptible to significant general corrosion that would affect the intended function of components. Therefore, the project team finds that there are no applicable aging effects for stainless steel components in an air environment.

In MPS Unit 2 LRA Table 3.4.2-1, the applicant proposes to manage loss of material and cracking for the following stainless steel main steam component types - expansion joints, flexible hoses, flow elements, flow orifices, valves and tubing - exposed internally to treated water and steam using MPS AMP B2.1.6, "Chemistry Control for Secondary Systems."

The applicant also proposes to manage cracking for the following stainless steel main steam component types - quench tank heat exchangers (tubes & tubesheet) - exposed internally and externally to treated water using MPS AMP B2.1.6, "Chemistry Control for Secondary Systems" and MPS AMP B2.1.7, "Closed-cycle Cooling Water System." The project team reviewed the chemistry control for secondary systems program and closed-cycle cooling water system

program and its evaluation of these programs is documented in Sections 7.1.5 and 7.1.6 of this report, respectively. The effectiveness of the chemistry control program is further provided by MPS AMP B2.1.25, “Work Control Process” and is documented in Section 7.2.4.2.2 of this report.

On the basis of its review and the effects of pitting and crevice corrosion on stainless steel are not being significant in treated water or steam, the project team finds that management of loss of material for stainless steel components using the chemistry control for secondary systems and closed-cycle cooling water system AMP is adequate.

The applicant states, in the MPS Unit 2 LRA, that stress corrosion cracking is an aging mechanism that requires the simultaneous action of a corrosion environment, a sustained stress, and a susceptible material. The applicant also states that elimination of any one of these elements will eliminate the susceptibility to stress corrosion cracking. The applicant credits MPS AMP B2.1.6, “Chemistry Control for Secondary Systems,” to manage this aging mechanism since it removed one of the three required actions.

Since the chemistry control program for secondary systems maintains a controlled environment with low contaminant concentration and the applicant’s operating experience has shown this program to be effective for the management of cracking due to stress corrosion cracking, the project team finds that management of stress corrosion cracking for stainless steel components using chemistry control for secondary systems is adequate.

In MPS Unit 2 LRA Table 3.4.2-1, the applicant proposes to manage loss of material for carbon steel main steam component type - silencers - exposed internally to air with MPS AMP B2.1.25, “Work Control Process.”

The project team reviewed the work control process program and its evaluation is documented in Section 7.1.22 of this report. The work control process provides the opportunity to visually inspect the internal surfaces of components during preventive and corrective maintenance activities on an ongoing basis. The work control process provides input to the corrective action program if aging effects are identified. On the basis of its review, the project team finds the work control process program acceptable for managing the aging effect of loss of material for the carbon steel silencer.

7.2.4.3.2 Extraction Steam - Aging Management Evaluation (MPS Unit 2 LRA Table 3.4.2-2)

The project team reviewed MPS Unit 2 LRA Table 3.4.2-2, which summarizes the results of AMR evaluations for the extraction steam system component groups.

In MPS Unit 2 LRA Table 3.4.2-2, the applicant proposes to manage loss of material and cracking for the following stainless steel extraction steam system component types - expansion joints, and tubing - exposed internally to steam using MPS AMP B2.1.6, “Chemistry Control for Secondary Systems.”

The material, environment, aging effects, and aging management program (MEAP) for extraction steam components is the same as that for the main steam components. Since both have the same MEAP combination, the project team finds that management of loss of material

and cracking for stainless steel components using the chemistry control for secondary systems program to be adequate. The project team reviewed the chemistry control for secondary systems program and its evaluation is documented in Section 7.2.4.3.1 of this report.

The applicant identified no aging effects for the following carbon low-alloy steel extraction steam system component types - pipe, steam traps, strainers, and valves - exposed externally to air.

On the basis that these components have the same previously discussed MEAP combination, the project team finds that there are no aging effects for these carbon low-alloy steel components exposed externally to air. The project team's evaluation is documented in Section 7.2.4.3.1 of this report.

7.2.4.3.3 Feedwater - Aging Management Evaluation (MPS Unit 2 LRA Table 3.4.2-3)

The project team reviewed MPS Unit 2 LRA Table 3.4.2-3, which summarizes the results of AMR evaluations for the feedwater system component groups.

In MPS Unit 2 LRA Table 3.4.2-3, the applicant proposes to manage loss of material and cracking for the following stainless steel feedwater system component types - flow elements, flow orifices, and tubing - exposed internally to steam using MPS AMP B2.1.6, "Chemistry Control for Secondary Systems."

The material, environment, aging effects, and aging management program (MEAP) for feedwater components is the same as that for the main steam components. Since both have the same MEAP combination, the project team finds that management of loss of material and cracking for stainless steel components using the chemistry control for secondary systems program to be adequate. The project team reviewed the chemistry control for secondary systems program and its evaluation is documented in Section 7.2.4.3.1 of this report.

In MPS Unit 2 LRA Table 3.4.2-3, the applicant proposes to manage loss of material for the carbon steel feedwater system pumps exposed internally to treated water using MPS AMP B2.1.6, "Chemistry Control for Secondary Systems" and MPS AMP B2.1.25, "Work Control Process."

The GALL Report recommends GALL AMP XI.M2, "Water Chemistry" to be augmented by verifying the effectiveness of water chemistry control by a supplementary program. GALL AMP XI.M32, "One-Time Inspection" is an acceptable verification program.

The project team reviewed the work control process program and its evaluation is documented in Section 7.1.22 of this report. The effectiveness of the chemistry control program is provided further by MPS AMP B2.1.25, "Work Control Process" and is documented in Section 7.2.4.2.2 of this report. The project team determined that the applicant's work control process program is an acceptable alternate inspection program for this component to manage the aging effects.

The applicant identified no aging effects for the following carbon steel feedwater system component types -heaters (feedwater heater channel head), and heaters (feedwater heater shell) - exposed externally to air.

On the basis that these components have the same previously discussed MEAP combination, the project team finds that there are no aging effects for these carbon steel components exposed externally to air. The project team's evaluation is documented in Section 7.2.4.3.1 of this report.

7.2.4.3.4 Condensate - Aging Management Evaluation (MPS Unit 2 LRA Table 3.4.2-4)

The project team reviewed MPS Unit 2 LRA Table 3.4.2-4, which summarizes the results of AMR evaluations for the condensate system component groups.

In MPS Unit 2 LRA Table 3.4.2-4, the AMR for rubber expansion joints is performed by NRR DE and its evaluation is documented in Section 3 of the SER related to the MPS Units 2 and 3 LRA.

In MPS Unit 2 LRA Table 3.4.2-4, the applicant identified no aging effects for the following stainless steel/carbon steel/low-alloy steel/cast iron condensate system component types -flow elements, flow orifices, tubing, condensers (main condenser shell), drain coolers (channel head), drain coolers (shell), heat exchanger steam jet air ejectors (shell), heaters (feedwater heater channel head), heaters (feedwater heater shell), pipe, steam packing exhauster (channel head), steam packing exhauster (shell), valves, and pumps - exposed externally to air.

On the basis that these have the same previously discussed MEAP combination, the project team finds that there are no aging effects for these stainless steel/carbon steel/low-alloy steel/cast iron components exposed externally to air. The project team's evaluation is documented in Section 7.2.4.3.1 of this report.

In MPS Unit 2 LRA Table 3.4.2-4, the applicant proposes to manage loss of material and cracking for stainless steel condensate system component types - flow elements, flow orifices, and tubing - exposed internally to treated water using MPS AMP B2.1.6, "Chemistry Control for Secondary Systems."

The material, environment, aging effects, and aging management program (MEAP) for condensate components is the same as that for the main steam components. Since both have the same MEAP combination, the project team finds that management of loss of material and cracking for stainless steel components using the chemistry control for secondary systems program to be adequate. The project team reviewed the chemistry control for secondary systems program and its evaluation is documented in Section 7.2.4.3.1 of this report.

7.2.4.3.5 Condensate Storage and Transfer - Aging Management Evaluation (MPS Unit 2 LRA Table 3.4.2-5)

The project team reviewed MPS Unit 2 LRA Table 3.4.2-5, which summarizes the results of AMR evaluations for the condensate storage and transfer system component groups.

In MPS Unit 2 LRA Table 3.4.2-5, the AMR for the carbon steel and low alloy steel condensate storage tank and the stainless steel rupture disks exposed internally to gas is performed by NRR DE and its evaluation is documented in Section 3 of the SER related to the MPS Units 2 and 3 LRA.

In MPS Unit 2 LRA Table 3.4.2-5, the AMR for the stainless steel rupture disks exposed externally to atmosphere/weather is performed by NRR DE and its evaluation is documented in Section 3 of the SER related to the MPS Units 2 and 3 LRA.

In MPS Unit 2 LRA Table 3.4.2-5, the applicant identified no aging effects for stainless tubing exposed externally to air.

On the basis that these components have the same previously discussed MEAP combination, the project team finds that there are no aging effects for this stainless component exposed externally to air. The project team's evaluation is documented in Section 7.2.4.3.1 of this report.

In MPS Unit 2 LRA Table 3.4.2-5, the applicant proposes to manage loss of material for carbon steel and low-alloy steel pipe exposed externally to an atmosphere/weather environment with MPS AMP B2.1.13, "General Condition Monitoring."

The project team reviewed the general condition monitoring program and its evaluation is documented in Section 7.1.12 of this report. The project team finds that this program is acceptable for managing loss of material since visual inspection of external surfaces is performed during various walkdowns.

7.2.4.3.6 Condensate Demin Mixed Bed - Aging Management Evaluation (MPS Unit 2 LRA Table 3.4.2-6)

The project team reviewed MPS Unit 2 LRA Table 3.4.2-6, which summarizes the results of AMR evaluations for the condensate demin mixed bed system component groups.

In MPS Unit 2 LRA Table 3.4.2-6, the applicant identified no aging effects for stainless steel tubing exposed externally to air.

On the basis that these components have the same previously discussed MEAP combination, the project teams finds that there are no aging effects for this stainless component exposed externally to air. Its evaluation is documented in Section 7.2.4.3.1 of this report.

7.2.4.3.7 Auxiliary Feedwater - Aging Management Evaluation (MPS Unit 2 LRA Table 3.4.2-7)

The project team reviewed MPS Unit 2 LRA Table 3.4.2-7, which summarizes the results of AMR evaluations for the auxiliary feedwater system component groups.

In the MPS Unit 2 LRA Table 3.4.2-7, the applicant identified no aging effects for the following stainless steel/carbon steel/low-alloy steel auxiliary feedwater system component types - flow elements, flow orifices, tubing, and turbine casing - exposed externally to air.

On the basis that these components have the same previously discussed MEAP combination, the project team finds that there are no aging effects for these stainless steel/carbon steel/low-alloy steel component exposed externally to air. The project team's evaluation is documented in Section 7.2.4.3.1 of this report.

In MPS Unit 2 LRA Table 3.4.2-7, the applicant proposes to manage loss material for the carbon steel and low-alloy steel turbine casing exposed internally to treated water and steam environment using MPS AMP B2.1.6, “Chemistry Control for Secondary Systems” and MPS AMP B2.1.25, “Work Control Process.”

The project team reviewed the chemistry control for secondary systems program and the work control process and its evaluation is documented in Sections 7.1.5 and 7.1.22 of this report. The chemistry control program purpose is to provide reasonable assurance that water quality is compatible with the materials of construction in the plant systems and equipment in order to minimize loss of material. The work control process ensures effectiveness of the water chemistry control for secondary systems. On this basis, the project team finds that management of loss of material for this component is adequate.

7.2.4.3.8 Feedwater Heater Vents and Drains - Aging Management Evaluation (MPS Unit 2 LRA Table 3.4.2-8)

The project team reviewed MPS Unit 2 LRA Table 3.4.2-8, which summarizes the results of AMR evaluations for the feedwater heater vents and drains system component groups.

In MPS Unit 2 LRA Table 3.4.2-8, the applicant proposes to manage cracking for stainless steel feedwater heater vents and drains system component types - expansion joints, flow elements, flow orifices, restricting orifices, tubing, and valves - exposed internally to a treated water and steam environment using MPS AMP B2.1.6, “Chemistry Control for Secondary Systems Program.”

The MEAP for feedwater heater vents and drains components is the same as that for the main steam components. Since both have the same MEAP combination, the project team finds that management of loss of material and cracking for stainless steel components using chemistry control for secondary systems program is adequate. The project team’s evaluation is documented in Section 7.2.4.3.1 of this report.

In MPS Unit 2 LRA Table 3.4.2-8, the applicant identified no aging effects for the following stainless steel/carbon steel/low-alloy steel feedwater heater vents and drains system component types - condensing pots, expansion joints, flow elements, flow orifices, heater drains tank, level indicators, pipe, pumps, restricting orifices, tubing, and valves - exposed externally to air.

On the basis that these components have the same previously discussed MEAP combination, the project teams finds that there are no aging effects for these stainless steel/carbon steel/low-alloy steel components exposed externally to air. The project team’s evaluation is documented in Section 7.2.4.3.1 of this report.

In MPS Unit 2 LRA Table 3.4.2-8, the applicant proposes to manage loss of material for the copper alloy gland seal coolers (coils) exposed internally and externally to a treated water environment using MPS AMP B2.1.6 “Chemistry Control for Secondary Systems” and MPS AMP B2.1.25, “Work Control Process.”

The project team reviewed the chemistry control for secondary systems program and the work control process and its evaluation is documented in Sections 7.1.5 and 7.1.22 of this report,

respectively. The chemistry control program purpose is to provide reasonable assurance that water quality is compatible with the materials of construction in the plant systems and equipment in order to minimize loss of material. The work control process ensures effectiveness of the water chemistry control for secondary systems and provides opportunity to inspect the outside surface of the cooler coils. On this basis, the project team finds that management of loss of material for this component is adequate.

7.2.4.3.9 Moisture Separation and Reheat - Aging Management Evaluation (MPS Unit 2 LRA Table 3.4.2-9)

The project team reviewed MPS Unit 2 LRA Table 3.4.2-9, which summarizes the results of AMR evaluations for the moisture separation and reheat system component groups.

In MPS Unit 2 LRA Table 3.4.2-9, the applicant proposes to manage loss of material/cracking for stainless steel moisture separation and reheat system component types - condensing pots, drains pots, flow elements, and tubing - exposed internally to treated water and steam environment using MPS AMP B2.1.6 “Chemistry Control for Secondary Systems.”

The MEAP for moisture separation and reheat components is the same as that for the main steam components. Since both have the same MEAP combination, the project team finds that management of loss of material and cracking for stainless steel components using the chemistry control for secondary systems program to be adequate. The project team’s evaluation is documented in Section 7.2.4.3.1 of this report.

In MPS Unit 2 LRA Table 3.4.2-9, the applicant identified no aging effects for stainless steel/carbon steel/low-alloy steel moisture separation and reheat system component types - condensing pots, drains pots, drain tanks, flow elements, tubing and valves - exposed externally to air.

On the basis that these components have the same previously discussed MEAP combination, the project teams finds that there are no aging effects for these stainless steel/carbon steel/low-alloy steel components exposed externally to air. The project team’s evaluation is documented in Section 7.2.4.3.1 of this report.

7.2.4.3.10 Plant Heating and Condensate Recovery - Aging Management Evaluation (MPS Unit 2 LRA Table 3.4.2-10)

The project team reviewed MPS Unit 2 LRA Table 3.4.2-10, which summarizes the results of AMR evaluations for the plant heating and condensate recovery system component groups.

In MPS Unit 2 LRA Table 3.4.2-10, the applicant proposes to manage loss of material for copper alloys plant heating and condensate recovery system component types - heating and ventilation Units(coils), and heating coils - exposed internally to a steam environment using MPS AMP B2.1.6 “Chemistry Control for Secondary Systems.”

The project team reviewed the chemistry control for secondary systems program and its evaluation is documented in Sections 7.1.5 of this report. The chemistry control program purpose is to provide reasonable assurance that water quality is compatible with the materials of construction in the plant systems and equipment in order to minimize loss of material. The

work control process ensures effectiveness of the water chemistry control for secondary systems. On this basis, the project team finds that management of loss of material for this component is adequate.

In MPS Unit 2 LRA Table 3.4.2-10, the applicant proposes to manage loss of material for the copper alloys plant heating and condensate recovery system sample coolers (tubes) exposed internally and externally to a treated water environment using MPS AMP B2.1.25, “Work Control Process” and MPS AMP B2.1.7, “Closed-cycle Cooling Water System.”

The project team reviewed the work control process program and the closed-cycle cooling water system program. Its evaluation of these programs is documented in Sections 7.1.22 and 7.1.6 of this report, respectively. The closed-cooling water system program monitors chemical parameters and provides inspection to further verify the chemistry control. The work control process program performs maintenance activities to provide visual inspection and tracks the performance of inspection and surveillance activities. On this basis, the project team finds that the management of loss material for these components is adequate.

In MPS Unit 2 Table 3.4.2-10, the applicant proposes to manage loss of material for carbon steel and low-alloy steel plant heating and condensate recovery system type components - pipe, reservoir, and steam traps - exposed externally to the atmosphere/weather environment using MPS AMP B2.1.13, “General Condition Monitoring.”

The project team reviewed the general condition monitoring program and its evaluation is documented in Section 7.1.12 of this report. The project team finds that this program is acceptable for managing loss of material since visual inspection of external surfaces is performed during various walkdowns.

In the MPS Unit 2 LRA Table 3.4.2-10, the applicant proposes to manage cracking for the stainless steel tubing exposed internally to a treated water and steam environment using MPS AMP B2.1.6, “Chemistry Control for Secondary Systems.”

The material, environment, aging effects, and aging management program (MEAP) for plant heating and condensate recovery components is the same as that for the main steam components. Since both have the same MEAP combination, the project team finds that the management of cracking for stainless steel components using chemistry control for secondary systems program to be adequate. The project team’s evaluation is documented in Section 7.2.4.3.1 of this report.

In MPS Unit 2 Table 3.4.2-10, the applicant identified no aging effects for the following stainless steel/carbon steel/low-alloy plant heating and condensate recovery system component types - pipe, sample traps, strainers, tubing and valves - exposed externally to air.

On the basis that these components have the same previously discussed MEAP combination, the project teams finds that there are no aging effects for these steel/carbon steel/low-alloy components exposed externally to air. The project team’s evaluation is documented in Section 7.2.4.3.1 of this report.

7.2.4.3.11 Secondary Chemical Feed - Aging Management Evaluation (MPS Unit 2 LRA Table 3.4.2-11)

The project team reviewed MPS Unit 2 LRA Table 3.4.2-1, which summarizes the results of AMR evaluations for the secondary chemical feed system component groups.

In MPS Unit 2 LRA Table 3.4.2-11, the applicant proposes to manage cracking for stainless steel secondary chemical feed system type components - tubing and valves - exposed internally to a treated water environment using MPS AMP 2.1.6, “Chemistry Control for Secondary Systems.”

The material, environment, aging effects, and aging management program (MEAP) for secondary chemical feed components is the same as that for the main steam components. Since both have the same MEAP combination, the project team finds that management of cracking for stainless steel components using the chemistry control for secondary systems program to be adequate. The project team’s evaluation is documented in Section 7.2.4.3.1 of this report.

In MPS Unit 2 LRA Table 3.4.2-11, the applicant identified no aging effects for stainless steel secondary chemical feed system type components - tubing and valves - exposed externally to air.

On the basis that these components have the same previously discussed MEAP combination, the project teams finds that there are no aging effects for these stainless steel components exposed externally to air. The project team’s evaluation is documented in Section 7.2.4.3.1 of this report.

7.2.4.3.12 Turbine Gland Sealing - Aging Management Evaluation (MPS Unit 2 LRA Table 3.4.2-12)

The project team reviewed MPS Unit 2 LRA Table 3.4.2-12, which summarizes the results of AMR evaluations for the turbine gland sealing system component groups.

In MPS Unit 2 LRA Table 3.4.2-12, the applicant identified no aging effects for the following stainless steel/carbon steel/low-alloy steel turbine gland sealing system type components - flow orifices, pipe, tubing, valves, and water pot - exposed externally to air.

On the basis that these components have the same previously discussed MEAP combination, the project teams finds that there are no aging effects for these stainless steel/carbon steel/low-alloy steel components exposed externally to air. The project team’s evaluation is documented in Section 7.2.4.3.1 of this report.

In MPS Unit 2 LRA Table 3.4.2-12, the applicant proposes to manage cracking and loss of material for stainless steel turbine gland sealing system type components - flow orifices, tubing, and valves - exposed internally to a steam environment using MPS AMP B2.1.6, “Chemistry Control for Secondary Systems.”

The material, environment, aging effects, and aging management program (MEAP) for turbine gland sealing components is the same as that for the main steam components. Since both

have the same MEAP combination, the project team finds that management of cracking and loss of material for stainless steel components using the chemistry control for secondary systems program to be adequate. The project team reviewed the chemistry control for secondary systems program and its evaluation is documented in Section 7.2.4.3.1 of this report.

7.2.4.3.13 Table 5: Steam and Power Conversion System - Auxiliary Steam Reboiler and Deaerating Feedwater - Aging Management Evaluation

In the MPS LRA supplement letter of November 9, 2004 (ML043200606), the applicant identified no aging effects for carbon steel and low-alloy steel exposed to an air environment for the auxiliary steam feedwater surge tank, pipe, and valve component types.

On the basis of current industry research and operating experience, carbon steel and low-alloy steel exposed air are not susceptible to significant general corrosion that would affect the intended function of components. Therefore, the project team finds that there are no applicable aging effects for carbon steel and low-alloy steel components in an air environment.

7.2.4.3.14 Table 6: Steam and Power Conversion System - Exciter Air Cooler - Aging Management Evaluation

In the MPS LRA supplement letter of November 9, 2004 (ML043200606), the applicant stated that loss of material of main transfomer and generator isophase bus duct cooling exchangers (coils) of copper alloys exposed to air and treated water environment in the exciter air cooler system is managed using MPS AMP B.2.1.25, “Work Control Process.”

The project team reviewed the work control process and its evaluation is documented in Section 7.1.22 of this report. The work control process program performs maintenance activities to provide visual inspection and tracks the performance of inspection and surveillance activities. On this basis, the project team finds that the management of loss material for these components is adequate.

7.2.4.3.15 Table 7: Steam and Power Conversion System - Stator Liquid Cooler - Aging Management Evaluation

In the MPS LRA supplement letter of November 9, 2004 (ML043200606), the applicant stated that loss of material of tubing and valve of stainless steel exposed to moisture-laden air or intermittent wetted environment in the stator liquid cooler is managed using MPS AMP B.2.1.13, “General Condition Monitoring.”

The project team reviewed the general condition monitoring and its evaluation is documented in Section 7.1.12 of this report. The project team finds that this program is acceptable for managing loss of material since visual inspection of external surfaces is performed during various walkdowns.

7.2.4.3.16 Table 8: Steam and Power Conversion System - Turbine Lube Oil- Aging Management Evaluation

In the MPS LRA supplement letter of November 9, 2004 (ML043200606), the applicant identified no aging effects for stainless steel exposed to air, including pipe, tubing, and valve component types.

On the basis of current industry research and operating experience, stainless steels exposed externally to air are not susceptible to significant general corrosion that would affect the intended function of components. Therefore, the project team finds that there are no applicable aging effects for stainless steel components in an air environment.

In the MPS LRA supplement letter of November 9, 2004 (ML043200606), the applicant stated that cracking of pipe, tubing and valves of stainless steel exposed to oil environment in the turbine lube oil is managed using MPS AMP B.2.1.25, "Work Control Process."

The project team reviewed the work control process and its evaluation is documented in Section 7.1.22 of this report. The work control process program performs maintenance activities to provide visual inspection and tracks the performance of inspection and surveillance activities. On this basis, the project team finds that the management of cracking for these components is adequate.

7.2.4.3.17 Electro Hydraulic Control - Aging Management Evaluation (MPS Unit 2 LRA Table 3.4.2-13)

In the MPS LRA supplement letter of January 11, 2005, (ML050190289), the applicant identified no aging effects for stainless steel exposed externally to air and internally to oil, including filter/strainers, flexible hoses, flow indicators, hydraulic fluid coolers (shell), pipe, pumps, tubing, and valve component types.

On the basis of current industry research and operating experience, stainless steels exposed externally to air and internally to oil environment are not susceptible to significant general corrosion that would affect the intended function of components. Therefore, the project team finds that there are no applicable aging effects for stainless steel components in an external air and internal oil environment.

In the MPS LRA supplement letter of January 11, 2005, (ML050190289), the applicant stated that loss of material of hydraulic fluid coolers (tubes) of copper alloys exposed externally to oil and internally to treated water environment is managed using MPS AMP B.2.1.25, "Work Control Process."

The project team reviewed the work control process and its evaluation is documented in Section 7.1.22 of this report. The work control process program performs maintenance activities to provide visual inspection and tracks the performance of inspection and surveillance activities. On this basis, the project team finds that the management of loss of material for these components is adequate.

7.2.5 MPS Unit 2 LRA Section 3.5 - Aging Management of Structures and Component Supports

In MPS Unit 2 LRA Section 3.5, the applicant provides the results of its AMRs for structures and components.

In the MPS Unit 2 LRA Tables 3.5.2-1 through 3.5.2-27 (Table 2s), the applicant provides a summary of the AMRs for component types associated with the following structures and commodities: (1) Unit 2 containment; (2) Unit 2 containment enclosure building; (3) Unit 2 auxiliary building; (4) Unit 2 warehouse building; (5) Unit 2 turbine building; (6) Unit 1 turbine building; (7) Unit 1 control room and radwaste treatment building; (8) Unit 2 fire pump house; (9) Unit 3 fire pump house; (10) SBO diesel generator enclosure and fuel oil tank vault; (11) Unit 2 condensate polishing facility and warehouse No. 5; (12) security diesel generator enclosure; (13) stack monitoring equipment building; (14) Millstone stack; (15) switchyard control house; (16) retaining wall; (17) 345kV switchyard; (18) Unit 2 intake structure; (19) sea walls; (20) Unit 2 discharge tunnel and discharge structure; (21) Unit 2 bypass line; (22) tank foundations; (23) yard structures; (24) nuclear steam supply system (NSSS) equipment supports; (25) general structural supports; (26) miscellaneous structural commodities; and (27) load handling cranes and devices. The applicant provides additional systems and components, in a MPS LRA supplement letter dated December 3, 2004 (ML043450341), that were added to the scope of license renewal. Specifically, the (1) Unit 2 condensate polishing service water strainer house, (2) Unit 2 hydrogen cylinder storage area, and (3) Unit 2 sodium hypochlorite building. The summary information for each component type included: intended function; material; environment; aging effect requiring management; AMPs; the GALL Report Volume 2 item; cross reference to the MPS Unit 2 LRA Table 3.5.1 (Table 1); and generic and plant-specific notes related to consistency with the GALL Report.

Also, the applicant identified for each component type in the MPS Unit 2 LRA Table 3.5.1 (Table 1) those components where further evaluation is recommended, those for which no further evaluation is required, and those that are not applicable to MPS Unit 2 together with the basis for their exclusion.

Additionally, the applicant identified in MPS Unit 2 LRA Tables 3.5.2-1 through 3.5.2-27 which AMR results it considered to be consistent with the GALL Report (table column Notes A through E) and which it justified on a different basis.

The AMRs that are within the scope of the project team audit and review are identified on copies of the MPS Unit 2 LRA Tables 3.5.2-1 through 3.5.2-27 which are included as an appendix to the MPS Units 2 and 3 audit and review plan.

The project team conducted its audit and review in accordance with SRP-LR Section 3.5.3 and the MPS Units 2 and 3 audit and review plan. The project team interviewed the applicant's technical staff and reviewed, in whole or in part, the documents listed in Attachment 5 of this report for Section 3.5, including the following Unit 2 Technical Reports: MP-LR-3601, "Containment," Revision 2; MP-LR-3602, "Class 1 Structures," Revision 3; MP-LR-3603, "Intake & Discharge Structures," Revision 3; MP-LR-3604, "Miscellaneous Structures," Revision 3; MP-LR-3651, "General Structural Supports," Revision 2; MP-LR-3652, "Load Handling Cranes & Devices," Revision 2; MP-LR-3653, "NSSS Equipment Supports," Revision 3; and MP-LR-3654, "Miscellaneous Structural Commodities," Revision 2, dated December 31, 2003.

The project team conducted its audit and review in accordance with SRP-LR Section 3.5.3 and the MPS Units 2 and 3 audit and review plan.

7.2.5.1 Aging Management Review Results That Are Consistent With the GALL Report, for Which No Further Evaluation Is Required

For aging management evaluations that the applicant states are consistent with the GALL Report and for which further evaluation is not recommended, the project team conducted its review and audit to determine if the applicant's reference to the GALL Report in the MPS Unit 2 LRA is acceptable.

The project team reviewed the MPS Unit 2 LRA and the information in the MPS LRA supplement letter dated January 11, 2005 (ML050190289), to confirm that the applicant (1) provides a brief description of the system, components, materials, and environment; (2) states that the applicable aging effects requiring management have been reviewed and are evaluated in the GALL Report; and (3) identifies those aging effects for the auxiliary system components that are subject to an AMR.

The project team also verified that the MPS Unit 2 LRA line item is consistent with the GALL Volume 2 system tables line item for component type, material, environment, aging effect, and AMP.

7.2.5.1.1 Aging of Component Supports

In MPS Unit 2 LRA Table 3.5.2-25 (page 3-535), the applicant states the loss of material of carbon steel and low-alloy steel for structural support components in an air or atmosphere/weather environment is managed by MPS AMP B2.1.15, "Infrequently Accessed Areas Inspection Program," MPS AMP B2.1.23, "Structures Monitoring Program," and MPS AMP B2.1.13, "General Condition Monitoring," and GALL Item III.B2.1-a is matched. During the audit and review, the project team asked the applicant to explain why Note E was used for the infrequently accessed areas inspection program, Note A used for the structures monitoring program, and Note C used for the general condition monitoring program. The applicant states that the Note C was incorrectly applied to the general condition monitoring line items. Note A should have been applied since the general condition monitoring program performs the same inspections of structural supports as the structures monitoring program and is considered equivalent to GALL AMP XI.S6, "Structures Monitoring Program." MPS AMP B2.1.23 is used to manage aging of non-ASME class, large equipment supports; and MPS AMP B2.1.13 is used to manage aging of other non-ASME class supports.

In a MPS LRA supplement letter dated July 7, 2004 (ML041900407), the applicant states, in response to Audit Item 100, that Note C should be Note A for the general condition monitoring line items in MPS Unit 2 LRA Table 3.5.2-25 (pages 3-532 through 3-538) since the general condition monitoring program performs the same inspections of structural supports as the structures monitoring program and is considered equivalent to GALL AMP XI.S6, "Structures Monitoring Program."

In addition, the applicant has initiated DMRs #3478 and #3479 to make the same correction in AMR basis document MPS Unit 2 Technical Report, MP-LR-3651, "General Structural Supports," Revision 2. On the basis of its review of the applicant's response, the project team finds the response to be acceptable.

On the basis of its audit and review, the project team determined that for AMRs not requiring further evaluation, as identified In MPS Unit 2 LRA Table 3.5.1 (Table 1), the applicant's references to the GALL Report are acceptable and no further project team review is required.

7.2.5.2 Aging Management Review Results That Are Consistent With the GALL Report, for Which Further Evaluation Is Recommended

For some line items consistent with the GALL Report in MPS Unit 2 LRA Tables 3.5.2-1 through 3.5.2-27, the GALL Report recommends further evaluation. When further evaluation is recommended, the project team reviewed these evaluations provided in MPS Unit 2 LRA Section 3.5.2.2 against the criteria provided in the SRP-LR Section 3.5.2.2. The following provides the project team's assessments of these evaluations. These project team assessments are applicable to each Table 2 line item in Section 3.5 citing the particular item in Table 1.

The MPS Unit 2 LRA sections identified in LRA Table 3.5.1 where further evaluation is recommended are discussed below.

7.2.5.2.1 PWR Containments (MPS Unit 2 LRA Section 3.5.2.2.1)

The project team reviewed MPS Unit 2 LRA Section 3.5.2.2.1 against the criteria in SRP-LR Section 3.5.2.2.1, which addresses several areas discussed below.

7.2.5.2.1.1 Aging of Inaccessible Concrete Areas (MPS Unit 2 LRA Section 3.5.2.2.1.1)

The project team reviewed MPS Unit 2 LRA Section 3.5.2.2.1.1 against the criteria in SRP-LR Section 3.5.2.2.1.1.

In MPS Unit 2 LRA Section 3.5.2.2.1.1, the applicant addresses aging of inaccessible concrete areas for the Unit 2 containment.

For inaccessible portions of the containment structure, 10 CFR 50.55a(b)(2)(ix) requires that the applicant evaluate the acceptability of inaccessible areas when conditions exist in accessible areas that could indicate the presence of, or result in, degradation to inaccessible areas.

The AMP recommended by the GALL Report for managing the aging of the accessible portions of the containment structures is GALL AMP XI.S2, "ASME Section XI, Subsection IWL." The applicant addresses this with MPS AMP B2.1.16, "Inservice Inspection Program: Containment Inspections." The project team reviewed the inservice inspection program: containment inspections program and its evaluation is documented in Section 7.1.15 of this report. ASME Subsection IWL exempts from examination those portions of the concrete containment that are inaccessible (e.g., foundation, below-grade exterior walls, or concrete covered by liner).

The applicant also uses MPS AMP B2.1.23, "Structures Monitoring Program," to monitor accessible areas for evidence of aging effects that may be applicable to containment structures. This program, which is consistent with GALL AMP XI.S6, "Structures Monitoring Program," with enhancements, was reviewed by the project team and its evaluation is documented

Section 7.1.20 of this report. The applicant also credits the structures monitoring program for the examination of below-grade concrete when it is exposed by excavation.

In the GALL Report, Volume 2, Chapter II, Table A1 (as modified by ISG-3), further evaluation is recommended to manage the aging effects for containment concrete components located in inaccessible areas if the aging mechanisms of (1) freeze-thaw, (2) leaching of calcium hydroxide, (3) aggressive chemical attack, (4) reaction with aggregates, or (5) corrosion of embedded steel are significant. Possible aging effects for containment concrete structural components due to these five aging mechanisms are cracking, change in material properties, and loss of material.

(1) Freeze-thaw

SRP-LR Section 3.5.2.2.1.1 does not address freeze-thaw as an aging mechanism for concrete containments because no further evaluation is recommended in the GALL Report. However, ISG-3, "Chapters II and III of GALL Report on Aging Management of Concrete Elements," dated November 21, 2003, clarifies the staff position that further evaluation is appropriate if the applicant's facility is subject to moderate to severe weather conditions unless the concrete meets certain specifications and subsequent inspections have confirmed that the aging mechanism has not caused degradation of the concrete.

MPS is located in a region considered to be subject to severe weather conditions. In the MPS Unit 2 LRA, the applicant states that MPS Unit 2 concrete structures are designed in accordance with ACI specification 318-63, "Building Code Requirements for Reinforced Concrete," which results in low permeability and resistance to aggressive chemical solutions by requiring the following:

high cement content
low water-to-cement ratio
proper curing
adequate air entrainment

In the MPS Unit 2 LRA, the applicant states that MPS Unit 2 concrete also meets requirements of the guideline ACI 201.2R-77, "Guide to Durable Concrete." ACI 318-63 and ACI 201.2R-77 use the same ASTM standards for selection, application, and testing of concrete.

During the audit and review, the project team interviewed members of the applicant's technical staff and reviewed relevant operating experience to confirm that loss of material from freeze-thaw has not been observed, either through the inservice inspection - IWL program or the structures monitoring program.

On the basis of its review, the project team finds that loss of material and cracking due to freeze-thaw will be adequately managed by the containment inservice inspection program since: (1) concrete that satisfies the requirements of ACI 318-63 will meet the requirements of ISG-3, (2) an audit of operating experience evaluated under the inservice inspection program: containment inspections and structures monitoring programs, and (3) the containment structure is protected from the elements by an enclosure structure.

(2) Leaching of calcium hydroxide

SRP-LR Section 3.5.2.2.1.1 states that cracking, spalling, and increases in porosity and permeability due to leaching of calcium hydroxide could occur in inaccessible areas of PWR concrete and steel containments. The GALL Report, as updated by ISG-3, recommends further evaluation of plant-specific programs to manage the aging effects for inaccessible areas if specific criteria cannot be satisfied.

The GALL Report states that leaching of calcium hydroxide becomes significant only if the concrete is exposed to flowing water. Even if reinforced concrete is exposed to flowing water, such leaching is not significant if the concrete is constructed to ensure that it is dense, well-cured, has low permeability, and that cracking is well controlled.

In the MPS Unit 2 LRA, the applicant states that MPS Unit 2 concrete structures are designed in accordance with specification ACI 318-63 and meet the requirements of guideline ACI 201.2R-77.

The project team finds that because ACI 318-63 and ACI 201.2R-77 provide assurance that the criteria of the GALL Report and ISG-3 are met, leaching of calcium hydroxide is not significant at MPS Unit 2, and therefore concludes that the inservice inspection program: containment inspections program will be sufficient for management of increases in porosity and permeability from this aging mechanism. A plant-specific aging management program is not required to address this aging effect.

(3) Aggressive chemical attack

SRP-LR Section 3.5.2.2.1.1 states that cracking, spalling, and increases in porosity and permeability due to aggressive chemical attack could occur in inaccessible areas of PWR concrete and steel containments. The GALL Report recommends further evaluation of plant-specific programs to manage the aging effects for inaccessible areas if specific criteria defined in the GALL Report and updated in ISG-3 cannot be satisfied.

The GALL Report, as updated by ISG-3, states that aggressive chemical attack is not significant unless pH is less than 5.5, chlorides are greater than 500 ppm, or sulfates are greater than 1,500 ppm. ISG-3 also states that a plant-specific program is required to examine representative samples of below-grade concrete when excavated for any reason.

In the MPS Unit 2 LRA, the applicant states that the below-grade environment is not aggressive (pH is greater than 5.5, chlorides are less than 500 ppm, and sulfates are less than 1,500 ppm). In addition, the project team noted that the applicant uses the structures monitoring program to examine below-grade concrete when it is exposed by excavation.

On the basis of the information provided in the MPS Unit 2 LRA and the guidelines provided in the SRP-LR, the GALL Report, and ISG-3, the project team finds that increases in porosity and permeability, loss of material (spalling, scaling), and cracking due to aggressive chemical attack are not significant for concrete in MPS Unit 2 containment inaccessible areas. The applicant uses MPS AMP B2.1.23, “Structures Monitoring Program,” to test the groundwater on a periodic basis, considering seasonal variations, to ensure the aging mechanism of aggressive chemical attack does not become significant in the future and also to examine below-grade concrete when it is exposed by excavation. The project team reviewed the structures monitoring program and its evaluation is documented in Section 7.1.20 of this report. The project team

finds that the structures monitoring program is an appropriate program for examination of below-grade concrete when it becomes accessible.

(4) Reaction with aggregates

SRP-LR Section 3.5.2.2.1.1 does not address reaction with aggregates as an aging mechanism for concrete containments because no further evaluation is recommended in the GALL Report. However, ISG-3 clarifies the staff position that further evaluation is appropriate if investigations, tests, or examinations have demonstrated that the aggregates are reactive.

In the MPS Unit 2 LRA, the applicant states that MPS Unit 2 concrete structures are designed in accordance with specification ACI 318-63 and meet the requirements of guideline ACI 201.2R-77. The ACI standard specifies the testing of aggregates at the time of construction.

On the basis of interviews with the applicant's technical staff, the project team confirmed that the results of those tests show that the aggregates used for the Unit 2 concrete containment at MPS are not reactive. The project team finds that this aging effect does not require management at MPS. However, the applicant states, in the MPS Unit 2 LRA, that it will manage change of material properties as a potential aging effect on concrete structures. In the MPS Unit 2 LRA, the applicant states that change of material properties for the Unit 2 containment due to alkali (cement)-aggregate reaction of concrete in an air environment is managed by MPS AMP B2.1.16, "Inservice Inspection Program: Containment Inspections," and MPS AMP B2.1.23 "Structures Monitoring Program." The project team reviewed these programs and its evaluation is documented in Sections 7.1.15 and 7.1.20 of this report, respectively.

(5) Corrosion of embedded steel

SRP-LR Section 3.5.2.2.1.1 states that loss of material due to corrosion of embedded steel could occur in inaccessible areas of PWR concrete and steel containments. The GALL Report (updated in ISG-3) recommends further evaluation of plant-specific programs to manage the aging effects for inaccessible areas if specific criteria defined in the GALL Report cannot be satisfied.

For cracking, loss of bond, and loss of material (spalling, scaling) due to corrosion of embedded steel, the GALL Report states that a plant-specific program is only required if the below-grade environment is aggressive. ISG-3 also states that a plant-specific program is required to examine representative samples of below-grade concrete when excavated for any reason.

In the MPS Unit 2 LRA, the applicant states that the below-grade environment is not aggressive (pH greater than 5.5, chlorides less than 500 ppm, and sulfates less than 1,500 ppm). The project team noted that the applicant credits the structures monitoring program for the examination of below-grade concrete when it is exposed by excavation. In addition, the applicant committed, in its structures monitoring program, to periodically monitor below-grade chemistry to ensure that the groundwater is not sufficiently aggressive to cause the below-grade concrete to degrade.

On the basis of interviews with the applicant's technical staff, the project team determined that the environment at the time of construction was not aggressive and on the basis of subsequent testing it has remained within the limits identified in the GALL Report. The project team finds that in accordance with the criteria of the GALL Report this aging effect is not significant and is adequately managed.

The project team reviewed the results of the applicant's AMR for inaccessible concrete areas. On the basis of its audit and review, the project team finds that the applicant appropriately evaluated AMR results involving management of aging of inaccessible concrete areas for the containment, as recommended in the GALL Report and ISG-3. Since the applicant's AMR results are otherwise consistent with the GALL Report, the project team finds that the applicant has demonstrated that the effects of aging will be adequately managed so that the intended functions will be maintained consistent with the CLB for the period of extended operation, as required by 10 CFR 54.21(a)(3).

7.2.5.2.1.2 Cracking, Distortion, and Increase in Component Stress Level Due to Settlement; Reduction of Foundation Strength Due to Erosion of Porous Concrete Subfoundations, if Not Covered by Structures Monitoring Program (MPS Unit 2 LRA Section 3.5.2.2.1.2)

The project team reviewed MPS Unit 2 LRA Section 3.5.2.2.1.2 against the criteria in SRP-LR Section 3.5.2.2.1.2.

In MPS Unit 2 LRA Section 3.5.2.2.1.2, the applicant addresses (1) cracking, distortion, and increase in component stress level due to settlement, and (2) reduction of foundation strength due to erosion of porous concrete subfoundations in the containment.

SRP-LR Section 3.5.2.2.1.2 states that cracking, distortion, and increase in component stress level due to settlement could occur in PWR concrete and steel containments. Also, reduction of foundation strength due to erosion of porous concrete subfoundations could occur in all types of PWR containments. Some plants may rely on a de-watering system to lower the site ground water level. If the plant's CLB credits a de-watering system, the GALL Report recommends verification of the continued functionality of the de-watering system during the period of extended operation. The GALL Report recommends no further evaluation if this activity is included in the scope of the applicant's structures monitoring program.

The applicant states, in the MPS Unit 2 LRA, that aging effects (cracking, distortion, and increase in component stress level) due to settlement, and reduction of foundation strength due to erosion of porous concrete subfoundations are not expected at MPS Unit 2. The applicant also states that MPS Unit 2 structures are founded on bedrock, well-consolidated in-situ material, or compacted fill. No structures utilize porous concrete subfoundations. MPS Unit 2 has no de-watering system.

On the basis of its review, the project team concludes that foundation settlement is not an aging mechanism at MPS Unit 2.

7.2.5.2.1.3 Reduction of Strength and Modulus of Concrete Structures Due to Elevated Temperature (MPS Unit 2 LRA Section 3.5.2.2.1.3)

The project team reviewed MPS Unit 2 LRA Section 3.5.2.2.1.3 against the criteria in SRP-LR Section 3.5.2.2.1.3.

In MPS Unit 2 LRA Section 3.5.2.2.1.3, the applicant addresses reduction of strength and modulus of concrete structures due to elevated temperature in containments.

SRP-LR Section 3.5.2.2.1.3 states that reduction of strength and modulus of elasticity due to elevated temperatures could occur in PWR concrete and steel containments. The GALL Report calls for a plant-specific aging management program and recommends further evaluation if any portion of the concrete containment components exceeds specified temperature limits, i.e., general area temperature 66EC (150EF) and local area temperature 93EC (200EF).

In MPS Unit 2 LRA Section 3.5.2.2.1.3, the applicant states that during normal operation, all areas within the containment building do not experience elevated temperatures greater than 150EF general and greater than 200EF local. Therefore, change in material properties due to elevated temperature is an aging effect not requiring management for the MPS Unit 2 containment concrete.

On the basis of its review, the project team concurs with the applicant and concludes that change in material properties due to elevated temperature is an aging effect not requiring management for the MPS Unit 2 containment concrete.

7.2.5.2.1.4 Loss of Material Due to Corrosion in Inaccessible Areas of Steel Containment Shell or Liner Plate (MPS Unit 2 LRA Section 3.5.2.2.1.4)

The project team reviewed MPS Unit 2 LRA Section 3.5.2.2.1.4 against the criteria in SRP-LR Section 3.5.2.2.1.4.

In MPS Unit 2 LRA Section 3.5.2.2.1.4, the applicant addresses loss of material due to corrosion in inaccessible areas of the steel containment shell or the steel liner plate for the containment.

SRP-LR Section 3.5.2.2.1.4 states that loss of material due to corrosion could occur in inaccessible areas of the steel containment shell or the steel liner plate for all types of PWR containments. The GALL Report recommends further evaluation of plant-specific programs to manage this aging effect for inaccessible areas if the following specific criteria defined in the GALL Report cannot be satisfied: (1) concrete meeting the requirements of ACI 318 or ACI 349 and the guidance of ACI 201.2R was used for the containment concrete in contact with the embedded containment shell or liner; (2) the accessible concrete is monitored to ensure that it is free of penetrating cracks that provide a path for water seepage to the surface of the containment shell or liner; (3) the accessible portion of the moisture barrier, at the junction where the shell or liner becomes embedded, is subject to aging management activities in accordance with ASME Subsection IWE requirements; (4) borated water spills and water ponding on the containment concrete floor are not common and when detected are cleaned up in a timely manner.

In the MPS Unit 2 LRA, the applicant states that the containment concrete in contact with the steel liner plate is designed in accordance with ACI 318-63, and meets the requirements of guideline ACI 201.2R-77. Accessible concrete of the containment structure is monitored for penetrating cracks under MPS AMP B2.1.16, "Inservice Inspection Program: Containment Inspections." In addition, the applicant states, in the MPS Unit 2 LRA, that the accessible portions of the steel liner plate and moisture barrier where the liner becomes embedded are inspected in accordance with MPS AMP B2.1.16, "Inservice Inspection Program: Containment Inspections." Spills (e.g., borated water spill) are cleaned up in a timely manner. The aging effect of loss of material due to corrosion has not been significant for the MPS Unit 2 liner plate. The project team reviewed the inservice inspection program: containment inspections program, with exceptions, and its evaluation is documented in Section 7.1.15 of this report.

On the basis of its review, the project team finds that all of the criteria identified in the GALL Report are satisfied. The project team finds that no additional, plant-specific aging management program is required to manage inaccessible areas of the steel containment liner plate.

On the basis of its audit and review, the project team finds that the applicant appropriately evaluated AMR results involving loss of material due to corrosion in inaccessible areas of the steel containment shell or the steel liner plate, as recommended in the GALL Report. Since the applicant's AMR results are otherwise consistent with the GALL Report, the project team finds that the applicant has demonstrated that the effects of aging will be adequately managed so that the intended functions will be maintained consistent with the CLB for the period of extended operation, as required by 10 CFR 54.21(a)(3).

7.2.5.2.1.5 Loss of Prestress Due to Relaxation, Shrinkage, Creep, and Elevated Temperature (MPS Unit 2 LRA Section 3.5.2.2.1.5)

MPS Unit 2 LRA Section 3.5.2.2.1.5 is reviewed by NRR DE staff and addressed in Section 4 of the SER related to the MPS Units 2 and 3 LRA.

7.2.5.2.1.6 Cumulative Fatigue Damage (MPS Unit 2 LRA Section 3.5.2.2.1.6)

MPS Unit 2 LRA Section 3.5.2.2.1.6 is reviewed by NRR DE staff and addressed in Section 4 of the SER related to the MPS Units 2 and 3 LRA.

7.2.5.2.1.7 Cracking Due to Cyclic Loading and Stress Corrosion Cracking (MPS Unit 2 LRA Section 3.5.2.2.1.7)

The project team reviewed MPS Unit 2 LRA Section 3.5.2.2.1.7 against the criteria in SRP-LR Section 3.5.2.2.1.7.

In MPS Unit 2 LRA Section 3.5.2.2.1.7, the applicant addresses aging mechanisms that can lead to cracking of penetration sleeves and penetration bellows, such as cyclic loads and SCC.

SRP-LR Section 3.5.2.2.1.7 states that cracking of containment penetrations (including penetration sleeves, penetration bellows, and dissimilar metal welds) due to cyclic loading or SCC could occur in containments. Further evaluation of inspection methods is recommended

to detect cracking due to cyclic loading and SCC, since visual VT-3 examinations may be unable to detect this aging effect.

In MPS Unit 2 LRA Section 3.5.2.2.1.7, the applicant states that SCC is applicable to carbon and low-alloy steel in air only if the fabrication material is high yield-strength steel. SCC of stainless steel in air is only applicable to sensitized stainless steel that is exposed to intermittent wetting. MPS Unit 2 containment penetrations, including penetration sleeves, bellows, and dissimilar metal welds, are not fabricated from high yield-strength steel and the stainless steel materials are not subject to intermittent wetting. Therefore, cracking due to SCC does not require aging management for the MPS Unit 2 containment.

The project team reviewed and concurs with the applicant that cracking due to SCC is not an applicable aging effect for the MPS Unit 2 containment, and augmented inspection to detect cracking is not necessary.

On the basis of its audit and review, the project team finds that the applicant appropriately evaluated AMR results involving management of cracking due to SCC for containment components, as recommended in the GALL Report. Since the applicant's AMR results are otherwise consistent with the GALL Report, the project team finds that the applicant has demonstrated that the effects of aging will be adequately managed so that the intended functions will be maintained consistent with the CLB for the period of extended operation, as required by 10 CFR 54.21(a)(3).

Cracking due to cyclic loading of the liner plate and penetrations is a TLAA which is evaluated by NRR DE staff and addressed in Section 4.6 of the SER related to the MPS Units 2 and 3 LRA.

7.2.5.2.2 Class 1 Structures (MPS Unit 2 LRA Section 3.5.2.2.2)

The project team reviewed MPS Unit 2 LRA Section 3.5.2.2.2 against the criteria in SRP-LR Section 3.5.2.2.2, which addresses several areas discussed below.

7.2.5.2.2.1 Aging of Structures Not Covered by Structures Monitoring Program (MPS Unit 2 LRA Section 3.5.2.2.2.1)

The project team reviewed MPS Unit 2 LRA Section 3.5.2.2.2.1 against the criteria in SRP-LR Section 3.5.2.2.2.1.

In MPS Unit 2 LRA Section 3.5.2.2.2.1, the applicant addresses aging of Class 1 structures not covered by the structures monitoring program.

SRP-LR Section 3.5.2.2.2.1 states that the GALL Report recommends further evaluation of certain structure/aging effect combinations if they are not covered by the structures monitoring program. This is described in GALL Report Chapter III and includes (1) scaling, cracking, and spalling due to repeated freeze-thaw for Groups 1-3, 5, 7-9 structures; (2) scaling, cracking, spalling and increase in porosity and permeability due to leaching of calcium hydroxide and aggressive chemical attack for Groups 1-5, 7-9 structures; (3) expansion and cracking due to reaction with aggregates for Groups 1-5, 7-9 structures; (4) cracking, spalling, loss of bond, and loss of material due to corrosion of embedded steel for Groups 1-5, 7-9 structures; (5) cracks,

distortion, and increase in component stress level due to settlement for Groups 1-3, 5, 7-9 structures; (6) reduction of foundation strength due to erosion of porous concrete subfoundations for Groups 1-3, 5-9 structures; (7) loss of material due to corrosion of structural steel components for Groups 1-5, 7-8 structures; (8) loss of strength and modulus of concrete structures due to elevated temperatures for Groups 1-5 structures; and (9) crack initiation and growth due to SCC and loss of material due to crevice corrosion of stainless steel liner for Groups 7 and 8 structures. Further evaluation is necessary only for structure/aging effect combinations not covered by the structures monitoring program.

Technical details of the aging management issue are presented in SRP-LR Subsection 3.5.2.2.1.2 for structure/aging effect combinations Items (5) and (6) and SRP-LR Subsection 3.5.2.2.1.3 for Item (8), above.

In MPS Unit 2 LRA Table 3.5.1, Item 3.5.1- 20 (page 3-432), the applicant credits MPS AMP B2.1.23, "Structures Monitoring Program," for all types of aging effects and all component groups, except Group 6, of accessible interior and exterior concrete and steel components of Class 1 structures. The project team reviewed the structures monitoring program and its evaluation is documented Section 7.1.20 of this report. Additional discussion of specific structure/aging effect combinations follows.

(1) Freeze-thaw

SRP-LR Section 3.5.2.2.2.1 addresses freeze-thaw as an aging mechanism for Class 1 structures. ISG-3 clarifies the staff position that further evaluation is appropriate if the applicant's facility is subject to moderate to severe weather conditions unless the concrete meets certain specifications and subsequent inspections have confirmed that the aging mechanism has not caused degradation of the concrete.

MPS is located in a region considered to be subject to severe weather conditions. In the MPS Unit 2 LRA, the applicant states that MPS Unit 2 structures are designed in accordance with specification ACI 318-63, which results in low permeability and resistance to aggressive chemical solutions by requiring the following:

high cement content
low water-to-cement ratio
proper curing
adequate air entrainment

In addition to ACI 318-63, the applicant states that MPS Unit 2 concrete also meets the guideline of ACI 201.2R-77. ACI 318-63 and ACI 201.2R-77 use the same ASTM standards for selection, application, and testing of concrete.

The project team interviewed members of the applicant's technical staff and reviewed relevant operating experience to confirm that loss of material from freeze-thaw has not been observed through MPS AMP B2.1.23, " Structures Monitoring Program." The project team reviewed the structures monitoring program and its evaluation is documented in Section 7.1.20 of this report.

On the basis that concrete that satisfies the requirements of ACI 318-63 will meet the requirements of ISG-3, and on the basis of an audit of operating experience evaluated under

the structures monitoring program, the project team finds that loss of material and cracking due to freeze-thaw will be adequately managed by the structures monitoring program.

(2)(a) Leaching of calcium hydroxide

SRP-LR Section 3.5.2.2.2.1 states that cracking, spalling, and increases in porosity and permeability due to leaching of calcium hydroxide could occur in Class 1 structures. The GALL Report requires a plant-specific AMP for inaccessible areas, unless the requirements of ACI 201.2R-77 for Class 1 structural concrete are met.

The GALL Report states that leaching of calcium hydroxide becomes significant only if the concrete is exposed to flowing water. Even if reinforced concrete is exposed to flowing water, such leaching is not significant if the concrete is constructed to ensure that it is dense, well-cured, has low permeability, and that cracking is well controlled.

In the MPS Unit 2 LRA, the applicant states that MPS Unit 2 concrete structures are designed in accordance with specification ACI 318-63 and meet the requirements of guideline ACI 201.2R-77.

The project team reviewed the structures monitoring program and its evaluation is documented in Section 7.1.20 of this report. The project team finds that because ACI 318-63 provides assurance that the criteria of the GALL Report and ISG-3 are met, leaching of calcium hydroxide is not significant at MPS Unit 2, and therefore concludes that the structures monitoring program will be sufficient for management of increases in porosity and permeability from this aging mechanism. A plant-specific aging management program is not required to address this aging effect.

(2)(b) Aggressive chemical attack

SRP-LR Section 3.5.2.2.2.1 states that cracking, spalling, and increases in porosity and permeability due to aggressive chemical attack could occur in inaccessible areas of Class 1 structures. The GALL Report recommends further evaluation of plant-specific programs to manage the aging effects for inaccessible areas if specific criteria defined in the GALL Report and updated in ISG-3 cannot be satisfied.

The GALL Report, as updated by ISG-3, states that aggressive chemical attack is not significant unless pH is less than 5.5, chlorides are greater than 500 ppm, or sulfates are greater than 1,500 ppm. ISG-3 also states that a plant-specific program is required to examine representative samples of below-grade concrete when excavated for any reason.

In the MPS Unit 2 LRA, the applicant states that the below-grade environment is not aggressive (pH is greater than 5.5, chlorides are less than 500 ppm, and sulfates are less than 1,500 ppm). In addition, the project team noted that the applicant uses the structures monitoring program for the examination of below-grade concrete when it is exposed by excavation. The project team reviewed the structures monitoring program and its evaluation is documented in Section 7.1.20 of this report.

On the basis of its review of the information provided in the MPS Unit 2 LRA and the guidelines provided in the SRP-LR, the GALL Report, and ISG-3, the project team finds that increases in

porosity and permeability, loss of material (spalling, scaling), and cracking due to aggressive chemical attack are not significant for concrete in inaccessible areas. The project team finds that an appropriate aging management program for examination of below-grade concrete (specifically, an enhancement to the structures monitoring program) has been identified.

(3) Reaction with aggregates

SRP-LR Section 3.5.2.2.2.1 addresses reaction with aggregates as an aging mechanism for Class 1 structures. ISG-3 clarifies the staff position that further evaluation is appropriate if investigations, tests, or examinations have demonstrated that the aggregates are reactive.

In the MPS Unit 2 LRA, the applicant states that MPS Unit 2 concrete structures are designed in accordance with specification ACI 318-63 and meet the requirements of guideline ACI 201.2R-77. The ACI standard specifies testing of aggregates at the time of construction.

On the basis of interviews with the applicant's technical staff, the project team confirmed that the results of those tests showed that the aggregates used for concrete Class 1 structures at MPS Unit 2 are not reactive. However, the applicant states that it will manage cracking as a potential aging effect on concrete structures. In the MPS Unit 2 LRA, the applicant states that change of material properties and cracking due to alkali (cement)-aggregate reaction of concrete in various environments is managed by MPS AMP B2.1.23, "Structures Monitoring Program." The project team reviewed the structures monitoring program and its evaluation is documented in Section 7.1.20 of this report.

(4) Corrosion of embedded steel

SRP-LR Section 3.5.2.2.2.1 states that cracking, spalling, loss of bond, and loss of material due to corrosion of embedded steel could occur in inaccessible areas of Class 1 structures. The GALL Report (updated in ISG-3) recommends further evaluation of plant-specific programs to manage the aging effects for inaccessible areas if specific criteria defined in the GALL Report cannot be satisfied.

Also, for cracking, loss of bond, and loss of material (spalling, scaling) due to corrosion of embedded steel, the GALL Report states that a plant-specific program is only required if the below-grade environment is aggressive. ISG-3 also states that a plant-specific program is required to examine representative samples of below-grade concrete when excavated for any reason.

In the MPS Unit 2 LRA, the applicant states that the below-grade environment is not aggressive because the environment at the time of construction had a measured pH greater than 5.5, chlorides less than 500 ppm, and sulfates less than 1,500 ppm, and subsequent testing has shown the environment has remained within these limits.

The project team finds that, in accordance with the criteria of the GALL Report, these aging effects are not significant and are adequately managed by MPS AMP B2.1.23 "Structures Monitoring Program." The project team reviewed the structures monitoring program and its evaluation is documented in Section 7.1.20 of this report. The project team also finds an enhancement to the structures monitoring program for examination of below-grade concrete to be acceptable.

(5) Settlement

SRP-LR Section 3.5.2.2.2.1 refers to Section 3.5.2.2.1.2 for the discussion of settlement. SRP-LR Section 3.5.2.2.1.2 states that cracking, distortion, and increase in component stress level due to settlement could occur in Class 1 structures. Some plants may rely on a de-watering system to lower the site groundwater level. If the plant's CLB credits a de-watering system, the GALL Report recommends verification of the continued functionality of the de-watering system during the period of extended operation. The GALL Report recommends no further evaluation if this activity is included in the scope of the applicant's structures monitoring program.

The applicant states, in the MPS Unit 2 LRA, that aging effects (cracking, distortion, and increase in component stress level) due to settlement, and reduction of foundation strength due to erosion of porous concrete subfoundations are not expected at MPS Unit 2. The applicant states that MPS Unit 2 structures are founded on bedrock, well-consolidated in-situ material, or compacted fill. No structures utilize porous concrete subfoundations. MPS Unit 2 has no de-watering system.

On the basis of its review, the project team concludes that foundation settlement is not an aging mechanism at MPS Unit 2.

On the basis of its audit and review, the project team finds that the applicant appropriately evaluated AMR results involving management of settlement, as recommended in the GALL Report. Since the applicant’s AMR results are otherwise consistent with the GALL Report, the project team finds that the applicant has demonstrated that the effects of aging will be adequately managed so that the intended functions will be maintained consistent with the CLB for the period of extended operation, as required by 10 CFR 54.21(a)(3).

(6) Erosion of porous concrete subfoundation

SRP-LR Section 3.5.2.2.2.1 refers to Section 3.5.2.2.1.2 for the discussion of erosion of porous concrete subfoundation. SRP-LR Section 3.5.2.2.1.2 states that reduction of foundation strength due to erosion of porous concrete subfoundations could occur in all types of Class 1 structures. Some plants may rely on a de-watering system to lower the site groundwater level. If the plant's CLB credits a de-watering system, the GALL Report recommends verification of the continued functionality of the de-watering system during the period of extended operation. The GALL Report recommends no further evaluation if this activity is included in the scope of the applicant's structures monitoring program.

The applicant states, in the MPS Unit 2 LRA, that aging effects (cracking, distortion, and increase in component stress level) due to settlement, and reduction of foundation strength due to erosion of porous concrete subfoundations are not expected at MPS Unit 2. MPS Unit 2 structures are founded on bedrock, well-consolidated in-situ material, or compacted fill. No structures utilize porous concrete subfoundations. MPS Unit 2 has no de-watering system.

On the basis of its review, the project team concludes that erosion of porous concrete subfoundation is not an aging mechanism at MPS Unit 2.

On the basis of its audit and review, the project team finds that the applicant appropriately evaluated AMR results involving management of erosion of porous concrete subfoundation, as recommended in the GALL Report. Since the applicant's AMR results are otherwise consistent with the GALL Report, the project team finds that the applicant has demonstrated that the effects of aging will be adequately managed so that the intended functions will be maintained consistent with the CLB for the period of extended operation, as required by 10 CFR 54.21(a)(3).

(7) Corrosion of structural steel components

SRP-LR Section 3.5.2.2.2.1 states that corrosion of structural steel components could occur and that further evaluation is necessary only for structure/aging effect combinations not covered by the structures monitoring program.

In MPS Unit 2 LRA Section 3.5.2.2.2.1, the applicant states that the aging effects associated with structures are managed by MPS AMP B2.1.23, "Structures Monitoring Program." However, aging effects for infrequently accessed portions of the structures are managed by MPS AMP B2.1.15, "Infrequently Accessed Areas Inspection Program."

The project team reviewed the AMR results involving management of aging effects resulting from corrosion of structural steel components and confirmed that MPS AMP B2.1.23, "Structures Monitoring Program," and MPS AMP B2.1.15, "Infrequently Accessed Areas Inspection Program," address each of the affected structures and components. The project team reviewed these programs and its evaluation is documented in Sections 7.1.20 and 7.1.14 of this report, respectively.

On the basis of this audit and review, the project team finds that the applicant has appropriately evaluated AMR results involving this aging effect and that corrosion of structural steel components is adequately managed by the structures monitoring program and infrequently accessed areas inspection program.

(8) Elevated temperatures

SRP-LR Section 3.5.2.2.2.1 refers to Section 3.5.2.2.1.3 for the discussion of elevated temperatures. SRP-LR Section 3.5.2.2.1.3 states that reduction of strength and modulus of elasticity due to elevated temperatures could occur in Class 1 structures in Groups 1-5. The GALL Report calls for a plant-specific AMP and recommends further evaluation if any portion of the concrete components exceeds specified temperature limits, i.e., general area temperature 66°C (150°F) and local area temperature 93°C (200°F).

In MPS Unit 2 LRA Section 3.5.2.2.1.3, the applicant states that during normal operation, all general concrete areas in Class 1 structures remain below 150°F and local area temperatures remain below 200°F. Therefore, change in material properties due to elevated temperature is an aging effect not requiring management for MPS Unit 2 Class 1 structures.

On the basis of its review, the project team concurs with the applicant and finds that change in material properties due to elevated temperature is an aging effect not requiring management for the MPS Unit 2 Class 1 structures.

(9) Aging effects for stainless steel liners for tanks

SRP-LR Section 3.5.2.2.2.1 states that crack initiation and growth due to SCC and loss of material due to crevice corrosion of stainless steel liners for Group 7 and 8 structures could occur and further evaluation is necessary only for structure/aging combinations not covered by the structures monitoring program.

The applicant states, in the MPS Unit 2 LRA, that no tanks with stainless steel liners are included in the structural AMRs. Tanks subject to an AMR are evaluated with their respective mechanical systems.

On the basis of its review, the project team concurs that no tanks with stainless steel liners are included in the structural AMRs.

7.2.5.2.2.2 Aging Management of Inaccessible Areas (MPS Unit 2 LRA Section 3.5.2.2.2.2)

The project team reviewed MPS Unit 2 LRA Section 3.5.2.2.2.2 against the criteria in SRP-LR Section 3.5.2.2.2.2.

In MPS Unit 2 LRA Section 3.5.2.2.2.2, the applicant addresses aging of inaccessible areas of Class 1 structures.

SRP-LR Section 3.5.2.2.2.2 states that cracking, spalling, and increases in porosity and permeability due to aggressive chemical attack, and cracking, spalling, loss of bond, and loss of material due to corrosion of embedded steel could occur in below-grade inaccessible concrete areas. The GALL Report recommends further evaluation to manage these aging effects in inaccessible areas of Groups 1-3, 5, 7-9 structures, if an aggressive below-grade environment exists. ISG-3 identifies additional requirements.

The GALL Report, as updated by ISG-3, states that aggressive chemical attack and corrosion of embedded steel is not significant unless pH is less than 5.5, chlorides are greater than 500 ppm, or sulfates are greater than 1,500 ppm. ISG-3 also states that a plant- specific program is required to examine representative samples of below-grade concrete when excavated for any reason.

In MPS Unit 2 LRA Section 3.5.2.2.2.2, the applicant states that the below-grade environment is not aggressive (pH is greater than 5.5, chlorides are less than 500 ppm, and sulfates are less than 1,500 ppm). The applicant, states in the MPS Unit 2 LRA that it credits the enhanced MPS AMP B2.1.23, “Structures Monitoring Program,” to examine below-grade concrete when it is exposed by excavation. The project team reviewed the structures monitoring program and its evaluation is documented in Section 7.1.20 of this report. The project team finds that the structures monitoring program, as enhanced, is an appropriate program for examination of below-grade concrete when it becomes accessible.

The applicant states, in the MPS Unit 2 LRA, that inspections of accessible concrete have not revealed degradation from aggressive chemical attack or corrosion of embedded steel.

On the basis that the below-grade environment is not aggressive, the applicant performs periodic groundwater monitoring considering seasonal variations, and excavated concrete has

been and will continue to be monitored, the project team finds that increases in porosity and permeability, loss of material (spalling, scaling). and cracking due to aggressive chemical attack, and cracking, spalling, loss of bond, and loss of material due to corrosion of embedded steel are adequately managed for concrete in inaccessible areas.

On the basis of its audit and review, the project team finds that the applicant appropriately evaluated AMR results involving management of inaccessible areas, as recommended in the GALL Report. Since the applicant's AMR results are otherwise consistent with the GALL Report, the project team finds that the applicant has demonstrated that the effects of aging will be adequately managed so that the intended functions will be maintained consistent with the CLB for the period of extended operation, as required by 10 CFR 54.21(a)(3).

7.2.5.2.3 Component Supports (MPS Unit 2 LRA Section 3.5.2.2.3)

The project team reviewed MPS Unit 2 LRA Section 3.5.2.2.3 against the criteria in SRP-LR Section 3.5.2.2.3, which addresses several areas discussed below.

7.2.5.2.3.1 Aging of Supports Not Covered by Structures Monitoring Program (MPS Unit 2 LRA Section 3.5.2.2.3.1)

The project team reviewed MPS Unit 2 LRA Section 3.5.2.2.3.1 against the criteria in SRP-LR Section 3.5.2.2.3.1.

In MPS Unit 2 LRA Section 3.5.2.2.3.1, the applicant addresses aging of component supports that are not managed by the structures monitoring program.

SRP-LR Section 3.5.2.2.3.1 states that the GALL Report recommends further evaluation of certain component support/aging effect combinations if they are not covered by the structures monitoring program. This includes (1) reduction in concrete anchor capacity due to degradation of the surrounding concrete for Groups B1-B5 supports; (2) loss of material due to environmental corrosion for Groups B2-B5 supports; and (3) reduction/loss of isolation function due to degradation of vibration isolation elements for Group B4 supports. Further evaluation is necessary only for structure/aging effect combinations not covered by the structures monitoring program.

The applicant, in the MPS Unit 2 LRA, has included the GALL Report AMP under the applicant's more general MPS AMP B2.1.23, "Structures Monitoring Program." However, this program is not consistent with the GALL Report since the component groups are not completely within the scope of the applicant's structures monitoring program, thus requiring further evaluation. The applicant states in MPS Unit 2 LRA Section 3.5.2.2.3.1 that the structures monitoring program only manages aging effects associated with large equipment supports. The applicant also states that MPS AMP B2.1.13, "General Condition Monitoring," is used to manage aging effects for supports for other components and piping, and MPS AMP B2.1.1, "Battery Rack Inspections," is used to manage age-related degradation specific to battery supports. The aging effects for supports in infrequently accessed areas are managed by MPS AMP B2.1.15, "Infrequently Accessed Areas Inspection Program." The project team reviewed these programs and its evaluation is documented in Sections 7.1.12, 7.1.1, and 7.1.14 of this report, respectively. The project team finds the structures monitoring program

acceptable, in conjunction with the other three programs, for managing aging of component supports for all GALL Report component support groups.

On the basis of its audit and review, the project team finds that the applicant appropriately evaluated AMR results involving management of aging of components supports, as recommended in the GALL Report. Since the applicant's AMR results are otherwise consistent with the GALL Report, the project team finds that the applicant has demonstrated that the effects of aging will be adequately managed so that the intended functions will be maintained consistent with the CLB for the period of extended operation, as required by 10 CFR 54.21(a)(3).

7.2.5.2.3.2 Cumulative Fatigue Damage Due to Cyclic Loading (MPS Unit 2 LRA Section 3.5.2.2.3.2)

MPS Unit 2 LRA Section 3.5.2.2.3.2 is reviewed by NRR DE staff and addressed in Section 4 of the SER related to the MPS Units 2 and 3 LRA.

7.2.5.2.4 Quality Assurance for Aging Management of Non-Safety-Related Components (MPS Unit 2 LRA Section 3.5.2.2.4)

MPS Unit 2 LRA Section 3.5.2.2.4 is reviewed by NRR DIPM staff and addressed in Section 3 of the SER related to the MPS Units 2 and 3 LRA.

7.2.5.3 Aging Management Review Results That Are Not Consistent with the GALL Report or Are Not Addressed in the GALL Report

In MPS Unit 2 LRA Tables 3.5.2-1 through 3.5.2-27, the project team reviewed additional details of the results of the AMRs for material, environment, aging effect requiring management, and AMP combinations that are not consistent with the GALL Report or are not addressed in the GALL Report.

7.2.5.3.1 Unit 2 Containment - Aging Management Evaluation (MPS Unit 2 LRA Table 3.5.2-1)

The project team reviewed Table 3.5.2-1 of the MPS Unit 2 LRA, which summarizes the results of AMR evaluations for the Unit 2 containment system component groups. The project team interviewed the applicant's technical staff and reviewed MPS Unit 2 Technical Report, MP-LR-3601, "Containment," Revision 2.

In the MPS Unit 2 LRA, the applicant identified no aging effects for stainless steel components exposed to air, including fuel transfer tube gate valve, containment sump screen, neutron shield tank, reactor cavity seal ring, refueling cavity liner, pipe, valve bodies, fuel transfer tube, expansion bellows, and fuel transfer tube penetration component types. Air is not identified in the GALL Report as an environment for these components and material.

On the basis of its review of current industry research and operating experience, the project team finds that air on metal will not result in aging that will be of concern during the period of extended operation. The external environments being referred to are typical of ambient air, e.g., under a shelter, indoor, or air-conditioned enclosure or room. Without the presence of an

aggressive environment, stainless steel components will experience insignificant amounts of corrosion, and no aging effects are applicable to this component/commodity group. Therefore, the project team finds that there are no aging effects requiring management for metal in an air environment.

The applicant states, in the MPS Unit 2 LRA, that change of material properties due to alkali (cement)-aggregate reaction of concrete is possible in an air environment. The applicant states that, based on tests conducted on the aggregate and the low-alkali cement used at MPS Unit 2, alkali (cement)-aggregate reaction is not a significant concern. However, the applicant states that it will manage change of material properties as a potential aging effect on concrete structures.

The applicant states, in the MPS Unit 2 LRA, that change of material properties for equipment pads/grout, jet impingement barriers, and structural reinforced concrete (beams, columns, floor slabs, foundation mat slabs, pedestals, and walls) due to alkali (cement)-aggregate reaction of concrete in an air environment is managed by MPS AMP B2.1.23, "Structures Monitoring Program." The project team reviewed the structures monitoring program and its evaluation is documented in Section 7.1.20 of this report. The project team also reviewed this program with respect to the SRP-LR. On the basis of its review, the project team finds this program acceptable for managing the aging effects, for the above components, of change in material properties due to alkali (cement)-aggregate reaction of concrete in an air environment.

The applicant states, in the MPS Unit 2 LRA, that change of material properties for containment shell (cylindrical wall and dome), and tendon gallery due to alkali (cement)-aggregate reaction of concrete in an air environment is managed by MPS AMP B2.1.16, "Inservice Inspection Program: Containment Inspections," with exceptions. The project team reviewed the inservice inspection program: containment inspections program and its evaluation is documented in Section 7.1.15 of this report. The project team also reviewed this program with respect to the SRP-LR. On the basis of its review, the project team finds this program acceptable for managing the aging effects, for the above components, of change in material properties due to alkali (cement)-aggregate reaction of concrete in an air environment.

7.2.5.3.2 Unit 2 Containment Enclosure Building - Aging Management Evaluation (MPS Unit 2 LRA Table 3.5.2-2)

The project team reviewed Table 3.5.2-2 of the MPS Unit 2 LRA, which summarizes the results of AMR evaluations for the Unit 2 containment enclosure building component groups. The project team interviewed the applicant's technical staff and reviewed MPS Unit 2 Technical Report, MP-LR-3602, "Class 1 Structures," Revision 3.

The applicant states, in the MPS Unit 2 LRA, that change of material properties due to alkali (cement)-aggregate reaction of concrete is possible in an air environment. The applicant states that based on tests conducted on the aggregate and the low-alkali cement used at MPS Unit 2, alkali (cement)-aggregate reaction is not a significant concern. However, the applicant states that it will manage change of material properties as a potential aging effect on concrete structures.

The applicant states, in the MPS Unit 2 LRA, that change of material properties for flood/spill barriers including curbs, dike, toe plates and stop logs, and structural reinforced concrete

(caisson, floor slabs, grade beams, slabs on grade, and walls), due to alkali (cement)-aggregate reaction of concrete in an air environment is managed by MPS AMP B2.1.23, "Structures Monitoring Program." The project team reviewed the structures monitoring program and its evaluation is documented in Section 7.1.20 of this report. The project team also reviewed this program with respect to the SRP-LR. On the basis of its review, the project team finds this program acceptable for managing the aging effects, for the above components, of change in material properties due to alkali (cement)-aggregate reaction of concrete in an air environment.

The applicant states, in the MPS Unit 2 LRA, that change of material properties due to alkali (cement)-aggregate reaction and leaching of calcium hydroxide of concrete is possible in an atmosphere/weather environment. The applicant also states that based on tests conducted on the aggregate and the low-alkali cement used at MPS Unit 2, alkali (cement)-aggregate reaction is not a significant concern. The applicant states that the use of high-density, low-permeability concrete, and proper arrangement and distribution of reinforcement to control cracking, prevents the leaching of calcium hydroxide from Class 1 structures' concrete to be of concern. Therefore, the applicant states that it will manage change of material properties as a potential aging effect on concrete structures.

In the MPS Unit 2 LRA, the applicant states that change of material properties for structural reinforced concrete (caisson, floor slabs, grade beams, slabs on grade, and walls) due to alkali (cement)-aggregate reaction and leaching of calcium hydroxide of concrete in an atmosphere/weather environment is managed by MPS AMP B2.1.23, "Structures Monitoring Program." The project team reviewed the structures monitoring program and its evaluation is documented in Section 7.1.20 of this report. The project team also reviewed this program with respect to the SRP-LR. On the basis of its review, the project team finds this program acceptable for managing the aging effects, for the above components, of change in material properties due to alkali (cement)-aggregate reaction and leaching of calcium hydroxide of concrete in an atmosphere/weather environment.

7.2.5.3.3 Unit 2 Auxiliary Building - Aging Management Evaluation (MPS Unit 2 LRA Table 3.5.2-3)

The project team reviewed Table 3.5.2-3 of the MPS Unit 2 LRA, which summarizes the results of AMR evaluations for the Unit 2 auxiliary building component groups. The project team interviewed the applicant's technical staff and reviewed MPS Unit 2 Technical Report, MP-LR-3602, "Class 1 Structures," Revision 3.

In the MPS Unit 2 LRA, the applicant identified no aging effects for stainless steel components exposed to air, including miscellaneous steel (embedded steel exposed surfaces, shapes, plates, unistrut, etc.), ladders, platforms, grating, and stairs component types. Air is not identified in the GALL Report as an environment for these components and material.

On the basis of its review of current industry research and operating experience, the project team finds that air on metal will not result in aging that will be of concern during the period of extended operation. The external environments being referred to are typical of ambient air, e.g., under a shelter, indoor, or air-conditioned enclosure or room. Without the presence of an aggressive environment, stainless steel components will experience insignificant amounts of corrosion, and no aging effects are applicable to this component/commodity group. Therefore,

the project team finds that there are no aging effects requiring management for metal in an air environment.

In the MPS Unit 2 LRA, the applicant identified no aging effects for carbon steel components exposed to air, including metal smoke barrier and control room ceiling support component types. Air is not identified in the GALL Report as an environment for these components and materials.

On the basis of its review of current industry research and operating experience, the project team finds that air on metal will not result in aging that will be of concern during the period of extended operation. The external environments being referred to are typical of ambient air, e.g., under a shelter, indoor, or air-conditioned enclosure or room. Significant corrosion of carbon steel requires an electrolytic environment, and a simultaneous presence of oxygen and moisture. Without the presence of the aggressive environment, carbon steel components will experience insignificant amounts of corrosion, and no aging effects are applicable to this component/commodity group. Therefore, the project team finds that there are no aging effects requiring management for metal in an air environment.

In the MPS Unit 2 LRA, the applicant identified no aging effects for aluminum components exposed to air, including the control room ceiling panel component type. The GALL Report does not include this material for these components.

The applicant states in MPS Unit 2 Technical Report, MP-LR-3602, that for aluminum in an air or an atmosphere/weather environment, there are no potential aging mechanisms for this aluminum and environment combination. The applicant states in the MAER that for aluminum material in an air or atmosphere/weather environment, there are no potential aging mechanisms for this material and environment combination at MPS Unit 2. This conclusion is based on engineering text references that indicate that aluminum and its alloys resist attack to a wide range of environments and many chemical compounds. On the basis of its review of the applicant's documentation, the project team concurs with the applicant and finds that there are no aging effects requiring management for aluminum in an air environment.

In the MPS Unit 2 LRA, the applicant states that change of material properties due to alkali (cement)-aggregate reaction of concrete is possible in an air environment. The applicant states that based on tests conducted on the aggregate and the low-alkali cement used at MPS, alkali (cement)-aggregate reaction is not a significant concern. However, the applicant states that it will manage change of material properties as a potential aging effect on concrete structures.

In the MPS Unit 2 LRA, the applicant states that change of material properties for flood/spill barriers, including curbs, dikes, toe plates and stop logs, structural reinforced concrete (beams, columns, floor slabs, foundation mat slabs, roof slabs, slabs on grade, and walls), and tunnels component types due to alkali (cement)-aggregate reaction of concrete in an air environment is managed by MPS AMP B2.1.23, "Structures Monitoring Program." The project team reviewed the structures monitoring program and its evaluation is documented in Section 7.1.20 of this report. The project team also reviewed this program with respect to the SRP-LR. On the basis of its review, the project team finds this program acceptable for managing the aging effects, for the above components, of change in material properties due to alkali (cement)-aggregate reaction of concrete in an air environment.

In the MPS Unit 2 LRA, the applicant states that change of material properties due to alkali (cement)-aggregate reaction and leaching of calcium hydroxide of concrete is possible in an atmosphere/weather environment. The applicant states that based on tests conducted on the aggregate and the low-alkali cement used at MPS, alkali (cement)-aggregate reaction is not a concern. The applicant states that the use of high-density, low-permeability concrete, and proper arrangement and distribution of reinforcement to control cracking, prevents the leaching of calcium hydroxide from Class 1 structures' concrete from being of concern. Therefore, the applicant states that it will manage change of material properties as a potential aging effect on concrete structures.

In the MPS Unit 2 LRA, the applicant states that change of material properties for structural reinforced concrete (beams, columns, floor slabs, foundation mat slabs, roof slabs, slabs on grade, and walls) component types due to alkali (cement)-aggregate reaction and leaching of calcium hydroxide of concrete in an atmosphere/weather environment is managed by MPS AMP B2.1.23, "Structures Monitoring Program." The project team reviewed the structures monitoring program and its evaluation is documented in Section 7.1.20 of this report. The project team also reviewed this program with respect to the SRP-LR. On the basis of its review, the project team finds this program acceptable for managing the aging effects, for the above components, of change in material properties due to alkali (cement)-aggregate reaction and leaching of calcium hydroxide of concrete in an atmosphere/weather environment.

In the MPS Unit 2 LRA, the applicant states that loss of material for stainless steel spent fuel storage racks exposed to treated water is managed using MPS AMP B2.1.5, "Chemistry Control for Primary Systems Program." The project team reviewed the chemistry control for primary systems program and its evaluation is documented in Section 7.1.4 of this report. The project team finds that this program is consistent with GALL AMP XI.M2, "Water Chemistry," with an acceptable exception. Since this program is consistent with the GALL Report recommendation for other components with the same material, environment, and aging effect, the project team finds this to be acceptable.

7.2.5.3.4 Unit 2 Warehouse Building - Aging Management Evaluation (MPS Unit 2 LRA Table 3.5.2-4)

The project team reviewed Table 3.5.2-4 of the MPS Unit 2 LRA, which summarizes the results of AMR evaluations for the Unit 2 warehouse building system component groups. The project team interviewed the applicant's technical staff and reviewed MPS Unit 2 Technical Report, MP-LR-3602, "Class 1 Structures," Revision 3.

In the MPS Unit 2 LRA, the applicant states that change of material properties due to alkali (cement)-aggregate reaction of concrete is possible in an air environment. The applicant states that based on tests conducted on the aggregate and the low-alkali cement used at MPS Unit 2, alkali (cement)-aggregate reaction is not a significant concern. However, the applicant states that it will manage change of material properties as a potential aging effect on concrete structures.

In the MPS Unit 2 LRA, the applicant states that change of material properties for flood/spill barriers, including curbs, dikes, toe plates and stop logs, structural reinforced concrete (floor slabs, foundation mat slabs, roof slabs, and walls), and tunnels component types in an air environment is managed by MPS AMP B2.1.23, "Structures Monitoring Program." The project

team reviewed the structures monitoring program and its evaluation is documented in Section 7.1.20 of this report. The project team also reviewed this program with respect to the SRP-LR. On the basis of its review, the project team finds this program acceptable for managing the aging effects, for the above components, of change in material properties due to alkali (cement)-aggregate reaction of concrete in an air environment.

In the MPS Unit 2 LRA, the applicant states that change of material properties due to alkali (cement)-aggregate reaction and leaching of calcium hydroxide of concrete is possible in an atmosphere/weather environment. The applicant states that based on tests conducted on the aggregate and the low-alkali cement used at MPS Unit 2, alkali (cement)-aggregate reaction is not a concern. The applicant states that the use of high-density, low-permeability concrete, and proper arrangement and distribution of reinforcement to control cracking, prevents the leaching of calcium hydroxide from Class 1 structures' concrete to be of concern. Therefore, the applicant states that it will manage change of material properties as a potential aging effect on concrete structures.

In the MPS Unit 2 LRA, the applicant states that change of material properties for structural reinforced concrete (floor slabs, foundation mat slabs, roof slabs, and walls) component types due to alkali (cement)-aggregate reaction and leaching of calcium hydroxide of concrete in an atmosphere/weather environment is managed by MPS AMP B2.1.23, "Structures Monitoring Program." The project team reviewed the structures monitoring program and its evaluation is documented in Section 7.1.20 of this report. The project team also reviewed this program with respect to the SRP-LR. On the basis of its review, the project team finds this program acceptable for managing the aging effects, for the above components, of change in material properties due to alkali (cement)-aggregate reaction and leaching of calcium hydroxide of concrete in an atmosphere/weather environment.

In the MPS Unit 2 LRA, the applicant identified no aging effects for stainless steel components exposed to air, including cask wash pit liner and new fuel rack assembly component types. Air is not identified in the GALL Report as an environment for these components and materials.

On the basis of its review of current industry research and operating experience, the project team finds that air on metal will not result in aging that will be of concern during the period of extended operation. The external environments being referred to are typical of ambient air, e.g., under a shelter, indoor, or air-conditioned enclosure or room. Without the presence of an aggressive environment, stainless steel components will experience insignificant amounts of corrosion, and no aging effects are applicable to this component/commodity group. Therefore, the project team finds that there are no aging effects requiring management for metal in an air environment.

7.2.5.3.5 <u>Unit 2 Turbine Building - Aging Management Evaluation (MPS Unit 2 LRA Table 3.5.2-5)</u>

The project team reviewed Table 3.5.2-5 of the MPS Unit 2 LRA, which summarizes the results of AMR evaluations for the Unit 2 turbine building system component groups. The project team interviewed the applicant's technical staff and reviewed MPS Unit 2 Technical Report, MP-LR-3602, "Class 1 Structures," Revision 3.

In the MPS Unit 2 LRA, the applicant states that change of material properties due to alkali (cement)-aggregate reaction of concrete is possible in an air environment. The applicant states that based on tests conducted on the aggregate and the low-alkali cement used at MPS, alkali (cement)-aggregate reaction is not a significant concern. However, the applicant states that it will manage change of material properties as a potential aging effect on concrete structures.

In the MPS Unit 2 LRA, the applicant states that change of material properties for flood/spill barriers, including curbs, dikes, toe plates and stop logs, structural reinforced concrete (floor slabs, footing and grade beams, pedestals, roof slabs, slabs on grade, spread footing, and turbine pedestal walls), and hatches component types in an air environment is managed by MPS AMP B2.1.23, "Structures Monitoring Program." The project team reviewed the structures monitoring program and its evaluation is documented in Section 7.1.20 of this report. The project team also reviewed this program with respect to the SRP-LR. On the basis of its review, the project team finds this program acceptable for managing the aging effects, for the above components, of change in material properties due to alkali (cement)-aggregate reaction of concrete in an air environment.

In the MPS Unit 2 LRA, the applicant states that change of material properties due to alkali (cement)-aggregate reaction and leaching of calcium hydroxide of concrete is possible in an atmosphere/weather environment. The applicant states that based on tests conducted on the aggregate and the low-alkali cement used at MPS, alkali (cement)-aggregate reaction is not a concern. The applicant states that the use of high-density, low-permeability concrete, and proper arrangement and distribution of reinforcements to control cracking, prevents the leaching of calcium hydroxide from Class 1 structures' concrete from being of concern. Therefore, the applicant states that it will manage change of material properties as a potential aging effect on concrete structures.

In the MPS Unit 2 LRA, the applicant states that change of material properties for structural reinforced concrete (floor slabs, footing and grade beams, pedestals, roof slabs, slabs on grade, spread footing, and turbine pedestal walls) component types due to alkali (cement)-aggregate reaction and leaching of calcium hydroxide of concrete in an atmosphere/weather environment is managed by MPS AMP B2.1.23, "Structures Monitoring Program." The project team reviewed the structures monitoring program and its evaluation is documented in Section 7.1.20 of this report. The project team also reviewed this program with respect to the SRP-LR. On the basis of its review, the project team finds this program acceptable for managing the aging effects, for the above components, of change in material properties due to alkali (cement)-aggregate reaction and leaching of calcium hydroxide of concrete in an atmosphere/weather environment.

7.2.5.3.6 Unit 1 Turbine Building - Aging Management Evaluation (MPS Unit 2 LRA Table 3.5.2-6)

The project team reviewed Table 3.5.2-6 of the MPS Unit 2 LRA, which summarizes the results of AMR evaluations for the Unit 1 turbine building system component groups. The project team interviewed the applicant's technical staff and reviewed MPS Unit 2 Technical Report, MP-LR-3602, "Class 1 Structures," Revision 3.

In the MPS Unit 2 LRA, the applicant states that change of material properties due to alkali (cement)-aggregate reaction of concrete is possible in an air environment. The applicant states

that based on tests conducted on the aggregate and the low-alkali cement used at MPS Unit 2, alkali (cement)-aggregate reaction is not a significant concern. However, the applicant states that it will manage change of material properties as a potential aging effect on concrete structures.

In the MPS Unit 2 LRA, the applicant states that change of material properties for structural reinforced concrete (floor slabs, foundation mat slabs, and walls) component types in an air environment is managed by MPS AMP B2.1.23, "Structures Monitoring Program." The project team reviewed the structures monitoring program and its evaluation is documented in Section 7.1.20 of this report. The project team also reviewed this program with respect to the SRP-LR. On the basis of its review, the project team finds this program acceptable for managing the aging effects, for the above components, of change in material properties due to alkali (cement)-aggregate reaction of concrete in an air environment.

In the MPS Unit 2 LRA, the applicant states that change of material properties due to alkali (cement)-aggregate reaction and leaching of calcium hydroxide of concrete is possible in an atmosphere/weather environment. The applicant states that based on tests conducted on the aggregate and the low-alkali cement used at MPS, alkali (cement)-aggregate reaction is not a concern. The applicant states that the use of high-density, low-permeability concrete, and proper arrangement and distribution of reinforcements to control cracking, prevents the leaching of calcium hydroxide from Class 1 structures' concrete from being of concern. Therefore, the applicant states that it will manage change of material properties as a potential aging effect on concrete structures.

In the MPS Unit 2 LRA, the applicant states that change of material properties for structural reinforced concrete (floor slabs, foundation mat slabs, and walls) component types due to alkali (cement)-aggregate reaction and leaching of calcium hydroxide of concrete in an atmosphere/weather environment is managed by MPS AMP B2.1.23, "Structures Monitoring Program." The project team reviewed the structures monitoring program and its evaluation is documented in Section 7.1.20 of this report. The project team also reviewed this program with respect to the SRP-LR. On the basis of its review, the project team finds this program acceptable for managing the aging effects, for the above components, of change in material properties due to alkali (cement)-aggregate reaction and leaching of calcium hydroxide of concrete in an atmosphere/weather environment.

In the MPS Unit 2 LRA, the applicant identified no aging effects for carbon steel H-piles components exposed to soil. The applicant states, in MPS Unit 2 Technical Report, MP-LR-3602, for carbon steel in a soil environment, that there are no potential aging mechanisms for this carbon steel and environment combination. The applicant states that test data indicate that undisturbed soils are deficient in oxygen at levels a few feet below the ground surface or below the water table. Carbon steel piles driven into undisturbed soils are not appreciably affected by corrosion, regardless of the soil type or the soil properties. The effects of corrosion are negligible for well-compacted soil because it does not contain sufficient oxygen. Therefore, the applicant finds that the loss of material due to corrosion is not a potential aging mechanism.

On the basis of its review of the applicant's documentation, the project team concurs with the applicant and finds that loss of material due to corrosion is not a potential aging effect. Therefore, the project team finds that, for carbon steel in a soil environment, there is negligible aging mechanism for this carbon steel and environment combination.

7.2.5.3.7 Unit 1 Control Room and Radwaste Treatment Building - Aging Management Evaluation (MPS Unit 2 LRA Table 3.5.2-7)

The project team reviewed Table 3.5.2-7 of the MPS Unit 2 LRA, which summarizes the results of AMR evaluations for the Unit 1 control room and radwaste treatment building system component groups. The project team interviewed the applicant's technical staff and reviewed MPS Unit 2 Technical Report, MP-LR-3602, "Class 1 Structures," Revision 3.

In the MPS Unit 2 LRA, the applicant states that change of material properties due to alkali (cement)-aggregate reaction of concrete is possible in an environment. The applicant states that based on tests conducted on the aggregate and the low-alkali cement used at MPS, alkali (cement)-aggregate reaction is not a significant concern. However, the applicant states that it will manage change of material properties as a potential aging effect on concrete structures.

In the MPS Unit 2 LRA, the applicant states that change of material properties for structural reinforced concrete (floor slabs, foundation mat slabs, roof slabs, and walls) component types in an air environment is managed by MPS AMP B2.1.23, "Structures Monitoring Program." The project team reviewed the structures monitoring program and its evaluation is documented in Section 7.1.20 of this report. The project team also reviewed this program with respect to the SRP-LR. On the basis of its review, the project team finds this program acceptable for managing the aging effects, for the above components, of change in material properties due to alkali (cement)-aggregate reaction of concrete in an air environment.

