U.S.NRC

United States Nuclear Regulatory Commission

Protecting People and the Environment

NUREG-1950

Disposition of Public Comments and Technical Bases for Changes in the License Renewal Guidance Documents NUREG-1801 and NUREG-1800

Office of Nuclear Reactor Regulation

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ABSTRACT

This document is a knowledge management and knowledge transfer document associated with Revision 2 of NUREG-1801, "Generic Aging Lessons Learned (GALL) Report," and Revision 2 to NUREG-1800, "Standard Review Plan for Review of License Renewal Applications for Nuclear Power Plants." This document updates and combines NUREG-1832, "Analysis of Public Comments on the Revised License Renewal Guidance Documents," and NUREG-1833, "Technical Bases for Revision to the License Renewal Guidance Documents," (both published in 2005) into a single document. The NRC has decided to combine these two documents because their subject matter is so closely related that there was considerable redundancy when they were two separate documents.

This document fulfills two purposes. Firstly, the technical changes that were made when revising the guidance contained in NUREG-1801 are captured in this document, along with the technical basis for the changes. Changes to NUREG-1800, many of which derive from the changes to NUREG-1801, are also discussed in this document. Consequently, this document provides the underlying rationale that the NRC used to develop the current revisions to these guidance documents.

Secondly, this document contains the NRC staff's analysis of the public comments received on the Revision 2 drafts of NUREG-1801 and NUREG-1800. Public comment drafts of the GALL Report and the Standard Review Plan for License Renewal (SRP-LR) were published on May 14, 2010, with the public comment period expiring on July 2, 2010. The disposition of comments that were accepted by the NRC staff and used as the basis for instituting a change to either the GALL Report or the SRP-LR are detailed in this document. In addition, the public comments that did not result in a change to either NUREG are also dispositioned, and a technical basis for the staff's disagreement with these comments is presented.

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EXECUTIVE SUMMARY

Public Comment Overview

On May 18, 2010 (75 FR 27838), the Nuclear Regulatory Commission (NRC) announced the issuance and availability of the following license renewal guidance documents (LRGDs) for public comment:

- Draft “Standard Review Plan for Review of License Renewal [SRP-LR] Applications for Nuclear Power Plants” (NUREG-1800), Revision 2
- Draft “Generic Aging Lessons Learned (GALL) Report” (NUREG-1801), Revision 2

These LRGDs described methods acceptable to the staff for implementing the license renewal rule, Title 10 of the Federal Code of Regulations (CFR)(10 CFR Part 54), as well as techniques used by the staff in evaluating applications for nuclear power plant (NPP) license renewals. The draft revisions incorporated changes that reflected past precedents and other lessons learned since Revision 1 of the LRGDs, published in 2005.

In addition to issuing the draft revisions of these LRGDs for formal public comment, the staff held several public meetings with stakeholders to discuss the content of the draft LRGDs and subsequent comments on these draft documents.

The staff took into consideration the comments received as a result of the formal solicitation described above and incorporated its dispositions into the December 2010 versions of the LRGDs. This report, NUREG-1950, provides the evaluation and disposition of public comments received by the NRC on the draft revisions of the LRGDs.

Technical Bases Overview

This report, NUREG-1950, provides a summary of changes and a synopsis of the bases for these changes made as part of Revision 2 to the SRP-LR, and Revision 2 to the GALL Report. These changes include those that were initiated by NRC staff as well as the changes made in response to public comments, as appropriate. This document provides the underlying rationale that the NRC used in developing the Revision 2 LRGDs. Furthermore, Appendix A of this document includes a one-to-