In the MPS Unit 2 LRA, the applicant states that change of material properties due to alkali (cement)-aggregate reaction and leaching of calcium hydroxide of concrete is possible in an atmosphere/weather environment. The applicant states that based on tests conducted on the aggregate and the low-alkali cement used at MPS, alkali (cement)-aggregate reaction is not a concern. The applicant states that the use of high-density, low-permeability concrete, and proper arrangement and distribution of reinforcements to control cracking, prevents the leaching of calcium hydroxide from Class 1 structures' concrete from being of concern. Therefore, the applicant states that it will manage change of material properties as a potential aging effect on concrete structures.

In the MPS Unit 2 LRA, the applicant states that change of material properties for structural reinforced concrete (floor slabs, foundation mat slabs, roof slabs, and walls) component types due to alkali (cement)-aggregate reaction and leaching of calcium hydroxide of concrete in an atmosphere/weather environment is managed by MPS AMP B2.1.23, "Structures Monitoring Program." The project team reviewed the structures monitoring program and its evaluation is documented in Section 7.1.20 of this report. The project team also reviewed this program with respect to the SRP-LR. On the basis of its review, the project team finds this program acceptable for managing the aging effects, for the above components, of change in material properties due to alkali (cement)-aggregate reaction and leaching of calcium hydroxide of concrete in an atmosphere/weather environment.

7.2.5.3.8 Unit 2 Fire Pump House - Aging Management Evaluation (MPS Unit 2 LRA Table 3.5.2-8)

The project team reviewed Table 3.5.2-8 of the MPS Unit 2 LRA, which summarizes the results of AMR evaluations for the Unit 2 fire pump house system component groups. The project

team interviewed the applicant's technical staff and reviewed MPS Unit 2 Technical Report, MP-LR-3604, "Miscellaneous Structures," Revision 3.

In the MPS Unit 2 LRA, the applicant states that cracking for concrete (masonry block walls) component types exposed to an atmosphere/weather environment is managed using MPS AMP B2.1.23, "Structures Monitoring Program." The applicant also states that cracking of masonry block walls due to long-term creep and variation in stiffness, dry shrinkage of concrete, and expansion or contraction, is possible in an atmosphere/weather environment. Masonry block walls are subject to all of these aging mechanisms which require aging management.

The project team reviewed the structures monitoring program and its evaluation is documented in Section 7.1.20 of this report. The project team also reviewed this program with respect to the SRP-LR. On the basis of its review, the project team finds this program acceptable for managing the aging effects, for the above components, of concrete cracking due to long-term creep and variation in stiffness, dry shrinkage of concrete, and expansion or contraction in this environment.

In the MPS Unit 2 LRA, the applicant states that change of material properties due to alkali (cement)-aggregate reaction of concrete is possible in an air environment. The applicant states that based on tests conducted on the aggregate and the low-alkali cement used at MPS, alkali (cement)-aggregate reaction is not a significant concern. However, the applicant states that it will manage change of material properties as a potential aging effect on concrete structures.

In the MPS Unit 2 LRA, the applicant states that change of material properties for structural reinforced concrete (foundation mat slabs and roof slabs) component types in an air environment is managed by MPS AMP B2.1.23, "Structures Monitoring Program." The project team reviewed the structures monitoring program and its evaluation is documented in Section 7.1.20 of this report. The project team also reviewed this program with respect to the SRP-LR. On the basis of its review, the project team finds this program acceptable for managing the aging effects, for the above components, of change in material properties due to alkali (cement)-aggregate reaction of concrete in an air environment.

7.2.5.3.9 <u>Unit 3 Fire Pump House - Aging Management Evaluation (MPS Unit 2 LRA Table 3.5.2-9)</u>

The project team reviewed Table 3.5.2-9 of the MPS Unit 2 LRA, which summarizes the results of AMR evaluations for the Unit 3 fire pump house system component groups. The project team interviewed the applicant's technical staff and reviewed MPS Unit 2 Technical Report, MP-LR-3604, "Miscellaneous Structures," Revision 3.

In the MPS Unit 2 LRA, the applicant states that cracking for concrete (masonry block walls) component types exposed to an atmosphere/weather environment is managed using MPS AMP B2.1.23, "Structures Monitoring Program." The applicant states that cracking of masonry block walls due to long-term creep and variation in stiffness, dry shrinkage of concrete, and expansion or contraction, is possible in an atmosphere/weather environment. Masonry block walls are subject to all of these aging mechanisms which require aging management.

The project team reviewed the structures monitoring program and its evaluation is documented in Section 7.1.20 of this report. The project team also reviewed this program with respect to the SRP-LR. On the basis of its review, the project team finds this program acceptable for managing the aging effects, for the above components, of concrete cracking due to long-term creep and variation in stiffness, dry shrinkage of concrete, and expansion or contraction in this environment.

In the MPS Unit 2 LRA, the applicant states that change of material properties due to alkali (cement)-aggregate reaction of concrete is possible in an air environment. The applicant states that based on tests conducted on the aggregate and the low-alkali cement used at MPS, alkali (cement)-aggregate reaction is not a significant concern. However, the applicant states that it will manage change of material properties as a potential aging effect on concrete structures.

In the MPS Unit 2 LRA, the applicant states that change of material properties for structural reinforced concrete (foundation mat slabs, and roof slabs) component types in an air environment is managed by MPS AMP B2.1.23, "Structures Monitoring Program." The project team reviewed the structures monitoring program and its evaluation is documented in Section 7.1.20 of this report. The project team also reviewed this program with respect to the SRP-LR. On the basis of its review, the project team finds this program acceptable for managing the aging effects, for the above components, of change in material properties due to alkali (cement)-aggregate reaction of concrete in an air environment.

7.2.5.3.10 <u>SBO Diesel Generator Enclosure & Fuel Oil Tank Vault - Aging Management Evaluation (MPS Unit 2 LRA Table 3.5.2-10)</u>

The project team reviewed Table 3.5.2-10 of the MPS Unit 2 LRA, which summarizes the results of AMR evaluations for the SBO diesel generator enclosure and fuel oil tank vault system component groups. The project team interviewed the applicant's technical staff and reviewed MPS Unit 2 Technical Report, MP-LR-3604, "Miscellaneous Structures," Revision 3.

In the MPS Unit 2 LRA, the applicant identified no aging effects for aluminum components exposed to air, including roofing and siding component types. The GALL Report does not include this material for these components.

The applicant states in Unit 2 Technical Report, MP-LR-3604, for aluminum in an air or an atmosphere/weather environment, that there are no potential aging mechanisms for this aluminum and environment combination. The applicant states in its MAER that for aluminum material in an air or atmosphere/weather environment, there are no potential aging mechanisms for this material and environment combination at MPS Unit 2. This conclusion is based on engineering text references that indicate that aluminum and its alloys resist attack to a wide range of environments and many chemical compounds. On the basis of its review of the applicant's documentation, the project team concurs with the applicant and finds that there are no aging effects requiring management for aluminum in an air environment.

In the MPS Unit 2 LRA, the applicant identified no aging effects for aluminum components exposed to an atmosphere/weather environment, including roofing and siding component types. The GALL Report does not include this material for these components.

The applicant states in Unit 2 Technical Report, MP-LR-3604, for aluminum in an air or an atmosphere/weather environment, that there are no potential aging mechanisms for this aluminum and environment combination. The applicant states in its MAER that for aluminum material in an air or atmosphere/weather environment, there are no potential aging mechanisms for this material and environment combination at MPS Unit 2. This conclusion is based on engineering text references that indicate that aluminum and its alloys resist attack to a wide range of environments and many chemical compounds. On the basis of its review of the applicant's documentation, the project team concurs with the applicant and finds that there are no aging effects requiring management for aluminum in an atmosphere/weather environment.

In the MPS Unit 2 LRA, the applicant states that change of material properties due to alkali (cement)-aggregate reaction of concrete is possible in an air environment. The applicant states that based on tests conducted on the aggregate and the low-alkali cement used at MPS, alkali (cement)-aggregate reaction is not a significant concern. However, the applicant states that it will manage change of material properties as a potential aging effect on concrete structures.

In the MPS Unit 2 LRA, the applicant states that change of material properties for structural reinforced concrete (foundation mat slabs) component types in an air environment is managed by MPS AMP B2.1.23, "Structures Monitoring Program." The project team reviewed the structures monitoring program and its evaluation is documented in Section 7.1.20 of this report. The project team also reviewed this program with respect to the SRP-LR. On the basis of its review, the project team finds this program acceptable for managing the aging effects, for the above components, of change in material properties due to alkali (cement)-aggregate reaction of concrete in an air environment.

In the MPS Unit 2 LRA, the applicant states that change of material properties due to alkali (cement)-aggregate reaction and leaching of calcium hydroxide of concrete is possible in an atmosphere/weather environment. The applicant states that based on tests conducted on the aggregate and the low-alkali cement used at MPS, alkali (cement)-aggregate reaction is not a concern. The applicant states, in the MPS Unit 2 LRA, that the use of high-density, low-permeability concrete, and proper arrangement and distribution of reinforcements to control cracking, prevents the leaching of calcium hydroxide from structural concrete to be of concern. Therefore, the applicant states that it will manage change of material properties as a potential aging effect on concrete structures.

In the MPS Unit 2 LRA, the applicant states that change of material properties for structural reinforced concrete (foundation mat slabs) component types due to alkali (cement)-aggregate reaction and leaching of calcium hydroxide of concrete in an atmosphere/weather environment is managed by MPS AMP B2.1.23, "Structures Monitoring Program." The project team reviewed the structures monitoring program and its evaluation is documented in Section 7.1.20 of this report. The project team also reviewed this program with respect to the SRP-LR. On the basis of its review, the project team finds this program acceptable for managing the aging effects, for the above components, of change in material properties due to alkali (cement)-aggregate reaction and leaching of calcium hydroxide of concrete in an atmosphere/weather environment.

7.2.5.3.11 Unit 2 Condensate Polishing Facility and Warehouse No. 5 - Aging Management Evaluation (MPS Unit 2 LRA Table 3.5.2-11)

The project team reviewed Table 3.5.2-11 of the MPS Unit 2 LRA, which summarizes the results of AMR evaluations for the Unit 2 condensate polishing facility and warehouse no. 5 system component groups. The project team interviewed the applicant's technical staff and reviewed MPS Unit 2 Technical Report, MP-LR-3604, "Miscellaneous Structures," Revision 3.

In the MPS Unit 2 LRA, the applicant states that change of material properties due to alkali (cement)-aggregate reaction of concrete is possible in an air environment. The applicant states that based on tests conducted on the aggregate and the low-alkali cement used at MPS, alkali (cement)-aggregate reaction is not a significant concern. However, the applicant states that it will manage change of material properties as a potential aging effect on concrete structures.

In the MPS Unit 2 LRA, the applicant states that change of material properties for structural reinforced concrete (beams, columns, floor slabs, spread footing, and walls) component types in an air environment is managed by MPS AMP B2.1.23, "Structures Monitoring Program." The project team reviewed the structures monitoring program and its evaluation is documented in Section 7.1.20 of this report. The project team also reviewed this program with respect to the SRP-LR. On the basis of its review, the project team finds this program acceptable for managing the aging effects, for the above components, of change in material properties due to alkali (cement)-aggregate reaction of concrete in an air environment.

In the MPS Unit 2 LRA, the applicant states that change of material properties due to alkali (cement)-aggregate reaction and leaching of calcium hydroxide of concrete is possible in an atmosphere/weather environment. The applicant states that based on tests conducted on the aggregate and the low-alkali cement used at MPS, alkali (cement)-aggregate reaction is not a concern. The applicant states that the use of high-density, low-permeability concrete, and proper arrangement and distribution of reinforcements to control cracking, prevents the leaching of calcium hydroxide from structural concrete from being of concern. Therefore, the applicant states that it will manage change of material properties as a potential aging effect on concrete structures.

In the MPS Unit 2 LRA, the applicant states that change of material properties for structural reinforced concrete (beams, columns, floor slabs, spread footing, and walls) component types due to alkali (cement)-aggregate reaction and leaching of calcium hydroxide of concrete in an atmosphere/weather environment is managed by MPS AMP B2.1.23, "Structures Monitoring Program." The project team reviewed the structures monitoring program and its evaluation is documented in Section 7.1.20 of this report. The project team also reviewed this program with respect to the SRP-LR. On the basis of its review, the project team finds this program acceptable for managing the aging effects, for the above components, of change in material properties due to alkali (cement)-aggregate reaction and leaching of calcium hydroxide of concrete in an atmosphere/weather environment.

7.2.5.3.12 Security Diesel Generator Enclosure - Aging Management Evaluation (MPS Unit 2 LRA Table 3.5.2-12)

The project team reviewed Table 3.5.2-12 of the MPS Unit 2 LRA, which summarizes the results of AMR evaluations for the security diesel generator enclosure system component

groups. The project team interviewed the applicant's technical staff and reviewed MPS Unit 2 Technical Report, MP-LR-3604, "Miscellaneous Structures," Revision 3.

In the MPS Unit 2 LRA, the applicant identified no aging effects for aluminum components exposed to air, including roofing, siding, and structural framing component types. The GALL Report does not include this material for these components.

The applicant states in MPS Technical Report, MP-LR-3604, for aluminum in an air environment, that there are no potential aging mechanisms for this aluminum and environment combination. The applicant states in the MAER that for aluminum material in an air environment there are no potential aging mechanisms for this material and environment combination at MPS Unit 2. This conclusion is based on engineering text references that indicate that aluminum and its alloys resist attack from a wide range of environments and many chemical compounds. On the basis of its review of the applicant's documentation, the project team concurs with the applicant and finds that there are no aging effects requiring management for aluminum in an air environment.

In the MPS Unit 2 LRA, the applicant identified no aging effects for aluminum components exposed to an atmosphere/weather environment, including roofing and siding component types. The GALL Report does not include this material for these components.

The applicant states in MPS Unit 2 Technical Report, MP-LR-3604, for aluminum in an atmosphere/weather environment, that there are no potential aging mechanisms for this aluminum and environment combination. The applicant states in its MAER that for aluminum material in an atmosphere/weather environment there are no potential aging mechanisms for this material and environment combination at MPS Unit 2. This conclusion is based on engineering text references that indicate that aluminum and its alloys resist attack from a wide range of environments and many chemical compounds. On the basis of its review of the applicant's documentation, the project team concurs with the applicant and finds that there are no aging effects requiring management for aluminum in an atmosphere/weather environment.

In the MPS Unit 2 LRA, the applicant states that change of material properties due to alkali (cement)-aggregate reaction and leaching of calcium hydroxide of concrete is possible in an atmosphere/weather environment. The applicant states that based on tests conducted on the aggregate and the low-alkali cement used at MPS, alkali (cement)-aggregate reaction is not a concern. The applicant states that the use of high-density, low-permeability concrete, and proper arrangement and distribution of reinforcements to control cracking, prevents the leaching of calcium hydroxide from structural concrete. However, the NRC staff has expressed concerns regarding aging of concrete. Therefore, the applicant will manage change of material properties as a potential aging effect on concrete structures.

In the MPS Unit 2 LRA, the applicant states that change of material properties for structural reinforced concrete (foundation mat slabs) component types due to alkali (cement)-aggregate reaction and leaching of calcium hydroxide of concrete in an atmosphere/weather environment is managed by MPS AMP B2.1.23, "Structures Monitoring Program." The project team reviewed the structures monitoring program and its evaluation is documented in Section 7.1.20 of this report. The project team also reviewed this program with respect to the SRP-LR. On the basis of its review, the project team finds this program acceptable for managing the aging effects, for the above components, of change in material properties due to alkali (cement)-

aggregate reaction and leaching of calcium hydroxide of concrete in an atmosphere/weather environment.

7.2.5.3.13 Stack Monitoring Equipment Building - Aging Management Evaluation (MPS Unit 2 LRA Table 3.5.2-13)

The project team reviewed Table 3.5.2-13 of the MPS Unit 2 LRA, which summarizes the results of AMR evaluations for the stack monitoring equipment building system component groups. The project team interviewed the applicant's technical staff and reviewed MPS Unit 2 Technical Report, MP-LR-3604, "Miscellaneous Structures," Revision 3.

In the MPS Unit 2 LRA, the applicant states that cracking for concrete (masonry block walls) component types exposed to an atmosphere/weather environment is managed using MPS AMP B2.1.23, "Structures Monitoring Program." The applicant states that cracking of masonry block walls due to long-term creep and variation in stiffness, dry shrinkage of concrete, and expansion or contraction, is possible in an atmosphere/weather environment. Masonry block walls are subject to all of these aging mechanisms which require aging management. The project team reviewed the structures monitoring program and its evaluation is documented in Section 7.1.20 of this report. The project team also reviewed this program with respect to the SRP-LR. On the basis of its review, the project team finds this program acceptable for managing the aging effects, for the above components, of concrete cracking due to long-term creep and variation in stiffness, dry shrinkage of concrete, and expansion or contraction in this environment.

In the MPS Unit 2 LRA, the applicant states that change of material properties due to alkali (cement)-aggregate reaction of concrete is possible in an air environment. The applicant states that based on tests conducted on the aggregate and the low-alkali cement used at MPS, alkali (cement)-aggregate reaction is not a significant concern. However, the applicant states that it will manage change of material properties as a potential aging effect on concrete structures. In the MPS Unit 2 LRA, the applicant states that change of material properties for structural reinforced concrete (roof slabs, slabs on grade, spread footing, and walls) component types in an air environment is managed by MPS AMP B2.1.23, "Structures Monitoring Program." The project team reviewed the structures monitoring program and its evaluation is documented in Section 7.1.20 of this report. The project team also reviewed this program with respect to the SRP-LR. On the basis of its review, the project team finds this program acceptable for managing the aging effects, for the above components, of change in material properties due to alkali (cement)-aggregate reaction of concrete in an air environment.

In the MPS Unit 2 LRA, the applicant states that change of material properties due to alkali (cement)-aggregate reaction and leaching of calcium hydroxide of concrete is possible in an atmosphere/weather environment. The applicant states that based on tests conducted on the aggregate and the low-alkali cement used at MPS, alkali (cement)-aggregate reaction is not a concern. The applicant states that the use of high-density, low-permeability concrete, and proper arrangement and distribution of reinforcements to control cracking, prevents the leaching of calcium hydroxide from structural concrete from being of concern. Therefore, the applicant states that it will manage change of material properties as a potential aging effect on concrete structures.

In the MPS Unit 2 LRA, the applicant states that change of material properties for structural reinforced concrete (roof slabs, slabs on grade, spread footing, and walls) component types due to alkali (cement)-aggregate reaction and leaching of calcium hydroxide of concrete in an atmosphere/weather environment is managed by MPS AMP B2.1.23, "Structures Monitoring Program." The project team reviewed the structures monitoring program and its evaluation is documented in Section 7.1.20 of this report. The project team also reviewed this program with respect to the SRP-LR. On the basis of its review, the project team finds this program acceptable for managing the aging effects, for the above components, of change in material properties due to alkali (cement)-aggregate reaction and leaching of calcium hydroxide of concrete in an atmosphere/weather environment.

7.2.5.3.14 Millstone Stack - Aging Management Evaluation (MPS Unit 2 LRA Table 3.5.2-14)

The project team reviewed Table 3.5.2-14 of the MPS Unit 2 LRA, which summarizes the results of AMR evaluations for the Millstone stack system component groups. The project team interviewed the applicant's technical staff and reviewed MPS Unit 2 Technical Report, MP-LR-3604, "Miscellaneous Structures," Revision 3.

In the MPS Unit 2 LRA, the applicant states that change of material properties due to alkali (cement)-aggregate reaction of concrete is possible in an air environment. The applicant states that based on tests conducted on the aggregate and the low-alkali cement used at MPS, alkali (cement)-aggregate reaction is not a significant concern. However, the applicant states that it will manage change of material properties as a potential aging effect on concrete structures.

In the MPS Unit 2 LRA, the applicant states that change of material properties for structural reinforced concrete (floor slabs, foundation mat slabs, and walls) component types in an air environment is managed by MPS AMP B2.1.23, "Structures Monitoring Program." The project team reviewed the structures monitoring program and its evaluation is documented in Section 7.1.20 of this report. The project team also reviewed this program with respect to the SRP-LR. On the basis of its review, the project team finds this program acceptable for managing the aging effects, for the above components, of change in material properties due to alkali (cement)-aggregate reaction of concrete in an air environment.

In the MPS Unit 2 LRA, the applicant states that change of material properties due to alkali (cement)-aggregate reaction and leaching of calcium hydroxide of concrete is possible in an atmosphere/weather environment. The applicant states that based on tests conducted on the aggregate and the low-alkali cement used at MPS, alkali (cement)-aggregate reaction is not a concern. The applicant states that the use of high-density, low-permeability concrete, and proper arrangement and distribution of reinforcements to control cracking, prevents the leaching of calcium hydroxide from structural concrete to be of concern. Therefore, the applicant states that it will manage change of material properties as a potential aging effect on concrete structures.

In the MPS Unit 2 LRA, the applicant states that change of material properties for structural reinforced concrete (floor slabs, foundation mat slabs, and walls) component types due to alkali (cement)-aggregate reaction and leaching of calcium hydroxide of concrete in an atmosphere/weather environment is managed by MPS AMP B2.1.23, "Structures Monitoring Program." The project team reviewed the structures monitoring program and its evaluation is

documented in Section 7.1.20 of this report. The project team also reviewed this program with respect to the SRP-LR. On the basis of its review, the project team finds this program acceptable for managing the aging effects, for the above components, of change in material properties due to alkali (cement)-aggregate reaction and leaching of calcium hydroxide of concrete in an atmosphere/weather environment.

In the MPS Unit 2 LRA, the applicant states that change of material properties due to alkali (cement)-aggregate reaction of concrete is possible in an air environment. The applicant states that based on tests conducted on the aggregate and the low-alkali cement used at MPS, alkali (cement)-aggregate reaction is not a significant concern. However, the applicant states that it will manage change of material properties as a potential aging effect on concrete structures in infrequently accessed areas.

In the MPS Unit 2 LRA, the applicant states that change of material properties for structural reinforced concrete (floor slabs, foundation mat slabs, and walls) component types in infrequently accessed areas in an air environment is managed by MPS AMR B2.1.15, "Infrequently Accessed Areas Inspection Program," which is a plant-specific program. The project team reviewed the infrequently accessed areas inspection program and its evaluation is documented in Section 7.1.14 of this report. The project team also reviewed this program with respect to the SRP-LR. On the basis of its review, the project team finds this program acceptable for managing the aging effects, for the above components, of change in material properties due to alkali (cement)-aggregate reaction of concrete in an air environment for infrequently accessed areas.

7.2.5.3.15 Switchyard Control House - Aging Management Evaluation (MPS Unit 2 LRA Table 3.5.2-15)

The project team reviewed Table 3.5.2-15 of the MPS Unit 2 LRA, which summarizes the results of AMR evaluations for the switchyard control house system component groups. The project team interviewed the applicant's technical staff and reviewed MPS Unit 2 Technical Report, MP-LR-3604, "Miscellaneous Structures," Revision 3.

In the MPS Unit 2 LRA, the applicant states that cracking of concrete (masonry block walls) component types exposed to an atmosphere/weather environment is managed using MPS AMP B2.1.23, "Structures Monitoring Program." The applicant also states that cracking of masonry block walls due to long-term creep and variation in stiffness, dry shrinkage of concrete, and expansion or contraction, is possible in an atmosphere/weather environment. Masonry block walls are subject to all of these aging mechanisms which require aging management. The project team reviewed the structures monitoring program and its evaluation is documented in Section 7.1.20 of this report. The project team also reviewed this program with respect to the SRP-LR. On the basis of its review, the project team finds this program acceptable for managing the aging effects, for the above components, of concrete cracking due to long-term creep and variation in stiffness, dry shrinkage of concrete, and expansion or contraction in this environment.

In the MPS Unit 2 LRA, the applicant states that change of material properties due to alkali (cement)-aggregate reaction of concrete is possible in an air environment. The applicant states that based on tests conducted on the aggregate and the low-alkali cement used at MPS, alkali

(cement)-aggregate reaction is not a significant concern. However, the applicant states that it will manage change of material properties as a potential aging effect on concrete structures.

In the Unit 2 LRA, the applicant states that change of material properties for structural reinforced concrete component types in an air environment is managed by MPS AMP B2.1.23, "Structures Monitoring Program." The project team reviewed the structures monitoring program and its evaluation is documented in Section 7.1.20 of this report. The project team also reviewed this program with respect to the SRP-LR. On the basis of its review, the project team finds this program acceptable for managing the aging effects, for the above components, of change in material properties due to alkali (cement)-aggregate reaction of concrete in an air environment.

In the MPS Unit 2 LRA, the applicant states that change of material properties due to alkali (cement)-aggregate reaction and leaching of calcium hydroxide of concrete is possible in an atmosphere/weather environment. The applicant states that based on tests conducted on the aggregate and the low-alkali cement used at MPS, alkali (cement)-aggregate reaction is not a concern. The applicant states that the use of high-density, low-permeability concrete, and proper arrangement and distribution of reinforcements to control cracking, prevents the leaching of calcium hydroxide from structural concrete from being of concern. Therefore, the applicant states that it will manage change of material properties as a potential aging effect on concrete structures.

In the MPS Unit 2 LRA, the applicant states that change of material properties for structural reinforced concrete component types due to alkali (cement)-aggregate reaction and leaching of calcium hydroxide of concrete in an atmosphere/weather environment is managed by MPS AMP B2.1.23, "Structures Monitoring Program." The project team reviewed the structures monitoring program and its evaluation is documented in Section 7.1.20 of this report. The project team also reviewed this program with respect to the SRP-LR. On the basis of its review, the project team finds this program acceptable for managing the aging effects, for the above components, of change in material properties due to alkali (cement)-aggregate reaction and leaching of calcium hydroxide of concrete in an atmosphere/weather environment.

7.2.5.3.16 Retaining Wall - Aging Management Evaluation (MPS Unit 2 LRA Table 3.5.2-16)

The project team reviewed Table 3.5.2-16 of the MPS Unit 2 LRA, which summarizes the results of AMR evaluations for the retaining wall system component groups. The project team interviewed the applicant's technical staff and reviewed MPS Unit 2 Technical Report, MP-LR-3604, "Miscellaneous Structures," Revision 3.

In the MPS Unit 2 LRA, the applicant states that change of material properties due to alkali (cement)-aggregate reaction and leaching of calcium hydroxide of concrete is possible in an atmosphere/weather environment. The applicant states that based on tests conducted on the aggregate and the low-alkali cement used at MPS, alkali (cement)-aggregate reaction is not a concern. The applicant states that the use of high-density, low-permeability concrete, and proper arrangement and distribution of reinforcements to control cracking, prevents the leaching of calcium hydroxide from structural concrete from being of concern. Therefore, the applicant states that it will manage change of material properties as a potential aging effect on concrete structures.

In the MPS Unit 2 LRA, the applicant states that change of material properties for structural reinforced concrete (footing and walls) component types due to alkali (cement)-aggregate reaction and leaching of calcium hydroxide of concrete in an atmosphere/weather environment is managed by MPS AMP B2.1.23, "Structures Monitoring Program." The project team reviewed the structures monitoring program and its evaluation is documented in Section 7.1.20 of this report. The project team also reviewed this program with respect to the SRP-LR. On the basis of its review, the project team finds this program acceptable for managing the aging effects, for the above components, of change in material properties due to alkali (cement)-aggregate reaction and leaching of calcium hydroxide of concrete in an atmosphere/weather environment.

7.2.5.3.17 <u>345kV Switchyard - Aging Management Evaluation (MPS Unit 2 LRA Table 3.5.2-17)</u>

The project team reviewed Table 3.5.2-17 of the MPS Unit 2 LRA, which summarizes the results of AMR evaluations for the 345kV switchyard system component groups. The project team interviewed the applicant's technical staff and reviewed MPS Unit 2 Technical Report, MP-LR-3604, "Miscellaneous Structures," Revision 3.

In the MPS Unit 2 LRA, the applicant states that change of material properties due to alkali (cement)-aggregate reaction and leaching of calcium hydroxide of concrete is possible in an atmosphere/weather environment. The applicant states that based on tests conducted on the aggregate and the low-alkali cement used at MPS, alkali (cement)-aggregate reaction is not a concern. The applicant states that the use of high-density, low-permeability concrete, and proper arrangement and distribution of reinforcements to control cracking, prevents the leaching of calcium hydroxide from structural concrete from being of concern. Therefore, the applicant states that it will manage change of material properties as a potential aging effect on concrete structures.

In the MPS Unit 2 LRA, the applicant states that change of material properties for structural reinforced concrete component types due to alkali (cement)-aggregate reaction and leaching of calcium hydroxide of concrete in an atmosphere/weather environment is managed by MPS AMP B2.1.23, "Structures Monitoring Program." The project team reviewed the structures monitoring program and its evaluation is documented in Section 7.1.20 of this report. The project team also reviewed this program with respect to the SRP-LR. On the basis of its review, the project team finds this program acceptable for managing the aging effects, for the above components, of change in material properties due to alkali (cement)-aggregate reaction and leaching of calcium hydroxide of concrete in an atmosphere/weather environment.

7.2.5.3.18 <u>Unit 2 Intake Structure - Aging Management Evaluation (MPS Unit 2 LRA Table 3.5.2-18)</u>

The project team reviewed Table 3.5.2-18 of the MPS Unit 2 LRA, which summarizes the results of AMR evaluations for the Unit 2 intake structure system component groups. The project team interviewed the applicant's technical staff and reviewed MPS Unit 2 Technical Report, MP-LR-3603, "Intake and Discharge Structures," Revision 3.

In the MPS Unit 2 LRA, the applicant states that change of material properties due to alkali (cement)-aggregate reaction of concrete is possible in an air environment. The applicant states

that based on tests conducted on the aggregate and the low-alkali cement used at MPS, alkali (cement)-aggregate reaction is not a significant concern. However, the applicant states that it will manage change of material properties as a potential aging effect on concrete structures.

In the MPS Unit 2 LRA, the applicant states that change of material properties for structural reinforced concrete (beams, columns, floor slabs, foundation mat slabs, roof slabs, and walls) and hatches component types in an air environment is managed by MPS AMP B2.1.23, "Structures Monitoring Program." The project team reviewed the structures monitoring program and its evaluation is documented in Section 7.1.20 of this report. The project team also reviewed this program with respect to the SRP-LR. On the basis of its review, the project team finds this program acceptable for managing the aging effects, for the above components, of change in material properties due to alkali (cement)-aggregate reaction of concrete in an air environment.

In the MPS Unit 2 LRA, the applicant states that change of material properties due to alkali (cement)-aggregate reaction and leaching of calcium hydroxide of concrete is possible in an atmosphere/weather environment. The applicant states that based on tests conducted on the aggregate and the low-alkali cement used at MPS, alkali (cement)-aggregate reaction is not a concern. The applicant states that the use of high-density, low-permeability concrete, and proper arrangement and distribution of reinforcements to control cracking, prevents the leaching of calcium hydroxide from structural concrete from being of concern. Therefore, the applicant states that it will manage change of material properties as a potential aging effect on concrete structures.

In the MPS Unit 2 LRA, the applicant states that change of material properties for structural reinforced concrete (beams, columns, floor slabs, foundation mat slabs, roof slabs, and walls) and hatches component types due to alkali (cement)-aggregate reaction and leaching of calcium hydroxide of concrete in an atmosphere/weather environment is managed by MPS AMP B2.1.23, "Structures Monitoring Program." The project team reviewed the structures monitoring program and its evaluation is documented in Section 7.1.20 of this report. The project team also reviewed this program with respect to the SRP-LR. On the basis of its review, the project team finds this program acceptable for managing the aging effects, for the above components, of change in material properties due to alkali (cement)-aggregate reaction and leaching of calcium hydroxide of concrete in an atmosphere/weather environment.

In the MPS Unit 2 LRA, the applicant states that change of material properties due to alkali (cement)-aggregate reaction of concrete is possible in a sea water environment. The applicant states that based on tests conducted on the aggregate and the low-alkali cement used at MPS, alkali (cement)-aggregate reaction is not a concern. During the audit and review, the project team expressed concerns regarding aging of concrete. The applicant states that it will manage change of material properties as a potential aging effect on concrete structures.

In the MPS Unit 2 LRA, the applicant states that change of material properties for structural reinforced concrete (beams, columns, floor slabs, foundation mat slabs, roof slabs, and walls) component types in a sea water environment is managed by MPS AMP B2.1.23, "Structures Monitoring Program." The project team reviewed the structures monitoring program and its evaluation is documented in Section 7.1.20 of this report. The project team also reviewed this program with respect to the SRP-LR. On the basis of its review, the project team finds this program acceptable for managing the aging effects, for the above components, of change in

material properties due to alkali (cement)-aggregate reaction of concrete in a sea water environment.

7.2.5.3.19 Sea Walls - Aging Management Evaluation (MPS Unit 2 LRA Table 3.5.2-19)

The project team reviewed Table 3.5.2-19 of the MPS Unit 2 LRA, which summarizes the results of AMR evaluations for the sea walls system component groups. The project team interviewed the applicant's technical staff and reviewed MPS Unit 2 Technical Report, MP-LR-3603, "Intake and Discharge Structures," Revision 3.

In the MPS Unit 2 LRA, the applicant states that change of material properties due to alkali (cement)-aggregate reaction and leaching of calcium hydroxide of concrete is possible in an atmosphere/weather environment. The applicant states that based on tests conducted on the aggregate and the low-alkali cement used at MPS, alkali (cement)-aggregate reaction is not a concern. The applicant states that the use of high-density, low-permeability concrete, and proper arrangement and distribution of reinforcements to control cracking, prevents the leaching of calcium hydroxide from structural concrete from being of concern. Therefore, the applicant states that it will manage change of material properties as a potential aging effect on concrete structures.

In the MPS Unit 2 LRA, the applicant states that change of material properties for structural reinforced concrete (footings and walls) component types due to alkali (cement)-aggregate reaction and leaching of calcium hydroxide of concrete in an atmosphere/weather environment is managed by MPS AMP B2.1.23, "Structures Monitoring Program." The project team reviewed the structures monitoring program and its evaluation is documented in Section 7.1.20 of this report. The project team also reviewed this program with respect to the SRP-LR. On the basis of its review, the project team finds this program acceptable for managing the aging effects, for the above components, of change in material properties due to alkali (cement)-aggregate reaction and leaching of calcium hydroxide of concrete in an atmosphere/weather environment.

In the MPS Unit 2 LRA, the applicant states that change of material properties due to alkali (cement)-aggregate reaction of concrete is possible in a sea water environment. The applicant states that based on tests conducted on the aggregate and the low-alkali cement used at MPS, alkali (cement)-aggregate reaction is not a concern. However, the NRC staff has expressed concerns regarding aging of concrete. Therefore, the applicant will manage change of material properties as a potential aging effect on concrete structures.

In the MPS Unit 2 LRA, the applicant states that change of material properties for structural reinforced concrete (footings and walls) component types in a sea water environment is managed by MPS AMP B2.1.23, "Structures Monitoring Program." The project team reviewed the structures monitoring program and its evaluation of this program is documented in Section 7.1.20 of this report. The project team also reviewed this program with respect to the SRP-LR. For these components, the project team finds this program acceptable for managing the aging effects of change in material properties due to alkali (cement)-aggregate reaction of concrete in a sea water environment.

7.2.5.3.20 Unit 2 Discharge Tunnel and Discharge Structure - Aging Management Evaluation (MPS Unit 2 LRA Table 3.5.2-20)

The project team reviewed Table 3.5.2-20 of the MPS Unit 2 LRA, which summarizes the results of AMR evaluations for the Unit 2 discharge tunnel and discharge structure system component groups. The project team interviewed the applicant's technical staff and reviewed MPS Unit 2 Technical Report, MP-LR-3603, "Intake and Discharge Structures," Revision 3.

In the MPS Unit 2 LRA, the applicant states that change of material properties due to alkali (cement)-aggregate reaction and leaching of calcium hydroxide of concrete is possible in an atmosphere/weather environment. The applicant states that based on tests conducted on the aggregate and the low-alkali cement used at MPS, alkali (cement)-aggregate reaction is not a concern. The applicant states that the use of high-density, low-permeability concrete, and proper arrangement and distribution of reinforcements to control cracking, prevents the leaching of calcium hydroxide from structural concrete from being of concern. Therefore, the applicant states that it will manage change of material properties as a potential aging effect on concrete structures.

In the MPS Unit 2 LRA, the applicant states that change of material properties for structural reinforced concrete (floor slabs, roof slabs, and walls) component types due to alkali (cement)-aggregate reaction and leaching of calcium hydroxide of concrete in an atmosphere/weather environment is managed by MPS AMP B2.1.23, "Structures Monitoring Program." The project team reviewed the structures monitoring program and its evaluation is documented in Section 7.1.20 of this report. The project team also reviewed this program with respect to the SRP-LR. On the basis of its review, the project team finds this program acceptable for managing the aging effects, for the above components, of change in material properties due to alkali (cement)-aggregate reaction and leaching of calcium hydroxide of concrete in an atmosphere/weather environment.

In the MPS Unit 2 LRA, the applicant states that change of material properties due to alkali (cement)-aggregate reaction of concrete is possible in a sea water environment. The applicant states that based on tests conducted on the aggregate and the low-alkali cement used at MPS, alkali (cement)-aggregate reaction is not a significant concern. However, the applicant states that it will manage change of material properties as a potential aging effect on concrete structures.

In the MPS Unit 2 LRA, the applicant states that change of material properties for structural reinforced concrete (floor slabs, roof slabs, and walls) component types in a sea water environment is managed by MPS AMP B2.1.23, "Structures Monitoring Program." The project team reviewed the structures monitoring program and its evaluation is documented in Section 7.1.20 of this report. The project team also reviewed this program with respect to the SRP-LR. On the basis of its review, the project team finds this program acceptable for managing the aging effects, for the above components, of change in material properties due to alkali (cement)-aggregate reaction of concrete in a sea water environment.

7.2.5.3.21 Unit 2 Bypass Line - Aging Management Evaluation (MPS Unit 2 LRA Table 3.5.2-21)

The project team reviewed Table 3.5.2-21 of the MPS Unit 2 LRA, which summarizes the results of AMR evaluations for the Unit 2 bypass line system component groups.

The project team's scope of AMR evaluations for MPS Unit 2 LRA Table 3.5.2-21 did not include AMR line items not consistent with the GALL Report.

7.2.5.3.22 Tank Foundations - Aging Management Evaluation (MPS Unit 2 LRA Table 3.5.2-22 and Table 3.5.2-22a)

The project team reviewed Table 3.5.2-22 of the MPS Unit 2 LRA and Table 3.5.2-22a of the MPS LRA supplement letter dated January 11, 2005 (ML050190289), which summarizes the results of AMR evaluations for the tank foundations system component groups. The project team interviewed the applicant's technical staff and reviewed MPS Unit 2 Technical Report, MP-LR-3604, "Miscellaneous Structures," Revision 3.

In the MPS Unit 2 LRA, the applicant states that change of material properties due to alkali (cement)-aggregate reaction and leaching of calcium hydroxide of concrete is possible in an atmosphere/weather environment. The applicant states that based on tests conducted on the aggregate and the low-alkali cement used at MPS, alkali (cement)-aggregate reaction is not a concern. The applicant states that the use of high-density, low-permeability concrete, and proper arrangement and distribution of reinforcements to control cracking, prevents the leaching of calcium hydroxide from structural concrete from being of concern. Therefore, the applicant states that it will manage change of material properties as a potential aging effect on concrete structures.

In the MPS Unit 2 LRA, the applicant states that change of material properties for structural reinforced concrete (foundation mat slabs and walls) of the CST foundation and missile barrier, structural reinforced concrete (footing) of the fire water tanks 1 and 2 foundations, structural reinforced concrete of the diesel fuel oil storage tank foundation, and structural reinforced concrete (foundation mat slabs) of the RWST foundation and SBO diesel fuel oil storage tank foundation component types due to alkali (cement)-aggregate reaction and leaching of calcium hydroxide of concrete in an atmosphere/weather environment is managed by MPS AMP B2.1.23, "Structures Monitoring Program." The project team reviewed the structures monitoring program and its evaluation is documented in Section 7.1.20 of this report. The project team also reviewed this program with respect to the SRP-LR. On the basis of its review, the project team finds this program acceptable for managing the aging effects, for the above components, of change in material properties due to alkali (cement)-aggregate reaction and leaching of calcium hydroxide of concrete in an atmosphere/weather environment.

In the MPS LRA supplement letter dated January 11, 2005 (ML050190289), the applicant stated that change of material properties of concrete for the structural reinforced concrete of the Unit 2 primary water storage tank in an atmosphere/weather environment is managed by MPS AMP B2.1.23, "Structures Monitoring Program." The project team reviewed the structures monitoring program and its evaluation is documented in Section 7.1.20 of this report. The project team also reviewed this program with respect to the SRP-LR. On the basis of its review, the project team finds this program acceptable for managing the aging effect of change in material properties of concrete in an atmosphere/weather environment.

7.2.5.3.23 Yard Structures - Aging Management Evaluation (MPS Unit 2 LRA Table 3.5.2-23)

The project team reviewed Table 3.5.2-23 of the MPS Unit 2 LRA, which summarizes the results of AMR evaluations for the yard structures system component groups. The project team interviewed the applicant's technical staff and reviewed MPS Unit 2 Technical Report, MP-LR-3604, "Miscellaneous Structures," Revision 3.

In the MPS Unit 2 LRA, the applicant identified no aging effects for aluminum components exposed to an atmosphere/weather environment, including the lighting poles component type. The GALL Report does not include this material for these components.

The applicant states in MPS Unit 2 Technical Report, MP-LR-3604, for aluminum in an air or an atmosphere/weather environment, that there are no potential aging mechanisms for this aluminum and environment combination. The applicant states in its MAER that for aluminum material in an air or atmosphere/weather environment there are no potential aging mechanisms for this material and environment combination at MPS Unit 2. This conclusion is based on engineering text references that indicate that aluminum and its alloys resist attack from a wide range of environments and many chemical compounds. On the basis of its review of the applicant's documentation, the project team concurs with the applicant and finds that there are no aging effects requiring management for aluminum in an atmosphere/weather environment.

In the MPS Unit 2 LRA, the applicant states that change of material properties due to alkali (cement)-aggregate reaction of concrete is possible in an air environment. The applicant states that based on tests conducted on the aggregate and the low-alkali cement used at MPS, alkali (cement)-aggregate reaction is not a significant concern. However, the applicant states that it will manage change of material properties as a potential aging effect on concrete structures.

In the MPS Unit 2 LRA, the applicant states that change of material properties for structural reinforced concrete (foundation mat slabs, roof slabs, and walls) of the RWST valve pit, hatches of pipe trenches, and structural reinforced concrete (foundation mat slabs and walls) of pipe trenches component types in an air environment is managed by MPS AMP B2.1.23, "Structures Monitoring Program." The project team reviewed the structures monitoring program and its evaluation is documented in Section 7.1.20 of this report. The project team also reviewed this program with respect to the SRP-LR. On the basis of its review, the project team finds this program acceptable for managing the aging effects, for the above components, of change in material properties due to alkali (cement)-aggregate reaction of concrete in an air environment.

In the MPS Unit 2 LRA, the applicant states that change of material properties due to alkali (cement)-aggregate reaction and leaching of calcium hydroxide of concrete is possible in an atmosphere/weather environment. The applicant states that based on tests conducted on the aggregate and the low-alkali cement used at MPS, alkali (cement)-aggregate reaction is not a concern. The applicant states that the use of high-density, low-permeability concrete, and proper arrangement and distribution of reinforcements to control cracking, prevents the leaching of calcium hydroxide from structural concrete from being of concern. Therefore, the applicant states that it will manage change of material properties as a potential aging effect on concrete structures.

In the MPS Unit 2 LRA, the applicant states that change of material properties for structural reinforced concrete (footings and walls) of transformer firewalls and dikes, structural reinforced concrete of the A700 switchgear enclosure dike, structural reinforced concrete (footing) of the diesel fuel oil storage tank dike, structural reinforced concrete (foundation mat slabs, roof slabs, and walls) of the RWST valve pit, hatches of pipe trenches, and structural reinforced concrete (footing) of security lighting supports component types due to alkali (cement)-aggregate reaction and leaching of calcium hydroxide of concrete in an atmosphere/weather environment is managed by MPS AMP B2.1.23, "Structures Monitoring Program." The project team reviewed the structures monitoring program and its evaluation is documented in Section 7.1.20 of this report. The project team also reviewed this program with respect to the SRP-LR. On the basis of its review, the project team finds this program acceptable for managing the aging effects, for the above components, of change in material properties due to alkali (cement)-aggregate reaction and leaching of calcium hydroxide of concrete in an atmosphere/weather environment.

7.2.5.3.24 <u>NSSS Equipment Supports - Aging Management Evaluation (MPS Unit 2 LRA Table 3.5.2-24)</u>

The project team reviewed Table 3.5.2-24 of the MPS Unit 2 LRA, which summarizes the results of AMR evaluations for the NSSS equipment supports system component groups. The project team interviewed the applicant's technical staff and reviewed MPS Unit 2 Technical Report, MP-LR-3653, "NSSS Equipment Supports," Revision 3.

In the MPS Unit 2 LRA, the applicant states that the GALL Report does not include a borated water leakage environment for the copper alloy steam generator support sliding support assembly component type. The applicant states in MPS Technical Report, MP-LR-3653, for copper alloys in a borated water leakage environment, that boric acid corrosion as an aging mechanism for loss of material. The applicant states that these components do not exceed the temperature threshold of 350° F. Therefore, boric acid corrosion is a potential aging mechanism for copper alloys. On the basis of its review of the applicant's document, the project team concurs with the applicant and finds that boric acid corrosion is a potential aging mechanism for copper alloys.

In the MPS Unit 2 LRA, the applicant states that loss of material for the copper alloy steam generator support sliding support assembly component type in a borated water leakage environment is managed by MPS AMP B2.1.13, "General Condition Monitoring," which is a plant-specific program. The project team reviewed the general condition monitoring program and its evaluation is documented in Section 7.1.12 of this report. The general condition monitoring program manages these aging effects by visual inspections for evidence of degradation or adverse conditions and includes heath physics inspections of radiologically controlled areas, system walkdowns by system engineering, and daily inspections of accessible areas of the plant by plant operators. Evidence of boron precipitation and active radioactive system leaks is identified during area observations made by health physics technicians while performing radiologically controlled area surveys. On the basis of its review, the project team finds the general condition monitoring program acceptable for managing the aging effect of loss of material for copper alloys for this environment.
In the discussion section of LRA Table 3.5.1, Item 3.5.1-33, the applicant stated, for Group B1.1: high strength low-alloy bolts in structures and component support systems, that cracking due to SCC is not an aging effect requiring management for NSSS equipment support bolting.

During the review, the project team noted that SRP-LR Table 3.5-1 recommended GALL AMP XI.M18, "Bolting Integrity," for managing high strength bolting for NSSS components supports for crack initiation and growth due to SCC.

By letter dated January 11, 2005 (ML050190289), the applicant submitted its response. In its response, the applicant states as following:

> For NSSS component supports, bolting material with estimated maximum yield strength that marginally exceeds 150 ksi is used in limited applications. This bolting is located inside the Containment in areas where the environment is typically dry and not subject to high levels of contaminants, such as halogens and sulfur compounds, that result in the potential for SCC. Leakage within the Containment is monitored and strictly controlled during plant operation and is investigated and corrected such that the potential for wetting of NSSS component support bolting is minimal. Based on the marginally susceptible bolting materials and a dry, non-conducive (benign) service environment, cracking due to SCC is not an aging effect requiring management for this bolting.
>
> As identified in Millstone Power Station Unit 2 LRA Table 3.5.2-24 and Millstone Power Station Unit 3 LRA Table 3.5.2-35, loss of material is conservatively considered an aging effect requiring management for NSSS component support bolting and is managed by the Inservice Inspection Program: Systems, Components and Supports AMP (which includes the elements of the ASME Section XI, Subsection IWF requirements as described in LRA Appendix B2.1.18). In addition, loss of material due to the potential for borated water leakage from nearby components is managed by the Boric Acid Corrosion and General Condition Monitoring AMPs.

On the basis of that the boric acid corrosion and general condition monitoring programs ensure a dry, non-conducive (benign) service environment and the bolting material is managed by the Inservice Inspection Program. The staff finds this acceptable.

7.2.5.3.25 General Structural Supports - Aging Management Evaluation (MPS Unit 2 LRA Table 3.5.2-25)

The project team reviewed Table 3.5.2-25 of the MPS Unit 2 LRA, which summarizes the results of AMR evaluations for the general structural supports system component groups. The project team interviewed the applicant's technical staff and reviewed MPS Unit 2 Technical Report, MP-LR-3651, "General Structural Supports," Revision 2.

In the MPS Unit 2 LRA, the applicant identified no aging effects for stainless steel components exposed to air, including structural support components (plate structural shapes, etc.), vendor-supplied specialty items (spring hangers, struts, clamps, vibration isolators, etc.), and sliding support bearing and sliding surfaces component types.

During the audit and review, the project team questioned the applicant as to why the MPS AMP B.2.1.18, "Inservice Inspection Program: Systems, Components and Supports," was not credit to mange loss of mechanical function for the sliding support bearing and sliding surfaces, as describe in the GALL Report. By letter dated January 11, 2005 (ML050190289), the applicant submitted its LRA supplement. In its response, the applicant states that the

inspection requirements for these supports associated with ASME XI IWF that are part of the CLB will carry forward to the period of extended operation.

In the MPS Unit 2 LRA, the applicant identified no aging effects for galvanized steel components exposed to air, including electrical conduit and cable tray component types. Air is not identified in the GALL Report as an environment for these components and materials.

On the basis of its review of current industry research and operating experience, the project team finds that air on metal will not result in aging that will be of concern during the period of extended operation. The external environments being referred to are typical of ambient air, e.g., under a shelter, indoor, or air-conditioned enclosure or room. Significant corrosion of carbon (galvanized steel) steel requires an electrolytic environment, and a simultaneous presence of oxygen and moisture. Without the presence of the aggressive environment, carbon steel components will experience insignificant amounts of corrosion, and no aging effects are applicable to this component/commodity group. Therefore, the project team finds that there are no aging effects requiring management for metal in an air environment.

In the MPS Unit 2 LRA, the applicant identified no aging effects for aluminum components exposed to an atmosphere/weather environment, including electrical conduit and cable tray component types. The GALL Report does not include this material for these components.

The applicant states in MPS Unit 2 Technical Report, MP-LR-3651, for aluminum in an air or an atmosphere/weather environment, that there are no potential aging mechanisms for this aluminum and environment combination. The applicant states in its MAER that for aluminum material in an air or atmosphere/weather environment there are no potential aging mechanisms for this material and environment combination at MPS Unit 2. This conclusion is based on engineering text references that indicate that aluminum and its alloys resist attack from a wide range of environments and many chemical compounds. On the basis of its review of the applicant's documentation, the project team concurs with the applicant and finds that there are no aging effects requiring management for aluminum in an atmosphere/weather environment.

In the MPS Unit 2 LRA, the applicant states that the GALL Report does not include a borated water leakage environment for copper alloy sliding support bearing and sliding surfaces component types. The applicant states in MPS Unit 2 Technical Report, MP-LR-3651, for copper alloys in a borated water leakage environment, that boric acid corrosion as an aging mechanism for loss of material. The applicant states that these components do not exceed the temperature threshold of 350° F. On the basis of its review of the applicant's document, the project team concurs with the applicant and finds that boric acid corrosion is a potential aging mechanism for copper alloys.

In the MPS Unit 2 LRA, the applicant states that loss of material for copper alloy sliding support bearing and sliding surfaces component types in a borated water leakage environment is managed by MPS AMP B2.1.13, "General Condition Monitoring," which is a plant-specific program. The project team reviewed the general condition monitoring program and its evaluation is documented in Section 7.1.12 of this report. The general condition monitoring program manages these aging effects by visual inspections for evidence of degradation or adverse conditions, and includes heath physics inspections of radiologically controlled areas, system walkdowns by system engineering, and daily inspections of accessible areas of the plant by plant operators. Evidence of boron precipitation and active radioactive system leaks is

identified during area observations made by health physics technicians while performing radiologically controlled area surveys. On the basis of its review, the project team finds the general condition monitoring program acceptable for managing the aging effect of loss of material for copper alloys for this environment.

In the MPS Unit 2 LRA, the applicant identified no aging effects for aluminum components exposed to an air environment, including electrical conduit and cable tray component types. The GALL Report does not include this material for these components.

The applicant states in MPS Unit 2 Technical Report, MP-LR-3651, for aluminum in an air or an atmosphere/weather environment, there are no potential aging mechanisms for this material and environment combination. The applicant states in its MAER that for aluminum material in an air or atmosphere/weather environment there are no potential aging mechanisms for this material and environment combination at MPS Unit 2. This conclusion is based on engineering text references that indicate that aluminum and its alloys resist attack from a wide range of environments and many chemical compounds. On the basis of its review of the applicant's documentation, the project team concurs with the applicant and finds that there are no aging effects requiring management for aluminum in an air environment.

7.2.5.3.26 Miscellaneous Structural Commodities - Aging Management Evaluation (MPS Unit 2 LRA Table 3.5.2-26)

The project team reviewed Table 3.5.2-26 of the MPS Unit 2 LRA, which summarizes the results of AMR evaluations for the miscellaneous structural commodities component groups. The project team interviewed the applicant's technical staff and reviewed MPS Unit 2 Technical Report, MP-LR-3654, "Miscellaneous Structural Commodities," Revision 2.

In the MPS Unit 2 LRA, the applicant states that the GALL Report does not include silicone rubber for expansion joint/seismic gap material (between adjacent buildings/structures) component types in an air environment. The applicant states in MPS Unit 2 Technical Report, MP-LR-3654, for silicone rubber in an air environment, that irradiation and thermal exposure are aging mechanisms for change of material properties. The applicant states that expansion joint/seismic gap material may be exposed to ionizing radiation values greater than the threshold radiation of 10E6 rads and temperatures greater than the threshold of 95°F. On the basis of its review of the applicant's document, the project team concurs with the applicant and finds that irradiation and thermal exposure are potential aging mechanisms for silicone rubber.

In the MPS Unit 2 LRA, the applicant states that change of material properties for expansion joint/seismic gap material (between adjacent buildings/structures) component types in an air environment is managed by MPS AMP B2.1.23, "Structures Monitoring Program." The project team reviewed the structures monitoring program and its evaluation is documented in Section 7.1.20 of this report. The project team also reviewed this program with respect to the SRP-LR. The project team finds that structural monitoring activities are intended to assess the overall integrity and condition of structures, components, support systems, and specified architectural details. Qualified personnel perform periodic inspections to identify any changes in the structural condition, such as change in material properties. On the basis of its review, the project team finds this program acceptable for managing the aging effects, for the above

components, of change in material properties due to irradiation and thermal exposure of silicone rubber in an air environment.

In the MPS Unit 2 LRA, the applicant states that the GALL Report does not include silicone rubber for expansion joint/seismic gap material (between adjacent buildings/structures) component types in an air environment. The applicant states in MPS Unit 2 Technical Report, MP-LR-3654, for silicone rubber in an air environment, that irradiation and thermal exposure are aging mechanisms for cracking. The applicant states that expansion joint/seismic gap material may be exposed to ionizing radiation values greater than the threshold radiation of 10E6 rads and temperatures greater than the threshold of 95°F. On the basis of its review of the applicant's document, the project team concurs with the applicant and finds that irradiation and thermal exposure are potential aging mechanisms for silicone rubber.

In the MPS Unit 2 LRA, the applicant states that cracking for expansion joint/seismic gap material (between adjacent buildings/structures) component types in an air environment is managed by MPS AMP B2.1.23, "Structures Monitoring Program." The project team reviewed the structures monitoring program and its evaluation is documented in Section 7.1.20 of this report. The project team also reviewed this program with respect to the SRP-LR. Structural monitoring activities are intended to assess the overall integrity and condition of structures, components, support systems, and specified architectural details. Qualified personnel perform periodic inspections to identify any changes in the structural condition, such as cracking. On the basis of its review, the project team finds this program acceptable for managing the aging effects, for the above components, of cracking due to irradiation and thermal exposure of silicone rubber in an air environment.

In the MPS Unit 2 LRA, the applicant states that the GALL Report does not include Pyrocrete for fire-resistant coatings component types in an air environment. The applicant states, in MPS Unit 2 Technical Report, MP-LR-3654, for Pyrocrete in an air environment , that irradiation is an aging mechanism for change of material properties. The applicant states that fire-resistant coatings material may be exposed to ionizing radiation values greater than the threshold radiation of 10E6 rads. On the basis of its review of the applicant's documentation, the project team concurs with the applicant and finds that irradiation is a potential aging mechanism for Pyrocrete.

In the MPS Unit 2 LRA, the applicant states that change of material properties for fire-resistant coatings in an air environment is managed by MPS AMP B2.1.10, "Fire Protection Program," with an exception. The project team reviewed the fire protection program and its evaluation is documented in Section 7.1.9 of this report. The project team also reviewed this program with respect to the SRP-LR. The project team finds that the fire protection program, with an exception, manages, through periodic inspection and tests, the aging effects on penetration seals, fire barrier walls, ceilings, floors, and all fire-rated doors that perform a fire barrier intended function. Qualified personnel perform periodic inspections to identify any changes in condition, such as change in material properties. On the basis of its review, the project team finds this program acceptable for managing the aging effects, for the above components, of change in material properties due to irradiation of Pyrocrete in an air environment.

In the MPS Unit 2 LRA, the applicant states that the GALL Report does not include Pyrocrete for fire-resistant coating component types in an air environment. The applicant states in MPS Unit 2 Technical Report, MP-LR-3654, for Pyrocrete in an air environment, that differential

movement, shrinkage, and vibration are aging mechanisms for cracking. On the basis of its review of the applicant's documentation, the project team concurs with the applicant and finds that differential movement, shrinkage, and vibration are potential aging mechanisms for Pyrocrete.

In the MPS Unit 2 LRA, the applicant states that cracking for fire-resistant coatings in an air environment is managed by MPS AMP B2.1.10, "Fire Protection Program," with an exception. The project team reviewed the fire protection program and its evaluation is documented in Section 7.1.9 of this report. The project team also reviewed this program with respect to the SRP-LR. The project team finds that the fire protection program, with an exception, manages, through periodic inspection and tests, the aging effects on penetration seals, fire barrier walls, ceilings, floors, and all fire-rated doors that perform a fire barrier intended function. Qualified personnel perform periodic inspections to identify any changes in condition, such as cracking. On the basis of its review, the project team finds this program acceptable for managing the aging effects, for the above components, of cracking due to differential movement, shrinkage, and vibration of Pyrocrete in an air environment.

In the MPS Unit 2 LRA, the applicant states that there are no aging effects for ceramic fire/EQ barrier penetration seals and concludes that no AMPs are required. The applicant states that its AMR conclusion for the material is consistent with the GALL Report, which only calls for aging management of ceramic fire-barrier penetration seals that are exposed to an outdoor environment. On the basis of its review of the applicant's documentation and the fact that the ceramic materials are exposed only to indoor environments, the project team concurs with the applicant and finds that ceramic fire/EQ barrier penetration seals do not require aging management for the period of extended operation.

In the MPS Unit 2 LRA, the applicant identified no aging effects for stainless steel components exposed to air, including fire boot component types. Air is not identified in the GALL Report as an environment for these components and materials.

On the basis of its review of current industry research and operating experience, the project team finds that air on metal will not result in aging that will be of concern during the period of extended operation. The external environments being referred to are typical of ambient air, e.g., under a shelter, indoor, or air-conditioned enclosure or room. Without the presence of an aggressive environment, stainless steel components will experience insignificant amounts of corrosion, and no aging effects are applicable to this component/commodity group. Therefore, the project team concludes that there are no aging effects requiring management for metal in an air environment.

In the MPS Unit 2 LRA, the applicant identified no aging effects for carbon steel components exposed to air, including cable tray cover and assembly; junction, terminal, and pull boxes; panels and pull boxes; panels and cabinets; switchgear enclosures; and electrical component supports within cabinets and panels component types. Air is not identified in the GALL Report as an environment for these components and materials.

On the basis of its review of current industry research and operating experience, the project team finds that air on metal will not result in aging that will be of concern during the period of extended operation. The external environments being referred to are typical of ambient air, e.g., under a shelter, indoor, or air-conditioned enclosure or room. Significant corrosion of

carbon steel requires an electrolytic environment, and a simultaneous presence of oxygen and moisture. Without the presence of the aggressive environment, carbon steel components will experience insignificant amounts of corrosion, and no aging effects are applicable to this component/commodity group. Therefore, the project team finds that there are no aging effects requiring management for metal in an air environment.

In the MPS Unit 2 LRA, the applicant states that the GALL Report does not include marinite radiant energy shields component types in an air environment. The applicant states in MPS Unit 2 Technical Report, MP-LR-3654, for marinite radiant energy shields in an air environment, that irradiation is a potential aging mechanism for change of material properties. The applicant states that marinite radiant energy shields may be exposed to ionizing radiation values greater than the threshold radiation of 10E6 rads. On the basis of its review of the applicant's documentation, the project team concurs with the applicant and finds that irradiation is a potential aging mechanism for marinite radiant energy shields.

In the MPS Unit 2 LRA, the applicant states that change of material properties for marinite radiant energy shields in an air environment is managed by MPS AMP B2.1.10, "Fire Protection Program," with an exception. The project team reviewed the fire protection program and its evaluation is documented in Section 7.1.9 of this report. The project team also reviewed this program with respect to the SRP-LR. The project team finds that the fire protection program, with an exception, manages, through periodic inspection and tests, the aging effects on penetration seals, fire barrier walls, ceilings, floors, and all fire-rated doors that perform a fire barrier intended function. Qualified personnel perform periodic inspections to identify any changes in condition, such as change in material properties. On the basis of its review, the project team finds this program acceptable for managing the aging effects, for the above components, of change in material properties due to irradiation of marinite radiant energy shields in an air environment.

In the MPS Unit 2 LRA, the applicant states that the GALL Report does not include marinite radiant energy shields component types in an air environment. The applicant states in MPS Unit 2 Technical Report MP-LR-3654, for marinite radiant energy shields in an air environment, differential movement, shrinkage, and vibration as aging mechanisms for cracking. The applicant states that marinite radiant energy shields are subject to cracking due to differential movement, shrinkage, and vibration. On the basis of its review of the applicant's documentation, the project team concurs with the applicant and finds that differential movement, shrinkage, and vibration are potential aging mechanisms for marinite radiant energy shields.

In the MPS Unit 2 LRA, the applicant states that cracking for marinite radiant energy shields in an air environment is managed by MPS AMP B2.1.10, "Fire Protection Program," with an exception. The project team reviewed the fire protection program and its evaluation is documented in Section 7.1.9 of this report. The project team also reviewed this program with respect to the SRP-LR. The project team finds that the fire protection program, with an exception, manages, through periodic inspection and tests, the aging effects on penetration seals, fire barrier walls, ceilings, floors, and all fire-rated doors that perform a fire barrier intended function. Qualified personnel perform periodic inspections to identify any changes in condition, such as cracking. On the basis of its review, the project team finds this program acceptable for managing the aging effects, for the above components, of cracking due to

differential movement, shrinkage, and vibration of marinite radiant energy shields in an air environment.

In the MPS Unit 2 LRA, the applicant states that the GALL Report does not include cracking of rubber for flood prevention plugs component types in an air environment. The applicant states in MPS Unit 2 Technical Report, MP-LR-3654, for rubber in an air environment, that thermal exposure is an aging mechanism for cracking. The applicant states that rubber for flood prevention plugs may be exposed to temperatures greater than the threshold of 95°F. On the basis of its review of the applicant's documentation, the project team concurs with the applicant and finds that thermal exposure is a potential aging mechanism for rubber.

In the MPS Unit 2 LRA, the applicant states that cracking for rubber flood prevention plugs in an air environment is managed by MPS AMP B2.1.23, "Structures Monitoring Program." The project team reviewed the structures monitoring program and its evaluation is documented in Section 7.1.20 of this report. The project team also reviewed this program with respect to the SRP-LR. The project team finds that structural monitoring activities are intended to assess the overall integrity and condition of structures, components, support systems, and specified architectural details. Qualified personnel perform periodic inspections to identify any changes in condition, such as cracking. On the basis of its review, the project team finds this program acceptable for managing the aging effects, for the above components, of cracking due to thermal exposure of rubber in an air environment.

The applicant states in MPS Unit 2 Technical Report, MP-LR-3654, that the MAER includes an evaluation of aluminum material in an air or an atmosphere/weather environment, and concludes that there are no potential aging mechanisms for these material /environment combinations. During the audit and review, the project team asked the applicant to explain why the evaluation is not in the MAER and the basis for its conclusions. The applicant stated to the project team that the MAER addresses aluminum material in an air or atmosphere/weather environment, and concludes that there are no potential aging mechanisms for these material/environment combinations at MPS Unit 2. This conclusion is based on engineering test references, "Handbook of Corrosion Data," and "Uhlig's Corrosion Handbook." The "Handbook of Corrosion Data" indicates that aluminum and its alloys resist attack by a wide range of environments and many chemical compounds. Consequently, aluminum is one of the metals most thought of by the public and engineering community when lower temperature corrosion resistance is considered. "Uhlig's Corrosion Handbook" indicates that aluminum-based alloys as a class are highly resistant to normal outdoor exposure conditions. This conclusion in the MAER is also based on staff determinations, as presented in the SERs for other applicants' LRAs for plants that have environments, particularly outdoor environments, similar to MPS. Further, this conclusion is also supported by a review of MPS Unit 2 plant-specific operating experience, which identifies no instances of loss of material for aluminum in an air or atmosphere/weather environment. The applicant stated to the project team that the conclusions in the MPS Unit 2 LRA remain valid and unchanged. However, the applicant initiated DMR #3524 to revise the MAER document. Specifically, MPS Unit 2 Technical Report, MP-LR-3700, was revised to include the cited references in the aluminum/air and aluminum/atmosphere/weather sections. On the basis of its review, the project team finds the applicant's response to be acceptable.

The applicant states in MPS Unit 2 Technical Report, MP-LR-3654, that Attachment 1, information for fire/EQ barrier penetration seals (including ceramic damming material), indicates

N/A for the evaluation group. During the audit and review, the project team asked the applicant to explain how the ceramic damming material was evaluated for aging effects. The applicant stated to the project team that ceramic materials are similar to the glass and porcelain that are described in the MAER as having no aging effects. The AMR basis documents do not properly document this conclusion and the MAER does not specifically address ceramics. The applicant stated that the conclusions in the MPS Unit 2 LRA remain valid and unchanged. However, the applicant has initiated DMR #3496 to revise the MAER, MPS Unit 2 Technical Report, MP-LR-3700, to include ceramic along with glass and porcelain as having no aging effects that require evaluation for any application or environment to which it is exposed. In addition, the applicant initiated DMRs #3497 and #3498 to revise MPS Unit 2 Technical Report, MP-LR-3654, to indicate, in Section 4.0, that the MAER indicates no potential aging effects and no aging management required for ceramics; therefore, the AMR does not evaluate aging mechanisms for the ceramic blanket or ceramic board in an air environment. On the basis of its review, the project team finds the applicant's response to be acceptable.

7.2.5.3.27 Load Handling Cranes and Devices - Aging Management Evaluation (MPS Unit 2 LRA Table 3.5.2-27)

The project team reviewed Table 3.5.2-27 of the MPS Unit 2 LRA, which summarizes the results of AMR evaluations for the load handling cranes and devices component groups. The project team interviewed the applicant's technical staff and reviewed MPS Unit 2 Technical Report, MP-LR-3652, "Load Handling Cranes and Devices," Revision 2.

In the MPS Unit 2 LRA, the applicant identified no aging effects for stainless steel components exposed to air, including fuel transfer machine and tilting mechanism support members (structural frame, tracks, and anchorage) component types. Air is not identified in the GALL Report as an environment for these components and materials.

On the basis of its review of current industry research and operating experience, the project team finds that air on metal will not result in aging that will be of concern during the period of extended operation. The external environments being referred to are typical of ambient air, e.g., under a shelter, indoor, or air-conditioned enclosure or room. Without the presence of an aggressive environment, stainless steel components will experience insignificant amounts of corrosion, and no aging effects are applicable to this component/commodity group. Therefore, the project team concludes that there are no aging effects requiring management for metal in an air environment.

7.2.5.3.28 Unit 2 Condensate Polishing Service Water Strainer House, Unit 2 Hydrogen Cylinder Storage Area, Unit 2 Sodium Hypochlorite Building

In the MPS LRA supplement letter dated December 3, 2004 (ML043450341), the applicant stated that changes of material properties in the structural reinforced concrete in an air or atmosphere/weather is managed by the MPS AMP B2.1.23, "Structures Monitoring Program." The project team reviewed the structures monitoring program and its evaluation is documented in Section 7.1.20 of this report. The project team also reviewed this program with respect to the SRP-LR. The project team finds that structural monitoring activities are intended to assess the overall integrity and condition of structures, components, support systems, and specified architectural details. Qualified personnel perform periodic inspections to identify any changes in condition, such as cracking. On the basis of its review, the project team finds this program

acceptable for managing the aging effects of changes of material properties for the above component.

In the MPS LRA supplement letter dated December 3, 2004 (ML043450341), the applicant also stated that cracking of the concrete masonry block walls in atmosphere/weather environment is is managed by the MPS AMP B2.1.23, "Structures Monitoring Program." The project team reviewed the structures monitoring program and its evaluation is documented in Section 7.1.20 of this report. The project team also reviewed this program with respect to the SRP-LR. The project team finds that structural monitoring activities are intended to assess the overall integrity and condition of structures, components, support systems, and specified architectural details. Qualified personnel perform periodic inspections to identify any changes in condition, such as cracking. On the basis of its review, the project team finds this program acceptable for managing the aging effects of cracking for the above component.

7.2.6 MPS Unit 2 LRA Section 3.6 - Aging Management of Electrical and Instrumentation and Controls

In MPS Unit 2 LRA Section 3.6, the applicant provides the results of its AMRs for electrical and instrumentation and controls (I&C) components.

In MPS Unit 2 LRA Tables 3.6.2-1 through 3.6.2-3 (Table 2s), the applicant provides a summary of the AMRs for component types associated with the following electrical and I&C component groups: (1) cables and connectors, (2) electrical penetrations, and (3) bus duct. The summary information for each component type included intended function; material; environment; aging effect requiring management; AMPs; the GALL Report Volume 2 item; cross reference to the MPS Unit 2 LRA Table 3.6.1 (Table 1); and generic and plant-specific notes related to consistency with the GALL Report.

Also, the applicant identified for each component type in MPS Unit 2 LRA Table 3.6.1 (Table 1) those components where further evaluation is recommended, those for which no further evaluation is required, and those that are not applicable to MPS Unit 2, together with the basis for their exclusion.

Additionally, the applicant identified in MPS Unit 2 LRA Tables 3.6.2-1 through 3.6.2-3, which AMR results it considered to be consistent with the GALL Report (table column Notes A through E) and which it justified on a different basis.

The AMRs that are within the scope of the project team audit and review are identified on copies of the MPS Unit 2 LRA Tables 3.6.2-1 through 3.6.2-3 which are included as an appendix to the MPS Units 2 and 3 audit and review plan. Specifically, the project team reviewed AMRs results that the applicant considered to be consistent with the GALL Report (table column Notes A through E).

The project team conducted its audit and review in accordance with SRP-LR Section 3.6.3 and the MPS Units 2 and 3 audit and review plan.

7.2.6.1 Aging Management Evaluations That Are Consistent With the GALL Report, for Which No Further Evaluation Is Required

For aging management evaluations that the applicant states are consistent with the GALL Report and for which further evaluation is not recommended, the project team conducted its audit and review to determine if the applicant's reference to the GALL Report in the MPS Unit 2 LRA is acceptable.

The project team reviewed the MPS Unit 2 LRA to confirm that the applicant (1) provides a brief description of the system, components, materials, and environment; (2) states that the applicable aging effects have been reviewed and are evaluated in the GALL Report; and (3) identifies those aging effects for the electrical and I&C components that are subject to an AMR.

On the basis of its audit and review, the project team determined that for AMRs not requiring further evaluation, as identified in MPS Unit 2 LRA Table 3.6.1 (Table 1), the applicant's references to the GALL Report are acceptable and no further project team review is required.

7.2.6.2 Aging Management Evaluations That Are Consistent With the GALL Report, for Which Further Evaluation Is Recommended

For some line items consistent with the GALL Report in MPS Unit 2 LRA Tables 3.6.2-1 through 3.6.2-3, the GALL Report recommends further evaluation. When further evaluation is recommended, the project team reviewed these further evaluations provided in MPS Unit 2 LRA Section 3.6.2.2 against the criteria provided in the SRP-LR Section 3.6.2.2. The following provides the project team's assessments of these evaluations. These project team assessments are applicable to each Table 2 line item in Section 3.6 citing the item in Table 1.

The MPS Unit 2 LRA sections, identified in MPS Unit 2 LRA Table 3.6.1, where further evaluation is recommended are discussed below.

7.2.6.2.1 Electrical Equipment Subject to Environmental Qualification (MPS Unit 2 LRA Section 3.6.2.2.1)

MPS Unit 2 LRA Section 3.6.2.2.1 is reviewed by NRR DE staff and addressed in Section 4 of the SER related to the MPS Units 2 and 3 LRA.

7.3 Aging Management Reviews Results for Millstone Power Station Unit 3

The project team's audit and review activities for the MPS Unit 3 AMRs and its conclusions regarding these reviews are documented below.

For its AMR reviews, the project team verified that the AMRs reported by the applicant to be consistent with the GALL Report are consistent with the GALL Report and verified that the plant-specific AMRs reported to be justified on the basis of an NRC-approved precedent are technically acceptable and applicable. For component groups evaluated in the GALL Report for which the applicant claimed consistency with the GALL Report, and for which the GALL Report recommended further evaluation, the project team reviewed the applicant's evaluation to determine whether or not it adequately addressed the issues for which the GALL Report recommended further evaluation.

The AMRs reviewed by the project team in MPS Unit 3 LRA Tables 3.X.2-Y in Chapter 3 of the MPS Unit 3 LRA were either consistent with the GALL Report, or those justified by the applicant on the basis of an NRC-approved precedent. In MPS Unit 3 LRA Tables 3.X.2-Y, in addition to the notes, the applicant provided a summary of AMRs for the applicable systems which included SCs, associated materials, environment, aging effect requiring management, and an AMP for each line item. The notes describe how the information in the tables aligns with the information in the GALL Report. Those that are defined in the GALL Report are assigned letters and are described below. Those defined by the applicant are assigned numbers and defined in the MPS Unit 3 LRA.

Note A indicates that the AMR line item is consistent with the GALL Report for component, material, environment, and aging effect. In addition, the AMP is consistent with the AMP identified in the GALL Report.

Note B indicates that the AMR line item is consistent with the GALL Report for component, material, environment, and aging effect. In addition, the AMP takes some exceptions to the AMP identified in the GALL Report. The project team verified that the identified exceptions to the GALL AMPs are acceptable.

Note C indicates that the component for the AMR line item is different, but consistent with the GALL Report for material, environment, and aging effect. This note indicates that the applicant was unable to find a listing of some system components in the GALL Report. However, the applicant identified a different component in the GALL Report that had the same material, environment, aging effect, and AMP as the component that was under review. The project team verified that the AMR line item of the different component was applicable to the component under review.

Note D indicates that the component for the AMR line item is different, but consistent with the GALL Report for material, environment, and aging effect. In addition, the AMP takes some exceptions to the AMP identified in the GALL Report. The project team reviewed these line items to verify consistency with the GALL Report. The project team verified that the AMR line item of the different component was applicable to the component under review. The project team verified that the identified exceptions to the GALL AMPs are acceptable.

Note E indicates that the AMR line item is consistent with the GALL Report for material, environment, and aging effect, but a different AMP is credited. The project team reviewed these line items to verify consistency with the GALL Report.

Note F indicates that the material is not in the GALL Report for the identified component.

Note G indicates that the environment is not in the GALL Report for the identified component and material.

Note H indicates that the aging effect is not in the GALL Report for component, material, and environment combination.

Note I indicates that the aging effect in the GALL Report for the identified component, material, and environment combination is not applicable

Note J indicates that neither the identified component nor the material and environment combination is evaluated in the GALL Report.

Any discrepancies or issues discovered by the project team during the audit and review that required a response on the docket are documented in this report. If an issue was not docketed or was not resolved prior to issuing this report, it was identified as an open item to be dispositioned in the SER related to the MPS Units 2 and 3 LRA. For some open items, an RAI was prepared by the project team describing the issue and the information needed to disposition the issue. The RAI will be included and dispositioned in the SER related to the MPS Units 2 and 3 LRA. The list of RAIs associated with the audit and review is provided in Attachment 4 to this report.

The project team conducted an audit and review of the information provided in the MPS Unit 3 LRA and program bases documents, which are available at the applicant's engineering office. On the basis of its audit and review, the project team found that the applicable aging effects were identified, the appropriate combination of materials and environments were listed, and acceptable AMPs were specified.

On the basis of its audit and review, the project team concludes that the applicant demonstrated that the effects of aging will be adequately managed so that the intended functions will be maintained consistent with the CLB for the period of extended operation, as required by 10 CFR 54.21(a)(3).

The reviews of MPS Unit 3 LRA Sections 3.1 through 3.6 that were performed by the project team are provided below.

7.3.1 MPS Unit 3 LRA Section 3.1 - Aging Management of Reactor Vessel, Internals, and Reactor Coolant System

In MPS Unit 3 LRA Section 3.1, the applicant provides the results of its AMRs for the reactor vessel, internals, and RCS components.

In MPS Unit 3 LRA Tables 3.1.2-1 through 3.1.2-4 (Table 2s), the applicant provides a summary of the AMRs for component types associated with the (1) reactor vessel, (2) reactor vessel internals, (3) RCS, and (4) steam generator. The summary information for each component type included intended function; material; environment; aging effect requiring management; AMPs; the GALL Report Volume 2 item; cross reference to the MPS Unit 3 LRA Table 3.1.1 (Table 1); and generic and plant-specific notes related to consistency with the GALL Report.

Also, the applicant identified for each component type In MPS Unit 3 LRA Table 3.1.1 (Table 1) those components where further evaluation is recommended, those for which no further evaluation is required, and those that are not applicable to MPS Unit 3, together with the basis for their exclusion.

Additionally, the applicant identified, in MPS Unit 3 LRA Tables 3.1.2-1 through 3.1.2-5, which AMR results it considered to be consistent with the GALL Report (table column Notes A through E) and which it justified on a different basis.

The AMRs that are within the scope of the project team audit and review are identified on copies of the MPS Unit 3 LRA Tables 3.1.2-1 through 3.1.2-5 which are included as an appendix to the MPS Units 2 and 3 audit and review plan.

The project team conducted its audit and review in accordance with SRP-LR Section 3.1.3 and the MPS Units 2 and 3 audit and review plan. The project team interviewed the applicant's technical staff and reviewed, in whole or in part, the documents listed in Attachment 5 of this reports for Section 3.1, including MPS Unit 3 Technical Reports, MP-LR-4501, "AMR for Reactor Vessel," Revision 2, dated December 20, 2003, MP-LR-4502, "AMR for Steam Generator," Revision 2, dated December 20, 2003, MP-LR-4503, "AMR for Reactor Vessel Internals," Revision 2, dated December 20, 2003, and MP-LR-4402, "AMR for Reactor Coolant System," Revision 3, dated April 23, 2004, which provides the AMR results for the reactor vessel, internals, and RCS components.

7.3.1.1 Aging Management Review Results That Are Consistent With the GALL Report, for Which No Further Evaluation Is Required

For aging management evaluations that the applicant states are consistent with the GALL Report and for which further evaluation is not recommended, the project team conducted its audit and review to determine if the applicant's reference to the GALL Report in the MPS Unit 3 LRA is acceptable.

The project team reviewed the MPS Unit 3 LRA to confirm that the applicant (1) provides a brief description of the system, components, materials, and environment; (2) states that the applicable aging effects have been reviewed and are evaluated in the GALL Report; and (3) identifies those aging effects for the reactor vessel, internals, and RCS system components that are subject to an AMR.

On the basis of its audit and review, the project team determined that for AMRs not requiring further evaluation, as identified in MPS Unit 3 LRA Table 3.1.1 (Table 1), the applicant's references to the GALL Report are acceptable and no further project team review is required.

7.3.1.1.1 Loss of Fracture Toughness Due to Thermal Aging Embrittlement

In the discussion section of Table 3.1.1, Item 3.1.1-24 of the MPS Unit 3 LRA, the applicant states that loss of fracture toughness is not an aging effect requiring management for applicable CASS piping and components. During the audit and review, the project team asked the applicant for clarification as to why loss of fracture toughness is not an aging effect requiring management. The applicant replied that loss of fracture toughness of the CASS piping is not an aging effect requiring management because the results of LBB analysis demonstrated that there was a large margin between detectable flaw size and flaw instability. The project team reviewed the applicant's TLAA Report, MP-LR-3014/4014, "Leak-Before-Break," Revision 1, and found that the LBB analysis is not a flaw tolerance evaluation as specified by the GALL Report. The applicant agreed that the LBB analysis cannot be used to manage the loss of fracture toughness due to thermal aging embrittlement.

The applicant submitted a MPS LRA supplement letter, dated July 7, 2004 (ML041900407), and stated, in response to Audit Items 42 and 19, as follows:

Note "6" for Unit 3 Tables 3.1.2-1 through 3.1.2-4 (page 3-106), should state the following:

> For potentially susceptible CASS materials, either enhanced volumetric examinations or a unit or component specific flaw tolerance evaluation (considering reduced fracture toughness and unit specific geometry and stress information) will be used to demonstrate that the thermally embrittled material has adequate fracture toughness in accordance with NUREG-1801 Section XI.M12.
>
> 'Loss of Fracture Toughness' as an aging effect for component group 'Pipe (Hot and Cold Leg Piping and Fittings)' should be added in Unit 3 Table 3.1.2-3 (page 3-80). The 'Loss of Fracture Toughness' is managed by the Inservice Inspection Program: Systems, Components and Supports and corresponds to NUREG-1801 Item IV.C2.1-f. The Note for this entry is "A,6" and the 'Table 1 Item' is "3.1.1-24". NOTE: Only the 'Loss of Fracture Toughness' entry will have Note "6" listed for the above component group.

The “Discussion” column in Unit 3 Table 3.1.1, Item 24, (page 3-32), should read as follows:

> Consistent with NUREG-1801. Loss of Fracture Toughness is managed with the Inservice Inspection Program: Systems, Components and Supports and this program takes some exception to the NUREG-1801 AMP.

Additionally, a new commitment, Item 28, should be added to MPS Unit 3 LRA Appendix A, Table A6.0-1 as follows and will be implemented prior to the period of extended operation:

> For potentially susceptible CASS materials, either enhanced volumetric examinations or a unit or component specific flaw tolerance evaluation (considering reduced fracture toughness and unit specific geometry and stress information) will be used to demonstrate that the thermally embrittled material has adequate fracture toughness in accordance with NUREG-1801 Section XI.M12.

The applicant modified the corresponding MPS Unit 3 LRA basis documents and MPS Unit 3 LRA to reflect the audit findings. The project team reviewed the applicant’s LRA supplement and finds that applicant appropriately addressed the aging mechanism with the abovementioned new commitment, as recommended in the GALL Report.

7.3.1.1.2 <u>Loss of Material Due to Wear; Loss of Preload Due to Stress Relaxation; Crack Initiation and Growth Due to Cyclic Loading and/or Stress Corrosion Cracking</u>

In MPS Unit 3 LRA Table 3.1.1, Item 26 (page 3-32), the applicant states that cracking and loss of preload are managed using MPS AMP B2.1.18, “Inservice Inspection Program: Systems, Components and Supports.” Also, the applicant states that loss of material due to wear is not an aging effect requiring management for this bolting.

The project team noted that SRP-LR Table 3.1-1 recommended GALL AMP XI.M18, “Bolting Integrity,” for managing closure bolting in high pressure or high temperature system for loss of material due to wear; loss of preload due to stress relaxation; crack initiation and growth due to cyclic loading and/or SCC.

The project team questioned the applicant whether all the resolution of generic safety issue for bolting, as stated in NUREG-1339, are addressed. By letter dated December 3, 2004 (ML043450341), the applicant submitted its LRA supplement. In its response, the applicant stated that it has developed a specific bolting integrity aging management program that addresses degradation of bolting at MPS. The bolting integrity program is reviewed by NRR DE staff and is addressed in Section 3 of the SER related to the MPS Units 2 and 3 LRA.

By letter dated January 11, 2005 (ML050190289), the applicant submitted its bolting aging management roll-up item. In its response, the applicant replaces the existing information in the “Discussion” column of Unit 3 LRA Table 3.1.1, Item 26 with “consistent with the NUREG-1801."

The project team reviewed the applicant’s response and finds this acceptable since it is consistent with the GALL Report. The bolting integrity program is reviewed by NRR DE and its evaluation is documented in Section 3 of the SER related to the MPS Units 2 and 3 LRA.

7.3.1.1.3 Loss of Fracture Toughness Due to Neutron Irradiation Embrittlement, and Void Swelling

In MPS Unit 3 LRA Table 3.1.1, Item 43 (page 3-37), the applicant states that loss of fracture toughness is managed using MPS AMP B2.1.17, “Inservice Inspection Program: Reactor Vessel Internals.” Also, the applicant states that MPS AMP B2.1.5, “Chemistry Control for Primary Systems Program,” is not credited to manage these aging effects, but is applied to all reactor vessel internals components as a corrosion mitigation program.

The project team reviewed the inservice inspection program: reactor vessel internals program and the chemistry control for primary systems program and its evaluation is documented in Section 7.1.16 and Section 7.1.4 of this report, respectively. On the basis of its review, the project team agrees with the applicant that the chemistry control for primary systems program is a corrosion mitigation program. The project team finds that the applicant’s proposed program is adequate to manage loss of fracture toughness due to neutron irradiation embrittlement and void swelling.

The project team finds that, based on the programs identified above, the applicant has demonstrated that the effects of aging will be adequately managed so that the intended functions will be maintained consistent with the CLB during the period of extended operation, as required by 10 CFR 54.21(a)(3).

On the basis of its audit and review, the project team determined that for all other AMRs not requiring further evaluation, as identified in MPS Unit 3 LRA Table 3.1.1 (Table 1), the applicant's references to the GALL Report are acceptable and no further project team review is required.

7.3.1.2 Aging Management Review Results That Are Consistent With the GALL Report, for Which Further Evaluation Is Recommended

For some line items consistent with the GALL Report In MPS Unit 3 LRA Tables 3.1.2-1 through 3.1.2-4, the GALL Report recommends further evaluation. When further evaluation is recommended, the project team reviewed these further evaluations provided in MPS Unit 3 LRA Section 3.1.2.2 against the criteria provided in the SRP-LR Section 3.1.2.2. The following provides the project team's assessments of these evaluations. These project team assessments are applicable to each Table 2 line item in Section 3.1 citing the item in Table 1.

The MPS Unit 3 LRA sections identified in MPS Unit 3 LRA Table 3.1.1 where further evaluation is recommended are discussed below.

7.3.1.2.1 Cumulative Fatigue Damage (MPS Unit 3 LRA Section 3.1.2.2.1)

MPS Unit 3 LRA Section 3.1.2.2.1 is reviewed by NRR DE staff and addressed in Section 4.3 of the SER related to the MPS Units 2 and 3 LRA.

7.3.1.2.2 Loss of Material Due to Pitting and Crevice Corrosion (MPS Unit 3 LRA Section 3.1.2.2.2)

The project team reviewed MPS Unit 3 LRA Section 3.1.2.2.2 against the criteria in SRP-LR Section 3.1.2.2.2.

In MPS Unit 3 LRA Section 3.1.2.2.2, the applicant addresses loss of material of steam generator assemblies due to pitting and crevice corrosion.

SRP-LR Section 3.1.2.2.2 states that loss of material due to pitting and crevice corrosion could occur in the steam generator shell assembly. The existing program relies on control of water chemistry to mitigate corrosion and inservice inspections to detect cracking due to loss of material. NRC IN 90-04, "Cracking of the Upper Shell-to-Transition Cone Girth Welds in Steam Generators," states that if general corrosion pitting of the shell exists, the existing program may not be sufficient. In that case the GALL Report recommends augmented inspections to manage the aging effect.

The AMPs recommended by the GALL Report for managing the aging of steam generator assemblies due to pitting and crevice corrosion are GALL AMP XI.M1, "ASME Section XI Inservice Inspection, Subsections IWB, IWC, and IWD," to detect loss of material and GALL AMP XI.M2, "Water Chemistry," to mitigate corrosion. The GALL Report also recommends a plant-specific program to conduct augmented inspections.

In the MPS Unit 3 LRA, the applicant credits MPS AMP B2.1.18, "Inservice Inspection Program: Systems, Components and Supports," and MPS AMP B2.1.5, "Chemistry Control for Primary Systems," for managing loss of material due to pitting and crevice corrosion for the internal surfaces of the steam generator shell. The project team evaluated these programs and its evaluation is documented in Section 7.1.17 and Section 7.1.4 of this report, respectively.

The project team reviewed IN 90-04, which identifies the need to perform augment inspections beyond the requirements of ASME Section XI, if general corrosion pitting of the steam generator shell is known to exist, in order to differentiate isolated cracks from inherent geometric conditions. The project team reviewed operating experience which indicated that no pitting corrosion of the steam generator shell has been detected to date, and that water

chemistry has been maintained for these steam generators per EPRI guidelines. The project team finds that the augmented inspections as recommended by NRC IN 90-04, as referenced in the SRP-LR, do not currently apply to the MPS Unit 3 steam generators.

Since pitting corrosion has not been detected on the steam generator shell since installation, the project team finds that augmented inspections are not required and that the current water chemistry control and inservice inspection programs adequately manage this aging effect.

The project team finds that, based on the programs identified above, the applicant has demonstrated that the effects of aging will be adequately managed so that the intended functions will be maintained consistent with the CLB during the period of extended operation, as required by 10 CFR 54.21(a)(3).

7.3.1.2.3 Loss of Fracture Toughness Due to Neutron Irradiation Embrittlement (MPS Unit 3 LRA Section 3.1.2.2.3)

The project team reviewed MPS Unit 3 LRA Section 3.1.2.2.3 against the criteria contained in the SRP-LR Section 3.1.2.2.3.

In MPS Unit 3 LRA Section 3.1.2.2.3, the applicant addresses (1) loss of fracture toughness due to neutron irradiation embrittlement for ferritic materials that have a neutron fluence of greater than 10^{17} n/cm^2 at the end of the license renewal term, (2) loss of fracture toughness due to irradiation embrittlement of the reactor vessel beltline materials, (3) loss of fracture toughness due to irradiation embrittlement and void swelling of the Westinghouse baffle/former bolts. The applicant's evaluation of loss of fracture toughness due to irradiation embrittlement and void swelling for the baffle/former bolts is reviewed by NRR DE staff and addressed in the SER related to the MPS Units 2 and 3 LRA.

SRP-LR Section 3.1.2.2.3 states that certain aspects of neutron irradiation embrittlement are TLAAs as defined in 10 CFR 54.3 and that TLAAs are required to be evaluated in accordance with 10 CFR 54.21(c)(1). SRP-LR Section 3.1.2.2.3 also states that loss of fracture toughness due to neutron irradiation embrittlement could occur in the reactor vessel. A reactor vessel materials surveillance program monitors neutron irradiation embrittlement of the reactor vessel. Reactor vessel surveillance programs are plant-specific, depending on matters such as the composition of limiting materials, availability of surveillance capsules, and projected fluence levels. In accordance with 10 CFR 50, Appendix H, an applicant is required to submit its proposed capsule withdrawal schedule for approval prior to implementation. SRP-LR Section 3.1.2.2.3 states that loss of fracture toughness due to neutron irradiation embrittlement and void swelling could occur in Westinghouse baffle/former bolts.

The AMP recommended by the GALL Report for managing loss of fracture toughness due to neutron irradiation embrittlement in the reactor vessel is GALL AMP XI.M31, "Reactor Vessel Surveillance," which complies with the requirements of 10 CFR 50, Appendices G and H, and 10 CFR 50.61.

The applicant states, in the MPS Unit 3 LRA, that loss of fracture toughness due to neutron irradiation embrittlement for ferritic materials is a TLAA, as described in Section 4.2 of the MPS Unit 3 LRA. This TLAA is reviewed by NRR DE staff and addressed in Section 4 of the SER related to the MPS Units 2 and 3 LRA.

The applicant states, in the MPS Unit 3 LRA, that loss of fracture toughness due to irradiation embrittlement of the reactor vessel beltline materials is managed by MPS AMP B2.1.20, "Reactor Vessel Surveillance." This program includes a plant-specific material surveillance program which monitors the effect of operational fluence levels on material specimens (surveillance capsules) located in the reactor vessel during power operations. These surveillance capsules are periodically withdrawn and analyzed. The reactor vessel surveillance program is reviewed by NRR DE staff and is addressed in Section 3 of the SER related to the MPS Units 2 and 3 LRA.

The project team finds that the applicant's AMR results are consistent with the GALL Report and that the applicant has demonstrated that the programs to manage the effects of aging will be adequate to maintain the intended functions consistent with the CLB during the period of extended operation, as required by 10CFR 54.21(a)(3).

7.3.1.2.4 Crack Initiation and Growth Due to Thermal and Mechanical Loading or Stress Corrosion Cracking (MPS Unit 3 LRA Section 3.1.2.2.4)

The project team reviewed MPS Unit 3 LRA Section 3.1.2.2.4 against the criteria contained in SRP-LR Section 3.1.2.2.4.

In MPS Unit 3 LRA Section 3.1.2.2.4, the applicant addresses the potential crack initiation and growth due to thermal and mechanical loading or SCC (including intergranular stress corrosion cracking) that could occur in small-bore RCS and connected system piping less than NPS 4.

SRP-LR Section 3.1.2.2.4 states that the GALL Report recommends that a plant-specific destructive examination or a NDE that permits inspection of the inside surfaces of the piping be conducted to ensure that cracking has not occurred and the component intended function will be maintained during the extended period. The applicant should verify that service-induced weld cracking is not occurring in small-bore piping less than NPS 4. A one-time inspection of a sample of locations is an acceptable method to ensure that the aging effect is not occurring and the component's intended function will be maintained during the period of extended operation. Per ASME Section XI, 1995 Edition, Examination Category B-J or B-F, small bore piping, defined as piping less than NPS 4, does not receive volumetric inspection.

The AMPs recommended by the GALL Report are GALL AMP XI.M1, "ASME Section XI Inservice Inspection, Subsections IWB, IWC, and IWD," to detect loss of material and GALL AMP XI.M2, "Water Chemistry," to mitigate SCC.

In the MPS Unit 3 LRA, the applicant credits MPS AMP B2.1.18, "Inservice Inspection Program: Systems, Components and Supports," and MPS AMP B2.1.5, "Chemistry Control for Primary Systems," to mitigate cracking of reactor coolant piping. The project team evaluated these programs and its evaluation is documented in Sections 7.1.17 and 7.1.4 of this report, respectively.

To address the GALL Report recommendation that a plant-specific destructive examination or a NDE that permits inspection of the inside surfaces of the piping be conducted, the applicant states, in the MPS Unit 3 LRA, that it has implemented a RI-ISI methodology at MPS Unit 3 to select RCS piping welds for inspection in lieu of the requirements specified in ASME Section XI. To address the GALL Report for a one-time inspection of small-bore piping less than NPS 4,

the application indicated that small-bore pipe butt-welded connections are included in the final weld selection for performance of volumetric examination. The project team verified that the applicant used the RI-ISI process to determine the most susceptible locations for performing the volumetric examination and did not eliminate small-bore pipe welds from examination with the RI-ISI process.

The project team reviewed and verified that the applicant's RI-ISI plan will perform volumetric examination, which is required to address cracking for small-bore Class 1 piping per ISG-12, "One-Time Inspection of Small-Bore Piping," on elements not currently required to be volumetrically examined. The project team finds that the applicant, based on the programs identified above, appropriately evaluated AMR results involving current inspection methods, as detailed in the inservice inspection program, and as supplemented by water chemistry control, for managing cracking of small-bore piping systems.

The project team finds that the applicant's AMR results are consistent with the GALL Report, and that the applicant has demonstrated that the effects of aging will be adequately managed so that the intended functions will be maintained consistent with the CLB during the period of extended operation, as required by 10 CFR 54.21(a)(3).

7.3.1.2.5 Crack Growth Due to Cyclic Loading (MPS Unit 3 LRA Section 3.1.2.2.5)

MPS Unit 3 LRA Section 3.1.2.2.5 is reviewed by NRR DE staff and addressed in Section 4 of the SER related to the MPS Units 2 and 3 LRA.

7.3.1.2.6 Changes in Dimension Due to Void Swelling (MPS Unit 3 LRA Section 3.1.2.2.6)

The project team reviewed MPS Unit 3 LRA Section 3.1.2.2.6 against the criteria in SRP-LR Section 3.1.2.2.6.

In MPS Unit 3 LRA Section 3.1.2.2.6, the applicant addresses changes in dimension due to void swelling that could occur in reactor internals components.

SRP-LR Section 3.1.2.2.6 states that the GALL Report recommends that changes in dimension due to void swelling in reactor internals components be evaluated to ensure that this aging effect is adequately managed. The GALL Report recommends that a plant-specific AMP be evaluated to manage the effects of changes in dimension due to void swelling and the loss of fracture toughness associated with swelling.

The applicant states that the void swelling of reactor vessel internals is managed by MPS AMP B2.1.17, "Inservice Inspection Program: Reactor Vessel Internals." The applicant has committed to further understanding of this aging effect through industry programs to provide additional bases for supplemental examinations or component-specific evaluations.

The project team reviewed the inservice inspection program: reactor vessel internals and its evaluation is documented Section 7.1.16 of this report. The project team finds that this program will be consistent with GALL AMP XI.M13, "Thermal Aging and Neutron Embrittlement of Cast Austenitic Stainless Steel (CASS)," and GALL AMP XI.M16, "PWR Vessel Internals."

The project team finds the applicant's approach for managing changes in dimension due to void swelling acceptable because the approach will be based on the guidelines developed by the ongoing industry activities related to void swelling. The applicant has committed to implement the appropriate recommendations resulting from the industry efforts. The applicant also committed, through a MPS LRA supplement letter dated July 7, 2004(ML041900407), that the revised program description, including a comparison to the 10 program elements of the GALL Report program, will be submitted to the NRC for approval prior to the period of extended operation.

The project team finds that the effects of aging will be adequately managed so that the intended functions will be maintained consistent with the CLB during the period of extended operation, as required by 10 CFR 54.21(a)(3).

7.3.1.2.7 Crack Initiation and Growth Due to Stress Corrosion Cracking or Primary Water Stress Corrosion Cracking (MPS Unit 3 LRA Section 3.1.2.2.7)

The project team reviewed MPS Unit 3 LRA Section 3.1.2.2.7 against the criteria in SRP-LR Section 3.1.2.2.7, which recommends plant-specific programs to address these aging mechanisms.

In MPS Unit 3 LRA Section 3.1.2.2.7, the applicant addresses (1) crack initiation and growth due to SCC and PWSCC in the pressurizer (spray head assembly/nozzle assembly), core support pads, and instrumentation tubes (bottom head); (2) crack initiation and growth due to SCC in the hot leg and cold leg piping and fittings fabricated of CASS; and (3) crack initiation and growth due to PWSCC in nickel-based alloy material such as the pressurizer (safe end welds - surge, spray, relief, and safety), reactor vessel (safe end welds - primary inlet and outlet), and steam generator primary drain nozzle weld.

SRP-LR Section 3.1.2.2.7 states that

> Crack initiation and growth due to SCC and PWSCC could occur in core support pads (or core guide lugs), instrument tubes (bottom head penetrations), pressurizer spray heads, and nozzles for the steam generator instruments and drains. The GALL Report recommends further evaluation to ensure that these aging effects are adequately managed. The GALL Report recommends that a plant-specific AMP be evaluated because existing programs may not be capable of mitigating or detecting crack initiation and growth due to SCC.
>
> Crack initiation and growth due to SCC could occur in CASS RCS piping and fittings and pressurizer surge line nozzles. The GALL Report recommends further evaluation of piping that does not meet either the reactor water chemistry guidelines of EPRI TR-105714 or material guidelines of NUREG-0313, "Technical Report on Material Selection and Processing Guidelines for BWR Coolant Pressure Boundary Piping," Revision 2, January 1988.
>
> Crack initiation and growth due to PWSCC could occur in pressurizer instrumentation penetrations and heater sheaths and sleeves made of nickel alloys. The existing program relies on ASME Section XI inservice inspections and on control of water chemistry to mitigate PWSCC. However, the existing

> program should be augmented to manage the effects of SCC on the intended function of nickel-alloy components. The GALL Report recommends that the applicant provide a plant-specific AMP or participate in industry programs to determine appropriate AMPs for PWSCC of the Inconel 182 weld.

The applicant credits the following plant-specific programs for each of the three SRP-LR criteria:

> Cracking of nickel based alloy components due to PWSCC is managed by the nickel-based alloys (i.e., PWSCC in Alloy 600 base metal and Alloy 82/182 weld metals) aging management activities, which are part of MPS AMP B2.1.18, “Inservice Inspection Program: Systems, Components and Supports,” supplemented by MPS AMP B2.1.5, ”Chemistry Control for Primary Systems Program.” Additionally, EPRI, through its MRP and in conjunction with the PWR owners groups, is developing a strategic plan to manage and mitigate cracking of nickel-based alloy items. The applicant states that the guidance developed by the MRP will be used to identify the appropriate aging management activities and will implement the appropriate recommendations resulting from this guidance as described in license renewal Commitment, Item 14. Pressurizer spray head fabricated from stainless steel is not a reactor coolant pressure boundary component and is managed by MPS AMP B2.1.5, ”Chemistry Control for Primary Systems Program.”
>
> Crack initiation and growth due to SCC at weld connections, including the hot leg and cold leg piping and fittings, is managed by MPS AMP B2.1.5,” Chemistry Control for Primary Systems Program,” and MPS AMP B2.1.18, ”Inservice Inspection Program: Systems, Components and Supports.”
>
> The programs credited for the management of PWSCC of these nickel-based alloy items are the nickel-based alloys (i.e., PWSCC in Alloy 600 base metal and Alloy 82/182 weld metals) aging management activities, which are part of MPS AMP B2.1.18, ”Inservice Inspection Program: Systems, Components and Supports,” and MPS AMP B2.1.5, ”Chemistry Control for Primary Systems Program. “As described in Item 1 above, the applicant committed to participate in the nickel-based alloys industry programs to identify appropriate aging management activities and implement the appropriate recommendations from the guidance developed by industry programs.

The project team reviewed the plant-specific programs for these aging effects and its evaluations are in Section 7.1.4 and Section 7.1.17 of this report, respectively.

The nickle-based alloys aging management activity is part of MPS AMP B2.1.18, “Inservice Inspection Program: Systems, Components and Supports,” and the staff’s evaluation of the nickel-based alloys (i.e., PWSCC in Alloy 600 base metal and Alloy 82/182 weld metals) aging management is documented in Section 3 of the SER related to the MPS Units 2 and 3 LRA.

The project team finds that the applicant appropriately evaluated AMR results which address these aging mechanisms, as recommended in the GALL Report.

The project team finds that the applicant has demonstrated that the effects of aging will be adequately managed so that the intended functions will be maintained consistent with the CLB during the period of extended operation, as required by 10 CFR 54.21(a)(3).

7.3.1.2.8 Crack Initiation and Growth Due to Stress Corrosion Cracking or Irradiation-Assisted Stress Corrosion Cracking (MPS Unit 3 LRA Section 3.1.2.2.8)

MPS Unit 3 LRA Section 3.1.2.2.8 is reviewed by NRR DE staff and addressed in Section 3 of the SER related to the MPS Units 2 and 3 LRA.

7.3.1.2.9 Loss of Preload Due to Stress Relaxation (MPS Unit 3 LRA Section 3.1.2.2.9)

Loss of preload due to stress relaxation for the baffle/former bolts is reviewed by NRR DE in the SER related to the MPS Units 2 and 3 LRA.

7.3.1.2.10 Loss of Section Thickness Due to Erosion (MPS Unit 3 LRA Section 3.1.2.2.10)

The project team reviewed MPS Unit 3 LRA Section 3.1.2.2.10 against the criteria in SRP-LR Section 3.1.2.2.10.

In MPS Unit 3 LRA Section 3.1.2.2.10, the applicant states that the MPS Unit 3 steam generators do not have feedwater impingement plates and that the discussion in this paragraph of the SRP-LR is not applicable to MPS Unit 3.

SRP-LR Section 3.1.2.2.10 states that loss of section thickness due to erosion could occur in steam generator feedwater impingement plates and supports. The GALL Report recommends further evaluation of a plant-specific AMP to ensure that this aging effect is adequately managed.

On the basis that feedwater impingement plates are not part of the MPS Unit 3 steam generator design, the project team finds that this aging effect is not applicable to MPS Unit 3.

7.3.1.2.11 Crack Initiation and Growth Due to Primary Water Stress Corrosion Cracking, Outside Diameter Stress Corrosion Cracking, or Intergranular Attack or Loss of Material Due to Wastage and Pitting Corrosion or Loss of Section Thickness Due to Fretting and Wear or Denting Due to Corrosion of Carbon Steel Tube Support Plate (MPS Unit 3 LRA Section 3.1.2.2.11)

The project team reviewed MPS Unit 3 LRA Section 3.1.2.2.11 against the criteria in SRP-LR Section 3.1.2.2.11.

In MPS Unit 3 LRA Section 3.1.2.2.11, the applicant addresses crack initiation and growth due to PWSCC, SCC, or IGA, or loss of material due to wastage and pitting corrosion, or deformation due to corrosion that could occur in nickel-based alloy components of the steam generator tubes and tube plugs.

SRP-LR Section 3.1.2.2.11 states that crack initiation and growth due to PWSCC, outside diameter SCC, or IGA, or loss of material due to wastage and pitting corrosion, or deformation

due to corrosion could occur in Alloy 600 components of the steam generator tubes, repair sleeves, and plugs. All PWR licensees have committed voluntarily to a steam generator degradation management program described in NEI 97-06; these guidelines are currently under NRC staff review. The GALL Report recommends that an AMP based on the recommendations of staff-approved NEI 97-06 guidelines, or other alternate regulatory basis for steam generator degradation management, should be developed to ensure that this aging effect is adequately managed.

The SRP-LR also states that crack initiation and growth due to PWSCC, SCC, or IGA, or loss of material due to wastage and pitting corrosion, or deformation due to corrosion could occur in nickel-based alloy components of the steam generator tubes and plugs.

To manage the effects of aging, the applicant credits MPS AMP B2.1.23, "Steam Generator Structural Integrity," supplemented by MPS AMP B2.1.5, "Chemistry Control for Primary Systems Program," and MPS AMP B2.1.6, "Chemistry Control for Secondary Systems Program." The NRR DE staff's evaluation of the steam generator structural integrity program is documented in Section 3.0 of the SER related to the MPS Units 2 and 3 LRA. The project team reviewed the chemistry control for primary systems and secondary systems programs and its evaluations are documented in Sections 7.1.4 and 7.1.5 of this report, respectively. For general and pitting corrosion and for the assessment of tube integrity, and plugging or repair criteria of flawed tubes, the steam generator structural integrity program acceptance criteria are in accordance with NEI 97-06 guidelines.

On the basis of its review of the chemistry control for primary and secondary systems programs, the project team finds that the applicant appropriately evaluated AMR results involving plant-specific programs to address these aging mechanisms, as recommended in the GALL Report.

7.3.1.2.12 Loss of Section Thickness Due to Flow-Accelerated Corrosion (MPS Unit 3 LRA Section 3.1.2.2.12)

The project team reviewed MPS Unit 3 LRA Section 3.1.2.2.12 against the criteria in SRP-LR Section 3.1.2.2.12.

In MPS Unit 3 LRA Section 3.1.2.2.12, the applicant states that the steam generator tube support lattice bars are constructed of stainless steel. Therefore, loss of section thickness of these bars is not an applicable aging effect for MPS Unit 3.

SRP-LR Section 3.1.2.2.12 states the loss of section thickness due to FAC could occur in tube support lattice bars made of carbon steel. The GALL Report recommends that a plant-specific AMP be evaluated and, on the basis of the guidelines of NRC GL 97-06, an inspection program for steam generator internals be developed to ensure that this aging effect is adequately managed.

On the basis that carbon steel tube support lattice bars are not part of the MPS Unit 3 steam generator design, the project team finds that this aging effect is not applicable to MPS Unit 3.

7.3.1.2.13 Ligament Cracking Due to Corrosion (MPS Unit 3 LRA Section 3.1.2.2.13)

The project team reviewed MPS Unit 3 LRA Section 3.1.2.2.13 against the criteria in SRP-LR Section 3.1.2.2.13.

In MPS Unit 3 LRA Section 3.1.2.2.13, the applicant states that tube support plates are not used in the steam generators. Therefore, ligament cracking due to corrosion is not an applicable aging effect for MPS Unit 3.

SRP-LR Section 3.1.2.2.13 states that ligament cracking due to corrosion could occur in carbon steel components in the steam generator tube support plate. All PWR licensees have committed voluntarily to a steam generator degradation management program described in NEI 97-06; these guidelines are currently under NRC staff review. The GALL Report recommends that an AMP based on the recommendations of staff-approved NEI 97-06 guidelines, or other alternate regulatory basis for steam generator degradation management, be developed to ensure that this aging effect is adequately managed.

On the basis that tube support plates are not used in the steam generators of MPS Unit 3, the project team finds that this aging effect is not applicable to MPS Unit 3.

7.3.1.2.14 Loss of Material Due to Flow-Accelerated Corrosion (MPS Unit 3 LRA Section 3.1.2.2.14)

The project team reviewed MPS Unit 3 LRA Section 3.1.2.2.14 against the criteria in SRP-LR Section 3.1.2.2.14.

SRP-LR Section 3.1.2.2.14 states that loss of material due to FAC could occur in the feedwater inlet ring and supports. As noted in CE IN 90-04, NRC IN 91-19, and LER 50-362/90-05-01, this form of degradation has been detected only in certain CE System 80 steam generators. The GALL Report recommends further evaluation to ensure that this aging effect is adequately managed. The GALL Report recommends that a plant-specific AMP be evaluated because existing programs may not be capable of mitigating or detecting loss of material due to FAC.

The project team noted that, in MPS Unit 3 LRA Table 3.1.2-4 (page 3-95), for loss of material of feedwater inlet ring and support component type of carbon steel exposed internally to a treated water environment, the applicant credits the chemistry control for secondary systems program. The project team asked the applicant to clarify why the FAC program is not assigned to this component (Audit Item 82-3).

In its MPS LRA supplement letter dated July 7, 2004 (ML041900407), the applicant stated, in response to Audit Item 82-3, that the FAC program should be added for the feedwater inlet ring and support component type. In addition, the GALL Report item match for this entry should be "IV.D1.3-a" with "Note B." Also, the "Table 1 Item" entry should be "3.1.1-21." Furthermore, the applicant states that in MPS Unit 3 LRA Section 3.1.2.2.14 (page 3-21) and MPS Unit 3 LRA Table 3.1.1, the discussion column for Item 3.1.1-21 (page 3-31) should state

> Although the Unit 3 steam generators are not CE System 80 steam generators, the feedwater inlet ring is included in the Flow Accelerated Corrosion program.

The project team requested that the applicant clarify how the FAC inspection of the steam generator feedwater ring would be performed. The applicant responded that FAC inspection of

the feedwater inlet is performed using the program generic FAC inspection techniques for gridding and UT.

On the basis of its review, the project team finds that the applicant has demonstrated that the effect of aging will be adequately managed so that the intended function will be maintained consistent with the CLB for the period of extended operation, as required by 10 CFR 54.21(a)(3).

7.3.1.3 Aging Management Review Results That Are Not Consistent with the GALL Report or Are Not Addressed in the GALL Report

In MPS Unit 3 LRA Tables 3.1.2-1 through 3.1.2-4, the project team reviewed additional details of the results of the AMRs for material, environment, aging effect requiring management, and AMP combinations that are not consistent with the GALL Report or are not addressed in the GALL Report.

7.3.1.3.1 Reactor Vessel - Aging Management Evaluation (MPS Unit 3 LRA Table 3.1.2-1)

The project team reviewed Table 3.1.2-1 of the MPS Unit 3 LRA, which summarizes the results of AMR evaluations for the reactor vessel component groups.

In MPS Unit 3 LRA Table 3.1.2-1, the applicant identified no aging effects for the following stainless steel, and nickel-based alloy reactor vessel component types - control rod drive mechanism (CRDM) pressure housings, instrument tubes extension (top head), instrumentation tubes (bottom head), primary nozzle safe end, seal table and fitting, and instrument tubes - exposed externally to air. Air is not identified in the GALL Report as an environment for these components and materials.

On the basis of its review of current industry research and operating experience, the project team finds that air on metal will not result in aging that will be of concern during the period of extended operation. These components are exposed to high temperature internal flow, which causes a dry air environment. Stainless steel and nickel-based alloy are not susceptible to general corrosion under that would affect the intended function of components in dry air environment. Therefore, the project team finds that there are no applicable aging effects requiring management for metal in an air environment.

In MPS Unit 3 LRA Table 3.1.2-1, the applicant proposes to manage loss of material for the following stainless steel, nickel-based alloy, and low-alloy steel clad with stainless steel component types of the reactor vessel - core support pads, bottom-mounted instrumentation (BMI) flux thimble tube, CRDM pressure housings, instrument tubes extension (top head), instrumentation tubes (bottom head), primary nozzles (and cladding), primary nozzle safe end, seal table and fitting, instrument tubes, bottom head (and cladding), closure head dome (and cladding), closure head flange (and cladding), intermediate and lower shell (and cladding), and vessel flange and core support ledge (and cladding) - exposed internally to treated, borated water using the MPS AMP B2.1.5, “Chemistry Control for Primary Systems Program.” The project team reviewed the chemistry control for primary systems program and its evaluation is documented in Section 7.1.4 of this report. On the basis of its review, the project team finds this program acceptable for managing loss of material for the above component types.

In MPS Unit 3 LRA Table 3.1.2-1, for each of these same component and material combinations, the applicant is also managing cracking using MPS AMP B2.1.5, "Chemistry Control for Primary Systems Program," and MPS AMP B2.1.18, "Inservice Inspection Program: Systems, Component and Supports." MPS AMP B2.1.18 is also credited with managing the effects of PWSCC in Alloy 600 base metal and Alloy 82/182 weld metals. The project team accepted the chemistry control for primary systems program and the inservice inspection program: systems, components and supports program and its evaluation of these programs is documented in Section 7.1.4 and Section 7.1.17 of this report, respectively. The Alloy 600 base metal and Alloy 82/182 weld metals portion of the MPS AMP are reviewed by NRR DE and its evaluation is documented in Section 3.0 of the SER related to the MPS Units 2 and 3 LRA. The project team finds that the applicant manages cracking in a manner consistent with the GALL Report.

On the basis that cracking of stainless steel, nickel-based alloy, and low-alloy steel clad with stainless steel is being managed by the water chemistry control and inservice inspection programs, and the effects of pitting and crevice corrosion on stainless steel and nickel-based alloy components are not significant in chemically treated, borated water, the project team finds that the chemistry control program is acceptable for managing loss of material.

The project team finds that the applicant has demonstrated that the effects of aging will be adequately managed so that the intended functions will be maintained consistent with the CLB during the period of extended operation, as required by 10 CFR 54.21(a)(3).

7.3.1.3.2 Reactor Vessel Internals - Aging Management Evaluation (MPS Unit 3 LRA Table 3.1.2-2)

The project team reviewed the MPS Unit 3 LRA Table 3.1.2-2, which summarizes the results of AMR evaluations for the reactor vessel internals component groups.

In MPS Unit 3 LRA Table 3.1.2-2, the applicant proposes to manage loss of material for the following stainless steel component types of the reactor vessel internals system - baffle/former plates, BMI columns, core barrel, core barrel flange, core barrel outlet nozzles, head and vessel alignment pins, hold-down spring, lower fuel alignment pins, lower support forging, lower support plate column bolts, lower support plate columns, neutron panel, radial support keys, rod cluster control assembly (RCCA) guide tube support pins, RCCA guide tubes, secondary core support, upper core plate, upper core plate alignment pins, upper fuel alignment pins, upper instrumentation columns, upper support column, and upper support plate - exposed internally to treated, borated water using MPS AMP B2.1.5, "Chemistry Control for Primary Systems Program." The project team accepted the chemistry control for primary systems program and its evaluation of this program is documented in Section 7.1.4 of this report.

In MPS Unit 3 LRA Table 3.1.2-2, for each of these same component and material combinations, the applicant is also managing cracking using MPS AMP B2.1.5, "Chemistry Control for Primary Systems Program," and MPS AMP B2.1.17, "Inservice Inspection Program: Reactor Vessel Internals." MPS AMP B2.1.17 credits the ASME Section XI, Subsection IWB, Category B-–3 inservice inspections and additional examinations based on future industry developments. The project team reviewed the embrittlement effects of CASS portion of the inservice inspection program: reactor vessel internals program and its evaluation of this part of the program is documented in Section 7.1.16 of this report. The PWR internals aging effects

management regarding such issues as void swelling (change in dimensions), stress corrosion cracking (PWSCC and IGSCC), and loss of preload are reviewed by NRR DE and its evaluation is documented in Section 3 of the SER related to the MPS Units 2 and 3 LRA. The project team finds that the applicant manages cracking in a manner consistent with the GALL Report. In addition, the project team reviewed the applicable part of MPS AMP B2.1.18, "Inservice Inspection Program: Systems, Components and Supports," which discusses the ASME Section XI, Subsection IWB, Category B-–3 inservice inspection activities. The project team accepted this program and its evaluation is documented in Section 7.1.17 of this report.

On the basis that cracking of stainless steel is being managed by the water chemistry control and inservice inspection programs, and the effects of pitting and crevice corrosion on stainless steel components are not significant in chemically treated, borated water, the project team finds that management of loss of material using water chemistry control is acceptable.

The GALL Report recommends a loose parts monitoring program to manage loss of mechanical closure integrity for the following reactor vessel internals component types - CEA shroud extension shaft guides, cylinders, and bases; shroud base; shroud flow channel; shroud flow channel cap; shroud shaft retention pin; shroud retention block; spanner nuts; shroud fasteners; guide tubes; ICI thimble support plate assembly; ICI support plate, grid, lifting support, lifting plate, column, plates, and funnel; pad, ring, nipple, hex bolt, and spacer; threaded rod, hex jam nut, thimble support nut, and cap screws.

In the MPS Unit 3 LRA, the applicant proposes to manage this aging effect using MPS AMP B2.1.17, "Inservice Inspection Program: Reactor Vessel Internals." The project team reviewed and accepted this program and its evaluation is documented in Section 7.1.16 of this report.

On the basis that the reactor vessel internals programs detect aging effects prior to the loss of mechanical integrity of these components, the project team finds that its use in lieu of a loose parts monitoring program is acceptable.

The project team finds that the applicant has demonstrated that the effects of aging will be adequately managed so that the intended functions will be maintained consistent with the CLB during the period of extended operation, as required by 10 CFR 54.21(a)(3).

7.3.1.3.3 Reactor Coolant System- Aging Management Evaluation (MPS Unit 3 LRA Table 3.1.2-3)

The project team reviewed the MPS Unit 3 LRA Table 3.1.2-3, which summarizes the results of AMR evaluations for the RCS component groups.

In MPS Unit 3 LRA Table 3.1.2-3, the applicant identified no aging effects for the following stainless steel, nickel-based alloy, and carbon steel component types of the RCS - flow elements, flow indicators, flow orifices, piping, tubing, valve; pressurizer nozzles, safe ends, and instruments and heaters (wells and sheathes), manway cover and insert; reactor coolant pressurizer relief tank, RCP seal coolers, RCP thermal barriers, RCP casing, RCP rupture disks - exposed externally to air. Air is not identified in the GALL Report as an environment for these components and materials.

The applicant states, in the MPS Unit 3 LRA, that the RCS stainless steel components are externally insulated. The applicant's UFSAR concludes (page 5-6) that the use of external thermal insulation of RCS in conformance with RG 1.36 provides reasonable assurance that the reactor coolant pressure boundary material will be adequately protected from conditions that would lead to loss of integrity from stress corrosion. Based on its review of the applicant's UFSAR, the project team agrees with the applicant that the RCS stainless steel components are adequately protected from conditions that could lead to loss of integrity from stress corrosion.

On the basis of its review of current industry research and operating experience, the project team finds that air on metal will not result in aging that will be of concern during the period of extended operation. These RCS components are exposed to high temperature internal flow, which creates a high temperature dry air environment, and general corrosion is not likely to occur under such an environment. Additionally, stainless steel and nickel-based alloys in a dry air environment are not susceptible to general corrosion that would affect the intended function of components. Therefore, the project team finds that there are no applicable aging effects requiring management for metal in a dry air environment.

In MPS Unit 3 LRA Table 3.1.2-3 (page 3-90), the applicant states that cracking of the CASS RCP thermal barrier exposed to treated water is to be managed by the chemistry control for primary systems program and the inservice inspection program: systems, components and supports program. The project team asked the applicant to clarify which part of the inservice inspection program is being credited with managing the aging effect for the RCP thermal barrier. The applicant responded as follows

> It was confirmed with the inservice inspection Coordinator that the inservice inspection program does not perform examinations associated with the thermal barriers. The work control process program is credited for managing the effects of aging for the reactor coolant pump thermal barriers. The reactor coolant pumps are refurbished, designated as spares, and reinstalled during future outages. Examples of work orders are identified where through the work control process program the thermal barriers associated with spare RCPs are blown down of the closed cooling water and a sample of the closed cooling water is taken. (See automated work orders M3-97-17720 through M3-97-17723.)

The applicant submitted a MPS letter, dated July 7, 2004 (ML04100407), and stated as follows in response to Audit Item 97

> Note 6 should be added for MPS Unit 3 LRA Table 3.1.2-3 (page 3-90) for the RCS component group 'RCP Thermal Barriers' and aging effect 'Loss of Fracture Toughness.' The Note for this item is revised by Item 42-1 of this clarification letter and is applicable to this component because it is CASS material.
>
> The "Inservice Inspection Program: Systems, Components and Supports" should be replaced by the "Work Control Process" for MPS Unit 3 Table 3.1.2-3 (page 3-90), for the RCS component group 'RCP Thermal Barriers' and aging effect 'Cracking.' The Note for this item should be "E" in the MPS Unit 3 LRA. Also, the "Discussion" column in Unit 3 Table 3.1.1, Item 3.1.1-36 (page 3-34), should read as follows:

> Not consistent with NUREG-1801. Cracking is managed with the Chemistry Control for Primary Systems program and the Inservice Inspection Program: Systems, Components and Supports except for the RCP Thermal Barriers, which are managed with chemistry, and the Work Control Process. These programs take some exceptions to the NUREG-1801 AMPs.

The project team reviewed the work control process program and the applicant's RRN-129, "Reactor Coolant Pump Motor Refurbishment Report for Millstone Unit," and determined that the applicant has demonstrated that the effects of aging of RCP thermal barriers will be adequately managed.

The project team reviewed thermal sleeves for the pressurizer surge nozzle and spray nozzle, MPS Unit 3 LRA Table 3.1.2-3 (page 3-92), and identified that the weld material is of nickel-based alloy 82/182 material and that these locations are not covered by the nickel-based alloy aging management activities. The applicant states that it will evaluate this area as part of extent of condition when responding to NRC Inspections and Enforcement Bulletin 2004-1, "Inspection of Alloy 82/182/600 Materials Used in the Fabrication of Pressurizer Penetrations and Steam Space Piping Connections at Pressurized-Water Reactors," dated May 28, 2004, as part of the CLB. This commitment is identified on the applicant's license renewal commitment list in the MPS Unit 3 LRA, Appendix A, Table A6.0-1, Item 15.

On the basis of its review of the MPS Unit 3 LRA commitment and Bulletin 2004-1, the project team determined that this issue is part of the CLB to be resolved with the applicant's response to Bulletin 2004-1.

7.3.1.3.4 Steam Generator - Aging Management Evaluation (MPS Unit 3 LRA Table 3.1.2-4)

The project team reviewed the MPS Unit 3 LRA Table 3.1.2-4, which summarizes the results of AMR evaluations for the steam generator component groups.

In MPS Unit 3 LRA Table 3.1.2-4, the applicant identified no aging effects for the following stainless steel and low-alloy steel component types of the steam generator - feedwater nozzle and safe end, lower head drain nozzle, primary manway cover and diaphragm, secondary manway and handhole covers, secondary-side nozzles (except main steam and feedwater), steam nozzle and safe end, top head, transition cone, and upper and lower shell - exposed externally to air. Air is not identified in the GALL Report as an environment for these components and materials.

On the basis of its review of current industry research and operating experience, the project team finds that dry air on metal will not result in aging that will be of concern during the period of extended operation. The external environments being referred to are typical of ambient air which is the reactor building air environment. Significant corrosion of low-alloy steel requires an electrolytic environment, and a simultaneous presence of oxygen and moisture. Without the presence of the aggressive environment, low-alloy steel components will experience insignificant amounts of corrosion, and no aging effects are applicable to this component/commodity group. Stainless steel is not susceptible to significant general corrosion

that would affect the intended function of components. Therefore, the project team finds that there are no applicable aging effects requiring management for metal in a dry air environment.

In MPS Unit 3 LRA Table 3.1.2-4, the applicant proposes to manage loss of material for the following stainless steel, carbon steel, low-alloy steel, and nickel-based alloy component types of steam generator - anti-vibration bars, divider plate, feedwater inlet ring and support, feedwater nozzle and safe end, lower head (and cladding), lower head drain nozzle, primary manway cover and diaphragm, primary nozzle and safe end, secondary manway and handhole covers, secondary-side nozzles (except main steam and feedwater), stay rod (including spacer pipes and nuts), steam nozzle and safe end, steam nozzle flow restrictor, top head, tube plugs, tube support plates, tube sheet (and cladding), upper and lower shell, and wrapper (includes jacking blocks, jacking block studs, anti-rotation block, and cone) - exposed to treated water/steam, borated water using the water chemistry control programs. Additionally, the tube sheet and steam generator U-tubes are managed by the steam generator structural integrity program. The project team accepted MPS AMP B2.1.5, “Chemistry Control for Primary Systems Program,” and MPS AMP B2.1.6, “Chemistry Control for Secondary Systems Program,” and its evaluation of these AMPs is documented in Section 7.1.5 and Section 7.1.6 of this report, respectively. The steam generator structural integrity program is reviewed by NRR DE and is evaluated in Section 3 of the SER related to the MPS Units 2 and 3 LRA.

On the basis of industry operating experience with this material and use of water chemistry control programs consistent with the GALL Report, the project team finds this to be acceptable.

In MPS Unit 3 LRA Table 3.1.2-4 (page 3-98), the applicant states that cracking of the nickel-based alloy steam generator primary manway cover and diaphragm is managed by MPS AMP B2.1.5,” Chemistry Control for Primary Systems Program.” During the audit and review, the project team asked the applicant to provide justification for using the chemistry control for primary systems program to prevent PWSCC. The applicant’s response is as follows

> Based on a review of the Bill of Materials (BOM) database, part number information, and the vendor technical manual (figure 8-3 sheet 2 of 2, Detail C), it was determined that MPS Unit 3 has stainless steel diaphragms (inserts) as part of the steam generator primary manway cover assemblies. The MPS Unit 3 LRA AMR Table currently identifies the diaphragm as a nickel-based alloy. The AMR Table needs to be revised to identify stainless steel in lieu of a nickel-based alloy for the diaphragms, and also clarify that the diaphragm is also referred to as an insert.

In a MPS LRA supplement letter dated July 7, 2004 (ML041900407), the applicant stated, in response to Audit Item 111, as follows

> The material "Nickel-based Alloy" should be "Stainless Steel" for the 'Primary Manway Cover and Diaphragm' component group in Unit 3 Table 3.1.2-4 (page 3-98).

The applicant also stated that the primary manway is not included in the inservice inspection program; however, the component is inspected each time manway is opened. On the basis of its review, the project team finds this to be acceptable.

In MPS Unit 3 LRA Table 3.1.2-4 (page 3-95), the applicant proposes to manage cracking for the nickel-based alloy divider plate exposed to borated water using water chemistry control programs. During the audit and review, the project team asked the applicant to provide justification for using the chemistry control for primary systems program to prevent PWSCC. The applicant's response is as follows

> The steam generator divider plate is located in the steam generator channel head and functions to direct reactor coolant flow through the steam generator tubes (flow distribution). The plate is welded to the primary side of the tube sheet and to the inside of the steam generator channel head. The divider plate material is ASTM SB-168 (Alloy 600) and the weld material is Alloy 82/182. The divider plate, and associated welds, do not penetrate the steam generator pressure-retaining boundary. Since the steam generator divider plates, and associated attachment welds, are not pressure retaining these components are not included within the scope of the MPS Unit 3 response to the generic issue related to Alloy 600 degradation (PWSCC). Cracking of the welds cannot result in leakage of borated water onto carbon steel pressure-retaining material, such that wastage due to boric acid corrosion will not occur. The intended function identified for the divider plate is flow distribution. Gross failure of the welds would be required before divider plate deflection that is sufficient to affect the intended function could occur. Additionally, there is no known industry operating experience with failures of steam generator divider plates or welds from PWSCC.

The applicant also states that this component is inspected under the steam generator inspection program. The project team reviewed the applicant's SP-31116, "Inservice Inspection of steam generators," Revision 008-01, and finds that the applicant adequately manages this aging effect.

In MPS Unit 3 Table 3.1.2.4, the applicant proposes to manage cracking of low alloy steel for the upper and lower shell, tubesheet, transition cone, top head, and feedwater/steam nozzle and safe end exposed externally to treated water/steam environment and cracking of low alloy steel for the upper support trunnions exposed externally to air using MPS AMP B2.1.18, "Inservice Inspection Program: Systems, Components and Supports." The project team reviewed inservice inspection program: systems, components and supports, and its evaluation of this program is documented in Section 7.1.17 of this report. On the basis of its review, the project team finds that this program is acceptable for managing this aging effect

All other AMRs assigned to the project team in Tables 3.1.2-1 through 3.1.2-4 were evaluated. The project team finds them to be acceptable.

7.3.2 MPS Unit 3 LRA Section 3.2 - Aging Management of Engineered Safety Features Systems

In MPS Unit 3 LRA Section 3.2, the applicant provides the results of its AMRs for components for the ESF systems.

In MPS Unit 3 LRA Tables 3.2.2-1 through 3.2.2-5 (Table 2s), the applicant provides a summary of the AMRs for component types associated with the following systems:

(1) containment recirculation; (2) quench spray ; (3) SI; (4) residual heat removal; and (5) fuel pool cooling and purification. The summary information for each component type included intended function; material; environment; aging effect requiring management; AMPs; the GALL Report Volume 2 item; cross reference to the MPS Unit 3 LRA Table 3.2.1 (Table 1); and generic and plant-specific notes related to consistency with the GALL Report.

Also, the applicant identified for each component type in MPS Unit 3 LRA Table 3.2.1 (Table 1) those components where further evaluation is recommended, those for which no further evaluation is required, and those that are not applicable to MPS Unit 3, together with the basis for their exclusion.

Additionally, the applicant identified In MPS Unit 3 LRA Tables 3.2.2-1 through 3.2.2-5, which AMR results it considered to be consistent with the GALL Report (table column Notes A through E) and which it justified on a different basis.

The AMRs that are within the scope of the project team audit and review are identified on copies of the MPS Unit 3 LRA Tables 3.2.2-1 through 3.2.2-5 which are included as an appendix to the MPS Units 2 and 3 audit and review plan.

The project team conducted its audit and review in accordance with SRP-LR Section 3.2.3 and the MPS Units 2 and 3 audit and review plan. The project team interviewed the applicant's technical staff and reviewed, in whole or in part, the documents listed in Attachment 5 of this report for Section 3.2, including MPS Unit 3 Technical Report, MP-LR-4412, "AMR for Engineered Safety Features," Revision 3, which provides the AMR results for the ESF systems.

7.3.2.1 Aging Management Review Results That Are Consistent With the GALL Report, for Which No Further Evaluation Is Required

For aging management evaluations that the applicant states are consistent with the GALL Report and for which further evaluation is not recommended, the project team conducted its audit and review to determine if the applicant's reference to the GALL Report in the MPS Unit 3 LRA is acceptable.

The project team reviewed the MPS Unit 3 LRA and MPS LRA supplement letter dated January 11, 2005 (ML050190289), to confirm that the applicant (1) provides a brief description of the system, components, materials, and environment; (2) states that the applicable aging effects have been reviewed and are evaluated in the GALL Report; and (3) identifies those aging effects for the ESF system components that are subject to an AMR.

7.3.2.1.1 Loss of Material Due to Boric Acid Corrosion

In the discussion section of MPS Unit 3 Table 3.2.1, Item 3.2.1-17, the applicant states that loss of material due to boric acid corrosion is managed by MPS AMP B2.1.3, "Boric Acid Corrosion Program," and MPS AMP B2.1.13, "General Condition Monitoring Program." The boric acid corrosion program includes specific inspections of reactor coolant pressure boundary and supporting systems components. The boric acid corrosion program is reviewed by NRR DE and is evaluated in Section 3 of the SER related to the MPS Units 2 and 3 LRA.

The general condition monitoring program provides inspections for management of loss of material due to boric acid corrosion beyond the scope of the boric acid corrosion program. During the audit and review, the project team asked the applicant for clarification regarding how loss of material for components not normally visible, or in infrequently accessed areas are managed by this program. Further clarification was requested on how identification, documentation, evaluation, and trending of boric acid leakage is performed under this program. The applicant stated to the project team that the general condition monitoring program is an extension of the boric acid corrosion program in that the general condition monitoring program inspections identify borated water leakage and then, through the corrective action program, the leak is assigned and evaluated by the boric acid corrosion program. When borated water leakage is identified by the general condition monitoring program, a condition report is written to identify the leak. During the daily review of the new condition reports, it is assigned to the boric acid corrosion program where it gets fully evaluated and repaired as required. This is the same process used to identify leaks in the boric acid corrosion program.

In the MPS Unit 3 LRA, the applicant states that for those areas identified as infrequently accessed areas, for the purposes of detecting boric acid leakage, entry into the area is performed often enough (at least once per refueling interval) to credit the general condition monitoring program. The one exception is the MPS Unit 3 demineralizer cubicles area. However, for this area, a video inspection is performed at least once per 10 years to verify the integrity of the equipment. There is reasonable assurance that this inspection interval will detect borated water leakage prior to the loss of intended function of the affected equipment. In addition, the inspection opportunities for the these cubicles will probably be more frequent than once per 10 years due to the need to perform corrective maintenance, filter changeout, etc. The MPS Unit 3 areas accessed at least once per refueling interval are typically observed by operations personnel during tagouts, health physics during general area surveys or a survey performed for upcoming work in the area, or during containment walkdowns as part of the boric acid corrosion program. The project team reviewed the general condition monitoring program and its evaluation is documented in Section 7.1.12 of this report. Based on the applicant's response and review of the general condition monitoring program, the project team finds that this program is acceptable for managing loss of material since visual inspection of external surfaces is performed during various walkdowns performed by plant personnel to look for boron buildup and/or boric acid leaks.

7.3.2.1.2 <u>Loss of Material Due to General Corrosion; Crack Initiation and Growth Due to Cyclic Loading and/or Stress Corrosion Cracking</u>

In Unit 3 LRA Table 3.2.1, Item 3.2.1-18, the applicant stated that bolting in the engineered safety features systems is not subject to wetted conditions, therefore, loss of material due to general corrosion is not expected. Additionally, cracking for bolting in engineered safety features systems is not identified as an aging effect requiring management.

The staff noted that SRP-LR Table 3.2-1 recommended GALL AMP XI.M18, "Bolting Integrity," for managing closure bolting in high pressure or high temperature system for loss of material due to general corrosion; crack initiation and growth due to cyclic loading and/or SCC.

The staff questioned the applicant whether all the resolution of generic safety issue for bolting, as stated in NUREG-1339, are addressed. By letter dated December 3, 2004 (ML043450341), the applicant submitted its LRA supplement. In its response, the applicant stated that it has

developed a specific bolting integrity aging management program that addresses degradation of bolting at MPS.

By letter dated January 11, 2005 (ML050190289), the applicant submitted its bolting aging management roll-up item. In its response, the applicant replaced the existing information in the "Discussion" column of Unit 3 LRA Table 3.2.1, Item 18 with "consistent with the NUREG-1801."

The project team reviewed the applicant's response and finds this acceptable since it is consistent with the GALL Report. The bolting integrity program is reviewed by NRR DE and its evaluation is documented in Section 3 of the SER related to the MPS Units 2 and 3 LRA.

On the basis of its audit and review, the project team determined that for AMRs not requiring further evaluation, as identified in MPS Unit 3 LRA Table 3.2.1 (Table 1), the applicant's references to the GALL Report are acceptable and no further project team review is required.

7.3.2.2 Aging Management Review Results That Are Consistent With the GALL Report, for Which Further Evaluation Is Recommended

For some line items consistent with the GALL Report in MPS Unit 3 LRA Tables 3.2.2-1 through 3.2.2-5, the GALL Report recommends further evaluation. When further evaluation is recommended, the project team reviewed these further evaluations provided in MPS Unit 3 LRA Section 3.2.2.2 against the criteria provided in the SRP-LR Section 3.2.2.2. The following provides the project team's assessments of these evaluations. These project team assessments are applicable to each Table 2 line item in Section 3.2 citing the item in Table 1.

The MPS Unit 3 LRA sections identified in MPS Unit 3 LRA Table 3.2.1 for which further evaluation is recommended are discussed below.

7.3.2.2.1 Cumulative Fatigue Damage (MPS Unit 3 LRA Section 3.2.2.2.1)

MPS Unit 3 LRA Section 3.2.2.2.1 is reviewed by NRR DE staff and addressed in Section 4 of the SER related to the MPS Units 2 and 3 LRA.

7.3.2.2.2 Loss of Material Due to General Corrosion (MPS Unit 3 LRA Section 3.2.2.2.2)

The project team reviewed MPS Unit 3 LRA Section 3.2.2.2.2 against the criteria in SRP-LR Section 3.2.2.2.2.

In MPS Unit 3 LRA Section 3.2.2.2.2, the applicant addresses loss of material due to general corrosion that could occur in the containment spray, containment isolation valves and associated piping, and the external surfaces of carbon steel components.

SRP-LR Section 3.2.2.2.2 states that loss of material due to general corrosion could occur in the containment spray, containment isolation valves and associated piping, and the external surfaces of carbon steel components. The GALL Report recommends further evaluation on a plant-specific basis to ensure that the aging effect is adequately managed.

The applicant states, in the MPS Unit 3 LRA, that for loss of material from internal surfaces, this item applies to carbon steel containment spray headers, nozzles, and valves and to carbon

steel containment isolation piping and valves. The containment spray headers, nozzles, and valves and containment isolation components in the ESF systems are constructed of stainless steel and are not subject to loss of material due to general corrosion. Containment isolation components associated with other plant systems are evaluated for the effects of aging along with the host system to which they are assigned.

For loss of material from external surfaces, this item applies to carbon steel ESF components. Loss of material from external surfaces due to general corrosion is applicable to carbon steel (including cast iron and low-alloy steel) components in an air environment when exposed to intermittent wetting conditions. For these components, loss of material from external surfaces is managed by MPS AMP B2.1.13, "General Condition Monitoring Program."

The project team finds that loss of materials due to general corrosion does not apply to stainless steel components.

The project team reviewed the general condition monitoring program and its evaluation is documented in Section 7.1.12 of this report. The project team finds that the general condition monitoring program is acceptable for managing loss of material due to general corrosion on external surfaces of carbon steel components since visual inspections will be performed on external surfaces to detect any sign of aging degradation.

On the basis of its review of the general condition monitoring program, the project team finds that the applicant has appropriately evaluated AMR results involving management of the loss of material due to general corrosion, as recommended in the GALL Report.

7.3.2.2.3 Local Loss of Material Due to Pitting and Crevice Corrosion (MPS Unit 3 LRA Section 3.2.2.2.3)

The project team reviewed MPS Unit 3 LRA Section 3.2.2.2.3 against the criteria in SRP-LR Section 3.2.2.2.3.

In MPS Unit 3 LRA Section 3.2.2.2.3, the applicant addresses local loss of material from pitting and crevice corrosion that could occur in the containment spray components, containment isolation valves and associated piping, and the buried portion of the RWST external surfaces.

SRP-LR Section 3.2.2.2.3 states that local loss of material from pitting and crevice corrosion could occur in the containment spray components, containment isolation valves and associated piping, and the buried portion of the refueling water tank external surfaces. The GALL Report recommends further evaluation to ensure that the aging effect is adequately managed.

The applicant states containment isolation components are potentially subject to loss of material due to pitting and crevice corrosion. Loss of material for these components is managed by MPS AMP B2.1.5, "Chemistry Control for Primary Systems Program," or for those components in a raw water environment, by MPS AMP B2.1.25, "Work Control Process."

Also, the external bottom surface of the RWST is potentially subject to loss of material due to pitting and crevice corrosion. Loss of material of the external surface of the RWST bottom is managed by MPS AMP B2.1.24, "Tank Inspection Program."

The applicant states, in the MPS Unit 3 LRA, that the chemistry control for primary systems program is consistent with GALL with an exception. The project team reviewed the chemistry control for primary systems program, with the exception, and its evaluation is documented in Section 7.1.4 of this report. The exception relates to use of a later, non-NRC approved revision of the EPRI guidelines. On the basis of its review, the project team finds the chemistry control for primary systems program acceptable for managing this aging effect for the above components.

The project team reviewed the work control process program and its evaluation is documented in Section 7.1.21 of this report. The project team finds that the work control process program provides the opportunity to visually inspect the internal surfaces of components during preventive and corrective maintenance activities on an ongoing basis. The work control process program also provides input to the corrective action program if aging effects are identified. On the basis of its review, the project team finds that the work control process program is acceptable for managing the aging effect of loss of materials.

The project team reviewed the tank inspection program, which includes an enhancement to measure wall thickness to detect significant loss of material of the RWST bottom surface, and its evaluation is documented in Section 7.1.21 of this report. On the basis of its review, the project team finds the program to be acceptable for managing loss of material due to pitting and crevice corrosion.

7.3.2.2.4 Local Loss of Material Due to Microbiologically Influenced Corrosion (MPS Unit 3 LRA Section 3.2.2.2.4)

The project team reviewed MPS Unit 3 LRA Section 3.2.2.2.4 against the criteria in SRP-LR Section 3.2.2.2.4.

In MPS Unit 3 LRA Section 3.2.2.2.4, the applicant addresses local loss of material due to MIC.

SRP-LR Section 3.2.2.2.4 states that local loss of material due to MIC could occur in containment isolation valves and associated piping in systems that are not addressed in other chapters of the GALL Report. The GALL Report recommends further evaluation to ensure that the aging effect is adequately managed.

The applicant states, in the MPS Unit 3 LRA, that containment isolation components are potentially subject to loss of material due to MIC. Loss of material for these components is managed by MPS AMP B2.1.5, “Chemistry Control for Primary Systems Program,” or for those components in a raw water environment, by MPS AMP B2.1.25, “Work Control Process.”

The applicant states, in the MPS Unit 3 LRA, that the chemistry control for primary systems program is consistent with GALL with an exception. The project team reviewed the chemistry control for primary systems program, with the exception, and its evaluation is documented in Section 7.1.4 of this report. The exception relates to use of a later, non-NRC approved revision of the EPRI guidelines. On the basis of its review, the project team finds the chemistry control for primary systems program to be acceptable for managing this aging effect for the above components.

The project team reviewed the work control process program and its evaluation is documented in Section 7.1.21 of this report. The project team finds that the work control process program provides the opportunity to visually inspect the internal surfaces of components during preventive and corrective maintenance activities on an ongoing basis. The work control process program also provides input to the corrective action program if aging effects are identified. On the basis of its review, the project team finds that the work control process program is acceptable for managing the aging effect of loss of materials.

7.3.2.2.5 Changes in Material Properties Due to Elastomer Degradation (MPS Unit 3 LRA Section 3.2.2.2.5)

The project team reviewed MPS Unit 3 LRA Section 3.2.2.2.5 against the criteria in SRP-LR Section 3.2.2.2.5.

In MPS Unit 3 LRA Section 3.2.2.2.5, the applicant addresses the changes in material properties due to elastomer degradation that could occur in seals associated with the standby gas treatment system ductwork and filters. The standby gas treatment system applies to BWRs only.

SRP-LR Section 3.2.2.2.5 states that the changes in properties due to elastomer degradation could occur in seals associated with the standby gas treatment system ductwork and filters. The GALL Report recommends further evaluation to ensure that the aging effect is adequately managed.

The applicant states, in the MPS Unit 3 LRA, that this issue applies to BWRs only.

The project team finds that this aging effect is applicable to BWRs only and is not applicable to MPS Unit 3.

7.3.2.2.6 Local Loss of Material Due to Erosion (MPS Unit 3 LRA Section 3.2.2.2.6)

The project team reviewed MPS Unit 3 LRA Section 3.2.2.2.6 against the criteria in SRP-LR Section 3.2.2.2.6.

In MPS Unit 3 LRA Section 3.2.2.2.6, the applicant addresses local loss of material due to erosion that could occur in the HPSI miniflow orifice.

SRP-LR Section 3.2.2.2.6 states that local loss of material due to erosion could occur in the HPSI pump miniflow orifice. This aging mechanism and its effect will apply only to pumps that are normally used as charging pumps in the CVCS. The GALL Report recommends further evaluation to ensure that the aging effect is adequately managed.

The applicant states, in the MPS Unit 3 LRA, that loss of material due to erosion of the charging pump miniflow recirculation orifices is managed by MPS AMP B2.1.25, “Work Control Process.”

The project team reviewed the work control process program and its evaluation is documented in Section 7.1.22 of this report. The project team finds that the work control process program provides the opportunity to visually inspect the internal surfaces of components during preventive and corrective maintenance activities on an ongoing basis. It also provides input to

the corrective action program if aging effects are identified. On the basis of its review, the project team finds that the work control process program is acceptable for managing the aging effects of loss of materials.

7.3.2.2.7 Buildup of Deposits Due to Corrosion (MPS Unit 3 LRA Section 3.2.2.2.7)

The project team reviewed MPS Unit 3 LRA Section 3.2.2.2.7 against the criteria in SRP-LR Section 3.2.2.2.7.

In MPS Unit 3 LRA Section 3.2.2.2.7, the applicant addresses the plugging of components due to general corrosion that could occur in the spray nozzles and flow orifices of the drywell and suppression chamber spray system. The drywell and suppression chamber spray system applies to BWRs only.

SRP-LR Section 3.2.2.2.7 states that the plugging of components due to general corrosion could occur in the spray nozzles and flow orifices of the drywell and suppression chamber spray system of BWRs.

The applicant states, in the MPS Unit 3 LRA, that this aging effect applies to BWRs only.

The project team finds that this aging effect is not applicable to MPS Unit 3.

7.3.2.2.8 Quality Assurance for Aging Management of Non-safety-related Components (MPS Unit 3 LRA Section 3.2.2.2.8)

MPS Unit 3 LRA Section 3.2.2.2.8 is reviewed by NRR DIPM staff and addressed in Section 3 of the SER related to the MPS Units 2 and 3 LRA.

7.3.2.3 Aging Management Review Results That Are Not Consistent with the GALL Report or Are Not Addressed in the GALL Report

In MPS Unit 3 LRA Tables 3.2.2-1 through 3.1.2-5, the project team reviewed additional details of the results of the AMRs for material, environment, aging effect requiring management, and AMP combinations that are not consistent with the GALL Report or are not addressed in the GALL Report. The project team also reviewed additional systems and components, provided in MPS LRA supplement letter January 11, 2005 (ML050190289).

7.3.2.3.1 Containment Recirculation - Aging Management Evaluation (MPS Unit 3 LRA Table 3.2.2-1)

The project team reviewed Table 3.2.2-1 of the MPS Unit 3 LRA, which summarizes the results of AMR evaluations for the containment recirculation component groups.

The applicant, in the MPS Unit 3 LRA, has identified no aging effect for low-alloy and stainless steel components exposed to air, including bolting, expansion joints, flow elements, flow indicators, hoses, pipe, pump seal coolers, pump seal head tanks, pumps, restricting orifices, spray nozzles, TSP baskets, tubing, and valve component types. Air is not identified in the GALL Report as an environment for these components and materials.

On the basis of its review of current industry research and operating experience, the project team finds that air on low-alloy and stainless steel components will not result in aging that will be of concern during the period of extended operation. The external environments being referred to are typical of ambient air, e.g., under a shelter, indoor, or air-conditioned enclosure or room. Significant corrosion of low-alloy steel requires an electrolytic environment, and a simultaneous presence of oxygen and moisture. Without the presence of the aggressive environment, therefore, low-alloy steel components will experience insignificant amounts of corrosion, and no aging effects would be applicable to this component/commodity group. Wrought austenitic stainless steels are not susceptible to significant general corrosion that would affect the intended function of components. Therefore, the project team finds that it did not identify any concerns with the applicant's conclusions that there are no applicable aging effects requiring management for metal in an air environment.

In the MPS Unit 3 LRA, the applicant proposes to manage loss of material of stainless steel flow indicators, hoses, piping, tubing, and valve component types exposed to chemically treated borated water using only MPS AMP B2.1.5, "Chemistry Control for Primary Systems Program," which is consistent with GALL AMP XI.M2, "Water Chemistry," with an exception. The project team reviewed the chemistry control for primary systems program, with an exception, and its evaluation is documented in Section 7.1.4 of this report. The exception relates to use of a later, non-NRC approved revision of the EPRI guidelines. The project team finds that because the effects of pitting and crevice corrosion on stainless steel components are not significant in chemically treated borated water, inspection of selected components to verify the absence of loss of material is not required. On the basis of its review, the project team finds the chemistry control for primary systems program to be acceptable for managing this aging effect.

In the MPS Unit 3 LRA, the applicant proposes to manage loss of material of stainless steel containment recirculation coolers (shell) component types exposed to a moisture-laden air and/or intermittently wetted environment using MPS AMP B2.1.13, "General Condition Monitoring." This is a plant-specific program. The project team reviewed the general condition monitoring program and its evaluation is documented in Section 7.1.12 of this report. On the basis of its review, the project team finds that the general condition monitoring program is acceptable for managing loss of material due to pitting and crevice corrosion since visual inspections will be performed on external surfaces to detect any sign of aging degradation.

In the MPS Unit 3 LRA, the applicant proposes to manage loss of material of copper alloy containment recirculation coolers (tubes) component types exposed externally to a moisture-laden air and/or intermittently wetted environment using MPS AMP B2.1.25, "Work Control Process." This is a plant-specific program. The project team reviewed the work control process program and its evaluation is documented in Section 7.1.22 of this report. The project team finds that visual inspections of the internal and external surfaces of plant components and plant commodities are performed during the performance of maintenance, in accordance with the work control process program, to determine the presence of loss of material. On the basis of its review, the project team finds that the work control process program is acceptable for managing loss of material due to general corrosion since visual inspections will be performed on external surfaces of components to detect any sign of aging degradation.

In the MPS Unit 3 LRA, the applicant proposes to manage loss of material of stainless steel containment recirculation coolers (shell), expansion joints, flow elements, pipe, and restricting orifices component types exposed internally to a moisture-laden air and/or intermittently wetted

environment using MPS AMP B2.1.25, "Work Control Process." This is a plant-specific program. The project team reviewed the work control process program and its evaluation is documented in Section 7.1.22 of this report. The project team finds that visual inspections of the internal and external surfaces of plant components and plant commodities are performed during the performance of maintenance, in accordance with the work control process program, to determine the presence of loss of material. On the basis of its review, the project team finds that the work control process program is acceptable for managing loss of material due to general corrosion since visual inspections will be performed on internal surfaces of components to detect any sign of aging degradation.

In the MPS Unit 3 LRA, the applicant proposes to manage loss of material of copper alloy containment recirculation coolers (tubes) component types exposed internally to a moisture-laden air and/or intermittently wetted environment using MPS AMP B2.1.21, "Service Water System (Open-Cycle Cooling)," with exceptions. The applicant states, in the MPS Unit 3 LRA, that the tube side and the shell side of the containment recirculation coolers are in dry lay-up except when testing. The applicant's exception to this line item relates to flushing and testing "infrequently used cooling loops," which is recommended in the GALL Report. Since these coolers are maintained in a dry lay-up condition, no mechanism exists for tube-side fouling. This does not have any impact on loss of material. In addition, the applicant states that this program is consistent with GALL AMP XI.M20, "Open-Cycle Cooling Water System," which includes routine inspection and a maintenance program to ensure that corrosion cannot degrade the performance of safety-related systems serviced by open-cycle cooling water. The project team reviewed the service water system (open-cycle cooling) program and its evaluation is documented in Section 7.1.19 of this report. On the basis of its review, the project team finds that this program is acceptable for managing this aging effect.

In the MPS Unit 3 LRA, the applicant proposes to manage loss of material of stainless steel pipe, pump, and valve component types exposed internally to raw water using MPS AMP B2.1.25, "Work Control Process." The applicant states, as documented in MPS Unit 3 Technical Report, MP-LR-4412, that the system drains going into the containment sump are assumed to contain raw water because of the potential contaminants and lack of chemistry control. The project team noted that this is different than the raw water used in open-cycle cooling systems. The applicant states per Note H that the aging effect is not in NUREG-1801 for this component, material, and environment combination. Visual inspections of the internal surfaces of plant components and plant commodities are performed during the performance of maintenance, in accordance with the work control process program, to determine the presence of loss of material. The project team reviewed the work control process program and its evaluation is documented in Section 7.1.22 of this report. On the basis of its review, the project team finds that the work control process program is acceptable for managing loss of material since visual inspections will be performed on internal surfaces of components to detect any sign of aging degradation.

7.3.2.3.2 <u>Quench Spray - Aging Management Evaluation (MPS Unit 3 LRA Table 3.2.2-2 and Table 3.2.2-2a)</u>

The project team reviewed Table 3.2.2-2 of the MPS Unit 3 LRA and Table 3.2.2-2a of the MPS LRA supplement letter dated January 11, 2005 (ML050190289), which summarizes the results of AMR evaluations for the quench spray system component groups.

The applicant, in the MPS Unit 3 LRA, has identified no aging effect for low-alloy and stainless steel components exposed to air, including bolting, flow elements, pipe, pumps, spray nozzles, tubing, and valve component types. Air is not identified in the GALL Report as an environment for these components and materials.

On the basis of its review of current industry research and operating experience, the project team finds that air on metal will not result in aging that will be of concern during the period of extended operation. The external environments being referred to are typical of ambient air, e.g., under a shelter, indoor, or air-conditioned enclosure or room. Significant corrosion of low-alloy steel requires an electrolytic environment, and a simultaneous presence of oxygen and moisture. Without the presence of the aggressive environment, therefore, low-alloy steel components will experience insignificant amounts of corrosion, and no aging effects would be applicable to this component/commodity group. Wrought austenitic stainless steels are not susceptible to significant general corrosion that would affect the intended function of components. Therefore, the project team concurs with the applicant's conclusions that there are no applicable aging effects requiring management for metal in an air environment.

In the MPS Unit 3 LRA, the applicant proposes to manage loss of material of stainless steel flow elements, pipe, pump, tubing, and valve component types exposed to chemically treated borated water using only MPS AMP B2.1.5, "Chemistry Control for Primary Systems Program," which is consistent with GALL AMP XI.M2, "Water Chemistry," with an exception. The project team reviewed the chemistry control for primary systems program and its evaluation is documented in Section 7.1.4 of this report. The exception relates to use of a later, non-NRC approved revision of the EPRI guidelines. The project team finds that because the effects of pitting and crevice corrosion on stainless steel components are not significant in chemically treated borated water, inspection of selected components to verify the absence of loss of material is not required. On the basis of its review, the project team finds this program to be acceptable for managing the aging effects for the above components.

In the MPS Unit 3 LRA, the applicant proposes to manage loss of material of stainless steel pipe exposed externally to a damp soil environment using MPS AMP B2.1.4, "Buried Piping Inspection Program." The applicant states that this program is consistent with GALL AMP XI.M28, "Buried Piping and Tanks Surveillance," and GALL AMP XI.M34, "Buried Piping and Tanks Inspection," with exceptions and enhancements. The project team reviewed the buried piping inspection program, with the exceptions and enhancements, and its evaluation is documented in Section 7.1.3 of this report. The project team finds that this program includes a baseline inspection of a representative sample of piping with different protective measures and inspections of buried components when piping is excavated during maintenance or for any other reason. On the basis of its review, the project team finds that the program is acceptable for managing loss of material of stainless steel pipe in a damp soil external environment.

In the MPS Unit 3 LRA and the MPS LRA supplement letter dated January 11, 2005 (ML050190289), the applicant proposes to manage (1) loss of material of stainless steel restricting orifice component types exposed externally to a moisture-laden air and/or intermittently wetted environment and (2) loss of loss of material of stainless steel refueling water coolers (channel head) using MPS AMP B2.1.13, "General Condition Monitoring." This is a plant-specific program. The project team reviewed the general condition monitoring program and its evaluation is documented in Section 7.1.12 of this report. On the basis of its review, the project team finds that the general condition monitoring program is acceptable for managing

loss of material due to pitting and crevice corrosion since visual inspections will be performed on external surfaces to detect any sign of aging degradation.

7.3.2.3.3 Safety Injection - Aging Management Evaluation (MPS Unit 3 LRA Table 3.2.2-3 and Table 3.2.2-3a)

The project team reviewed Table 3.2.2-3 of the MPS Unit 3 LRA and Table 3.2.2-3 a of the MPS LRA supplement letter dated January 11, 2005 (ML050190289), which summarizes the results of AMR evaluations for the safety injection system component groups.

The applicant, in the MPS Unit 3 LRA and in MPS LRA supplement letter dated January 11, 2005 (ML050190289), has identified no aging effect for carbon steel, cast iron, stainless steel, and CASS components exposed to air, including filters/strainers, flow elements, pipe, pumps, restricting orifices, SI accumulator tanks (carbon steel with stainless steel cladding), SI pump lube oil coolers (shell), SI pump lube oil reservoirs, tubing, valve, and hydro test pump component types. Air is not identified in the GALL Report as an environment for these components and materials.

On the basis of its review of current industry research and operating experience, the project team finds that air on metal will not result in aging that will be of concern during the period of extended operation. The external environments being referred to are typical of ambient air, e.g., under a shelter, indoor, or air-conditioned enclosure or room. Significant corrosion of carbon steel requires an electrolytic environment, and a simultaneous presence of oxygen and moisture. Significant corrosion of carbon steel in an ambient air environment also requires the components to be subject to condensation. Without the presence of the aggressive environment, therefore, carbon steel components will experience insignificant amounts of corrosion, and no aging effects would be applicable to this component/commodity group. Wrought austenitic stainless steels and CASS are not susceptible to significant general corrosion that would affect the intended function of components. Therefore, the project team finds that it did not identify any concerns with the applicant's conclusions that there are no applicable aging effects requiring management for metal in an air environment.

In the MPS Unit 3 LRA, the applicant proposes to manage loss of material of stainless steel pipe exposed externally to a damp soil environment using MPS AMP B2.1.4, "Buried Piping Inspection Program." The applicant states that this program is consistent with GALL AMP XI.M28, "Buried Piping and Tanks Surveillance," and GALL AMP XI.M34, "Buried Piping and Tanks Inspection," with exceptions and enhancements. The project team reviewed the buried piping inspection program, with the exceptions and enhancements, and its evaluation is documented in Section 7.1.3 of this report. The project team finds that this program includes a baseline inspection of a representative sample of piping with different protective measures and inspections of buried components when piping is excavated during maintenance or for any other reason. On the basis of its review, the project team finds that this program is acceptable for managing loss of material of stainless steel pipe exposed externally to a damp soil environment.

The applicant, in the MPS Unit 3 LRA, has identified no aging effect for carbon and stainless steel components exposed internally to gas, including pipe, SI accumulator tanks (carbon steel with stainless steel cladding), and valve component types. Gas is not identified in the GALL Report as an environment for these components and materials.

On the basis of its review of current industry research and operating experience, the project team finds that an internal environment of gas (which is similar to air) on metal will not result in aging that will be of concern during the period of extended operation. Therefore, the project team concurs with the applicant's conclusion that there are no applicable aging effects requiring management for metal in a gas environment.

In the MPS Unit 3 LRA, the applicant proposes to manage loss of material of stainless steel SI pump lube oil coolers (channel head) component types exposed to atmosphere/weather using MPS AMP B2.1.13, "General Condition Monitoring." This is a plant-specific program. The project team reviewed the general condition monitoring program and its evaluation is documented in Section 7.1.12 of this report. On the basis of its review, the project team finds that the general condition monitoring program is acceptable for managing loss of material due to pitting and crevice corrosion since visual inspections will be performed on external surfaces to detect any sign of aging degradation.

In the MPS Unit 3 LRA, the applicant proposes to manage loss of material of carbon steel, cast iron, and stainless steel filter/strainer, SI pump lube oil coolers (shell), SI pump lube oil coolers (tubes), SI pump lube oil coolers (tube sheet), and SI pump lube oil reservoirs component types exposed internally to oil, and in some cases externally to oil, using MPS AMP B2.1.25, "Work Control Process." The project team reviewed the work control process program and its evaluation is documented in Section 7.1.22 of this report. The project team finds that visual inspections of internal surfaces of components are performed during the performance of maintenance to determine the presence of loss of material. Oil samples are analyzed periodically for contaminants that would indicate degradation. On the basis of its review, the project team finds that the program is acceptable for managing loss of materials for the above components.

In the MPS Unit 3 LRA, the applicant proposes to manage loss of materials of copper alloy SI pump lube oil coolers (tubes) component types in an environment of treated closed-cycle cooling water using MPS AMP B2.1.7, "Closed-Cycle Cooling Water System." The CCCW system program is consistent with GALL AMP X.IM21, "Closed-Cycle Cooling Water Systems," with an exception. The project team reviewed the CCCW system program, with the exception, and its evaluation is documented in Section 7.1.6 of this report. On the basis of its review, the project team finds that this program, with the exception, is acceptable for managing loss of material of components in the treated water environment that are serviced by the CCCW system.

7.3.2.3.4 Residual Heat Removal - Aging Management Evaluation (MPS Unit 3 LRA Table 3.2.2-4)

The project team reviewed Table 3.2.2-4 of the MPS Unit 3 LRA, which summarizes the results of AMR evaluations for the residual heat removal system component groups.

The applicant, in the MPS Unit 3 LRA, has identified no aging effect for carbon steel, stainless steel, and CASS components exposed to air, including flow elements, pipe, pumps, residual heat removal heat exchangers (channel head), tubing, and valve component types. Air is not identified in the GALL Report as an environment for these components and materials.

On the basis of its review of current industry research and operating experience, the project team finds that air on metal will not result in aging that will be of concern during the period of extended operation. The external environments being referred to are typical of ambient air, e.g., under a shelter, indoor, or air-conditioned enclosure or room. Significant corrosion of carbon steel requires an electrolytic environment, and a simultaneous presence of oxygen and moisture. Significant corrosion of carbon steel in an ambient air environment also requires the components to be subject to condensation. Without the presence of the aggressive environment, therefore, carbon steel components will experience insignificant amounts of corrosion, and no aging effects would be applicable to this component/commodity group. Wrought austenitic stainless steels and CASS are not susceptible to significant general corrosion that would affect the intended function of components. Therefore, the project team concurs with the applicant's conclusion that there are no applicable aging effects requiring management for metal in an air environment.

In the MPS Unit 3 LRA, the applicant proposes to manage loss of material of stainless steel residual heat removal heat exchanger (tubes) component types exposed internally to treated water using MPS AMP B2.1.25, "Work Control Process." The project team reviewed the work control process program and its evaluation is documented in Section 7.1.22 of this report. The project team finds that visual inspections of the internal surfaces of plant components and plant commodities are performed during the performance of maintenance, in accordance with the work control process program, to determine the presence of loss of material. On the basis of its review, the project team finds that the work control process program is acceptable for managing loss of material since visual inspections will be performed on internal surfaces of components to detect any sign of aging degradation.

7.3.2.3.5 <u>Fuel Pool Cooling and Purification - Aging Management Evaluation (MPS Unit 3 LRA Table 3.2.2-5 and Table 3.2.2-5a)</u>

The project team reviewed Table 3.2.2-5 of the MPS Unit 3 LRA and Table 3.2.2-5a of the MPS LRA supplement letter dated January 11, 2005 (ML050190289), which summarizes the results of AMR evaluations for the fuel pool cooling and purification system component groups.

The applicant, in the MPS Unit 3 LRA and the MPS LRA supplement letter dated January 11, 2005 (ML050190289), the applicant identified no aging effect for low-alloy and stainless steel components exposed to air, including bolting, flow elements, fuel pool coolers (channel head), pipe, pumps, tubing, valve, fuel pool demineralizer, fuel pool post filter, and strainers component types. Air is not identified in the GALL Report as an environment for these components and materials.

On the basis of its review of current industry research and operating experience, the project team finds that air on metal will not result in aging that will be of concern during the period of extended operation. The external environments being referred to are typical of ambient air, e.g., under a shelter, indoor, or air-conditioned enclosure or room. Therefore, the project team concurs with the applicant's conclusion that there are no applicable aging effects requiring management for metal in an air environment.

In the MPS Unit 3 LRA, the applicant proposes to manage loss of material of stainless steel flow elements and fuel pool coolers (channel head) component types exposed to chemically treated borated water using only MPS AMP B2.1.5, "Chemistry Control for Primary Systems

Program," which is consistent with GALL AMP XI.M2, "Water Chemistry," with an exception. The project team reviewed the chemistry control for primary systems program and its evaluation is documented in Section 7.1.4 of this report. The exception relates to use of a later, non-NRC approved revision of the EPRI guidelines. The project team finds that because the effects of pitting and crevice corrosion on stainless steel components are not significant in chemically treated borated water, inspection of selected components to verify the absence of loss of material is not required. On the basis of its review, the project team finds this program to be acceptable for managing the aging effects for the above components.

All other AMRs assigned to the project team in Tables 3.2.2-1 through 3.2.2-5 were evaluated. The project team finds them to be acceptable.

7.3.3 MPS Unit 3 LRA Section 3.3 - Aging Management of Auxiliary Systems

In MPS Unit 3 LRA Section 3.3, the applicant provides the results of its AMRs for components for the auxiliary systems.

In MPS Unit 3 LRA Tables 3.3.2-1 through 3.3.2-50 (Table 2s), the applicant provides a summary of the AMRs for component types associated with the following systems: (1) circulating water; (2) service water; (3) sodium hypochlorite; (4) reactor plant component cooling; (5) turbine plant component cooling water; (6) chilled water; (7) charging pumps cooling; (8) SI pumps cooling; (9) neutron shield tank cooling; (10) containment atmosphere monitoring; (11) containment instrument air; (12) instrument air; (13) nitrogen; (14) service air; (15) CVCS; (16) reactor plant sampling; (17) primary grade water; (18) auxiliary building ventilation; (19) circulating and service water pumphouse ventilation; (20) containment air recirculation; (21) containment purge air; (22) containment leakage monitoring; (23) containment vacuum; (24) control building ventilation; (25) CRDM ventilation and cooling; (26) emergency generator enclosure ventilation; (27) ESF building ventilation; (28) fuel building ventilation; (29) hydrogen recombiner and hydrogen recombiner building HVAC; (30) main steam valve building ventilation; (31) service building ventilation and air-conditioning; (32) SBO diesel generator building ventilation; (33) supplementary leak collection and release; (34) turbine building area ventilation; (35) waste disposal building ventilation; (36) Unit 2 fire protection; (37) Unit 3 fire protection; (38) domestic water; (39) emergency diesel generators; (40) emergency diesel generator fuel oil; (41) SBO diesel generator; (42) security; (43) boron recovery; (44) radioactive liquid waste recovery; (45) radioactive gaseous waste; (46) post-accident sampling; (47) radioactive solid waste; (48) reactor plant aerated drains; (49) reactor plant gaseous drains; and (50) sanitary water. The summary information for each component type included intended function; material; environment; aging effect requiring management; AMPs; the GALL Report Volume 2 item; cross reference to the MPS Unit 3 LRA Table 3.3.1 (Table 1); and generic and plant-specific notes related to consistency with the GALL Report.

Also, the applicant identified for each component type in MPS Unit 3 LRA Table 3.3.1 (Table 1) those components where further evaluation is recommended, those for which no further evaluation is required, and those that are not applicable to MPS Unit 3, together with the basis for their exclusion.

Additionally, the applicant identified in MPS Unit 3 LRA Tables 3.3.2-1 through 3.3.2-50, which AMR results it considered to be consistent with the GALL Report (table column Notes A through E) and which it justified on a different basis.

The AMRs that are within the scope of the project team audit and review are identified on copies of the MPS Unit 3 LRA Tables 3.3.2-1 through 3.3.2-50 which are included as an appendix to the MPS Units 2 and 3 audit and review plan.

The project team conducted its audit and review in accordance with SRP-LR Section 3.3.3 and the MPS Units 2 and 3 audit and review plan.

7.3.3.1 Aging Management Review Results That Are Consistent With the GALL Report, for Which No Further Evaluation Is Required

For aging management evaluations that the applicant states are consistent with the GALL Report and for which further evaluation is not recommended, the project team conducted its audit and review to determine if the applicant's reference to the GALL Report in the MPS Unit 3 LRA is acceptable.

The project team reviewed the MPS Unit 3 LRA and the information in the MPS LRA supplement letter dated January 11, 2005 (ML050190289), to confirm that the applicant (1) provides a brief description of the system, components, materials, and environment; (2) states that the applicable aging effects have been reviewed and are evaluated in the GALL Report; and (3) identifies those aging effects for the auxiliary system components that are subject to an AMR.

7.3.3.1.1 Loss of Material Due to Boric Acid Corrosion

In the discussion section of MPS Unit 3 LRA Table 3.3.1, Item 3.3.1-14, the applicant states that loss of material due to boric acid corrosion is managed by MPS AMP B2.1.3, "Boric Acid Corrosion Program," and MPS AMP B2.1.13, "General Condition Monitoring Program." The boric acid corrosion program includes specific inspections of reactor coolant pressure boundary and supporting systems components. The boric acid corrosion program is reviewed by NRR DE and is evaluated in Section 3 of the SER related to the MPS Units 2 and 3 LRA.

In the MPS Unit 3 LRA, the applicant states that the general condition monitoring program provides inspections for management of loss of material due to boric acid corrosion beyond the scope of the boric acid corrosion program. The project team asked the applicant for clarification of how loss of material for components not normally visible, or in infrequently accessed areas, is managed by this program. Further clarification was requested on how identification, documentation, evaluation, and trending of boric acid leakage is performed under this program. The applicant stated to the project team that the general condition monitoring program is an extension of the boric acid corrosion program in that it identifies borated water leakage during inspections and then, through the corrective action program, the leak is assigned and evaluated by the boric acid corrosion program. When borated water leakage is identified by the general condition monitoring program, a condition report is written to identify the leak. During the daily review of the new condition reports, it is assigned to the boric acid corrosion program where it gets fully evaluated and repaired as required. This is the same process used to identify leaks in the boric acid corrosion program.

For those areas identified as infrequently accessed areas, for the purposes of detecting boric acid leakage, entry into the area is performed often enough (at least once per refueling interval) to credit the general condition monitoring program. The one exception is the Unit 3 demineralizer cubicles area. However, for this area, a video inspection is performed at least once per 10 years to verify the integrity of the equipment. There is reasonable assurance that this inspection interval will detect borated water leakage prior to the loss of intended function of the affected equipment. In addition, the inspection opportunities for these cubicles will probably be more frequent than once per 10 years due to the need to perform corrective maintenance, filter changeout, etc. The Unit 3 areas accessed at least once per refueling interval are typically observed by operations personnel during tagouts, health physics during general area surveys or a survey performed for upcoming work in the area, or during containment walkdowns as part of the boric acid corrosion program.

The project team's evaluation of the general condition monitoring program is documented in Section 7.1.12 of this report. On the basis of its review, the project team finds that this program is acceptable for managing loss of material since visual inspections of external surfaces are performed during various walkdowns by plant personnel to detect boron buildup and/or boric acid leaks.

7.3.3.1.2 Loss of Material Due to General, Pitting, and Galvanic Corrosion, MIC, and Biofouling; Buildup of Deposits Due to Biofouling

In the discussion section of MPS Unit 3 LRA Table 3.3.1, Item 3.3.1-17, the applicant states that loss of material for components in a open-cycle cooling water environment is managed by MPS AMP B2.1.21, "Service Water System (Open-Cycle Cooling) Program." However, Item 3.3.1-17 does not address buildup of deposits in a sea water environment for the heat exchanger tubes and lined piping as an aging effect managed by the service water program. In a MPS LRA supplement letter dated July 7, 2004 (ML041900407), the applicant stated, in response to Audit Item 101, that Unit 3 LRA Table 3.3.1, Item 3.3.1-17 (page 3-210), first sentence in the discussion should include 'and Buildup of Deposits' after 'Loss of Material.' The project team reviewed the applicant's response and finds that response is acceptable.

In a MPS LRA supplement letter dated November 9, 2004 (ML043200606), the applicant added the groundwtater underdrains storage tank to the scope of license renewal and performed an aging management review. The applicant states that loss of material of stainless steel is manage using MSP AMP B2.1.24, "Tank Inspection Program." The applicant also states that visual inspections are performed that look for loss of material (e.g., pitting, MIC, etc). Because the subject tank is fully accessible from underneath (i.e., it is not resting on the ground or concrete), volumetric inspection is not necessary. The project team reviewed the tank inspection program and its evaluation is documented in the Section 7.1.21 of this report. On the basis of its review, the project team finds that the tank inspection is acceptable for managing this aging effect.

7.3.3.1.3 Loss of Material Due to Wear, Hardening and Shrinkage

In the discussion section of MPS Unit 3 LRA Table 3.3.1, Item 3.3.1-20, the applicant states that loss of material due to wear is not an applicable aging effect for components (doors and barrier penetration seals) in the fire protection system. Fire doors could see wear on hinges, locks, etc., due to periodic opening and closing. This could cause loss of material and impact

on the intended function of fire doors. During the audit and review, the project team asked the applicant to provide justification as to why this aging effect was not included. The applicant states that fire doors are passive features to seal passageways through fire-rated barriers. Fire doors are equipped with hardware and attachment/closure devices that perform their intended function with moving parts and/or change of configuration, and are considered to be active components. As such, wear of the hardware, appurtenances, and attachment/closure mechanisms is not considered to be an aging effect, but rather a consequence of frequent or rough usage. The applicant restated that the conclusions in the MPS Unit 3 LRA remain valid and unchanged. However, the applicant initiated revisions to MPS Unit 3 Technical Report, MP-LR-4654, "Miscellaneous Structural Commodities-Unit 3," to incorporate, in Section 2.0, the above evaluation for wear of the hinges and locks for the fire doors. On the basis of its review, the project team finds the applicant's response to be acceptable.

7.3.3.1.4 Loss of Material Due to Selective Leaching

In the discussion section of MPS Unit 3 LRA Table 3.3.1, Item 3.3.1-29, the applicant states that loss of material due to selective leaching is managed using MPS AMP B2.1.25, "Work Control Process," and MPS AMP B2.1.4, "Buried Pipe Inspection Program." The applicant states that these two programs are not consistent with GALL AMP XI.M33, "Selective Leaching of Materials," in that the GALL Report recommends a one-time visual inspection and hardness measurement of selected components that may be susceptible to selective leaching to determine whether loss of materials due to selective leaching is occurring and whether the process will affect the ability of the components to perform their intended function for the period of extended operation. However, the work control process program and the buried pipe inspection program perform only routine visual inspections (which is more than a one-time inspection) when the opportunity arises, but do not perform hardness testing. The project team reviewed the work control process program and the buried pipe inspection program and its evaluation is documented in the Section 7.1.22 and Section 7.1.3 of this report, respectively.

Since selective leaching generally does not cause changes in dimension and is difficult to detect by visual inspection alone, the project team asked the applicant to justify the use of visual inspection only, or provide other means of detection (Brinnell hardness, destructive testing) or other mechanical means (scraping, chipping, etc.).

In MPS Unit 3 Technical Report, MP-LR-4733, "Work Control Process," the applicant states that selective leaching is an aging mechanism that causes an aging effect of change in material properties. However, in MPS Unit 3 Technical Report, MP-LR-4410, "Closed Water System AMR," the applicant states that selective leaching is an aging mechanism under the aging effect of loss of material. MPS Unit 3 Technical Report, MP-LR-4410 also references MPS Unit 3 Technical Report, MP-LR-4700, "Material Aging Effect Report," which considers selective leaching under loss of material. The project team noted there is a discrepancy as to how selective leaching is considered between the AMP and the AMR technical reports.

During the audit and review, the applicant was requested to provide a rationale for considering selective leaching as causing change in material properties, which is generally an aging effect associated with non-metallic, elastomer type materials. The applicant concurred that MPS Unit 3 Technical Report, MP-LR-4733 should have associated selective leaching with the aging effect of loss of material. The project team reviewed the change document to MP-LR-4733,

which identifies the change to include selective leaching under the “loss of material” aging effect. On the basis of its review, the project team finds this to be acceptable.

During the audit and review, the project team noted that there is an error in the line item for cast iron and copper alloys in MPS Unit 3 LRA Table 3.3.2-37 (pages 3-341 to 3-352) Unit 3 fire protection system. It appeared that the applicant may have intended to reference Table 3.3.1, Item 3.3.1-29 for selective leaching instead of referencing Table 3.3.1, Item 3.3.1-21. Unit 2 has referenced this correctly. Also, the GALL Report item should be VII.C.1.2-a, similar to that referenced in the MPS Unit 2 LRA.

In a MPS LRA supplement letter dated July 7, 2004 (ML041900407), the applicant stated, in response to Audit Item 142, that the MPS Unit 3 LRA Table 3.3.2-37 (pages 3-341 to 3-352) should state "3.3.1-29" for the second 'Table 1 Item' listed for components with cast iron/raw water and copper alloy/raw water material/environment combinations. The 'NUREG-1801 Volume 2 Item' column for the affected component groups should be "VII.C1.2-a" except for the 'Pipe' and 'Tubing' component groups, which should be "VII.C1.1-a." The project team reviewed the applicant’s response and finds that it is acceptable.

7.3.3.1.5 Loss of Fracture Toughness Due to Thermal Aging Embrittlement

The applicant identifies, in MPS Unit 3 LRA Table 3.3.2-15 (page 3-268), for the CVCS, loss of fracture toughness as an aging effect for stainless steel regenerative heat exchanger (page 3-268) and valves (page 3-275). The project team noted that loss of fracture toughness is an aging effect normally associated with CASS material. During the audit and review, the applicant was requested to clarify the material. In a MPS LRA supplement letter dated July 7, 2004 (ML041900407), the applicant stated, in response to Audit Item 164, that the material listed for the regenerative heat exchanger (channel head) and regenerative channel head (shell) in MPS Unit 3 LRA Table 3.3.2-15 should be "stainless steel (CASS)" rather than just "stainless steel."

During the audit and review, the project team questioned why various portions of the fire protection system were not included within the scope of license renewal and subject to an AMR. In its MPS LRA supplement letter dated July 7, 2004 (ML041900370), the applicant added several components to the fire protection system list of components that are subject to an AMR. The addition of these components did not result in the addition of material/environment combinations or AMPs for the fire protection system AMR. The project team finds this material/environment/aging effect/AMP combination to be acceptable. The staff's evaluation of the scope of the fire protection system is documented in Section 2.3.3.32 of the SER related to the MPS Units 2 and 3 LRA.

7.3.3.1.6 Loss of Material Due to General Corrosion; Crack Initiation and Growth Due to Cyclic Loading and Stress Corrosion Cracking

In MPS Unit 3 LRA Table 3.3.1, Item 3.3.1-24, the applicant states that bolting in the auxiliary systems is not subject to wetted conditions, therefore, loss of material due to general corrosion is not expected. Additionally, cracking for bolting in auxiliary systems is not identified as an aging effect requiring management.

The project team noted that SRP-LR Table 3.3-1 recommended GALL AMP XI.M18, “Bolting Integrity,” for managing closure bolting in high pressure or high temperature system for loss of material due to general corrosion; crack initiation and growth due to cyclic loading and SCC.

The project team questioned the applicant whether all the resolution of generic safety issue for bolting, as stated in NUREG-1339, are addressed. By letter dated December 3, 2004 (ML043450341), the applicant submitted its LRA supplement. In its response, the applicant stated that it has developed a specific bolting integrity aging management program that addresses degradation of bolting at MPS. The bolting integrity program is reviewed by NRR DE staff and is addressed in Section 3 of the SER related to the MPS Units 2 and 3 LRA.

By letter dated January 11, 2005 (ML050190289), the applicant submitted its bolting aging management roll-up item. In its response, the applicant replaces the existing information in the “Discussion” column of Unit 3 LRA Table 3.3.1, Item 24 with “consistent with the NUREG-1801."

The project team reviewed the applicant’s response and this acceptable since it is consistent with the GALL Report. The bolting integrity program is reviewed by NRR DE and its evaluation is documented in Section 3 of the SER related to the MPS Units 2 and 3 LRA.

On the basis of its audit and review, the project team determined that for AMRs not requiring further evaluation, as identified in MPS Unit 3 LRA Table 3.3.1 (Table 1), the applicant’s references to the GALL Report are acceptable and no further project team review is required.

7.3.3.2 Aging Management Review Results That Are Consistent With the GALL Report, for Which Further Evaluation Is Recommended

For some line items consistent with the GALL Report in MPS Unit 3 LRA Tables 3.3.2-1 through 3.3.2-50, the GALL Report recommends further evaluation. When further evaluation is recommended, the project team reviewed these further evaluations provided in MPS Unit 3 LRA Section 3.3.2.2 against the criteria provided in the SRP-LR Section 3.3.2.2. The following provides the project team’s assessments of these evaluations. These project team assessments are applicable to each Table 2 line item in Section 3.3, citing the item in Table 1.

The MPS Unit 3 LRA sections, identified in MPS Unit 3 LRA Table 3.3.1, for which further evaluation is recommended are discussed below.

7.3.3.2.1 Loss of Material Due to General, Pitting, and Crevice Corrosion (MPS Unit 3 LRA Section 3.3.2.2.1)

In MPS Unit 3 LRA Section 3.3.2.2.1, the applicant addresses loss of material in components of the spent fuel pool system.

SRP-LR Section 3.3.2.2.1 states that loss of material due to general, pitting, and crevice corrosion could occur in the channel head and access cover, tubes, and tube sheets of the heat exchanger in the spent fuel pool cooling and cleanup system. The water chemistry program relies on monitoring and control of reactor water chemistry based on EPRI TR-105714 guidelines for primary water chemistry and TR-102134 for secondary water chemistry to manage the effects of loss of material from general, pitting, or crevice corrosion. However, high

concentrations of impurities at crevices and locations of stagnant flow conditions could cause general, pitting, or crevice corrosion. Therefore, verification of the effectiveness of the chemistry control program should be performed to ensure that corrosion is not occurring. The GALL Report recommends further evaluation of programs to manage loss of material from general, pitting, and crevice corrosion to verify the effectiveness of the water chemistry program. A one-time inspection of select components at susceptible locations is an acceptable method for ensuring that corrosion is not occurring and that the component's intended function will be maintained during the period of extended operation.

Further, SRP-LR Section 3.3.2.2.1 states that loss of material due to pitting and crevice corrosion could occur in the filter housing, valve bodies, and nozzles of the ion exchanger in the spent fuel pool cooling and cleanup system. The water chemistry program relies on monitoring and control of reactor water chemistry based on EPRI TR-105714 guidelines for primary water chemistry and TR-102134 for secondary water chemistry to manage the effects of loss of material from pitting or crevice corrosion. However, high concentrations of impurities at crevices and locations of stagnant flow conditions could cause pitting or crevice corrosion. Therefore, verification of the effectiveness of the chemistry control program should be performed to ensure that corrosion is not occurring. The GALL Report recommends further evaluation of programs to manage loss of material from pitting and crevice corrosion to verify the effectiveness of the water chemistry program. A one-time inspection of select components at susceptible locations is an acceptable method to ensure that corrosion is not occurring and that the component's intended function will be maintained during the period of extended operation.

The AMP recommended by the GALL Report is GALL AMP XI.M2, “Water Chemistry,” for management of loss of material due to general, pitting, and crevice corrosion.

The applicant states, in the MPS Unit 3 LRA, that per the GALL Report, this item applies to spent fuel pool cooling and cleanup carbon steel components with elastomer linings. The spent fuel pool cooling system does not contain carbon steel components with elastomer linings. Therefore, the applicant concludes that this item is not applicable. The applicant has included the spent fuel pool cooling system in MPS Unit 3 LRA Section 3.2, “Engineered Safety Features Systems.” The project team reviewed MPS Unit 3 LRA Table 3.2.2-5, AMR for spent fuel pool cooling system, and verified that the system did not contain carbon steel components with elastomer linings. On the basis of its review, the project team finds this line item to be not applicable for components in the MPS Unit 3 spent fuel pool cooling system.

However, these components are fabricated from stainless steel material. As stated in Section 7.3.2.3.5 of this report, the applicant proposes to manage loss of material of stainless steel expansion joints, flow elements, pipe, pumps, and spent fuel pool heat exchangers (channel head) component types exposed to chemically treated borated water using only MPS AMP B2.1.5, “Chemistry Control for Primary Systems Program,” which is consistent with GALL AMP XI.M2, “Water Chemistry,” with an exception. The project team reviewed the chemistry control for primary systems program and its evaluation is documented in Section 7.1.4 of this report. The exception relates to use of a later, non-NRC approved revision of the EPRI guidelines. The project team finds that because the effects of pitting and crevice corrosion on stainless steel components are not significant in chemically treated borated water, inspection of selected components to verify the absence of loss of material is not required. On

the basis of its review, the project team finds that the chemistry control for primary systems program is acceptable for managing this aging effect.

The project team finds that the applicant has demonstrated that the effects of aging for components of the spent fuel pool system subject to loss of material will be adequately managed so that the intended functions will be maintained consistent with the CLB during the period of extended operation, as required by 10 CFR 54.21(a)(3).

7.3.3.2.2 Hardening and Cracking or Loss of Strength Due to Elastomer Degradation or Loss of Material Due to Wear (MPS Unit 3 LRA Section 3.3.2.2.2)

The project team reviewed MPS Unit 3 LRA Section 3.3.2.2.2 against the criteria in SRP-LR Section 3.3.2.2.2.

In MPS Unit 3 LRA Section 3.3.2.2.2, the applicant addresses the potential for degradation of elastomers in collars and seals in spent fuel cooling systems and ventilation systems.

SRP-LR Section 3.3.2.2.2 states that hardening and cracking due to elastomer degradation could occur in elastomer linings of the filter, valve, and ion exchangers in spent fuel pool cooling and cleanup systems. Hardening and loss of strength due to elastomer degradation could occur in the collars and seals of the duct and in the elastomer seals of the filters in the control room area, auxiliary and radwaste area, and primary containment heating and ventilation systems and in the collars and seals of the duct in the diesel generator building ventilation system. Loss of material due to wear could occur in the collars and seals of the duct in the ventilation systems. The GALL Report recommends further evaluation to ensure that these aging effects are adequately managed.

The applicant states, in the MPS Unit 3 LRA, that the spent fuel pool cooling system does not contain carbon steel components with elastomer linings. Therefore, this item is not applicable. The applicant has included the spent fuel pool cooling system in MPS Unit 3 LRA Section 3.2, “Engineered Safety Features Systems.” The project team reviewed MPS Unit 3 Table 3.2.2-5, AMR for spent fuel pool cooling system, and verified that the system did not contain carbon steel components with elastomer linings. On the basis of its review, the project team finds that this line item is not applicable for components in the MPS Unit 3 spent fuel pool cooling system.

The applicant states, in the MPS Unit 3 LRA that elastomers are used in ventilation system components and are evaluated for cracking and change of material properties due to thermal and radiation exposure. The applicant credits MPS AMP B2.1.25, “Work Control Process,” and MPS AMP B2.1.13, “General Condition Monitoring Program,” for managing age-related degradation of elastomers used in ventilation system components. The work control process program provides the opportunity to visually inspect the internal surfaces of components during preventive and corrective maintenance activities on an ongoing basis. Also, this program provides input to the corrective action program if aging effects are identified. The project team accepted the work control process program for managing the aging effects of cracking and change in material properties and its evaluation of this program is documented in Section 7.1.22 of this report. The project team also accepted the general condition monitoring program for managing cracking and change of material properties since visual inspections will be performed on external surfaces to detect any sign of aging degradation. The project team’s

evaluation of the general condition monitoring program is documented in Section 7.1.12 of this report.

In MPS Unit 3 LRA Section 3.3.2.2.2, the applicant states that loss of material due to wear is not an aging effect requiring management for the elastomers in the ventilation systems. During the audit and review, the project team requested further clarification concerning the applicant's assertion. The rationale offered by the applicant was that the elastomers in the ventilation systems are not subject to motions which could result in wear. The project team finds that the applicant's justification is acceptable.

The project team finds that the applicant has demonstrated that the effects of aging will be adequately managed so that the intended functions will be maintained consistent with the CLB during the period of extended operation, as required by 10 CFR 54.21(a)(3).

7.3.3.2.3 Cumulative Fatigue Damage (MPS Unit 3 LRA Section 3.3.2.2.3)

MPS Unit 3 LRA Section 3.3.2.2.3 is reviewed by NRR DE staff and addressed in Section 4 of the SER related to the MPS Units 2 and 3 LRA.

7.3.3.2.4 Crack Initiation and Growth Due to Cracking or Stress Corrosion Cracking (MPS Unit 3 LRA Section 3.3.2.2.4)

The project team reviewed MPS Unit 3 LRA Section 3.3.2.2.4 against the criteria in SRP-LR Section 3.3.2.2.4.

In MPS Unit 3 LRA Section 3.3.2.2.4, the applicant addresses the potential for cracking in the high-pressure pumps of the CVCS.

SRP-LR Section 3.3.2.2.4 addresses crack initiation and growth due to cracking in the high-pressure pump in the CVCS. The GALL Report recommends further evaluation to ensure that these aging effects are adequately managed.

The applicant states, in the MPS Unit 3 LRA, that cracking is not identified as an aging effect requiring management for the CVCS high-pressure pump casing. The high-pressure pump casing is constructed of stainless steel and operates at temperatures less than 140°F. SCC is applicable to stainless steel components in aqueous environments that experience operating temperatures greater than 140°F.

The applicant states that based upon industry experience, a temperature criterion of greater than 140°F is used as the threshold for susceptibility of austenitic stainless steel to SCC. No instances were identified that would bring this temperature threshold into question. On the basis of its review, the project team finds the applicant's statement reasonable and acceptable because the applicant's bases for excluding the aging effects of cracking in the MPS Unit 3 CVCS high-pressure pump casing are consistent with industry and site operating experience.

The project team finds that the applicant has demonstrated that the effects of aging will be adequately managed so that the intended functions will be maintained consistent with the CLB during the period of extended operation, as required by 10 CFR 54.21(a)(3).

7.3.3.2.5 Loss of Material Due to General, Microbiologically Influenced, Pitting, and Crevice Corrosion (MPS Unit 3 LRA Section 3.3.2.2.5)

The project team reviewed MPS Unit 3 LRA Section 3.3.2.2.5 against the criteria in SRP-LR Section 3.3.2.2.5.

In MPS Unit 3 LRA Section 3.3.2.2.5, the applicant addresses the loss of material from corrosion that could occur on internal and external surfaces of components exposed to air and the associated range of atmospheric conditions.

SRP-LR Section 3.3.2.2.5 states that loss of material due to general, pitting, and crevice corrosion could occur in the piping and filter housing and supports in the control room area, the auxiliary and radwaste area, the primary containment heating and ventilation systems, the piping of the diesel generator building ventilation system, and the aboveground piping and fittings, valves, and pumps in the diesel fuel oil system, and in the diesel engine starting air, combustion air intake, and combustion air exhaust subsystems in the emergency diesel generator system. Loss of material due to general, pitting, and crevice corrosion, and MIC could occur in the duct fittings, access doors and closure bolts, equipment frames, and housing of the duct. Loss of material due to pitting and crevice corrosion could occur in the heating/cooling coils of the air handler units, and due to general corrosion could occur on the external surfaces of all carbon steel SCs, including bolting, exposed to operating temperatures less than 212EF in the ventilation systems. The GALL Report recommends further evaluation to ensure that these aging effects are adequately managed.

The applicant states that MPS AMP B2.1.10, “Fire Protection Program,” MPS AMP B2.1.24, “Tank Inspection Program,” and MPS AMP B2.1.25, “Work Control Process,” manage loss of material due to general corrosion, MIC, pitting, and crevice corrosion for the internal surfaces of ducts, piping, filter housings, compressed air systems components, and fuel oil systems components. Loss of material for external surfaces of carbon steel components is managed by MPS AMP B2.1.13, “General Condition Monitoring Program,” MPS AMP B2.1.10, “Fire Protection Program,” MPS AMP B2.1.23, “Structures Monitoring Program,” and MPS AMP B2.1.24, “Tank Inspection Program.” MPS AMP B2.1.15, “Infrequently Accessed Areas Inspection Program,” manages this aging effect for components in infrequently accessed areas.

The project team identified a discrepancy between MPS Unit 3 LRA Table 3.3.2-36: Auxiliary Systems - Unit 2 Fire Protection and MPS Unit 3 LRA Table 3.3.2-37: Auxiliary Systems - Unit 3 Fire Protection. In MPS Unit 3 LRA Table 3.3.2-36 (page 3-334), the applicant states, for carbon steel pipe exposed internally to moist air, that the fire protection program is used to manage the aging effects of loss of material. In MPS Unit 3 LRA Table 3.3.2-37 (page 3-346), the applicant credits the work control process program to manage loss of material and references MPS Unit 3 LRA Table 3.3.1, Item 3.3.1-05. During the audit and review, the applicant was requested to clarify which is appropriate for managing the aging effect of loss of material. In a MPS LRA supplement letter dated July 7, 2004 (ML041900407), the applicant stated, in response to Audit Item 122, that for MPS Unit 3 LRA Table 3.3.2-37 (page 3-346), the "Work Control Process" AMP for the carbon steel 'Pipe' group exposed internally to an air environment should be the "Fire Protection Program" AMP. The ‘NUREG-1801' item should be “VII.H2.3-a” and the ‘Notes’ should be “C, 2.” The project team reviewed the applicant’s response and finds it to be acceptable.

The project team reviewed the work control process program and its evaluation is documented in Section 7.1.22 of this report. The work control process program provides the opportunity to visually inspect the internal surfaces of components during preventive and corrective maintenance activities on an ongoing basis. The work control process program provides input to the corrective action program if aging effects are identified. On the basis of its review, the project team finds the work control process program to be acceptable for managing the aging effects of loss of material due to general corrosion, MIC, pitting, and crevice corrosion for the internal surfaces of ducts, piping, filter housings, compressed air systems components, and fuel oil systems components.

The project team reviewed the fire protection program and its evaluation is documented in Section 7.1.9 of this report. The fire protection program is consistent with GALL AMPs XI.M.26, "Fire Protection," and XI.M.27, "Fire Water System." On the basis of its review, the project team finds that the fire protection program is acceptable for managing loss of material since visual inspections will be performed on internal surfaces to detect any sign of aging degradation when the system is opened for maintenance and/or repair.

The project team reviewed the tank inspection program and its evaluation is documented in Section 7.1.21 of this report. The tank inspection program is consistent with GALL AMP XI.M.29, "Aboveground Carbon Steel Tanks," On the basis of its review, the project team finds that the tank Inspection program is acceptable for managing loss of material due to general corrosion since wall thickness measurements will be performed on the lower portion of the tank.

The project team reviewed the general condition monitoring program and its evaluation is documented in Section 7.1.12 of this report. The general condition monitoring program performs visual inspections to detect evidence of degradation or adverse conditions in accessible plant areas. System engineers perform comprehensive visual inspections during walkdowns of plant systems and components during normal operation and during refueling outages; plant equipment operators perform equipment and structures inspections twice a day to maintain awareness of system and plant operation and material condition during normal operation and refueling outages. On the basis of its review, the project team finds that the general condition monitoring program is acceptable for managing loss of materials since visual inspections will be performed on external surfaces to detect any sign of aging degradation.

The structures monitoring program manages the aging effects of cracking, loss of material, and change of material properties by monitoring structures and structural support systems that are within the scope of license renewal. The majority of these structures and structural support systems are monitored under 10 CFR 50.65 as addressed in RG 1.160, Revision 2, and NUMARC 93-01, Revision 2. These two documents provide guidance for development of licensee-specific programs to monitor the condition of structures and structural components within the scope of the Maintenance Rule, such that there is no loss of structure or structural component intended function. The remaining structures within the scope of license renewal (such as non-safety related buildings and enclosures, duct banks, valve pits and trenches, high-energy line break barriers, and flood gates) are also monitored to ensure there is no loss of intended function. The project team reviewed the structures monitoring program and its evaluation is documented in Section 7.1.20 of this report. On the basis of its review, the project team finds that the structures monitoring program is acceptable for managing loss of materials

since visual inspections will be performed on external surfaces to detect any sign of aging degradation.

The project team reviewed the infrequently accessed areas inspection program and its evaluation is documented in Section 7.1.14 of this report. The infrequently accessed areas inspection program is a new, plant-specific program that manages the aging effects of loss of material using visual inspections of the external surfaces of SCs. The program encompasses infrequently accessed areas of the plant which contain in-scope equipment. All areas not normally accessible for inspection and evaluation, and that contain SCs subject to aging management, have been identified for inclusion in the program. On the basis of its review, the project team finds that the infrequently accessed areas inspection program is acceptable for managing loss of material due to general corrosion on external surfaces of carbon steel components, since visual inspections will be performed on external surfaces to detect any sign of aging degradation in the service water system.

During the audit and review, the project team questioned why various portions of the diesel generator system were not included within the scope of license renewal and subject to an AMR. In its response dated July 7, 2004 (ML041900370), the applicant added several components to the diesel generator system that are subject to an AMR. The addition of these components did not result in the addition of material/environment combinations or AMPs for the diesel generator system AMR for components addressed by MPS Unit 3 LRA Section 3.3.2.2.5. The project team finds this material/environment/aging effect/AMP combination to be acceptable. The staff's evaluation of the scope of the diesel generator system is documented in Section 2.3.3.34 of the SER for the MPS Units 2 and 3 LRA.

The project team finds that the applicant has demonstrated that the effects of aging will be adequately managed so that the intended functions will be maintained consistent with the CLB during the period of extended operation, as required by 10 CFR 54.21(a)(3).

7.3.3.2.6 Loss of Material Due to General, Galvanic, Pitting, and Crevice Corrosion (MPS Unit 3 LRA Section 3.3.2.2.6)

The project team reviewed MPS Unit 3 LRA Section 3.3.2.2.6 against the criteria in SRP-LR Section 3.2.2.2.6.

In MPS Unit 3 LRA Section 3.3.2.2.6, the applicant addresses further evaluation of programs to manage loss of material in the RCP oil collection system to verify the effectiveness of the fire protection program.

SRP-LR Section 3.3.2.2.6 states that loss of material due to general, galvanic, pitting, and crevice corrosion could occur in tanks, piping, valve bodies, and tubing in the RCP oil collection system in fire protection. The fire protection program relies on a combination of visual and volumetric examinations in accordance with the guidelines of 10 CFR 50 Appendix R and Branch Technical Position 9.5-1 to manage loss of material from corrosion. However, corrosion may occur at locations where water from wash downs may accumulate. Therefore, verification of the effectiveness of the program should be performed to ensure that corrosion is not occurring. The GALL Report recommends further evaluation of programs to manage loss of material due to general, galvanic, pitting, and crevice corrosion to verify the effectiveness of the program. A one-time inspection of the bottom half of the interior surface of the RCP oil

collection system tank is an acceptable method to ensure that corrosion is not occurring and that the component's intended function will be maintained during the period of extended operation.

The applicant states, in the MPS Unit 3 LRA, that loss of material is managed for the components associated with the RCP oil collection system by MPS AMP B2.1.24, “Tank Inspection Program,” which subjects the RCP oil collection tanks to periodic internal and external inspections. Additionally, during containment close-out activities, the RCP oil collection tanks are visually inspected and verified to be empty.

The project team reviewed the tank inspection program, which is consistent with GALL AMP XI.29, “Aboveground Carbon Steel Tanks,” and its evaluation is documented in Section 7.1.21 of this report. Since the tank inspection program includes volumetric examination for wall thickness measurement of the RCP oil collection tank, the project team finds the program acceptable for managing loss of material due to general, galvanic, pitting, and crevice corrosion.

The applicant references MPS Unit 3 LRA Table 3.3.1, Item 3.3.1-06 (page 3-205), for components exposed internally to lube oil (Note 14) and loss of material aging effect combination in MPS Unit 3 Table 3.3.2-32, and credits the work control process program. In the discussion of Item 3.3.1-06, the applicant states that the loss of material is managed by the tank inspection program. The project team noted that there is no mention of the work control process program in the discussion. In a MPS LRA supplement letter dated July 7, 2004 (ML041900407), the applicant stated, in response to Audit Item 143, that MPS Unit 3 LRA Table 3.3.1, Item 3.3.1-06, should include the following words between the second and third sentences:

> For the non-tank components, loss of material is managed by the work control process.

Additionally, MPS Unit 3 LRA Section 3.3.2.2.6 (page 3-198) should include the following words at the end of the first sentence:

> For the non-tank components, loss of material is managed by the work control process.

The project team reviewed the work control process program and its evaluation is documented in Section 7.1.22 of this report. The project team finds that the work control process program provides the opportunity to visually inspect the internal surfaces of components during preventive and corrective maintenance activities on an ongoing basis. It also provides input to the corrective action program if aging effects are identified. On the basis of its review, the project team finds that the work control process program is acceptable for managing the aging effect of loss of material.

The project team finds that the applicant has demonstrated that the effects of aging will be adequately managed so that the intended functions will be maintained consistent with the CLB during the period of extended operation, as required by 10 CFR 54.21(a)(3).

7.3.3.2.7 Loss of Material Due to General, Pitting, Crevice, and Microbiologically Influenced Corrosion and Biofouling (MPS Unit 3 LRA Section 3.3.2.2.7)

The project team reviewed MPS Unit 3 LRA Section 3.3.2.2.7 against the criteria in SRP-LR Section 3.3.2.2.7.

In MPS Unit 3 LRA Section 3.3.2.2.7, the applicant addresses further evaluation of programs to manage loss of material in the diesel fuel oil system to verify the effectiveness of the diesel fuel monitoring program.

SRP-LR Section 3.3.2.2.7 states that loss of material due to general, pitting, and crevice corrosion, MIC, and biofouling could occur in the internal surface of tanks in the diesel fuel oil system and due to general, pitting, and crevice corrosion and MIC in the tanks of the diesel fuel oil system in the emergency diesel generator system. The existing AMP relies on the fuel oil chemistry program for monitoring and control of fuel oil contamination in accordance with the guidelines of ASTM Standards D4057, D1796, D2709, and D2276 to manage loss of material due to corrosion or biofouling. Corrosion or biofouling may occur at locations where contaminants accumulate. Verification of the effectiveness of the chemistry control program should be performed to ensure that corrosion is not occurring. The GALL Report recommends further evaluation of programs to manage corrosion/biofouling to verify the effectiveness of the program. A one-time inspection of selected components at susceptible locations is an acceptable method to ensure that corrosion is not occurring and that the component's intended function will be maintained during the period of extended operation.

The AMPs recommended by the GALL Report are GALL AMP XI.M30, “Fuel Oil Chemistry,” and GALL AMP XI.M32, “One Time Inspection,” for management of this aging effect.

The applicant states, in the MPS Unit 3 LRA, that MPS AMP B2.1.12, “Fuel Oil Chemistry,” manages loss of material for diesel fuel oil tanks and other components in the diesel generator fuel oil system, the security system, and the SBO diesel generator system. In lieu of a one-time inspection as described in SRP-LR Section 3.3.2.2.7, the applicant states in MPS Unit 3 LRA Section 3.3.2.2.7 that MPS AMP B2.1.25, “Work Control Process,” will be used to provide confirmation of the effectiveness of the fuel oil chemistry program, and that tank inspections performed under the applicant’s MPS AMP B2.1.24, “Tank Inspection Program,” provide additional confirmation that the fuel oil chemistry program is effective for managing aging effects for applicable tanks.

The project team reviewed the fuel oil chemistry program and its evaluation is documented in Section 7.1.11 of this report. The fuel oil chemistry program monitors and controls fuel oil quality to ensure that it is compatible with the materials of construction, to manage the conditions that cause general corrosion, pitting, and MIC of fuel tank internal surfaces; establishes fuel oil quality limits; and samples and tests fuel oil used for equipment within the scope of license renewal. On the basis of its review, the project team finds the fuel oil chemistry program to be acceptable.

The project team reviewed the work control process program and its evaluation is documented in Section 7.1.22 of this report. The work control process program provides the opportunity to visually inspect the internal surfaces of components during preventive and corrective maintenance activities on an ongoing basis. The work control process program provides input

to the corrective action program if aging effects are identified. On the basis of its review, the project team finds that the work control process program is acceptable for use to provide confirmation of the effectiveness of the fuel oil chemistry program.

The project team reviewed the tank inspection program and its evaluation is documented in Section 7.1.21 of this report. The tank inspection program is consistent with GALL AMP XI.M29, "Aboveground Carbon Steel Tanks." On the basis of its review, the project team finds that the tank inspection program is acceptable for providing additional confirmation that the fuel oil chemistry program is effective for managing aging effects for applicable tanks.

The project team finds that the applicant has demonstrated that the effects of aging will be adequately managed so that the intended functions will be maintained consistent with the CLB during the period of extended operation, as required by 10 CFR 54.21(a)(3).

7.3.3.2.8 Quality Assurance for Aging Management of Non-safety-related Components (MPS Unit 3 LRA Section 3.3.2.2.8)

MPS Unit 3 LRA Section 3.3.2.2.8 is reviewed by NRR DIPM staff and addressed in Section 3 of the SER related to the MPS Units 2 and 3 LRA.

7.3.3.2.9 Crack Initiation and Growth Due to Stress Corrosion Cracking and Cyclic Loading (MPS Unit 3 LRA Section 3.3.2.2.9)

The project team reviewed MPS Unit 3 LRA Section 3.3.2.2.9 against the criteria in SRP-LR Section 3.3.2.2.9.

In MPS Unit 3 LRA Section 3.3.2.2.9, the applicant addresses further evaluation of programs to manage cracking in the CVCS to verify the effectiveness of the water chemistry control program.

SRP-LR Section 3.3.2.2.9 states that crack initiation and growth due to SCC and cyclic loading could occur in the channel head and access cover, tube sheet, tubes, shell and access cover, and closure bolting of the regenerative heat exchanger, and in the channel head and access cover, tube sheet, and tubes of the letdown heat exchanger in the CVCS. The water chemistry program relies on monitoring and control of water chemistry based on the guidelines of EPRI TR-105714 for primary water chemistry to manage the effects of crack initiation and growth due to SCC and cyclic loading. Verification of the effectiveness of the chemistry control program should be performed to ensure that crack initiation and growth are not occurring. The GALL Report recommends further evaluation to manage crack initiation and growth from SCC and cyclic loading for these systems to verify the effectiveness of the water chemistry program. A one-time inspection of select components and susceptible locations is an acceptable method to ensure that crack initiation and growth are not occurring and that the component's intended function will be maintained during the period of extended operation.

The AMPs recommended by the GALL Report are GALL AMP XI.M2, "Water Chemistry," and a plant-specific verification program for management of this aging effect.

The applicant states, in the MPS Unit 3 LRA, that cracking due to SCC for the regenerative and letdown heat exchangers is managed by MPS AMP B2.1.5, "Chemistry Control for Primary

Systems Program." Verification of the effectiveness of the chemistry control program is provided by MPS AMP B2.1.25, "Work Control Process." The work control process program provides the opportunity to visually inspect the internal surfaces of components during preventive and corrective maintenance activities on an ongoing basis. The work control process program provides input to the corrective action program if aging effects are identified. The corrective action program would evaluate the cause and extent of condition and, if required, recommend enhancements to ensure continued effectiveness of the chemistry control for primary systems program.

The project team reviewed the chemistry control for primary systems program and its evaluation is documented in Section 7.1.4 of this report. The chemistry control for primary systems program is consistent with the GALL Report, with an acceptable exception. The exception relates to use of a later, non-NRC approved revision of the EPRI guidelines. On the basis of its review, the project team finds the chemistry control for primary systems program to be acceptable for managing this aging effect.

The project team reviewed the work control process program and its evaluation is documented in Section 7.1.22 of this report. The project team finds that visual inspections of the internal surfaces of plant components and plant commodities are performed during the performance of maintenance, in accordance with the work control process program, to determine the presence of crack initiation and growth. On the basis of it review, the project team finds that the work control process program is acceptable for managing crack initiation and growth since visual inspections will be performed on internal surfaces of components to detect any sign of aging degradation.

The project team finds that the applicant has demonstrated that the effects of aging for crack initiation and growth will be adequately managed so that the intended functions will be maintained consistent with the CLB during the period of extended operation, as required by 10 CFR 54.21(a)(3).

7.3.3.2.10 Reduction of Neutron-Absorbing Capacity and Loss of Material Due to General Corrosion (MPS Unit 3 LRA Section 3.3.2.2.10)

The project team reviewed MPS Unit 3 LRA Section 3.3.2.2.10 against the criteria in SRP-LR Section 3.3.2.2.10.

In MPS Unit 3 LRA Section 3.3.2.2.10, the applicant addresses reduction of neutron-absorbing capacity and loss of material due to general corrosion, which could occur in the neutron-absorbing sheets of the spent fuel storage rack in the spent fuel storage system.

SRP-LR Section 3.3.2.2.10 states that reduction of neutron-absorbing capacity and loss of material due to general corrosion could occur in the neutron-absorbing sheets of the spent fuel storage rack in the spent fuel storage system. The GALL Report recommends further evaluation to ensure that these aging effects are adequately managed.

The applicant states, in the MPS Unit 3 LRA, that the neutron absorber elements credited in the criticality analysis for the spent fuel pool are constructed of Boral. Boral is a thermal neutron poison composed of boron carbide and 1100 alloy aluminum. Boron carbide is a compound having a high boron content in a physically stable and chemically inert form. The

neutron-absorbing central layer of Boral is clad with aluminum. The boron carbide and aluminum materials in Boral are unaffected by long-term exposure to radiation.

The applicant states, in the MPS Unit 3 LRA, that Boral has shown no signs of degradation in neutron-absorbing capability. The applicant concludes, based on the design of the neutron absorber elements and the results of surveillance testing, that reduction of neutron-absorbing capacity is not an aging effect that requires management for Boral in the spent fuel pool. On the basis of its review, the project team concurs with the applicant's conclusion that there are no applicable aging effects requiring management for the Boral in the spent fuel pool.

In the MPS Unit 3 LRA, the applicant states that the aluminum cladding of the neutron absorber elements is not subject to general corrosion in the spent fuel pool environment. However, the applicant states that pitting corrosion could occur if spent fuel pool water chemistry exceeded specific contaminant levels. The applicant states, for the neutron absorber elements, loss of material is managed by maintaining the quality of the spent fuel pool water chemistry. The applicant credits MPS AMP B2.1.5, "Chemistry Control for Primary Systems Program," for this purpose. The project team reviewed the chemistry control for primary systems program, with exception, and its evaluation is documented in Section 7.1.4 of this report. The exception relates to use of a later, non-NRC approved revision of the EPRI guidelines. On the basis of its review, the project team finds that the chemistry control for primary systems program is acceptable for managing this aging effect.

7.3.3.2.11 Loss of Material Due to General, Pitting, Crevice, and Microbiologically Influenced Corrosion (MPS Unit 3 LRA Section 3.3.2.2.11)

The project team reviewed MPS Unit 3 LRA Section 3.3.2.2.11 against the criteria in SRP-LR Section 3.3.2.2.11.

In MPS Unit 3 LRA Section 3.3.2.2.11, the applicant addresses the potential for loss of material in buried piping of the service water and diesel fuel oil systems.

SRP-LR Section 3.3.2.2.11 states that loss of material due to general, pitting, and crevice corrosion, and MIC could occur in the underground piping and fittings in the open-cycle cooling water system (service water system) and in the diesel fuel oil system. The buried piping and tanks inspection program relies on industry practice, frequency of pipe excavation, and operating experience to manage the effects of loss of material from general, pitting, and crevice corrosion, and MIC. The effectiveness of the buried piping and tanks inspection program should be verified to evaluate an applicant's inspection frequency and operating experience with buried components, ensuring that loss of material is not occurring.

The AMP recommended by the GALL Report is GALL AMP XI.M34, "Buried Piping and Tanks Inspection."

The applicant states, in the MPS Unit 3 LRA, that loss of material for buried piping and valves in the service water system, and in the Unit 2 fire protection system, Unit 3 fire protection system, and enclosure building filtration system, is managed by MPS AMP B2.1.4, "Buried Pipe Inspection Program."

In the MPS Unit 3 LRA, the applicant states that as part of the buried pipe inspection program a baseline inspection of representative in-scope buried piping is performed, which provides an effective method for detection of aging effects. In addition, inspections are performed when the buried components are excavated for maintenance or any other reason, which provides an effective method to evaluate the condition of the buried piping and protective coatings. Operating experience with age-related degradation of buried piping is limited, and no failures of in-scope buried piping have been identified. The applicant states that there is no buried piping in the diesel fuel oil systems.

The project team reviewed the buried pipe inspection program and its evaluation is documented in Section 7.1.3 of this report. The project team finds that the buried pipe inspection program, which is consistent with GALL AMP XI.M28, "Buried Piping and Tanks Surveillance," and GALL AMP XI.M34, "Buried Piping and Tanks Inspection," with exceptions and enhancements, to be acceptable. The project team also finds the exceptions and enhancements to be acceptable. The project team reviewed the plant operating experience and found that the program is effective in identifying age-related degradation, implementing repairs, and maintaining the integrity of buried pipe. On the basis of its review, the project team finds that the buried pipe inspection program is acceptable for managing the aging effect of loss of material in buried piping and fittings.

The project team finds that the applicant has demonstrated that the effects of aging for loss of material will be adequately managed so that the intended functions will be maintained consistent with the CLB during the period of extended operation, as required by 10 CFR 54.21(a)(3).

7.3.3.3 Aging Management Review Results That Are Not Consistent with the GALL Report or Are Not Addressed in the GALL Report

In MPS Unit 3 LRA Tables 3.3.2-1 through 3.3.2-50, the project team reviewed additional details of the results of the AMRs for material, environment, aging effect requiring management, and AMP combinations that are not consistent with the GALL Report or are not addressed in the GALL Report. The project team also reviewed additional systems and components, provided in the MPS LRA supplement letter dated January 11, 2005 (ML050190289).

7.3.3.3.1 Circulating Water - Aging Management Evaluation (MPS Unit 3 LRA Table 3.3.2-1)

The project team reviewed Table 3.3.2-1 of the MPS Unit 3 LRA, which summarizes the results of AMR evaluations for the circulating water system component groups.

In the MPS Unit 3 LRA, the applicant proposes to manage loss of material of stainless steel pipe and valve component types exposed to atmosphere/weather using MPS AMP B2.1.13, "General Condition Monitoring," which is a plant-specific program. The project team reviewed the general condition monitoring program and its evaluation is documented in Section 7.1.12 of this report. On the basis of its review, the project team finds that the general condition monitoring program is acceptable for managing loss of material due to pitting and crevice corrosion since visual inspections will be performed on external surfaces to detect any sign of aging degradation.

In the MPS Unit 3 LRA, the applicant identified no aging effects for rubber expansion joints exposed to air. The applicant states, in Section 4.2.5 of MPS Unit 3 Technical Report, MP-LR-4403, “Open Water,” that reduced strength due to ozone exposure of non-metallic is possible in an air environment.

In the MPS Unit 3 LRA, the applicant identified no aging effects for fiberglass pipe component types exposed to air. The applicant states, in Section 4.2.5 of MPS Unit 3 Technical Report, MP-LR-4403, “Open Water,” that reduced strength due to ozone exposure of non-metallic is possible in an air environment. The applicant explains that the fiberglass components exposed to air in this system are not located near high-voltage electrical equipment. Therefore, ozone exposure is not a potential aging mechanism. In addition, a review of operating experience has identified no concerns related to the occurrence of ozone exposure in the open water systems. The project team reviewed MPS Unit 3 Technical Report, MP-LR-4403, current industry research and operating experience. On the basis of its review, the project team concludes that reduced strength due to ozone for fiberglass components in air environment is not an aging effect that requires aging management.

In the MPS Unit 3 LRA, the applicant identified no aging effects for fiberglass pipe component types exposed to sea water. The applicant states, in Section 4.2.5 of MPS Unit 3 Technical Report, MP-LR-4403, “Open Water,” that exposure to ultraviolet radiation and ozone can cause damage to the chemical structure of the epoxy matrix of fiberglass. The earliest signs of this effect can be changes in color and surface cracking or crazing. Fiberglass exposed to direct sun or high levels of ozone that might be found in conjunction with high-voltage electrical equipment would be most prone to this effect. The project team reviewed MPS Unit 3 Technical Report, MP-LR-4403, current industry research and operating experience and finds that fiberglass components in sea water environment are not exposed to high level of ultraviolet radiation or ozone. On the basis of its review, the project team concludes that cracking in fiberglass components in sea water is not an aging effect that requires aging management.

In the MPS Unit 3 LRA, the applicant identified no aging effects for rubber expansion joints exposed to air. The applicant explains, in Section 4.2.2 of MPS Unit 3 Technical Report, MP-LR-4403, “Open Water,” that change of material properties due to thermal exposure and irradiation and cracking due to irradiation of rubber components in air are aging effects that do not require aging management for the components in this system. The project team reviewed MPS Unit 3 Technical Report, MP-LR-4403, current industry research and operating experience and finds that these components are not exposed to high levels of ultraviolet radiation, ozone, or temperatures greater than 95EF. On the basis of its review, the project team concludes that it did not identify any concerns with the applicant’s conclusions that there are no applicable aging effects requiring management for rubber expansion joints exposed to air.

In the MPS Unit 3 LRA, the applicant identified no aging effects for rubber expansion joints exposed to sea water. The applicant explains, in Section 4.2.2 of MPS Unit 3 Technical Report, MP-LR-4403, “Open Water,” that change of material properties and cracking due to thermal of rubber components exposed to sea water are aging effects that do not require aging management for the components in this system. The project team reviewed MPS Unit 3 Technical Report, MP-LR-4403, current industry research and operating experience and finds that the threshold temperature for applying the aging effects of cracking and change of material properties to elastomers is 95EF. In addition, for MPS Unit 3, the surface temperature of the rubber expansion joints in the open water systems will never exceed 95EF, since the internal

water (raw water from the Long Island Sound) is significantly less than 95EF. On the basis of its review, the project team concludes that it did not identify any concerns with the applicant's conclusions that there are no applicable aging effects for rubber expansion joints exposed to sea water since these components are not exposed to temperatures greater than 95°F.

7.3.3.3.2 Service Water - Aging Management Evaluation (MPS Unit 3 LRA Table 3.3.2-2)

The project team reviewed Table 3.3.2-2 of the MPS Unit 3 LRA, which summarizes the results of AMR evaluations for the service water system component groups.

In MPS Unit 3 LRA Table 3.3.2-2, the applicant proposes to manage build up of deposit of carbon steel pipe component type exposed to sea water using MPS AMP B2.1.21, "Service Water System," which is consistent with GALL AMP XI.M20, "Open-Cycle Cooling Water System." However, buildup of deposits due to biofouling is not identified in the GALL Report as an aging effect for the pipes and strainers component types. The applicant, in Section 4.2.1 of its MPS Unit 3 Technical Report, MP-LR-4403, "Open Water," states that the carbon steel and cast iron material lined piping interfaces with sea water and is subject to macro-fouling, silting, and sedimentation. Therefore, buildup of deposits is a potential aging effect for these components that requires aging management.

The applicant, in MPS Unit 3 LRA Appendix C (page C-24), describes that buildup of deposits due to biofouling is an aging effect requiring aging management for heat exchanger tubes, tube sheets, and lined components. The applicant states that lined piping was included because piping can contribute to heat exchanger fouling since small segments of the coating can become detached and foul associated heat exchangers. Buildup of deposits does not directly effect the pressure boundary of the lined piping. However, prolonged operation with deteriorated coatings would lead to loss of material. For this reason, both buildup of deposits and loss of material are managed by the service water system (open cycle cooling) aging management activity. Specifically, internal visual inspections of the service water piping are periodically performed.

During the audit and review, the project team asked applicant to provide justification as to why buildup of deposits is not applied to stainless steel service water filters/strainers since filtration is an intended function. The applicant responded that the stainless steel service water filters/strainers are not lined. Although filtration is an intended function, clogging of the filter is an expected service condition and does not result from age related degradation. The stainless steel service water filters/strainers in question are equipped with differential pressure gauges and are periodically cleaned based on differential pressure.

The project team reviewed the service water system program and its evaluation is documented in Section 7.1.19 of this report. On the basis of its review of the applicant's program and technical report, together with current industry research and operating experience, the project team finds that the service water program is acceptable for managing buildup of deposits for the lined components, since internal visual inspections of the service water components will be periodically performed to detect any sign of deposit build up.

In the MPS Unit 3 LRA, the applicant proposes to manage loss of material of stainless steel and copper alloy pipe control building HVAC booster pump, MCC and rod control HVAC booster pump, valves, and tubing types exposed to a moisture-laden air and/or intermittently wetted

environments using MPS AMP B2.1.13, “General Condition Monitoring,” which is a plant-specific program. The project team reviewed the general condition monitoring program and its evaluation is documented in Section 7.1.12 of this report. On the basis of its review, the project team finds that the general condition monitoring program is acceptable for managing loss of material due to pitting and crevice corrosion since visual inspections will be performed on external surfaces to detect any sign of aging degradation.

The applicant, in the MPS Unit 3 LRA, proposes to manage loss of material of copper alloy pipe and valve external surfaces caused by borated water leakage using MPS AMP B2.1.13, “General Condition Monitoring,” which is a plant-specific program. The project team reviewed the general condition monitoring program and its evaluation is documented in Section 7.1.12 of this report. The project team finds that visual inspections will be performed on external surfaces to detect any sign of aging degradation. On the basis of its review, the project team concludes that the use of the general condition monitoring program in lieu of boric acid corrosion is acceptable for managing loss of material due to borated acid leakage on external surfaces of copper alloy components in this system.

In MPS Unit 3 LRA Table 3.3.2-2, the applicant proposes to manage loss of material for nickel-based alloys expansion joints, flow elements, pipe and restricting orifices exposed to sea water using MPS AMP B2.1.21, “Service Water System (Open-Cycle Cooling),” which is consistent with the GALL XI.M20 program. However, loss of material for nickel-based component types in treated water as a component, material, environment, and aging effect combination is not identified in the GALL Report. The applicant, in Section 4.2.2 of MPS Unit 3 Technical Report, MP-LR-4403, “Open Water,” states that the nickel-based alloys in sea water are exposed to low flow conditions with an aggressive environment. Therefore, pitting corrosion is a potential aging mechanism. The project team reviewed the service water system program and its evaluation is documented in Section 7.1.19 of this report. The project team finds that this program implements the intent of GL 89-13. On the basis of its review of the applicant’s program and technical report, together with current industry research and operating experience, the project team finds that the service water program is acceptable for managing loss of material of nickel-based alloys (due to pitting corrosion) components in a sea water environment for this system.

In MPS Unit 3 LRA Table 3.3.2-2, the applicant proposes to manage loss of material for titanium valves exposed to sea water using MPS AMP B2.1.21, “Service Water System (Open-Cycle Cooling),” which is consistent with the GALL XI.M20 program. However, loss of material for titanium component types in treated water is not identified in the GALL Report. The applicant, in Section 4.2.2 of MPS Unit 3 Technical Report, MP-LR-4403, “Open Water System,” states that loss of material due to erosion of titanium component is possible in a sea water environment. The titanium components in this application have flow rates greater than 50 feet per second (fps) or contain fluids with high particulates. Therefore, erosion is a potential aging mechanism. The project team reviewed the service water system program and its evaluation is documented in Section 7.1.19 of this report. The project team finds that this program implements the intent of the NRC Guidelines of GL 89-13. On the basis of its review of the applicant’s program and technical report, together with current industry research and operating experience, the project team finds that the service water program is acceptable for managing for managing loss of material due to erosion/corrosion for titanium valves in a sea water environment.

In the MPS Unit 3 LRA, the applicant identified no aging effects for rubber expansion joints exposed to air. The applicant explains, in Section 4.2.2 of MPS Unit 3 Technical Report, MP-LR-4403, "Open Water System," that change of material properties due to thermal exposure and irradiation and cracking due to irradiation of rubber components in air are aging effects that do not require aging management for the components in this system.

In the MPS Unit 3 LRA, the applicant identified no aging effects for rubber expansion joints exposed to air. The applicant explains, in Section 4.2.2 of MPS Unit 3 Technical Report, MP-LR-4403, "Open Water System," that change of material properties due to thermal exposure and irradiation and cracking due to irradiation of rubber components in air are aging effects that do not require aging management for the components in this system. The project team reviewed MPS Unit 3 Technical Report, MP-LR-4403, current industry research and operating experience and finds that these components are not exposed to high levels of ultraviolet radiation, ozone, or temperatures greater than 95EF. On the basis of its review, the project team concludes that it did not identify any concerns with the applicant's conclusions that there are no applicable aging effects requiring management for rubber expansion joints exposed to air.

In the MPS Unit 3 LRA, the applicant identified no aging effects for rubber expansion joints exposed to sea water. The applicant states, in Section 4.2.2 of its MPS Unit 3 Technical Report, MP-LR-4403, "Open Water System," that change of material properties and cracking due to thermal of rubber components in sea water are aging effects that do not require aging management for the components in this system.

The project team reviewed MPS Unit 3 Technical Report, MP-LR-4403, current industry research and operating experience and finds that the threshold temperature for applying the aging effects of cracking and change of material properties to elastomers is 95EF. In addition, for MPS Unit 3, the surface temperature of the rubber expansion joints in the open water systems will never exceed 95EF, since the internal water (raw water from the Long Island Sound) is significantly less than 95EF. On the basis of its review, the project team concludes that it did not identify any concerns with the applicant's conclusions that there are no applicable aging effects for rubber expansion joints exposed to sea water since these components are not exposed to temperatures greater than 95°F.

In the MPS Unit 3 LRA, the applicant identified no aging effects for stainless steel spool piece and titanium valves exposed internally and externally to air. Air is not identified in the GALL Report as an environment for this combination of component and material.

On the basis of its review of current industry research and operating experience, the project team finds that air on metal will not result in aging that will be of concern during the period of extended operation. The external environments being referred to are typical of ambient air, e.g., under a shelter, indoor, or air-conditioned enclosure or room. Wrought austenitic stainless steels and titanium are not susceptible to significant general corrosion that would affect the intended function of components. Therefore, the project team concludes that there are no aging effects requiring management for metal in an air environment.

7.3.3.3.3 <u>Sodium Hypochlorite - Aging Management Evaluation (MPS Unit 3 LRA Table 3.3.2-3)</u>

The project team reviewed Table 3.3.2-3 of the MPS Unit 3 LRA, which summarizes the results of AMR evaluations for the sodium hypochlorite system component groups.

The applicant, In the MPS Unit 3 LRA, proposes to manage loss of material of copper alloy pipes exposed to a moisture-laden air and/or intermittently wetted environments using MPS AMP B2.1.13, "General Condition Monitoring," which is a plant-specific program. The project team reviewed the general condition monitoring program and its evaluation is documented in Section 7.1.12 of this report. The project team finds that visual inspections will be performed on external surfaces to detect any sign of aging degradation. On the basis of its review, the project team concludes that the general condition monitoring program is acceptable for managing loss of material due to pitting and crevice corrosion.

In the MPS Unit 3 LRA, the applicant identified no aging effects for fiberglass piping component types exposed to air. The applicant, in Section 4.2.5 of its MPS Unit 3 Technical Report, MP-LR-4403, "Open Water System," that reduced strength due to ozone exposure of non-metallic is possible in an air environment. The applicant explains that the fiberglass components exposed to air in this system are not located near high-voltage electrical equipment. Therefore, ozone exposure is not a potential aging mechanism. In addition, a review of operating experience has identified no concerns related to the occurrence of ozone exposure in the open water systems. The project team reviewed MPS Unit 3 Technical Report, MP-LR-4403, current industry research and operating experience. On the basis of its review, the project team concludes that reduced strength due to ozone for fiberglass components in air environment is not an aging effect that requires aging management.

Based on the review of open water technical report and on the basis of current industry research and operating experience, the project team finds that reduced strength due to ozone for fiberglass components in air environment is not an aging effect that requires aging management.

The applicant identified no aging effects for fiberglass piping component types exposed to sea water. The applicant states, in its open water system AMR MPS Unit 3 Technical Report, MP-LR-4403, Section 4.2.5, that exposure to ultraviolet radiation and ozone can cause damage to the chemical structure of the epoxy matrix of fiberglass. The earliest signs of this effect can be changes in color and surface cracking or crazing. Fiberglass exposed to direct sun or high levels of ozone that might be found in conjunction with high-voltage electrical equipment would be most prone to this effect.

On the basis of the open water technical report, current industry research, and operating experience, the fiberglass components in sea water environment are not exposed to high levels of ultraviolet radiation or ozone. Therefore, the project team finds that cracking in fiberglass components in sea water is not an aging effect that requires aging management.

The applicant identified no aging effects for PVC pipe and valve component types exposed to air and sea water. Current industry research and operating experience reviews have identified instances of PVC degradation resulting from exposure to direct sunlight and exposure to ozone from high voltage. The MPS Material Aging Effects Report (MAER) Technical Report, MP-LR-3700/MP-LR-4700, identifies the aging effect of reduced strength due to ozone exposure for PVC components exposed to sea water, and reduced strength due to ozone exposure or ultraviolet exposure for PVC components exposed to air. The AMR evaluated PVC

components for the above aging effects and concluded that no aging management was required. This conclusion was based on the fact that the PVC components are not exposed to direct sunlight and are not exposed to high levels of ozone, since they are not in close proximity to high voltage electrical equipment.

On the basis of the open water technical report, current industry research, and operating experience, the project team finds that reduced strength PVC components in air or sea water environment is not an aging effect that requires aging management.

7.3.3.3.4 Reactor Plant Component Cooling - Aging Management Evaluation (MPS Unit 3 LRA Table 3.3.2-4 and Table 3.3.2-4a)

The project team reviewed Table 3.3.2-4 of the MPS Unit 3 LRA and the MPS LRA supplement letter dated January 11, 2005 (ML050190289), which summarizes the results of AMR evaluations for the reactor plant component cooling system component groups.

In the MPS Unit 3 LRA, the applicant proposes to manage loss of RPCC heat exchanger copper alloy tubes in treated water using MPS AMP B2.1.25, “Work Control Process,” which is a plant-specific program. The project team reviewed the work control process and its evaluation is documented in Section 7.1.22 of this report. The project team finds that visual inspections of the internal surfaces of plant components and plant commodities are performed during the performance of maintenance, in accordance with the work control process program, to determine the presence of loss of material. On the basis of its review, the project team concludes that the work control process program is acceptable for managing loss of material due to general corrosion since visual inspections will be performed external surfaces of heat exchanger tubes to detect any sign of aging degradation.

In the MPS Unit 3 LRA, the applicant proposes to manage loss of material of external surfaces of the copper alloy RPCC heat exchanger channel and valves exposed to borated water leakage using the MPS AMP B2.1.13, “General Condition Monitoring,” which is a plant-specific program. The project team reviewed the general condition monitoring program and its evaluation is documented in Section 7.1.12 of this report. The project team finds that visual inspections will be performed on external surfaces to detect any sign of aging degradation. On the basis of its review, the project team concludes that the use of the general condition monitoring program in lieu of boric acid corrosion is acceptable for managing loss of material due to borated acid leakage on external surfaces of copper alloy components in this system.

In the MPS Unit 3 LRA and MPS LRA supplement letter dated January 11, 2005 (ML050190289), the applicant proposes to manage loss of material of stainless steel and copper alloy RPCC heat exchanger channel, valves, flow elements, hoses, tubing, and radiation detectors component types exposed to a moisture-laden air and/or intermittently wetted environments using MPS AMP B2.1.13, “General Condition Monitoring,” which is a plant-specific program. The project team reviewed the general condition monitoring program and its evaluation is documented in Section 7.1.12 of this report. On the basis of its review, the project team finds that the general condition monitoring program is acceptable for managing loss of material due to pitting and crevice corrosion since visual inspections will be performed on external surfaces to detect any sign of aging degradation.

7.3.3.3.5 Turbine Plant Component Cooling Water - Aging Management Evaluation (MPS Unit 3 LRA Table 3.3.2-5)

The project team reviewed Table 3.3.2-5 of the MPS Unit 3 LRA, which summarizes the results of AMR evaluations for the turbine plant component cooling water system component groups.

In the MPS Unit 2 LRA, the applicant proposes to manage loss of material of stainless steel pipe and valve component types exposed to a moisture-laden air and/or intermittently wetted environments using MPS AMP B2.1.13, "General Condition Monitoring," which is a plant-specific program. The project team reviewed the general condition monitoring program an its evaluation is documented in Section 7.1.12 of this report. On the basis of its review, the project team finds that the general condition monitoring program is acceptable for managing loss of material due to pitting and crevice corrosion since visual inspections will be performed on external surfaces to detect any sign of aging degradation.

7.3.3.3.6 Chilled Water - Aging Management Evaluation (MPS Unit 3 LRA Table 3.3.2-6)

The project team reviewed Table 3.3.2-6 of the MPS Unit 3 LRA, which summarizes the results of AMR evaluations for the chilled water system component groups.

In the MPS Unit 3 LRA, the applicant proposes to manage loss of material of external surfaces of the copper alloy tubing and valves exposed to borated water leakage using the MPS AMP B2.1.13, "General Condition Monitoring," which is a plant-specific program. The project team reviewed the general condition monitoring program and its evaluation is documented in Section 7.1.12 of this report. The project team finds that visual inspections will be performed on external surfaces to detect any sign of aging degradation. On the basis of its review, the project team concludes that the use of the general condition monitoring program in lieu of boric acid corrosion is acceptable for managing loss of material due to borated acid leakage on external surfaces of copper alloy components in this system.

In the MPS Unit 3 LRA, the applicant proposes to manage loss of material of stainless steel and copper alloy tubing, valves, flow elements, and hoses component types exposed to a moisture-laden air and/or intermittently wetted environments using MPS AMP B2.1.13, "General Condition Monitoring," which is a plant-specific program. The project team reviewed the general condition monitoring program and its evaluation is documented in Section 7.1.12 of this report. The project team finds that visual inspections will be performed on external surfaces to detect any sign of aging degradation. On the basis of its review, the project team concludes that the general condition monitoring program is acceptable for managing loss of material due to pitting and crevice corrosion.

7.3.3.3.7 Charging Pumps Cooling - Aging Management Evaluation (MPS Unit 3 LRA Table 3.3.2-7)

The project team reviewed Table 3.3.2-7 of the MPS Unit 3 LRA, which summarizes the results of AMR evaluations for the charging pumps cooling system component groups.

In the MPS Unit 3 LRA, the applicant proposes to manage loss of material of external surfaces of the copper alloy valves exposed to borated water leakage using MPS AMP B2.1.13, "General Condition Monitoring," which is a plant-specific program. The project team reviewed the

general condition monitoring program and its evaluation is documented in Section 7.1.12 of this report. The project team finds that visual inspections will be performed on external surfaces to detect any sign of aging degradation. On the basis of its review, the project team concludes that the general condition monitoring program in lieu of boric acid corrosion is acceptable for managing loss of material due to borated acid leakage on external surfaces of copper alloy components in this system.

In the MPS Unit 3 LRA, the applicant proposes to manage loss of material of stainless steel and copper alloy charging pump coolers channel and shell, valves, flow elements, pumps, and tubing component types exposed to a moisture-laden air and/or intermittently wetted environments using MPS AMP B2.1.13, “General Condition Monitoring,” which is a plant-specific program. The project team reviewed the general condition monitoring program and its evaluation is documented in Section 7.1.12 of this report. The project team finds that visual inspections will be performed on external surfaces to detect any sign of aging degradation. On the basis of its review, the project team concludes that the general condition monitoring program is acceptable for managing loss of material due to pitting and crevice corrosion.

7.3.3.3.8 Safety Injection Pumps Cooling - Aging Management Evaluation (MPS Unit 3 LRA Table 3.3.2-8)

The project team reviewed Table 3.3.2-8 of the MPS Unit 3 LRA, which summarizes the results of AMR evaluations for the safety injection pumps cooling system component groups.

In the MPS Unit 3 LRA, the applicant proposes to manage loss of material of external surfaces of the copper alloy safety injection pump coolers shell and channel and valves exposed to borated water leakage using MPS AMP B2.1.13, “General Condition Monitoring,” which is a plant-specific program. The project team reviewed the general condition monitoring program and its evaluation is documented in Section 7.1.12 of this report. The project team finds that visual inspections will be performed on external surfaces to detect any sign of aging degradation. On the basis of its review, the project team concludes that the general condition monitoring program isacceptable for managing loss of material due to borated acid leakage on external surfaces of copper alloy components in this system.

In the MPS Unit 3 LRA, the applicant proposes to manage loss of material of stainless steel and copper alloy safety injection pump coolers shell and channel, valves flow elements, pumps, restricting orifices, and tubing component types exposed to a moisture-laden air and/or intermittently wetted environments using MPS AMP B2.1.13, “General Condition Monitoring,” which is a plant-specific program. The project team reviewed the general condition monitoring program and its evaluation is documented in Section 7.1.12 of this report. The project team finds that visual inspections will be performed on external surfaces to detect any sign of aging degradation. On the basis of its review, the project team concludes that the general condition monitoring program is acceptable for managing loss of material due to pitting and crevice corrosion.

7.3.3.3.9 Neutron Shield Tank Cooling - Aging Management Evaluation (MPS Unit 3 LRA Table 3.3.2-9)

The project team reviewed Table 3.3.2-9 of the MPS Unit 3 LRA, which summarizes the results of AMR evaluations for the neutron shield tank cooling system component groups.

In the MPS Unit 3 LRA, the applicant proposes to manage loss of material of external surfaces of the copper alloy valves exposed to borated water leakage using MPS AMP B2.1.13, "General Condition Monitoring," which is a plant-specific program. The project team reviewed the general condition monitoring program and its evaluation is documented in Section 7.1.12 of this report. The project team finds that visual inspections will be performed on external surfaces to detect any sign of aging degradation. On the basis of its review, the project team concludes that the general condition monitoring program in lieu of boric acid corrosion is acceptable for managing loss of material due to borated acid leakage on external surfaces of copper alloy components in this system.

In the MPS Unit 3 LRA, the applicant proposes to manage loss of material of stainless steel and copper alloy valves and tubing component types exposed to a moisture-laden air and/or intermittently wetted environments using MPS AMP B2.1.13, "General Condition Monitoring," which is a plant-specific program. The project team reviewed the general condition monitoring program and its evaluation is documented in Section 7.1.12 of this report. The project team finds that visual inspections will be performed on external surfaces to detect any sign of aging degradation. On the basis of its review, the project team concludes that the general condition monitoring program is acceptable for managing loss of material due to pitting and crevice corrosion.

7.3.3.3.10 Containment Atmosphere Monitoring - Aging Management Evaluation (MPS Unit 3 LRA Table 3.3.2-10)

The project team reviewed Table 3.3.2-10 of the MPS Unit 3 LRA, which summarizes the results of AMR evaluations for the containment atmosphere monitoring system component groups. The project team reviewed, in whole or in part, MPS Unit 3 Technical Report, MP-LR-4401, "License Renewal Project, Aging Management Review, Air and Gas Systems," Revision 2, which provides the AMR results for the air and gas systems.

In the MPS Unit 3 LRA, the applicant identified no aging effects for low-alloy and stainless steel components exposed internally or externally to air, including bolting, pipe, and valves component types. Air is not identified in the GALL Report as an environment for these components and materials.

On the basis of its review of current industry research and operating experience, the project team finds that air on metal will not result in aging that will be of concern during the period of extended operation. The external environments being referred to are typical of ambient air, e.g., under a shelter, indoor, or air-conditioned enclosure or room. Significant corrosion of low-alloy steel requires an electrolytic environment, and a simultaneous presence of oxygen and moisture. Without the presence of the aggressive environment, low-alloy steel components will experience insignificant amounts of corrosion, and no aging effects are applicable to this component/commodity group. Wrought austenitic stainless steels are not susceptible to significant general corrosion that would affect the intended function of components. Therefore,

the project team concludes that there are no applicable aging effects for metal in an air environment.

7.3.3.3.11 Containment Instrument Air - Aging Management Evaluation (MPS Unit 3 LRA Table 3.3.2-11)

The project team reviewed Table 3.3.2-11 of the MPS Unit 3 LRA, which summarizes the results of AMR evaluations for the containment instrument air system component groups. The project team reviewed, in whole or in part, MPS Unit 3 Technical Report, MP-LR-4401, "License Renewal Project, Aging Management Review, Air and Gas Systems," Revision 2, which provides the AMR results for the air and gas systems.

In the MPS Unit 3 LRA, the applicant proposes to manage loss of material of copper alloy pipe, tubing, and valve component types exposed externally to a borated water leakage environment using the MPS AMP B2.1.13, "General Condition Monitoring," which is a plant-specific program. However, the GALL Report specifies GALL AMP XI.M10, "Boric Acid Corrosion" to manage this aging effect. The applicant states, in Note 1, that the boric acid corrosion program includes specific inspections of reactor coolant pressure boundary and supporting systems components. The project team reviewed the general condition monitoring program and its evaluation is documented in Section 7.1.12 of this report. The project team finds that the general condition monitoring program provides inspections for management of loss of material due to boric acid corrosion beyond the scope of the boric acid corrosion program. Also, visual inspection of external surfaces is performed during various walkdowns performed by plant personnel to look for boron buildup and/or boric acid leaks. On the basis of its review, the project team concludes that this program is acceptable for managing loss of material of copper alloy pipe, tubing, and valve component types exposed to a borated water.

In the MPS Unit 3 LRA, the applicant identified no aging effects for stainless steel, low-alloy steel, and copper alloys components exposed internally or externally to air, including bolting, pipe, tubing, and valve component types. Air is not identified in the GALL Report as an environment for these components and materials.

On the basis of its review of current industry research and operating experience, the project team finds that air on metal will not result in aging that will be of concern during the period of extended operation. The external environments being referred to are typical of ambient air, e.g., under a shelter, indoor, or air-conditioned enclosure or room. Significant corrosion of low-alloy steel requires an electrolytic environment, and a simultaneous presence of oxygen and moisture. Without the presence of the aggressive environment, low-alloy steel components will experience insignificant amounts of corrosion, and no aging effects are applicable to this component/commodity group. Wrought austenitic stainless steels and copper alloys are not susceptible to significant general corrosion that would affect the intended function of components. Therefore, the project team concludes that there are no applicable aging effects requiring management for metal in an air environment.

7.3.3.3.12 Instrument Air - Aging Management Evaluation (MPS Unit 3 LRA Table 3.3.2-12)

The project team reviewed Table 3.3.2-12 of the MPS Unit 3 LRA, which summarizes the results of AMR evaluations for the instrument air system component groups. The project team reviewed, in whole or in part, MPS Unit 3 Technical Report, MP-LR-4401, "License Renewal

Project, Aging Management Review, Air and Gas Systems," Revision 2, dated December 29, 2003, which provides the AMR results for the air and gas systems.

In the MPS Unit 3 LRA, the applicant proposes to manage loss of material of copper alloy pipe and valve component types exposed externally to a borated water leakage environment using MPS AMP B2.1.13, "General Condition Monitoring," which is a plant-specific program. However, the GALL Report specifies GALL AMP XI.M10, "Boric Acid Corrosion" to manage this aging effect. The applicant states, in Note 1, that the boric acid corrosion program includes specific inspections of reactor coolant pressure boundary and supporting systems components.

The project team reviewed the general condition monitoring program and its evaluation is documented in Section 7.1.12 of this report. The project team finds that the general condition monitoring program provides inspections for management of loss of material due to boric acid corrosion beyond the scope of the boric acid corrosion program. Also, visual inspection of external surfaces is performed during various walkdowns by plant personnel to look for boron buildup and/or boric acid leaks. On the basis of its review, the project team finds that this program is acceptable for managing loss of material of copper alloy pipe and valves exposed externally to a borated water leakage environment.

In the MPS Unit 3 LRA, the applicant identified no aging effects for carbon steel, cast iron, and copper alloys components exposed external, including air dryers, filters, instrument air aftercooler (shell), instrument air compressor (intercooler shell), instrument air filter silencer, instrument air receiver, pipe, strainers, traps, valves, instrument air compressor, tubing, and valve component types. Air is not identified in the GALL Report as an environment for these components and materials.

On the basis of its review of current industry research and operating experience, the project team finds that air on metal will not result in aging that will be of concern during the period of extended operation. The external environments being referred to are typical of ambient air, e.g., under a shelter, indoor, or air-conditioned enclosure or room. Significant corrosion of carbon steel and cast iron requires an electrolytic environment, and a simultaneous presence of oxygen and moisture. Without the presence of the aggressive environment, carbon steel and cast iron components will experience insignificant amounts of corrosion, and no aging effects are applicable to this component/commodity group. Copper alloys are not susceptible to significant general corrosion that would affect the intended function of components. Therefore, the project team finds that there are no applicable aging effects requiring management for metal in an air environment.

In the MPS Unit 3 LRA, the applicant proposes to manage loss of materials of copper alloy instrument air aftercooler (tubing) component type in an environment of treated water (closed cooling water) using MPS AMP B2.1.7, "Closed-Cycle Cooling Water System." The project team reviewed the closed-cycle cooling water system program and its evaluation is documented in Section 7.1.6 of this report. The project team finds that the closed cycle cooling water system program is consistent with GALL AMP XI.M21, "Closed-cycle Cooling Water System," with an acceptable exception. On the basis of its review, the project team finds that the closed-cycle cooling water system program is acceptable for managing loss of material of components in the treated water environment that are serviced by closed-cycle cooling system.

In the MPS Unit 3 LRA, the applicant proposes to manage loss of material of copper alloy pipe exposed externally to a damp soil environment using MPS AMP B2.1.4, "Buried Piping Inspection Program." The project team reviewed the buried piping inspection program and its evaluation is documented in Section 7.1.3 of this report. The project team finds that the buried piping inspection program is consistent with GALL AMP XI.M28, "Buried Piping and Tanks Surveillance" and GALL AMP XI.M34, "Buried Piping and Tanks Inspection" with acceptable exceptions and enhancements. The program includes a baseline inspection of representative samples of piping with different protective measures and also inspections of buried components when piping is excavated during maintenance or for any other reason. On the basis of its review, the project team finds that the program is acceptable for managing loss of material.

In the MPS Unit 3 LRA, the applicant proposes to manage loss of material of copper alloy instrument air compressor (intercooler tubing) component groups exposed externally to moisture-laden air and/or an intermittently wetted environment (but internal to the air compressor) using MPS AMP B2.1.25, "Work Control Process," which is a plant-specific program. The project team reviewed the work control process and its evaluation is documented in Section 7.1.22 of this report. The project team finds that visual inspections of the internal surfaces of plant components and plant commodities are performed during maintenance, in accordance with the work control process program, to determine the presence of loss of material. On the basis of its review, the project team finds that the work control process program is acceptable for managing loss of material due to general corrosion since visual inspections will be performed on internal surfaces of components (external surface of intercooler tubing) to detect any sign of aging degradation.

In the MPS Unit 3 LRA, the applicant identified no aging effects for the cast iron air compressor component type exposed internally to oil. However, the combination of cast iron in oil was not addressed in MPS Unit 3 Technical Report, MP-LR-4401, "License Renewal Project, Aging Management Review, Air and Gas Systems," Revision 2, dated December 29, 2003, and that no basis was evident for the applicant's conclusion that there was no aging effect for this component type. During the audit and review, the project team requested that the applicant provide a basis for considering no aging effects. In a MPS LRA supplement dated July 7, 2004 (ML041900407), the applicant stated, in response to Audit Item 150, that the oil environment was inadvertently listed for the instrument air compressor. On the basis of its review, the project team finds the applicant's response acceptable.

7.3.3.3.13 <u>Nitrogen - Aging Management Evaluation (MPS Unit 3 LRA Table 3.3.2-13)</u>

The project team reviewed Table 3.3.2-13 of the MPS Unit 3 LRA, which summarizes the results of AMR evaluations for the nitrogen system component groups. The project team reviewed, in whole or in part, MPS Unit 3 Technical Report, MP-LR-4401, Revision 2, which provides the AMR results for the air and gas systems.

In the MPS Unit 3 LRA, the applicant identified no aging effects for carbon steel components exposed externally to air, including pipe and valve component types. Air is not identified in the GALL Report as an environment for these components and materials.

On the basis of current industry research and operating experience, the project team finds that air on metal will not result in aging that will be of concern during the period of extended operation. The external environments being referred to are typical of ambient air, e.g., under a

shelter, indoor, or air-conditioned enclosure or room. Significant corrosion of carbon steel requires an electrolytic environment, and a simultaneous presence of oxygen and moisture. Without the presence of the aggressive environment, carbon steel components will experience insignificant amounts of corrosion, and no aging effects are applicable to this component/commodity group. Therefore, the project team finds that there are no applicable aging effects requiring management for metal in an air environment.

In the MPS Unit 3 LRA, the applicant identified no aging effects for carbon steel components exposed internally to gas for pipe and valve component types. Gas is not identified in the GALL Report as an environment for these components and materials.

On the basis of its review of current industry research and operating experience, the project team finds that an internal environment of gas (nitrogen, which is an inert gas) on metal will not result in aging that will be of concern during the period of extended operation. Therefore, the project team finds that there are no applicable aging effects requiring management for metal in a gas environment.

In the MPS Unit 3 LRA, the applicant proposes to manage loss of material of stainless steel pipe component types exposed to atmosphere/weather using MPS AMP B2.1.13, “General Condition Monitoring,” which is a plant-specific program. The project team reviewed the general condition monitoring program and its evaluation is documented in Section 7.1.12 of this report. The project team finds that visual inspections will be performed on external surfaces to detect any sign of aging degradation. On the basis of its review, the project team concludes that the general condition monitoring program isacceptable for managing loss of material due to pitting and crevice corrosion.

7.3.3.3.14 Service Air - Aging Management Evaluation (MPS Unit 3 LRA Table 3.3.2-14 and Table 3.3.2-14a)

The project team reviewed Table 3.3.2-14 of the MPS Unit 3 LRA and Table 3.3.2-14a of the MPS LRA supplement letter dated January 11, 2005 (ML050190289), which summarizes the results of AMR evaluations for the service air system component groups. The project team reviewed, in whole or in part, MPS Unit 3 Technical Report, MP-LR-4401, Revision 2, which provides the AMR results for the air and gas systems.

In the MPS Unit 3 LRA, the applicant proposes to manage loss of material of stainless steel pipe, and valve component types exposed to atmosphere/weather using MPS AMP B2.1.13, “General Condition Monitoring,” which is a plant-specific program. The project team reviewed the general condition monitoring program and its evaluation is documented in Section 7.1.12 of this report. The project team finds that visual inspections will be performed on external surfaces to detect any sign of aging degradation. On the basis of its review, the project team finds that the general condition monitoring program isacceptable for managing loss of material due to pitting and crevice corrosion.

In the MPS Unit 3 LRA and the MPS LRA supplement letter dated January 11, 2005 (ML050190289), the applicant proposes to manage loss of material of stainless steel pipe, valves, and flow transmitters component groups exposed internally to moisture-laden air and/or an intermittently wetted environment using MPS AMP B2.1.25, “Work Control Process,” which is a plant-specific program. The project team reviewed the work control process and its

evaluation is documented in Section 7.1.22 of this report. The project team finds that visual inspections of the internal surfaces of plant components and plant commodities are performed during the performance of maintenance, in accordance with the work control process program, to determine the presence of loss of material. On the basis of its review, the project team finds that the work control process program is acceptable for managing loss of material due to general corrosion since visual inspections will be performed on internal surfaces of components to detect any sign of aging degradation.

In the MPS Unit 3 LRA and the MPS LRA supplement letter dated January 11, 2005 (ML050190289), the applicant identified no aging effects for carbon steel and stainless steel components exposed externally to air, including pipe, valves and flow transmitters component types. Air is not identified in the GALL Report as an environment for these components and materials.

On the basis of its review of current industry research and operating experience, the project team finds that air on metal will not result in aging that will be of concern during the period of extended operation. The external environments being referred to are typical of ambient air, e.g., under a shelter, indoor, or air-conditioned enclosure or room. Significant corrosion of carbon steel requires an electrolytic environment, and a simultaneous presence of oxygen and moisture. Without the presence of the aggressive environment, carbon steel components will experience insignificant amounts of corrosion, and no aging effects are applicable to this component/commodity group. Therefore, the project team finds that there are no applicable aging effects requiring management for metal in an air environment.

7.3.3.3.15 Chemical and Volume Control - Aging Management Evaluation (MPS Unit 3 LRA Table 3.3.2-15 and Table 3.3.2-15a)

The project team reviewed Table 3.3.2-15 of the MPS Unit 3 LRA and Table 3.3.2-15a of the MPS LRA supplement letter dated January 11, 2005 (ML050190289), which summarizes the results of AMR evaluations for the CVCS component groups.

In the MPS Unit 3 LRA and the MPS LRA supplement letter dated January 11, 2005 (ML050190289), the applicant identified no aging effects for carbon steel, low-alloy steel, and stainless steel components exposed to air, including bolting, charging pump lube oil coolers (shell), chiller surge tank, letdown chiller heat exchanger (shell), level indicators, lube oil reservoirs, pipe, pumps, thermal regeneration chiller compressor oil cooler (channel head), thermal regeneration chiller compressor oil cooler (shell), thermal regeneration chiller condenser (channel head) thermal regeneration chiller condenser (shell), thermal regeneration chiller evaporator (shell), valves, boric acid blender and tanks, chemical mixing tank, demineralizer, excess letdown heat exchanger (channel head), filter/strainer, flexible hoses, flow element, letdown chiller heat exchanger (channel head), letdown heat exchanger (channel head), letdown reheat heat exchanger (channel head and shell), moderating heat exchanger (channel head and shell), moderating heat exchanger (shell), RCP seal standpipes, regenerative heat exchanger (channel head), regenerative heat exchanger (shell), restricting orifices, seal water heat exchanger (channel head), tubing, volume control tank, and boric acid batching tank component types. Air is not identified in the GALL Report as an environment for these components and materials.

On the basis of its review of current industry research and operating experience, the project team finds that air on metal will not result in aging that will be of concern during the period of extended operation. The external environments being referred to are typical of ambient air, e.g., under a shelter, indoor, or air-conditioned enclosure or room. Significant corrosion of carbon steel and low-alloy steel requires an electrolytic environment, and a simultaneous presence of oxygen and moisture. Without the presence of the aggressive environment, low-alloy steel components will experience insignificant amounts of corrosion, and no aging effects are applicable to this component/commodity group. Wrought austenitic stainless steels are not susceptible to significant general corrosion that would affect the intended function of components. Therefore, the project team finds that there are no applicable aging effects requiring management for metal in an air environment.

In the MPS Unit 3 LRA, the applicant proposes to manage loss of material of carbon steel, and copper alloy charging pump lube oil coolers (tubes), charging pump lube oil coolers (tubesheet), charging pump lube oil coolers (shell), CS manifolds (charging pump LO), flexible hoses, level indicators, lube oil reservoirs, pipe, pumps, thermal regeneration chiller compressor oil cooler (channel head), thermal regeneration chiller compressor oil cooler (tube sheet), thermal regeneration chiller compressor oil cooler (tubes), tubing, and valve component types exposed internally or externally to oil using MPS AMP B2.1.25, “Work Control Process.” The work control process program provides the opportunity to visually inspect the internal surfaces of components during preventive and corrective maintenance activities on an ongoing basis. Oil samples are analyzed periodically for contaminants for indication of degradation. The work control process program provides input to the MPS Unit 3 corrective action program if aging effects are identified.

The project team finds the work control process program acceptable for managing the aging effect of loss of material. The project team’s evaluation of the work control process program is documented in Section 7.1.22 of this report.

In the MPS Unit 3 LRA, the applicant identified no aging effects for stainless steel components exposed internally to gas or air for pipe, valves, and volume control tank component types. Gas is not identified in the GALL Report as an environment for these components and materials.

On the basis of its review of current industry research and operating experience, the project team finds that an internal environment of gas (which is similar to air) or air on metal will not result in aging that will be of concern during the period of extended operation. Therefore, the project team finds that there are no applicable aging effects requiring management for metal in a gas or air environment.

In the MPS Unit 3 LRA, the applicant identified no aging effects for carbon steel components exposed internally to air for thermal regeneration chiller condenser (shell), thermal regeneration chiller evaporator (shell), and valve component types. Air is not identified in the GALL Report as an environment for these components and materials. However, the applicant identifies Note 5 for these components (page 3-273 and page 3-276). Specifically, Note 5 addresses external environment of air and not internal environment. During the audit and review, the applicant was requested to clarify this issue. In a MPS LRA supplement dated July 7, 2004 (ML041900407), the applicant stated, in response to Audit Item 163, that the Note 5 should be replaced with Note 6 in MPS Unit 3 LRA Table 3.3.2-15 (page 3-273) for CVCS component groups “Thermal Regeneration Chiller Condenser (shell)” and “Thermal Regeneration Chiller Evaporator (shell)”

for an internal environment of air. On the basis of its review, the project team finds the applicant's response acceptable.

On the basis of its review of current industry research and operating experience, the project team finds that an internal environment of air on metal will not result in aging that will be of concern during the period of extended operation. Therefore, the project team concludes that there are no applicable aging effects requiring management for metal in an air environment.

In the MPS Unit 3 LRA, the applicant proposes to manage loss of material of copper alloy charging pump lube oil coolers (tubes), and charging pump lube oil coolers (tube sheet) component types exposed internally to treated water using MPS AMP B2.1.7, "Closed-Cycle Cooling Water System." The project team reviewed the closed-cycle cooling water system program and its evaluation is documented in Section 7.1.6 of this report. The project team finds that the closed-cycle cooling water system program is consistent with GALL AMP XI.M.21, "Closed-Cycle Cooling Water System" with an acceptable exception. The exception is performance testing of the closed-cycle cooling water side of heat exchangers. On the basis of its review, the project team finds the closed-cycle cooling water program acceptable for managing the aging effect of loss of material for these component groups.

7.3.3.3.16 Reactor Plant Sampling - Aging Management Evaluation (MPS Unit 3 LRA Table 3.3.2-16 and Table 3.3.2-16a)

The project team reviewed Table 3.3.2-16 of the MPS Unit 3 LRA and Table 3.3.2-16a of the MPS LRA supplement letter dated January 11, 2005 (ML050190289), which summarizes the results of AMR evaluations for the reactor plant sampling system component groups.

In the MPS Unit 3 LRA, the applicant identified no aging effects for low-alloy and stainless steel components exposed to air, including bolting, flexible hoses, piping, tubing, and valve component types. Air is not identified in the GALL Report as an environment for these components and materials.

On the basis of its review of current industry research and operating experience, the project team finds that air on metal will not result in aging that will be of concern during the period of extended operation. The external environments being referred to are typical of ambient air, e.g., under a shelter, indoor, or air-conditioned enclosure or room. Significant corrosion of low-alloy steel requires an electrolytic environment, and a simultaneous presence of oxygen and moisture. Without the presence of the aggressive environment, low-alloy steel components will experience insignificant amounts of corrosion, and no aging effects are applicable to this component/commodity group. Wrought austenitic stainless steels are not susceptible to significant general corrosion that would affect the intended function of components. Therefore, the project team concludes that there are no aging effects requiring management for metal in an air environment.

7.3.3.3.17 Primary Grade Water - Aging Management Evaluation (MPS Unit 3 LRA Table 3.3.2-17)

The project team reviewed Table 3.3.2-17 of the MPS Unit 3 LRA, which summarizes the results of AMR evaluations for the primary grade water system component groups.

In the MPS Unit 3 LRA, the applicant identified no aging effects for low-alloy and stainless steel components exposed to air, including bolting, piping, and valve component types. Air is not identified in the GALL Report as an environment for these components and materials.

On the basis of its review of current industry research and operating experience, the project team finds that air on metal will not result in aging that will be of concern during the period of extended operation. The external environments being referred to are typical of ambient air, e.g., under a shelter, indoor, or air-conditioned enclosure or room. Significant corrosion of low-alloy steel requires an electrolytic environment, and a simultaneous presence of oxygen and moisture. Without the presence of the aggressive environment, low-alloy steel components will experience insignificant amounts of corrosion, and no aging effects are applicable to this component/commodity group. Wrought austenitic stainless steels are not susceptible to significant general corrosion that would affect the intended function of components. Therefore, the project team finds that there are no aging effects requiring management for metal in an air environment.

7.3.3.3.18 Auxiliary Building Ventilation - Aging Management Evaluation (MPS Unit 3 LRA Table 3.3.2-18)

The project team reviewed Table 3.3.2-18 of the MPS Unit 3 LRA, which summarizes the results of AMR evaluations for the auxiliary building ventilation system component groups.

In the MPS Unit 3 LRA, the applicant proposes to manage loss of material of stainless steel flow elements, pipe, and tubing component types exposed to atmosphere/weather using MPS AMP B2.1.13, “General Condition Monitoring,” which is a plant-specific program. The project team reviewed the general condition monitoring program and its evaluation is documented in Section 7.1.12 of this report. The project team finds that visual inspections will be performed on external surfaces to detect any sign of aging degradation. On the basis of its review, the project team finds the general condition monitoring acceptable for managing loss of material due to pitting and crevice corrosion.

In the MPS Unit 3 LRA, the applicant identified no aging effects for carbon and stainless steel HVAC components exposed internally or externally to air that is not intermittently wetted, including auxiliary building filter bank housings, damper housings, ductwork, filter bank housing, MCC rod control and cable vault AC air supply unit, pipe, silencers, valves, flow elements, and tubing component types.

The applicant states, in the MPS Unit 3 LRA, that surfaces of carbon and stainless steel components located within structures have not experienced corrosion degradation that would affect the intended function of components due to humidity in the absence of cyclic or intermittent wetting conditions, such as condensation. The applicant interprets the GALL Report environment termed ‘warm, moist air’ to be air with an undefined relative humidity level, and not a wetted environment. Since the MPS Unit 3 AMR approach considers loss of material only in a moisture-laden air and/or intermittently wetted environment, the GALL Report items were determined to be not applicable.

The project team reviewed the MPS Unit 3 operating experience as a confirmation of the validity of the AMR approach for corrosion in an air environment. The operating experience reviews did not find significant corrosion of ventilation system components (other than cooling

coils and associated components) due to the air environment. The project team finds that, based on the absence of significant corrosion, “moist air” alone does not result in corrosion for these components. On the basis of its review, the project team finds that there are no aging effects requiring management for metal in an air environment.

In the MPS Unit 3 LRA, the applicant identified no aging effects for copper alloy HVAC components exposed internally or externally to air that is not intermittently wetted, including auxiliary building heating and ventilation air supply heating coils component types.

The applicant states, in the MPS Unit 3 LRA, that surfaces of copper alloy components located within structures have not experienced corrosion degradation that would affect the intended function of components due to humidity in the absence of cyclic or intermittent wetting conditions, such as condensation. The applicant interprets the GALL Report environment termed ‘warm, moist air’ to be air with an undefined relative humidity level, and not a wetted environment. Since the MPS Unit 3 AMR approach considers loss of material only in a wetted environment, the GALL Report items were determined to be not applicable.

The project team reviewed the MPS Unit 3 operating experience as a confirmation of the validity of the AMR approach for corrosion in an air environment. The operating experience reviews did not find significant corrosion of ventilation system components (other than cooling coils and associated components) due to the air environment. The project team finds that, based on the absence of significant corrosion, “moist air” alone does not result in corrosion for these components. On the basis of its review, the project team finds that there are no aging effects requiring management for metal in an air environment.

7.3.3.3.19 Circulating and Service Water Pumphouse Ventilation - Aging Management Evaluation (MPS Unit 3 LRA Table 3.3.2-19)

The project team reviewed Table 3.3.2-19 of the MPS Unit 3 LRA, which summarizes the results of AMR evaluations for the circulating and service water pumphouse ventilation system component groups.

In the MPS Unit 3 LRA, the applicant identified no aging effects for carbon steel HVAC components exposed internally or externally to air that is not intermittently wetted, including damper housings, ductwork, fan/blower housing, and silencer component types.

The applicant states, in the MPS Unit 3 LRA, that surfaces of carbon steel components located within structures have not experienced corrosion degradation that would affect the intended function of components due to humidity in the absence of cyclic or intermittent wetting conditions, such as condensation. The applicant interprets the GALL Report environment termed ‘warm, moist air’ to be air with an undefined relative humidity level, and not a wetted environment. Since the MPS Unit 3 AMR approach considers loss of material only in a wetted environment, the GALL Report items were determined to be not applicable.

The project team reviewed the MPS Unit 3 operating experience as a confirmation of the validity of the AMR approach for corrosion in an air environment. The operating experience reviews did not find significant corrosion of ventilation system components (other than cooling coils and associated components) due to the air environment. The project team finds that, based on the absence of significant corrosion, “moist air” alone does not result in corrosion for

these components. On the basis of its review, the project team finds that there are no aging effects requiring management for metal in an air environment.

7.3.3.3.20 Containment Air Recirculation - Aging Management Evaluation (MPS Unit 3 LRA Table 3.3.2-20)

The project team reviewed Table 3.3.2-20 of the MPS Unit 3 LRA, which summarizes the results of AMR evaluations for the containment air recirculation system component groups.

In the MPS Unit 3 LRA, the applicant identified no aging effects for carbon steel and stainless steel HVAC components exposed internally or externally to air that is not intermittently wetted, including containment air recirculation cooling unit housings, damper housings, ductwork, fan/blower housing, and tubing component types.

The applicant states, in the MPS Unit 3 LRA, that surfaces of carbon steel and stainless steel components located within structures have not experienced corrosion degradation that would affect the intended function of components due to humidity in the absence of cyclic or intermittent wetting conditions, such as condensation. The applicant interprets the GALL Report environment termed 'warm, moist air' to be air with an undefined relative humidity level, and not a wetted environment. Since the MPS Unit 3 AMR approach considers loss of material only in a wetted environment, the GALL Report items were determined to be not applicable.

The project team reviewed the MPS Unit 3 operating experience as a confirmation of the validity of the AMR approach for corrosion in an air environment. The operating experience reviews did not find significant corrosion of ventilation system components (other than cooling coils and associated components) due to the air environment. The project team finds that, based on the absence of significant corrosion, 'moist air' alone does not result in corrosion for these components. On the basis of its review, the project team finds that there are no aging effects requiring management for metal in an air environment.

7.3.3.3.21 Containment Purge Air - Aging Management Evaluation (MPS Unit 3 LRA Table 3.3.2-21)

The project team reviewed Table 3.3.2-21 of the MPS Unit 3 LRA, which summarizes the results of AMR evaluations for the containment purge air system component groups.

In the MPS Unit 3 LRA, the applicant identified no aging effects for carbon steel components exposed to air, including damper housing, ductwork, pipe, and valve component types. Air is not identified in the GALL Report as an environment for these components and materials.

On the basis of its review of current industry research and operating experience, the project team finds that air on metal will not result in aging that will be of concern during the period of extended operation. The external environments being referred to are typical of ambient air, e.g., under a shelter, indoor, or air-conditioned enclosure or room. Significant corrosion of carbon steel requires an electrolytic environment, and a simultaneous presence of oxygen and moisture. Without the presence of the aggressive environment, carbon steel components will experience insignificant amounts of corrosion, and no aging effects are applicable to this component/commodity group. Therefore, the project team finds that there are no applicable aging effects requiring management for metal in an air environment.

In the MPS Unit 3 LRA, the applicant identified no aging effects for carbon steel components exposed internally to air, including damper housing, ductwork, pipe, and valve component types. Air is not identified in the GALL Report as an environment for these components and materials.

On the basis of its review of current industry research and operating experience, the project team finds that air on metal will not result in aging that will be of concern during the period of extended operation. The internal environment is air. Significant amounts of corrosion of carbon steel require an electrolytic environment, and a simultaneous presence of oxygen and moisture. Significant corrosion of carbon steel in air environment also requires the components to be subject to condensation. Without the presence of the aggressive environment, therefore, carbon steel components will experience insignificant amounts of corrosion, and no aging effects would be applicable to this component/commodity group. Therefore, the project team did not identify any concerns with the applicant's conclusions that there are no applicable aging effects requiring management for metal in an air environment.

In the MPS Unit 3 LRA, the applicant identified no aging effects for copper alloy components exposed to air, including containment purge heating and ventilation air supply heating coils component types. Air is not identified in the GALL Report as an environment for these components and materials.

On the basis of its review of current industry research and operating experience, the project team finds that air on metal will not result in aging that will be of concern during the period of extended operation. The external environments being referred to are typical of ambient air, e.g., under a shelter, indoor, or air-conditioned enclosure or room. Without the presence of the aggressive environment, copper alloy components will experience insignificant amounts of corrosion, and no aging effects are applicable to this component/commodity group. Therefore, the project team finds that there are no applicable aging effects requiring management for metal in an air environment.

7.3.3.3.22 <u>Containment Leakage Monitoring - Aging Management Evaluation (MPS Unit 3 LRA Table 3.3.2-22)</u>

The project team reviewed Table 3.3.2-22 of the MPS Unit 3 LRA, which summarizes the results of AMR evaluations for the containment leakage monitoring system component groups.

In the MPS Unit 3 LRA, the applicant identified no aging effects for carbon and stainless steel components exposed to air, including pipe, tubing, and valve component types. Air is not identified in the GALL Report as an environment for these components and materials.

On the basis of its review of current industry research and operating experience, the project team finds that air on metal will not result in aging that will be of concern during the period of extended operation. The external environments being referred to are typical of ambient air, e.g., under a shelter, indoor, or air-conditioned enclosure or room. Significant corrosion of carbon steel requires an electrolytic environment, and a simultaneous presence of oxygen and moisture. Without the presence of the aggressive environment, carbon steel components will experience insignificant amounts of corrosion, and no aging effects are applicable to this component/commodity group. Wrought austenitic stainless steels is not susceptible to significant general corrosion that would affect the intended function of components. Therefore,

the project team finds that there are no applicable aging effects requiring management for metal in an air environment.

In the MPS Unit 3 LRA, the applicant identified no aging effects for carbon and stainless steel components exposed internally to air, including pipe, tubing, and valve component types. Air is not identified in the GALL Report as an environment for these components and materials.

On the basis of its review of current industry research and operating experience, the project team finds that air on metal will not result in aging that will be of concern during the period of extended operation. The internal environment is air. Significant amounts of corrosion of carbon steel require an electrolytic environment, and a simultaneous presence of oxygen and moisture. Significant corrosion of carbon steel in air environment also requires the components to be subject to condensation. Without the presence of the aggressive environment, therefore, carbon steel components will experience insignificant amounts of corrosion, and no aging effects would be applicable to this component/commodity group. Wrought austenitic stainless steels is not susceptible to significant general corrosion that would affect the intended function of components. Therefore, the project team did not identify any concerns with the applicant's conclusions that there are no applicable aging effects requiring management for metal in an air environment.

7.3.3.3.23 Containment Vacuum - Aging Management Evaluation (MPS Unit 3 LRA Table 3.3.2-23 and Table 3.3.2-23a)

The project team reviewed Table 3.3.2-23 of the MPS Unit 3 LRA and Table 3.3.2-23a of the MPS LRA supplement letter dated January 11, 2005 (ML050190289), which summarizes the results of AMR evaluations for the containment vacuum system component groups.

In the MPS Unit 3 LRA, the applicant identified no aging effects for carbon steel components exposed to air, including bolting, component types. Air is not identified in the GALL Report as an environment for these components and materials.

On the basis of its review of current industry research and operating experience, the project team finds that air on metal will not result in aging that will be of concern during the period of extended operation. The external environments being referred to are typical of ambient air, e.g., under a shelter, indoor, or air-conditioned enclosure or room. Significant corrosion of carbon steel requires an electrolytic environment, and a simultaneous presence of oxygen and moisture. Significant corrosion of carbon steel in air environment also requires the components to be subject to condensation. Without the presence of the aggressive environment, carbon steel components will experience insignificant amounts of corrosion, and no aging effects are applicable to this component/commodity group. Wrought austenitic stainless steels is not susceptible to significant general corrosion that would affect the intended function of components. Therefore, the project team finds that there are no applicable aging effects requiring management for metal in an air environment.

In the MPS Unit 3 LRA and the MPS LRA supplement letter dated January 11, 2005 (ML050190289), the applicant identified no aging effects for stainless steel components exposed to an indoor air environment and are not intermittently wetted, including pipe, valves, pumps, and vacuum ejector component types. Air is not identified in the GALL Report as an environment for these components and materials.

On the basis of its review of current industry research and operating experience, the project team finds that air on metal will not result in aging that will be of concern during the period of extended operation. Therefore, the project team did not identify any concerns with the applicant's conclusions that there are no applicable aging effects requiring management for metal in an air environment.

7.3.3.3.24 Control Building Ventilation - Aging Management Evaluation (MPS Unit 3 LRA Table 3.3.2-24)

The project team reviewed Table 3.3.2-24 of the MPS Unit 3 LRA, which summarizes the results of AMR evaluations for the control building ventilation system component groups.

In the MPS Unit 3 LRA, the applicant proposes to manage loss of material of stainless steel and carbon steel chiller reservoirs, filter/strainer housing, pipe, valves, pumps (control building HVAC chiller oil pump), chiller oil coolers (shell), chiller oil coolers (tubes),and chiller oil coolers (tubesheet) component types exposed internally or externally to oil using MPS AMP B2.1.25, "Work Control Process." The work control process program provides the opportunity to visually inspect the internal surfaces of components during preventive and corrective maintenance activities on an ongoing basis. Oil samples are analyzed periodically for contaminants for indication of degradation. The work control process program provides input to the MPS Unit 3 corrective action program if aging effects are identified.

The project team finds the work control process program acceptable for managing the aging effect of loss of material. The project team reviewed the work control process program and its evaluation is documented in Section 7.1.22 of this report.

In the MPS Unit 3 LRA, the applicant proposes to manage loss of material of stainless steel expansion joints, flow elements, moisture indicators, tubing, and valve component types exposed to atmosphere/weather using MPS AMP B2.1.13, "General Condition Monitoring," which is a plant-specific program. The project team reviewed the general condition monitoring program and its evaluation is documented in Section 7.1.12 of this report. The project team finds that visual inspections will be performed on external surfaces to detect any sign of aging degradation. On the basis of its review, the project team finds that the general condition monitoring program is acceptable for managing loss of material due to pitting and crevice corrosion.

In the MPS Unit 3 LRA, the applicant identified no aging effects for carbon steel and stainless steel HVAC components exposed internally or externally to air that is not intermittently wetted, including air storage tanks, control building air handling units (housing), control room emergency ventilation filter bank housings, damper housings, duct flow restrictors, ductwork, fan blower housing, filter/strainer housing, heater housing, humidifiers, pipe, tubing, and valves component types.

The applicant states, in the MPS Unit 3 LRA, that surfaces of carbon and stainless steel components located within structures have not experienced corrosion degradation that would affect the intended function of components due to humidity in the absence of cyclic or intermittent wetting conditions, such as condensation. The applicant interprets the GALL Report environment termed 'warm, moist air' to be air with an undefined relative humidity level, and not a wetted environment. Since the MPS Unit 3 AMR approach considers loss of material

only in a moisture-laden air and/or intermittently wetted environment, the GALL Report items were determined to be not applicable.

The project team reviewed the MPS Unit 3 operating experience as a confirmation of the validity of the AMR approach for corrosion in an air environment. The operating experience reviews did not find significant corrosion of ventilation system components (other than cooling coils and associated components) due to the air environment. The project team finds that, based on the absence of significant corrosion, 'moist air' alone does not result in corrosion for these components. On the basis of its review, the project team finds that there are no aging effects requiring management for metal in an air environment.

In the MPS Unit 3 LRA, the applicant identified no aging effects for cast iron and copper alloy components exposed internally or externally to gas for economizers, evaporator (shell), evaporator (tubesheet), evaporator (tubes), and compressor component types. Gas is not identified in the GALL Report as an environment for these components and materials.

On the basis of its review of current industry research and operating experience, the project team finds that an internal environment of gas (which is similar to air) on metal will not result in aging that will be of concern during the period of extended operation. Therefore, the project team finds that there are no applicable aging effects requiring management for metal in a gas environment.

7.3.3.3.25 CRDM Ventilation and Cooling - Aging Management Evaluation (MPS Unit 3 LRA Table 3.3.2-25)

The project team reviewed Table 3.3.2-25 of the MPS Unit 3 LRA, which summarizes the results of AMR evaluations for the CRDM ventilation and cooling system component groups.

All line items in this system are consistent with the GALL Report.

7.3.3.3.26 Emergency Generator Enclosure Ventilation - Aging Management Evaluation (MPS Unit 3 LRA Table 3.3.2-26)

The project team reviewed Table 3.3.2-26 of the MPS Unit 3 LRA, which summarizes the results of AMR evaluations for the emergency generator enclosure ventilation system component groups.

In the MPS Unit 3 LRA, the applicant identified no aging effects for carbon steel HVAC components exposed internally or externally to air that is not intermittently wetted, including damper housings, ductwork, and fan blower housing component types.

The applicant states, in the MPS Unit 3 LRA, that surfaces of carbon steel components located within structures have not experienced corrosion degradation that would affect the intended function of components due to humidity in the absence of cyclic or intermittent wetting conditions, such as condensation. The applicant interprets the GALL Report environment termed 'warm, moist air' to be air with an undefined relative humidity level, and not a wetted environment. Since the MPS Unit 3 AMR approach considers loss of material only in a moisture-laden air and/or intermittently wetted environment, the GALL Report items were determined to be not applicable.

The project team reviewed the MPS Unit 3 operating experience as a confirmation of the validity of the AMR approach for corrosion in an air environment. The operating experience reviews did not find significant corrosion of ventilation system components (other than cooling coils and associated components) due to the air environment. The project team finds that, based on the absence of significant corrosion, 'moist air' alone does not result in corrosion for these components. On the basis of its review, the project team finds that there are no aging effects requiring management for metal in an air environment.

7.3.3.3.27 ESF Building Ventilation - Aging Management Evaluation (MPS Unit 3 LRA Table 3.3.2-27)

The project team reviewed Table 3.3.2-27 of the MPS Unit 3 LRA, which summarizes the results of AMR evaluations for the ESF building ventilation system component groups.

In the MPS Unit 3 LRA Table 3.3.2-27 the applicant credits MPS AMP B.2.1.25, “Work Control Process,” to manage loss of material of carbon steel condensers (shell) and copper alloy condenser (tubes) exposed internally or externally to gas, respectively (Note G). However, also in LRA Table 3.3.2-27, the project team identified several other carbon steel and copper alloy component types that have no aging effect in the same environment (Note G). During the audit and review, the project team asked the applicant to justify the difference in aging effects and AMPs between the two material, environment, aging effect, and AMP combinations.

In a MPS LRA supplement letter dated November 9, 2004, (ML043200606), the applicant responded that it was conservatively assumed that a small amount of moisture may be present in the refrigerant gas environment. This moisture could condense in the condenser shell-side due to exposure to cooling water (cold sea water) on the tube-side of the condenser. Therefore, the loss of material aging effect was applied to the condenser shell and tubes exposed to a gas environment. Other carbon steel and copper alloy components are not exposed to potential condensation and, therefore, would not experience the same aging effect.

In MPS Unit 3 LRA Table 3.3.2-27, the applicant credits MPS AMP B.2.1.25, “Work Control Process,” to manage loss of material of copper alloy condensers (tubes) exposed externally to gas (Note A). This AMR line item references the GALL Report Item VII.F.2.2-a, which is an environment of warm, moist air. The project team asked the applicant to clarify the environment, aging effect, and aging management program combination.

In a MPS LRA supplement letter dated November 9, 2004, (ML043200606), the applicant responded to Audit Item 187 that the potential for moisture in the refrigerant gas was incorrectly compared to the warm, moist air environment described in GALL Report Item VII.F2.2-a. No matching item from the GALL Report should have been listed in LRA Table 3.3.2-27 for this item and Note G should have been listed instead of Note A. On the basis of its review, the project team finds the applicant’s response acceptable.

7.3.3.3.28 Fuel Building Ventilation - Aging Management Evaluation (MPS Unit 3 LRA Table 3.3.2-28)

The project team reviewed Table 3.3.2-28 of the MPS Unit 3 LRA, which summarizes the results of AMR evaluations for the fuel building ventilation system component groups.

In the MPS Unit 3 LRA, the applicant identified no aging effects for carbon steel, copper alloys and stainless steel HVAC components exposed internally or externally to air that is not intermittently wetted, including damper housing, ductwork, fan blower housing, fuel building filter bank housing, heating coils (fuel building), pipe, silencers, tubing, and valve component types.

The applicant states, in the MPS Unit 3 LRA, that surfaces of carbon steel, copper alloys and stainless steel components located within structures have not experienced corrosion degradation that would affect the intended function of components due to humidity in the absence of cyclic or intermittent wetting conditions, such as condensation. The applicant interprets the GALL Report environment termed 'warm, moist air' to be air with an undefined relative humidity level, and not a wetted environment. Since the MPS Unit 3 AMR approach considers loss of material only in a moisture-laden air and/or intermittently wetted environment, the GALL Report items were determined to be not applicable.

The project team reviewed the MPS Unit 3 operating experience as a confirmation of the validity of the AMR approach for corrosion in an air environment. The operating experience reviews did not find significant corrosion of ventilation system components (other than cooling coils and associated components) due to the air environment. The project team finds that, based on the absence of significant corrosion, 'moist air' alone does not result in corrosion for these components. On the basis of its review, the project team finds that there are no aging effects requiring management for metal in an air environment.

7.3.3.3.29 Hydrogen Recombiner and Hydrogen Recombiner Building HVAC - Aging Management Evaluation (MPS Unit 3 LRA Table 3.3.2-29)

The project team reviewed Table 3.3.2-29 of the MPS Unit 3 LRA, which summarizes the results of AMR evaluations for the hydrogen recombiner and hydrogen recombiner building HVAC system component groups.

In the MPS Unit 3 LRA, the applicant identified no aging effects for carbon steel and stainless steel HVAC components exposed internally or externally to air that is not intermittently wetted, including airblast heat exchangers, damper housing, ductwork, fan/blower housing, pipe, flow elements, radiant heaters, reaction chamber, tubing, and valve component types.

The applicant states, in the MPS Unit 3 LRA, that surfaces of carbon and stainless steel components located within structures have not experienced corrosion degradation that would affect the intended function of components due to humidity in the absence of cyclic or intermittent wetting conditions, such as condensation. The applicant interprets the GALL Report environment termed 'warm, moist air' to be air with an undefined relative humidity level, and not a wetted environment. Since the MPS Unit 3 AMR approach considers loss of material only in a moisture-laden air and/or intermittently wetted environment, the GALL Report items were determined to be not applicable.

The project team reviewed the MPS Unit 3 operating experience as a confirmation of the validity of the AMR approach for corrosion in an air environment. The operating experience reviews did not find significant corrosion of ventilation system components (other than cooling coils and associated components) due to the air environment. The project team finds that, based on the absence of significant corrosion, 'moist air' alone does not result in corrosion for

these components. On the basis of its review, the project team finds that there are no aging effects requiring management for metal in an air environment.

7.3.3.3.30 Main Steam Valve Building Ventilation - Aging Management Evaluation (MPS Unit 3 LRA Table 3.3.2-30)

The project team reviewed Table 3.3.2-30 of the MPS Unit 3 LRA, which summarizes the results of AMR evaluations for the main steam valve building ventilation system component groups.

In the MPS Unit 3 LRA, the applicant identified no aging effects for carbon steel and copper alloy HVAC components exposed internally or externally to air that is not intermittently wetted, including damper housing, ductwork, fan/blower housing, and heating coils (main steam valve building) component types.

The applicant states, in the MPS Unit 3 LRA, that surfaces of carbon steel and copper alloy components located within structures have not experienced corrosion degradation that would affect the intended function of components due to humidity in the absence of cyclic or intermittent wetting conditions, such as condensation. The applicant interprets the GALL Report environment termed 'warm, moist air' to be air with an undefined relative humidity level, and not a wetted environment. Since the MPS Unit 3 AMR approach considers loss of material only in a moisture-laden air and/or intermittently wetted environment, the GALL Report items were determined to be not applicable.

The project team reviewed the MPS Unit 3 operating experience as a confirmation of the validity of the AMR approach for corrosion in an air environment. The operating experience reviews did not find significant corrosion of ventilation system components (other than cooling coils and associated components) due to the air environment. The project team finds that, based on the absence of significant corrosion, 'moist air' alone does not result in corrosion for these components. On the basis of its review, the project team finds that there are no aging effects requiring management for metal in an air environment.

7.3.3.3.31 Service Building Ventilation and Air-Conditioning - Aging Management Evaluation (MPS Unit 3 LRA Table 3.3.2-31)

The project team reviewed Table 3.3.2-31 of the MPS Unit 3 LRA, which summarizes the results of AMR evaluations for the service building ventilation and air-conditioning system component groups.

In the MPS Unit 3 LRA, the applicant identified no aging effects for carbon steel HVAC components exposed internally or externally to air that is not intermittently wetted, including damper housing, and ductwork component types.

The applicant states, in the MPS Unit 3 LRA, that surfaces of carbon steel components located within structures have not experienced corrosion degradation that would affect the intended function of components due to humidity in the absence of cyclic or intermittent wetting conditions, such as condensation. The applicant interprets the GALL Report environment termed 'warm, moist air' to be air with an undefined relative humidity level, and not a wetted environment. Since the MPS Unit 3 AMR approach considers loss of material only in a

moisture-laden air and/or intermittently wetted environment, the GALL Report items were determined to be not applicable.

The project team reviewed the MPS Unit 3 operating experience as a confirmation of the validity of the AMR approach for corrosion in an air environment. The operating experience reviews did not find significant corrosion of ventilation system components (other than cooling coils and associated components) due to the air environment. The project team finds that, based on the absence of significant corrosion, 'moist air' alone does not result in corrosion for these components. On the basis of its review, the project team finds that there are no aging effects requiring management for metal in an air environment.

7.3.3.3.32 SBO Diesel Generator Building Ventilation - Aging Management Evaluation (MPS Unit 3 LRA Table 3.3.2-32)

The project team reviewed Table 3.3.2-32 of the MPS Unit 3 LRA, which summarizes the results of AMR evaluations for the SBO diesel generator building ventilation system component groups.

In the MPS Unit 3 LRA, the applicant identified no aging effects for carbon steel HVAC components exposed internally or externally to air that is not intermittently wetted, including air conditioning units; self contained housing component types.

The applicant states, in the MPS Unit 3 LRA, that surfaces of carbon steel components located within structures have not experienced corrosion degradation that would affect the intended function of components due to humidity in the absence of cyclic or intermittent wetting conditions, such as condensation. The applicant interprets the GALL Report environment termed 'warm, moist air' to be air with an undefined relative humidity level, and not a wetted environment. Since the MPS Unit 3 AMR approach considers loss of material only in a moisture-laden air and/or intermittently wetted environment, the GALL Report items were determined to be not applicable.

The project team reviewed the MPS Unit 3 operating experience as a confirmation of the validity of the AMR approach for corrosion in an air environment. The operating experience reviews did not find significant corrosion of ventilation system components (other than cooling coils and associated components) due to the air environment. The project team finds that, based on the absence of significant corrosion, 'moist air' alone does not result in corrosion for these components. On the basis of its review, the project team finds that there are no aging effects requiring management for metal in an air environment.

7.3.3.3.33 Supplementary Leak Collection and Release - Aging Management Evaluation (MPS Unit 3 LRA Table 3.3.2-33)

The project team reviewed Table 3.3.2-33 of the MPS Unit 3 LRA, which summarizes the results of AMR evaluations for the supplementary leak collection and release system component groups.

In the MPS Unit 3 LRA, the applicant identified no aging effects for carbon and stainless steel components exposed to air, including damper housings, ductwork, fan/blower housings, flow elements, pipe, pipe (Millstone stack), filter bank housings, tubing, valves, valves (Millstone

stack) component types. Air is not identified in the GALL Report as an environment for these components and materials.

On the basis of its review of current industry research and operating experience, the project team finds that air on metal will not result in aging that will be of concern during the period of extended operation. The external environments being referred to are typical of ambient air, e.g., under a shelter, indoor, or air-conditioned enclosure or room. Significant corrosion of carbon steel requires an electrolytic environment, and a simultaneous presence of oxygen and moisture. Without the presence of the aggressive environment, carbon steel components will experience insignificant amounts of corrosion, and no aging effects are applicable to this component/commodity group. Wrought austenitic stainless steels is not susceptible to significant general corrosion that would affect the intended function of components. Therefore, the project team concludes that there are no applicable aging effects requiring management for metal in an air environment.

In the MPS Unit 3 LRA, the applicant identified no aging effects for carbon and stainless steel components exposed internally to air, including damper housings, ductwork, fan/blower housings, flow elements, pipe, pipe (Millstone stack), filter bank housings, tubing, valves, valves (Millstone stack) component types. Air is not identified in the GALL Report as an environment for these components and materials.

On the basis of its review of current industry research and operating experience, the project team finds that air on metal will not result in aging that will be of concern during the period of extended operation. The internal environment is air. Significant amounts of corrosion of carbon steel require an electrolytic environment, and a simultaneous presence of oxygen and moisture. Significant corrosion of carbon steel in air environment also requires the components to be subject to condensation. Without the presence of the aggressive environment, therefore, carbon steel components will experience insignificant amounts of corrosion, and no aging effects would be applicable to this component/commodity group. Wrought austenitic stainless steels is not susceptible to significant general corrosion that would affect the intended function of components. Therefore, the project team did not identify any concerns with the applicant's conclusions that there are no applicable aging effects requiring management for metal in an air environment.

7.3.3.3.34 Turbine Building Area Ventilation - Aging Management Evaluation (MPS Unit 3 LRA Table 3.3.2-34)

The project team reviewed Table 3.3.2-34 of the MPS Unit 3 LRA, which summarizes the results of AMR evaluations for the turbine building area ventilation system component groups.

In the MPS Unit 3 LRA, the applicant identified no aging effects for carbon steel HVAC components exposed internally and externally to air that is not intermittently wetted, including damper housings component types.

The applicant states, in the MPS Unit 3 LRA, that surfaces of carbon steel components located within structures have not experienced corrosion degradation that would affect the intended function of components due to humidity in the absence of cyclic or intermittent wetting conditions, such as condensation. The applicant interprets the GALL Report environment termed 'warm, moist air' to be air with an undefined relative humidity level, and not a wetted

environment. Since the MPS Unit 3 AMR approach considers loss of material only in a moisture-laden air and/or intermittently wetted environment, the GALL Report items were determined to be not applicable.

The project team reviewed the MPS Unit 3 operating experience as a confirmation of the validity of the AMR approach for corrosion in an air environment. The operating experience reviews did not find significant corrosion of ventilation system components (other than cooling coils and associated components) due to the air environment. The project team finds that, based on the absence of significant corrosion, 'moist air' alone does not result in corrosion for these components. On the basis of its review, the project team finds that there are no aging effects requiring management for metal in an air environment.

7.3.3.3.35 Waste Disposal Building Ventilation - Aging Management Evaluation (MPS Unit 3 LRA Table 3.3.2-35)

The project team reviewed Table 3.3.2-35 of the MPS Unit 3 LRA, which summarizes the results of AMR evaluations for the waste disposal building ventilation system component groups.

In the MPS Unit 3 LRA, the applicant identified no aging effects for carbon steel HVAC components exposed internally and externally to air that is not intermittently wetted, including damper housings, and ductwork component types.

The applicant states, in the MPS Unit 3 LRA, that surfaces of carbon steel components located within structures have not experienced corrosion degradation that would affect the intended function of components due to humidity in the absence of cyclic or intermittent wetting conditions, such as condensation. The applicant interprets the GALL Report environment termed 'warm, moist air' to be air with an undefined relative humidity level, and not a wetted environment. Since the MPS Unit 3 AMR approach considers loss of material only in a moisture-laden air and/or intermittently wetted environment, the GALL Report items were determined to be not applicable.

The project team reviewed the MPS Unit 3 operating experience as a confirmation of the validity of the AMR approach for corrosion in an air environment. The operating experience reviews did not find significant corrosion of ventilation system components (other than cooling coils and associated components) due to the air environment. The project team finds that, based on the absence of significant corrosion, 'moist air' alone does not result in corrosion for these components. On the basis of its review, the project team finds that there are no aging effects requiring management for metal in an air environment.

7.3.3.3.36 Unit 2 Fire Protection - Aging Management Evaluation (MPS Unit 3 LRA Table 3.3.2-36)

The project team reviewed Table 3.3.2-36 of the MPS Unit 3 LRA, which summarizes the results of AMR evaluations for the Unit 2 fire protection system component groups.

In the MPS Unit 3 LRA, the applicant identified no aging effects for carbon steel HVAC components exposed internally or externally to air that is not intermittently wetted, including damper housing, and ductwork component types.

The applicant states, in the MPS Unit 3 LRA, that surfaces of carbon steel components located within structures have not experienced corrosion degradation that would affect the intended function of components due to humidity in the absence of cyclic or intermittent wetting conditions, such as condensation. The applicant interprets the GALL Report environment termed 'warm, moist air' to be air with an undefined relative humidity level, and not a wetted environment. Since the MPS Unit 3 AMR approach considers loss of material only in a moisture-laden air and/or intermittently wetted environment, the GALL Report items were determined to be not applicable.

The project team reviewed the MPS Unit 3 operating experience as a confirmation of the validity of the AMR approach for corrosion in an air environment. The operating experience reviews did not find significant corrosion of ventilation system components (other than cooling coils and associated components) due to the air environment. The project team finds that, based on the absence of significant corrosion, 'moist air' alone does not result in corrosion for these components. On the basis of its review, the project team finds that there are no aging effects requiring management for metal in an air environment.

7.3.3.3.37 Unit 3 Fire Protection - Aging Management Evaluation (MPS Unit 3 LRA Table 3.3.2-37)

The project team reviewed Table 3.3.2-37 of the MPS Unit 3 LRA, which summarizes the results of AMR evaluations for the Unit 3 fire protection system component groups.

In the MPS Unit 3 LRA, the applicant identified no aging effects for carbon steel HVAC components exposed internally or externally to air that is not intermittently wetted, including air conditioning units; self contained housing component types.

The applicant states, in the MPS Unit 3 LRA, that surfaces of carbon steel components located within structures have not experienced corrosion degradation that would affect the intended function of components due to humidity in the absence of cyclic or intermittent wetting conditions, such as condensation. The applicant interprets the GALL Report environment termed 'warm, moist air' to be air with an undefined relative humidity level, and not a wetted environment. Since the MPS Unit 3 AMR approach considers loss of material only in a moisture-laden air and/or intermittently wetted environment, the GALL Report items were determined to be not applicable.

The project team reviewed the MPS Unit 3 operating experience as a confirmation of the validity of the AMR approach for corrosion in an air environment. The operating experience reviews did not find significant corrosion of ventilation system components (other than cooling coils and associated components) due to the air environment. The project team finds that, based on the absence of significant corrosion, 'moist air' alone does not result in corrosion for these components. On the basis of its review, the project team finds that there are no aging effects requiring management for metal in an air environment.

7.3.3.3.38 Domestic Water - Aging Management Evaluation (MPS Unit 3 LRA Table 3.3.2-38)

The project team reviewed Table 3.3.2-38 of the MPS Unit 3 LRA, which summarizes the results of AMR evaluations for the domestic water system component groups.

In the MPS Unit 3 LRA, the applicant proposes to manage loss of material of copper alloy pipe, shock absorbers, strainers, and valve component types exposed externally to a moisture-laden air and/or intermittently wetted environment using MPS AMP B2.1.13, “General Condition Monitoring,” which is a plant-specific program. The project team reviewed the general condition monitoring program and its evaluation is documented in Section 7.1.12 of this report. The project team finds that the general condition monitoring program is acceptable for managing loss of material due to pitting and crevice corrosion since visual inspections will be performed on external surfaces to detect any sign of aging degradation.

In the MPS Unit 3 LRA, the applicant identified no aging effects for carbon steel heater component type exposed to air. Air is not identified in the GALL Report as an environment for these components and materials.

On the basis of its review of current industry research and operating experience, the project team finds that air on metal will not result in aging that will be of concern during the period of extended operation. The external environments being referred to are typical of ambient air, e.g., under a shelter, indoor, or air-conditioned enclosure or room. Significant corrosion of carbon steel requires an electrolytic environment, and a simultaneous presence of oxygen and moisture. Without the presence of the aggressive environment, carbon steel components will experience insignificant amounts of corrosion, and no aging effects are applicable to this component/commodity group. Therefore, the project team finds that there are no applicable aging effects requiring management for metal in an air environment.

In the MPS Unit 3 LRA, the applicant proposes to manage loss of material of copper alloy pipe and valves exposed externally environment of borated water leakage using MPS AMP B2.1.13, “General Condition Monitoring,” which is a plant-specific program. However, the GALL Report specifies GALL AMP XI.M10, “Boric Acid Corrosion” to manage this aging effect. The applicant states, in Note 1, that the boric acid corrosion program includes specific inspections of reactor coolant pressure boundary and supporting systems components. The project team reviewed the general condition monitoring program and its evaluation is documented in Section 7.1.12 of this report. The project team finds that the general condition monitoring program provides inspections for management of loss of material due to boric acid corrosion beyond the scope of the boric acid corrosion program. Also, a visual inspection of external surfaces is performed during various walkdowns performed by plant personnel to look for boron buildup and/or boric acid leaks. On the basis of its review, the project team finds that this program is acceptable for managing loss of material of copper alloy pipe and valves exposed externally environment of borated water.

7.3.3.3.39 <u>Emergency Diesel Generators - Aging Management Evaluation (MPS Unit 3 LRA Table 3.3.2-39)</u>

The project team reviewed Table 3.3.2-39 of the MPS Unit 3 LRA, which summarizes the results of AMR evaluations for the emergency diesel generators system component groups. The project team reviewed, in whole or in part, MPS Unit 3 Technical Report, MP-LR-4414, "License Renewal Project Aging Management Review, Diesel and Support Systems, Millstone Power Station - Unit 3," Revision 3, dated February 27, 2004, which provides the AMR results for the diesel generator and support systems.

In the MPS Unit 3 LRA, the applicant proposes to manage loss of material of stainless steel, carbon steel, cast iron, and copper alloy engine sumps, filter/strainers, governor lube oil coolers (shell), jacket water heaters, lube oil heat exchangers (shell), oil reservoirs, oil separators, pipe, pre-lube oil heaters, pumps, valves, turbochargers, governor lube oil coolers (tubes), lube oil heat exchangers (tubes), lube oil heat exchangers (tubesheet), and tubing component types exposed internally or externally to oil using MPS AMP B2.1.25, "Work Control Process." The project team reviewed the work control process program and its evaluation is documented in Section 7.1.22 of this report. The work control process program provides the opportunity to visually inspect the internal surfaces of components during preventive and corrective maintenance activities on an ongoing basis. Oil samples are analyzed periodically for contaminants for indication of degradation. The work control process program provides input to the MPS Unit 3 corrective action program if aging effects are identified. The project team finds the work control process program acceptable for managing the aging effect of loss of material.

In the MPS Unit 3 LRA, the applicant proposes to manage loss of material due to selective leaching of copper alloy diesel engine jacket water cooler heat exchangers (tubes), and engine air cooler water heat exchangers (tubes) component types exposed to treated water using MPS AMP B2.1.25, "Work Control Process," which is a plant-specific program. The project team reviewed the work control process program and its evaluation is documented in Section 7.1.22 of this report. The work control process program provides the opportunity to visually inspect the internal surfaces of components during preventive and corrective maintenance activities on an ongoing basis. The work control process program provides input to the MPS Unit 3 corrective action program if aging effects are identified. The project team finds the work control process program acceptable for managing the aging effect of loss of material due to selective leaching since other mechanical means will be used in addition to visual inspection to detect selective leaching.

In the MPS Unit 3 LRA, the applicant proposes to manage loss of material of stainless steel pipe component types exposed externally to an atmosphere/weather environment using MPS AMP B2.1.13, "General Condition Monitoring," which is a plant-specific program. The project team reviewed the general condition monitoring program and its review is documented in Section 7.1.12 of this report. The project team finds that visual inspections will be performed on external surfaces to detect any sign of aging degradation. The project team finds the general condition monitoring program acceptable for managing loss of material due to pitting and crevice corrosion.

In the MPS Unit 3 LRA, the applicant identified no aging effects for carbon steel, stainless steel, cast iron, copper alloy and aluminum components exposed internally and externally to air, including air distributors, air receiver tanks, air tanks, crankcase vacuum manometers, diesel engine jacket water cooler heat exchangers (shell), engine air cooler water heat exchangers (shell), engine sumps, filter/strainers, fresh water expansion tanks, governor lube oil coolers (shell), jacket water heaters, lube oil heat exchangers (channel), lube oil heat exchangers (shell), oil reservoirs, oil separators, pipe, pre-lube oil heaters, pumps, servo fuel rack shutdown and starting boosters, silencers, valves, turbochargers, level indicators, tubing, diesel engine jacket water cooler heat exchangers (channel), and engine air cooler water heat exchangers (channel, expansion joints, and restricting orifices component types. Air is not identified in the GALL Report as an environment for these components and materials.

On the basis of its review of current industry research and operating experience, the project team finds that air on metal will not result in aging that will be of concern during the period of extended operation. The external environments being referred to are typical of ambient air, e.g., under a shelter, indoor, or air-conditioned enclosure or room. Significant corrosion of carbon steel and cast iron requires an electrolytic environment, and a simultaneous presence of oxygen and moisture. Without the presence of the aggressive environment, carbon steel and cast iron components will experience insignificant amounts of corrosion, and no aging effects are applicable to this component/commodity group. Wrought austenitic stainless steels, copper alloy, and aluminum are not susceptible to significant general corrosion that would affect the intended function of components. Therefore, the project team finds that there are no applicable aging effects requiring management for metal in an air environment.

7.3.3.3.40 Emergency Diesel Generator Fuel Oil - Aging Management Evaluation (MPS Unit 3 LRA Table 3.3.2-40)

The project team reviewed Table 3.3.2-40 of the MPS Unit 3 LRA, which summarizes the results of AMR evaluations for the emergency diesel generator fuel oil system component groups. The project team reviewed, in whole or in part, MPS Unit 3 Technical Report, MP-LR-4414, "License Renewal Project Aging Management Review, Diesel and Support Systems, Millstone Power Station - Unit 3," Revision 3, which provides the AMR results for the diesel generator and support systems.

In the MPS Unit 3 LRA, the applicant proposes to manage loss of material of copper alloy, and stainless steel pumps, tubing, valves, flow elements, restricting orifices, and filter/strainers component types exposed internally to fuel oil using MPS AMP B2.1.12, "Fuel Oil Chemistry." The applicant states in MPS Unit 3 LRA Section 3.3.2.2.7 that MPS AMP B2.1.25, "Work Control Process," will be used to provide confirmation of the effectiveness of the fuel oil chemistry program.

The project team reviewed the fuel oil chemistry program and its evaluation is documented in Section 7.1.11 of this report. The fuel oil chemistry program monitors and controls fuel oil quality to ensure that it is compatible with the materials of construction, to manage the conditions that cause general corrosion, pitting, and MIC of fuel tank internal surfaces; establish fuel oil quality limits; and sample and test fuel oil used for equipment in license renewal scope. On the basis of its review, the project team finds the fuel oil chemistry program acceptable for managing this aging effect.

The project team reviewed the work control process program and its evaluation is documented in Section 7.1.22 of this report. The work control process program provides the opportunity to visually inspect the internal surfaces of components during preventive and corrective maintenance activities on an ongoing basis. The work control process program provides input to the corrective action program if aging effects are identified. The project team finds the work control process program acceptable for confirming the effectiveness of the fuel oil chemistry program.

In the MPS Unit 3 LRA, the applicant identified no aging effects for carbon steel, stainless steel, cast iron, copper alloy and aluminum components exposed internally and externally to air, including flame arrestors, flow elements, accumulator tanks, fuel oil day tanks, fuel oil storage tank, injectors, pipe, pumps, valves, restricting orifices, filter/strainers, and tubing component

types. Air is not identified in the GALL Report as an environment for these components and materials.

On the basis of its review of current industry research and operating experience, the project team finds that air on metal will not result in aging that will be of concern during the period of extended operation. The external environments being referred to are typical of ambient air, e.g., under a shelter, indoor, or air-conditioned enclosure or room. Significant corrosion of carbon steel and cast iron requires an electrolytic environment, and a simultaneous presence of oxygen and moisture. Without the presence of the aggressive environment, carbon steel and cast iron components will experience insignificant amounts of corrosion, and no aging effects are applicable to this component/commodity group. Wrought austenitic stainless steels, copper alloy, and aluminum are not susceptible to significant general corrosion that would affect the intended function of components. Therefore, the project team finds that there are no applicable aging effects requiring management for metal in an air environment.

7.3.3.3.41 Station Blackout Diesel Generator - Aging Management Evaluation (MPS Unit 3 LRA Table 3.3.2-41)

The project team reviewed Table 3.3.2-41 of the MPS Unit 3 LRA, which summarizes the results of AMR evaluations for the SBO diesel generator system component groups. The project team reviewed, in whole or in part, MPS Unit 3 Technical Report, MP-LR-4414, Revision 3, which provides the AMR results for the diesel generator and support systems.

In the MPS Unit 3 LRA, the applicant proposes to manage cracking of stainless steel expansion tanks, pipe, tubing, and valve component groups exposed internally to treated water using MPS AMP B2.1.25, “Work Control Process,” which is a plant-specific program. The project team reviewed the work control process program is its evaluation is documented in Section 7.1.22 of this report. The work control process program provides the opportunity to visually inspect the internal surfaces of components during preventive and corrective maintenance activities on an ongoing basis. The work control process program provides input to the MPS Unit 3 corrective action program if aging effects are identified. The project team finds the work control process program acceptable for managing the aging effect of cracking.

In the MPS Unit 3 LRA, the applicant proposes to manage loss of material of stainless steel, carbon steel, and cast iron flow indicators, lube oil coolers (channel), oil sumps, pipe, silencers, pumps, turbo chargers, lube oil coolers (tubes), lube oil coolers (tubesheet), radiators, lubricators, restricting orifices, tubing, and valve component types exposed internally or externally to oil using MPS AMP B2.1.25, “Work Control Process.” The project team reviewed the work control process program and its evaluation is documented in Section 7.1.22 of this report. The project team finds that the work control process program provides the opportunity to visually inspect the internal surfaces of components during preventive and corrective maintenance activities on an ongoing basis. Oil samples are analyzed periodically for contaminants for indication of degradation. The work control process program provides input to the MPS Unit 3 corrective action program if aging effects are identified. The project team finds the work control process program acceptable for managing the aging effect of loss of material.

In the MPS Unit 3 LRA, the applicant proposes to manage loss of material of stainless steel fuel heaters, tubing, and valve component types exposed internally to fuel oil using MPS AMP B2.1.12, “Fuel Oil Chemistry.” The applicant states, in MPS Unit 3 LRA Section 3.3.2.2.7, that

MPS AMP B2.1.25, “Work Control Process” will be used to provide confirmation of the effectiveness of the fuel oil chemistry program. The project team reviewed the fuel oil chemistry program and its evaluation is documented in Section 7.1.11 of this report. The fuel oil chemistry program monitors and controls fuel oil quality to ensure that it is compatible with the materials of construction, to manage the conditions that cause general corrosion, pitting, and MIC of fuel tank internal surfaces; establishes fuel oil quality limits; and samples and tests fuel oil used for equipment within the scope of license renewal. On the basis of its review, the project team finds the fuel oil chemistry program acceptable for managing this aging effect.

The project team reviewed the work control process program and its evaluation is documented in Section 7.1.22 of this report. The work control process program provides the opportunity to visually inspect the internal surfaces of components during preventive and corrective maintenance activities on an ongoing basis. Oil samples are analyzed periodically for contaminants for indication of degradation. The work control process program provides input to the MPS Unit 3 corrective action program if aging effects are identified. The project team finds the work control process program acceptable for confirming the effectiveness of the fuel oil chemistry program.

In the MPS Unit 3 LRA, the applicant proposes to manage loss of material of stainless steel expansion tanks, and valve component types exposed to atmosphere/weather using MPS AMP B2.1.13, “General Condition Monitoring,” which is a plant-specific program. The project team reviewed the general condition monitoring program and its evaluation is documented in Section 7.1.12 of this report. The project team finds that the general condition monitoring program is acceptable for managing loss of material due to pitting and crevice corrosion since visual inspections will be performed on external surfaces to detect any sign of aging degradation.

In the MPS Unit 3 LRA, the applicant proposes to manage loss of material of stainless steel valve component groups exposed internally to moisture-laden air and/or an intermittently wetted environment using MPS AMP B2.1.25, “Work Control Process,” which is a plant-specific program. The project team reviewed the work control process program and its evaluation is documented in Section 7.1.22 of this report. Visual inspections of the internal surfaces of plant components and plant commodities are performed during the performance of maintenance, in accordance with the work control process, to determine the presence of loss of material. The project team finds that the work control process program is acceptable for managing loss of material due to pitting and crevice corrosion since visual inspections will be performed on internal surfaces of components to detect any sign of aging degradation.

In the MPS Unit 3 LRA, the applicant identified no aging effects for carbon steel, stainless steel, cast iron, and aluminum components exposed internally and externally to air, including filter/strainers, radiators, aftercoolers, aspirators, flow Indicators, fuel heaters, fuel oil day tanks, immersion heaters, injectors, lube oil coolers (channel), lube oil coolers (shell), oil sumps, pipe, silencers, pump, turbochargers, air receivers, expansion joints, lubricators, pulsation dampeners, restricting orifices, tubing, and valve component types. Air is not identified in the GALL Report as an environment for these components and materials.

On the basis of its review of current industry research and operating experience, the project team finds that air on metal will not result in aging that will be of concern during the period of extended operation. The external environments being referred to are typical of ambient air, e.g., under a shelter, indoor, or air-conditioned enclosure or room. Significant corrosion of

carbon steel and cast iron requires an electrolytic environment, and a simultaneous presence of oxygen and moisture. Without the presence of the aggressive environment, carbon steel and cast iron components will experience insignificant amounts of corrosion, and no aging effects are applicable to this component/commodity group. Wrought austenitic stainless steels, and aluminum are not susceptible to significant general corrosion that would affect the intended function of components. Therefore, the project team concurs that there are no applicable aging effects requiring management for metal in an air environment.

In the MPS Unit 3 LRA, the applicant identified no aging effects for rubber expansion joints exposed to air. Based on industry research and operating experience, change of material properties due to thermal exposure and irradiation and cracking due to irradiation of rubber components in air is contingent on radiation levels, ambient temperatures, and exposure to ultraviolet radiation and ozone.

On the basis of its review, the project team concurs with the applicant's finding that no aging effect for rubber expansion joints in air to be acceptable, since these components are not exposed to high levels of ultraviolet radiation, ozone, or temperatures greater than 95°F.

In the MPS Unit 3 LRA, the applicant identified no aging effect for aluminum filter/strainers component group exposed internally to lubricating oil. MPS Unit 3 Technical Report, MP-LR-4414, did not specifically evaluate aging effects for aluminum exposed internally to oil. During the audit and review, the project team requested that the applicant provide a basis for its conclusion that there are no aging effects requiring management for this combination of component, material, and environment. The applicant states that the MAER was used as the basis. The project team reviewed the applicant's MAER and finds that additional information regarding the basis was necessary. The applicant revised its MAER and MPS Unit 3 Technical Report, MP-LR-4414 to include the basis. The project team reviewed the basis and finds it acceptable. In addition, the applicant states that, in a lubricating oil environment, significant corrosion is only expected where the water can settle or pool. Due to the differential densities of lubricating oil and water, water will tend to separate and settle in low flow or stagnant areas where the flow velocity is insufficient to flush the water through the system. Lube oil systems are assumed to be free of water contamination as their initial condition. Lube oil systems are typically closed systems that have little potential for ingress of contaminants unless a component failure occurs. License renewal does not assume component failures as a means to establish the conditions necessary for aging to occur. For example, tube failures in lube oil coolers are not assumed. Therefore, water contamination of lube oil is event driven, and would be addressed by corrective maintenance. For license renewal purposes, lube oil is therefore assumed to be free of water contamination. On the basis of its review, the project team concurs that there are no applicable aging effects requiring management for aluminum in a fuel oil environment.

In the MPS Unit 3 LRA, the applicant identified no aging effects for aluminum radiators component group in an external environment of atmosphere/weather. MPS Unit 3 Technical Report, MP-LR-4414, Revision 3, did not specifically evaluate aging effects for aluminum in an external environment of atmosphere/weather. During the audit and review, the project team requested that the applicant provide a basis for its conclusion that there are no aging effects requiring management for this combination of component, material, and environment. The applicant stated to the project team that the technical report was revised to add the following statement:

> Industry experience identified a potential conflict with the MAER with regard to Aluminum in an air environment. St. Lucie identified corrosion problems with the aluminum and copper components associated with the cooling fins of a radiator in a cooling water system. The St. Lucie evaluation identified that it was an unusual occurrence since aluminum elsewhere in the plant did not demonstrate similar problems. Accordingly, and in conjunction with the MAER basis, operating experience was used to validate that no problems of this type had occurred at MPS Unit 3.

The project team reviewed the revised technical report and operating experience. On the basis of its review, the project team finds that there are no applicable aging effects requiring management for aluminum in an atmosphere/weather environment.

7.3.3.3.42 Security - Aging Management Evaluation (MPS Unit 3 LRA Table 3.3.2-42)

The project team reviewed Table 3.3.2-42 of the MPS Unit 3 LRA, which summarizes the results of AMR evaluations for the security system component groups. The project team reviewed, in whole or in part, MPS Unit 3 Technical Report, MP-LR-4414, Revision 3, which provides the AMR results for the diesel generator and support systems.

In the MPS Unit 3 LRA, the applicant proposes to manage loss of material of carbon steel, cast iron, and copper alloy coolers (shell), fan/blower housings, heaters, oil pans, pipe, pump, valves, filter\strainers, coolers (tubes), and coolers (tubesheet) component types exposed internally or externally to lubricating oil using MPS AMP B2.1.25, “Work Control Process.” The project team reviewed the work control process program and its evaluation is documented in Section 7.1.22 of this report. The work control process program provides the opportunity to visually inspect the internal surfaces of components during preventive and corrective maintenance activities on an ongoing basis. Oil samples are analyzed periodically for contaminants for indication of degradation. The work control process program provides input to the MPS Unit 3 corrective action program if aging effects are identified. The project team finds the work control process program acceptable for managing the aging effect of loss of material.

In the MPS Unit 3 LRA, the applicant proposes to manage loss of material of copper alloy pipe, tubing, and valve component types exposed internally to fuel oil using MPS AMP B2.1.12, “Fuel Oil Chemistry.” The applicant states in MPS Unit 3 LRA Section 3.3.2.2.7 that MPS AMP B2.1.25, “Work Control Process,” will be used to provide confirmation of the effectiveness of the fuel oil chemistry program. The project team reviewed the fuel oil chemistry program and its evaluation is documented in Section 7.1.11 of this report. The fuel oil chemistry program monitors and controls fuel oil quality to ensure that it is compatible with the materials of construction, to manage the conditions that cause general corrosion, pitting, and MIC of fuel tank internal surfaces; establishes fuel oil quality limits; and samples and tests fuel oil used for equipment within the scope of license renewal. The project team finds the fuel oil chemistry program acceptable.

The project team reviewed the work control process program and its evaluation is documented in Section 7.1.22 of this report. The project team finds the work control process program provides the opportunity to visually inspect the internal surfaces of components during preventive and corrective maintenance activities on an ongoing basis. It also provides input to the corrective action program if aging effects are identified. On the basis of its review, the

project team concludes that the work control process program is acceptable for confirming the effectiveness of the fuel oil chemistry program.

In the MPS Unit 3 LRA, the applicant identified no aging effects for carbon steel, cast iron, and copper alloy components exposed internally and externally to air, including coolers (channel head), coolers (shell), diesel fuel oil storage tank, fan/blower housings, filter/strainers, heaters, oil pans, pipe, pumps, valves, filter/strainers, tubing, and radiators component types. Air is not identified in the GALL Report as an environment for these components and materials.

On the basis of its review of current industry research and operating experience, the project team finds that air on metal will not result in aging that will be of concern during the period of extended operation. The external environments being referred to are typical of ambient air, e.g., under a shelter, indoor, or air-conditioned enclosure or room. Significant corrosion of carbon steel and cast iron requires an electrolytic environment, and a simultaneous presence of oxygen and moisture. Without the presence of the aggressive environment, carbon steel and cast iron components will experience insignificant amounts of corrosion, and no aging effects are applicable to this component/commodity group. Copper alloys are not susceptible to significant general corrosion that would affect the intended function of components. Therefore, the project team finds that there are no applicable aging effects requiring management for metal in an air environment.

In the MPS Unit 3 LRA, the applicant identified no aging effects for aluminum radiators component type in an external environment of air. MPS Unit 3 Technical Report, MP-LR-4414, Revision 3, did not specifically evaluate aging effects for aluminum in an external environment of air. During the audit and review, the project team requested that the applicant provide a basis for its conclusion that there are no aging effects requiring management for this combination of component, material, and environment. The applicant stated to the project team that the technical report was revised to add the following statement:

> Industry experience identified a potential conflict with the MAER with regard to Aluminum in an air environment. St. Lucie identified corrosion problems with the aluminum and copper components associated with the cooling fins of a radiator in a cooling water system. The St. Lucie evaluation identified that it was an unusual occurrence since aluminum elsewhere in the plant did not demonstrate similar problems. Accordingly, and in conjunction with the MAER basis, operating experience was used to validate that no problems of this type had occurred at MPS Unit 3.

The project team reviewed the revised technical report and operating experience. On the basis of its review, the project team finds that there are no applicable aging effects requiring management for aluminum in an air environment.

7.3.3.3.43 <u>Boron Recovery - Aging Management Evaluation (MPS Unit 3 LRA Table 3.3.2-43 and Table 3.3.2-43a)</u>

The project team reviewed Table 3.3.2-43 of the MPS Unit 3 LRA and Table 3.3.2-43a of the MPS LRA supplement letter dated January 11, 2005 (ML050190289), which summarizes the results of AMR evaluations for the boron recovery system component groups.

In the MPS Unit 3 LRA and the MPS LRA supplement letter dated January 11, 2005 (ML050190289), the applicant identified no aging effects for low-alloy steel and stainless steel components exposed to air, including bolting, boron recovery tanks, cesium removal ion exchangers, filters/strainers, pipe, tubing, valves, boron distillate cooler (shell), boron distillate tank, boron evaporator, boron evaporator bottoms coolant preheater, boron evaporator bottons cooler (shell), boron evaporator condenser (channel head), boron evaporator condenser (shell), boron evaporator reboiler (channel head), boron evaporator reboiler (shell), boron evaporator sample cooler (shell), density element, flow indicating switch, flow indicating transmitter, flow transmitters, pumps and traps component types. Air is not identified in the GALL Report as an environment for these components and materials.

On the basis of its review of current industry research and operating experience, the project team finds that air on metal will not result in aging that will be of concern during the period of extended operation. The external environments being referred to are typical of ambient air, e.g., under a shelter, indoor, or air-conditioned enclosure or room. Significant corrosion of low-alloy steel requires an electrolytic environment, and a simultaneous presence of oxygen and moisture. Without the presence of the aggressive environment, low-alloy steel components will experience insignificant amounts of corrosion, and no aging effects are applicable to this component/commodity group. Wrought austenitic stainless steels is not susceptible to significant general corrosion that would affect the intended function of components. Therefore, the project team finds that there are no applicable aging effects requiring management for metal in an air environment.

In MPS Unit 3 LRA Table 3.4.2-43, the applicant proposes to manage loss of material for the stainless steel boron recovery tanks exposed internally to air environment using MPS AMP B2.1.24, “Tank Inspection Program.” The project team reviewed the tank inspection program and its evaluation is documented in Section 7.1.21 of this report. On the basis of its review, the project team finds management of loss of material for this component using the tank inspection program to be adequate.

In the MPS LRA supplement letter dated January 11, 2005 (ML050190289), the applicant proposes to manage loss of material for the boron distillate cooler (shell) and the boron evaporator expose externally to air environment using MPS AMP B2.1.5, “Chemistry Control for Primary Systems Program.” The project team reviewed the chemistry control for primary systems program and its evaluation is documented in Section 7.1.4 of this report. The chemistry control for primary systems program is consistent with the GALL Report, with an acceptable exception. The exception relates to use of a later, non-NRC approved revision of the EPRI guidelines. On the basis of its review, the project team finds the chemistry control for primary systems program to be acceptable for managing this aging effect.

In the MPS LRA supplement letter dated January 11, 2005 (ML050190289), the applicant proposes to manage cracking of carbon steel for density element, flow transmitters, pumps and restricting orifices component types exposed externally to treated water environment using MPS AMP B2.1.25, “Work Control Process.” The project team reviewed the work control process program and its evaluation is documented in Section 7.1.22 of this report. The work control process program provides the opportunity to visually inspect the internal surfaces of components during preventive and corrective maintenance activities on an ongoing basis. Oil samples are analyzed periodically for contaminants for indication of degradation. The work control process program provides input to the MPS Unit 3 corrective action program if aging

effects are identified. The project team finds the work control process program acceptable for managing the aging effect of cracking.

7.3.3.3.44 Radioactive Liquid Waste Processing - Aging Management Evaluation (MPS Unit 3 LRA Table 3.3.2-44 and LRA Table 3.3.2-44a)

The project team reviewed Table 3.3.2-44 of the MPS Unit 3 LRA and Table 3.3.2-44a of the MPS LRA supplement letter dated January 11, 2005 (ML050190289), which summarizes the results of AMR evaluations for the radioactive liquid waste processing system component groups.

In the MPS Unit 3 LRA and the MPS LRA supplement letter dated January 11, 2005 (ML050190289), the applicant identified no aging effects for low-alloy and stainless steel components exposed to air, including bolting, flow elements, piping, valves, pumps, radiation detectors, and tubing component types. Air is not identified in the GALL Report as an environment for these components and materials.

On the basis of its review of current industry research and operating experience, the project team finds that air on metal will not result in aging that will be of concern during the period of extended operation. The external environments being referred to are typical of ambient air, e.g., under a shelter, indoor, or air-conditioned enclosure or room. Significant corrosion of low-alloy steel requires an electrolytic environment, and a simultaneous presence of oxygen and moisture. Without the presence of the aggressive environment, low-alloy steel components will experience insignificant amounts of corrosion, and no aging effects are applicable to this component/commodity group. Wrought austenitic stainless steels are not susceptible to significant general corrosion that would affect the intended function of components. Therefore, the project team finds that there are no aging effects requiring management for metal in an air environment.

7.3.3.3.45 Radioactive Gaseous Waste - Aging Management Evaluation (MPS Unit 3 LRA Table 3.3.2-45 and Table 3.3.2-45a)

The project team reviewed Table 3.3.2-45 of the MPS Unit 3 LRA and Table 3.3.2-45a of the MPS LRA supplement letter dated January 11, 2005 (ML050190289), which summarizes the results of AMR evaluations for the radioactive gaseous waste system component groups.

In the MPS Unit 3 LRA, the applicant identified no aging effects for stainless steel components exposed to air, including damper housings, ductwork, pipe, process vent cooler, valves, degasifer condenser (shell), degasifers feed preheater (shell), degasifers, and tubing component types. Air is not identified in the GALL Report as an environment for these components and materials.

On the basis of its review of current industry research and operating experience, the project team finds that air on metal will not result in aging that will be of concern during the period of extended operation. The external environments being referred to are typical of ambient air, e.g., under a shelter, indoor, or air-conditioned enclosure or room. Significant corrosion of carbon steel requires an electrolytic environment, and a simultaneous presence of oxygen and moisture. Without the presence of the aggressive environment, carbon steel components will experience insignificant amounts of corrosion, and no aging effects are applicable to this

component/commodity group. Wrought austenitic stainless steels is not susceptible to significant general corrosion that would affect the intended function of components. Therefore, the project team finds that there are no applicable aging effects requiring management for metal in an air environment.

In the MPS Unit 3 LRA, the applicant proposes to manage loss of material of carbon steel and stainless steel pipe and valve component groups exposed internally to moisture-laden air and/or an intermittently wetted environment using MPS AMP B2.1.25, "Work Control Process," which is a plant-specific program. The project team reviewed the work control process program and its evaluation is documented in Section 7.1.22 of this report. The project team finds that visual inspections of the internal surfaces of plant components and plant commodities are performed during the performance of maintenance, in accordance with the work control process program, to determine the presence of loss of material. On the basis of its review, the project team finds that the work control process program is acceptable for managing loss of material due to general corrosion.

In the MPS LRA supplement letter dated January 11, 2005 (ML050190289), the applicant proposes to manage loss of material of stainless steel for the degasifers and tubing exposed internally to treated water and steam environment using MPS AMP B2.1.5, "Chemistry Control for Primary Systems Program." The project team reviewed the chemistry control for primary systems program and its evaluation is documented in Section 7.1.4 of this report. The chemistry control for primary systems program is consistent with the GALL Report, with an acceptable exception. The exception relates to use of a later, non-NRC approved revision of the EPRI guidelines. On the basis of its review, the project team finds the chemistry control for primary systems program to be acceptable for managing this aging effect.

7.3.3.3.46 Post-Accident Sampling - Aging Management Evaluation (MPS Unit 3 LRA Table 3.3.2-46)

The project team reviewed Table 3.3.2-46 of the MPS Unit 3 LRA, which summarizes the results of AMR evaluations for the post-accident sampling system component groups.

In the MPS Unit 3 LRA, the applicant identified no aging effects for low-alloy steel and stainless steel components exposed internally and/or externally to gas or air for bolting, accumulators, de-ionized water flush tank, drain tanks, filter/strainers, flow elements, hoses, hydrogen sensors, pipe, pumps, sample coolers shell, sample cylinders/chambers tubing and valve component types. Gas is not identified in the GALL Report as an environment for these components and materials.

On the basis of its review of current industry research and operating experience, the project team finds that an internal environment of gas (which is similar to air) on metal will not result in aging that will be of concern during the period of extended operation. Therefore, the project team concludes that there are no applicable aging effects requiring management for metal in a gas environment.

In the MPS Unit 3 LRA, the applicant proposes to manage loss of material of stainless steel de-ionized water flush tank, drain tanks, hydrogen sensors, pipe, vacuum pump, sample cylinders/chambers, tubing, and valve component groups exposed internally to moisture-laden air and/or an intermittently wetted environment using MPS AMP B2.1.25, "Work Control

Process," which is a plant-specific program. The project team reviewed the work control process program and its evaluation is documented in Section 7.1.22 of this report. Visual inspections of the internal surfaces of plant components and plant commodities are performed during the performance of maintenance, in accordance with the work control process program, to determine the presence of loss of material. The project team finds that the work control process program is acceptable for managing loss of material due to general corrosion since visual inspections will be performed on internal surfaces of components to detect any sign of aging degradation.

During the audit and review, the project team determined that additional components/structures were added to the scope of license renewal and subject to an AMR. By letter dated July 7, 2004 (ML041900370), the applicant submitted additional information, entitled, "Millstone Power Station Units 2 and 3 Additional Information in Support of Application for renewed Operation Licenses." The applicant added, in Attachment 1 to its letter, the component type "hydrogen tanks" and "restricting orifices" to the MPS Unit 3 LRA post-accident sampling system screening results and AMR, MPS Unit 3 LRA Table 2.3.3.46 and Table 3.3.2-46, respectively. The applicant stated that the addition of these components did not result in the addition of material/environment/aging effect/program combinations for the MPS Unit 3 LRA post accident sampling system. The project team reviewed the applicant's response. On the basis of its review, the project team finds the additional AMR results in MPS Unit 3 LRA Table 3.3.2-46 for the hydrogen tanks and restricting orifices component types acceptable.

7.3.3.3.47 Radioactive Solid Waste - Aging Management Evaluation (MPS Unit 3 LRA Table 3.3.2-47)

The project team reviewed Table 3.3.2-47 of the MPS Unit 3 LRA, which summarizes the results of AMR evaluations for the radioactive solid waste system component groups.

In the MPS Unit 3 LRA, the applicant identified no aging effects for low-alloy steel and stainless steel components exposed to air, including bolting, pipe, and valve component types. Air is not identified in the GALL Report as an environment for these components and materials.

On the basis of its review of current industry research and operating experience, the project team finds that air on metal will not result in aging that will be of concern during the period of extended operation. The external environments being referred to are typical of ambient air, e.g., under a shelter, indoor, or air-conditioned enclosure or room. Significant corrosion of low-alloy steel requires an electrolytic environment, and a simultaneous presence of oxygen and moisture. Without the presence of the aggressive environment, low-alloy steel components will experience insignificant amounts of corrosion, and no aging effects are applicable to this component/commodity group. Wrought austenitic stainless steels is not susceptible to significant general corrosion that would affect the intended function of components. Therefore, the project team finds that there are no applicable aging effects requiring management for metal in an air environment.

7.3.3.3.48 Reactor Plant Aerated Drains - Aging Management Evaluation (MPS Unit 3 LRA Table 3.3.2-48 and Table 3.3.2-48a)

The project team reviewed Table 3.3.2-48 of the MPS Unit 3 LRA and Table 3.3.2-48a of the MPS LRA supplement letter dated January 11, 2005 (ML050190289), which summarizes the results of AMR evaluations for the reactor plant aerated drains system component groups.

In the MPS Unit 3 LRA, the applicant identified no aging effects for carbon and stainless steel, PVC, fiberglass, copper alloys, and ethylene propylene diene monomer components exposed to air, including expansion joints, filters/strainers, flow elements, flow indicators, groundwater sumps, pipe, pumps, restricting orifices, tubing, and valve component types. Air is not identified in the GALL Report as an environment for these components and materials.

On the basis of its review of current industry research and operating experience, the project team finds that air on metal will not result in aging that will be of concern during the period of extended operation. The internal environment is air without the presence of moisture. The external environments being referred to are typical of ambient air, e.g., under a shelter, indoor, or air-conditioned enclosure or room. Significant corrosion of carbon steel and copper alloys requires an electrolytic environment, and a simultaneous presence of oxygen and moisture. Without the presence of the aggressive environment, carbon steel copper alloy components will experience insignificant amounts of corrosion, and no aging effects are applicable to this component/commodity group. Wrought austenitic stainless steels is not susceptible to significant general corrosion that would affect the intended function of components. PVC, fiberglass and EPDM are impervious to an air environment. Therefore, the project team finds that there are no applicable aging effects requiring management for metal in an air environment.

In the MPS Unit 3 LRA, the applicant proposes to manage loss of material of stainless steel pipe and valve component types exposed to atmosphere/weather using MPS AMP B2.1.13, “General Condition Monitoring,” which is a plant-specific program. The project team reviewed the general condition monitoring program and its evaluation is documented in Section 7.1.12 of this report. Visual inspections will be performed on external surfaces to detect any sign of aging degradation. On the basis of its review, the project team finds that the general condition monitoring program is acceptable for managing loss of material due to pitting and crevice corrosion.

In the MPS Unit 3 LRA, the applicant proposes to manage loss of material of stainless steel expansion joint, groundwater sump, and pipe component groups exposed internally to moisture-laden air and/or an intermittently wetted environment using MPS AMP B2.1.25, “Work Control Process,” which is a plant-specific program. The project team reviewed the work control process program and its evaluation is documented in Section 7.1.22 of this report. Visual inspections of the internal surfaces of plant components and plant commodities are performed during the performance of maintenance, in accordance with the work control process program, to determine the presence of loss of material. On the basis of its review, the project team finds that the work control process program is acceptable for managing loss of material due to general corrosion since visual inspections will be performed on internal surfaces of components to detect any sign of aging degradation.

In the MPS Unit 3 LRA, the applicant identified no aging effects for PVC and fiberglass pipe, and tubing components exposed internally or externally to raw water and sea water. Both PVC and fiberglass material are benign in this environment.

On the basis of its review of current industry research and operating experience, the project team finds that raw/sea water environment does not have significant aging effect on materials like PVC and fiberglass. Therefore, the project team did not identify any concerns with the applicant's conclusions that there are no applicable aging effects requiring management for PVC and fiberglass in raw/sea water environment.

In MPS LRA supplement letter dated January 11, 2005 (ML050190289), the applicant proposes to manage loss of material of the stainless steel for the groundwater underdrains storage tank exposed to atmoshpere/weather environment using MPS AMP B2.1.24, "Tank Inspection Program." The project team reviewed the tank inspection program and its evaluation is documented in Section 7.1.21 of this report. On the basis of its review, the project team finds management of loss of material for this component using the tank inspection program to be adequate.

7.3.3.3.49 Reactor Plant Gaseous Drains - Aging Management Evaluation (MPS Unit 3 LRA Table 3.3.2-49 and Table 3.3.2-49a)

The project team reviewed Table 3.3.2-49 of the MPS Unit 3 LRA and Table 3.3.2-49a of the MPS LRA supplement letter dated January 11, 2005 (ML050190289), which summarizes the results of AMR evaluations for the reactor plant gaseous drains system component groups.

In the MPS Unit 3 LRA and MPS LRA supplement letter dated January 11, 2005 (ML050190289), the applicant identified no aging effects for low-alloy and stainless steel components exposed to air, including bolting, flow indicators, pipe, pump, tubing, valves, containment drains transfer tank, and primary drains transfer tank component types. Air is not identified in the GALL Report as an environment for these components and materials.

On the basis of its review of current industry research and operating experience, the project team finds that air on metal will not result in aging that will be of concern during the period of extended operation. The external environments being referred to are typical of ambient air, e.g., under a shelter, indoor, or air-conditioned enclosure or room. Significant corrosion of low-alloy steel requires an electrolytic environment, and a simultaneous presence of oxygen and moisture. Without the presence of the aggressive environment, low-alloy steel components will experience insignificant amounts of corrosion, and no aging effects are applicable to this component/commodity group. Wrought austenitic stainless steels is not susceptible to significant general corrosion that would affect the intended function of components. Therefore, the project team finds that there are no applicable aging effects requiring management for metal in an air environment.

In the MPS Unit 3 LRA, the applicant proposes to manage cracking of stainless steel flow indicators, pipe, pump, tubing, and valves exposed internally to the environment of treated water using MPS AMP B2.1.25, "Work Control Process," which is a plant-specific program. However, the applicant identifies Note E for these components and references MPS Unit 3 Table 3.3.1, Item 3.3.1-15. The project team noted that Item 3.3.1-15 applies to loss of material aging effect and not cracking. The project team requested clarification for this reference. In a

MPS LRA supplement letter dated July 7, 2004 (ML041900407), the applicant states, in response to Audit Item 146, that MPS Unit 3 LRA Table 3.3.2-49 should not include entries in the 'NUREG-1801 Volume 2 Item' and 'Table 1 Item' columns for all line entries associated with the 'Cracking' aging effect. The Note for each 'Cracking' line entry should be "H." On the basis of its review, the project team finds the applicant's response acceptable.

Also, in MPS LRA supplement letter dated January 11, 2005 (ML050190289), the applicant proposes to manage cracking of stainless steel containment drains transfer tank and the primary drains transfer tank exposed to internally to the environment of treated water using MPS AMP B2.1.25, "Work Control Process,"

The project team reviewed the work control process program and its evaluation is documented in Section 7.1.22 of this report. Visual inspections of the internal surfaces of plant components and plant commodities are performed during the performance of maintenance, in accordance with the work control process program, to determine the presence of loss of material. On the basis of its review, the project team finds that the work control process program is acceptable for managing loss of material due to general corrosion since visual inspections will be performed on internal surfaces of components to detect any sign of aging degradation.

7.3.3.3.50 Sanitary Water - Aging Management Evaluation (MPS Unit 3 LRA Table 3.3.2-50)

The project team reviewed Table 3.3.2-50 of the MPS Unit 3 LRA, which summarizes the results of AMR evaluations for the sanitary water system component groups.

In the MPS Unit 3 LRA, the applicant identified no aging effects for cast iron and carbon steel components exposed to air, including pipe, and valve component types. Air is not identified in the GALL Report as an environment for these components and materials.

On the basis of its review of current industry research and operating experience, the project team finds that air on metal will not result in aging that will be of concern during the period of extended operation. The external environments being referred to are typical of ambient air, e.g., under a shelter, indoor, or air-conditioned enclosure or room. Significant corrosion of cast iron and carbon steel requires an electrolytic environment, and a simultaneous presence of oxygen and moisture. Without the presence of the aggressive environment, cast iron and carbon steel components will experience insignificant amounts of corrosion, and no aging effects are applicable to this component/commodity group. Therefore, the project team finds that there are no applicable aging effects requiring management for metal in an air environment.

7.3.4 MPS Unit 3 LRA Section 3.4 - Aging Management of Steam and Power Conversion Systems

In MPS Unit 3 LRA Section 3.4, the applicant provided the results of its AMRs for components for the steam and power conversion systems.

In the MPS Unit 3 LRA Tables 3.4.2-1 through 3.4.2-12 (Table 2s), the applicant provides a summary of the AMRs for component types associated with the (1) main steam system; (2) feedwater system; (3) condensate make-up and draw-off system; (4) steam generator

blowdown system; (5) auxiliary feedwater; (6) auxiliary steam system; (7) auxiliary boiler condensate and feedwater system; (8) hot water heating system; (9) hot water pre-heating system; (10) steam generator chemical addition system; and (11) turbine plant miscellaneous drains system. The summary information for each component type included intended function; material; environment; aging effect requiring management; AMPs; the GALL Report Volume 2 item; cross reference to the LRA Table 3.4.1 (Table 1); and generic and plant-specific notes related to consistency with the GALL Report.

Also, the applicant identified for each component type in the MPS Unit 3 LRA Table 3.4.1 (Table 1) those components where further evaluation is recommended, and those for which no further evaluation is required, and those that are not applicable to MPS Unit 3 together with the basis for their exclusion.

Additionally, the applicant identified in the MPS Unit 3 LRA Tables 3.4.2-1 through 3.4.2-11, which AMR results it considered to be consistent with the GALL Report (table column Notes A through E) and which it justified on a different basis.

The AMRs that are within the scope of the project team audit and review are identified on copies of the MPS Unit 3 LRA Tables 3.4.2-1 through 3.4.2-11 which are included as an appendix to the MPS Units 2 and 3 audit and review plan.

The project team conducted its audit and review in accordance with SRP-LR Section 3.4.3 and the MPS Units 2 and 3 audit and review plan. The project team interviewed the applicant's technical staff and reviewed, in whole or in part, the documents listed in Attachment 5 of this report for Section 3.4, including MPS Unit 3 Technical Report, MP-LR-4400, "License Renewal Project - Aging Management Review for Steam and Power Conversion System - Unit 3," dated March 19, 2004, which provides the AMR results for the steam and power conversion systems.

7.3.4.1 Aging Management Review Results That Are Consistent With the GALL Report, for Which No Further Evaluation Is Required

For aging management evaluations that the applicant states are consistent with the GALL Report and for which further evaluation is not recommended, the project team conducted its audit and review to determine if the applicant's reference to the GALL Report in the MPS Unit 3 LRA is acceptable.

The project team reviewed the MPS Unit 3 LRA and the information in the MPS LRA supplement letter dated January 11, 2005 (ML050190289), to confirm that the applicant (1) provides a brief description of the system, components, materials, and environment; (2) states that the applicable aging effects have been reviewed and are evaluated in the GALL Report; and (3) identifies those aging effects for the steam and power conversion system components that are subject to an AMR.

7.3.4.1.1 Loss of Material Due to Boric Acid Corrosion

In the discussion section of Table 3.4.1, item 13, of the MPS Unit 3 LRA, the applicant states that loss of material due to boric acid corrosion is managed by MPS AMP B2.1.3, "Boric Acid Corrosion" and MPS AMP B2.1.13, "General Condition Monitoring." The boric acid corrosion program includes specific inspections of steam and power conversion and supporting systems

components. The boric acid corrosion program is reviewed by NRR DE staff and is addressed in Section 3 of the SER related to the MPS Units 2 and 3 LRA.

The applicant states, in the MPS Unit 3 LRA, that the general condition monitoring program provides inspections for management of loss of material due to boric acid corrosion beyond the scope of the boric acid corrosion program. During the audit and review, the project team requested the applicant to provide clarification regarding how loss of material for components not normally visible, or in infrequently accessed areas, are manage using this program. Further clarification was requested regarding the identification, documentation, evaluation, and trending of boric acid leakage performance under this program. The applicant stated that the general condition monitoring program is an extension of the boric acid corrosion program. It identifies borated water leakage during the performance of the inspections performed by the general condition monitoring program and then, through the applicant's corrective action program, the leak is assigned and evaluated under the boric acid corrosion program. When borated water leakage is identified by the general condition monitoring program, a condition report is written to identify the leak. During the daily review of new condition reports, it is assigned to the boric acid corrosion program where it gets fully evaluated and repaired, as required. This is the same process used to identify leaks in the boric acid corrosion program.

The project team reviewed the general condition monitoring program and its evaluation is documented in Section 7.1.12 of this report. On the basis of its review, the project team concludes that this program is acceptable for managing loss of material due to boric acid corrosion since visual inspection of external surfaces is performed during various walkdowns performed by plant personnel to look for boron buildup and/or boric acid leaks.

7.3.4.1.2 Loss of Material Due to General Corrosion; Crack Initiation and Growth Due to Cyclic Loading and/or Stress Corrosion Cracking

In the MPS Unit 3 Table 3.4.1, Item 8, for loss of material due to general corrosion, crack initiation and growth due to cyclic loading and/or stress corrosion cracking (SCC) for closure bolting in high-pressure or high-temperature systems components, the applicant states that bolting in the steam and power conversion systems are not subject to wetted conditions, therefore, loss of material due to general corrosion is not expected. Additionally, cracking for bolting in steam and power conversion systems is not identified as an aging effect requiring management. However, SRP-LR Table 3.4-1, stipulates that the AMR evaluations consider crack initiations and growth due to cyclic loading for components closure bolting in high pressure or hi-temperature systems and that the applicant could manage the aging effects via GALL AMP XI.M18, "Bolting Integrity."

The applicant states, in the MPS Unit 3 LRA, that SCC is an aging mechanism that requires the simultaneous action of a corrosive environment, a sustained tensile stress, and a susceptible material. Elimination of any one of these elements will eliminate the susceptibility to SCC. Further, the applicant states that steam and power conversion systems bolting is fabricated to ASTM A194, Grade B7 standard, is not high yield strength (>150 ksi), and is not subjected to an adverse environment that could result in SCC. Therefore, cracking is not an aging effect requiring management.

The project team noted that SCC could occur in corrosive environment and that the environment does not have to be in a wetted condition. The project team questioned the

applicant whether the good bolting practices, bolting preload considerations, and proper sealant and lubricant, as stated in NUREG-1339, are followed.

By letter dated December 3, 2004 (ML043450341), the applicant submitted its LRA supplement. In its response, the applicant stated that it has developed a specific bolting integrity aging management program that addresses degradation of bolting at MPS. The bolting integrity program is reviewed by NRR DE staff and is addressed in Section 3 of the SER related to the MPS Units 2 and 3 LRA.

By letter dated January 11, 2005 (ML050190289), the applicant submitted its bolting aging management roll-up item. In its response, the applicant replaces the existing information in the "Discussion" column of Unit 3 LRA Table 3.4.1, Item 8 with "consistent with the NUREG-1801."

The project team reviewed the applicant's response and this acceptable since it is consistent with the GALL Report. The bolting integrity program is reviewed by NRR DE and its evaluation is documented in Section 3 of the SER related to the MPS Units 2 and 3 LRA.

7.3.4.1.3 Loss of Material Due to General Corrosion (Carbon Steel Only), Pitting, and Crevice Corrosion, MIC, and Biofouling; Buildup of Deposit Due to Biofouling

In the discussion section of Table 3.4.1, Item 9, of the MPS Unit 3 LRA, the applicant proposes to manage loss of material due to general (carbon steel), pitting, and crevice corrosion, MIC, and biofouling and buildup of deposit due to biofouling for heat exchangers and coolers/condensers serviced by open-cycle cooling water components using MPS AMP B2.1.25, "Work Control Process." The SRP-LR stipulates that the aging effects of these components be managed by Open-Cycle Cooling Water program and specifies the use of thermal performance testing as an effective method for assessing the effects of aging on heat exchangers.

The applicant proposes to manage the aging effects primarily by MPS AMP B2.1.21, "Service Water System (Open-Cycle Cooling)," and credits the work control process to provide confirmation of the effectiveness of the service water system (open-cycle cooling). The applicant also credits the work control process program to perform regular inspection and cleaning of heat exchangers, in lieu of thermal performance testing. The applicant states that frequent regular inspection and cleaning is allowed by Generic Letter 89-13 and meets the intent of the GALL report for ensuring that heat exchangers are capable of performing their intended function of heat transfer.

The project team reviewed the service water system (open-cycle cooling) and work control process program and its evaluation of these programs is documented in Sections 7.1.19 and 7.1.22 of this report, respectively. On the basis of its review, the project team concludes that applicant's work control process program is an acceptable alternate inspection program for this component to manage the aging effects.

7.3.4.1.4 Loss of Material Due to General (Carbon Steel Only), Pitting, and Crevice Corrosion

In the discussion section of Table 3.4.1, item 10, of MPS Unit 3 LRA, the applicant states that for components in a treated water environment other than closed-cycle cooling water, loss of

material is managed by the chemistry control for secondary systems or the work control process.

The GALL Report identifies that further evaluation is required for components managed by water chemistry program in the steam and power conversion system. During the audit and review, the project team requested that the applicant provide clarification why those components that are managed by the chemistry control program do not require further evaluation.

The applicant states that GALL Report, Item VIII.E.4-a, which references GALL AMP XI.M2 "Water Chemistry," should have been chosen for these components, along with a Note D to indicate that the component is different than the component described in the NUREG-1801. The further evaluation recommended, associated with GALL Report, Item VIII.E.4-a in MPS Unit 3 LRA Table 3.4.1, Item 3.4.1-02, is addressed in MPS Unit 3 LRA Section 3.4.2.2.2.

The applicant also states, in the MPS Unit 3 LRA, that the effectiveness of MPS AMP B2.1.6, "Chemistry Control for Secondary Systems Program" is confirmed by MPS AMP B2.1.25, "Work Control Process." The work control process program provides the opportunity to visually inspect the internal surfaces of components during preventive and corrective maintenance activities on an ongoing basis. The work control process program provides input to the corrective action program if and when aging effects are identified. The corrective action program evaluates the cause and extent of the condition and, if required, recommends enhancements to ensure continued effectiveness of the chemistry control for secondary systems program. The project team finds the applicant's response acceptable and is consistent with the GALL Report.

On the basis of its audit and review, the project team determined that for AMRs not requiring further evaluation, as identified in the MPS Unit 3 LRA Table 3.4.1 (Table 1), the applicant's references to the GALL Report are acceptable and no further project team review is required.

7.3.4.2 Aging Management Review Results That Are Consistent With the GALL Report, for Which Further Evaluation Is Recommended

For some line items consistent with the GALL Report in the MPS Unit 3 LRA Tables 3.4.2-1 through 3.4.2-12, (Table 2s), the GALL Report recommends further evaluation. When further evaluation is recommended, the project team reviewed the applicant's evaluations provided in MPS Unit 3 LRA Sections 3.4.2.2 against the criteria provided in the SRP-LR Section 3.4.2.2. The following provides the project team's assessments of these evaluations. These project team assessments are applicable to each Table 2 line item in Section 3.4 citing the item in Table 1.

The MPS Unit 3 LRA sections identified in MPS Unit 3 LRA Table 3.4.1, where further evaluation is recommended are discussed below.

7.3.4.2.1 Cumulative Fatigue Damage (MPS Unit 3 LRA Section 3.4.2.2.1)

MPS Unit 3 LRA Section 3.4.2.2.1 is reviewed by the NRR DE staff and addressed in Section 4 of the SER related to the MPS Units 2 and 3 LRA.

7.3.4.2.2 Loss of Material Due to General (Carbon Steel Only), Pitting, and Crevice Corrosion (MPS Unit 3 LRA Section 3.4.2.2.2)

The project team reviewed the MPS Units 2 LRA Section 3.4.2.2.2 against the criteria in SRP-LR Section 3.4.2.2.2.

SRP-LR Section 3.4.2.2.2 states that management of loss of material due to general, pitting, and crevice corrosion should be evaluated further for carbon steel piping and fittings, valve bodies and bonnets, pump casings, pump suction and discharge lines, tanks, tubesheets, channel heads, and shells except for main steam system components and for loss of material due to pitting and crevice corrosion for stainless steel tanks and heat exchanger/cooler tubes. The water chemistry program relies on monitoring and control of water chemistry based on the guidelines in EPRI guideline TR-102134 for secondary water chemistry to manage the effects of loss of material due to general, pitting, or crevice corrosion. However, corrosion may occur at locations of stagnant flow conditions. Therefore, the effectiveness of the chemistry control program should be verified to ensure that corrosion is not occurring. The GALL Report recommends further evaluation of programs to manage loss of material due to general, pitting, and crevice corrosion to verify the effectiveness of the water chemistry program. A one-time inspection of select components and susceptible locations is an acceptable method to ensure that corrosion is not occurring and that the component's intended function will be maintained during the period of extended operation.

The AMPs recommended by the GALL Report are GALL AMP XI.M2, “Water Chemistry,” and GALL AMP XI.M32, “One Time Inspection,” for management of this aging effect.

The applicant states, in the MPS Unit 3 LRA, that the loss of material due to general corrosion, pitting, and crevice corrosion in the steam and power conversion system components is managed by control of water chemistry through MPS AMP B2.1.6, “Chemistry Control for Secondary Systems.” The applicant also states that in lieu of a one-time inspection, MPS AMP B2.1.25, “Work Control Process” is used to provide confirmation of the effectiveness of the chemistry control for secondary systems program. The work control process provides the opportunity to visually inspect the internal surfaces of components during preventive and corrective maintenance activities on an ongoing basis and provides input to the corrective action program if aging effects are identified. The corrective action program would evaluate the cause and extent of the condition and, if required, recommend enhancements to ensure continued effectiveness of the chemistry control for secondary systems program.

The project team reviewed the chemistry control for secondary systems and its evaluation is documented in Section 7.1.5 of this report. In addition, in response to the project team’s query regarding the one-time inspection, the applicant states that the work control process program provides more opportunities for inspection of signs of aging than would a one-time inspection program. In addition, it provides confirmation of chemistry control effectiveness on a continuing basis, rather than a single point in time afforded by a one-time inspection program. The applicant confirmed that indications of age-related degradation would be evaluated and the extent of the condition be determined through the corrective action system. Enhancements to water chemistry control programs and follow-up inspections would be initiated, as necessary, to provide effective management of aging effects.

The project team reviewed the information provided in the MPS Unit 3 LRA and concurs that the applicant's approach is consistent with GALL AMP XI.M32, "One-time Inspection," which states: "An alternate acceptable program may include routine maintenance or a review of repair records to confirm that these components have been inspected for aging degradation and significant aging degradation has not occurred and thereby verify the effectiveness of the existing AMPs." Also, the project team reviewed operating experience associated with the work control process program as it applied to the steam and power conversion system. Specifically, MPS Unit 3 Technical Report, MP-LR-3925/4925, "Work Control Inspection Opportunities," which provides the results of a plant-wide review of maintenance history for a 10-year period. The project team finds that more than 50 work control related inspection opportunities were listed against the steam and power conversion system. The project team finds this to be more than adequate for providing confirmation of the effectiveness of the chemistry control for secondary systems program.

The project team finds that the applicant has demonstrated that the effects of aging for loss of material will be adequately managed so that the intended functions will be maintained consistent with the CLB during the period of extended operation, as required by 10 CFR 54.21(a)(3).

7.3.4.2.3 Loss of Material Due to General, Pitting, and Crevice Corrosion, Microbiologically Influenced Corrosion, and Biofouling (MPS Unit 3 Section 3.4.2.2.3)

The project team reviewed MPS Unit 3 LRA Section 3.4.2.2.3 against the criteria in SRP-LR Section 3.4.2.2.3.

SRP-LR Section 3.4.2.2.3 states that loss of material due to general corrosion, pitting and crevice corrosion, microbiologically influenced corrosion (MIC), and biofouling could occur in carbon steel piping and fittings for untreated water from the backup water supply in the PWR auxiliary feedwater system. The GALL Report recommends further evaluation to ensure that these aging effects are adequately managed. Acceptance criteria are described in Branch Technical Position RLSB-1 (Appendix A.1, of this standard review plan.)

The applicant states, in MPS Unit 3 LRA Section 3.4.2.2.3, that the backup water supply for the auxiliary feedwater system is the MPS Unit 3 service water system. The backup water source is maintained isolated from the auxiliary feedwater system by removed spool pieces, which are normally maintained in storage, thus ensuring that untreated water from the service water system does not enter the auxiliary feedwater pumps suction piping. The applicant also states that the backup water supply piping and components were evaluated to be satisfactory for the effects of aging with the Unit 3 service water system.

During the audit and review, the project team reviewed MPS Unit 3 piping and instrumentation diagram (reference drawings: Unit 3: 25212-26933, Sheet 2, Service Water System), and finds that there was effective isolation to ensure that untreated water from the service water system does not enter the auxiliary feedwater pumps suction piping.

Since the untreated water environment is isolated from the auxiliary feedwater pumps suction piping, this aging effect is not applicable to auxiliary feedwater pumps suction piping. On this basis, the project team concludes that this item is acceptable.

7.3.4.2.4 Loss of Material Due To General Corrosion (MPS Unit 3 LRA Section 3.4.2.2.4)

The project team reviewed MPS Unit 3 LRA Section 3.4.2.2.4 against the criteria in SRP-LR Section 3.4.2.2.4.

SRP-LR Section 3.4.2.2.4 states that loss of material due to general corrosion could occur on the external surfaces of all carbon steel SCs, including closure boltings, exposed to operating temperature less than 212EF. The GALL Report recommends further evaluation to ensure that this aging effect is adequately managed.

The applicant states, in the MPS Unit 3 LRA, that general corrosion is applicable to carbon steel, low-alloy steel, and cast iron components in an air environment only when it is exposed to intermittent wetting. The applicant also states that loss of material due to general corrosion of external surfaces is managed by MPS AMP B2.1.13, "General Condition Monitoring."

The project team reviewed the general condition monitoring program and its evaluation is documented in Section 7.1.12 of this report. On the basis of its review, the project team concludes that this program is acceptable for managing loss of material since visual inspection of external surfaces is performed during various walkdowns.

7.3.4.2.5 Loss of Material Due to General, Pitting, Crevice Corrosion, and Microbiologically Influenced Corrosion (MPS Unit 3 LRA Sections 3.4.2.2.5.1 and 3.4.2.2.5.2)

The project team reviewed MPS Unit 3 LRA Sections 3.4.2.2.5.1 and 3.4.2.2.5.2 against the criteria in SRP-LR Section 3.4.2.2.5.

The applicant states, in MPS Unit 3 LRA Section 3.4.2.2.5.1, that loss of material of the auxiliary feedwater pump lube oil coolers is managed by the work control process.

The applicant states, in MPS Unit 3 Section 3.4.2.2.5.2, that there are no underground, carbon steel components associated with the auxiliary feedwater system, and therefore, this item is not applicable.

SRP-LR Section 3.4.2.2.5 addresses loss of material due to general corrosion (carbon steel only), pitting and crevice corrosion, and MIC which could occur in stainless steel and carbon steel shells, tubes, and tubesheets within the bearing oil coolers (for steam turbine pumps) in the auxiliary feedwater system. The GALL Report recommends further evaluation to ensure that these aging effects are adequately managed.

SRP-LR 3.4.2.2.5 also addresses loss of material due to general corrosion, pitting and crevice corrosion, and MIC, which could occur in underground piping and fittings and emergency condensate storage tank in the auxiliary feedwater system and the underground condensate storage tank in the condensate system.

In MPS Unit 3 LRA Table 3.4.2-5, the applicant proposes to manage loss of material due to pitting, crevice corrosion, and microbiologically influenced corrosion for the stainless steel oil coolers in auxiliary feedwater (AFW) system exposed to oil using MPS AMP B2.1.25, "Work Control Process."

The project team reviewed the work control process program and its evaluation is documented in Section 7.1.22 of this report. The work control process provides the opportunity to visually inspect the components during preventive and corrective maintenance activities on an ongoing basis. The work control process provides input to the corrective action program if aging effects are identified. On the basis of its review, the project team finds that using the work control process program to manage the aging effect of loss of material for the oil cooler in AFW system is adequate.

On the basis that there are no buried components in steam and power conversion systems at MPS Unit 3, the project team finds that this aging effect is not applicable to MPS Unit 3.

7.3.4.2.6 Quality Assurance for Aging Management of Non-Safety-Related Components (MPS Unit 3 LRA Section 3.4.2.2.6)

MPS Unit 3 LRA Section 3.4.2.2.6 is reviewed by the NRR DIPM staff and addressed in Section 3 of the SER related to the MPS Units 2 and 3 LRA.

7.3.4.3 Aging Management Review Results That Are Not Consistent with the GALL Report or Are Not Addressed in the GALL Report

In MPS Unit 3 LRA Tables 3.4.2-1 through 3.4.2-11, the project team reviewed additional details of the AMRs for material, environment, aging effect requiring management, and AMP combinations that are not consistent with the GALL Report or are not addressed in the GALL Report. The project team also reviewed additional systems and components, provided in MPS LRA supplement letter January 11, 2005 (ML050190289).

7.3.4.3.1 Main Steam - Aging Management Evaluation (MPS Unit 3 LRA Table 3.4.2-1)

The project team reviewed Table 3.4.2-1 of the MPS Unit 3 LRA, which summarizes the results of AMR evaluations for the main steam system component groups.

In MPS Unit 3 LRA Table 3.4.2-1, the applicant identified no aging effects for the following carbon steel, and low alloy steel main steam component types - pipe, steam traps, valves, and valves (atmospheric dumps and main steam safety/relief) - exposed externally to air.

During the audit and review, the project team requested that the applicant provide clarification as to why there are no aging effects for these components. The applicant states that the steam and power conversion systems components are normally operated at high temperatures (greater than 212EF) and the external surface of the component was determined to be dry. The applicant also states that these components are located inside buildings and because of the high operating temperature, would not be subject to condensation. These components were determined not to be susceptible to loss of material due to corrosion based on the dry environment, as described in MPS Unit 3 LRA Appendix C, Section C3.7.15.

The project team expressed concern regarding possible long-term shutdown such as the plant shutdown in the ‘90s. The applicant states that the only potential source of wetting of the external surfaces for these components, in a sheltered environment, is condensation. However, intermittent wetting conditions would not be expected during out-of-service periods for these components because for condensation to occur, the surface temperature of the

components would have to decrease below the dew point of the ambient environment. These normally high temperature components are located in buildings with warm to hot temperatures and they are insulated. Therefore, conditions for condensation are not expected even when the components are out-of-service for long periods of time.

Since the external surface temperature for these main steam system components is high enough to preclude condensation and these components are not exposed to the intermittent wetting, the project team finds there are no applicable aging effects for the above mention components.

In MPS Unit 3 LRA Table 3.4.2-1, the applicant identified no aging effects for the following stainless steel and nickle-based alloys main steam component types - expansion joints, flexible hoses, flow elements, tubing, and valves - exposed externally to air.

On the basis of current industry research and operating experience, stainless steel/nickel-base alloy exposed externally to air are not susceptible to significant general corrosion that would affect the intended function of components. Therefore, the project team finds that there are no applicable aging effects for stainless steel components exposed externally to air.

In MPS Unit 3 LRA Table 3.4.2-1, the applicant proposes to manage loss of material and cracking for the following stainless steel and nickel-base alloy main steam component types - expansion joints, flexible hoses, flow elements, and tubing - exposed internally to steam using MPS AMP B2.1.6, “Chemistry Control for Secondary Systems.”

The project team reviewed the chemistry control for secondary systems program and its evaluation of this program is documented in Sections 7.1.5 of this report. The effectiveness of the chemistry control program is further provided by MPS AMP B2.1.25, “Work Control Process” and is documented in Section 7.3.4.2.2 of this report.

On the basis of its review and its determination that the effects of pitting and crevice corrosion on stainless steel and nickel-based alloys not being significant in treated water or steam, the project team finds that management of loss of material for stainless steel/nickel-based alloy components using the chemistry control for secondary systems program is adequate.

The applicant states, in the MPS Unit 3 LRA, that stress corrosion cracking is an aging mechanism that requires the simultaneous action of a corrosion environment, a sustained stress, and a susceptible material. The applicant also states that elimination of any one of these elements will eliminate the susceptibility to stress corrosion cracking. The applicant credits MPS AMP B2.1.6, “Chemistry Control for Secondary Systems,” to manage this aging mechanism since it removed one of the three required actions.

Since the chemistry control program for secondary systems maintains a controlled environment with low contaminant concentration and the applicant’s operating experience has shown this program to be effective for the management of cracking due to stress corrosion cracking, the project team finds that management of stress corrosion cracking for stainless steel and nickel-based components using chemistry control for secondary systems to be adequate.

7.3.4.3.2 Feedwater - Aging Management Evaluation (MPS Unit 3 LRA Table 3.4.2-2)

The project team reviewed MPS Unit 3 LRA Table 3.4.2-2, which summarizes the results of AMR evaluations for the feedwater system component groups.

In MPS Unit 3 LRA Table 3.4.2-2, the applicant proposes to manage cracking for the following stainless steel feedwater steam system component types - flow elements, tubing, and valves - exposed internally to steam using MPS AMP B2.1.6, "Chemistry Control for Secondary Systems."

The material, environment, aging effects, and aging management program (MEAP) for feedwater steam components is the same as that for the main steam components. Since both have the same MEAP combination, the project team finds that management of cracking for stainless steel components using the chemistry control for secondary systems program is adequate. The project team reviewed the chemistry control for secondary systems program and its evaluation is documented in Section 7.3.4.3.1 of this report.

The applicant identified no aging effects for the following stainless steel, carbon steel, and low-alloy steel feedwater steam system component types - flow elements, pipe, tubing, and valves - exposed externally to air.

On the basis that these components have the same previously discussed MEAP combination, the project team finds that there are no aging effects for these stainless steel, carbon steel and low-alloy steel components exposed externally to air. The project team's evaluation is documented in Section 7.3.4.3.1 of this report.

7.3.4.3.3 Condensate Make-Up and Draw-Off - Aging Management Evaluation (MPS Unit 3 LRA Table 3.4.2-3)

The project team reviewed MPS Unit 3 LRA Table 3.4.2-3, which summarizes the results of AMR evaluations for the condensate make-up and draw-off system component groups.

In MPS Unit 3 LRA Table 3.4.2-3, the AMR for condensate storage tank exposed internally to treated water and externally to damp soil and for rupture disk exposed externally to atmosphere/weather is reviewed by NRR DE. Its evaluation of this review is documented in Section 3 of the SER related to the MPS Units 2 and 3 LRA.

In MPS Unit 3 LRA Table 3.4.2-3, the applicant identified no aging effects for the following stainless steel condensate make-up and draw-off system component types - pipe, tubing, and valves - exposed externally to air.

On the basis that these components have the same previously discussed MEAP combination, the project team finds that there are no aging effects for these stainless steel components exposed externally to air. The project team's evaluation is documented in Section 7.3.4.3.1 of this report.

In MPS Unit 3 LRA Table 3.4.2-3, the applicant identified no aging effects for the stainless steel condensate make-up and draw-off system rupture disk, and aluminum condensate storage tank exposed internally to gas environment.

On the basis of current industry research and operating experience, an internal environment of gas (which is similar to air) on metal will not result in aging that will be of concern during the period of extended operation. Therefore, the project team concludes that there are no applicable aging effects for metal in a gas environment.

In MPS Unit 3 LRA Table 3.4.2-3, the applicant proposes to manage loss of material for the stainless steel pipe exposed externally to damp soil environment using MPS AMP B2.1.4, "Buried Pipe Inspection Program."

The project team reviewed the buried pipe inspection program and its evaluation is documented in Section 7.1.3 of this report. On the basis of its review, the project team finds that using the buried pipe inspection program to manage the aging effect of loss of material for the buried pipe component is adequate.

7.3.4.3.4 Steam Generator Blowdown - Aging Management Evaluation (MPS Unit 3 LRA Table 3.4.2-4 and Table 3.4.2-4a)

The project team reviewed MPS Unit 3 LRA Table 3.4.2-4 and Table 3.4.2-4a of the MPS LRA supplement letter dated January 11, 2005 (ML050190289), which summarizes the results of AMR evaluations for the steam generator blowdown system component groups.

In MPS Unit 3 LRA Table 3.4.2-4, the applicant proposes to manage cracking for the following stainless steel steam generator blowdown system component types - flow elements, and tubing - exposed internally to treated water using MPS AMP B2.1.6, "Chemistry Control for Secondary Systems."

The material, environment, aging effects, and aging management program (MEAP) for steam generator blowdown components is the same as that for the main steam components. Since both have the same MEAP combination, the project team finds that management of loss of material and cracking for stainless steel components using chemistry control for secondary systems program to be adequate. The project team's evaluation is documented in Section 7.3.4.3.1 of this report.

In MPS Unit 3 LRA Table 3.4.2-4 and Table 3.4.2-4a of the MPS LRA supplement letter dated January 11, 2005 (ML050190289), the applicant identified no aging effects for the following stainless steel, carbon steel and low-alloy steel steam generator blowdown system component types -flow elements, pipe, tubing, and steam generator blowdown tank - exposed externally to air. On the basis that these components have the same MEAP combination as previously discussed, the project team finds that there are no aging effects for these stainless steel, carbon steel and low-alloy steel components exposed externally to air. The project team's evaluation is documented in Section 7.3.4.3.1 of this report.

7.3.4.3.5 Auxiliary Feedwater - Aging Management Evaluation - (MPS Unit 3 LRA Table 3.4.2-5 and Table 3.4.2-5a)

The project team reviewed MPS Unit 3 LRA Table 3.4.2-5 and Table 3.4.2-5a of the MPS LRA supplement letter dated January 11, 2005 (ML050190289), which summarizes the results of AMR evaluations for the auxiliary feedwater system component groups.

In MPS Unit 3 LRA Table 3.4.2-5, the applicant identified no aging effects for the following stainless steel auxiliary feedwater system component types - AFW pump oil coolers (channel heads), AFW pump oil coolers (shell), cavitating venturies, flow elements, level indicators, pipe, restricting orifices, tubing, valves and carbon steel turbine casings - exposed externally to air.

On the basis that these components have the same previously discussed MEAP combination, the project team finds that there are no aging effects for these stainless components exposed externally to air. The project team's evaluation is documented in Section 7.3.4.3.1 of this report.

In MPS Unit 3 LRA Table 3.4.2-5, the applicant identified no aging effects for copper alloy spool pieces exposed internally and externally to air.

The applicant states, in MPS Unit 3 LRA Section 3.4.2.2.3, the removable spool pieces are normally maintained in storage. On the basis of current industry research and operating experience, an internal storage environment of air on copper alloys will not result in aging that will be of concern during the period of extended operation. Therefore, the project team concludes that there are no applicable aging effects for copper alloy spool pieces in an air environment.

In MPS Unit 3 LRA Table 3.4.2-5, the applicant proposes to manage loss of material for the stainless steel demineralized water storage tank exposed internally to a treated water and air environment and carbon steel turbine casings exposed internally to treated water using MPS AMP B2.1.6, "Chemistry Control for Secondary Systems" and MPS AMP B2.1.25, "Work Control Process."

The GALL Report recommends GALL AMP XI.M2, "Water Chemistry" to be augmented by verifying the effectiveness of water chemistry control by a supplementary program. GALL AMP XI.M32, "One-Time Inspection," is an acceptable verification program.

The project team reviewed the work control process program and its evaluation is documented in Section 7.1.22 of this report. The effectiveness of the chemistry control program is provided further by MPS AMP B2.1.25, "Work Control Process," and is documented in Section 7.3.4.2.2 of this report. The work control process provides the opportunity to visually inspect the surfaces of components during preventive and corrective maintenance activities on an ongoing basis. The work control process also provides input to the corrective action program if aging effects are identified. On the basis on its review, the project team finds management of loss of material for these components using the chemistry control for secondary systems and work control process program to be adequate.

In MPS Unit 3 LRA Table 3.4.2-5, the applicant proposes to manage loss of material for the stainless steel pipe exposed externally to damp soil environment using MPS AMP B2.1.4, "Buried Pipe Inspection Program."

The project team reviewed the buried pipe inspection program and its evaluation is documented in Section 7.1.3 of this report. On the basis of its review, the project team finds the buried pipe inspection program acceptable for managing the aging effect of loss of material for the buried pipe component.

In MPS Unit 3 LRA Table 3.4.2-5, the applicant proposes to manage loss of material for the stainless steel demineralized water storage tank exposed externally to atmosphere/weather environment using MPS AMP B2.1.24, “Tank Inspection Program.”

The project team reviewed the tank inspection program and its evaluation is documented in Section 7.1.21 of this report. On the basis of its review, the project team finds management of loss of material for this component using the tank inspection program to be adequate.

In MPS Unit 3 LRA Table 3.4.2-5, the applicant proposes to manage cracking for the following stainless steel auxiliary feedwater system component types, AFW pump oil coolers (tube sheets) and AFW pump oil coolers (tube), exposed externally to oil environment and AFW pump oil coolers (shell) exposed internally to oil environment using MPS AMP B2.1.25, “Work Control Process.”

The project team reviewed the work control process program and its evaluation is documented in Section 7.1.22 of this report. The work control process provides the opportunity to visually inspect the surfaces of components during preventive and corrective maintenance activities on an ongoing basis. The work control process provides input to the corrective action program if aging effects are identified. On the basis of its review, the project team finds the work control process program acceptable for managing the aging effect of cracking for stainless steel AFW pump oil cooler tubesheets, tubes and shell.

7.3.4.3.6 Auxiliary Steam - Aging Management Evaluation (MPS Unit 3 LRA Table 3.4.2-6)

The project team reviewed MPS Unit 3 LRA Table 3.4.2-6, which summarizes the results of AMR evaluations for the auxiliary steam system component groups.

In MPS Unit 3 LRA Table 3.4.2-6, the applicant identified no aging effects for the stainless steel/carbon steel/low-alloy steel pipe, tubing, and valves exposed externally to air.

On the basis that these components have the same previously discussed MEAP combination, the project team finds that there are no aging effects for these stainless components exposed externally to air. The project team’s evaluation is documented in Section 7.3.4.3.1 of this report.

In MPS Unit 3 LRA Table 3.4.2-6, the applicant proposes to manage cracking for stainless steel tubing exposed internally to a treated water and steam environment using MPS AMP B2.1.6, “Chemistry Control for Secondary Systems Program.”

The material, environment, aging effects, and aging management program (MEAP) for auxiliary steam is the same as that for the main steam components. Since both have the same MEAP combination, the project team finds that management of loss of material and cracking for stainless steel components using the chemistry control for secondary systems program to be adequate. The project team reviewed the chemistry control for secondary systems program and its evaluation is documented in Section 7.3.4.3.1 of this report.

7.3.4.3.7 Auxiliary Boiler Condensate and Feedwater - Aging Management Evaluation (MPS Unit 3 LRA Table 3.4.2-7 and Table 3.4.2-7a)

The project team reviewed MPS Unit 3 LRA Table 3.4.2-7 and Table 3.4.2-7a of the MPS LRA supplement letter dated January 11, 2005 (ML050190289), which summarizes the results of AMR evaluations for the auxiliary boiler condensate and feedwater system component groups.

In Table 3.4.2-7 of the MPS Unit 3 LRA and Table 3.4.2-7a of the MPS LRA supplement letter dated January 11, 2005 (ML050190289), the applicant identified no aging effects for the following stainless steel/carbon steel/low-alloy steel auxiliary boiler condensate and feedwater system component types - auxiliary condensate flash tank, restricting orifices, sample coolers, steam traps, tubing, flow elements, and radiation detectors - exposed externally to air.

On the basis that these components have the same previously discussed MEAP combination, the project teams finds that there are no aging effects for these stainless steel/carbon steel/low-alloy steel components exposed externally to air. The project team's evaluation is documented in Section 7.3.4.3.1 of this report.

7.3.4.3.8 Hot Water Heating - Aging Management Evaluation (MPS Unit 3 LRA Table 3.4.2-8)

The project team reviewed MPS Unit 3 LRA Table 3.4.2-8, which summarizes the results of AMR evaluations for the hot water heating system component groups.

In MPS Unit 3 LRA Table 3.4.2-8, the applicant identified no aging effects for the following stainless steel/carbon steel/low-alloy steel hot water heating system component types - flex connections, flow elements, pipe, and tubing - exposed externally to air.

On the basis that these components have the same previously discussed MEAP combination, the project team finds that there are no aging effects for these stainless steel/carbon steel/low-alloy steel components exposed externally to air. The project team's evaluation is documented in Section 7.3.4.3.1 of this report.

In MPS Unit 3 LRA Table 3.4.2-8, the applicant identified no aging effects for the copper alloy unit heaters exposed externally to air.

On the basis that these components have the same previously discussed MEAP combination, the project team finds that there are no aging effects for these copper alloy components exposed externally to air. Its evaluation is documented in Section 7.3.4.3.5 of this report.

7.3.4.3.9 Hot Water Pre-Heating - Aging Management Evaluation (MPS Unit 3 LRA Table 3.4.2-9)

The project team reviewed MPS Unit 3 LRA Table 3.4.2-9, which summarizes the results of AMR evaluations for the hot water pre-heating system component groups.

In MPS Unit 3 LRA Table 3.4.2-9, the applicant identified no aging effects for the following stainless steel/carbon steel/low-alloy steel hot water pre-heating system component types - flow elements, pipe, tubing, and valves - exposed externally to air.

On the basis that these components have the same previously discussed MEAP combination, the project team finds that there are no aging effects for these stainless steel/carbon steel/low-alloy steel components exposed externally to air. The project team's evaluation is documented in Section 7.3.4.3.1 of this report.

7.3.4.3.10 Steam Generator Chemical Addition - Aging Management Evaluation (MPS Unit 3 LRA Table 3.4.2-10)

The project team reviewed MPS Unit 3 LRA Table 3.4.2-10, which summarizes the results of AMR evaluations for the steam generator chemical addition system component groups.

In the MPS Unit 3 LRA Table 3.4.2-10, the applicant identified no aging effects for stainless steel pipe and valves exposed externally to air.

On the basis that these components have the same previously discussed MEAP combination, the project team finds that there are no aging effects for these stainless steel/carbon steel/low-alloy steel components exposed externally to air. The project team's evaluation is documented in Section 7.3.4.3.1 of this report.

In MPS Unit 3 LRA Table 3.4.2-10, the applicant proposes to manage loss of material for the stainless steel pipe exposed externally to an atmosphere/weather environment using MPS AMP B2.1.13, "General Condition Monitoring Program."

The project team reviewed the general condition monitoring program and its evaluation is documented in Section 7.1.12 of this report. The project team finds that this program is acceptable for managing loss of material since visual inspections of external surfaces are performed during various walkdowns.

In MPS Unit 3 LRA Table 3.4.2-10, the applicant proposes to manage cracking for the stainless steel piping and valves exposed internally to a treated water environment using MPS AMP B2.1.25, "Work Control Process."

The project team reviewed the work control process program and its evaluation is documented in Section 7.1.22 of this report. The work control process provides the opportunity to visually inspect the internal surfaces of components during preventive and corrective maintenance activities on an ongoing basis. The work control process provides input to the corrective action program if aging effects are identified. On the basis of its review, the project team finds that using the work control process program to manage the aging effect of loss of material for these components is adequate.

7.3.4.3.11 Turbine Plant Miscellaneous Drains - Aging Management Evaluation (MPS Unit 3 LRA Table 3.4.2-11)

The project team reviewed MPS Unit 3 LRA Table 3.4.2-11, which summarizes the results of AMR evaluations for the turbine plant miscellaneous drains system component groups.

In MPS Unit 3 LRA Table 3.4.2-11, the applicant identified no aging effects for carbon steel and low-alloy steel pipe, steam traps, and valves exposed externally to air.

On the basis that these components have the same previously discussed MEAP combination, the project team finds that there are no aging effects for these stainless steel components exposed externally to air. The project team's evaluation is documented in Section 7.3.4.3.1 of this report.

7.3.5 MPS Unit 3 LRA Section 3.5 - Aging Management of Containment, Structures and Component Supports

In MPS Unit 3 LRA Section 3.5, the applicant provides the results of its AMRs for structures and components.

In the MPS Unit 3 LRA Tables 3.5.2-1 through 3.5.2-38 (Table 2s), the applicant provides a summary of the AMRs for component types associated with the following structures and commodities: (1) containment; (2) containment enclosure building; (3) auxiliary building; (4) control building; (5) fuel building; (6) railroad canopy; (7) Unit 3 hydrogen recombiner building; (8) Unit 3 engineered safety features building; (9) Unit 3 main steam valve building; (10) Unit 3 emergency generator enclosure and fuel oil tank vault; (11) Unit 2 fire pump house; (12) Unit 3 fire pump house; (13) Unit 3 service building; (14) Unit 3 turbine building; (15) Unit 3 auxiliary boiler enclosure; (16) Unit 3 technical support center; (17) Unit 3 maintenance shop; (18) Unit 3 waste disposal building; (19) SBO diesel generator enclosure and fuel oil tank vault; (20) Unit 3 condensate polishing enclosure; (21) Unit 2 condensate polishing facility and warehouse No. 5; (22) security diesel generator enclosure; (23) stack monitoring equipment building; (24) Unit 3 stack; (25) switchyard control house; (26) 345kV switchyard; (27) Unit 3 circulating and service water pumphouse; (28) Unit 3 west retaining wall; (29) sea wall; (30) Unit 3 circulating water discharge tunnel and discharge structure; (31) Unit 3 recirculation tempering line; (32) vacuum priming pumphouse; (33) tank foundations; (34) yard structures; (35) NSSS equipment supports; (36) general structural supports; (37) miscellaneous structural commodities; and (38) load handling cranes and devices. The summary information for each component type included: intended function; material; environment; aging effect requiring management; AMPs; the GALL Report Volume 2 item; cross reference to the MPS Unit 3 LRA Table 3.5.1 (Table 1); and generic and plant-specific notes related to consistency with the GALL Report.

Also, the applicant identified for each component type in MPS Unit 3 LRA Table 3.5.1 (Table 1) those components where further evaluation is recommended, those for which no further evaluation is required, and those that are not applicable to MPS Unit 3 together with the basis for their exclusion.

Additionally, the applicant identified in MPS Unit 3 LRA Tables 3.5.2-1 through 3.5.2-38 which AMR results it considered to be consistent with the GALL Report (table column Notes A through E) and which it justified on a different basis.

The AMRs that are within the scope of the project team audit and review are identified on copies of MPS Unit 3 LRA Tables 3.5.2-1 through 3.5.2-38 which are included as an appendix to the MPS Units 2 and 3 audit and review plan.

The project team conducted its audit and review in accordance with SRP-LR Section 3.5.3 and the MPS Units 2 and 3 audit and review plan. The project team interviewed the applicant's

technical staff and reviewed, in whole or in part, the documents listed in Attachment 5 of this report for Section 3.5, including the following MPS Unit 3 Technical Reports: MP-LR-4601, "Containment," Revision 3; MP-LR-4602, "Class 1 Structures," Revision 3; MP-LR-4603, "Intake & Discharge Structures," Revision 3; MP-LR-4604, "Miscellaneous Structures," Revision 3; MP-LR-4651, "General Structural Supports," Revision 2; MP-LR-4652, "Load Handling Cranes & Devices," Revision 3; MP-LR-4653, "NSSS Equipment Supports," Revision 2; and MP-LR-4654, "Miscellaneous Structural Commodities," Revision 3.

These documents provide the AMR results for the containment, structures and component supports.

7.3.5.1 Aging Management Review Results That Are Consistent With the GALL Report, for Which No Further Evaluation Is Required

For aging management evaluations that the applicant states are consistent with the GALL Report and for which further evaluation is not recommended, the project team conducted its audit and review to determine if the applicant's reference to the GALL Report in the MPS Unit 3 LRA is acceptable.

The project team verified that the applicant: (1) provides a brief description of the system, components, materials, and environment; (2) states that the applicable aging effects have been reviewed and are evaluated in the GALL Report; and (3) identifies those aging effects for the structures and components that are subject to an AMR.

The project team also verified that the MPS Unit 3 LRA line item is consistent with the GALL Report Volume 2 system tables line item for component type, material, environment, aging effect, and AMP.

7.3.5.1.1 Aging of Component Supports (MPS Unit 3 LRA Table 3.5.2-37)

In MPS Unit 3 LRA Table 3.5.2-37 (page 3-655), the applicant states that change of material properties and cracking of rubber material for watertight door gaskets in an air environment is managed by MPS AMP B2.1.23, "Structures Monitoring Program." The applicant also references GALL Item III. Item B4.2-a which specifies GALL AMP XI.S6, "Structures Monitoring Program" to manage these aging effects. The project team noted that Note E was used and that the component listed in the GALL Report is for vibration isolation elements while the component listed in the MPS Unit 3 LRA table is a watertight door gasket. During the audit and review, the project team asked the applicant to explain why Note E was used instead of Note C.

In a MPS LRA supplement letter dated July 7, 2004 (ML041900407), the applicant stated, in response to Audit Item 161, that Note E should be Note C for the rubber material of the watertight door gasket structural member. In addition, the applicant has initiated DMR #3558 to make the same correction in MPS Unit 3 Technical Report, MP-LR-4556, "Misc. Structural Commodities," Revision 3. On the basis of its review, the project team finds the applicant's response acceptable.

In MPS Unit 2 LRA Table 3.5.2-25 (page 3-535 of the MPS Unit 2 LRA), the applicant states the loss of material of carbon steel and low-alloy steel for structural support components in an air or

atmosphere/weather environment is managed by MPS AMP B2.1.15, “Infrequently Accessed Areas Program,” MPS AMP B2.1.23, “Structures Monitoring Program,” and MPS AMP B2.1.13, “General Condition Monitoring” and GALL Item III.B2.1-a is matched. During the audit and review, the project team asked the applicant to explain why Note E was used for the infrequently accessed areas inspection program, Note A used for the structures monitoring program, and Note C was used for the general condition monitoring program. The applicant states that the Note C was incorrectly applied to these general condition monitoring line items and includes similar line items in MPS Unit 3 LRA Table 3.5.2-36. Note A should have been applied since the general condition monitoring program performs the same inspections of structural supports as the structures monitoring program and is considered equivalent to GALL AMP XI.S6, “Structures Monitoring Program.” MPS AMP B2.1.23 is used to manage aging of non-ASME class, large equipment supports; and MPS AMP B2.1.13 is used to manage aging of other non-ASME class supports.

In a MPS LRA supplement letter dated July 7, 2004 (ML041900407), the applicant stated, in response to Audit Item 100, that Note C should be Note A for the general condition monitoring line items in Unit 3 Table 3.5.2-36 (pages 3-643 through 3-648) since the general condition monitoring program performs the same inspections of structural supports for the structures monitoring program and is considered equivalent to GALL AMP XI.S6, “Structures Monitoring Program.”

In addition, the applicant has initiated DMRs #3478 and #3479 to make the same correction in MPS Unit 3 Technical Report, MP-LR-4651, “General Structural Supports,” Revision 2. On the basis of its review of the applicant response, the project team finds the response acceptable.

7.3.5.1.2 <u>Crack Initiation and Growth Due to Stress Corrosion Cracking</u>

In the discussion section of MPS Unit 3 LRA Table 3.5.1, Item 3.5.1-33, the applicant states, for Group B1.1: high strength low-alloy bolts in structures and component support systems, that cracking due to SCC is not an aging effect requiring management for NSSS equipment support bolting.

During the review, the project team noted that SRP-LR Table 3.5-1 recommended GALL AMP XI.M18, “Bolting Integrity,” for managing high strength bolting for NSSS components supports for crack initiation and growth due to SCC.

The project team questioned the applicant whether all the resolution of generic safety issue for bolting, as stated in NUREG-1339, are addressed. By letter dated December 3, 2004 (ML043450341), the applicant submitted its LRA supplement. In its response, the applicant stated that it has developed a specific bolting integrity aging management program that addresses degradation of bolting at MPS. The bolting integrity program is reviewed by NRR DE staff and is addressed in Section 3 of the SER related to the MPS Units 2 and 3 LRA.

By letter dated January 11, 2005 (ML050190289), the applicant submitted its bolting aging management roll-up item. In its response, the applicant replaces the existing information in the “Discussion” column of Unit 3 LRA Table 3.3.1, Item 33 with “consistent with the NUREG-1801."

The project team reviewed the applicant's response and this acceptable since it is consistent with the GALL Report. The bolting integrity program is reviewed by NRR DE and its evaluation is documented in Section 3 of the SER related to the MPS Units 2 and 3 LRA.

On the basis of its audit and review, the project team determined that for AMRs not requiring further evaluation, as identified In MPS Unit 3 LRA Table 3.5.1 (Table 1), the applicant's references to the GALL Report are acceptable and no further project team review is required.

7.3.5.2 Aging Management Review Results That Are Consistent With the GALL Report, for Which Further Evaluation Is Recommended

For some line items consistent with the GALL Report in the MPS Unit 3 LRA Tables 3.5.2-1 through 3.5.2-38, the GALL Report recommends further evaluation. When further evaluation is recommended, the project team reviewed these evaluations provided in MPS Unit 3 LRA Section 3.5.2.2 against the criteria provided in the SRP-LR Section 3.5.2.2. The following provides the project team's assessments of these evaluations. These project team assessments are applicable to each Table 2 line item in Section 3.5 citing the particular item in Table 1.

The MPS Unit 3 LRA sections identified in MPS Unit 3 LRA Table 3.5.1 where further evaluation is recommended are discussed below.

7.3.5.2.1 PWR Containments (MPS Unit 3 LRA Section 3.5.2.2.1)

The project team reviewed MPS Unit 3 LRA Section 3.5.2.2.1 against the criteria in SRP-LR Section 3.5.2.2.1, which addresses several areas discussed below.

7.3.5.2.1.1 Aging of Inaccessible Concrete Areas (MPS Unit 3 LRA Section 3.5.2.2.1.1)

The project team reviewed MPS Unit 3 LRA Section 3.5.2.2.1.1 against the criteria in SRP-LR Section 3.5.2.2.1.1.

In MPS Unit 3 LRA Section 3.5.2.2.1.1, the applicant addresses aging of inaccessible concrete areas for the Unit 3 containment.

For inaccessible portions of the containment structure, 10 CFR 50.55a(b)(2)(ix) requires that the applicant evaluate the acceptability of inaccessible areas when conditions exist in accessible areas that could indicate the presence of, or result in, degradation to inaccessible areas.

The AMP recommended by the GALL Report for managing the aging of the accessible portions of the containment structures is GALL AMP XI.S2, "ASME Section XI, Subsection IWL." The applicant addresses this with MPS AMP B2.1.16, "Inservice Inspection Program: Containment Inspections." The project team reviewed the inservice inspection program: containment inspections and its evaluation is documented in Section 7.1.15 of this report. Subsection IWL exempts from examination those portions of the concrete containment that are inaccessible (e.g., foundation, below-grade exterior walls, or concrete covered by liner).

The applicant also uses MPS AMP B2.1.23, “Structures Monitoring Program” where accessible areas are monitored for evidence of aging effects that may be applicable to containment structures. This program, which is consistent with GALL AMP XI.S6, “Structures Monitoring Program,” with enhancements, was reviewed by the project team and its evaluation is documented Section 7.1.20 of this report. The applicant also credits the structures monitoring program for the examination of below-grade concrete when it is exposed by excavation.

In the GALL Report, Volume 2, Chapter II, Table A1 (as modified by ISG-3), further evaluation is recommended to manage the aging effects for containment concrete components located in inaccessible areas if the aging mechanisms of (1) freeze-thaw, (2) leaching of calcium hydroxide, (3) aggressive chemical attack, (4) reaction with aggregates, or (5) corrosion of embedded steel are significant. Possible aging effects for containment concrete structural components due to these five aging mechanisms are cracking, change in material properties, and loss of material.

(1) Freeze-thaw

SRP-LR Section 3.5.2.2.1.1 does not address freeze-thaw as an aging mechanism for concrete containments because no further evaluation is recommended in the GALL Report. However, ISG-3, “Chapters II and III fo GALL Report on Aging Management of Concrete Elements,” clarifies the staff position that further evaluation is appropriate if the applicant’s facility is subject to moderate to severe weathering conditions unless the concrete meets certain specifications and subsequent inspections have confirmed that the aging mechanism has not caused degradation of the concrete.

MPS Unit 3 is located in a region considered to be subject to severe weathering conditions. In the MPS Unit 3 LRA, the applicant states that MPS Unit 3 concrete structures are designed in accordance with specification ACI 318-63, “Building Code Requirements for Reinforced Concrete,” which results in low permeability and resistance to aggressive chemical solutions by requiring the following:

high cement content
low water-to-cement ratio
proper curing
adequate air entrainment

In the MPS Unit 3 LRA, the applicant states that MPS Unit 3 concrete also meets requirements of the guideline ACI 201.2R-77, “Guide to Durable Concrete.” ACI 318-63 and ACI 201.2R-77 use the same ASTM standards for selection, application, and testing of concrete.

The MPS Unit 3 containment structure is protected from precipitation by an enclosure building which also prevents potential freeze-thaw action. During the audit and review, the project team interviewed members of the applicant’s technical staff and reviewed relevant operating experience to confirm that loss of material from freeze-thaw has not been observed, either through the inservice inspection - IWL program or the structures monitoring program.

On the basis of its review, the project team finds that loss of material and cracking due to freeze-thaw will be adequately managed by the containment inservice inspection program

since: (1) that concrete that satisfies the requirements of ACI 318-63 will meet the requirements of ISG-3, (2) an audit of operating experience evaluated under the inservice inspection program: containment inspections and structures monitoring programs, and (3) the containment structure is protected from the elements by an enclosure structure.

(2) Leaching of calcium hydroxide

SRP-LR Section 3.5.2.2.1.1 states that cracking, spalling, and increases in porosity and permeability due to leaching of calcium hydroxide could occur in inaccessible areas of PWR concrete and steel containments. The GALL Report, as updated by ISG-3, recommends further evaluation of plant-specific programs to manage the aging effects for inaccessible areas if specific criteria cannot be satisfied.

The GALL Report states that leaching of calcium hydroxide becomes significant only if the concrete is exposed to flowing water. Even if reinforced concrete is exposed to flowing water, such leaching is not significant if the concrete is constructed to ensure that it is dense, well-cured, has low permeability, and that cracking is well controlled.

In the MPS Unit 3 LRA, the applicant states that MPS Unit 3 concrete structures are designed in accordance with specification ACI 318-63 and meet the requirements of guideline ACI 201.2R-77.

The project team finds that because ACI 318 and ACI 201.2R-77 provide assurance that the criteria of the GALL Report and ISG-3 are met, leaching of calcium hydroxide is not significant at MPS Unit 3, and therefore concludes that the inservice inspection program: containment inspections program will be sufficient for management of increases in porosity and permeability from this aging mechanism. A plant-specific AMP is not required to address this aging effect.

(3) Aggressive chemical attack

SRP-LR Section 3.5.2.2.1.1 states that cracking, spalling, and increases in porosity and permeability due to aggressive chemical attack could occur in inaccessible areas of PWR concrete and steel containments. The GALL Report recommends further evaluation of plant-specific programs to manage the aging effects for inaccessible areas if specific criteria defined in the GALL Report and updated in ISG-3 cannot be satisfied.

The GALL Report, as updated by ISG-3, states that aggressive chemical attack is not significant unless pH is less than 5.5, chlorides are greater than 500 ppm, or sulfates are greater than 1,500 ppm. ISG-3 also states that a plant-specific program is required to examine representative samples of below-grade concrete when excavated for any reason.

In the MPS Unit 3 LRA, the applicant states that the below-grade environment is not aggressive (pH is less than 5.5, chlorides are less than 500 ppm, and sulfates are less than 1,500 ppm). In addition, the project team noted that the applicant uses the structures monitoring program for the examination of below-grade concrete when it is exposed by excavation.

On the basis of the information provided in the MPS Unit 3 LRA and the guidelines provided in the SRP-LR, the GALL Report, and ISG-3, the project team finds that increases in porosity and

permeability, loss of material (spalling, scaling) and cracking due to aggressive chemical attack are not significant for concrete in MPS Unit 3 containment inaccessible areas. The applicant uses MPS AMP B2.1.23, "Structures Monitoring Program" to test the ground water on a periodic basis, considering seasonal variations to ensure the aging mechanism of aggressive chemical attack does not become significant in the future and also examine below-grade concrete when it is exposed by excavation. The project team reviewed the structures monitoring program and its evaluation is documented in Section 7.1.20 of this report. The project team finds that the structures monitoring program is an appropriate program for examination of below-grade concrete when it becomes accessible.

(4) Reaction with aggregates

SRP-LR Section 3.5.2.2.1.1 does not address reaction with aggregates as an aging mechanism for concrete containments because no further evaluation is recommended in the GALL Report. However, ISG-3 clarifies the staff position that further evaluation is appropriate if investigations, tests, or examinations have demonstrated that the aggregates are reactive.

In the MPS Unit 3 LRA, the applicant states that MPS Unit 3 concrete structures are designed in accordance with specification ACI 318-63 and meet the requirements of guideline ACI 201.2R-77. The ACI standards call for the testing of aggregates at the time of construction.

On the basis of interviews with the applicant's technical staff, the project team confirmed that the results of those tests show that the aggregates used for the Unit 3 concrete containment at MPS are not reactive. The project team finds that this aging effect does not require management at MPS. However, the applicant states, in the MPS Unit 3 LRA, that it will manage change of material properties as a potential aging effect on concrete structures. In the MPS Unit 3 LRA, the applicant states that change of material properties for the Unit 3 containment due to alkali (cement)-aggregate reaction of concrete in an air environment is managed by MPS AMP B2.1.16, "Inservice Inspection Program: Containment Inspections" and MPS AMP B2.1.23, "Structures Monitoring Program." The project team reviewed these programs and its evaluation is documented in Sections 7.1.15 and 7.1.20 of this report, respectively.

(5) Corrosion of embedded steel

SRP-LR Section 3.5.2.2.1.1 states that loss of material due to corrosion of embedded steel could occur in inaccessible areas of PWR concrete and steel containments. The GALL Report (updated in ISG-3) recommends further evaluation of plant-specific programs to manage the aging effects for inaccessible areas if specific criteria defined in the GALL Report cannot be satisfied.

For cracking, loss of bond, and loss of material (spalling, scaling) due to corrosion of embedded steel, the GALL Report states that a plant-specific program is only required if the below-grade environment is aggressive. ISG-3 also states that a plant-specific program is required to examine representative samples of below-grade concrete when excavated for any reason.

In the MPS Unit 3 LRA, the applicant states that the below-grade environment is not aggressive (pH greater than 5.5, chlorides less than 500 ppm, and sulfates less than 1,500 ppm). The project team noted that the applicant credits the structures monitoring program for the examination of below-grade concrete when it is exposed by excavation. In addition, the applicant committed, in its structures monitoring program, to periodically monitor below-grade chemistry to ensure that the groundwater is not sufficiently aggressive to cause the below-grade concrete to degrade.

On the basis of interviews with the applicant's technical staff, the project team determined that the environment at the time of construction was not aggressive and on the basis of subsequent testing it has remained within the limits identified in the GALL Report. The project team finds that in accordance with the criteria of the GALL Report this aging effect is not significant and is adequately managed.

The project team reviewed the results of the applicant's AMR for inaccessible concrete areas. On the basis of its audit and review, the project team finds that the applicant appropriately evaluated AMR results involving management of aging of inaccessible concrete areas for containment, as recommended in the GALL Report and ISG-3. Since the applicant's AMR results are otherwise consistent with the GALL Report, the project team finds that the applicant has demonstrated that the effects of aging will be adequately managed so that the intended functions will be maintained consistent with the CLB for the period of extended operation, as required by 10 CFR 54.21(a)(3).

7.3.5.2.1.2 Cracking, Distortion, and Increase in Component Stress Level Due to Settlement; Reduction of Foundation Strength Due to Erosion of Porous Concrete Subfoundations, if Not Covered by Structures Monitoring Program (MPS Unit 3 LRA Section 3.5.2.2.1.2)

The project team reviewed MPS Unit 3 LRA Section 3.5.2.2.1.2 against the criteria in SRP-LR Section 3.5.2.2.1.2.

In MPS Unit 3 LRA Section 3.5.2.2.1.2, the applicant addresses (1) cracking, distortion and increase in component stress level due to settlement and (2) reduction of foundation strength due to erosion of porous concrete subfoundations in the containment.

SRP-LR Section 3.5.2.2.1.2 states that cracking, distortion, and increase in component stress level due to settlement could occur in PWR concrete and steel containments. Also, reduction of foundation strength due to erosion of porous concrete subfoundations could occur in all types of PWR containments. Some plants may rely on a de-watering system to lower the site ground water level. If the plant's CLB credits a de-watering system, the GALL Report recommends verification of the continued functionality of the de-watering system during the period of extended operation. The GALL Report recommends no further evaluation if this activity is included in the scope of the applicant's structures monitoring program.

The applicant states, in the MPS Unit 3 LRA, that aging effects (cracking, distortion, and increase in component stress level) due to settlement; and reduction of foundation strength due to erosion of porous concrete subfoundations are not expected at MPS Unit 3. The applicant also states that MPS Unit 3 structures are founded on bedrock, well-consolidated in-situ

material, or compacted fill. A porous concrete subfoundation is installed beneath the reinforced concrete foundation mat for MPS Unit 3 containment and a portion of the ESF building to control groundwater seepage through or around the waterproof membrane. Breaches in the waterproof membrane around the MPS Unit 3 containment have been identified, which has resulted in water seepage through the membrane and the porous concrete subfoundation. Aging effects associated with porous concrete subfoundation degradation and the resulting potential for settlement of MPS Unit 3 containment are managed by MPS AMP B2.1.23, "Structures Monitoring Program." An installed dewatering system removes water that seeps through the membrane. Most of the ESF building is founded on bedrock and only a small portion of the ESF building is founded on a porous concrete subfoundation that is placed on the bedrock. Therefore, cracking due to settlement is not a concern associated with the ESF building. The project team reviewed the structures monitoring program and its evaluation is documented in Section 7.1.20 of this report. The project team also reviewed the AMR results involving management of aging effects resulting from settling and erosion of porous concrete subfoundations and confirmed that the structures monitoring program addresses each of the affected structures and components.

On the basis of this review, the project team concludes that the applicant has appropriately evaluated AMR results involving cracking, distortion, and increase in component stress level from settlement and reduction of foundation strength from erosion, as recommended in the GALL Report.

The project team finds that the applicant has demonstrated that the effects of aging will be adequately managed so that the intended functions will be maintained consistent with the CLB for the period of extended operation, as required by 10 CFR 54.21(a)(3).

7.3.5.2.1.3 Reduction of Strength and Modulus of Concrete Structures Due to Elevated Temperature (MPS Unit 3 LRA Section 3.5.2.2.1.3)

The project team reviewed MPS Unit 3 LRA Section 3.5.2.2.1.3 against the criteria in SRP-LR Section 3.5.2.2.1.3.

In MPS Unit 3 LRA Section 3.5.2.2.1.3, the applicant addresses reduction of strength and modulus of concrete structures due to elevated temperature in containments.

SRP-LR Section 3.5.2.2.1.3 states that reduction of strength and modulus of elasticity due to elevated temperatures could occur in PWR concrete and steel containments. The GALL Report calls for a plant-specific aging management program and recommends further evaluation if any portion of the concrete containment components exceeds specified temperature limits, i.e., general area temperature 66°C (150°F) and local area temperature 93°C (200°F).

In MPS Unit 3 LRA Section 3.5.2.2.1.3, the applicant states that during normal operation, all areas within the containment building do not experience elevated temperatures greater than 150°F general and greater than 200° F local. Therefore, change in material properties due to elevated temperature is an aging effect not requiring management for the MPS Unit 3 containment concrete.

On the basis of its review, the project team concurs with the applicant and concludes that change in material properties due to elevated temperature is an aging effect not requiring management for the MPS Unit 3 containment concrete.

7.3.5.2.1.4 Loss of Material Due to Corrosion in Inaccessible Areas of Steel Containment Shell or Liner Plate (MPS Unit 3 LRA Section 3.5.2.2.1.4)

The project team reviewed MPS Unit 3 LRA Section 3.5.2.2.1.4 against the criteria in SRP-LR Section 3.5.2.2.1.4.

In MPS Unit 3 LRA Section 3.5.2.2.1.4, the applicant addresses loss of material due to corrosion in inaccessible areas of the steel containment shell or the steel liner plate for the containment.

SRP-LR Section 3.5.2.2.1.4 states that loss of material due to corrosion could occur in inaccessible areas of the steel containment shell or the steel liner plate for all types of PWR containments. The GALL Report recommends further evaluation of plant-specific programs to manage this aging effect for inaccessible areas if the following specific criteria defined in the GALL Report cannot be satisfied: (1) concrete meeting the requirements of ACI 318 or ACI 349 and the guidance of 201.2R was used for the containment concrete in contact with the embedded containment shell or liner; (2) the accessible concrete is monitored to ensure that it is free of penetrating cracks that provide a path for water seepage to the surface of the containment shell or liner; (3) the accessible portion of the moisture barrier, at the junction where the shell or liner becomes embedded, is subject to aging management activities in accordance with IWE requirements; (4) borated water spills and water ponding on the containment concrete floor are not common and when detected are cleaned up in a timely manner.

In the MPS Unit 3 LRA, the applicant states that the containment concrete in contact with the steel liner plate is designed in accordance with ACI 318-63, and meets the requirements of guideline ACI 201.2R-77. Accessible concrete of the containment structure is monitored for penetrating cracks under MPS AMP B2.1.16, “Inservice Inspection Program: Containment Inspections.” The project team reviewed the inservice inspection program: containment inspections program, with exceptions, and its evaluation is documented in Section 7.1.15 of this report. In addition, the applicant states, in the MPS Unit 3 LRA, that the accessible portions of the steel liner plate and moisture barrier where the liner becomes embedded are inspected in accordance with MPS AMP B2.1.16, “Inservice Inspection Program: Containment Inspections.” Spills (e.g., borated water spill) are cleaned up in a timely manner. The aging effect of loss of material due to corrosion has not been significant for MPS Unit 3 liner plate.

On the basis of its review, the project team finds that all of the criteria identified in the GALL Report are satisfied. The project team finds that no additional, plant-specific AMP is required to manage inaccessible areas of the steel containment liner plate.

On the basis of its audit and review, the project team finds that the applicant appropriately evaluated AMR results involving loss of material due to corrosion in inaccessible areas of the steel containment shell or the steel liner plate, as recommended in the GALL Report. Since the applicant’s AMR results are otherwise consistent with the GALL Report, the project team finds

that the applicant has demonstrated that the effects of aging will be adequately managed so that the intended functions will be maintained consistent with the CLB for the period of extended operation, as required by 10 CFR 54.21(a)(3).

7.3.5.2.1.5 Loss of Prestress Due to Relaxation, Shrinkage, Creep, and Elevated Temperature (MPS Unit 3 LRA Section 3.5.2.2.1.5)

In MPS Unit 3 LRA Section 3.5.2.2.1.5, the applicant states that the MPS Unit 3 containment is not a prestressed structure and therefore, this item is not applicable.

The project team concurs with the applicant and finds that this aging effect is not applicable to MNP Unit 3.

7.3.5.2.1.6 Cumulative Fatigue Damage (MPS Unit 3 LRA Section 3.5.2.2.1.6)

MPS Unit 3 LRA Section 3.5.2.2.1.6 is reviewed by NRR DE staff and addressed in Section 4 of the SER related to the MPS Units 2 and 3 LRA.

7.3.5.2.1.7 Cracking Due to Cyclic Loading and Stress Corrosion Cracking (MPS Unit 3 LRA Section 3.5.2.2.1.7)

The project team reviewed MPS Unit 3 LRA Section 3.5.2.2.1.7 against the criteria in SRP-LR Section 3.5.2.2.1.7.

In MPS Unit 3 LRA Section 3.5.2.2.1.7, the applicant addresses aging mechanisms that can lead to cracking of penetration sleeves and penetration bellows such as cyclic loads and SCC.

SRP-LR Section 3.5.2.2.1.7 states that cracking of containment penetrations (including penetration sleeves, penetration bellows, and dissimilar metal welds) due to cyclic loading or SCC could occur in containments. Further evaluation of inspection methods is recommended to detect cracking due to cyclic loading and SCC since visual VT-3 examinations may be unable to detect this aging effect.

In MPS Unit 3 LRA Section 3.5.2.2.1.7, the applicant states that stress corrosion cracking is applicable to carbon and low-alloy steel in air only if the fabrication material is high yield strength steel. SCC of stainless steel in air is only applicable to sensitized stainless steel that is exposed to intermittent wetting. MPS Unit 3 containment penetrations, including penetration sleeves, bellows, and dissimilar metal welds, are not fabricated form high yield strength steel and the stainless steel materials are not subject to intermittent wetting. Therefore, cracking due to SCC does not require aging management for the MPS Unit 3 containment.

The project team reviewed and concurs with the applicant that cracking due to SCC is not an applicable aging effect for MPS, and augmented inspection to detect cracking is not necessary.

On the basis of its audit and review, the project team finds that the applicant appropriately evaluated AMR results involving management of cracking due to SCC for containment components, as recommended in the GALL Report. Since the applicant's AMR results are otherwise consistent with the GALL Report, the project team finds that the applicant has

demonstrated that the effects of aging will be adequately managed so that the intended functions will be maintained consistent with the CLB for the period of extended operation, as required by 10 CFR 54.21(a)(3).

Cracking due to cyclic loading of the liner plate and penetrations is a TLAA which is evaluated by NRR DE staff and addressed in Section 4.6 of the SER related to the MPS Units 2 and 3 LRA.

7.3.5.2.2 Class 1 Structures (MPS Unit 3 LRA Section 3.5.2.2.2)

The project team reviewed MPS Unit 3 LRA Section 3.5.2.2.2 against the criteria in SRP-LR Section 3.5.2.2.2, which addresses several areas discussed below.

7.3.5.2.2.1 Aging of Structures Not Covered by Structures Monitoring Program (MPS Unit 3 LRA Section 3.5.2.2.2.1)

The project team reviewed MPS Unit 3 LRA Section 3.5.2.2.2.1 against the criteria in SRP-LR Section 3.5.2.2.2.1.

In MPS Unit 3 LRA Section 3.5.2.2.2.1, the applicant addresses aging of Class 1 structures not covered by the structures monitoring program.

SRP-LR Section 3.5.2.2.2.1 states that the GALL Report recommends further evaluation of certain structure/aging effect combinations if they are not covered by the structures monitoring program. This is described in GALL Report Chapter III and includes (1) scaling, cracking, and spalling due to repeated freeze-thaw for Groups 1-3, 5, 7-9 structures; (2) scaling, cracking, spalling and increase in porosity and permeability due to leaching of calcium hydroxide and aggressive chemical attack for Groups 1-5, 7-9 structures; (3) expansion and cracking due to reaction with aggregates for Groups 1-5, 7-9 structures; (4) cracking, spalling, loss of bond, and loss of material due to corrosion of embedded steel for Groups 1-5, 7-9 structures; (5) cracks, distortion, and increase in component stress level due to settlement for Groups 1-3, 5, 7-9 structures; (6) reduction of foundation strength due to erosion of porous concrete subfoundations for Groups 1-3, 5-9 structures; (7) loss of material due to corrosion of structural steel components for Groups 1-5, 7-8 structures; (8) loss of strength and modulus of concrete structures due to elevated temperatures for Groups 1-5; and (9) crack initiation and growth due to SCC and loss of material due to crevice corrosion of stainless steel liner for Groups 7 and 8 structures. Further evaluation is necessary only for structure/aging effect combinations not covered by the structures monitoring program.

Also, technical details of the aging management issue are presented in SRP-LR Subsection 3.5.2.2.1.2 for structure/aging effect combinations Items (5) and (6) and SRP-LR Subsection 3.5.2.2.1.3 for Item (8), above.

In MPS Unit 3 LRA Table 3.5.1, Item 3.5.1-20 (page 3-502), the applicant credits MPS AMP B2.1.23, “Structures Monitoring Program” for all types of aging effects and all component groups except Group 6 of accessible interior and exterior concrete and steel components of Class 1 structures. The project team reviewed the structures monitoring

program and its evaluation is documented Section 7.1.20 of this report. Additional discussion of specific structure/aging effect combinations follows.

(1) Freeze-thaw

SRP-LR Section 3.5.2.2.2.1 addresses freeze-thaw as an aging mechanism for Class 1 structures. ISG-3 clarifies the staff position that further evaluation is appropriate if the applicant's facility is subject to moderate to severe weathering conditions unless the concrete meets certain specifications and subsequent inspections have confirmed that the aging mechanism has not caused degradation of the concrete.

MPS Unit 3 is located in a region considered to be subject to severe weathering conditions. In the MPS Unit 3 LRA, the applicant states that MPS Unit 3 structures are designed in accordance with specification ACI 318-63, which results in low permeability and resistance to aggressive chemical solutions by requiring the following:

high cement content
low water-to-cement ratio
proper curing
adequate air entrainment

In addition to ACI 318-63, the applicant states that MPS Unit 3 concrete also meets requirements of the guideline of ACI 201.2R-77. ACI 318-63 and ACI 201.2R-77 use the same ASTM standards for selection, application and testing of concrete.

The project team interviewed members of the applicant's technical staff and reviewed relevant operating experience to confirm that loss of material from freeze-thaw has not been observed through MPS AMP B2.1.23, " Structures Monitoring Program." The project team reviewed the structures monitoring program and its evaluation is documented in Section 7.1.20 of this report.

On the basis that concrete that satisfies the requirements of ACI 318-63 will meet the requirements of ISG-3, and on the basis of an audit of operating experience evaluated under the structures monitoring program, the project team finds that loss of material and cracking due to freeze-thaw will be adequately managed by the structures monitoring program.

(2)(a) Leaching of calcium hydroxide

SRP-LR Section 3.5.2.2.2.1 states that cracking, spalling, and increases in porosity and permeability due to leaching of calcium hydroxide could occur in Class 1 structures. The GALL Report requires a plant-specific AMP for inaccessible areas, unless the requirements of ACI 201.2R-77 for Class 1 structural concrete are met.

The GALL Report states that leaching of calcium hydroxide becomes significant only if the concrete is exposed to flowing water. Even if reinforced concrete is exposed to flowing water, such leaching is not significant if the concrete is constructed to ensure that it is dense, well-cured, has low permeability, and that cracking is well controlled.

In the MPS Unit 3 LRA, the applicant states that MPS Unit 3 concrete structures are designed in accordance with specification ACI 318-63 and meet the requirements of guideline ACI 201.2R-77.

The project team finds that because ACI 318 provides assurance that the criteria of the GALL Report and ISG-3 are met, leaching of calcium hydroxide is not significant at MPS Unit 3, and therefore concludes that the structures monitoring program will be sufficient for management of increases in porosity and permeability from this aging mechanism. A plant-specific AMP is not required to address this aging effect.

(2)(b) Aggressive chemical attack

SRP-LR Section 3.5.2.2.2.1 states that cracking, spalling, and increases in porosity and permeability due to aggressive chemical attack could occur in inaccessible areas of Class 1 structures. The GALL Report recommends further evaluation of plant-specific programs to manage the aging effects for inaccessible areas if specific criteria defined in the GALL Report and updated in ISG-3 cannot be satisfied.

The GALL Report, as updated by ISG-3, states that aggressive chemical attack is not significant unless pH is less than 5.5, chlorides are greater than 500 ppm, or sulfates are greater than 1,500 ppm. ISG-3 also states that a plant-specific program is required to examine representative samples of below-grade concrete when excavated for any reason.

In the MPS Unit 3 LRA, the applicant states that the below-grade environment is not aggressive (pH is greater than 5.5, chlorides are less than 500 ppm, and sulfates are less than 1,500 ppm). In addition, the project team noted that the applicant uses the structures monitoring program for the examination of below-grade concrete when it is exposed by excavation.

On the basis of its review of the information provided in the MPS Unit 3 LRA and the guidelines provided in the SRP-LR, the GALL Report, and ISG-3, the project team finds that increases in porosity and permeability, loss of material (spalling, scaling) and cracking due to aggressive chemical attack are not significant for concrete in inaccessible areas. The project team finds that an appropriate AMP for examination of below-grade concrete (specifically, an enhancement to the structures monitoring program) has been identified.

(3) Reaction with aggregates

SRP-LR Section 3.5.2.2.2.1 addresses reaction with aggregates as an aging mechanism for Class 1 structures. ISG-3 clarifies the staff position that further evaluation is appropriate if investigations, tests, or examinations have demonstrated that the aggregates are reactive.

In the MPS Unit 3 LRA, the applicant states that MPS Unit 3 concrete structures are designed in accordance with specification ACI 318-63 and meets the requirements of guideline ACI 201.2R-77. The ACI standards call for the testing of aggregates at the time of construction.

On the basis of interviews with the applicant's technical staff, the project team confirmed that the results of those tests showed that the aggregates used for concrete Class 1 structures at

MPS Unit 3 are not reactive. However, the applicant states that it will manage cracking as a potential aging effect on concrete structures. In the MPS Unit 3 LRA, the applicant states that change of material properties and cracking due to alkali (cement)-aggregate reaction of concrete in various environments is managed by MPS AMP B2.1.23, "Structures Monitoring Program." The project team reviewed the structures monitoring program and its evaluation is documented in Section 7.1.20 of this report.

(4) Corrosion of embedded steel

SRP-LR Section 3.5.2.2.2.1 states that cracking, spalling, loss of bond, and loss of material due to corrosion of embedded steel could occur in inaccessible areas of Class 1 structures. The GALL Report (updated in ISG-3) recommends further evaluation of plant-specific programs to manage the aging effects for inaccessible areas if specific criteria defined in the GALL Report cannot be satisfied.

Also, for cracking, loss of bond, and loss of material (spalling, scaling) due to corrosion of embedded steel, the GALL Report states that a plant-specific program is only required if the below-grade environment is aggressive. ISG-3 also states that a plant-specific program is required to examine representative samples of below-grade concrete when excavated for any reason.

In the MPS Unit 3 LRA, the applicant states that the below-grade environment is not aggressive because the environment at the time of construction had a measured pH greater than 5.5, chlorides less than 500 ppm, and sulfates less than 1,500 ppm and subsequent testing has shown the environment has remained within these limits.

The project team finds that, in accordance with the criteria of the GALL Report, these aging effects are not significant and are adequately managed by MPS AMP B2.1.23 "Structures Monitoring Program." The project team reviewed the structures monitoring program and its evaluation is documented in Section 7.1.20 of this report. The project team also finds an enhancement to the structures monitoring program for examination of below-grade concrete to be acceptable.

(5) Settlement

SRP-LR Section 3.5.2.2.2.1 refers to Section 3.5.2.2.1.2 for discussion of settlement. SRP-LR Section 3.5.2.2.1.2 states that cracking, distortion, and increase in component stress level due to settlement could occur in Class 1 structures. Some plants may rely on a de-watering system to lower the site ground water level. If the plant's CLB credits a de-watering system, the GALL Report recommends verification of the continued functionality of the de-watering system during the period of extended operation. The GALL Report recommends no further evaluation if this activity is included in the scope of the applicant's structures monitoring program.

The applicant states, in the MPS Unit 3 LRA, that aging effects (cracking, distortion, and increase in component stress level) due to settlement; and reduction of foundation strength due to erosion of porous concrete subfoundations are not expected at MPS Unit 3 for Class 1 structures. The applicant states that MPS Unit 3 Class 1 structures are founded on bedrock, well-consolidated in-situ material, or compacted fill. Also, no Class 1 structures utilize porous

concrete subfoundations, other than a portion of the ESF building, which is on bedrock. In addition, the applicant states that MPS Unit 3 has a dewatering system under some Class 1 structures which is monitored by MPS AMP B2.1.23, “Structures Monitoring Program.” The project team reviewed the structures monitoring program and its evaluation is documented in Section 7.1.20 of this report.

On the basis of its review, the project team concludes that foundation settlement is not an aging mechanism at MPS Unit 3.

On the basis of its audit and review, the project team finds that the applicant appropriately evaluated AMR results involving management of settlement, as recommended in the GALL Report. Since the applicant’s AMR results are otherwise consistent with the GALL Report, the project team finds that the applicant has demonstrated that the effects of aging will be adequately managed so that the intended functions will be maintained consistent with the CLB for the period of extended operation, as required by 10 CFR 54.21(a)(3).

(6) Erosion of porous concrete subfoundation

SRP-LR Section 3.5.2.2.2.1 refers to Section 3.5.2.2.1.2 for discussion of erosion of porous concrete subfoundation. SRP-LR Section 3.5.2.2.1.2 states that reduction of foundation strength due to erosion of porous concrete subfoundations could occur in all types of Class 1 structures. Some plants may rely on a de-watering system to lower the site ground water level. If the plant's CLB credits a de-watering system, the GALL Report recommends verification of the continued functionality of the de-watering system during the period of extended operation. The GALL Report recommends no further evaluation if this activity is included in the scope of the applicant's structures monitoring program.

The applicant states, in the MPS Unit 3 LRA, that aging effects (cracking, distortion, and increase in component stress level) due to settlement; and reduction of foundation strength due to erosion of porous concrete subfoundations are not expected at MPS Unit 3 for Class 1 structures. The applicant states that MPS Unit 3 Class 1 structures are founded on bedrock, well-consolidated in-situ material, or compacted fill. No structures utilize porous concrete subfoundations, other than a portion of the ESF building, which is on bedrock. In addition, the applicant states that MPS Unit 3 has a dewatering system under some Class 1 structures which is monitored by MPS AMP B2.1.23, “Structures Monitoring Program.” The project team reviewed the structures monitoring program and its evaluation is documented in Section 7.1.20 of this report.

On the basis of its review, the project team concludes that foundation settlement is not an aging mechanism at MPS Unit 3.

On the basis of its audit and review, the project team finds that the applicant appropriately evaluated AMR results involving management of erosion of porous concrete subfoundation, as recommended in the GALL Report. Since the applicant’s AMR results are otherwise consistent with the GALL Report, the project team finds that the applicant has demonstrated that the effects of aging will be adequately managed so that the intended functions will be maintained consistent with the CLB for the period of extended operation, as required by 10 CFR 54.21(a)(3).

(7) Corrosion of structural steel components

The SRP-LR Section 3.5.2.2.2.1 states that corrosion of structural steel components for Groups 1-5 and 7-8 could occur and that further evaluation is necessary only for structure/aging effect combinations not covered by the structures monitoring program.

In MPS Unit 3 LRA Section 3.5.2.2.2.1, the applicant states that the aging effects associated with structures are managed by MPS AMP B2.1.23, “Structures Monitoring Program.” However, aging effects for infrequently accessed portions of the structures are managed by MPS AMP B2.1.15, “Infrequently Accessed Areas Inspection Program.”

The project team reviewed the AMR results involving management of aging effects resulting from corrosion of structural steel components and confirmed that MPS AMP B2.1.23, “Structures Monitoring Program” and MPS AMP B2.1.15, “Infrequently Accessed Areas Inspection Program” address each of the affected Structures and components. The project team reviewed these programs and its evaluation of these programs is documented in Sections 7.1.20 and 7.1.14, of this report, respectively.

On the basis of its audit and review, the project team finds that the applicant has appropriately evaluated AMR results involving this aging effect and that corrosion of structural steel components is adequately managed by the structures monitoring program and infrequently accessed areas inspection program.

(8) Elevated temperatures

SRP-LR Section 3.5.2.2.2.1 refers to Section 3.5.2.2.1.3 for discussion of elevated temperatures. SRP-LR Section 3.5.2.2.1.3 states that reduction of strength and modulus of elasticity due to elevated temperatures could occur in Class 1 structures in Groups 1-5. The GALL Report calls for a plant-specific aging management program and recommends further evaluation if any portion of the concrete components exceeds specified temperature limits, i.e., general area temperature 66EC (150EF) and local area temperature 93EC (200EF).

In MPS Unit 3 LRA Section 3.5.2.2.1.3, the applicant states that during normal operation, all general concrete areas in Class 1 structures remain below 150EF and local area temperatures remain below 200EF. Therefore, change in material properties due to elevated temperature is an aging effect not requiring management for MPS Unit 3 Class 1 structures.

On the basis of its review, the project team concurs with the applicant and concludes that change in material properties due to elevated temperature is an aging effect not requiring management for the MPS Unit 3 Class 1 structures.

(9) Aging effects for stainless steel liners for tanks

The SRP-LR Section 3.5.2.2.2.1 states that crack initiation and growth due to SCC and loss of material due to crevice corrosion of stainless steel liners for Group 7 and 8 structures could occur and further evaluation is necessary only for structure/aging combinations not covered by the structures monitoring program.

In MPS Unit 3 LRA Table 3.5.1, Item 3.5.1-28 (page 3-505), the applicant states that there are no steel-lined concrete tanks at MPS Unit 3 in GALL Structures Group 7, requiring aging management. The applicant also states that all other tanks (steel tanks, Structures Group 8) are evaluated as part of the associated plant system. During the audit and review, the project team noted that, for sump liner of stainless steel material in MPS Unit 3 LRA Table 3.5.2-5 (page 3-538) and MPS Unit 3 Table 3.5.2-8 (page 3-549), the applicant references Item 3.5.1-28. It appears that the applicant does not evaluate all steel tanks as part of the associated plant system. The project team asked the applicant to explain why further evaluation is not provided.

The applicant responded that the MPS Unit 3 Table 3.5.2-5 and MPS Unit 3 Table 3.5.2-8 for sump liner of stainless steel material roll-up to MPS Unit 3 LRA Table 3.5.1, Item 3.5.1-28; however, the discussion column only states that there are no steel lined concrete tanks. The discussion column should be revised to indicate that loss of material for stainless steel sump liners is managed by MPS AMP B2.1.25, "Work Control Process."

In a MPS LRA supplement letter dated July 7, 2004 (ML ML041900407), the applicant stated, in response to Audit Item 136, that MPS Unit 3 LRA Table 3.5.1, Item 3.5.1-28 "Discussion" column should have included a statement that loss of material of steel lined concrete sumps is managed by the work control process program. In addition, a further evaluation recommended discussion should have been included in MPS Unit 3 LRA Section 3.5.2.2 as follows:

> There are no in-scope steel lined concrete tanks at MPS. Loss of material for steel lined concrete sumps is managed by the Work Control Process AMP.

In addition, the applicant has initiated DMR #3570 to revise MPS Unit 3 Technical Report, MP-LR-4923, "SRP Items Recommended for Further Evaluation," to add a further evaluation recommended discussion in MPS Unit 3 LRA Section 3.5.2.2.

On the basis of its review, the project team finds the applicant's response acceptable.

7.3.5.2.2.2 <u>Aging Management of Inaccessible Areas (MPS Unit 3 LRA Section 3.5.2.2.2.2)</u>

The project team reviewed MPS Unit 3 LRA Section 3.5.2.2.2.2 against the criteria in SRP-LR Section 3.5.2.2.2.2.

In MPS Unit 3 LRA Section 3.5.2.2.2.2, the applicant addresses aging of inaccessible areas of Class 1 structures.

SRP-LR Section 3.5.2.2.2.2 states that cracking, spalling, and increases in porosity and permeability due to aggressive chemical attack and cracking, spalling, loss of bond, and loss of material due to corrosion of embedded steel could occur in below-grade inaccessible concrete areas. The GALL Report recommends further evaluation to manage these aging effects in inaccessible areas of Groups 1-3, 5, 7-9 structures, if an aggressive below-grade environment exists. ISG-3 identifies additional requirements.

The GALL Report, as updated by ISG-3, states that aggressive chemical attack and corrosion of embedded steel is not significant unless pH is less than 5.5, chlorides are greater than

500 ppm, or sulfates are greater than 1,500 ppm. ISG-3 also states that a plant-specific program is required to examine representative samples of below-grade concrete when excavated for any reason.

In MPS Unit 3 LRA Section 3.5.2.2.2.2, the applicant states that the below-grade environment is not aggressive (pH is greater than 5.5, chlorides are less than 500 ppm, and sulfates are less than 1,500 ppm). The applicant, states in the MPS Unit 3 LRA, that it uses the enhanced MPS AMP B2.1.23, "Structures Monitoring Program" to examine below-grade concrete when it is exposed by excavation. The project team reviewed the structures monitoring program and its evaluation is documented in Section 7.1.20 of this report. The project team finds that the structures monitoring program, as enhanced, is an appropriate program for examination of below-grade concrete when it becomes accessible.

The applicant states, in the MPS Unit 3 LRA, that inspections of accessible concrete have not revealed degradation from aggressive chemical attack or corrosion of embedded steel.

On the basis that the below-grade environment is not aggressive with periodic groundwater monitoring considering seasonal variations and that excavated concrete has been and will continue to be monitored, the project team finds that increases in porosity and permeability, loss of material (spalling, scaling) and cracking due to aggressive chemical attack and cracking, spalling, loss of bond, and loss of material due to corrosion of embedded steel are adequately managed for concrete in inaccessible areas.

On the basis of its audit and review, the project team finds that the applicant appropriately evaluated AMR results involving management of inaccessible areas, as recommended in the GALL Report. Since the applicant's AMR results are otherwise consistent with the GALL Report, the project team finds that the applicant has demonstrated that the effects of aging will be adequately managed so that the intended functions will be maintained consistent with the CLB for the period of extended operation, as required by 10 CFR 54.21(a)(3).

7.3.5.2.3 Component Supports (MPS Unit 3 LRA Section 3.5.2.2.3)

The project team reviewed MPS Unit 3 LRA Section 3.5.2.2.3 against the criteria in SRP-LR Section 3.5.2.2.3, which addresses several areas discussed below.

7.3.5.2.3.1 Aging of Supports Not Covered by Structures Monitoring Program (MPS Unit 3 LRA Section 3.5.2.2.3.1)

The project team reviewed MPS Unit 3 LRA Section 3.5.2.2.3.1 against the criteria in SRP-LR Section 3.5.2.2.3.1.

In MPS Unit 3 LRA Section 3.5.2.2.3.1, the applicant addresses aging of component supports that are not managed by the structures monitoring program.

SRP-LR Section 3.5.2.2.3.1 states that the GALL Report recommends further evaluation of certain component support/aging effect combinations if they are not covered by the structures monitoring program. This includes (1) reduction in concrete anchor capacity due to degradation of the surrounding concrete, for Groups B1-B5 supports; (2) loss of material due to

environmental corrosion, for Groups B2-B5 supports; and (3) reduction/loss of isolation function due to degradation of vibration isolation elements, for Group B4 supports. Further evaluation is necessary only for structure/aging effect combinations not covered by the structures monitoring program.

The applicant, in the MPS Unit 3 LRA, has included the GALL Report AMP under the applicant's more general MPS AMP B2.1.23, "Structures Monitoring Program." However, this program is not consistent with the GALL Report since the component groups are not completely within the scope of the applicants structures monitoring program, thus requiring further evaluation. The applicant states, in MPS Unit 3 LRA Section 3.5.2.2.3.1, that the structures monitoring program only manages aging effects associated with large equipment supports. The applicant also states that MPS AMP B2.1.13, "General Condition Monitoring" is used to manage aging effects for supports for other components and piping and MPS AMP B2.1.1, "Battery Rack Inspections," is used to manage age-related degradation specific to battery supports. The aging effects for supports in infrequently accessed areas are managed by MPS AMP B2.1.15, "Infrequently Accessed Areas Inspection Program." The project team reviewed these programs and its evaluation is documented in Sections 7.1.12, 7.1.1, and 7.1.14 of this report, respectively. The project team finds the structures monitoring program acceptable, in conjunction with the other three programs, for managing aging of component supports for all GALL Report component support groups.

On the basis of its audit and review, the project team finds that the applicant appropriately evaluated AMR results involving management of aging of components supports, as recommended in the GALL Report. Since the applicant's AMR results are otherwise consistent with the GALL Report, the project team finds that the applicant has demonstrated that the effects of aging will be adequately managed so that the intended functions will be maintained consistent with the CLB for the period of extended operation, as required by 10 CFR 54.21(a)(3).

7.3.5.2.3.2 Cumulative Fatigue Damage Due to Cyclic Loading (MPS Unit 3 LRA Section 3.5.2.2.3.2)

MPS Unit 3 LRA Section 3.5.2.2.3.2 is reviewed by NRR DE staff and addressed in Section 4 of the SER related to the MPS Units 2 and 3 LRA.

7.3.5.2.4 Quality Assurance for Aging Management of Non-Safety-Related Components (MPS Unit 3 LRA Section 3.5.2.2.4)

MPS Unit 3 LRA Section 3.5.2.2.3.2 is reviewed by NRR DE staff and addressed in Section 4 of the SER related to the MPS Units 2 and 3 LRA.

7.3.5.3 Aging Management Review Results That Are Not Consistent with the GALL Report or Are Not Addressed in the GALL Report

In MPS Unit 3 LRA Tables 3.5.2-1 through 3.5.2-38, the project team reviewed additional details of the results of the AMRs for material, environment, aging effect requiring management, and AMP combinations that are not consistent with the GALL Report or are not addressed in the GALL Report.

7.3.5.3.1 Unit 3 Containment - Aging Management Evaluation (MPS Unit 3 LRA Table 3.5.2-1)

The project team reviewed Table 3.5.2-1 of the MPS Unit 3 LRA, which summarizes the results of AMR evaluations for the Unit 3 containment system component groups. The project team interviewed the applicant's technical staff and reviewed MPS Unit 3 Technical Report, MP-LR-4601, "Containment," Revision 3.

In the MPS Unit 3 LRA, the applicant identified no aging effects for stainless steel components exposed to air, including fuel transfer tube gate valve, containment sump screen, neutron shield tank, reactor cavity seal ring, refueling cavity liner, pipe, valve bodies, fuel transfer tube, expansion bellows and fuel transfer tube penetration component types. Air is not identified in the GALL Report as an environment for these components and materials.

On the basis of its review of current industry research and operating experience, the project team finds that air on metal will not result in aging that will be of concern during the period of extended operation. The external environments being referred to are typical of ambient air, e.g., under a shelter, indoor, or air-conditioned enclosure or room. Without the presence of an aggressive environment, stainless steel components will experience insignificant amounts of corrosion, and no aging effects are applicable to this component/commodity group. Therefore, the project team finds that there are no aging effects requiring management for metal in an air environment.

The applicant states, in the MPS Unit 3 LRA, that change of material properties due to alkali (cement)-aggregate reaction of concrete is possible in an air environment. The applicant states that, based on tests conducted on the aggregate and the low-alkali cement used at MPS Unit 3, alkali (cement)-aggregate reaction is not a significant concern. However, the applicant states that it will manage change of material properties as a potential aging effect on concrete structures.

The applicant states, in the MPS Unit 3 LRA, that change of material properties for equipment pads/grout, jet impingement barriers, and structural reinforced concrete (beams, columns, floor slabs, foundation mat slabs, pedestals, walls) due to alkali (cement)-aggregate reaction of concrete in an protected air environment is managed by MPS AMP B2.1.23, "Structures Monitoring Program." The project team reviewed the structures monitoring program and its evaluation is documented in Section 7.1.20 of this report. The project team also reviewed this program with respect to the SRP-LR. On the basis of its review, the project team finds this program acceptable for managing the aging effects, for the above components, of change in material properties due to alkali (cement)-aggregate reaction of concrete in an protected air environment.

The applicant states, in the MPS Unit 3 LRA, that change of material properties for containment shell (cylindrical wall and dome), and tendon gallery due to alkali (cement)-aggregate reaction of concrete in an protected air environment is managed by MPS AMP B2.1.16, "Inservice Inspection Program: Containment Inspections," with exceptions. The project team reviewed the inservice inspection program: containment inspections program and its evaluation is documented in Section 7.1.15 of this report. The project team also reviewed this program with respect to the SRP-LR. On the basis of its review, the project team finds this program

acceptable for managing the aging effects, for the above components, of change in material properties due to alkali (cement)-aggregate reaction of concrete in an air environment.

In the MPS Unit 3 LRA, the applicant states that change of material properties due to alkali (cement)-aggregate reaction of concrete is possible in an air environment. The applicant states that based on tests conducted on the aggregate and the low-alkali cement used at MPS, alkali (cement)-aggregate reaction is not a significant concern. The applicant states that it will manage change of material properties as a potential aging effect on MPS Unit 3 containment concrete structures in infrequently accessed areas. The applicant states, in the MPS Unit 3 LRA, that change of material properties for structural reinforced concrete (beams, columns, floor slabs, foundation mat slabs, pedestals, walls) in an air environment is managed by MPS AMP B2.1.15, "Infrequently Accessed Areas Inspection Program," which is a plant-specific program. The project team reviewed the infrequently accessed area inspection program and its evaluation is documented in Section 7.1.14 of this report. The project team also reviewed this program with respect to the SRP-LR. On the basis of its review, the project team finds this program acceptable for managing the aging effects, for the above components, of change in material properties due to alkali (cement)-aggregate reaction of concrete in an protected air environment for infrequently accessed areas.

7.3.5.3.2 Unit 3 Containment Enclosure Building - Aging Management Evaluation (MPS Unit 3 LRA Table 3.5.2-2)

The project team reviewed Table 3.5.2-2 of the MPS Unit 3 LRA, which summarizes the results of AMR evaluations for the Unit 3 containment enclosure building component groups. The project team interviewed the applicant's technical staff and reviewed MPS Unit 3 Technical Report, MP-LR-4602, "Class 1 Structures," Revision 3.

The applicant states, in the MPS Unit 3 LRA, that change of material properties due to alkali (cement)-aggregate reaction of concrete is possible in an air environment. The applicant states that based on tests conducted on the aggregate and the low-alkali cement used at MPS Unit 3, alkali (cement)-aggregate reaction is not a significant concern. However, the applicant states that it will manage change of material properties as a potential aging effect on Unit 3 Class 1 concrete structures. In the MPS Unit 3 LRA, the applicant states that change of material properties for structural reinforced concrete (grade beams, slabs on grade) due to alkali (cement)-aggregate reaction of concrete in an air environment is managed by MPS AMP B2.1.23, "Structures Monitoring Program." The project team reviewed the structures monitoring program and its evaluation is documented in Section 7.1.20 of this report. The project team also reviewed this program with respect to the SRP-LR. On the basis of its review, the project team finds this program acceptable for managing the aging effects, for the above components, of change in material properties due to alkali (cement)-aggregate reaction of concrete in an air environment.

The applicant states, in the MPS Unit 3 LRA, that change of material properties due to alkali (cement)-aggregate reaction and leaching of calcium hydroxide of concrete is possible in an atmosphere/weather environment. The applicant also states that based on tests conducted on the aggregate and the low-alkali cement used at MPS Unit 3, alkali (cement)-aggregate reaction is not a significant concern. The applicant states that the use of high-density, low-permeability concrete, and proper arrangement and distribution of reinforcement to control

cracking, prevents the leaching of calcium hydroxide from Class 1 structures' concrete to be of concern. Therefore, the applicant states that it will manage change of material properties as a potential aging effect on Unit 3 Class 1 concrete structures.

In the MPS Unit 3 LRA, the applicant states that change of material properties for structural reinforced concrete (grade beams, slabs on grade) due to alkali (cement)-aggregate reaction and leaching of calcium hydroxide of concrete in an atmosphere/weather environment is managed by MPS AMP B2.1.23, "Structures Monitoring Program." The project team reviewed the structures monitoring program and its evaluation is documented in Section 7.1.20 of this report. The project team also reviewed this program with respect to the SRP-LR. On the basis of its review, the project team finds this program acceptable for managing the aging effects, for the above components, of change in material properties due to alkali (cement)-aggregate reaction and leaching of calcium hydroxide of concrete in an atmosphere/weather environment.

7.3.5.3.3 Unit 3 Auxiliary Building - Aging Management Evaluation (MPS Unit 3 LRA Table 3.5.2-3)

The project team reviewed Table 3.5.2-3 of the MPS Unit 3 LRA, which summarizes the results of AMR evaluations for the Unit 3 auxiliary building component groups. The project team interviewed the applicant's technical staff and reviewed MPS Unit 3 Technical Report, MP-LR-4602, "Class 1 Structures," Revision 3.

In the MPS Unit 3 LRA, the applicant states that the GALL Report does not include stainless steel sump liners in a raw water environment. The applicant states that loss of material due to crevice corrosion/under deposit attack of stainless steel is possible in a raw water environment. The sump liners have either the necessary geometry or the material deposits and oxygen greater than 100 ppb, which are required to support crevice corrosion/under deposit attack. The applicant concludes crevice corrosion/under-deposit attack is a potential aging mechanism. On the basis of it review, the project team agrees with the applicant's conclusion.

The applicant states, in the MPS Unit 3 LRA, that sump liners are exposed to an aqueous environment with temperatures less than 210°F and a pH of less than 10. Therefore, the applicant concludes that MIC is a potential aging mechanism. The applicant states, in the MPS Unit 3 LRA, that the sump liners are exposed to low flow conditions with an aggressive environment. Therefore, the applicant concludes that pitting corrosion is a potential aging mechanism. On the basis of its review, the project team agrees with the applicant's conclusion.

In the MPS Unit 3 LRA, the applicant states that loss of material for sump liners due to crevice corrosion/under-deposit attack, MIC, and pitting corrosion of stainless steel in a raw water environment is managed by MPS AMP B2.1.25, "Work Control Process," which is a plant-specific program. The project team reviewed the work control process program and its evaluation is documented in Section 7.1.22 of this report. The project team finds that the work control process program credits visual inspection for the detection of loss of material in structures. On the basis of its review, the project team finds this program acceptable for managing the aging effects, for the above components, of loss of material due to crevice corrosion/under-deposit attack, MIC, and pitting corrosion of stainless steel in a raw water environment.

In the MPS Unit 3 LRA, the applicant states that change of material properties due to alkali (cement)-aggregate reaction of concrete is possible in an air environment. The applicant states that based on tests conducted on the aggregate and the low-alkali cement used at MPS Unit 3, alkali (cement)-aggregate reaction is not a significant concern. The applicant states that it will manage change of material properties as a potential aging effect on Unit 3 Class 1 concrete structures. In the MPS Unit 3 LRA, the applicant states that change of material properties for flood/spill barriers, including curbs, dikes, toe plates, and stop logs; hatches, missile barriers, structural reinforced concrete (beams, columns, floor slabs, foundation mat slabs, roof slabs, walls) and tunnel due to alkali (cement)-aggregate reaction of concrete in an air environment is managed by MPS AMP B2.1.23, "Structures Monitoring Program." The project team reviewed the structures monitoring program and its evaluation is documented in Section 7.1.20 of this report. The project team also reviewed this program with respect to the SRP-LR. On the basis of its review, the project team finds this program acceptable for managing the aging effects, for the above components, of change in material properties due to alkali (cement)-aggregate reaction of concrete in an air environment.

In the MPS Unit 3 LRA, the applicant states that change of material properties due to alkali (cement)-aggregate reaction and leaching of calcium hydroxide of concrete is possible in an atmosphere/weather environment. The applicant states that based on tests conducted on the aggregate and the low-alkali cement used at MPS Unit 3, alkali (cement)-aggregate reaction is not a significant concern. The applicant states that the use of high-density, low-permeability concrete, and proper arrangement and distribution of reinforcement to control cracking, prevents significant leaching of calcium hydroxide from Class 1 Structures' concrete. The applicant will manage change of material properties as a potential aging effect on Unit 3 Class 1 concrete structures. In the MPS Unit 3 LRA, the applicant states that change of material properties for structural reinforced concrete (beams, columns, floor slabs, foundation mat slabs, roof slabs), hatches, and missile barriers due to alkali (cement)-aggregate reaction and leaching of calcium hydroxide of concrete in an atmosphere/weather environment is managed by MPS AMP B2.1.23, "Structures Monitoring Program." The project team reviewed the structures monitoring program and its evaluation is documented in Section 7.1.20 of this report. The project team also reviewed this program with respect to the SRP-LR. On the basis of its review, the project team finds this program acceptable for managing the aging effects, for the above components, for change in material properties due to alkali (cement)-aggregate reaction and leaching of calcium hydroxide of concrete in an atmosphere/weather environment.

In the MPS Unit 3 LRA, the applicant states that change of material properties due to alkali (cement)-aggregate reaction of concrete is possible in an air environment. The applicant states that based on tests conducted on the aggregate and the low-alkali cement used at MPS Unit 3, alkali (cement)-aggregate reaction is not a significant concern. The applicant states that it will manage change of material properties as a potential aging effect on Unit 3 Class 1 concrete structures in infrequently accessed areas. In the MPS Unit 3 LRA, the applicant states that change of material properties for structural reinforced concrete (beams, columns, floor slabs, foundation mat slabs, roof slabs, walls) and tunnel in an air environment is managed by MPS AMP B2.1.15, "Infrequently Accessed Areas Inspection Program," which is a plant-specific program. The project team reviewed the infrequently accessed area inspection program and its evaluation is documented in Section 7.1.14 of this report. The project team also reviewed this program with respect to the SRP-LR. On the basis of its review, the project team finds this program acceptable for managing the aging effects for the above components, of change in

material properties due to alkali (cement)-aggregate reaction of concrete in an protected air environment for infrequently accessed areas.

7.3.5.3.4 Unit 3 Control Building - Aging Management Evaluation (MPS Unit 3 LRA Table 3.5.2-4)

The project team reviewed Table 3.5.2-4 of the MPS Unit 3 LRA, which summarizes the results of AMR evaluations for the Unit 3 control building component groups. The project team interviewed the applicant's technical staff and reviewed MPS Unit 3 Technical Report, MP-LR-4602, "Class 1 Structures," Revision 3.

In the MPS Unit 3 LRA, the applicant states that change of material properties due to alkali (cement)-aggregate reaction of concrete is possible in an air environment. The applicant states that based on tests conducted on the aggregate and the low-alkali cement used at MPS Unit 3, alkali (cement)-aggregate reaction is not a significant concern. The applicant states that it will manage change of material properties as a potential aging effect on Unit 3 Class 1 concrete structures. In the MPS Unit 3 LRA, the applicant states that change of material properties for flood/spill barriers, including curbs, dikes, toe plates, and stop logs; structural reinforced concrete (floor slabs, foundation mat slabs, roof slabs, walls) and hatches due to alkali (cement)-aggregate reaction of concrete in an air environment is managed by MPS AMP B2.1.23, "Structures Monitoring Program." The project team reviewed the structures monitoring program and its evaluation is documented in Section 7.1.20 of this report. The project team also reviewed this program with respect to the SRP-LR. On the basis of its review, the project team finds this program acceptable for managing the aging effects, for the above components, of change in material properties due to alkali (cement)-aggregate reaction of concrete in an air environment.

In the MPS Unit 3 LRA, the applicant states that change of material properties due to alkali (cement)-aggregate reaction and leaching of calcium hydroxide of concrete is possible in an atmosphere/weather environment. The applicant states that based on tests conducted on the aggregate and the low-alkali cement used at MPS Unit 3, alkali (cement)-aggregate reaction is not a significant concern. The applicant states that the use of high-density, low-permeability concrete, and proper arrangement and distribution of reinforcement to control cracking, prevents significant leaching of calcium hydroxide from Class 1 structures' concrete. The applicant will manage change of material properties as a potential aging effect on Unit 3 Class 1 concrete structures. In the MPS Unit 3 LRA, the applicant states that change of material properties for structural reinforced concrete (floor slabs, foundation mat slabs, roof slabs, walls), hatches, and missile barriers due to alkali (cement)-aggregate reaction and leaching of calcium hydroxide of concrete in an atmosphere/weather environment is managed by MPS AMP B2.1.23, "Structures Monitoring Program." The project team reviewed the structures monitoring program and its evaluation is documented in Section 7.1.20 of this report. The project team also reviewed this program with respect to the SRP-LR. On the basis of its review, the project team finds this program acceptable for managing the aging effects, for the above components, of change in material properties due to alkali (cement)-aggregate reaction and leaching of calcium hydroxide of concrete in an atmosphere/weather environment.

In the MPS Unit 3 LRA, the applicant identified no aging effects for carbon steel components exposed to air, including control room ceiling support component types. Air is not identified in the GALL Report as an environment for these components and materials.

On the basis of its review of current industry research and operating experience, the project team finds that air on metal will not result in aging that will be of concern during the period of extended operation. The external environments being referred to are typical of ambient air, e.g., under a shelter, indoor, or air-conditioned enclosure or room. Significant corrosion of carbon steel requires an electrolytic environment, and a simultaneous presence of oxygen and moisture. Without the presence of the aggressive environment, carbon steel components will experience insignificant amounts of corrosion, and no aging effects are applicable to this component/commodity group. Therefore, the project team finds that there are no aging effects requiring management for metal in an air environment.

7.3.5.3.5 Unit 3 Fuel Building - Aging Management Evaluation (MPS Unit 3 LRA Table 3.5.2-5)

The project team reviewed Table 3.5.2-5 of the MPS Unit 3 LRA, which summarizes the results of AMR evaluations for the Unit 3 fuel building component groups. The project team interviewed the applicant's technical staff and reviewed MPS Unit 3 Technical Report, MP-LR-4602, "Class 1 Structures," Revision 3.

In the MPS Unit 3 LRA, the applicant states that loss of material for stainless steel spent fuel storage racks exposed to treated water is managed using MPS AMP B2.1.5, "Chemistry Control for Primary Systems Program." The project team reviewed the chemistry control for primary systems program and its evaluation is documented in Section 7.1.4 of this report. The project team finds this program is consistent which is consistent with GALL AMP XI.M2, "Water Chemistry," with an acceptable exception. On the basis of its review, the project team finds this line item acceptable since this program is consistent with the GALL Report recommendation for other components with the same material, environment, and aging effect.

In the MPS Unit 3 LRA, the applicant identified no aging effects for stainless steel components exposed to air, including miscellaneous steel (embedded steel-exposed surfaces, shapes, plates, unistrut, etc., ladders, platforms and grating, stairs), cask wash pit liner and new fuel storage rack component types. Air is not identified in the GALL Report as an environment for these components and materials.

On the basis of its review of current industry research and operating experience, the project team finds that air on metal will not result in aging that will be of concern during the period of extended operation. The external environments being referred to are typical of ambient air, e.g., under a shelter, indoor, or air-conditioned enclosure or room. Without the presence of the aggressive environment, stainless steel components will experience insignificant amounts of corrosion, and no aging effects are applicable to this component/commodity group. Therefore, the project team finds that there are no aging effects requiring management for metal in an air environment.

In the MPS Unit 3 LRA, the applicant states that change of material properties due to alkali (cement)-aggregate reaction of concrete is possible in an air environment. The applicant states

that based on tests conducted on the aggregate and the low-alkali cement used at MPS, alkali (cement)-aggregate reaction is not a significant concern. The applicant states that it will manage change of material properties as a potential aging effect on MPS Unit 3 Class 1 concrete structures. In the MPS Unit 3 LRA, the applicant states that change of material properties for flood/spill barriers, including curbs, dikes, toe plates, and stop logs; hatches, structural reinforced concrete (beams, columns, floor slabs, foundation mat slabs, roof slabs, walls) and hatches due to alkali (cement)-aggregate reaction of concrete in an air environment is managed by MPS AMP B2.1.23, "Structures Monitoring Program." The project team reviewed the structures monitoring program and its evaluation is documented in Section 7.1.20 of this report. The project team also reviewed this program with respect to the SRP-LR. On the basis of its review, the project team finds this program acceptable for managing the aging effects, for the above components, of change in material properties due to alkali (cement)-aggregate reaction of concrete in an air environment.

In the MPS Unit 3 LRA, the applicant states that change of material properties due to alkali (cement)-aggregate reaction and leaching of calcium hydroxide of concrete is possible in an atmosphere/weather environment. The applicant states that based on tests conducted on the aggregate and the low-alkali cement used at MPS Unit 3, alkali (cement)-aggregate reaction is not a significant concern. The applicant states that the use of high-density, low-permeability concrete, and proper arrangement and distribution of reinforcement to control cracking, prevents significant leaching of calcium hydroxide from Class 1 structures' concrete. The applicant will manage change of material properties as a potential aging effect on MPS Unit 3 Class 1 concrete structures. In the MPS Unit 3 LRA, the applicant states that change of material properties for structural reinforced concrete (beams, columns, floor slabs, foundation mat slabs, roof slabs, walls), and hatches due to alkali (cement)-aggregate reaction and leaching of calcium hydroxide of concrete in an atmosphere/weather environment is managed by MPS AMP B2.1.23, "Structures Monitoring Program." The project team reviewed the structures monitoring program and its evaluation is documented in Section 7.1.20 of this report. The project team also reviewed this program with respect to the SRP-LR. On the basis of its review, the project team finds this program acceptable for managing the aging effects, for the above components, of change in material properties due to alkali (cement)-aggregate reaction and leaching of calcium hydroxide of concrete in an atmosphere/weather environment.

In the MPS Unit 3 LRA, the applicant states that change of material properties due to alkali (cement)-aggregate reaction of concrete is possible in an air environment. The applicant states that based on tests conducted on the aggregate and the low-alkali cement used at MPS Unit 3, alkali (cement)-aggregate reaction is not a significant concern. The applicant states that it will manage change of material properties as a potential aging effect on MPS Unit 3 Class 1 concrete structures in infrequently accessed areas. In the MPS Unit 3 LRA, the applicant states that change of material properties for tunnel in an air environment is managed by MPS AMP B2.1.15, "Infrequently Accessed Areas Inspection Program," which is a plant-specific program. The project team reviewed the infrequently accessed area inspection program and its evaluation is documented in Section 7.1.14 of this report. The project team also reviewed this program with respect to the SRP-LR. On the basis of its review, the project team finds this program acceptable for managing the aging effects, for the above components, of change in material properties due to alkali (cement)-aggregate reaction of concrete in an protected air environment for infrequently accessed areas.

7.3.5.3.6 Railroad Canopy - Aging Management Evaluation (MPS Unit 3 LRA Table 3.5.2-6)

The project team reviewed Table 3.5.2-6 of the MPS Unit 3 LRA, which summarizes the results of AMR evaluations for the railroad canopy component groups. The project team interviewed the applicant's technical staff and reviewed MPS Unit 3 Technical Report, MP-LR-4602, "Class 1 Structures," Revision 3.

In the MPS Unit 3 LRA, the applicant states that change of material properties due to alkali (cement)-aggregate reaction of concrete is possible in an air environment. The applicant states that based on tests conducted on the aggregate and the low-alkali cement used at MPS Unit 3, alkali (cement)-aggregate reaction is not a significant concern. The applicant states that it will manage change of material properties as a potential aging effect on MPS Unit 3 Class 1 concrete structures. In the MPS Unit 3 LRA, the applicant states that change of material properties for structural reinforced concrete (foundation mat slabs, roof slabs, walls) due to alkali (cement)-aggregate reaction of concrete in an air environment is managed by MPS AMP B2.1.23, "Structures Monitoring Program." The project team reviewed the structures monitoring program and its evaluation is documented in Section 7.1.20 of this report. The project team also reviewed this program with respect to the SRP-LR. On the basis of its review, the project team finds this program acceptable for managing the aging effects, for the above components, of change in material properties due to alkali (cement)-aggregate reaction of concrete in an air environment.

In the MPS Unit 3 LRA, the applicant states that change of material properties due to alkali (cement)-aggregate reaction and leaching of calcium hydroxide of concrete is possible in an atmosphere/weather environment. The applicant states that based on tests conducted on the aggregate and the low-alkali cement used at MPS, alkali (cement)-aggregate reaction is not a significant concern. The applicant states that the use of high-density, low-permeability concrete, and proper arrangement and distribution of reinforcement to control cracking, prevents significant leaching of calcium hydroxide from Class 1 structures' concrete. The applicant will manage change of material properties as a potential aging effect on MPS Unit 3 Class 1 concrete structures. In the MPS Unit 3 LRA, the applicant states that change of material properties for structural reinforced concrete (foundation mat slabs, roof slabs, walls) due to alkali (cement)-aggregate reaction and leaching of calcium hydroxide of concrete in an atmosphere/weather environment is managed by MPS AMP B2.1.23, "Structures Monitoring Program." The project team reviewed the structures monitoring program and its evaluation is documented in Section 7.1.20. The project team has reviewed this program with respect to the SRP-LR and found it acceptable. For these components, the project team finds this program acceptable for managing the aging effects of change in material properties due to alkali (cement)-aggregate reaction and leaching of calcium hydroxide of concrete in an atmosphere/weather environment.

7.3.5.3.7 Unit 3 Hydrogen Recombiner Building - Aging Management Evaluation (MPS Unit 3 LRA Table 3.5.2-7)

The project team reviewed Table 3.5.2-7 of the MPS Unit 3 LRA, which summarizes the results of AMR evaluations for the Unit 3 hydrogen recombiner building component groups. The

project team interviewed the applicant's technical staff and reviewed MPS Unit 3 Technical Report, MP-LR-4602, "Class 1 Structures," Revision 3.

In the MPS Unit 3 LRA, the applicant states that change of material properties due to alkali (cement)-aggregate reaction of concrete is possible in an air environment. The applicant states that based on tests conducted on the aggregate and the low-alkali cement used at MPS Unit 3, alkali (cement)-aggregate reaction is not a significant concern. The applicant states that it will manage change of material properties as a potential aging effect on MPS Unit 3 Class 1 concrete structures. In the MPS Unit 3 LRA, the applicant states that change of material properties for structural reinforced concrete (beams, floor slabs, foundation mat slabs, roof slabs) and hatches due to alkali (cement)-aggregate reaction of concrete in an air environment is managed by MPS AMP B2.1.23, "Structures Monitoring Program." The project team reviewed the structures monitoring program and its evaluation is documented in Section 7.1.20 of this report. The project team also reviewed this program with respect to the SRP-LR. On the basis of its review, the project team finds this program acceptable for managing the aging effects, for the above components, of change in material properties due to alkali (cement)-aggregate reaction of concrete in an air environment.

In the MPS Unit 3 LRA, the applicant states that change of material properties due to alkali (cement)-aggregate reaction and leaching of calcium hydroxide of concrete is possible in an atmosphere/weather environment. The applicant states that based on tests conducted on the aggregate and the low-alkali cement used at MPS Unit 3, alkali (cement)-aggregate reaction is not a significant concern. The applicant states that the use of high-density, low-permeability concrete, and proper arrangement and distribution of reinforcement to control cracking, prevents significant leaching of calcium hydroxide from Class 1 structures' concrete. The applicant will manage change of material properties as a potential aging effect on MPS Unit 3 Class 1 concrete structures. In the MPS Unit 3 LRA, the applicant states that change of material properties for structural reinforced concrete (beams, floor slabs, foundation mat slabs, roof slabs), missile barriers and hatches due to alkali (cement)-aggregate reaction and leaching of calcium hydroxide of concrete in an atmosphere/weather environment is managed by MPS AMP B2.1.23, "Structures Monitoring Program." The project team reviewed the structures monitoring program and its evaluation is documented in Section 7.1.20 of this report. The project team also reviewed this program with respect to the SRP-LR. On the basis of its review, the project team finds this program acceptable for managing the aging effects, for the above components, of change in material properties due to alkali (cement)-aggregate reaction and leaching of calcium hydroxide of concrete in an atmosphere/weather environment.

7.3.5.3.8 <u>Unit 3 Engineered Safety Features Building - Aging Management Evaluation (MPS Unit 3 LRA Table 3.5.2-8)</u>

The project team reviewed Table 3.5.2-8 of the MPS Unit 3 LRA, which summarizes the results of AMR evaluations for the MPS Unit 3 engineered safety features building component groups. The project team interviewed the applicant's technical staff and reviewed MPS Unit 3 Technical Report, MP-LR-4602, "Class 1 Structures," Revision 3.

In the MPS Unit 3 LRA, the applicant states that change of material properties due to alkali (cement)-aggregate reaction of concrete is possible in an air environment. The applicant states that based on tests conducted on the aggregate and the low-alkali cement used at MPS Unit 3,

alkali (cement)-aggregate reaction is not a significant concern. The applicant states that it will manage change of material properties as a potential aging effect on Unit 3 Class 1 concrete structures. In the MPS Unit 3 LRA, the applicant states that change of material properties for flood/spill barriers including curbs, dikes, toe plates and stop logs, hatches, and structural reinforced concrete (beams, floor slabs, foundation mat slabs, roof slabs, walls) due to alkali (cement)-aggregate reaction of concrete in an air environment is managed by MPS AMP B2.1.23, "Structures Monitoring Program." The project team reviewed the structures monitoring program and its evaluation is documented in Section 7.1.20 of this report. The project team also reviewed this program with respect to the SRP-LR. On the basis of its review, the project team finds this program acceptable for managing the aging effects, for the above components, of change in material properties due to alkali (cement)-aggregate reaction of concrete in an air environment.

In the MPS Unit 3 LRA, the applicant states that change of material properties due to alkali (cement)-aggregate reaction and leaching of calcium hydroxide of concrete is possible in an atmosphere/weather environment. The applicant states that based on tests conducted on the aggregate and the low-alkali cement used at MPS Unit 3, alkali (cement)-aggregate reaction is not a significant concern. The applicant states that the use of high-density, low-permeability concrete, and proper arrangement and distribution of reinforcement to control cracking, prevents significant leaching of calcium hydroxide from Class 1 structures' concrete. The applicant will manage change of material properties as a potential aging effect on MPS Unit 3 Class 1 concrete structures. In the MPS Unit 3 LRA, the applicant states that change of material properties for hatches, and structural reinforced concrete (beams, floor slabs, foundation mat slabs, roof slabs, walls) due to alkali (cement)-aggregate reaction and leaching of calcium hydroxide of concrete in an atmosphere/weather environment is managed by MPS AMP B2.1.23, "Structures Monitoring Program." The project team reviewed the structures monitoring program and its evaluation is documented in Section 7.1.20 of this report. The project team also reviewed this program with respect to the SRP-LR. On the basis of its review, the project team finds this program acceptable for managing the aging effects, for the above components, of change in material properties due to alkali (cement)-aggregate reaction and leaching of calcium hydroxide of concrete in an atmosphere/weather environment.

7.3.5.3.9 Unit 3 Main Steam Valve Building - Aging Management Evaluation (MPS Unit 3 LRA Table 3.5.2-9)

The project team reviewed Table 3.5.2-9 of the MPS Unit 3 LRA, which summarizes the results of AMR evaluations for the MPS Unit 3 main steam valve building component groups. The project team interviewed the applicant's technical staff and reviewed MPS Unit 3 Technical Report, MP-LR-4602, "Class 1 Structures," Revision 3.

In the MPS Unit 3 LRA, the applicant states that change of material properties due to alkali (cement)-aggregate reaction of concrete is possible in an air environment. The applicant states that based on tests conducted on the aggregate and the low-alkali cement used at MPS Unit 3, alkali (cement)-aggregate reaction is not a significant concern. The applicant states that it will manage change of material properties as a potential aging effect on Unit 3 Class 1 concrete structures. In the MPS Unit 3 LRA, the applicant states that change of material properties for flood/spill barriers including curbs, dikes, toe plates and stop logs, and structural reinforced concrete (floor slabs, foundation mat slabs, roof slabs, walls) due to alkali (cement)-aggregate

reaction of concrete in an air environment is managed by MPS AMP B2.1.23, "Structures Monitoring Program." The project team reviewed the structures monitoring program and its evaluation is documented in Section 7.1.20 of this report. The project team also reviewed this program with respect to the SRP-LR. On the basis of its review, the project team finds this program acceptable for managing the aging effects, for the above components, of change in material properties due to alkali (cement)-aggregate reaction of concrete in an air environment.

In the MPS Unit 3 LRA, the applicant states that change of material properties due to alkali (cement)-aggregate reaction and leaching of calcium hydroxide of concrete is possible in an atmosphere/weather environment. The applicant states that based on tests conducted on the aggregate and the low-alkali cement used at MPS Unit 3, alkali (cement)-aggregate reaction is not a significant concern. The applicant states that the use of high-density, low-permeability concrete, and proper arrangement and distribution of reinforcement to control cracking, prevents significant leaching of calcium hydroxide from Class 1 structures' concrete. The applicant will manage change of material properties as a potential aging effect on Unit 3 Class 1 concrete structures. In the MPS Unit 3 LRA, the applicant states that change of material properties for structural reinforced concrete (floor slabs, foundation mat slabs, roof slabs, walls) and missile barriers due to alkali (cement)-aggregate reaction and leaching of calcium hydroxide of concrete in an atmosphere/weather environment is managed by MPS AMP B2.1.23, "Structures Monitoring Program." The project team reviewed the structures monitoring program and its evaluation is documented in Section 7.1.20 of this report. The project team also reviewed this program with respect to the SRP-LR. On the basis of its review, the project team finds this program acceptable for managing the aging effects, for the above components, of change in material properties due to alkali (cement)-aggregate reaction and leaching of calcium hydroxide of concrete in an atmosphere/weather environment.

7.3.5.3.10 Unit 3 Emergency Generator Enclosure and Fuel Oil Tank Vault - Aging Management Evaluation (MPS Unit 3 LRA Table 3.5.2-10)

The project team reviewed Table 3.5.2-10 of the MPS Unit 3 LRA, which summarizes the results of AMR evaluations for the MPS Unit 3 emergency generator enclosure and fuel oil tank vault component groups. The project team interviewed the applicant's technical staff and reviewed MPS Unit 3 Technical Report, MP-LR-4602, "Class 1 Structures," Revision 3.

In the MPS Unit 3 LRA, the applicant states that change of material properties due to alkali (cement)-aggregate reaction of concrete is possible in an air environment. The applicant states that based on tests conducted on the aggregate and the low-alkali cement used at MPS Unit 3, alkali (cement)-aggregate reaction is not a significant concern. The applicant states that it will manage change of material properties as a potential aging effect on MPS Unit 3 Class 1 concrete structures. In the MPS Unit 3 LRA, the applicant states that change of material properties for flood/spill barriers, including curbs, dikes, toe plates, and stop logs; fuel oil tank vault, structural reinforced concrete (beams, floor slabs, footing, foundation mat slabs, roof slabs, slabs on grade walls) due to alkali (cement)-aggregate reaction of concrete in an air environment is managed by MPS AMP B2.1.23, "Structures Monitoring Program." The project team reviewed the structures monitoring program and its evaluation is documented in Section 7.1.20 of this report. The project team also reviewed this program with respect to the SRP-LR. On the basis of its review, the project team finds this program acceptable for managing the

aging effects, for the above components, of change in material properties due to alkali (cement)-aggregate reaction of concrete in an air environment.

In the MPS Unit 3 LRA, the applicant states that change of material properties due to alkali (cement)-aggregate reaction and leaching of calcium hydroxide of concrete is possible in an atmosphere/weather environment. The applicant states that based on tests conducted on the aggregate and the low-alkali cement used at MPS Unit 3, alkali (cement)-aggregate reaction is not a significant concern. The applicant states that the use of high-density, low-permeability concrete, and proper arrangement and distribution of reinforcement to control cracking, prevents significant leaching of calcium hydroxide from Class 1 structures' concrete. The applicant will manage change of material properties as a potential aging effect on MPS Unit 3 Class 1 concrete structures. In the MPS Unit 3 LRA, the applicant states that change of material properties for structural reinforced concrete (beams, floor slabs, footing, foundation mat slabs, roof slabs, slabs on grade walls), and hatches due to alkali (cement)-aggregate reaction and leaching of calcium hydroxide of concrete in an atmosphere/weather environment is managed by MPS AMP B2.1.23, "Structures Monitoring Program." The project team reviewed the structures monitoring program and its evaluation is documented in Section 7.1.20 of this report. The project team also reviewed this program with respect to the SRP-LR. On the basis of its review, the project team finds this program acceptable for managing the aging effects, for the above components, of change in material properties due to alkali (cement)-aggregate reaction and leaching of calcium hydroxide of concrete in an atmosphere/weather environment.

In the MPS Unit 3 LRA, the applicant states that change of material properties due to alkali (cement)-aggregate reaction of concrete is possible in an air environment. The applicant states that based on tests conducted on the aggregate and the low-alkali cement used at MPS Unit 3, alkali (cement)-aggregate reaction is not a significant concern. The applicant states that it will manage change of material properties as a potential aging effect on MPS Unit 3 Class 1 concrete structures in infrequently accessed areas. In the MPS Unit 3 LRA, the applicant states that change of material properties for structural reinforced concrete (beams, floor slabs, footing, foundation mat slabs, roof slabs, slabs on grade walls), and hatches in an air environment is managed by MPS AMP B2.1.15, "Infrequently Accessed Areas Inspection Program," which is a plant-specific program. The project team reviewed the infrequently accessed area inspection program and its evaluation is documented in Section 7.1.14 of this report. The project team also reviewed this program with respect to the SRP-LR. On the basis of its review, the project team finds this program acceptable for managing the aging effects, for the above components, of change in material properties due to alkali (cement)-aggregate reaction of concrete in an protected air environment for infrequently accessed areas.

7.3.5.3.11 <u>Unit 2 Fire Pumphouse - Aging Management Evaluation (MPS Unit 3 LRA Table 3.5.2-11)</u>

The project team reviewed Table 3.5.2-11 of the MPS Unit 3 LRA, which summarizes the results of AMR evaluations for the Unit 2 fire pumphouse component groups. The project team interviewed the applicant's technical staff and reviewed MPS Unit 3 Technical Report, MP-LR-4604, "Miscellaneous Structures," Revision 3.

In the MPS Unit 3 LRA, the applicant states that change of material properties due to alkali (cement)-aggregate reaction of concrete is possible in an air environment. The applicant states that based on tests conducted on the aggregate and the low-alkali cement used at MPS Unit 3, alkali (cement)-aggregate reaction is not a significant concern. The applicant states that it will manage change of material properties as a potential aging effect on Unit 3 concrete structures. In the MPS Unit 3 LRA, the applicant states that change of material properties for structural reinforced concrete (foundation mat slabs, roof slabs) due to alkali (cement)-aggregate reaction of concrete in an air environment is managed by MPS AMP B2.1.23, "Structures Monitoring Program." The project team reviewed the structures monitoring program and its evaluation is documented in Section 7.1.20 of this report. The project team also reviewed this program with respect to the SRP-LR. On the basis of its review, the project team finds this program acceptable for managing the aging effects, for the above components, of change in material properties due to alkali (cement)-aggregate reaction of concrete in an air environment.

In the MPS Unit 3 LRA, the applicant states that cracking for concrete component types (masonry block walls) exposed to an atmosphere/weather environment is managed using MPS AMP B2.1.23, "Structures Monitoring Program." The applicant states that cracking of masonry block walls due to long term creep and variation in stiffness, dry shrinkage of concrete, and expansion or contraction, is possible in an atmosphere/weather environment. Masonry block walls are subject to all of these aging mechanisms which require aging management. The project team reviewed the structures monitoring program and its evaluation is documented in Section 7.1.20 of this report. The project team also reviewed this program with respect to the SRP-LR. On the basis of its review, the project team finds this program acceptable for managing the aging effects, for the above components, of concrete cracking due to long term creep and variation in stiffness, dry shrinkage of concrete, and expansion or contraction in this environment.

7.3.5.3.12 Unit 3 Fire Pumphouse - Aging Management Evaluation (MPS Unit 3 LRA Table 3.5.2-12)

The project team reviewed Table 3.5.2-12 of the MPS Unit 3 LRA, which summarizes the results of AMR evaluations for the Unit 3 fire pumphouse component groups. The project team interviewed the applicant's technical staff and reviewed MPS Unit 3 Technical Report, MP-LR-4604, "Miscellaneous Structures," Revision 3.

In the MPS Unit 3 LRA, the applicant states that change of material properties due to alkali (cement)-aggregate reaction of concrete is possible in an air environment. The applicant states that based on tests conducted on the aggregate and the low-alkali cement used at MPS Unit 3, alkali (cement)-aggregate reaction is not a significant concern. The applicant states that it will manage change of material properties as a potential aging effect on MPS Unit 3 concrete structures. In the MPS Unit 3 LRA, the applicant states that change of material properties for structural reinforced concrete (foundation mat slabs, roof slabs) due to alkali (cement)-aggregate reaction of concrete in an air environment is managed by MPS AMP B2.1.23, "Structures Monitoring Program." The project team reviewed the structures monitoring program and its evaluation is documented in Section 7.1.20 of this report. The project team also reviewed this program with respect to the SRP-LR. On the basis of its review, the project team finds this program acceptable for managing the aging effects, for the above components,

of change in material properties due to alkali (cement)-aggregate reaction of concrete in an air environment.

In the MPS Unit 3 LRA, the applicant states that cracking for concrete component types (masonry block walls) exposed to an atmosphere/weather environment is managed using MPS AMP B2.1.23, "Structures Monitoring Program." The applicant states that cracking of masonry block walls due to long term creep and variation in stiffness, dry shrinkage of concrete, and expansion or contraction, is possible in an atmosphere/weather environment. Masonry block walls are subject to all of these aging mechanisms which require aging management. The project team reviewed the structures monitoring program and its evaluation is documented in Section 7.1.20 of this report. The project team also reviewed this program with respect to the SRP-LR. On the basis of its review, the project team finds this program acceptable for managing the aging effects, for the above components, of concrete cracking due to long term creep and variation in stiffness, dry shrinkage of concrete, and expansion or contraction in this environment.

7.3.5.3.13 Unit 3 Service Building - Aging Management Evaluation (MPS Unit 3 LRA Table 3.5.2-13)

The project team reviewed Table 3.5.2-13 of the MPS Unit 3 LRA, which summarizes the results of AMR evaluations for the Unit 3 service building component groups. The project team interviewed the applicant's technical staff and reviewed MPS Unit 3 Technical Report, MP-LR-4604, "Miscellaneous Structures," Revision 3.

In the MPS Unit 3 LRA, the applicant states that change of material properties due to alkali (cement)-aggregate reaction of concrete is possible in an air environment. The applicant states that based on tests conducted on the aggregate and the low-alkali cement used at MPS Unit 3, alkali (cement)-aggregate reaction is not a significant concern. The applicant states that it will manage change of material properties as a potential aging effect on MPS Unit 3 concrete structures. In the MPS Unit 3 LRA, the applicant states change of material properties for structural reinforced concrete (beams, columns, floor slabs, footing, foundation mat slabs, walls) due to alkali (cement)-aggregate reaction of concrete in an air environment is managed by MPS AMP B2.1.23, "Structures Monitoring Program." The project team reviewed the structures monitoring program and its evaluation is documented in Section 7.1.20 of this report. The project team also reviewed this program with respect to the SRP-LR. On the basis of its review, the project team finds this program acceptable for managing the aging effects, for the above components, of change in material properties due to alkali (cement)-aggregate reaction of concrete in an air environment.

In the MPS Unit 3 LRA, the applicant states that change of material properties due to alkali (cement)-aggregate reaction and leaching of calcium hydroxide of concrete is possible in an atmosphere/weather environment. The applicant states that based on tests conducted on the aggregate and the low-alkali cement used at MPS Unit 3, alkali (cement)-aggregate reaction is not a significant concern. The applicant states that the use of high-density, low-permeability concrete, and proper arrangement and distribution of reinforcement to control cracking, prevents significant leaching of calcium hydroxide from concrete structures. The applicant will manage change of material properties as a potential aging effect on MPS Unit 3 concrete structures. In the MPS Unit 3 LRA, the applicant states that change of material properties for

structural reinforced concrete (beams, floor slabs, footing, foundation mat slabs, walls) due to alkali (cement)-aggregate reaction and leaching of calcium hydroxide of concrete in an atmosphere/weather environment is managed by MPS AMP B2.1.23, "Structures Monitoring Program." The project team reviewed the structures monitoring program and its evaluation is documented in Section 7.1.20 of this report. The project team also reviewed this program with respect to the SRP-LR. On the basis of its review, the project team finds this program acceptable for managing the aging effects, for the above components, of change in material properties due to alkali (cement)-aggregate reaction and leaching of calcium hydroxide of concrete in an atmosphere/weather environment.

7.3.5.3.14 Unit 3 Turbine Building - Aging Management Evaluation (MPS Unit 3 LRA Table 3.5.2-14)

The project team reviewed Table 3.5.2-14 of the MPS Unit 3 LRA, which summarizes the results of AMR evaluations for the Unit 3 turbine building component groups. The project team interviewed the applicant's technical staff and reviewed MPS Unit 3 Technical Report, MP-LR-4604, "Miscellaneous Structures," Revision 3.

In the MPS Unit 3 LRA, the applicant states that change of material properties due to alkali (cement)-aggregate reaction of concrete is possible in an air environment. The applicant states that based on tests conducted on the aggregate and the low-alkali cement used at MPS Unit 3, alkali (cement)-aggregate reaction is not a significant concern. The applicant states that it will manage change of material properties as a potential aging effect on MPS Unit 3 concrete structures. In the MPS Unit 3 LRA, the applicant states that change of material properties for flood/spill barriers including curbs, dikes, toe plates and stop logs, structural reinforced concrete (beams, columns, floor slabs, footing, and grade beams, walls) and turbine pedestal due to alkali (cement)-aggregate reaction of concrete in an air environment is managed by MPS AMP B2.1.23, "Structures Monitoring Program." The project team reviewed the structures monitoring program and its evaluation is documented in Section 7.1.20 of this report. The project team also reviewed this program with respect to the SRP-LR. On the basis of its review, the project team finds this program acceptable for managing the aging effects, for the above components, of change in material properties due to alkali (cement)-aggregate reaction of concrete in an air environment.

In the MPS Unit 3 LRA, the applicant states that change of material properties due to alkali (cement)-aggregate reaction and leaching of calcium hydroxide of concrete is possible in an atmosphere/weather environment. The applicant states that based on tests conducted on the aggregate and the low-alkali cement used at MPS Unit 3, alkali (cement)-aggregate reaction is not a significant concern. The applicant states that the use of high-density, low-permeability concrete, and proper arrangement and distribution of reinforcement to control cracking, prevents significant leaching of calcium hydroxide from concrete structures. The applicant will manage change of material properties as a potential aging effect on MPS Unit 3 concrete structures. In the MPS Unit 3 LRA, the applicant states that change of material properties for structural reinforced concrete (beams, columns, floor slabs, footing, and grade beams, walls) due to alkali (cement)-aggregate reaction and leaching of calcium hydroxide of concrete in an atmosphere/weather environment is managed by MPS AMP B2.1.23, "Structures Monitoring Program." The project team reviewed the structures monitoring program and its evaluation is documented in Section 7.1.20 of this report. The project team also reviewed this program with

respect to the SRP-LR. On the basis of its review, the project team finds this program acceptable for managing the aging effects, for the above components, of change in material properties due to alkali (cement)-aggregate reaction and leaching of calcium hydroxide of concrete in an atmosphere/weather environment.

7.3.5.3.15 Unit 3 Auxiliary Boiler Enclosure - Aging Management Evaluation (MPS Unit 3 LRA Table 3.5.2-15)

The project team reviewed Table 3.5.2-15 of the MPS Unit 3 LRA, which summarizes the results of AMR evaluations for the Unit 3 auxiliary boiler enclosure component groups. The project team interviewed the applicant's technical staff and reviewed MPS Unit 3 Technical Report, MP-LR-4604, "Miscellaneous Structures," Revision 3.

In the MPS Unit 3 LRA, the applicant states that change of material properties due to alkali (cement)-aggregate reaction of concrete is possible in an air environment. The applicant states that based on tests conducted on the aggregate and the low-alkali cement used at MPS Unit 3, alkali (cement)-aggregate reaction is not a significant concern. The applicant states that it will manage change of material properties as a potential aging effect on MPS Unit 3 concrete structures. In the MPS Unit 3 LRA, the applicant states that change of material properties for structural reinforced concrete (floor slabs, foundation mat slabs, walls) due to alkali (cement)-aggregate reaction of concrete in an air environment is managed by MPS AMP B2.1.23, "Structures Monitoring Program." The project team reviewed the structures monitoring program and its evaluation is documented in Section 7.1.20 of this report. The project team also reviewed this program with respect to the SRP-LR. On the basis of its review, the project team finds this program acceptable for managing the aging effects, for the above components, of change in material properties due to alkali (cement)-aggregate reaction of concrete in an air environment.

In the MPS Unit 3 LRA, the applicant states that change of material properties due to alkali (cement)-aggregate reaction and leaching of calcium hydroxide of concrete is possible in an atmosphere/weather environment. The applicant states that based on tests conducted on the aggregate and the low-alkali cement used at MPS Unit 3, alkali (cement)-aggregate reaction is not a significant concern. The applicant states that the use of high-density, low-permeability concrete, and proper arrangement and distribution of reinforcement to control cracking, prevents significant leaching of calcium hydroxide from concrete structures. The applicant will manage change of material properties as a potential aging effect on MPS Unit 3 concrete structures. In the MPS Unit 3 LRA, the applicant states that change of material properties for structural reinforced concrete (floor slabs, foundation mat slabs, walls) due to alkali (cement)-aggregate reaction and leaching of calcium hydroxide of concrete in an atmosphere/weather environment is managed by MPS AMP B2.1.23, "Structures Monitoring Program." The project team reviewed the structures monitoring program and its evaluation is documented in Section 7.1.20 of this report. The project team also reviewed this program with respect to the SRP-LR. On the basis of its review, the project team finds this program acceptable for managing the aging effects, for the above components, of change in material properties due to alkali (cement)-aggregate reaction and leaching of calcium hydroxide of concrete in an atmosphere/weather environment.

7.3.5.3.16 Unit 3 Technical Support Center - Aging Management Evaluation (MPS Unit 3 LRA Table 3.5.2-16)

The project team reviewed Table 3.5.2-16 of the MPS Unit 3 LRA, which summarizes the results of AMR evaluations for the Unit 3 technical support center component groups. The project team interviewed the applicant's technical staff and reviewed MPS Unit 3 Technical Report, MP-LR-4604, "Miscellaneous Structures," Revision 3.

In the MPS Unit 3 LRA, the applicant states that change of material properties due to alkali (cement)-aggregate reaction of concrete is possible in an air environment. The applicant states that based on tests conducted on the aggregate and the low-alkali cement used at MPS Unit 3, alkali (cement)-aggregate reaction is not a significant concern. The applicant states that it will manage change of material properties as a potential aging effect on MPS Unit 3 concrete structures. In the MPS Unit 3 LRA, the applicant states that change of material properties for structural reinforced concrete (beams, columns, floor slabs, footing, roof slabs, walls) due to alkali (cement)-aggregate reaction of concrete in an air environment is managed by MPS AMP B2.1.23, "Structures Monitoring Program." The project team reviewed the structures monitoring program and its evaluation is documented in Section 7.1.20 of this report. The project team also reviewed this program with respect to the SRP-LR. On the basis of its review, the project team finds this program acceptable for managing the aging effects, for the above components, of change in material properties due to alkali (cement)-aggregate reaction of concrete in an air environment.

In the MPS Unit 3 LRA, the applicant states that change of material properties due to alkali (cement)-aggregate reaction and leaching of calcium hydroxide of concrete is possible in an atmosphere/weather environment. The applicant states that based on tests conducted on the aggregate and the low-alkali cement used at MPS Unit 3, alkali (cement)-aggregate reaction is not a significant concern. The applicant states that the use of high-density, low-permeability concrete, and proper arrangement and distribution of reinforcement to control cracking, prevents significant leaching of calcium hydroxide from concrete structures. The applicant will manage change of material properties as a potential aging effect on MPS Unit 3 concrete structures. In the MPS Unit 3 LRA, the applicant states that change of material properties for structural reinforced concrete (beams, columns, floor slabs, footing, roof slabs, walls) due to alkali (cement)-aggregate reaction and leaching of calcium hydroxide of concrete in an atmosphere/weather environment is managed by MPS AMP B2.1.23, "Structures Monitoring Program." The project team reviewed the structures monitoring program and its evaluation is documented in Section 7.1.20 of this report. The project team also reviewed this program with respect to the SRP-LR. On the basis of its review, the project team finds this program acceptable for managing the aging effects, for the above components, of change in material properties due to alkali (cement)-aggregate reaction and leaching of calcium hydroxide of concrete in an atmosphere/weather environment.

7.3.5.3.17 Unit 3 Maintenance Shop - Aging Management Evaluation (MPS Unit 3 LRA Table 3.5.2-17)

The project team reviewed Table 3.5.2-17 of the MPS Unit 3 LRA, which summarizes the results of AMR evaluations for the Unit 3 maintenance shop component groups. The project

team interviewed the applicant's technical staff and reviewed MPS Unit 3 Technical Report, MP-LR-4604, "Miscellaneous Structures," Revision 3.

In the MPS Unit 3 LRA, the applicant states that change of material properties due to alkali (cement)-aggregate reaction of concrete is possible in an air environment. The applicant states that based on tests conducted on the aggregate and the low-alkali cement used at MPS Unit 3, alkali (cement)-aggregate reaction is not a significant concern. The applicant states that it will manage change of material properties as a potential aging effect on MPS Unit 3 concrete structures. In the MPS Unit 3 LRA, the applicant states that change of material properties for structural reinforced concrete (beams, floor slabs, spread footings, walls) due to alkali (cement)-aggregate reaction of concrete in an air environment is managed by MPS AMP B2.1.23, "Structures Monitoring Program." The project team reviewed the structures monitoring program and its evaluation is documented in Section 7.1.20 of this report. The project team also reviewed this program with respect to the SRP-LR. On the basis of its review, the project team finds this program acceptable for managing the aging effects of change in material properties due to alkali (cement)-aggregate reaction of concrete in an air environment.

In the MPS Unit 3 LRA, the applicant states that change of material properties due to alkali (cement)-aggregate reaction and leaching of calcium hydroxide of concrete is possible in an atmosphere/weather environment. The applicant states that based on tests conducted on the aggregate and the low-alkali cement used at MPS Unit 3, alkali (cement)-aggregate reaction is not a significant concern. The applicant states that the use of high-density, low-permeability concrete, and proper arrangement and distribution of reinforcement to control cracking, prevents significant leaching of calcium hydroxide from concrete structures. The applicant will manage change of material properties as a potential aging effect on Unit 3 concrete structures. In the MPS Unit 3 LRA, the applicant states that change of material properties for structural reinforced concrete (beams, floor slabs, spread footings, walls) due to alkali (cement)-aggregate reaction and leaching of calcium hydroxide of concrete in an atmosphere/weather environment is managed by MPS AMP B2.1.23, "Structures Monitoring Program." The project team reviewed the structures monitoring program and its evaluation is documented in Section 7.1.20 of this report. The project team also reviewed this program with respect to the SRP-LR. On the basis of its review, the project team finds this program acceptable for managing the aging effects, for the above components, of change in material properties due to alkali (cement)-aggregate reaction and leaching of calcium hydroxide of concrete in an atmosphere/weather environment.

7.3.5.3.18 <u>Unit 3 Waste Disposal Building - Aging Management Evaluation (MPS Unit 3 LRA Table 3.5.2-18)</u>

The project team reviewed Table 3.5.2-18 of the MPS Unit 3 LRA, which summarizes the results of AMR evaluations for the MPS Unit 3 waste disposal building component groups. The project team interviewed the applicant's technical staff and reviewed MPS Unit 3 Technical Report, MP-LR-4604, "Miscellaneous Structures," Revision 3.

In the MPS Unit 3 LRA, the applicant states that change of material properties due to alkali (cement)-aggregate reaction of concrete is possible in an air environment. The applicant states that based on tests conducted on the aggregate and the low-alkali cement used at MPS Unit 3, alkali (cement)-aggregate reaction is not a significant concern. The applicant states that it will

manage change of material properties as a potential aging effect on MPS Unit 3 concrete structures. In the MPS Unit 3 LRA, the applicant states that change of material properties for structural reinforced concrete (beams, floor slabs, spread footings, slabs on grade, walls) due to alkali (cement)-aggregate reaction of concrete in an air environment is managed by MPS AMP B2.1.23, "Structures Monitoring Program." The project team reviewed the structures monitoring program and its evaluation is documented in Section 7.1.20 of this report. The project team also reviewed this program with respect to the SRP-LR. On the basis of its review, the project team finds this program acceptable for managing the aging effects, for the above components, of change in material properties due to alkali (cement)-aggregate reaction of concrete in an air environment.

In the MPS Unit 3 LRA, the applicant states that change of material properties due to alkali (cement)-aggregate reaction and leaching of calcium hydroxide of concrete is possible in an atmosphere/weather environment. The applicant states that based on tests conducted on the aggregate and the low-alkali cement used at MPS Unit 3, alkali (cement)-aggregate reaction is not a significant concern. The applicant states that the use of high-density, low-permeability concrete, and proper arrangement and distribution of reinforcement to control cracking, prevents significant leaching of calcium hydroxide from concrete structures. The applicant will manage change of material properties as a potential aging effect on MPS Unit 3 concrete structures. In the MPS Unit 3 LRA, the applicant states that change of material properties for structural reinforced concrete (beams, floor slabs, spread footings, slabs on grade, walls) due to alkali (cement)-aggregate reaction and leaching of calcium hydroxide of concrete in an atmosphere/weather environment is managed by MPS AMP B2.1.23, "Structures Monitoring Program." The project team reviewed the structures monitoring program and its evaluation is documented in Section 7.1.20 of this report. The project team also reviewed this program with respect to the SRP-LR. On the basis of its review, the project team finds this program acceptable for managing the aging effects, for the above components, of change in material properties due to alkali (cement)-aggregate reaction and leaching of calcium hydroxide of concrete in an atmosphere/weather environment.

In the MPS Unit 3 LRA, the applicant states that cracking for concrete component types (masonry block walls) exposed to an atmosphere/weather environment is managed using MPS AMP B2.1.23, "Structures Monitoring Program." The applicant states that cracking of masonry block walls due to long term creep and variation in stiffness, dry shrinkage of concrete, and expansion or contraction, is possible in an atmosphere/weather environment. Masonry block walls are subject to all of these aging mechanisms which require aging management. The project team reviewed the structures monitoring program and its evaluation is documented in Section 7.1.20 of this report. The project team also reviewed this program with respect to the SRP-LR. On the basis of its review, the project team finds this program acceptable for managing the aging effects, for the above components, of concrete cracking due to long term creep and variation in stiffness, dry shrinkage of concrete, and expansion or contraction in this environment.

7.3.5.3.19 <u>SBO Diesel Generator Enclosure and Fuel Oil Tank Vault - Aging Management Evaluation (MPS Unit 3 LRA Table 3.5.2-19)</u>

The project team reviewed Table 3.5.2-19 of the MPS Unit 3 LRA, which summarizes the results of AMR evaluations for the SBO diesel generator enclosure and fuel oil tank vault

component groups. The project team interviewed the applicant's technical staff and reviewed MPS Unit 3 Technical Report, MP-LR-4604, "Miscellaneous Structures," Revision 3.

In the MPS Unit 3 LRA, the applicant states that change of material properties due to alkali (cement)-aggregate reaction of concrete is possible in an air environment. The applicant states that based on tests conducted on the aggregate and the low-alkali cement used at MPS Unit 3, alkali (cement)-aggregate reaction is not a significant concern. The applicant states that it will manage change of material properties as a potential aging effect on MPS Unit 3 concrete structures. In the MPS Unit 3 LRA, the applicant states that change of material properties for structural reinforced concrete (foundation, mat slabs) due to alkali (cement)-aggregate reaction of concrete in an air environment is managed by MPS AMP B2.1.23, "Structures Monitoring Program." The project team reviewed the structures monitoring program and its evaluation is documented in Section 7.1.20 of this report. The project team also reviewed this program with respect to the SRP-LR. On the basis of its review, the project team finds this program acceptable for managing the aging effects, for the above components, of change in material properties due to alkali (cement)-aggregate reaction of concrete in an air environment.

In the MPS Unit 3 LRA, the applicant states that change of material properties due to alkali (cement)-aggregate reaction and leaching of calcium hydroxide of concrete is possible in an atmosphere/weather environment. The applicant states that based on tests conducted on the aggregate and the low-alkali cement used at MPS Unit 3, alkali (cement)-aggregate reaction is not a significant concern. The applicant states that the use of high-density, low-permeability concrete, and proper arrangement and distribution of reinforcement to control cracking, prevents significant leaching of calcium hydroxide from concrete structures. The applicant will manage change of material properties as a potential aging effect on MPS Unit 3 concrete structures. In the MPS Unit 3 LRA, the applicant states that change of material properties for structural reinforced concrete (foundation, mat slabs) due to alkali (cement)-aggregate reaction and leaching of calcium hydroxide of concrete in an atmosphere/weather environment is managed by MPS AMP B2.1.23, "Structures Monitoring Program." The project team reviewed the structures monitoring program and its evaluation is documented in Section 7.1.20 of this report. The project team also reviewed this program with respect to the SRP-LR. On the basis of its review, the project team finds this program acceptable for managing the aging effects, for the above components, of change in material properties due to alkali (cement)-aggregate reaction and leaching of calcium hydroxide of concrete in an atmosphere/weather environment.

In the MPS Unit 3 LRA, the applicant identified no aging effects for aluminum components exposed to air, including roofing and siding component types. The GALL Report does not include this material for these components.

The applicant concludes, as documented in its AMR basis document, MPS Unit 3 Technical Report, MP-LR-4604, "Miscellaneous Structures," Revision 3, for aluminum in an air or an atmosphere/weather environment, that there are no potential aging mechanisms for this aluminum and environment combination. The applicant states in the MAER that for aluminum material in an air or atmosphere/weather environment, there are no potential aging mechanisms for this material and environment combination at MPS Unit 3. This conclusion is based on engineering text references that indicates that aluminum and its alloys resist attack to a wide range of environments and many chemical compounds. On the basis of its review of the

applicant's documentation, the project team concurs with the applicant and finds that there are no aging effects requiring management for aluminum in an air environment.

In the MPS Unit 3 LRA, the applicant identified no aging effects for aluminum components exposed to an atmosphere/weather environment, including roofing and siding component types. The GALL Report does not include this material for these components.

The applicant concludes, as documented in its AMR basis document, MPS Unit 3 Technical Report, MP-LR-4604, "Miscellaneous Structures," Revision 3, for aluminum in an air or an atmosphere/weather environment, that there are no potential aging mechanisms for this aluminum and environment combination. The applicant states in the MAER that for aluminum material in an air or atmosphere/weather environment, there are no potential aging mechanisms for this material and environment combination at MPS Unit 3. This conclusion is based on engineering text references that indicates that aluminum and its alloys resist attack to a wide range of environments and many chemical compounds. On the basis of its review of the applicant's documentation, the project team concurs with the applicant and finds that there are no aging effects requiring management for aluminum in an atmosphere/weather environment.

7.3.5.3.20 Unit 3 Condensate Polishing Enclosure - Aging Management Evaluation (MPS Unit 3 LRA Table 3.5.2-20)

The project team reviewed Table 3.5.2-20 of the MPS Unit 3 LRA, which summarizes the results of AMR evaluations for the Unit 3 condensate polishing enclosure component groups. The project team interviewed the applicant's technical staff and reviewed MPS Unit 3 Technical Report, MP-LR-4604, "Miscellaneous Structures," Revision 3.

In the MPS Unit 3 LRA, the applicant states that change of material properties due to alkali (cement)-aggregate reaction of concrete is possible in an air environment. The applicant states that based on tests conducted on the aggregate and the low-alkali cement used at MPS Unit 3, alkali (cement)-aggregate reaction is not a significant concern. The applicant states that it will manage change of material properties as a potential aging effect on MPS Unit 3 concrete structures. In the MPS Unit 3 LRA, the applicant states that change of material properties for structural reinforced concrete (beams, columns, floor slabs, spread footing, walls) due to alkali (cement)-aggregate reaction of concrete in an air environment is managed by MPS AMP B2.1.23, "Structures Monitoring Program." The project team reviewed the structures monitoring program and its evaluation is documented in Section 7.1.20 of this report. The project team also reviewed this program with respect to the SRP-LR. On the basis of its review, the project team finds this program acceptable for managing the aging effects, for the above components, of change in material properties due to alkali (cement)-aggregate reaction of concrete in an air environment.

In the MPS Unit 3 LRA, the applicant states that change of material properties due to alkali (cement)-aggregate reaction and leaching of calcium hydroxide of concrete is possible in an atmosphere/weather environment. The applicant states that based on tests conducted on the aggregate and the low-alkali cement used at MPS Unit 3, alkali (cement)-aggregate reaction is not a significant concern. The applicant states that the use of high-density, low-permeability concrete, and proper arrangement and distribution of reinforcement to control cracking, prevents significant leaching of calcium hydroxide from concrete structures. The applicant will

manage change of material properties as a potential aging effect on MPS Unit 3 concrete structures In the MPS Unit 3 LRA, the applicant states that change of material properties for structural reinforced concrete (beams, columns, floor slabs, spread footing, walls) due to alkali (cement)-aggregate reaction and leaching of calcium hydroxide of concrete in an atmosphere/weather environment is managed by MPS AMP B2.1.23, "Structures Monitoring Program." The project team reviewed the structures monitoring program and its evaluation is documented in Section 7.1.20 of this report. The project team also reviewed this program with respect to the SRP-LR. On the basis of its review, the project team finds this program acceptable for managing the aging effects, for the above components, of change in material properties due to alkali (cement)-aggregate reaction and leaching of calcium hydroxide of concrete in an atmosphere/weather environment.

7.3.5.3.21 Unit 2 Condensate Polishing Facility and Warehouse No. 5 - Aging Management Evaluation (MPS Unit 3 LRA Table 3.5.2-21)

The project team reviewed Table 3.5.2-21 of the MPS Unit 3 LRA, which summarizes the results of AMR evaluations for the Unit 2 condensate polishing facility and warehouse No. 5 component groups. The project team interviewed the applicant's technical staff and reviewed MPS Unit 3 Technical Report, MP-LR-4604, "Miscellaneous Structures," Revision 3.

In the MPS Unit 3 LRA, the applicant states that change of material properties due to alkali (cement)-aggregate reaction of concrete is possible in an air environment. The applicant states that based on tests conducted on the aggregate and the low-alkali cement used at MPS Unit 3, alkali (cement)-aggregate reaction is not a significant concern. The applicant states that it will manage change of material properties as a potential aging effect on MPS Unit 3 concrete structures. In the MPS Unit 3 LRA, the applicant states that change of material properties for structural reinforced concrete (beams, columns, floor slabs, foundation mat slabs, walls) due to alkali (cement)-aggregate reaction of concrete in an air environment is managed by MPS AMP B2.1.23, "Structures Monitoring Program." The project team reviewed the structures monitoring program and its evaluation is documented in Section 7.1.20 of this report. The project team also reviewed this program with respect to the SRP-LR. On the basis of its review, the project team finds this program acceptable for managing the aging effects, for the above components, of change in material properties due to alkali (cement)-aggregate reaction of concrete in an air environment.

In the MPS Unit 3 LRA, the applicant states that change of material properties due to alkali (cement)-aggregate reaction and leaching of calcium hydroxide of concrete is possible in an atmosphere/weather environment. The applicant states that based on tests conducted on the aggregate and the low-alkali cement used at MPS Unit 3, alkali (cement)-aggregate reaction is not a significant concern. The applicant states that the use of high-density, low-permeability concrete, and proper arrangement and distribution of reinforcement to control cracking, prevents significant leaching of calcium hydroxide from concrete structures. The applicant will manage change of material properties as a potential aging effect on MPS Unit 3 concrete structures. In the MPS Unit 3 LRA, the applicant states that change of material properties for structural reinforced concrete (beams, columns, floor slabs, foundation mat slabs, walls) due to alkali (cement)-aggregate reaction and leaching of calcium hydroxide of concrete in an atmosphere/weather environment is managed by MPS AMP B2.1.23, "Structures Monitoring Program." The project team reviewed the structures monitoring program and its evaluation is

documented in Section 7.1.20 of this report. The project team also reviewed this program with respect to the SRP-LR. On the basis of its review, the project team finds this program acceptable for managing the aging effects, for the above components, of change in material properties due to alkali (cement)-aggregate reaction and leaching of calcium hydroxide of concrete in an atmosphere/weather environment.

In the MPS Unit 3 LRA, the applicant identified no aging effects for aluminum components exposed to air, including roofing, siding and structural framing component types. The GALL Report does not include this material for these components.

The applicant concludes, as documented in its AMR basis document, MPS Unit 3 Technical Report, MP-LR-4604, "Miscellaneous Structures," Revision 3, for aluminum in an air or an atmosphere/weather environment, that there are no potential aging mechanisms for this aluminum and environment combination. The applicant states in the MAER that for aluminum material in an air or atmosphere/weather environment there are no potential aging mechanisms for this material and environment combination at MPS Unit 3. This conclusion is based on engineering text references that indicate that aluminum and its alloys resist attack to a wide range of environments and many chemical compounds. On the basis of its review of the applicant's documentation, the project team concurs with the applicant and finds that there are no aging effects requiring management for aluminum in an air environment.

In the MPS Unit 3 LRA, the applicant identified no aging effects for aluminum components exposed to an atmosphere/weather environment, including roofing and siding component types. The GALL Report does not include this material for these components.

The applicant concludes, as documented in its AMR basis document, MPS Unit 3 Technical Report, MP-LR-4604, "Miscellaneous Structures," Revision 3, for aluminum in an air or an atmosphere/weather environment, that there are no potential aging mechanisms for this aluminum and environment combination. The applicant states in the MAER that for aluminum material in an air or atmosphere/weather environment there are no potential aging mechanisms for this material and environment combination at MPS Unit 3. This conclusion is based on engineering text references that indicate that aluminum and its alloys resist attack to a wide range of environments and many chemical compounds. On the basis of its review of the applicant's documentation, the project team concurs with the applicant and finds that there are no aging effects requiring management for aluminum in an atmosphere/weather environment.

7.3.5.3.22 Security Diesel Generator Enclosure - Aging Management Evaluation (MPS Unit 3 LRA Table 3.5.2-22)

The project team reviewed Table 3.5.2-22 of the MPS Unit 3 LRA, which summarizes the results of AMR evaluations for the security diesel generator enclosure component groups. The project team interviewed the applicant's technical staff and reviewed MPS Unit 3 Technical Report, MP-LR-4604, "Miscellaneous Structures," Revision 3.

In the MPS Unit 3 LRA, the applicant states that change of material properties due to alkali (cement)-aggregate reaction and leaching of calcium hydroxide of concrete is possible in an atmosphere/weather environment. The applicant states that based on tests conducted on the aggregate and the low-alkali cement used at MPS Unit 3, alkali (cement)-aggregate reaction is

not a significant concern. The applicant states that the use of high-density, low-permeability concrete, and proper arrangement and distribution of reinforcement to control cracking, prevents significant leaching of calcium hydroxide from concrete structures. The applicant will manage change of material properties as a potential aging effect on MPS Unit 3 concrete structures. In the MPS Unit 3 LRA, the applicant states that change of material properties for structural reinforced concrete (foundation mat slabs) due to alkali (cement)-aggregate reaction and leaching of calcium hydroxide of concrete in an atmosphere/weather environment is managed by MPS AMP B2.1.23, "Structures Monitoring Program." The project team reviewed the structures monitoring program and its evaluation is documented in Section 7.1.20 of this report. The project team also reviewed this program with respect to the SRP-LR. On the basis of its review, the project team finds this program acceptable for managing the aging effects, for the above components, of change in material properties due to alkali (cement)aggregate reaction and leaching of calcium hydroxide of concrete in an atmosphere/weather environment.

7.3.5.3.23 Stack Monitoring Equipment Building - Aging Management Evaluation (MPS Unit 3 LRA Table 3.5.2-23)

The project team reviewed Table 3.5.2-23 of the MPS Unit 3 LRA, which summarizes the results of AMR evaluations for the stack monitoring equipment building component groups. The project team interviewed the applicant's technical staff and reviewed MPS Unit 3 Technical Report, MP-LR-4604, "Miscellaneous Structures," Revision 3.

In the MPS Unit 3 LRA, the applicant states that change of material properties due to alkali (cement)-aggregate reaction of concrete is possible in an air environment. The applicant states that based on tests conducted on the aggregate and the low-alkali cement used at MPS Unit 3, alkali (cement)-aggregate reaction is not a significant concern. The applicant states that it will manage change of material properties as a potential aging effect on MPS Unit 3 concrete structures. In the MPS Unit 3 LRA, the applicant states that change of material properties for structural reinforced concrete (roof slabs, slabs on grade, spread footing, walls) due to alkali (cement)-aggregate reaction of concrete in an air environment is managed by MPS AMP B2.1.23, "Structures Monitoring Program." The project team reviewed the structures monitoring program and its evaluation is documented in Section 7.1.20 of this report. The project team also reviewed this program with respect to the SRP-LR. On the basis of its review, the project team finds this program acceptable for managing the aging effects, for the above components, of change in material properties due to alkali (cement)-aggregate reaction of concrete in an air environment.

In the MPS Unit 3 LRA, the applicant states that change of material properties due to alkali (cement)-aggregate reaction and leaching of calcium hydroxide of concrete is possible in an atmosphere/weather environment. The applicant states that based on tests conducted on the aggregate and the low-alkali cement used at MPS Unit 3, alkali (cement)-aggregate reaction is not a significant concern. The applicant states that the use of high-density, low-permeability concrete, and proper arrangement and distribution of reinforcement to control cracking, prevents significant leaching of calcium hydroxide from concrete structures. The applicant will manage change of material properties as a potential aging effect on MPS Unit 3 concrete structures. In the MPS Unit 3 LRA, the applicant states that change of material properties for structural reinforced concrete (roof slabs, slabs on grade, spread footing, walls) due to alkali (cement)-aggregate reaction and leaching of calcium hydroxide of concrete in an

atmosphere/weather environment is managed by MPS AMP B2.1.23, "Structures Monitoring Program." The project team reviewed the structures monitoring program and its evaluation is documented in Section 7.1.20 of this report. The project team also reviewed this program with respect to the SRP-LR. On the basis of its review, the project team finds this program acceptable for managing the aging effects, for the above components, of change in material properties due to alkali (cement)-aggregate reaction and leaching of calcium hydroxide of concrete in an atmosphere/weather environment.

In the MPS Unit 3 LRA, the applicant states that cracking for concrete component types (masonry block walls) exposed to an atmosphere/weather environment is managed using MPS AMP B2.1.23, "Structures Monitoring Program." The applicant states that cracking of masonry block walls due to long term creep and variation in stiffness, dry shrinkage of concrete, and expansion or contraction, is possible in an atmosphere/weather environment. Masonry block walls are subject to all of these aging mechanisms which require aging management. The project team reviewed the structures monitoring program and its evaluation is documented in Section 7.1.20 of this report. The project team also reviewed this program with respect to the SRP-LR. On the basis of its review, the project team finds this program acceptable for managing the aging effects, for the above components, of concrete cracking due to long term creep and variation in stiffness, dry shrinkage of concrete, and expansion or contraction in this environment.

7.3.5.3.24 <u>MPS Unit 3 Stack - Aging Management Evaluation (MPS Unit 3 LRA Table 3.5.2-24)</u>

The project team reviewed Table 3.5.2-24 of the MPS Unit 3 LRA, which summarizes the results of AMR evaluations for the MPS Unit 3 stack component groups. The project team interviewed the applicant's technical staff and reviewed MPS Unit 3 Technical Report, MP-LR-4604, "Miscellaneous Structures," Revision 3.

In the MPS Unit 3 LRA, the applicant states that change of material properties due to alkali (cement)-aggregate reaction of concrete is possible in an air environment. The applicant states that based on tests conducted on the aggregate and the low-alkali cement used at MPS Unit 3, alkali (cement)-aggregate reaction is not a significant concern. The applicant states that it will manage change of material properties as a potential aging effect on MPS Unit 3 concrete structures. In the MPS Unit 3 LRA, the applicant states that change of material properties for structural reinforced concrete (floor slabs, foundation mat, slabs, walls) due to alkali (cement)-aggregate reaction of concrete in an air environment is managed by MPS AMP B2.1.23, "Structures Monitoring Program." The project team reviewed the structures monitoring program and its evaluation is documented in Section 7.1.20 of this report. The project team also reviewed this program with respect to the SRP-LR. On the basis of its review, the project team finds this program acceptable for managing the aging effects, for the above components, of change in material properties due to alkali (cement)-aggregate reaction of concrete in an air environment.

In the MPS Unit 3 LRA, the applicant states that change of material properties due to alkali (cement)-aggregate reaction and leaching of calcium hydroxide of concrete is possible in an atmosphere/weather environment. The applicant states that based on tests conducted on the aggregate and the low-alkali cement used at MPS Unit 3, alkali (cement)-aggregate reaction is

not a significant concern. The applicant states that the use of high-density, low-permeability concrete, and proper arrangement and distribution of reinforcement to control cracking, prevents significant leaching of calcium hydroxide from concrete structures. The applicant will manage change of material properties as a potential aging effect on MPS Unit 3 concrete structures. In the MPS Unit 3 LRA, the applicant states that change of material properties for structural reinforced concrete (floor slabs, foundation mat, slabs, walls) due to alkali (cement)-aggregate reaction and leaching of calcium hydroxide of concrete in an atmosphere/weather environment is managed by MPS AMP B2.1.23, "Structures Monitoring Program." The project team reviewed the structures monitoring program and its evaluation is documented in Section 7.1.20 of this report. The project team also reviewed this program with respect to the SRP-LR. On the basis of its review, the project team finds this program acceptable for managing the aging effects, for the above components, of change in material properties due to alkali (cement)-aggregate reaction and leaching of calcium hydroxide of concrete in an atmosphere/weather environment.

In the MPS Unit 3 LRA, the applicant states that change of material properties due to alkali (cement)-aggregate reaction of concrete is possible in an air environment. The applicant states that based on tests conducted on the aggregate and the low-alkali cement used at MPS Unit 3, alkali (cement)-aggregate reaction is not a significant concern. The applicant states that it will manage change of material properties as a potential aging effect on MPS Unit 3 concrete structures in infrequently accessed areas. In the MPS Unit 3 LRA, the applicant states that change of material properties for structural reinforced concrete (floor slabs, foundation mat, slabs, walls) in an air environment is managed by MPS AMP B2.1.15, "Infrequently Accessed Areas Inspection Program," a plant-specific program. The project team reviewed the infrequently accessed area inspection program and its evaluation is documented in Section 7.1.14 of this report. The project team also reviewed this program with respect to the SRP-LR. On the basis of its review, the project team finds this program acceptable for managing the aging effects, for the above components, of change in material properties due to alkali (cement)-aggregate reaction of concrete in an protected air environment for infrequently accessed areas.

7.3.5.3.25 <u>Switchyard Control House - Aging Management Evaluation (MPS Unit 3 LRA Table 3.5.2-25)</u>

The project team reviewed Table 3.5.2-25 of the MPS Unit 3 LRA, which summarizes the results of AMR evaluations for the switchyard control house component groups. The project team interviewed the applicant's technical staff and reviewed MPS Unit 3 Technical Report, MP-LR-4604, "Miscellaneous Structures," Revision 3.

In the MPS Unit 3 LRA, the applicant states that change of material properties due to alkali (cement)-aggregate reaction of concrete is possible in an air environment. The applicant states that based on tests conducted on the aggregate and the low-alkali cement used at MPS Unit 3, alkali (cement)-aggregate reaction is not a significant concern. The applicant states that it will manage change of material properties as a potential aging effect on MPS Unit 3 concrete structures. In the MPS Unit 3 LRA, the applicant states that change of material properties for structural reinforced concrete due to alkali (cement)-aggregate reaction of concrete in an air environment is managed by MPS AMP B2.1.23, "Structures Monitoring Program". The project team reviewed the infrequently accessed area inspection program and its evaluation is

documented in Section 7.1.14 of this report. The project team also reviewed this program with respect to the SRP-LR. On the basis of its review, the project team finds this program acceptable for managing the aging effects, for the above components, of change in material properties due to alkali (cement)-aggregate reaction of concrete in an air environment.

In the MPS Unit 3 LRA, the applicant states that change of material properties due to alkali (cement)-aggregate reaction and leaching of calcium hydroxide of concrete is possible in an atmosphere/weather environment. The applicant states that based on tests conducted on the aggregate and the low-alkali cement used at MPS Unit 3, alkali (cement)-aggregate reaction is not a significant concern. The applicant states that the use of high-density, low-permeability concrete, and proper arrangement and distribution of reinforcement to control cracking, prevents significant leaching of calcium hydroxide from concrete structures. The applicant will manage change of material properties as a potential aging effect on MPS Unit 3 concrete structures. In the MPS Unit 3 LRA, the applicant states that change of material properties for structural reinforced concrete due to alkali (cement)-aggregate reaction and leaching of calcium hydroxide of concrete in an atmosphere/weather environment is managed by MPS AMP B2.1.23, "Structures Monitoring Program." The project team reviewed the structures monitoring program and its evaluation is documented in Section 7.1.20 of this report. The project team also reviewed this program with respect to the SRP-LR. On the basis of its review, the project team finds this program acceptable for managing the aging effects, for the above components, of change in material properties due to alkali (cement)-aggregate reaction and leaching of calcium hydroxide of concrete in an atmosphere/weather environment.

In the MPS Unit 3 LRA, the applicant states that cracking for concrete component types (masonry block walls) exposed to an atmosphere/weather environment is managed using MPS AMP B2.1.23, "Structures Monitoring Program." The applicant states that cracking of masonry block walls due to long term creep and variation in stiffness, dry shrinkage of concrete, and expansion or contraction, is possible in an atmosphere/weather environment. Masonry block walls are subject to all of these aging mechanisms which require aging management. The project team reviewed the structures monitoring program and its evaluation is documented in Section 7.1.20 of this report. The project team also reviewed this program with respect to the SRP-LR. On the basis of its review, the project team finds this program acceptable for managing the aging effects, for the above components, of concrete cracking due to long term creep and variation in stiffness, dry shrinkage of concrete, and expansion or contraction in this environment.

7.3.5.3.26 <u>345 kV Switchyard - Aging Management Evaluation (MPS Unit 3 LRA Table 3.5.2-26)</u>

The project team reviewed Table 3.5.2-26 of the MPS Unit 3 LRA, which summarizes the results of AMR evaluations for the 345 kV switchyard component groups. The project team interviewed the applicant's technical staff and reviewed MPS Unit 3 Technical Report, MP-LR-4604, "Miscellaneous Structures," Revision 3.

In the MPS Unit 3 LRA, the applicant states that change of material properties due to alkali (cement)-aggregate reaction and leaching of calcium hydroxide of concrete is possible in an atmosphere/weather environment. The applicant states that based on tests conducted on the aggregate and the low-alkali cement used at MPS Unit 3, alkali (cement)-aggregate reaction is

not a significant concern. The applicant states that the use of high-density, low-permeability concrete, and proper arrangement and distribution of reinforcement to control cracking, prevents significant leaching of calcium hydroxide from concrete structures. The applicant will manage change of material properties as a potential aging effect on MPS Unit 3 concrete structures. In the MPS Unit 3 LRA, the applicant states change of material properties for structural reinforced concrete due to alkali (cement)-aggregate reaction and leaching of calcium hydroxide of concrete in an atmosphere/weather environment is managed by MPS AMP B2.1.23, "Structures Monitoring Program." The project team reviewed the structures monitoring program and its evaluation is documented in Section 7.1.20 of this report. The project team also reviewed this program with respect to the SRP-LR. On the basis of its review, the project team finds this program acceptable for managing the aging effects, for the above components, of change in material properties due to alkali (cement)-aggregate reaction and leaching of calcium hydroxide of concrete in an atmosphere/weather environment.

7.3.5.3.27 Unit 3 Circulating and Service Water Pumphouse - Aging Management Evaluation (MPS Unit 3 LRA Table 3.5.2-27)

The project team reviewed Table 3.5.2-27 of the MPS Unit 3 LRA, which summarizes the results of AMR evaluations for the Unit 3 circulating and service water pumphouse component groups. The project team interviewed the applicant's technical staff and reviewed MPS Unit 3 Technical Report, MP-LR-4603, "Intake and Discharge Structures," Revision 3.

In the MPS Unit 3 LRA, the applicant identified no aging effects for aluminum components exposed to an air environment, including miscellaneous aluminum (embedded aluminum exposed surfaces) (shapes, plates, unistrut, etc. ladders, platforms and grading) component types. The GALL Report does not include this material for these components.

The applicant concludes, as documented in its AMR basis document, MPS Unit 3 Technical Report, MP-LR-4603, "Intake and Discharge Structures," Revision 3, for aluminum in an air or an air environment, that there are no potential aging mechanisms for this aluminum and environment combination. The applicant states in the MAER that for aluminum material in an air or atmosphere/weather environment there are no potential aging mechanisms for this material and environment combination at MPS Unit 3. This conclusion is based on engineering text references that indicate that aluminum and its alloys resist attack to a wide range of environments and many chemical compounds. On the basis of its review of the applicant's documentation, the project team concurs with the applicant and finds that there are no aging effects requiring management for aluminum in an air environment.

In the MPS Unit 3 LRA, the applicant states that change of material properties due to alkali (cement)-aggregate reaction of concrete is possible in an air environment. The applicant states that based on tests conducted on the aggregate and the low-alkali cement used at MPS Unit 3, alkali (cement)-aggregate reaction is not a significant concern. The applicant states that it will manage change of material properties as a potential aging effect on MPS Unit 3 concrete structures. In the MPS Unit 3 LRA, the applicant states that change of material properties for flood/spill barriers including curbs, dikes, toe plates, and stop logs; structural reinforced concrete (beams, columns, floor slabs, foundation mat slabs, roof slabs, walls) and hatches due to alkali (cement)-aggregate reaction of concrete in an air environment is managed by MPS AMP B2.1.23, "Structures Monitoring Program." The project team reviewed the structures

monitoring program and its evaluation is documented in Section 7.1.20 of this report. The project team also reviewed this program with respect to the SRP-LR. On the basis of its review, the project team finds this program acceptable for managing the aging effects, for the above components, of change in material properties due to alkali (cement)-aggregate reaction of concrete in an air environment.

In the MPS Unit 3 LRA, the applicant states that change of material properties due to alkali (cement)-aggregate reaction and leaching of calcium hydroxide of concrete is possible in an atmosphere/weather environment. The applicant states that based on tests conducted on the aggregate and the low-alkali cement used at MPS Unit 3, alkali (cement)-aggregate reaction is not a significant concern. The applicant states that the use of high-density, low-permeability concrete, and proper arrangement and distribution of reinforcement to control cracking, prevents significant leaching of calcium hydroxide from concrete structures. The applicant will manage change of material properties as a potential aging effect on MPS Unit 3 concrete structures. In the MPS Unit 3 LRA, the applicant states that change of material properties for structural reinforced concrete (beams, columns, floor slabs, foundation mat slabs, roof slabs, walls) and hatches due to alkali (cement)-aggregate reaction and leaching of calcium hydroxide of concrete in an atmosphere/weather environment is managed by MPS AMP B2.1.23, "Structures Monitoring Program." The project team reviewed the structures monitoring program and its evaluation is documented in Section 7.1.20 of this report. The project team also reviewed this program with respect to the SRP-LR. On the basis of its review, the project team finds this program acceptable for managing the aging effects, for the above components, of change in material properties due to alkali (cement)-aggregate reaction and leaching of calcium hydroxide of concrete in an atmosphere/weather environment.

In the MPS Unit 3 LRA, the applicant states that change of material properties due to alkali (cement)-aggregate reaction of concrete is possible in a sea water environment. The applicant states that based on tests conducted on the aggregate and the low-alkali cement used at MPS Unit 3, alkali (cement)-aggregate reaction is not a significant concern. The applicant states that it will manage change of material properties as a potential aging effect on MPS Unit 3 concrete structures. In the MPS Unit 3 LRA, the applicant states that change of material properties for structural reinforced concrete (beams, columns, floor slabs, foundation mat slabs, roof slabs, walls) due to alkali (cement)-aggregate reaction of concrete in a sea water environment is managed by MPS AMP B2.1.23, "Structures Monitoring Program." The project team reviewed the structures monitoring program and its evaluation is documented in Section 7.1.20 of this report. The project team also reviewed this program with respect to the SRP-LR. On the basis of its review, the project team finds this program acceptable for managing the aging effects, for the above components, of change in material properties due to alkali (cement)-aggregate reaction of concrete in a sea water environment.

7.3.5.3.28 <u>Unit 3 West Retaining Rail - Aging Management Evaluation (MPS Unit 3 LRA Table 3.5.2-28)</u>

The project team reviewed Table 3.5.2-28 of the MPS Unit 3 LRA, which summarizes the results of AMR evaluations for the Unit 3 west retaining rail component groups. The project team interviewed the applicant's technical staff and reviewed MPS Unit 3 Technical Report, MP-LR-4603, "Intake and Discharge Structures," Revision 3.

In the MPS Unit 3 LRA, the applicant states that change of material properties due to alkali (cement)-aggregate reaction and leaching of calcium hydroxide of concrete is possible in an atmosphere/weather environment. The applicant states that based on tests conducted on the aggregate and the low-alkali cement used at MPS Unit 3, alkali (cement)-aggregate reaction is not a significant concern. The applicant states that the use of high-density, low-permeability concrete, and proper arrangement and distribution of reinforcement to control cracking, prevents significant leaching of calcium hydroxide from concrete structures. The applicant will manage change of material properties as a potential aging effect on MPS Unit 3 concrete structures. In the MPS Unit 3 LRA, the applicant states that change of material properties for structural reinforced concrete (footings, walls) due to alkali (cement)-aggregate reaction and leaching of calcium hydroxide of concrete in an atmosphere/weather environment is managed by MPS AMP B2.1.23, "Structures Monitoring Program." The project team reviewed the structures monitoring program and its evaluation is documented in Section 7.1.20 of this report. The project team also reviewed this program with respect to the SRP-LR. On the basis of its review, the project team finds this program acceptable for managing the aging effects, for the above components, of change in material properties due to alkali (cement)-aggregate reaction and leaching of calcium hydroxide of concrete in an atmosphere/weather environment.

In the MPS Unit 3 LRA, the applicant states that change of material properties due to alkali (cement)-aggregate reaction of concrete is possible in a sea water environment. The applicant states that based on tests conducted on the aggregate and the low-alkali cement used at MPS Unit 3, alkali (cement)-aggregate reaction is not a significant concern. The applicant states that it will manage change of material properties as a potential aging effect on MPS Unit 3 concrete structures. In the MPS Unit 3 LRA, the applicant states that change of material properties for structural reinforced concrete (footing, walls) due to alkali (cement)-aggregate reaction of concrete in a sea water environment is managed by MPS AMP B2.1.23, "Structures Monitoring Program." The project team reviewed the structures monitoring program and its evaluation is documented in Section 7.1.20 of this report. The project team also reviewed this program with respect to the SRP-LR. On the basis of its review, the project team finds this program acceptable for managing the aging effects, for the above components, of change in material properties due to alkali (cement)-aggregate reaction of concrete in a sea water environment.

7.3.5.3.29 <u>Sea Wall - Aging Management Evaluation (MPS Unit 3 LRA Table 3.5.2-29)</u>

The project team reviewed Table 3.5.2-29 of the MPS Unit 3 LRA, which summarizes the results of AMR evaluations for the sea wall component groups. The project team interviewed the applicant's technical staff and reviewed MPS Unit 3 Technical Report, MP-LR-4603, "Intake and Discharge Structures," Revision 3.

In the MPS Unit 3 LRA, the applicant states that change of material properties due to alkali (cement)-aggregate reaction and leaching of calcium hydroxide of concrete is possible in an atmosphere/weather environment. The applicant states that based on tests conducted on the aggregate and the low-alkali cement used at MPS Unit 3, alkali (cement)-aggregate reaction is not a significant concern. The applicant states that the use of high-density, low-permeability concrete, and proper arrangement and distribution of reinforcement to control cracking, prevents significant leaching of calcium hydroxide from concrete structures. The applicant will manage change of material properties as a potential aging effect on MPS Unit 3 concrete

structures. In the MPS Unit 3 LRA, the applicant states that change of material properties for structural reinforced concrete (footings, walls) due to alkali (cement)-aggregate reaction and leaching of calcium hydroxide of concrete in an atmosphere/weather environment is managed by MPS AMP B2.1.23, "Structures Monitoring Program. The project team reviewed the structures monitoring program and its evaluation is documented in Section 7.1.20 of this report. The project team also reviewed this program with respect to the SRP-LR. On the basis of its review, the project team finds this program acceptable for managing the aging effects, for the above components, of change in material properties due to alkali (cement)-aggregate reaction and leaching of calcium hydroxide of concrete in an atmosphere/weather environment.

In the MPS Unit 3 LRA, the applicant states that change of material properties due to alkali (cement)-aggregate reaction of concrete is possible in a sea water environment. The applicant states that based on tests conducted on the aggregate and the low-alkali cement used at MPS Unit 3, alkali (cement)-aggregate reaction is not a significant concern. The applicant states that it will manage change of material properties as a potential aging effect on MPS Unit 3 concrete structures. In the MPS Unit 3 LRA, the applicant states that change of material properties for structural reinforced concrete (footing, walls) due to alkali (cement)-aggregate reaction of concrete in a sea water environment is managed by MPS AMP B2.1.23, "Structures Monitoring Program." The project team reviewed the structures monitoring program and its evaluation is documented in Section 7.1.20 of this report. The project team also reviewed this program with respect to the SRP-LR. On the basis of its review, the project team finds this program acceptable for managing the aging effects, for the above components, of change in material properties due to alkali (cement)-aggregate reaction of concrete in a sea water environment.

7.3.5.3.30 <u>Unit 3 Circulating Water Discharge Tunnel and Discharge Structure - Aging Management Evaluation (MPS Unit 3 LRA Table 3.5.2-30)</u>

The project team reviewed Table 3.5.2-30 of the MPS Unit 3 LRA, which summarizes the results of AMR evaluations for the MPS Unit 3 circulating water discharge tunnel and discharge structure component groups. The project team interviewed the applicant's technical staff and reviewed MPS Unit 3 Technical Report, MP-LR-4603, "Intake and Discharge Structures," Revision 3.

In the MPS Unit 3 LRA, the applicant states that change of material properties due to alkali (cement)-aggregate reaction and leaching of calcium hydroxide of concrete is possible in an atmosphere/weather environment. The applicant states that based on tests conducted on the aggregate and the low-alkali cement used at MPS Unit 3, alkali (cement)-aggregate reaction is not a significant concern. The applicant states that the use of high-density, low-permeability concrete, and proper arrangement and distribution of reinforcement to control cracking, prevents significant leaching of calcium hydroxide from concrete structures. The applicant will manage change of material properties as a potential aging effect on MPS Unit 3 concrete structures. In the MPS Unit 3 LRA, the applicant states that change of material properties for structural reinforced concrete (floor slabs, roof slabs, walls) due to alkali (cement)-aggregate reaction and leaching of calcium hydroxide of concrete in an atmosphere/weather environment is managed by MPS AMP B2.1.23, "Structures Monitoring Program." The project team reviewed the structures monitoring program and its evaluation is documented in Section 7.1.20 of this report. The project team also reviewed this program with respect to the SRP-LR. On the

basis of its review, the project team finds this program acceptable for managing the aging effects, for the above components, of change in material properties due to alkali (cement)-aggregate reaction and leaching of calcium hydroxide of concrete in an atmosphere/weather environment.

In the MPS Unit 3 LRA, the applicant states that change of material properties due to alkali (cement)-aggregate reaction of concrete is possible in a sea water environment. The applicant states that based on tests conducted on the aggregate and the low-alkali cement used at MPS Unit 3, alkali (cement)-aggregate reaction is not a significant concern. The applicant states that it will manage change of material properties as a potential aging effect on MPS Unit 3 concrete structures. In the MPS Unit 3 LRA, the applicant states that change of material properties for structural reinforced concrete (floor slabs, roof slabs, walls) due to alkali (cement)-aggregate reaction of concrete in a sea water environment is managed by MPS AMP B2.1.23, "Structures Monitoring Program." The project team reviewed the structures monitoring program and its evaluation is documented in Section 7.1.20 of this report. The project team also reviewed this program with respect to the SRP-LR. On the basis of its review, the project team finds this program acceptable for managing the aging effects, for the above components, of change in material properties due to alkali (cement)-aggregate reaction of concrete in a sea water environment.

7.3.5.3.31 Unit 3 Recirculation Tempering Line - Aging Management Evaluation (MPS Unit 3 LRA Table 3.5.2-31)

The project team reviewed Table 3.5.2-31 of the MPS Unit 3 LRA, which summarizes the results of AMR evaluations for the MPS Unit 3 recirculation tempering line component groups.

The project team's scope of AMR evaluations for MPS Unit 3 LRA Table 3.5.2-31 did not include AMR line items not consistent with the GALL Report.

7.3.5.3.32 Vacuum Priming Pumphouse - Aging Management Evaluation (MPS Unit 3 LRA Table 3.5.2-32)

The project team reviewed Table 3.5.2-32 of the MPS Unit 3 LRA, which summarizes the results of AMR evaluations for the vacuum priming pumphouse component groups. The project team interviewed the applicant's technical staff and reviewed MPS Unit 3 Technical Report, MP-LR-4603, "Intake and Discharge Structures," Revision 3.

In the MPS Unit 3 LRA, the applicant states that change of material properties due to alkali (cement)-aggregate reaction of concrete is possible in an air environment. The applicant states that based on tests conducted on the aggregate and the low-alkali cement used at MPS Unit 3, alkali (cement)-aggregate reaction is not a significant concern. The applicant states that it will manage change of material properties as a potential aging effect on MPS Unit 3 concrete structures. In the MPS Unit 3 LRA, the applicant states that change of material properties for structural reinforced concrete (beams, foundation mat slabs, roof slabs, walls) due to alkali (cement)-aggregate reaction of concrete in an air environment is managed by MPS AMP B2.1.23, "Structures Monitoring Program." The project team reviewed the structures monitoring program and its evaluation is documented in Section 7.1.20 of this report. The project team also reviewed this program with respect to the SRP-LR. On the basis of its review, the project

team finds this program acceptable for managing the aging effects, for the above components, of change in material properties due to alkali (cement)-aggregate reaction of concrete in an air environment.

In the MPS Unit 3 LRA, the applicant states that change of material properties due to alkali (cement)-aggregate reaction and leaching of calcium hydroxide of concrete is possible in an atmosphere/weather environment. The applicant states that based on tests conducted on the aggregate and the low-alkali cement used at MPS Unit 3, alkali (cement)-aggregate reaction is not a significant concern. The applicant states that the use of high-density, low-permeability concrete, and proper arrangement and distribution of reinforcement to control cracking, prevents significant leaching of calcium hydroxide from concrete structures. The applicant will manage change of material properties as a potential aging effect on MPS Unit 3 concrete structures. In the MPS Unit 3 LRA, the applicant states that change of material properties for structural reinforced concrete (beams, foundation mat slabs, roof slabs, walls) due to alkali (cement)-aggregate reaction and leaching of calcium hydroxide of concrete in an atmosphere/weather environment is managed by MPS AMP B2.1.23, "Structures Monitoring Program." The project team reviewed the structures monitoring program and its evaluation is documented in Section 7.1.20 of this report. The project team also reviewed this program with respect to the SRP-LR. On the basis of its review, the project team finds this program acceptable for managing the aging effects, for the above components, of change in material properties due to alkali (cement)-aggregate reaction and leaching of calcium hydroxide of concrete in an atmosphere/weather environment.

7.3.5.3.33 <u>Tank Foundations - Aging Management Evaluation (MPS Unit 3 LRA Table 3.5.2-33)</u>

The project team reviewed Table 3.5.2-33 of the MPS Unit 3 LRA, which summarizes the results of AMR evaluations for the tank foundations component groups. The project team interviewed the applicant's technical staff and reviewed MPS Unit 3 Technical Report, MP-LR-4604, "Miscellaneous Structures," Revision 3.

In the MPS Unit 3 LRA, the applicant states that change of material properties due to alkali (cement)-aggregate reaction of concrete is possible in an air environment. The applicant states that based on tests conducted on the aggregate and the low-alkali cement used at MPS Unit 3, alkali (cement)-aggregate reaction is not a significant concern. The applicant states that it will manage change of material properties as a potential aging effect on MPS Unit 3 concrete structures. In the MPS Unit 3 LRA, the applicant states that change of material properties for the structural reinforced concrete (foundation mat slabs, walls) (MPS Unit 3 Boron Recovery Tanks and Enclosure) due to alkali (cement)-aggregate reaction of concrete in an air environment is managed by MPS AMP B2.1.23, "Structures Monitoring Program." The project team reviewed the structures monitoring program and its evaluation is documented in Section 7.1.20 of this report. The project team also reviewed this program with respect to the SRP-LR. On the basis of its review, the project team finds this program acceptable for managing the aging effects, for the above components, of change in material properties due to alkali (cement)-aggregate reaction of concrete in an air environment.

In the MPS Unit 3 LRA, the applicant states that change of material properties due to alkali (cement)-aggregate reaction and leaching of calcium hydroxide of concrete is possible in an

atmosphere/weather environment. The applicant states that based on tests conducted on the aggregate and the low-alkali cement used at MPS Unit 3, alkali (cement)-aggregate reaction is not a significant concern. The applicant states that the use of high-density, low-permeability concrete, and proper arrangement and distribution of reinforcement to control cracking, prevents significant leaching of calcium hydroxide from concrete structures. The applicant will manage change of material properties as a potential aging effect on MPS Unit 3 concrete structures. In the MPS Unit 3 LRA, the applicant states that change of material properties for structural reinforced concrete (foundation mat slabs) (condensate storage tank foundation); structural reinforced concrete (footing) (fire water tanks 1 and 2 foundations); structural reinforced concrete (foundation mat slabs) (refueling water storage tank foundation); structural reinforced concrete (foundation mat slabs) (SBO diesel fuel oil storage tank foundation); structural reinforced concrete (foundation mat slabs, roof slabs, walls) (demineralized water storage tank foundation and enclosure); structural reinforced concrete (foundation mat slabs) (carbon dioxide tank foundation); and structural reinforced concrete (foundation mat slabs, walls) (boron recovery tank foundation and enclosure) due to alkali (cement)-aggregate reaction and leaching of calcium hydroxide of concrete in an atmosphere/weather environment is managed by MPS AMP B2.1.23, "Structures Monitoring Program." The project team reviewed the structures monitoring program and its evaluation is documented in Section 7.1.20 of this report. The project team also reviewed this program with respect to the SRP-LR. On the basis of its review, the project team finds this program acceptable for managing the aging effects, for the above components, of change in material properties due to alkali (cement)-aggregate reaction and leaching of calcium hydroxide of concrete in an atmosphere/weather environment.

7.3.5.3.34 Yard Structures - Aging Management Evaluation (MPS Unit 3 LRA Table 3.5.2-34)

The project team reviewed Table 3.5.2-34 of the MPS Unit 3 LRA, which summarizes the results of AMR evaluations for the yard structures component groups. The project team interviewed the applicant's technical staff and reviewed MPS Unit 3 Technical Report, MP-LR-4604, "Miscellaneous Structures," Revision 3.

In the MPS Unit 3 LRA, the applicant identified no aging effects for aluminum components exposed to an atmosphere/weather environment, including lighting pole component types. The GALL Report does not include this material for these components.

The applicant concludes, as documented in MPS Unit 3 Technical Report, MP-LR-4604, "Miscellaneous Structures," Revision 3, for aluminum in an air or an air environment, that there are no potential aging mechanisms for this aluminum and environment combination. The applicant states in the MAER that for aluminum material in an air or atmosphere/weather environment there are no potential aging mechanisms for this material and environment combination at MPS Unit 3. This conclusion is based on engineering text references that indicate that aluminum and its alloys resist attack to a wide range of environments and many chemical compounds. On the basis of its review of the applicant's documentation, the project team concurs with the applicant and finds that there are no aging effects requiring management for aluminum in an atmosphere/weather environment.

In the MPS Unit 3 LRA, the applicant states that change of material properties due to alkali (cement)-aggregate reaction of concrete is possible in an air environment. The applicant states that based on tests conducted on the aggregate and the low-alkali cement used at MPS Unit 3, alkali (cement)-aggregate reaction is not a significant concern. The applicant states that it will manage change of material properties as a potential aging effect on MPS Unit 3 concrete structures. In the MPS Unit 3 LRA, the applicant states that change of material properties for the access covers (yard valve pits and enclosure); structural reinforced concrete (foundation mat slabs, roof slabs, walls) (yard valve pits and enclosure); structural reinforced concrete (foundation mat slabs, roof slabs, walls) (pipe tunnel); and structural reinforced concrete (foundation mat slabs, roof slabs, walls) (manholes) due to alkali (cement)-aggregate reaction of concrete in an air environment is managed by MPS AMP B2.1.23, "Structures Monitoring Program." The project team reviewed the structures monitoring program and its evaluation is documented in Section 7.1.20 of this report. The project team also reviewed this program with respect to the SRP-LR. On the basis of its review, the project team finds this program acceptable for managing the aging effects, for the above components, of change in material properties due to alkali (cement)-aggregate reaction of concrete in an air environment.

In the MPS Unit 3 LRA, the applicant states that change of material properties due to alkali (cement)-aggregate reaction and leaching of calcium hydroxide of concrete is possible in an atmosphere/weather environment. The applicant states that based on tests conducted on the aggregate and the low-alkali cement used at MPS Unit 3, alkali (cement)-aggregate reaction is not a significant concern. The applicant states that the use of high-density, low-permeability concrete, and proper arrangement and distribution of reinforcement to control cracking, prevents significant leaching of calcium hydroxide from concrete structures. The applicant will manage change of material properties as a potential aging effect on MPS Unit 3 concrete structures. In the MPS Unit 3 LRA, the applicant states that change of material properties for structural reinforced concrete (footing, walls) (transformer firewalls and dikes); access covers (yard valve pits and enclosure); structural reinforced concrete (foundation mat slabs, roof slabs, walls) (yard valve pits and enclosure); structural reinforced concrete (foundation mat slabs, roof slabs, walls) (Pipe Tunnel); structural reinforced concrete (foundation mat slabs, roof slabs, walls) (Manholes); duct banks; structural reinforced concrete (security lighting supports); and structural reinforced concrete (footing, walls) (technical support building) due to alkali (cement)-aggregate reaction and leaching of calcium hydroxide of concrete in an atmosphere/weather environment is managed by MPS AMP B2.1.23, "Structures Monitoring Program." The project team reviewed the structures monitoring program and its evaluation is documented in Section 7.1.20 of this report. The project team also reviewed this program with respect to the SRP-LR. On the basis of its review, the project team finds this program acceptable for managing the aging effects, for the above components, of change in material properties due to alkali (cement)-aggregate reaction and leaching of calcium hydroxide of concrete in an atmosphere/weather environment.

In the MPS Unit 3 LRA, the applicant states that change of material properties due to alkali (cement)-aggregate reaction of concrete is possible in an air environment. The applicant states that based on tests conducted on the aggregate and the low-alkali cement used at MPS Unit 3, alkali (cement)-aggregate reaction is not a significant concern. The applicant states that it will manage change of material properties as a potential aging effect on MPS Unit 3 concrete structures in infrequently accessed areas. In the MPS Unit 3 LRA, the applicant states that change of material properties for structural reinforced concrete (foundation mat slabs, roof

slabs, walls) (yard valve pits and enclosure) in an air environment is managed by MPS AMP B2.1.15, "Infrequently Accessed Areas Inspection Program," which is a plant-specific program. The project team reviewed the infrequently accessed area inspection program and its evaluation is documented in Section 7.1.14 of this report. The project team also reviewed this program with respect to the SRP-LR. On the basis of its review, the project team finds this program acceptable for managing the aging effects, for the above components, of change in material properties due to alkali (cement)-aggregate reaction of concrete in an protected air environment for infrequently accessed areas.

7.3.5.3.35 NSSS Equipment Supports - Aging Management Evaluation (MPS Unit 3 LRA Table 3.5.2-35)

The project team reviewed Table 3.5.2-35 of the MPS Unit 3 LRA, which summarizes the results of AMR evaluations for the NSSS equipment supports component groups. The project team interviewed the applicant's technical staff and reviewed MPS Unit 3 Technical Report, MP-LR-4653, "NSSS Equipment Supports," Revision 2.

In the MPS Unit 3 LRA, the applicant identified no aging effects for stainless steel components exposed to air, including pressurizer support: bolting component types. Air is not identified in the GALL Report as an environment for these components and materials.

On the basis of its review of current industry research and operating experience, the project team finds that air on metal will not result in aging that will be of concern during the period of extended operation. The external environments being referred to are typical of ambient air, e.g., under a shelter, indoor, or air-conditioned enclosure or room. Without the presence of the aggressive environment, stainless steel components will experience insignificant amounts of corrosion, and no aging effects are applicable to this component/commodity group. Therefore, the project team finds that there are no aging effects requiring management for metal in an air environment.

In the MPS Unit 3 LRA, the applicant states that the GALL Report does not include a borated water leakage environment for reactor vessel support: sliding support plate of copper alloy material.

The applicant identifies, in MPS Unit 3 Technical Report, MP-LR-4653, "NSSS Equipment Supports," Revision 2, for copper alloys in a borated water leakage environment, that boric acid corrosion as an aging mechanism for loss of material. The applicant states that these components do not exceed the temperature threshold of 350° F. Therefore, boric acid corrosion is a potential aging mechanism for copper alloys. On the basis of its review of the applicant's document, the project team concurs with the applicant and finds that boric acid corrosion is a potential aging mechanism for copper alloys.

In the MPS Unit 3 LRA, the applicant states that loss of material for copper alloy reactor vessel support: sliding support plate in a borated water leakage environment is managed by MPS AMP B2.1.13, "General Condition Monitoring." The project team reviewed the general condition monitoring program and its evaluation is documented in Section 7.1.12 of this report. The general condition monitoring program, manages these aging effects by visual inspections for evidence of degradation or adverse conditions and includes heath physics inspections of

radiologically controlled areas, system walkdowns by system engineering, and daily inspections of accessible areas of the plant by plant operators. Evidence of boron precipitation and active radioactive system leaks is identified during area observations made by health physics technicians while performing radiologically controlled area surveys. On the basis of its review, the project team finds the general condition monitoring program acceptable for managing the aging effect of loss of material for copper alloys for this component.

In the discussion section of LRA Table 3.5.1, Item 3.5.1-33, the applicant stated, for Group B1.1: high strength low-alloy bolts in structures and component support systems, that cracking due to SCC is not an aging effect requiring management for NSSS equipment support bolting.

During the review, the project team noted that SRP-LR Table 3.5-1 recommended GALL AMP XI.M18, "Bolting Integrity," for managing high strength bolting for NSSS components supports for crack initiation and growth due to SCC.

By letter dated January 11, 2005 (ML050190289), the applicant submitted its response. In its response, the applicant states as following:

> For NSSS component supports, bolting material with estimated maximum yield strength that marginally exceeds 150 ksi is used in limited applications. This bolting is located inside the Containment in areas where the environment is typically dry and not subject to high levels of contaminants, such as halogens and sulfur compounds, that result in the potential for SCC. Leakage within the Containment is monitored and strictly controlled during plant operation and is investigated and corrected such that the potential for wetting of NSSS component support bolting is minimal. Based on the marginally susceptible bolting materials and a dry, non-conducive (benign) service environment, cracking due to SCC is not an aging effect requiring management for this bolting.
>
> As identified in Millstone Power Station Unit 2 LRA Table 3.5.2-24 and Millstone Power Station Unit 3 LRA Table 3.5.2-35, loss of material is conservatively considered an aging effect requiring management for NSSS component support bolting and is managed by the Inservice Inspection Program: Systems, Components and Supports AMP (which includes the elements of the ASME Section XI, Subsection IWF requirements as described in LRA Appendix B2.1.18). In addition, loss of material due to the potential for borated water leakage from nearby components is managed by the Boric Acid Corrosion and General Condition Monitoring AMPs.

On the basis of that the boric acid corrosion and general condition monitoring programs ensure a dry, non-conducive (benign) service environment and the bolting material is managed by the Inservice Inspection Program. The project team finds this acceptable.

7.3.5.3.36 <u>General Structural Supports - Aging Management Evaluation (MPS Unit 3 LRA Table 3.5.2-36)</u>

The project team reviewed Table 3.5.2-36 of the MPS Unit 3 LRA, which summarizes the results of AMR evaluations for the general structural supports component groups. The project

team interviewed the applicant's technical staff and reviewed MPS Unit 3 Technical Report, MP-LR-4651, "General Structural Supports," Revision 2.

In the MPS Unit 3 LRA, the applicant identified no aging effects for aluminum components exposed to an atmosphere/weather environment, including electrical conduit and cable tray component types. The GALL Report does not include this material for these components. The applicant concludes, as documented in its AMR basis document, MPS Unit 3 Technical Report, MP-LR-4604, "Miscellaneous Structures," Revision 3, for aluminum in an air or an air environment, the applicant concludes that there are no potential aging mechanisms for this aluminum and environment combination. The applicant states in the MAER that for aluminum material in an air or atmosphere/weather environment there are no potential aging mechanisms for this material and environment combination at MPS Unit 3. This conclusion is based on engineering text references that indicate that aluminum and its alloys resist attack to a wide range of environments and many chemical compounds. On the basis of its review of the applicant's documentation, the project team concurs with the applicant and concludes that there are no aging effects requiring management for aluminum in an atmosphere/weather environment.

In the MPS Unit 3 LRA, the applicant has identified no aging effects for aluminum components exposed to an air environment, including electrical conduit and cable tray component types. The GALL Report does not include this material for these components. The applicant concludes, as documented in MPS Unit 3 Technical Report, MP-LR-4604, "Miscellaneous Structures," Revision 3, for aluminum in an air or an air environment, the applicant concludes that there are no potential aging mechanisms for this aluminum and environment combination. The applicant states in the MAER that for aluminum material in an air or atmosphere/weather environment there are no potential aging mechanisms for this material and environment combination at MPS Unit 3. This conclusion is based on engineering text references that indicate that aluminum and its alloys resist attack to a wide range of environments and many chemical compounds. On the basis of its review of the applicant's documentation, the project team concurs with the applicant and concludes that there are no aging effects requiring management for aluminum in an air environment.

In the MPS Unit 3 LRA, the applicant has identified no aging effects for stainless steel components exposed to air, including sliding support bearing and sliding surfaces, structural support components (plate structural shapes, etc.) and vendor supplied specialty items (spring hangers, struts, clamps, vibration isolators, etc.) component types.

During the audit and review, the project team questioned the applicant as to why the MPS AMP B.2.1.18, "Inservice Inspection Program: Systems, Components and Supports," was not credit to mange loss of mechanical function, as describe in the GALL Report. By letter dated January 11, 2005 (ML050190289), the applicant submitted its LRA supplement. In its response, the applicant states that the inspection requirements for these supports associated with ASME XI IWF that are part of the CLB will carry forward to the period of extended operation.

In the MPS Unit 3 LRA, the applicant states that the GALL Report does not include a borated water leakage environment for sliding support bearing and sliding surfaces of copper alloy material.

The applicant identifies, as documented in MPS Unit 3 Technical Report, MP-LR-4651, "General Structural Supports," Revision 2, for copper alloys in a borated water leakage environment, that boric acid corrosion as an aging mechanism for loss of material. The applicant states that these components do not exceed the temperature threshold of 350EF. Therefore, boric acid corrosion is a potential aging mechanism for copper alloys. On the basis of its review of the applicant's document, the project team concurs with the applicant and concludes that boric acid corrosion is a potential aging mechanism for copper alloys. In MPS Unit 3 LRA, the applicant states that loss of material for copper alloy reactor vessel support: sliding support plate in a borated water leakage environment is managed by MPS AMP B2.1.13, "General Condition Monitoring." The project team reviewed the general condition monitoring program and its evaluation is documented in Section 7.1.12 of this report. The general condition monitoring program, manages these aging effects by visual inspections for evidence of degradation or adverse conditions and includes heath physics inspections of radiologically controlled areas, system walkdowns by system engineering, and daily inspections of accessible areas of the plant by plant operators. Evidence of boron precipitation and active radioactive system leaks is identified during area observations made by health physics technicians while performing radiologically controlled area surveys. On the basis of its review, the project team finds the general condition monitoring program acceptable for managing the aging effect of loss of material for copper alloys for this component.

In the MPS Unit 3 LRA, the applicant identified no aging effects for galvanized steel components exposed to air, including electrical conduit and cable tray component types. Air is not identified in the GALL Report as an environment for these components and materials.

On the basis of its review of current industry research and operating experience, the project team finds that air on metal will not result in aging that will be of concern during the period of extended operation. The external environments being referred to are typical of ambient air, e.g., under a shelter, indoor, or air-conditioned enclosure or room. Significant corrosion of carbon (galvanized steel) and low-alloy steel requires an electrolytic environment, and a simultaneous presence of oxygen and moisture. Without the presence of the aggressive environment, low-alloy steel components will experience insignificant amounts of corrosion, and no aging effects are applicable to this component/commodity group. Therefore, the project team concludes that there are no aging effects requiring management for metal in an air environment.

7.3.5.3.37 <u>Miscellaneous Structural Commodities - Aging Management Evaluation (MPS Unit 3 LRA Table 3.5.2-37)</u>

The project team reviewed Table 3.5.2-37 of the MPS Unit 3 LRA, which summarizes the results of AMR evaluations for the miscellaneous structural commodities component groups. The project team interviewed the applicant's technical staff and reviewed MPS Unit 3 Technical Report MP-LR-4654, "Miscellaneous Structural Commodities," Revision 3.

In the MPS Unit 3 LRA, the applicant states that the GALL Report does not include Pyrocrete for fire resistant coating in an air environment. The applicant identified, as documented in its AMR basis document, MPS Unit 3 Technical Report, MP-LR-4654, "Miscellaneous Structural Commodities," Revision 3, for Pyrocrete in an air environment, irradiation as an aging mechanism for change of material properties. The applicant states that fire resistant coating

material may be exposed to ionizing radiation values greater than the threshold radiation of 10E6 Rads. On the basis of its review of the applicant's documentation, the project team concurs with the applicant and finds that irradiation is a potential aging mechanism for Pyrocrete. In the MPS Unit 3 LRA, the applicant states that change of material properties for fire resistant coatings in an air environment is managed by MPS AMP B2.1.10, "Fire Protection Program," with exception. The project team reviewed the fire protection program and its evaluation is documented in Section 7.1.9 of this report. The project team also reviewed this program with respect to the SRP-LR. The project team finds that the fire protection program, with an exception, manages, through periodic inspection and tests, the aging effects on penetration seals, fire barrier walls, ceilings, floors, and all fire rated doors that perform a fire barrier intended function. Qualified personnel perform periodic inspections to identify any changes in the condition such as change in material properties. On the basis of its review, the project team finds this program acceptable for managing the aging effects, for the above components, of change in material properties due to irradiation of Pyrocrete in an air environment.

In the MPS Unit 3 LRA, the applicant states that the GALL Report does not include Pyrocrete for fire resistant coating in an air environment. The applicant identified, as documented in its AMR basis document, MPS Unit 3 Technical Report, MP-LR-4654, "Miscellaneous Structural Commodities," Revision 3, for Pyrocreter in an air environment, differential movement, shrinkage, and vibration as an aging mechanisms for cracking. The applicant states that fire resistant coating material are subject to cracking due to differential movement, shrinkage, and vibration. On the basis of its review of the applicant's documentation, the project team concurs with the applicant and finds that differential movement, shrinkage, and vibration are potential aging mechanisms for Pyrocrete. In the MPS Unit 3 LRA, the applicant states that cracking for fire resistant coatings in an air environment is managed by MPS AMP B2.1.10, "Fire Protection Program," with exception. The project team reviewed the fire protection program and its evaluation is documented in Section 7.1.9 of this report. The project team also reviewed this program with respect to the SRP-LR. The project team finds that the fire protection program, with an exception, manages, through periodic inspection and tests, the aging effects on penetration seals, fire barrier walls, ceilings, floors, and all fire rated doors that perform a fire barrier intended function. Qualified personnel perform periodic inspections to identify any changes in the condition such as change in material properties. On the basis of its review, the project team finds this program acceptable for managing the aging effects, for the above components, of cracking due to differential movement, shrinkage, and vibration of Pyrocrete in an air environment.

In the MPS Unit 3 LRA, the applicant states that there are no aging effects for ceramic fire/equipment qualification barrier penetration seals and concludes that no AMPs are required. The applicant states that its AMR conclusion for the material is consistent with the GALL Report, which only calls for aging management of ceramic fire barrier penetration seals that are exposed to an outdoor environment. On the basis of its review of the applicant's documentation and that the ceramic materials are exposed only to indoor environments, the project team concurs with the applicant and finds that ceramic fire/equipment qualification barrier penetration seals do not require aging management for the period of extended operation.

In the MPS Unit 3 LRA, the applicant identified no aging effects for carbon steel components exposed to air, including cable tray cover and assembly; junction, terminal, and pull boxes; bus

duct enclosures; panels and cabinets; switchgear enclosures; and electrical component supports within cabinets and panels component types. Air is not identified in the GALL Report as an environment for these components and materials.

On the basis of its review of current industry research and operating experience, the project team finds that air on metal will not result in aging that will be of concern during the period of extended operation. The external environments being referred to are typical of ambient air, e.g., under a shelter, indoor, or air-conditioned enclosure or room. Significant corrosion of carbon and low-alloy steel requires an electrolytic environment, and a simultaneous presence of oxygen and moisture. Without the presence of the aggressive environment, low-alloy steel components will experience insignificant amounts of corrosion, and no aging effects are applicable to this component/commodity group. Therefore, the project team finds that there are no aging effects requiring management for metal in an air environment.

In the MPS Unit 3 LRA, the applicant states that the GALL Report does not include cracking of rubber for flood prevention plugs in an air environment. The applicant identifies, in MPS Unit 3 Technical Report, MP-LR-4654, “Miscellaneous Structural Commodities,” Revision 3, for rubber in an air environment, thermal exposure as an aging mechanism for cracking. The applicant states that rubber for flood prevention plugs may be exposed to temperatures greater than the threshold of 95°F. On the basis of its review of the applicant’s documentation, the project team concurs with the applicant and finds that thermal exposure is a potential aging mechanism for rubber. In the MPS Unit 3 LRA, the applicant states that cracking for rubber flood prevention plugs in an air environment is managed by MPS AMP B2.1.23, “Structures Monitoring Program.” The project team reviewed the structures monitoring program and its evaluation is documented in Section 7.1.20 of this report. The project team also reviewed this program with respect to the SRP-LR. The project team finds that structural monitoring activities are intended to assess the overall integrity and condition of structures, components, support systems and specified architectural details. Qualified personnel perform periodic inspections to identify any changes in the condition such as cracking. On the basis of its review, the project team finds this program acceptable for managing the aging effects, for the above components, of cracking due to thermal exposure of rubber in an air environment.

In the MPS Unit 3 LRA, the applicant identified no aging effects for aluminum components exposed to an atmosphere/weather environment, including bus duct enclosure component types. The GALL Report does not include this material for these components. The applicant identifies, in MPS Unit 3 Technical Report, MP-LR-4654, “Miscellaneous Structural Commodities,” Revision 3, for aluminum in an air or an air environment, the applicant concludes that there are no potential aging mechanisms for this aluminum and environment combination. The applicant states in the MAER that for aluminum material in an air or atmosphere/weather environment there are no potential aging mechanisms for this material and environment combination at MPS Unit 3. This conclusion is based on engineering text references that indicate that aluminum and its alloys resist attack to a wide range of environments and many chemical compounds. On the basis of its review of the applicant’s documentation, the project team concurs with the applicant and finds that there are no aging effects requiring management for aluminum in an atmosphere/weather environment.

In the MPS Unit 3 LRA, the applicant identified no aging effects for aluminum components exposed to an air environment, including cable tray cover assemblies and bus duct enclosure

component types. The GALL Report does not include this material for these components. The applicant concludes, in MPS Unit 3 Technical Report, MP-LR-4654, "Miscellaneous Structural Commodities," Revision 3, for aluminum in an air or an air environment, that there are no potential aging mechanisms for this aluminum and environment combination. The applicant states in the MAER that for aluminum material in an air or atmosphere/weather environment there are no potential aging mechanisms for this material and environment combination at MPS Unit 3. This conclusion is based on engineering text references that indicate that aluminum and its alloys resist attack to a wide range of environments and many chemical compounds. On the basis of its review of the applicant's documentation, the project team concurs with the applicant and finds that there are no aging effects requiring management for aluminum in an air environment.

The applicant states, as documented in the "Miscellaneous Structural Commodities" section of MPS Unit 3 Technical Report, MP-LR-4654, "Miscellaneous Structural Commodities," the following statement:

> The MAER includes an evaluation of aluminum material in an air or an atmosphere/weather environment, and concludes that there are no potential aging mechanisms for these material /environment combinations

During the audit and review, the project team asked the applicant to explain why the evaluation is not in the MAER and provide the basis for its conclusions. The applicant states, in response Audit Item 132, that the MAER addresses aluminum material in an air or atmosphere/weather environment, and concludes that there are no potential aging mechanisms for these material/environment combinations at MPS Unit 3. The applicant states that this conclusion is based on engineering test references, "Handbook of Corrosion Data" and "Uhlig's Corrosion Handbook." The Handbook of Corrosion Data indicates that aluminum and its alloys resist attack by a wide range of environments and many chemical compounds. Consequently, aluminum is one of the metals most thought of by the public and engineering community when lower temperature corrosion resistance is considered. Uhlig's Corrosion Handbook indicates that aluminum base alloys as a class is highly resistant to normal outdoor exposure conditions. This conclusion in the MAER is also based on other nuclear power stations license renewal safety evaluation reports (SERs) (i.e., Turkey Point, St. Lucie, and Surry) that have environments, particular outdoor environments, similar to MPS Unit 3. Further, this conclusion is also supported by a review of MPS Unit 3 plant-specific operating experience, which identifies no instances of loss of material for aluminum in an air or atmosphere/weather environment. The applicant also states that the conclusions in the MPS Unit 3 LRA remain valid and unchanged. However, the applicant initiated DMR #3524 to revise the MAER document. Specifically, MPS Unit 3 Technical Report, MP-LR-4700 was revised to include these references in the aluminum/air and aluminum/atmosphere/weather sections. On the basis of its review, the project team finds the applicant's response acceptable.

The applicant states, as documented in MPS Unit 3 Technical Report, MP-LR-4654, "Miscellaneous Structural Commodities," that the Attachment 1 information for fire/eq barrier penetration seals (including ceramic damming material) indicates N/A for the evaluation group. During the audit and review, the project team asked the applicant to explain how the ceramic damming material was evaluated for aging effects. The applicant states, in response to Audit Item 112, that ceramic materials are similar to the glass and porcelain that are described in the

MAER as having no aging effects. The AMR basis documents do not properly document this conclusion and the MAER does not specifically address ceramics. The applicant states that the conclusions in the MPS Unit 3 LRA remain valid and unchanged. However, the applicant has initiated DMR #3496 to revise the MAER, MPS Unit 3 Technical Report, MP-LR-4700, to include ceramic along with glass and porcelain as having no aging effects that require evaluation for any application or environment to which it is exposed. In addition, the applicant initiated DMRs #3497 and #3498 to revise MPS Unit 3 Technical Report, MP-LR-4654, "Miscellaneous Structural Commodities" to indicate, in Section 4.0, that the MAER indicates no potential aging effects and no aging management required for ceramics; therefore, the AMR does not evaluate aging mechanisms for the ceramic blanket or ceramic board in an air environment. On the basis of its review, the project team finds the applicant's response acceptable.

7.3.5.3.38 Load Handling Cranes and Devices - Aging Management Evaluation (MPS Unit 3 LRA Table 3.5.2-38)

The project team reviewed Table 3.5.2-38 of the MPS Unit 3 LRA, which summarizes the results of AMR evaluations for the load handling cranes and devices component groups. The project team interviewed the applicant's technical staff and reviewed MPS Unit 3 Technical Report, MP-LR-4652, "Load Handling Cranes and Devices," Revision 3.

In the MPS Unit 3 LRA, the applicant has identified no aging effects for stainless steel components exposed to air, including fuel transfer system support members (structural base supports, tracks and anchorage) component types. Air is not identified in the GALL Report as an environment for these components and materials.

On the basis of its review of current industry research and operating experience, the project team finds that air on metal will not result in aging that will be of concern during the period of extended operation. The external environments being referred to are typical of ambient air, e.g., under a shelter, indoor, or air-conditioned enclosure or room. Without the presence of the aggressive environment, stainless steel components will experience insignificant amounts of corrosion, and no aging effects are applicable to this component/commodity group. Therefore, the project team finds that there are no aging effects requiring management for metal in an air environment.

7.3.6 MPS Unit 3 LRA Section 3.6 - Aging Management of Electrical and Instrumentation and Controls

In MPS Unit 3 LRA Section 3.6, the applicant provides the results of its AMRs for electrical and instrumentation and controls (I&C) components.

In MPS Unit 3 LRA Tables 3.6.2-1 through 3.6.2-3, (Table 2s) the applicant provides a summary of the AMRs for component types associated with the following electrical and I&C component groups: (1) cables and connectors; (2) electrical penetrations; and (3) bus duct. The summary information for each component type included intended function; material; environment; aging effect requiring management; AMPs; the GALL Report Volume 2 item, cross reference to the MPS Unit 3 LRA Table 3.6.1 (Table 1); and generic and plant-specific notes related to consistency with the GALL Report.

Also, the applicant identified for each component type In MPS Unit 3 LRA Table 3.6.1 (Table 1) those components where further evaluation is recommended, those for which no further evaluation is required, and those that are not applicable to MPS Unit 3, together with the basis for their exclusion.

Additionally, the applicant identified in MPS Unit 3 LRA Tables 3.6.2-1 through 3.6.2-3, which AMR results it considered to be consistent with the GALL Report (table column Notes A through E) and which it justified on a different basis.

The AMRs that are within the scope of the project team audit and review are identified on copies of the MPS Unit 3 LRA Tables 3.6.2-1 through 3.6.2-3 which are included as an appendix to the MPS Units 2 and 3 audit and review plan. Specifically, the project team reviewed AMRs results that the applicant considered to be consistent with the GALL Report (table column Notes A through E).

The project team conducted its audit and review in accordance with SRP-LR Section 3.6.3 and the MPS Units 2 and 3 audit and review plan.

7.3.6.1 Aging Management Evaluations That Are Consistent With the GALL Report, for Which No Further Evaluation Is Required

For aging management evaluations that the applicant states are consistent with the GALL Report and for which further evaluation is not recommended, the project team conducted its audit and review to determine if the applicant's reference to the GALL Report in the MPS Unit 3 LRA is acceptable.

The project team reviewed the MPS Unit 3 LRA to confirm that the applicant (1) provides a brief description of the system, components, materials, and environment; (2) states that the applicable aging effects have been reviewed and are evaluated in the GALL Report; and (3) identifies those aging effects for the electrical and I&C components that are subject to an AMR.

On the basis of its audit and review, the project team determined that for AMRs not requiring further evaluation, as identified In MPS Unit 3 LRA Table 3.6.1 (Table 1), the applicant's references to the GALL Report are acceptable and no further project team review is required.

7.3.6.2 Aging Management Evaluations That Are Consistent With the GALL Report, for Which Further Evaluation Is Recommended

For some line items consistent with the GALL Report in MPS Unit 3 LRA Tables 3.6.2-1 through 3.6.2-3, the GALL Report recommends further evaluation. When further evaluation is recommended, the project team reviewed these further evaluations provided in MPS Unit 3 LRA Section 3.6.2.2 against the criteria provided in the SRP-LR Section 3.6.2.2. The following provides the project team's assessments of these evaluations. These project team assessments are applicable to each Table 2 line item in Section 3.6 citing the item in Table 1.

The MPS Unit 3 LRA sections, identified in MPS Unit 3 LRA Table 3.6.1, where further evaluation is recommended are discussed below.

7.3.6.2.1 Electrical Equipment Subject to Environmental Qualification (MPS Unit 3 LRA Section 3.6.2.2.1)

MPS Unit 3 LRA Section 3.6.2.2.1 is reviewed by NRR DE staff and addressed in Section 4 of the SER related to the MPS Units 2 and 3 LRA.

Attachment 1
Abbreviations, Acronyms and Initialisms

ACI	American Concrete Institute
ACSR	aluminum conductor steel reinforced
AMP	aging management program
AMR	aging management review
API	American Petroleum Institute
ASME	American Society of Mechanical Engineers
ASTM	American Society for Testing and Materials
ATWS	anticipated transients without scram
B&W	Babcock and Wilcox
BMI	bottom mounted instrumentation
BOM	bill of materials
CASS	cast austenitic stainless steel
CCCW	closed-cycle cooling water
CE	Combustion Engineering
CEA	control element assembly
CEDM	control element drive mechanism
CFR	Code of Federal Regulations
CLB	current licensing basis
CRDM	control rod drive mechanism
CST	condensate storage tank
CUF	cumulative usage factor
CVCS	chemical and volume control system
DC	direct current
DE	NRC's Division of Engineering
DIPM	NRC's Division of Inspection Program Management
DMR	document modification record
EPRI	Electric Power Research Institute
EQ	equipment qualification
ESF	engineered safety features
FAC	flow-accelerated corrosion
FSAR	final safety analysis report
GALL	generic aging lessons learned
GL	generic letter
HVAC	heating, ventilation, and air conditioning

Attachment 1 (Continued)
Abbreviations, Acronyms and Initialisms

I&C	instrumentation and controls
IASCC	irradiation-assisted stress corrosion cracking
ICI	incore instrumentation
IEEE	Institute of Electrical and Electronics Engineers
IGA	intergranular attack
IGSCC	intergranular stress corrosion cracking
ILRT	integrated leak rate test
IN	information notice
ISG	interim staff guidance
ISL	Information Systems Laboratories, Inc.
kV	kilovolt
LBB	leak-before-break
LER	licensee event report
LOCA	loss-of-coolant accident
LRA	license renewal application
MAER	material aging effects report
MCC	motor control center
MIC	microbiologically influenced corrosion
MPS	Millstone Power Station
MRP	material reliability program
NACE	National Association of Corrosion Engineers
NDE	non-destructive examination
NEI	Nuclear Energy Institute
NFPA	National Fire Protection Association
NRC	Nuclear Regulatory Commission
NRR	NRC's Office of Nuclear Reactor Regulation
NSAC	Nuclear Safety Analysis Center
NSSS	nuclear steam supply system
ppb	parts per billion
ppm	parts per million
PTS	pressurized thermal shock
PVC	polyvinyl chloride
PWR	pressurized water reactor
PWSCC	primary water stress corrosion cracking
RAI	request for additional information
RBCCW	reactor building closed cooling water
RCCA	rod cluster control assembly
RCP	reactor coolant pump
RCS	reactor coolant system
RG	regulatory guide

Attachment 1 (Continued)
Abbreviations, Acronyms and Initialisms

RI-ISI	risk informed - inservice inspection
RLEP-B	NRC's License Renewal and Environmental Impacts Program, Section B
RWST	refueling water storage tank
SBO	station blackout
SC	structures and components
SCC	stress corrosion cracking
SER	safety evaluation report
SI	safety injection
SRP-LR	Standard Review Plan for Review of License Renewal Applications for Nuclear Power Plants
SRP	Standard Review Plan
SSC	systems, structures, and components
TLAA	time-limited aging analysis
TSP	trisodium phosphate dodecahydrate
UFSAR	updated final safety analysis report
UT	ultrasonic testing

Attachment 2

Project Team and Applicant Personnel

MPS Unit 2 and 3 Audit and Review Project Team

K. Chang, NRC, Team Leader*
K. Hsu, Backup Team Leader*
R. Subbaratnam, NRC
M. Patterson, ISL
S. Traiforos, ISL
J. Woodfield, ISL Lead
F. Saba, ISL
E. Patel, ISL*
J. Leivo, ISL

Project Team Support

S. West, Chief, NRC, RLEP Section B*
J. Eads, NRC, Project Manager
L. Tran, NRC
S. Pope, ISL
C. Amoruso, ISL
D. Nguyen, NRC

Applicant Personnel Contacted

A. Price, Site Vice President
B. Corbin, Director Nuclear Projects
B. Hayes
B. Watson
C. Sorrell
D. Dougherty
D. Duncan
D. Gerber
D. Hei
D. Lippard
D. Wootten
E. Annino
G. Komosky
G. Gardner
G. D'Auria
G. Olson
J. Connelly
J. Klisiewicz
J. Williams
J. Voss
M. Hotchkiss
P. Aitken, Supervisor IPA
P. Smith
R. Wells
S. Baker
S. Heard
S. Janes
S. Jordan
S. Matthess
S. Thickman
T. Steahr
T. Hendy

Applicant Personnel Who Attended the Public Exit Meeting on July 13, 2004

A. Price, Site Vice President
B. Corbin
B. Watson
E. Annino
P. Aitken
S. Jordan
S. Heard

*Attended the Public Exit Meeting on July 13, 2004
NOTE: There were no members of the public at the Public Exit Meeting.

Attachment 3
Element of an Aging Management Program for License Renewal

1	Scope of program	Scope of program should include the specific structures and components subject to an AMR for license renewal.
2	Preventive actions	Preventive actions should prevent or mitigate aging degradation.
3	Parameters monitored or inspected	Parameters monitored or inspected should be linked to the degradation of the particular structure or component intended function(s).
4	Detection of aging effects	Detection of aging effects should occur before there is a loss of structure or component intended function(s). This includes aspects such as method or technique (i.e., visual, volumetric, surface inspection), frequency, sample size, data collection and timing of new/one-time inspections to ensure timely detection of aging effects.
5	Monitoring and trending	Monitoring and trending should provide predictability of the extent of degradation, and timely corrective or mitigative actions.
6	Acceptance criteria	Acceptance criteria, against which the need for corrective action will be evaluated, should ensure that the structure or component intended function(s) are maintained under all CLB design conditions during the period of extended operation.
7	Corrective actions (Audited by DIPM)*	Corrective actions, including root cause determination and prevention of recurrence, should be timely.
8	Confirmation process (Audited by DIPM)	Confirmation process should ensure that preventive actions are adequate and that appropriate corrective actions have been completed and are effective.
9	Administrative controls (Audited by DIPM)	Administrative controls should provide a formal review and approval process.
10	Operating experience	Operating experience of the aging management program, including past corrective actions resulting in program enhancements or additional programs, should provide objective evidence to support the conclusion that the effects of aging will be managed adequately so that the structure and component intended function(s) will be maintained during the period of extended operation.

* DIMP Division of Inspection Program Management

Attachment 4

Disposition of Requests for Additional Information, LRA Supplements, and Followup Items

Requests for Additional Information

None

LRA Supplements

By letter dated July 7, 2004 (ML041900370) the applicant submitted an LRA supplement in response to on-site audits of the aging management programs and management reviews. This LRA supplement provides disposition for all docketed audit findings and addresses future commitments, as stated in Attachment 6 of this report.

By letter dated July 7, 2004 (ML041900407) , the applicant submitted an additional LRA supplement in response to on-site audits of the aging management programs and reviews. This LRA supplement provides additional disposition for docketed audit findings and addresses future commitments, as stated in Attachment 6 of this report.

By letter dated November 9, 2004 (ML0432000606), December 3, 2004 (ML043450341), January 11, 2005 (ML050190289), the applicant submitted additional LRA supplements in response to questions from the project team/staff regarding aging management programs and management reviews.

Any followup items that could not be closed out at the time this audit and review report was issued, are identified below. These items will be closed out in the SER related to the MPS Units 2 and 3 LRA.

Followup Items

Followup Item No.	Description	Closed to RAI (RAI Issue)
7.1.7.4-1	The project team requested the applicant to provide an aging management program to address the metallic portion of fuse holders or provide justification of as to why an AMP is not required.	

Attachment 5

List of Documents Reviewed

The following is a list of applicant documents reviewed by the project team, including documents prepared by others for the applicant. Inclusion of a document on this list does imply that the project team reviewed the entire document, but, rather that selected sections or portions of the documents were reviewed as part of the overall effort documented in this report. In addition, inclusion of a document in this list does not imply NRC acceptance of the document.

Applicant's Aging Management Program	GALL Aging Management Program	MPS LRA-AMP Basis Document and Other Documents Reviewed
Battery Rack Inspections (B2.1.1)	Plant-specific	MPS Technical Report, MP-LR-3734/MP-LR-4734, Battery Rack Inspections, Rev. 2, 3/22/2004 MPS Surveillance Procedure, C SP 750, Battery Weekly and Quarterly Surveillance, Rev. 000, 8/15/2002 MPS Surveillance Procedure, C SP 788B, Fire Pump Diesel Engine Battery 18-Month Surveillance, Rev. 000, 4/2/2001 MPS Maintenance Procedure, MP 3786AB, SBO Battery Inspections and Equalize Procedure, MPS Unit 3, Rev. 002, 7/12/2002 MPS LRA Section A2.1.1 (U-2), Battery Rack Inspections MPS LRA Section A2.1.1 (U-3), Battery Rack Inspections MPS LRA Section B2.1.1 (U-2), Battery Rack Inspections MPS LRA Section B2.1.1 (U-3), Battery Rack Inspections MPS Follow-up Action Item - FAI 122

Attachment 5 (Continued)
List of Document Reviewed

Applicant's Aging Management Program	GALL Aging Management Program	MPS LRA-AMP Basis Document and Other Documents Reviewed
Boraflex Monitoring (B2.1.2)	XI.M22	MPS Technical Report, MP-LR-3717/MP-LR-4717, Boraflex Monitoring, Rev. 2, 3/16/2004 NUREG-1801, *Generic Aging Lessons Learned (GALL) Report*, Volume 1 and Volume 2, April 2001, Chapter XI.M22 NRC Information Notice 95-38, Degradation of Boraflex Neutron Absorber in Spent Fuel Storage Racks, September 1995 NRC Generic Letter 96-04, Boraflex Degradation in Spent Fuel Storage Racks, June 1996 MPS System Operating Procedure, EN 21054, Spent Fuel Rack Boraflex Monitoring, Rev. 1, Ch. 1, 7/12/2001
Boric Acid Corrosion (B2.1.3)	XI.M10	MPS Technical Report, MP-LR-3705/MP-LR-4705, Boric Acid Corrosion, Rev. 2, 3/11/2004 NUREG-1801, *Generic Aging Lessons Learned (GALL) Report*, Volume 1 and Volume 2, April 2001, Chapter XI.M10
Buried Piping Inspection (B2.1.4)	XI.M28 and XI.M34	MPS Technical Report, MP-LR-3721/MP-LR-4721, Buried Piping Inspection, Rev. 2, 3/16/2004 NUREG-1801, *Generic Aging Lessons Learned (GALL) Report*, Volume 1 and Volume 2, April 2001, Chapters XI.M28, XI.M34 National Association of Corrosion Engineers (NACE) Standard, RP0169-96, Control of External Corrosion on Underground or Submerged Metallic Piping Systems, 1996 MPS Maintenance Procedure, MP 2720A3, Cathodic Protection Maintenance, Millstone Unit 2, Rev. 004, 11/27/2001

Attachment 5 (Continued)
List of Document Reviewed

Applicant's Aging Management Program	GALL Aging Management Program	MPS LRA-AMP Basis Document and Other Documents Reviewed
		MPS Maintenance Procedure, MP 3786BA, Preventive Maintenance on Cathodic Protection Equipment, Millstone Unit 3, Rev. 007-03, 6/15/2000 MPS LRA Section A2.1.3 (U-2), Buried Pipe Inspection Program MPS LRA Section A2.1.3 (U-3), Buried Pipe Inspection Program MPS LRA Section B2.1.4 (U-2), Buried Pipe Inspection Program MPS LRA Section B2.1.4 (U-3), Buried Pipe Inspection Program MPS Follow-up Action Item - FAI 78 MPS Follow-up Action Item - FAI 113
Chemistry Control For Primary Systems (B2.1.5)	XI.M2	MPS Technical Report, MP-LR-3702/MP-LR-4702, Chemistry Control For Primary Systems, Rev. 2, 3/16/2004 NUREG-1801, *Generic Aging Lessons Learned (GALL) Report*, Volume 1 and Volume 2, April 2001, Chapter XI.M2 EPRI TR-105714, "PWR Primary Water Chemistry Guidelines," Revision 4, March 1999 MPS Technical Specification, Table 3.4-1, Reactor Coolant Systems Chemistry Limits, Millstone Unit 2, 8/1/1975 MPS Technical Specification, Table 4.4-3, Reactor Coolant Systems Chemistry Limits Surveillance Requirements, Millstone Unit 3, 1/31/1996

Attachment 5 (Continued)
List of Document Reviewed

Applicant's Aging Management Program	GALL Aging Management Program	MPS LRA-AMP Basis Document and Other Documents Reviewed
		MPS Chemistry Procedure, CP 3802L, Rev. 0, Reactor Coolant System Lithium and Hydrazine Control MPS Chemistry Procedure, CP 2802A, Rev. 003-02, Primary Chemistry Control, 10/23/2001 MPS Chemistry Procedure, CP 3802A, Rev. 006-02, Primary Chemistry Control, 8/14/2001 MPS Chemistry Procedure, CP 2802C, Rev. 006-03, Balance of Plant Sampling and Chemistry, 10/1/2001 MPS Chemistry Procedure, CP 3802C, Rev. 004-01, Balance of Plant Sampling and Chemistry, 8/14/2001 MPS Chemistry Procedure, CP 3802L, Rev. 0, Reactor Coolant System Lithium and Hydrazine Control, 5/19/2000 MPS Condition Report, M2-00-1590, Reactor Coolant Sulfate Concentration Greater Than Action Level 1, 5/25/2000 MPS Condition Report, M3-98-3538, RCS Lithium Concentration Did Not Change As Expected, 7/26/1998 MPS Condition Report, CR-01-05168, Large Increase in RCS Ammonia Concentration, 5/14/2001 MPS Condition Report, M3-00-2187, Unit 3 RCS Lithium Below Control, 8/12/2000 MPS Condition Report, M3-00-3713, Primary Grade Water Storage Tank A Contaminated With Chlorides and Sodium, 12/27/2000

Attachment 5 (Continued)
List of Document Reviewed

Applicant's Aging Management Program	GALL Aging Management Program	MPS LRA-AMP Basis Document and Other Documents Reviewed
		MPS Strategics Primary Water Chemistry Plan, Rev. 0, 7/17/2000
Chemistry Control For Secondary Systems (B2.1.6)	XI.M2	MPS Technical Report, MP-LR-3703/MP-LR-4703 Chemistry Control for Secondary Systems, Rev. 2, 3/11/2004 NUREG-1801, *Generic Aging Lessons Learned (GALL) Report*, Volume 1 and Volume 2, April 2001, Chapter XI.M2 MNPS-2 - FSAR, Rev. 17, Page 9.12-2; Table 9.2-2 Reactor Coolant and Demineralized Water Chemistry MPS NGP 2.17, Secondary Water Chemistry Program, Rev 10, 1/8/1999 MPS Chemistry Procedure, CP 2802B, Secondary Chemistry Control, Rev. 003-05, 10/23/2001 MPS Chemistry Procedure, CP 2802C, Balance of Plant Sampling and Chemistry Control, Rev. 006-03, 10/01/2001 MPS Chemistry Procedure, CP 2802K, Unit 2 Feed Water Sampling Station, Rev. 000, 2/14/2001 MPS Chemistry Procedure, CP 3802B, Secondary Chemistry Control, Rev. 010-01, 8/11/2000 MPS Chemistry Procedure, CP 3802C, Balance of Plant Chemistry Control, Rev. 004-01, 8/9/2001 MPS Strategic Secondary Water Chemistry Plan, Rev. 0, 3/16/1999 MPS Strategic Secondary Water Chemistry Plan, Rev. 0, 9/13/1999

Attachment 5 (Continued)
List of Document Reviewed

Applicant's Aging Management Program	GALL Aging Management Program	MPS LRA-AMP Basis Document and Other Documents Reviewed
		MPS Condition Report, M2-00-2342 - MP2 Chemistry failed to meet acceptance criteria on the NWT QA Splits for Silica (Q-Check Set 24) and Lithium, Sulfate (Q-Chem Set 62). Event date: 8/23/2000 MPS Condition Report, M2-00-2509 - An unexpected ingress of Sodium and Total Organic Carbon (TOC) in the water being fed to the Steam Generators. Event date: 9/10/2000 MPS Condition Report, M2-00-2727 - Weekly Feed Water sample for Iron Conc. found to be above Action Level 1 and EPRI PWR Secondary Chemistry guideline value of 5.0 PPB. Event date: 10/5/2000 MPS Condition Report, M2-01-0110 - Condensate dissolved oxygen is elevated, yet Steamjet Air Ejector (SJAE) off-gas flow is low. Event date: 1/11/2001 MPS Condition Report, M3-99-3746 - Materials Eng. reviewed video tape from Steam Generator. Secondary side exam revealed significant corrosion product deposition on tube surfaces. Event date: 11/8/1999 MPS Condition Report, M3-00-0802 - CST oxygen out of spec high at 870 PPB limit is 1000 PPB. Event date: 3/23/2000
Closed-Cycle Cooling Water System (B2.1.7)	XI.M21	MPS Technical Report, MP-LR-3716/MP-LR-4716, Closed-Cycle Cooling Water Systems, Rev. 2, 3/9/2002 NUREG-1801, *Generic Aging Lessons Learned (GALL) Report*, Volume 1 and Volume 2, April 2001, Chapter XI.M21

Attachment 5 (Continued)
List of Document Reviewed

Applicant's Aging Management Program	GALL Aging Management Program	MPS LRA-AMP Basis Document and Other Documents Reviewed
		MPS Surveillance Procedure, SP 3630A.4, Reactor Plant Component Cooling Water Pump 3CCP*P1A Operational Readiness Test, Rev. 010-03, 11/26/2003 MPS Engineering Procedure, EN31121, IST Pump Operational Readiness Evaluation, Rev. 007-04, 5/7/2003 MPS Chemistry Procedure, CP 802/2802/3802AA, Closed Cooling Water Systems Chemistry Control, Rev. 006, 12/20/2002 MPS Chemistry Procedure, CP 2802G, Sampling Closed Cooling Water Systems, Rev. 001-01, 3/13/2000 MPS Chemistry Procedure, CP 802/2802/3802Z, Sampling for Microbiological Activity, Rev. 1, 8/3/1998 IST Program Manual, Rev. 0, 6/19/1997 MPS Inservice Test Program for Pumps and Valves, Rev. 7, Change 7, 3/30/2001 MPS Inservice Testing Program Plan, Rev. 7, 6/15/2001 MPS Pump and Valve Inservice Testing Basis Document, Rev. 3, Change 0 MPS Surveillance Procedure, SP 2613K, Diesel Generator Slow Start Operability Test, Facility 1, Rev. 001-03, 10/10/2001 MPS Surveillance Procedure, SP 2613A, Diesel Generator Operability Test, Facility 1, Rev. 020-01, 10/10/2001

Attachment 5 (Continued)
List of Document Reviewed

Applicant's Aging Management Program	GALL Aging Management Program	MPS LRA-AMP Basis Document and Other Documents Reviewed
		MPS Surveillance Procedure, SP 3646A.1, Emergency Diesel Generator A Operability Test, Rev. 014-04, 9/17/2001 MPS Surveillance Procedure, AP 2611A, "A" Reactor Building Closed Cooling Water (RBCCW) Pump Tests, Rev. 8, 12/18/1998 MPS Surveillance Procedure, SP 2670, Saltwater Cooled HX D/P Determination, Rev. 008-10, 2/21/2003 MPS Condition Report, M2-97-2540, Non-Destructive Examination (NDE) of Reactor Building Closed Cooling Water (RBCCW) Piping in Containment shows 45 degree elbow does not meet wall thickness required, 11/1/1997 MPS Condition Report, M3-00-1789, High PH in Unit 3 Reactor Plant Component Cooling Water System, 7/12/2000 MPS Condition Report, M2-00-3316, Lowering PH trend on the B EDG Cooling Water, 12/5/2000 MPS Condition Report, M2-99-2256, Shill Water Chlorides and Conductivity have exhibited an adverse increasing trend since the beginning of April, 8/17/1999 MPS Condition Report, M3-98-4998, High out of Specification Chlorides were detected during routing weekly sampling of the control BLDG CHILL Water System, 12/3/1998 MPS Condition Report, M2-98-0469, Sodium Nitrite in DG Jacket cooling water as corrosion inhibitor misidentified as high chloride, 2/20/1998

Attachment 5 (Continued)
List of Document Reviewed

Applicant's Aging Management Program	GALL Aging Management Program	MPS LRA-AMP Basis Document and Other Documents Reviewed
		MPS Condition Report, M2-98-1603, Past Chemical Treatment of EDG Jacket cooling water system did not kill all denitrifying bacteria because some portion of system were isolated, 6/2/1998 MPS Condition Report, M2-99-1005, Cooling Water PH had dropped below minimum specification limit in B EDG Jacket Cooling Water, 2/26/1999
Electrical Cables And Connectors Not Subject To 10 CFR 50.49 Environmental Qualification Requirements (B2.1.8)	XI.E1	MPS Technical Report, MP-LR-3731/MP-LR-4731, Electrical Cables And Connectors Not Subject To 10 CFR 50.49 Environmental Qualification Requirements, Rev. 2, 3/13/2004 NUREG-1801, *Generic Aging Lessons Learned (GALL) Report*, Volume 1 and Volume 2, April 2001, Chapter XI.E1 MPS Technical Report, MP-LR-3655, License Renewal Project Aging Management Review, Cables and Connectors, Millstone Power Station Unit 2, Section 3.1, Evaluation Boundaries and Scope, Revision 2, Effective Date 12/27/2003 MPS Technical Report, MP-LR-4655, License Renewal Project Aging Management Review, Cables and Connectors, Millstone Power Station Unit 3, Section 3.1, Evaluation Boundaries and Scope Revision 2, Effective Date 12/27/2003 MPS Follow-up Action Item, FAI-85 (Unit 2), AMA Technical Report; LR Application: Tracking No. MP-LR-3731/4731(P), due date 1/1/2010 MPS Follow-up Action Item, FAI-86 (Unit 3), Procedure; LR Application: Tracking No. MP-LR-3731/4731(P), due date 1/1/2010

Attachment 5 (Continued)
List of Document Reviewed

Applicant's Aging Management Program	GALL Aging Management Program	MPS LRA-AMP Basis Document and Other Documents Reviewed
		MPS Condition Report, M2-98-3248, Qualified Life for Kerite Control Cable Associated with PORV Block Valve Motor Operators and 2 CAR Fan Motors Has Been Exceeded - Calculation EEQLKECB-02657-E2, Event date: 10/29/1998 MPS Condition Report, M2-98-1756, During Wire Bend Investigation RPS Channel B NIS High Power Trip Alarm Received When B Rear Panel Door Was Opened, Event date: 6/17/1998 MPS Condition Report, M2-99-1286, The Jacket on the Channel A Linear Range Detector Cable Located in Control Room Cabinet RC05A Is Damaged (CRED completed), Event date: 4/7/1999 MPS Condition Report, M3-98-5341, Discrepancies Found with HV Cable and Inner Shield of the Signal Cable for 3RMS*RE41, Event date: 12/29/1998 MPS Condition Report, M3-99-0381, 32-2P 7H Starter Contact Carrier Damaged, Event date: 2/4/1999 MPS Condition Report, M1-98-0439, NRC IN-98-21: SNL Environmental Testing Identifies Potential of Class 1E Cable Conduit Seals/Connectors to Degrade Safety Related Equipment [industry OE evaluation], Event date: 6/11/1998 MPS Condition Report, M2-99-1456, As-found Low Flow Trip TU-3 Setpoint Found Out-of-Spec During Performance of SP2401GB, Event date: 4/25/1999

Attachment 5 (Continued)
List of Document Reviewed

Applicant's Aging Management Program	GALL Aging Management Program	MPS LRA-AMP Basis Document and Other Documents Reviewed
		MPS Condition Report, M2-99-0165, Bundle of Three Cables is in Contact with Unistrut and Bottom Cable is Deformed (West Cable Vault, 45'-6" Elevation), Event date: 1/15/1999 MPS Condition Report, M3-99-0901, Insulation on Main Feed Cables in [bolt heater] Powerpack from Turbine Deck Deteriorated to the Point of Cracking and Flaking off, Event date: 3/24/1999 MPS Condition Report, M2-98-2934, Cable Z2B6230A Has Exceeded Its Qualified Life; Z2B6159A Is Approaching End of Qualified Life per Calculation EEQLANCB-02604-E2 Revision 0, Event date: 9/30/1998 MPS Condition Report, M2-99-0566, Some Connection Plugs for the HJTC Probes Found to Be Missing Their Ceramic Inserts, Event date: 2/13/1999 MPS Condition Report, M2-98-0175, Outer Braided Cover on 2-SI-624 Motor Lead Degraded, Event date: 1/21/1998 MPS Condition Report, 02-3168 [Unit 2], Damaged Conductor Insulation in Box Exposing Bare Conductor, Event date: 3/16/2002
Electrical Cables Not Subject to 10 CFR 50.49 Environmental Qualification Requirements Used in Instrumentation Circuits (B2.1.9)	XI.E2	MPS Technical Report, MP-LR-3916/4916, License Renewal Project Aging Management Program, Electrical Cables and Connectors not Subject to 10 CFR 50.49 EQ Requirements Used in Instrumentation Circuits, Revision 2, 3/13/2004 NUREG-1801, *Generic Aging Lessons Learned (GALL) Report*, Volume 1 and Volume 2, April 2001, Chapter XI.E2

Attachment 5 (Continued)
List of Document Reviewed

Applicant's Aging Management Program	GALL Aging Management Program	MPS LRA-AMP Basis Document and Other Documents Reviewed
		MPS Technical Report, MP-LR-3740/4740, License Renewal Project Position Paper, In-Scope Non-Environmentally Qualified Instrumentation Circuits with Sensitive Low-Level Signals, Revision 1, 12/10/2003 MPS Follow-up Action Item, FAI-214 (both units), Procedure; LR Application: Tracking No. MP-LR-3740/4740, due date 1/1/2010 MPS Condition Report, M2-99-1286, The Jacket on the Channel A Linear Range Detector Cable Located in Control Room Cabinet RC05A Is Damaged (CRED completed), Event date: 4/7/1999 MPS Condition Report, M3-98-5341, Discrepancies Found with HV Cable and Inner Shield of the Signal Cable for 3RMS*RE41, Event date: 12/29/1998
Fire Protection Program (B2.1.10)	XI.M26 and XI.M27	MPS Technical Report, MP-LR-3720/ MP-LR-4720, Fire Protection Program, Rev. 2, 3/9/2004 NUREG-1801, *Generic Aging Lessons Learned (GALL) Report*, Chapter XI.M26 and XI.M27 MPS Technical Report, MP-LR-3720, Rev 2, "Fire Protection Program." 10 CFR 50.48, Fire Protection, Code of Federal Regulations, Office of the Federal Register, National Archives and Records Administration MPS Unit 2 Fire Hazards Analysis (FHA), Technical Report, Millstone Unit 2, Dominion Nuclear Connecticut MPS Unit 3 Fire Protection Evaluation Report (FPER), Technical Report, Millstone Unit 3, Dominion Nuclear Connecticut

Attachment 5 (Continued)
List of Document Reviewed

Applicant's Aging Management Program	GALL Aging Management Program	MPS LRA-AMP Basis Document and Other Documents Reviewed
		10 CFR 50, Appendix R, Fire Protection Program for Nuclear Power Facilities Operating Prior to January 1, 1979, Code of Federal Regulations, Office of the Federal Register, National Archives and Records Administration CMEB 9.5-1, Guidelines for Fire Protection for Nuclear Power Plants Branch Technical Position (BTP), U.S. Nuclear Regulatory Commission, Washington, D.C. MPS Technical Report, MP-LR-3005/MP-LR-4005, Fire Protection, Technical Report, Millstone License Renewal Project, Dominion Nuclear Connecticut Interim Staff Guidance (ISG)-04, Aging Management of Fire Protection Systems for License Renewal, U.S. Nuclear Regulatory Commission, 12/3/2002
Flow Accelerated Corrosion (B2.1.11)	XI.M17	MPS Technical Report, MP-LR-3712/MP-LR-4712, Flow Accelerated Corrosion, Rev. 2, 3/16/2004 NUREG-1801, *Generic Aging Lessons Learned (GALL) Report*, Volume 1 and Volume 2, April 2001, Chapter XI.M17 NSAC-202L, Recommendation for an Effective Flow-Accelerated Corrosion Program, Electric Power Research Institute, Rev. 1, November 1996 NRC Bulletin 87-01, Thinning of Pipe Wall in Nuclear Power Plants, 7/9/1987 NRC Generic Letter 89-08, Erosion/ Corrosion-Induced Pipe Wall Thinning, 5/2/1989 MPS Program Manual, MP-24-FAC-PRG, Flow-Accelerated Corrosion Program Manual, Rev. 5, 8/8/2001

Attachment 5 (Continued)
List of Document Reviewed

Applicant's Aging Management Program	GALL Aging Management Program	MPS LRA-AMP Basis Document and Other Documents Reviewed
Fuel Oil Chemistry (B2.1.12)	XI.M30	MPS Technical Report, MP-LR-3723/MP-LR-4723, Fuel Oil Chemistry, Rev. 2, 3/15/2004 NUREG-1801, *Generic Aging Lessons Learned (GALL) Report*, Volume 1 and Volume 2, April 2001, Chapter XI.M30 American Society for Testing and Materials (ASTM) Designation, D1796-97, Standard Test Method for Water and Sediment in Fuel Oils by the Centrifuge Method (Laboratory Procedure) American Society for Testing and Materials (ASTM) Designation, D2276-00, Standard Test Method for Particulate Contaminant in Aviation Fuel by Line Sampling American Society for Testing and Materials (ASTM) Designation, D2709-96 (Reapproved 2001), Standard Test Method for Water and Sediment in Middle Distillate Fuels by Centrifuge American Society for Testing and Materials (ASTM) Designation, D4057-95 (Re-approved 2000), Standard Practice for Manual Sampling of Petroleum and Petroleum Products MPS Chemistry Procedure, CP 807/2807/ 3807AAL, Diesel Fuel Oil and Aviation Turbine Fuel Sampling and Analysis, Rev. 002, 4/13/2000 MPS Site Services Procedure, ENP 5101, Receiving and Transferring Fuel Oil at Millstone Station, Rev. 0, 11/12/1999 MPS Common Operating Procedure, C OP 600.5, Fuel Oil Delivery Sampling Requirements, Rev. 004-02, 11/29/2000

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List of Document Reviewed

Applicant's Aging Management Program	GALL Aging Management Program	MPS LRA-AMP Basis Document and Other Documents Reviewed
		MPS Surveillance Procedure, SP 2613E, Diesel Generator Fuel Oil Filling and Sampling, Millstone Unit 2, Rev. 009-01, 10/22/2001 MPS Surveillance Procedure, SP 3646B.8, Emergency Generator Fuel Oil Particulate Sample Analysis, Millstone Unit 3, Rev. 009-01, 1/5/2000 MPS Surveillance Procedure, SP 2865, Sampling and Analysis of Diesel Fuel Oil Storage Tank T-148, Millstone Unit 2, Rev. 002-00, 10/24/2001 MPS Surveillance Procedure, SP 3670.4, Routine Preventive Maintenance (PM), Millstone Unit 3, Rev. 018-05, 10/16/2001 MPS Common Surveillance Procedure, C SP 600.10, Diesel Fire Pump Fuel Oil Storage Tank M7-15 Sample, Rev. 000-03, 2/24/2001 MPS Surveillance Procedure, SP 3646B.5, Diesel Generator Fuel Oil Storage Tank Dewatering, Rev. 6, 7/10/1995 MPS System Operating Procedure, OP 3346D, Station Blackout Diesel, Millstone Unit 3, Rev. 009-01, 8/30/2001 MPS Maintenance Procedure, MP2721J, Periodic Inspection of Unit 2 Tanks, Rev. 003-02, 12/21/2000 MPS Engineering Procedure, EN31154, Tank Inspection Plan, Rev. 000-05, 12/17/2001 MPS Preventive Maintenance, M2T48A, "A" Diesel Engine Fuel Oil Supply Day Tank, 1/29/2002 MPS Condition Report, M2-00-0364, Fuel Oil Delivery was discovered unsat for API Gravity and Kinematic Viscosity not accepted, 2/10/2000

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Applicant's Aging Management Program	GALL Aging Management Program	MPS LRA-AMP Basis Document and Other Documents Reviewed
		MPS Condition Report, M2-00-0406, Sample of MP2 Emergency Diesel Generator Fuel Oil taken from the Road Tanker failed the sample analysis, 2/15/2000 MPS Condition Report, M3-99-3126, While performing SP 3646B.5 EDG Fuel Oil Storage Tank Dewatering slight rust and gritty sediment was observed being pumped out of EGF*TK1A, 9/6/1999 MPS Condition Report, M3-98-0850, Fuel Oil Delivery failed the Octane Test, 2/12/1998 MPS Condition Report, M3-99-2178, During post refuel maintenance testing of the B EDG, Engine driven fuel pump was not supplying fuel to engine, as DC fuel pump was observed to be, 6/6/1999 MPS Condition Report, M2-98-2927, Diesel Fuel Oil Shipment 2-98-013 failed analysis for particulates analysis results 59 parts per million (PPM) spec is under 10 PPM, 9/29/1998 MPS Condition Report, M3-98-3396, Results of the fuel oil particulates for SBO Diesel storage measured 19 parts per million (PPM) guidelines are 10 PPM, 7/15/1998 MPS Condition Report, M2-00-0454, The current practice of sending emergency diesel fuel oil samples offsite for analysis during deliveries is cumbersome and expensive, 2/18/2000 MPS Condition Report, M2-98-0494, Common Procedure Basis may not have adequately considered all tech. att. for fuel oil, 2/24/1998

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Applicant's Aging Management Program	GALL Aging Management Program	MPS LRA-AMP Basis Document and Other Documents Reviewed
		MPS Condition Report, M3-98-0048, Purchase order for MP3 EDG fuel was not QA, 1/5/1998 MPS Discrepancy Report, DR-0312, Water in Diesel Oil Storage Tank (T47A) could enter diesel oil supply, Rev. 4, 1/27/1998 MPS Follow-up Action Item, FAI-204, MP-LR-3723/4723, AMA Technical Report, LR Application; Procedure MPS Follow-up Action Item, FAI-17, MP-LR-3722/4722, AMA Technical Report
General Condition Monitoring (B2.1.13)	Plant-specific	MPS Technical Report, MP-LR-3736/ MP-LR-4736, General Condition Monitoring Activities, Rev. 2, 3/16/2004 MPS Guideline, MP-24-ENG-GDL555, Millstone System Engineer Walkdowns, Rev. 0, 2/24/2000 MPS Health Physics Operations Procedure, RPM 1.5.5, Guidelines For The Performance Of Radiological Surveys, Rev. 004, 2/8/2002 MPS Health Physics Operations Procedure, RPM 1.5.1, Routine Survey Frequency, Rev. 008, 12/20/2001 MPS Surveillance Procedure, SP 2669A, PEO Rounds, Millstone Unit 2 MPS Guideline, MP-24-MR-GDL650, System Engineer's Quarterly System Health Reports, Rev. 003-01, 1/2/2002 MPS Health Physics Procedure, C-HP-1032.020, Radiological Survey Criteria and Scheduling, Draft MPS Follow-up Action Item, FAI-218, Training of Personnel Performing GCM Activities Inspections (undated)

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Applicant's Aging Management Program	GALL Aging Management Program	MPS LRA-AMP Basis Document and Other Documents Reviewed
		MPS Follow-up Action Item, FAI-266, Addition of Duct Seal Inspections (undated)
Inaccessible Medium Voltage Cables Not Subject To 10 CFR 50.49 Environmental Qualification Requirements (B2.1.14)	XI.E3	MPS Technical Report, MP-LR-3731/MP-LR-4731, License Renewal Project Aging Management Program, Inaccessible Medium Voltage Cables not Subject to 10 CFR 50.49 EQ Requirements, Revision 2, effective date 3/16/2004 NUREG-1801, *Generic Aging Lessons Learned (GALL) Report*, Volume 1 and Volume 2, April 2001, Chapter XI.E3 MPS Technical Report MP-LR-3728/4728, Structures Monitoring Program, Aging Management Program Report, License Renewal Project, Dominion Nuclear Connecticut, Section 4.3, Enhancement No. 4, Revision 2, 3/16/2004 *Guideline for the Management of Adverse Localized Equipment Environments*, EPRI, Palo Alto, CA: 1999. TR-109619. [Final Report, June 1999] NRC Information Notice (IN) 2002-12, Submerged Safety-Related Electrical Cables, USNRC, March 2002 CEN104I-1, Condition Monitoring of Structures, Revision 5, effective 3/19/2003 CEN104I-1, Structural Monitoring Inspection Sheet, Unit 2 Turbine Building 2390D below 14'-6" elevation, Cable Pit 2, completed/signed by engineering 12/14/2001 EN 31098, Millstone Unit 3 Condition Monitoring of Structure, Sheet 12, Revision 5, effective 8/20/2001

Attachment 5 (Continued)
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Applicant's Aging Management Program	GALL Aging Management Program	MPS LRA-AMP Basis Document and Other Documents Reviewed
		MPS PMMS Work Order M3-98-18202, [inspection of manhole 3EMH*3B], 11/17/1999 MPS PMMS Work Order M3-98-16244, [inspection of manhole 3EMH*3A], 9/7/1999 MPS Follow-up Action Item, FAI-171, (Unit 2), Procedure; LR Application: Tracking No. MP-LR-3728/4728, due date 1/10/2010 MPS Follow-up Action Item, FAI-88, (Unit 3), Procedure; LR Application: Tracking No. MP-LR-3728/4728, due date 1/10/2010 MPS Condition Report, CR-01-09527 [Unit 2], Safety Related Cables Found Partially Immersed in Water at Manhole 1A Located near Intake Structure; Water Level Comes Only to Bottom of Cables, initiated 9/26/2001 MPS Condition Report, CR-01-12270 [Unit 2], Follow-up Cable Inspections Based on CR-01-08714, Submergence of Cables in Manholes or Cable Pits, initiated 12/21/2001 MPS Condition Report, CR-01-08714 [Unit 3], Potential for Submergence of Safety Related Cables and Cable Qualification Needs Investigation Due to Experience from Other Stations, Event date 8/3/2001 MPS Operability Determination MP2-084-01, Safety Related Cables Partially Immersed in Unit 2 Manhole 1A and B, Revision 0 [Final], 9/27/2001
Infrequently Accessed Areas Inspection Program (B2.1.15)	Plant-specific	MPS Technical Report, MP-LR-3732/MP-LR-4732, Infrequently Accessed Areas Inspection Areas, Rev. 2, 3/16/2004 MPS LRA Section A2.1.14 (U-2), Infrequently Accessed Areas Inspection Program

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List of Document Reviewed

Applicant's Aging Management Program	GALL Aging Management Program	MPS LRA-AMP Basis Document and Other Documents Reviewed
		MPS LRA Section A2.1.14 (U-3), Infrequently Accessed Areas Inspection Program MPS LRA Section B2.1.15 (U-2), Infrequently Accessed Areas Inspection Program MPS LRA Section B2.1.15 (U-3), Infrequently Accessed Areas Inspection Program MPS Follow-up Action Item, FAI-97, Develop a one time inspection activity for infrequently accessed areas. Inspection results will be used as base line. (U-3) MPS Follow-up Action Item, FAI-98, Develop a one time inspection activity for infrequently accessed areas. Inspection results will be used as base line. (U-2)
ISI: Containment Inspections (B2.1.16)	XI.S1, XI.S2 and XI.S4	MPS Technical Report: MP-LR-3726/MP-LR-4726, Inservice Inspection-Containment Inspection, Rev. 2, 3/16/2004 NUREG-1801, *Generic Aging Lessons Learned (GALL) Report*, Volume 1 and Volume 2, April 2001, Chapters XI.S1, XI.S2 and XI.S4 10 CFR 50.55a, Codes and Standards, Code of Federal Regulations, Office of the Federal Register, National Archives and Records Administration American Society of Mechanical Engineers (ASME) Section XI, Rules for Inservice Inspection of Nuclear Power Plant Components, American Society of Mechanical Engineers, New York, NY 10 CFR 50, Appendix J, Primary Reactor Containment Leakage Testing for Water-Cooled Power Reactors, Code of Federal Regulations, Office of the Federal Register, National Archives and Records Administration

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Applicant's Aging Management Program	GALL Aging Management Program	MPS LRA-AMP Basis Document and Other Documents Reviewed
		MPS CEN 101C, Management of ASME XI Inservice Inspection Program, Common Engineering Procedure, Millstone Power Station, Dominion Nuclear Connecticut MPS IWE/IWL Inservice Inspection Program Manual, Program Manual, Millstone Power Station, Dominion Nuclear Connecticut MPS Technical Specification 3/4.6, Containment Systems, Millstone Unit 2, Dominion Nuclear Connecticut MPS Technical Specification 3/4.6, Containment Systems, Millstone Unit 3, Dominion Nuclear Connecticut NRC Regulatory Guide 1.35, Inservice Inspection of Ungrouted Tendons in Prestressed Concrete Containments, Rev. 3, July 1990 10 CFR 50.65, Requirements for Monitoring the Effectiveness of Maintenance at Nuclear Power Plants, Code of Federal Regulations, Office of the Federal Register, National Archives and Records Administration NRC Regulatory Guide 1.147, Inservice Inspection Code Case Acceptability, ASME Section XI, Division 1, Revision 12, May 1999 NRC Information Notice 99-10, Degradation of Prestressing Tendon Systems in Prestressed Concrete Containments, April 1999 NRC Regulatory Guide 1.163, Performance-Based Containment Leak-Test Program, September 1995

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List of Document Reviewed

Applicant's Aging Management Program	GALL Aging Management Program	MPS LRA-AMP Basis Document and Other Documents Reviewed
		Nuclear Energy Institute, NEI 94-01, Industry Guideline for Implementing Performance-Based Option of 10 CFR Part 50, Appendix J, Revision 0, MPS MP-16-MMM, Corrective Action, Administrative Procedure, Dominion Nuclear Connecticut American Concrete Institute, ACI 349.3R, Evaluation of Existing Safety-Related Concrete Structures NRC Regulatory Guide 1.35.1, Determining Prestressing Forces for Inspection of Prestressed Concrete Containments, July 1990 MPS WC 3, ASME Section XI Repair and Replacement Program, Work Management Procedure, Millstone Power Station, Dominion Nuclear Connecticut MPS Engineering File Number 354, 25th, Year Physical Surveillance of Unit 2 Containment Building Post-Tensioning at the Millstone Power Station, Precision Surveillance Corporation, Revision 1, Millstone Unit 2, Dominion Nuclear Connecticut, August 15, 2003
ISI: Reactor Vessel Internals (B2.1.17)	XI.M16, XI.M12, XI.M13	MPS Technical Report, MP-LR-3711/MP-LR-4711, Inservice Inspection: Reactor Vessel Internals, Rev. 2, 3/13/2004 NUREG-1801, *Generic Aging Lessons Learned (GALL) Report*, Volume 1 and Volume 2, April 2001, Chapters XI.M16, XI.M12, XI.M13

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Applicant's Aging Management Program	GALL Aging Management Program	MPS LRA-AMP Basis Document and Other Documents Reviewed
ISI: Systems, Components & Supports (B2.1.18)	XI.S3, XI.M1, XI.M3, XI.M11, XI.M12	MPS Technical Report: MP-LR-3701/MP-LR-4701, Inservice Inspection Program-Systems, Components and Supports, Rev. 2, 3/11/2004 NUREG-1801, *Generic Aging Lessons Learned (GALL) Report*, Volume 1 and Volume 2, April 2001, Chapter XI.S3, XI.M1, XI.M3, XI.M11, XI.M12 MPS Surveillance Procedure, SP 21141, "Inservice Inspection", Unit 2, Rev. 7, 9/8/2000 MPS Surveillance Procedure, SP 31129, "Inservice Inspection", Unit 3, Rev. 8, 9/17/2001 American Society of Mechanical Engineers (ASME) Code Case N-491-1 MPS TLAA Report, MP-LR-3013/4013, "Identification/Nuclear Component Fatigue Management (NCFM) Program Description", (define the Unit 3 PZR Spray Head Assembly) MPS TLAA Report, MP-LR-3014/4014, "Leak-Before-Break (LBB), Rev.1, 3/31/2004 MPS Technical Report, MP-LR-4402, AMR Reactor Coolant System, Millstone Power Station Unit 3, Rev. 2 12/29/2003 MPS Technical Report, MP-LR-4029, Thermal Embrittlement Evaluation of the Millstone Unit 3 Pressurizer Spray Head, TLAA Report, Millstone Unit 3

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Applicant's Aging Management Program	GALL Aging Management Program	MPS LRA-AMP Basis Document and Other Documents Reviewed
Inspection Activities: Load Handling Cranes and Devices (B2.1.19)	XI.M23	MPS Technical Report, MP-LR-3718/MP-LR-4718, Inspection Activities: Load Handling Cranes and Devices, Rev. 2, 3/13/2004 NUREG-1801, *Generic Aging Lessons Learned (GALL) Report*, Volume 1 and Volume 2, April 2001, Chapter XI.M23 MPS NC REF01, Millstone Lifting and Handling Program Manual, Administrative Procedure, Millstone Power Station, Dominion Nuclear Connecticut NUREG-0612, *Control of Heavy Loads at Nuclear Power Plants*, Nuclear Regulation, U.S. Nuclear Regulatory Commission American National Standards Institute/American Society of Mechanical Engineers, ANSI/ASME B30.2-1976, Overhead and Gantry Cranes, Nuclear Standard American National Standards Institute/American Society of Mechanical Engineers, ANSI/ASME B30.11, Monorails and Underhung Cranes American National Standards Institute/American Society of Mechanical Engineers, ANSI/ASME B30.16, Overhead Hoists (Underhung) American National Standards Institute/American Society of Mechanical Engineers, ANSI/ASME B30.17, Overhead and Gantry Cranes (Top Running Bridge, Single Girder, Underhung Hoist) MPS Technical Report, MP-LR-3733/MP-LR-4733, Work Control Process, Aging Management Program Report, License Renewal Project, Dominion Nuclear Connecticut

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Applicant's Aging Management Program	GALL Aging Management Program	MPS LRA-AMP Basis Document and Other Documents Reviewed
		MPS Technical Report, MP-LR-3728/MP-LR-4728, Structures Monitoring Program, Aging Management Program Report, License Renewal Project, Dominion Nuclear Connecticut MPS Technical Specification 70, Specifications for Electric Overhead Traveling Cranes, Crane Manufacturers of America, Inc. MPS Technical Report, MP-16-MMM, Corrective Action, Administrative Procedure, Dominion Nuclear Connecticut
Reactor Vessel Surveillance (B2.1.20)	XI.M31	MPS Technical Report, MP-LR-3724/MP-LR-4724, Reactor Vessel Surveillance, Rev. 2, 3/13/2004 NUREG-1801, *Generic Aging Lessons Learned (GALL) Report*, Volume 1 and Volume 2, April 2001, Chapter XI.M31
Service Water System (Open-Cycle Cooling), Rev. 2 (B2.1.21)	XI.M20	MPS Technical Report, MP-LR-3715/MP-LR-4715, Service Water System (Open-cycle Cooling), Rev. 2, 3/13/2004 NUREG-1801, *Generic Aging Lessons Learned (GALL) Report*, Volume 1 and Volume 2, April 2001, Chapter XI.M20 NRC Generic Letter 89-13, Service Water System Problems Affecting Safety-Related Equipment, July 1989 NRC Letter B17205, Service Water System - Generic Letter 89-13, Millstone Unit 3, Northeast Nuclear Energy Company, 5/6/1998 (TAC No. 74027, ML010660034)

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Applicant's Aging Management Program	GALL Aging Management Program	MPS LRA-AMP Basis Document and Other Documents Reviewed
		NRC Letter B18331, Commitment Changes Associated with Service Water System - Generic Letter 89-13, Millstone Unit 3, Dominion Nuclear Connecticut, 2/28/2001. (TAC No. 74027, ML010660034)
Steam Generator Structural Integrity Program (B2.1.22)	XI.M19	MPS Technical Report, MP-LR-3714/MP-LR-4714, Steam Generator Structural Integrity Program, Rev. 2, 3/16/2004 NUREG-1801, *Generic Aging Lessons Learned (GALL) Report*, Chapter XI.M19
Structures Monitoring Program (B2.1.23)	XI.S5, 6 & 7	MPS Technical Report: MP-LR-3728/MP-LR-4728, Structures Monitoring Program, Rev. 2, 3/16/2004 NUREG-1801, *Generic Aging Lessons Learned (GALL) Report*, Volume 1 and Volume 2, April 2001, Chapter XI.S5, XI.S6 and XI.S7 MPS Station Procedure, QA-10, Millstone Station Maintenance Rule Program, Rev. 2, 4/8/1998 MPS Common Engineering Procedure, C EN 104I, Condition Monitoring of Structures, Millstone Unit 2, Rev. 005, 3/19/2003 MPS Engineering Procedure, EN 31098, Condition Monitoring of Structures, Millstone Unit 3, Rev. 005, 8/20/2001 MPS LRA Section B2.1.23 (U-2), Structures Monitoring Program MPS LRA Section B2.1.23 (U-3), Structures Monitoring Program MPS LRA Section A2.1.23 (U-2), Structures Monitoring Program

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List of Document Reviewed

Applicant's Aging Management Program	GALL Aging Management Program	MPS LRA-AMP Basis Document and Other Documents Reviewed
		MPS LRA Section A2.1.22 (U-3), Structures Monitoring Program MPS Follow-up Action Item, FAI-5, Add certain structures or types of structural members to Unit 2 Condition Monitoring Procedure CEN 1041, Rev. 003 (U-2) MPS Follow-up Action Item, FAI-55, Add certain structures or types of structural members to Unit 3 Condition Monitoring Procedure EN 31098, Rev. 004-001 (U-3) MPS Follow-up Action Item, FAI-22, Ensure the structural inspections required by the Structures Monitoring Program bound the inspections for license renewal. CEN 1041 Rev. 003 (U-2) MPS Follow-up Action Item, FAI-170, Ensure the structural inspections required by the Structures Monitoring Program bound the inspections for license renewal. EN 31098 Rev. 004-001 (U-3) MPS Follow-up Action Item, FAI-24, Provide direction in plant documents/procedures to take advantage of inspection opportunities that occur as the result of inaccessible areas becoming accessible during work activities. (Units 2 and 3) MPS Follow-up Action Item, FAI-31, Revise CEN 1041 to ensure that ground water samples will be taken periodically to evaluate for below-grade concrete degradation. (U-2) MPS Follow-up Action Item, FAI-56, Revise EN 31098 to ensure that ground water samples will be taken periodically to evaluate for below-grade concrete degradation. (U-3)

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Applicant's Aging Management Program	GALL Aging Management Program	MPS LRA-AMP Basis Document and Other Documents Reviewed
		MPS Follow-up Action Item, FAI-15, Modify CEN 1041 to indicate that accessible areas of structures subject to similar condition may be evaluated in lieu of inaccessible areas. (U-2) MPS Follow-up Action Item, FAI-60, Modify EN 31098 to indicate that accessible areas of structures subject to similar condition may be evaluated in lieu of inaccessible areas. (U-3) MPS Follow-up Action Item, FAI-88, Procedures need revised to perform inspection of underground enclosures to identify evidence of cable submergence. Engineering will be notified to evaluate the condition. (U-3) MPS Follow-up Action Item, FAI-171, Procedures need revised to perform inspection of underground enclosures to identify evidence of cable submergence. Engineering will be notified to evaluate the condition. (U-2) MPS Follow-up Action Item, FAI-141, Revise CEN 1041, Rev. 003 to include ACI 349.3R as a reference in Section 6. (U-2) MPS Follow-up Action Item, FAI-142, Revise EN 31098, Rev. 004-01 to include ACI 349.3R as a reference in Section 6. (U-3) MPS Follow-up Action Item, FAI-264, Need to determine how to address the components and/or equipment in the switchyard required for restoration of power after an SBO event that are owned by CL&P from a QA program standpoint. (U-2)

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Applicant's Aging Management Program	GALL Aging Management Program	MPS LRA-AMP Basis Document and Other Documents Reviewed
		MPS Follow-up Action Item, FAI-265, Need to determine how to address the components and/or equipment in the switchyard required for restoration of power after an SBO event that are owned by CL&P from a QA program standpoint. (U-3)
Tank Inspection Program (B2.1.24)	XI.M.29	MPS Technical Report, MP-LR-3722/MP-LR-4722, Tank Inspection Program, Rev. 2, 3/16/2004 NUREG-1801, *Generic Aging Lessons Learned (GALL) Report*, Volume 1 and Volume 2, April 2001, Chapter XI.M29 MPS LRA Section B2.1.24 (U-2), Tank Inspection Program MPS LRA Section B2.1.24 (U-3), Tank Inspection Program MPS LRA Section A2.1.24 (U-2), Tank Inspection Program MPS LRA Section A2.1.23 (U-3, Tank Inspection Program MPS Engineering Procedure, EN 21154A, Rev. 001-02, Tank Inspection Plan, 4/15/2003, Millstone Unit 2 MPS Engineering Procedure, EN 31154, Rev. 001, Tank Inspection Plan, 4/15/2003, Millstone Unit 3 MPS Follow-up Action Item, FAI-204, Add Security diesel fuel oil tank to EN 21154A (U-2) MPS Follow-up Action Item, FAI-17, Add diesel fire pump fuel oil tank to EN 31154A (U-3)

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Applicant's Aging Management Program	GALL Aging Management Program	MPS LRA-AMP Basis Document and Other Documents Reviewed
		MPS Follow-up Action Item, FAI-92, Add inspections of sealants and caulkings used for moisture prevention in and around above ground tanks to EN 21154A (U-2) MPS Follow-up Action Item, FAI-165, Add inspections of sealants and caulkings used for moisture prevention in and around above ground tanks to EN 31154A (U-3) MPS Follow-up Action Item, FAI-99, Develop procedures and perform non-destructive volumetric examination of the inaccessible locations for those tanks that require aging management for license renewal (U-2) MPS Follow-up Action Item, FAI-166, Develop procedures and perform non-destructive volumetric examination of the inaccessible locations for those tanks that require aging management for license renewal (U-3)
Work Control Process (B2.1.25)	Plant-specific	MPS Technical Report, MP-LR-3700/MP-LR-4700, Material Aging Effects Report (MAER), Rev. 4, 1/22/2004 MPS Technical Report, MP-LR-3925/MP-LR-4925, Work Control Inspection Opportunities, Rev. 0, 1/28/2004 MPS Station Writer's Guide Reference Manual, MP-05-DC-REF01s5A&B, Rev. 002, 12/27/2002 MPS Condition Based Maintenance Procedure, CBM 106, Oil Analysis, Rev. 001, 3/15/2000 MPS Follow-up Action Item, FAI-76, Prepare Work Order Inspection Opportunities Study (closed) (undated) MPS Follow-up Action Item, FAI-78, Work Control Process Procedure Guidance (undated)

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Applicant's Aging Management Program	GALL Aging Management Program	MPS LRA-AMP Basis Document and Other Documents Reviewed
Electrical Equipment Qualification (B3.1)	X.E1	MPS Technical Report, MP-LR-3739/4739, License Renewal Project Aging Management Program, Electrical Equipment Qualification, Revision 2, 3/13/2004 NUREG-1801, *Generic Aging Lessons Learned (GALL) Report*, Volume 1 and Volume 2, April 2001, Chapter X.E1 MPS Program Description, MP-24-EEQ-PRG, Electrical Equipment Qualification Program Description, Revision 5-01, effective date 1/14/2003 MPS Functional Administrative Procedure, MP-24-EEQ-FAP100.01, Units 2 and 3 Class 1E Electrical Equipment Qualification Walkdowns, Revision 1, effective date 10/21/2002
Metal Fatigue of RCPB (B3.2)	X.M1	MPS Technical Report, MP-LR-3737/MP-LR-4737, Metal Fatigue of the Reactor Coolant Pressure Boundary (RCPB), Rev. 2, 3/11/2004 NUREG-1801, *Generic Aging Lessons Learned (GALL) Report*, Volume 1 and Volume 2, April 2001, Chapter X.M1 MPS MP-24-NCFM-FAP01, "Implementation of the NFCM Program", Rev 000, (draft) MPS MP-24-NCFM-FAP01, "Implementation of the NFCM Program", Rev. 000, (draft) MPS MP-24-NCFM-PRG, "Nuclear Component Fatigue Management Program", Rev. 000, 12/3/2001 MPS SP-ST-ME-946, Standard Specification for Nuclear Component Fatigue Management, Rev. 0 12/7/1995

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Applicant's Aging Management Program	GALL Aging Management Program	MPS LRA-AMP Basis Document and Other Documents Reviewed
Steam Generator Structural Integrity Program (B2.1.22)	XI.M.19	MPS Technical Report, MP-LR-3714/MP-LR-4714, Steam Generator Structural Integrity Program, Rev. 2, 3/16/2004 NUREG-1801, *Generic Aging Lessons Learned (GALL) Report*, Volume 1 and Volume 2, April 2001, Chapter XI.M19
Structures Monitoring Program (B2.1.23)	XI.S5, XI.S6 and XI.S7	MPS Technical Report, MP-LR-3728/MP-LR-4728, Structures Monitoring Program, Rev. 2, 3/16/2004 NUREG-1801, *Generic Aging Lessons Learned (GALL) Report*, Volume 1 and Volume 2, April 2001, Chapters XI.S5, XI.S6 and XI.S7 MPS Station Procedure, QA-10, Millstone Station Maintenance Rule Program, Rev. 2, 4/8/1998 MPS Common Engineering Procedure, C EN 104I, Condition Monitoring of Structures, Millstone Unit 2, Rev. 005, 3/19/2003 MPS Engineering Procedure, EN 31098, Condition Monitoring of Structures, Millstone Unit 3, Rev. 005, 8/20/2001 MPS LRA Section B2.1.23 (U-2), Structures Monitoring Program MPS LRA Section B2.1.23 (U-3), Structures Monitoring Program MPS LRA Section A2.1.23 (U-2), Structures Monitoring Program MPS LRA Section A2.1.22 (U-3), Structures Monitoring Program MPS Follow-up Action Item, FAI-5, Condition Monitoring Procedure CEN 1041 Rev. 003, Unit 2

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List of Document Reviewed

Applicant's Aging Management Program	GALL Aging Management Program	MPS LRA-AMP Basis Document and Other Documents Reviewed
		MPS Follow-up Action Item, FAI-55, Condition Monitoring Procedure EN 31098 Rev. 004-001, Unit 3 MPS Follow-up Action Item, FAI-22, Ensure the structural inspections required by the Structures Monitoring Program bound the inspections for license renewal. CEN 1041 Rev. 003 (U-2) MPS Follow-up Action Item, FAI-170, Ensure the structural inspections required by the Structures Monitoring Program bound the inspections for license renewal. EN 31098 Rev. 004-001 (U-3) MPS Follow-up Action Item, FAI-24, Provide direction in plant documents/procedures to take advantage of inspection opportunities that occur as the result of inaccessible areas becoming accessible during work activities. (Units 2 and 3) MPS Follow-up Action Item, FAI-31, Revise CEN 1041 to ensure that ground water samples will be taken periodically to evaluate for below-grade concrete degradation. (U-2) MPS Follow-up Action Item, FAI-56, Revise EN 31098 to ensure that ground water samples will be taken periodically to evaluate for below-grade concrete degradation. (U-3) MPS Follow-up Action Item, FAI-15, Modify CEN 1041 to indicate that accessible areas of structures subject to similar condition may be evaluated in lieu of inaccessible areas. (U-2) MPS Follow-up Action Item, FAI-60, Modify EN 31098 to indicate that accessible areas of structures subject to similar condition may be evaluated in lieu of inaccessible areas. (U-3)

Attachment 5 (Continued)
List of Document Reviewed

Applicant's Aging Management Program	GALL Aging Management Program	MPS LRA-AMP Basis Document and Other Documents Reviewed
		MPS Follow-up Action Item, FAI-88, Procedures need revised to perform inspection of underground enclosures to identify evidence of cable submergence. Engineering will be notified to evaluate the condition. (U-3) MPS Follow-up Action Item, FAI-171, Procedures need revised to perform inspection of underground enclosures to identify evidence of cable submergence. Engineering will be notified to evaluate the condition. (U-2) MPS Follow-up Action Item, FAI-141, Revise CEN 1041, Rev. 003 to include ACI 349.3R as a reference in Section 6. (U-2) MPS Follow-up Action Item, FAI-142, Revise EN 31098, Rev. 004-01 to include ACI 349.3R as a reference in Section 6. (U-3) MPS Follow-up Action Item, FAI-264, Need to determine how to address the components and/or equipment in the switchyard required for restoration of power after an SBO event that are owned by CL&P from a QA program standpoint. (U-2) MPS Follow-up Action Item, FAI-265, Need to determine how to address the components and/or equipment in the switchyard required for restoration of power after an SBO event that are owned by CL&P from a QA program standpoint. (U-3)

Attachment 5 (Continued)
List of Document Reviewed

Applicant's AMR Sections and Systems MPS Unit 2	MPS LRA-AMR Basis Document and Other Documents Reviewed
3.1 Reactor Vessel, Internals and Reactor Coolant System	Letter from Dominion Nuclear Connecticut, Inc. to US Nuclear Regulatory Commission, Dated January 20, 2004 (ML040280079), Subject: License Renewal Application for Operating Licenses DPR-65 and NFP-49 for Millstone Power Station (MPS), Units 2 and 3 NUREG-1800, *Standard Review Plan for Review of License Renewal Applications for Nuclear Power Plants*, April 2001 NUREG-1801, *Generic Aging Lessons Learned (GALL) Report*, Volume 1 and Volume 2, April 2001 MPS Technical Report, MP-LR-3402, Reactor Coolant System, Rev. 3, 4/28/2004 MPS Technical Report, MP-LR-3501, Reactor Vessel, Rev. 2, 12/20/2003 MPS Technical Report, MP-LR-3502, Steam Generator, Rev. 2, 12/20/2003 MPS Technical Report, MP-LR-3503, Reactor Vessel Internals, Rev. 2, 12/20/2003 VPROC ENG00-2-013, Rev. 001, "BWI Replacement Steam Generator Secondary Side Inspection Procedure" MPS Condition Report, CR-04-04878 MPS CMP-715A,"General Practice for Threaded Fasteners," Rev. 002-001 MPS CC-1, Rev. 4, "Control of Chemicals and Consumable"

Attachment 5 (Continued)
List of Document Reviewed

Applicant's AMR Sections and Systems MPS Unit 2	MPS LRA-AMR Basis Document and Other Documents Reviewed
3.2 Engineered Safety Features	Letter from Dominion Nuclear Connecticut, Inc. to US Nuclear Regulatory Commission, Dated January 20, 2004 (ML040280079), Subject: License Renewal Application for Operating Licenses DPR-65 and NFP-49 for Millstone Power Station (MPS), Units 2 and 3 NUREG-1800, *Standard Review Plan for Review of License Renewal Applications for Nuclear Power Plants*, April 2001 NUREG-1801, *Generic Aging Lessons Learned (GALL) Report*, Volume 1 and Volume 2, April 2001 NUREG-1766, *Safety Evaluation Report related to License Renewal of North Anna Power Station, Units 1 & 2, and Surry Power Plant, Units 1 & 2*
3.3 Auxiliary Systems	Letter from Dominion Nuclear Connecticut, Inc. to US Nuclear Regulatory Commission, Dated January 20, 2004 (ML040280079), Subject: License Renewal Application for Operating Licenses DPR-65 and NFP-49 for Millstone Power Station (MPS), Units 2 and 3 NUREG-1800, *Standard Review Plan for Review of License Renewal Applications for Nuclear Power Plants*, April 2001 NUREG-1801, *Generic Aging Lessons Learned (GALL) Report*, Volume 1 and Volume 2, April 2001 MPS Technical Report, MP-LR-3414, "License Renewal Project Aging Management Review, Diesel and Support Systems, Millstone Power Station – Unit 2," Revision 3, 2/27/2004 MPS Technical Report, MP-LR-4401, "License Renewal Project Aging Management Review, Air and Gas Systems, Millstone Power Station - Unit 2," Revision 2, 12/29/2003 MPS Unit 2 Open Water Technical Report, MP-LR-3403

Attachment 5 (Continued)
List of Document Reviewed

Applicant's AMR Sections and Systems MPS Unit 2	MPS LRA-AMR Basis Document and Other Documents Reviewed
	NUREG-1766, *Safety Evaluation Report Related to the License Renewal of North Anna Power Station, Units 1 and 2, and Surry Power Station, Units 1 and 2* NUREG-1782, *Safety Evaluation Report Related to the License Renewal of Ft. Calhoun Station, Unit 1* MPS MP-GDL301, Aging Management Reviews Millstone Station, Project Guideline MPS MP-LR-3700/MP-LR-4700, Material Aging Effect Review. MPS MP-LR-3923, Standard Review Plan Items Recommended for Further Evaluation, MPS Unit 2 NUREG-1779, *Safety Evaluation Report Related to the License Renewal of St. Lucie Nuclear Plant, Units 1 and 2* LRA for St. Lucie Units 1 and 2 MPS MP-LR-3410, Millstone Unit 2 Closed Water Technical Report MPS MP-LR-3603, Millstone Unit 2 Intake & Discharge Structure Technical Report MPS MP-LR-3736, General Condition Monitoring Activities MPS MP-LR-3715, Service Water System MPS MP-LR-3733, Work Control Process. MPS MP-LR-3732, Infrequently Accessed Area Inspection. MPS Work Order M29800985, B Instrument Air Dryer Tower, 1/31/1998 MPS Work Order M20209885, Instrument air compressor F3A & F3B Air Dryer Assembly, 7/29/2002

Attachment 5 (Continued)
List of Document Reviewed

Applicant's AMR Sections and Systems MPS Unit 2	MPS LRA-AMR Basis Document and Other Documents Reviewed
	MPS Work Order M20107759, B instrument air compressor, 6/27/2001 MPS Surveillance Procedure 2862, Instrument Air Quality Test, Revision 3-03, 4/4/2003 MPS Technical Report, MP-LR-3401, License Renewal Project Aging Management Millstone Power Station – Unit 2, Air and Gas Systems, 12/29/2003 MPS License Renewal Drawing, 25203-LR-26015, Sheet 3, Safety Injection Tanks, Revision 0, 1/14/2002 MPS License Renewal Diagram, 25203-LR26009, Sheet 8, Instrument and Station Air Systems, Revision 0, 1/22/2002 MPS License Renewal Diagram, 25203-LR26009, Sheet 10, Instrument and Station Air Systems, Revision 0, 1/29/2002 NUREG-1766, *Safety Evaluation Report related to License Renewal of North Anna Power Station, Units 1 & 2, and Surry Power Plant, Units 1 & 2* MPS MP-LR-3400, Rev. 3, AMR Steam and Power Conversion Systems, Millstone Unit 2 MPS MP-LR-3405, Rev. 3, AMR Drain and Vent, Millstone Unit 2 MPS MP-LR-3411, Rev. 2, AMR Primary Water Systems, Millstone Unit 2 NUREG-1766, *Safety Evaluation Report related to License Renewal of North Anna Power Station, Units 1 & 2, and Surry Power Plant, Units 1 & 2*, Section 3.6.6.2 LRA for Surry Power Plant, Table 3.3.6-5, Page 3-222 MPS Technical Report, MP-LR-3733/4733, Work Control Process

Attachment 5 (Continued)
List of Document Reviewed

Applicant's AMR Sections and Systems MPS Unit 2	MPS LRA-AMR Basis Document and Other Documents Reviewed
	MPS Technical Report, MP-LR-3700, Material Aging Effects Report MPS License Renewal Drawing, 25203-LR26018, Sheet 2, Emergency Diesel Generator H-7A Lube Oil, Air, and Jacket Water Cooling, Rev. 0, 1/7/2002 MPS License Renewal Drawing, 25203-LR26018, Sheet 4, Emergency Diesel Generator H-7A and H-7B Starting Air, Rev. 0, 1/8/2002 MPS License Renewal Drawing, 25203-LR26008, Sheet 2, Service Water [diesel interface] Rev. 0, 1/3/2002 MPS License Renewal Drawing, 25203-LR26010, Sheet 1, Fuel Oil System, Rev. 0, 7/16/2002 MPS Technical Report, MP-LR-3414, License Renewal Project, Aging Management Review, Diesel and Support Systems, Revision 3, 2/27/2004 MPS License Renewal Diagram, 25203-LR26010, Sheet 1, Fuel Oil System, Rev. 0, 7/16/2002 MPS Technical Report, MP-LR-3700/4700, "License Renewal Project, Material Aging Effects Report, Millstone Power Station," Rev. 4, 1/22/2004 MPS License Renewal Diagram, 25212-LR26958, Sheet 4, Diesel Air Start System, Revision 0, 2/15/2002 MPS License Renewal Diagram, 25212-LR26958, Sheet 5, SBO Diesel Engine Air Intake & Exhaust System, Revision 0, 2/15/2002 MPS Technical Report, MP-LR-4414, License Renewal Project Aging Management Review, Diesel and Support Systems, Millstone Power Station – Unit 3, Revision 3, 02/27/2004

Attachment 5 (Continued)
List of Document Reviewed

Applicant's AMR Sections and Systems MPS Unit 2	MPS LRA-AMR Basis Document and Other Documents Reviewed
	MPS MP-LR-3400, Rev. 3, AMR Steam and Power Conversion Systems, Millstone Unit 2 MPS MP-LR-3405, Rev. 3, AMR Drain and Vent, Millstone Unit 2
3.4 Steam and Power Conversion Systems	Letter from Dominion Nuclear Connecticut, Inc. to US Nuclear Regulatory Commission, Dated January 20, 2004 (ML040280079), Subject: License Renewal Application for Operating Licenses DPR-65 and NFP-49 for Millstone Power Station (MPS), Units 2 and 3 NUREG-1800, *Standard Review Plan for Review of License Renewal Applications for Nuclear Power Plants*, April 2001 NUREG-1801, *Generic Aging Lessons Learned (GALL) Report*, Volume 1 and Volume 2, April 2001 MPS MP-LR-3000/MP-LR-4000, System/Structure Scoping Report, Technical Report, Millstone License Renewal Project MPS MP-LRP-GDL201, System and Structure Screening for Millstone, Project Guideline, Millstone License Renewal Project
3.5 Containments, Structures, and Component Supports	Letter from Dominion Nuclear Connecticut, Inc. to US Nuclear Regulatory Commission, Dated January 20, 2004 (ML040280079), Subject: License Renewal Application for Operating Licenses DPR-65 and NFP-49 for Millstone Power Station (MPS), Units 2 and 3 NUREG-1800, *Standard Review Plan for Review of License Renewal Applications for Nuclear Power Plants*, April 2001 NUREG-1801, *Generic Aging Lessons Learned (GALL) Report*, Volume 1 and Volume 2, April 2001 MPS Technical Report MP-LR-3601 Rev. 2, Containment (U-2) AMR Basis Document 12/31/2003

Attachment 5 (Continued)
List of Document Reviewed

Applicant's AMR Sections and Systems MPS Unit 2	MPS LRA-AMR Basis Document and Other Documents Reviewed
	MPS Technical Report MP-LR-3602 Rev. 3, Class 1 Structures (U-2) AMR Basis Document 3/19/2004 MPS Technical Report MP-LR-3603 Rev. 3, Intake and Discharge Structures (U-2) AMR Basis Document 3/08/2004 MPS Technical Report MP-LR-3604 Rev. 3, Miscellaneous Structures (U-2) AMR Basis Document 3/08/2004 MPS Technical Report MP-LR-3651 Rev. 2, General Structural Supports (U-2) AMR Basis Document 12/31/2003 MPS Technical Report MP-LR-3652 Rev. 2, Load Handling Cranes and Devices (U-2) AMR Basis Document 12/31/2003 MPS Technical Report MP-LR-3653 Rev. 3, NSSS Equipment Supports (U-2) AMR Basis Document Millstone 3/26/2004 MPS Technical Report MP-LR-3654 Rev. 2, Miscellaneous Structural Commodities (U-2) AMR Basis Document 12/31/2003
3.6 Electrical, Instrumentation and Controls	Letter from Dominion Nuclear Connecticut, Inc. to US Nuclear Regulatory Commission, Dated January 20, 2004 (ML040280079), Subject: License Renewal Application for Operating Licenses DPR-65 and NFP-49 for Millstone Power Station (MPS), Units 2 and 3 NUREG-1800, *Standard Review Plan for Review of License Renewal Applications for Nuclear Power Plants*, April 2001 NUREG-1801, *Generic Aging Lessons Learned (GALL) Report*, Volume 1 and Volume 2, April 2001 MPS Technical Report, MP-LR-3654, "License Renewal Project Aging Management Review, Miscellaneous Structural Commodities, Millstone Power Station – Unit 2," Rev. 2, 12/31/2003

Attachment 5 (Continued)
List of Document Reviewed

Applicant's AMR Sections and Systems MPS Unit 2	MPS LRA-AMR Basis Document and Other Documents Reviewed
	MPS Technical Report, MP-LR-3655, "License Renewal Project Aging Management Review, Cables and Connectors, Millstone Power Station – Unit 2," Rev. 2, 12/27/2003 MPS Technical Report, MP-LR-3700/4700, "License Renewal Project, Material Aging Effects Report, Millstone Power Station," Rev. 4 1/22/2004 MPS License Renewal Electrical Handbook: Electric Power Research Institute, Palo Alto, CA - 20011003057 SAND96-0344, Aging Management Guideline for Commercial Nuclear Power Plants – Electrical Cable and Terminations, September 1996 MPS Technical Report, MP-LR-3656, License Renewal Project Aging Management Review, Bus Duct, Millstone Unit 2, Revision 4, 3/12/2004 MPS Technical Report, MP-LR-3657, "License Renewal Project Aging Management Review, Electrical Penetrations, Millstone Power Station – Unit 2," Rev. 2, 12/27/2003 NUREG-1766, *Safety Evaluation Report Related to License Renewal of North Anna Power Station, Units 1 & 2, and Surry Power Plant, Units 1 & 2*, Section 3.9.1.2 LRA for Surry Power Plant, Table 3.6.2-1, Page 3-328

Attachment 5 (Continued)
List of Document Reviewed

Applicant's AMR Sections and Systems MPS Unit 3	LRA-AMR Basis Document and Other Documents Reviewed
3.1 Reactor Vessel, Internals and Reactor Coolant System	Letter from Dominion Nuclear Connecticut, Inc. to US Nuclear Regulatory Commission, Dated January 20, 2004 (ML040280079), Subject: License Renewal Application for Operating Licenses DPR-65 and NFP-49 for Millstone Power Station (MPS), Units 2 and 3 NUREG-1800, *Standard Review Plan for Review of License Renewal Applications for Nuclear Power Plants*, April 2001 NUREG-1801, *Generic Aging Lessons Learned (GALL) Report*, Volume 1 and Volume 2, April 2001 MPS Technical Report, MP-LR-4501, Reactor Vessel, Rev. 2, 12/20/2003 MPS Technical Report, MP-LR-4503, Reactor Vessel Internals, Rev. 2, 12/20/2003 MPS Technical Report MP-LR-4402, Reactor Coolant System, Rev. 3, 04/23/2004 MPS Technical Report MP-LR-4502, Steam Generator, Rev. 2, 12/20/2003
3.2 Engineered Safety Features	Letter from Dominion Nuclear Connecticut, Inc. to US Nuclear Regulatory Commission, Dated January 20, 2004 (ML040280079), Subject: License Renewal Application for Operating Licenses DPR-65 and NFP-49 for Millstone Power Station (MPS), Units 2 and 3 NUREG-1800, *Standard Review Plan for Review of License Renewal Applications for Nuclear Power Plants*, April 2001 NUREG-1801, *Generic Aging Lessons Learned (GALL) Report*, Volume 1 and Volume 2, April 2001 NUREG-1766, *Safety Evaluation Report related to License Renewal of North Anna Power Station, Units 1 & 2, and Surry Power Plant, Units 1 & 2*

Attachment 5 (Continued)
List of Document Reviewed

Applicant's AMR Sections and Systems MPS Unit 3	LRA-AMR Basis Document and Other Documents Reviewed
	MPS Technical Report, MP-LR-4412, for Engineered Safety Features AMR, Revision 3, 6/18/2003
3.3 Auxiliary Systems	Letter from Dominion Nuclear Connecticut, Inc. to US Nuclear Regulatory Commission, Dated January 20, 2004 (ML040280079), Subject: License Renewal Application for Operating Licenses DPR-65 and NFP-49 for Millstone Power Station (MPS), Units 2 and 3 NUREG-1800, *Standard Review Plan for Review of License Renewal Applications for Nuclear Power Plants*, April 2001 NUREG-1801, *Generic Aging Lessons Learned (GALL) Report*, Volume 1 and Volume 2, April 2001 MPS Technical Report, MP-LR-3414, "License Renewal Project Aging Management Review, Diesel and Support Systems, Millstone Power Station – Unit 2," Revision 3, 2/27/2004 MPS Technical Report, MP-LR-4401, "License Renewal Project Aging Management Review, Air and Gas Systems, Millstone Power Station - Unit 2," Revision 2, 12/29/2003 MPS MP-LR-3403, Millstone Unit 2 Open Water Technical Report NUREG-1779, *Safety Evaluation Report Related to the License Renewal of St. Lucie Nuclear Plant, Units 1 and 2* LRA for St. Lucie Units 1 and 2 NUREG-1782, *Safety Evaluation Report Related to the License Renewal of Ft. Calhoun Station, Unit 1* LRA for Ft. Calhoun Station Unit 1 MPS MP-GDL301, Aging Management Reviews Millstone Station, Project Guideline

Attachment 5 (Continued)
List of Document Reviewed

Applicant's AMR Sections and Systems MPS Unit 3	LRA-AMR Basis Document and Other Documents Reviewed
	MPS MP-LR-3700/ MP-LR-4700, Material Aging Effect Review, Rev. 4 MPS MP-LR-3923, Standard Review Plan Items Recommended for Further Evaluation, Millstone Power Station – Unit 2 MPS MP-LR-4403, Millstone Unit 3 Open Water Technical Report, Rev. 2 MPS Technical Report, MP-LR-4603, Millstone Unit 3 Intake & Discharge Structure MPS MP-LR-3736, General Conditioning Monitoring Activities MPS MP-LR-3715, Service Water System MPS MP-LR-3733, Work Control Process MPS MP-LR-3732, Infrequently Accessed Area Inspection, Rev. 2 NUREG-1766, *Safety Evaluation Report related to License Renewal of North Anna Power Station, Units 1 & 2, and Surry Power Plant, Units 1 & 2* LRA for Surry Power Station, Units 1 and 2 MPS Technical Report, MP-LR-4410, Revision 2, Millstone Unit 3 Closed Water Systems MPS Technical Report, MP-LR-4414, "License Renewal Project Aging Management Review, Diesel and Support Systems, Millstone Power Station – Unit 3, Revision 3 MPS License Renewal Diagram, 25212-LR26958, Sheet 4, Diesel Air Start System, Revision 0, 2/15/2002 MPS License Renewal Diagram, 25212-LR26958, Sheet 5, SBO Diesel Engine Air Intake & Exhaust System, Revision 0, 2/15/2002

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List of Document Reviewed

Applicant's AMR Sections and Systems MPS Unit 3	LRA-AMR Basis Document and Other Documents Reviewed
	MPS MP-LR-4923, Standard Review Plan Items Recommended for Further Evaluation, Millstone Power Station – Unit 3
3.4 Steam and Power Conversion Systems	Letter from Dominion Nuclear Connecticut, Inc. to US Nuclear Regulatory Commission, Dated January 20, 2004 (ML040280079), Subject: License Renewal Application for Operating Licenses DPR-65 and NFP-49 for Millstone Power Station (MPS), Units 2 and 3 NUREG-1800, *Standard Review Plan for Review of License Renewal Applications for Nuclear Power Plants*, April 2001 NUREG-1801, *Generic Aging Lessons Learned (GALL) Report*, Volume 1 and Volume 2, April 2001 MPS MP-LR-3000/MP-LR-4000, System/Structure Scoping Report, Technical Report, Millstone License Renewal Project MPS MP-LRP-GDL201, System and Structure Screening for Millstone, Project Guideline, Millstone License Renewal Project MPS MP-LR-4400, License Renewal Project - Aging Management Review for Steam and Power Conversion System - Unit 3, 3/19/2004
3.5 Containments, Structures, and Component Support	Letter from Dominion Nuclear Connecticut, Inc. to US Nuclear Regulatory Commission, Dated January 20, 2004 (ML040280079), Subject: License Renewal Application for Operating Licenses DPR-65 and NFP-49 for Millstone Power Station (MPS), Units 2 and 3 NUREG-1800, *Standard Review Plan for Review of License Renewal Applications for Nuclear Power Plants*, April 2001 NUREG-1801, *Generic Aging Lessons Learned (GALL) Report*, Volume 1 and Volume 2, April 2001 MPS Technical Report, MP-LR-4601 Rev. 3, Containment

Attachment 5 (Continued)
List of Document Reviewed

Applicant's AMR Sections and Systems MPS Unit 3	LRA-AMR Basis Document and Other Documents Reviewed
	(U-3) AMR Basis Document MPS Technical Report, MP-LR-4602 Rev. 3, Class 1 Structures (U-3) AMR Basis Document MPS Technical Report, MP-LR-4603 Rev. 3, Intake and Discharge Structures (U-3) AMR Basis Document MPS Technical Report, MP-LR-4604 Rev. 3, Miscellaneous Structures (U-3) AMR Basis Document MPS Technical Report, MP-LR-4651 Rev. 2, General Structural Supports (U-3) AMR Basis Document MPS Technical Report, MP-LR-4652 Rev. 3, Load Handling Cranes and Devices (U-3) AMR Basis Document MPS Technical Report, MP-LR-4653 Rev. 2, NSSS Equipment Supports (U-3) AMR Basis Document MPS Technical Report, MP-LR-4654 Rev. 3, Miscellaneous Structural Commodities (U-3) AMR Basis Document
3.6 Aging Management of Electrical and Instrumentation and Controls	Letter from Dominion Nuclear Connecticut, Inc. to US Nuclear Regulatory Commission, Dated January 20, 2004 (ML040280079), Subject: License Renewal Application for Operating Licenses DPR-65 and NFP-49 for Millstone Power Station (MPS), Units 2 and 3 NUREG-1800, *Standard Review Plan for Review of License Renewal Applications for Nuclear Power Plants*, April 2001 NUREG-1801, *Generic Aging Lessons Learned (GALL) Report*, Volume 1 and Volume 2, April 2001 MPS Technical Report, MP-LR-3700/4700, "License Renewal Project, Material Aging Effects Report, Millstone Power Station," Rev. 4, 1/22/2004

Attachment 5 (Continued)
List of Document Reviewed

Applicant's AMR Sections and Systems MPS Unit 3	LRA-AMR Basis Document and Other Documents Reviewed
	MPS License Renewal Electrical Handbook: Electric Power Research Institute, Palo Alto, CA - 2001.1003057 SAND96-0344, Aging Management Guideline for Commercial Nuclear Power Plants – Electrical Cable and Terminations, September 1996 MPS Technical Report, MP-LR-4654, "License Renewal Project Aging Management Review, Miscellaneous Structural Commodities, Millstone Power Station – Unit 3," Rev. 3 MPS Technical Report, MP-LR-4655, "License Renewal Project Aging Management Review, Cables and Connectors, Millstone Power Station – Unit 3," Rev. 3 MPS Technical Report, MP-LR-4656, License Renewal Project Aging Management Review, Bus Duct – Millstone Unit 3, Revision 3, 3/12/2004 MPS Technical Report, MP-LR-4657, "License Renewal Project Aging Management Review, Electrical Penetrations, Millstone Power Station – Unit 3," Rev. 3, 3/12/2004 NUREG-1766, *Safety Evaluation Report related to License Renewal of North Anna Power Station, Units 1 & 2, and Surry Power Plant, Units 1 & 2*, Section 3.9.1.2 LRA for Surry Power Plant, Table 3.6.2-1, Page 3-328

Attachment 6
List of Commitments

Millstone Power Station Unit 2		
No.	**Audit and Review Report Section**	**Commitment**
1	7.1.1.1.1	The existing inspection program will be modified to include those battery racks that require monitoring for license renewal, but are not already included in the program.
2	7.1.1.1.4	Implementing procedures will be modified to include loss of material as a potential aging effect and to provide guidance on the inspection of items (such as anchorages, bracing and supports, side and end rails, and spacers), which contribute to battery rack integrity or seismic design of the battery racks.
3	7.1.3.1	A baseline inspection of the in-scope buried piping located in a damp soil environment will be performed for a representative sample of each combination of material and protective measures. Inspection for the loss of material due to selective leaching will be performed by visual, and mechanical or other appropriate methods. At the end of the Program Description section, the following should be added (LRA Supplement dated July 7, 2004): “In addition to visual inspections, the field inspections for loss of material due to selective leaching will include mechanical means, such as resonance when struck by another object, scraping, or chipping.”
4	7.1.3.1	The maintenance and work control procedures will be revised to ensure that inspections of buried piping are performed when the piping is excavated during maintenance or for any other reason. These procedures will include the inspection for the loss of material due to selective leaching which will be performed by visual, and mechanical or other appropriate methods.
5	7.1.7	The Electrical Cables and Connections Not Subject to 10 CFR 50.49 Environmental Qualification Requirements program will be established.

Millstone Power Station Unit 2		
No.	**Audit and Review Report Section**	**Commitment**
6	7.1.7.1	Fuse holders meeting the requirements will be evaluated prior to the period of extended operation for possible aging effects requiring management. The fuse holder will either be replaced, modified to minimize the aging effects, or this program will manage the aging effects. The program (if needed for fuse holders) will consider the aging stressors for the metallic clips.
7	7.1.8.1	Procedures will be developed to employ an alternate testing methodology to confirm the condition of cables and connectors in circuits that have sensitive, low level signals and where the instrumentation is not calibrated in situ.
8	7.1.9.4	A baseline visual inspection will be performed on a representative sample of the buried fire protection piping and components, whose internal surfaces are exposed to raw water, to confirm there is no degradation.
9	7.1.9.4	Testing a representative sample of fire protection sprinkler heads or replacing those that have been in service for 50 years will be included in the Fire Protection Program. The first tests will be completed prior to the sprinkler heads achieving 50 years of service life. The frequency of subsequent tests will not exceed a 10 year interval. (LRA Supplement dated July 7, 2004)
10	7.1.12.1.10	The procedures and training for personnel performing General Condition Monitoring inspections and walkdowns will be enhanced to provide expectations that identify the requirements for the inspection of aging effects.
11	7.1.13.3	Engineering will identify testing requirements, as necessary, to confirm the condition of the cable insulation for inaccessible medium-voltage cables that are exposed to significant voltage and have been submerged. Any tests performed will be proven tests for detecting deterioration of the insulation due to wetting. If cables have become submerged during the period of extended operation, Engineering will evaluate to determine the appropriate testing, as necessary, to be performed during the corresponding ten-year interval.

Millstone Power Station Unit 2		
No.	**Audit and Review Report Section**	**Commitment**
12	7.1.14	The Infrequently Accessed Areas Inspection Program will be established.
13	7.1.16.1	Millstone will follow the industry efforts on reactor vessel internals regarding such issues as thermal or neutron irradiation embrittlement (loss of fracture toughness), void swelling (change in dimensions), stress corrosion cracking (PWSCC and IASCC), and loss of pre-load for baffle and former-assembly bolts and will implement the appropriate recommendations resulting from this guidance. The revised program description, including a comparison to the 10 program elements of NUREG-1801 program, will be submitted to the NRC for approval (LRA Supplement dated July 7, 2004).
14	7.1.17.1	Millstone will follow the industry efforts investigating the aging effects applicable to nickel-based alloys (i.e., PWSCC in Alloy 600 base metal and Alloy 82/182 weld metals) and identifying the appropriate aging management activities and will implement the appropriate recommendations resulting from this guidance.
15	7.1.18.4	The existing inspection program will be modified to include those lifting devices that require monitoring for license renewal, but are not already included in the program. This enhancement will be implemented prior to the period of extended operation.
16	7.1.18.6	Implementing procedures and documentation will be modified to include visual inspections for the loss of material on the crane and trolley structural components and the rails in the scope of license renewal. This enhancement will be implemented prior to the period of extended operation.
17	7.1.20.4	The implementing procedures will be modified to include ACI 349.3R-96 and ANSI/ASCE 11-90 as references and as input documents for the inspection program.
18	7.1.20.5	The Structures Monitoring Program and implementing procedures will be modified to include all in-scope structures.

Millstone Power Station Unit 2		
No.	**Audit and Review Report Section**	**Commitment**
19	7.1.20.4	Groundwater samples will be taken on a periodic basis, considering seasonal variations, to ensure that the groundwater is not sufficiently aggressive to cause the below-grade concrete to degrade.
20	7.1.20.4	The Structures Monitoring Program and implementing procedures will be modified to alert the appropriate engineering organization if the structures inspections identify that medium voltage cables in the scope of license renewal have been submerged.
21	7.1.20.4	The maintenance and work control procedures will be revised to ensure that inspections of inaccessible areas are performed when the areas become accessible by such means as excavation or installation of shielding during maintenance or for any other reason.
22	7.1.21.4	Appropriate inspections of sealants and caulkings used for moisture intrusion prevention in and around aboveground tanks will be performed.
23	7.1.21.4	Non-destructive volumetric examination of the in-scope inaccessible locations, such as the external surfaces of tank bottoms, will be performed prior to the period of extended operation. Subsequent inspections will be performed on a frequency consistent with scheduled tank internals inspection activities.
24	7.1.21.4	The Unit 2 security diesel fuel oil tank and diesel fire pump fuel oil tank are in-scope for license renewal and will be included on the respective Tank Inspection Program inspection plan.
25	7.1.22	Changes will be made to maintenance and work control procedures to ensure that inspections of plant components and plant commodities will be appropriately and consistently performed and documented for aging effects during maintenance activities.

Millstone Power Station Unit 2		
No.	**Audit and Review Report Section**	**Commitment**
27	7.2.1.1.1	For potentially susceptible CASS materials, either enhanced volumetric examinations or a unit or component specific flaw tolerance evaluation (considering reduced fracture toughness and unit specific geometry and stress information) will be used to demonstrate that the thermally-embrittled material has adequate fracture toughness in accordance with NUREG-1801, Section XI.M12.
28	7.1.24.6	Millstone will follow industry efforts that will provide specific guidance to license renewal applicants for evaluating the environmental effects of fatigue on applicable locations, other than those identified in NUREG/CR-6260. Millstone will also implement the appropriate recommendations resulting from this guidance.
29	7.1.6.6	A baseline visual inspection will be performed of the accessible areas of the shell side (including accessible portions of the exterior side of the tubes) of one: C Millstone Unit 2 Reactor Building Closed Cooling Water heat exchanger, C Millstone Unit 2 Emergency Diesel Generator Jacket Cooling Water heat exchanger, and C Millstone Unit 3 Emergency Diesel Generator Jacket Cooling Water heat exchanger.
30	7.1.22.1.4	Using the Work Control Process, a baseline inspection for the loss of material due to selective leaching will be performed on a representative sample of locations for susceptible materials by visual, and mechanical or other appropriate methods prior to entering the period of extended operation.
31	7.1.22.1.1	A review of the Work Control Process inspection opportunities for each material and environment group supplemental to the initial review, conducted during the development of the LRA, will be performed. Baseline inspections will be performed for the material and environment combinations that have not been inspected as part of the Work Control Process.

Millstone Power Station Unit 2		
No.	**Audit and Review Report Section**	**Commitment**
32	7.1.8.4	Calibration results for cable tested in situ will be reviewed to detect severe aging degradation of the cable insulation. The initial review will be completed prior to entering the period of extended operation and will include at least 5 years of surveillance test data for each cable reviewed. Subsequent reviews will be performed on a period not to exceed 10 years.
33	7.1.13.3	The in scope cables in Unit 3 duct lines # 929 (SBO Diesel to Unit 3 4.16kV Normal Switchgear) and # 973 (RSST 3RTXXSR-B to 6.9kV Normal Switchgear Bus 35A, 35B, 35C and 35D) will be tested to demonstrate that water treeing will not prevent the cables from performing their intended function

Millstone Power Station Unit 3		
No.	**Audit and Review Report Section**	**Commitment**
1	7.1.1.1.1	The existing inspection program will be modified to include those battery racks that require monitoring for license renewal, but are not already included in the program.
2	7.1.1.1.4	Implementing procedures will be modified to include loss of material as a potential aging effect and to provide guidance on the inspection of items (such as anchorages, bracing and supports, side and end rails, and spacers), which contribute to battery rack integrity or seismic design of the battery racks.

Millstone Power Station Unit 3		
No.	**Audit and Review Report Section**	**Commitment**
3	7.1.3.1	At the end of the Program Description section, the following should be added: "In addition to visual inspections, the field inspections for loss of material due to selective leaching will include mechanical means, such as resonance when struck by another object, scraping, or chipping." A baseline inspection of the in-scope buried piping located in a damp soil environment will be performed for a representative sample of each combination of material and protective measures. Inspection for the loss of material due to selective leaching will be performed by visual, and mechanical or other appropriate methods. (LRA supplement dated July 7, 2004)
4	7.1.3.1	The maintenance and work control procedures will be revised to ensure that inspections of buried piping are performed when the piping is excavated during maintenance or for any other reason. These procedures will include the inspection for the loss of material due to selective leaching which will be performed by visual, and mechanical or other appropriate methods. (LRA supplement dated July 7, 2004)
5	7.1.7	The Electrical Cables and Connections Not Subject to 10 CFR 50.49 Environmental Qualification Requirements program will be established.
6	7.1.7.1	Fuse holders meeting the requirements will be evaluated prior to the period of extended operation for possible aging effects requiring management. The fuse holder will either be replaced, modified to minimize the aging effects, or this program will manage the aging effects. The program (if needed for fuse holders) will consider the aging stressors for the metallic clips.
7	7.1.8.1	Procedures will be developed to employ an alternate testing methodology to confirm the condition of cables and connectors in circuits that have sensitive, low level signals and where the instrumentation is not calibrated in situ.

Millstone Power Station Unit 3		
No.	**Audit and Review Report Section**	**Commitment**
8	7.1.9.4	A baseline visual inspection will be performed on a representative sample of the buried fire protection piping and components, whose internal surfaces are exposed to raw water, to confirm there is no degradation.
9	7.1.9.4	Testing a representative sample of fire protection sprinkler heads or replacing those that have been in service for 50 years will be included in the Fire Protection Program. The first tests will be completed prior to the sprinkler heads achieving 50 years of service life. The frequency of subsequent tests will not exceed a 10 years interval.
10	7.1.12.1.10	The procedures and training for personnel performing General Condition Monitoring inspections and walkdowns will be enhanced to provide expectations that identify the requirements for the inspection of aging effects.
11	7.1.13.3	Engineering will identify testing requirements, as necessary, to confirm the condition of the cable insulation for inaccessible medium-voltage cables that are exposed to significant voltage and have been submerged. Any tests performed will be proven tests for detecting deterioration of the insulation due to wetting. If cables have become submerged during the period of extended operation, Engineering will evaluate to determine the appropriate testing, as necessary, to be performed during the corresponding ten-year interval.
12	7.1.14	The Infrequently Accessed Areas Inspection Program will be established.

Millstone Power Station Unit 3		
No.	**Audit and Review Report Section**	**Commitment**
13	7.1.16.1	Millstone will follow the industry efforts on reactor vessel internals regarding such issues as thermal or neutron irradiation embrittlement (loss of fracture toughness), void swelling (change in dimensions), stress corrosion cracking (PWSCC and IASCC), and loss of pre-load for baffle and former-assembly bolts and will implement the appropriate recommendations resulting from this guidance. The revised program description, including a comparison to the 10 program elements of the NUREG-1801 program, will be submitted to the NRC for approval.
14	7.1.16.4	Augmented inspection of the Millstone Unit 3 core barrel holddown spring will be performed. In particular, the inspection will detect gross indication of loss of preload as an aging effect.
15	7.1.17.1	Millstone will follow the industry efforts investigating the aging effects applicable to nickel-based alloys (i.e., PWSCC in Alloy 600 base metal and Alloy 82/182 weld metals) and identifying the appropriate aging management activities and will implement the appropriate recommendations resulting from this guidance.
16	7.1.18.4	The existing inspection program will be modified to include those lifting devices that require monitoring for license renewal, but are not already included in the program. This enhancement will be implemented prior to the period of extended operation.
17	7.1.18.6	Implementing procedures and documentation will be modified to include visual inspections for the loss of material on the crane and trolley structural components and the rails in the scope of license renewal. This enhancement will be implemented prior to the period of extended operation.
18	7.1.20.4	The implementing procedures will be modified to include ACI 349.3R-96 and ANSI/ASCE 11-90 as references and as input documents for the inspection program.
19	7.1.20.5	The Structures Monitoring Program and implementing procedures will be modified to include all in-scope structures.

Millstone Power Station Unit 3		
No.	**Audit and Review Report Section**	**Commitment**
20	7.1.20.4	Groundwater samples will be taken on a periodic basis, considering seasonal variations, to ensure that the groundwater is not sufficiently aggressive to cause the below-grade concrete to degrade.
21	7.1.20.4	The Structures Monitoring Program and implementing procedures will be modified to alert the appropriate engineering organization if the structures inspections identify that medium voltage cables in the scope of license renewal have been submerged.
22	7.1.20.4	The maintenance and work control procedures will be revised to ensure that inspections of inaccessible areas are performed when the areas become accessible by such means as excavation or installation of shielding during maintenance or for any other reason.
23	7.1.21.4	Appropriate inspections of sealants and caulkings used for moisture intrusion prevention in and around aboveground tanks will be performed.
24	7.1.21.4	Non-destructive volumetric examination of the in-scope inaccessible locations, such as the external surfaces of tank bottoms, will be performed prior to the period of extended operation. Subsequent inspections will be performed on a frequency consistent with scheduled tank internals inspection activities.
25	7.1.21.4	The Unit 2 security diesel fuel oil tank and the Unit 3 diesel fire pump fuel oil tank are in-scope for license renewal and will be included on the respective Tank Inspection Program inspection plan.
26	7.1.22	Changes will be made to maintenance and work control procedures to ensure that inspections of plant components and plant commodities will be appropriately and consistently performed and documented for aging effects during maintenance activities.
27	7.1.24.1	Consistent with 10 CFR 54.21(c)(1),(iii), the effects of environmentally assisted fatigue for those specific locations with a CUF greater than 1.0 will be managed by the Metal Fatigue of Reactor Coolant Pressure Boundary program.

Millstone Power Station Unit 3		
No.	**Audit and Review Report Section**	**Commitment**
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Millstone Power Station Unit 3		
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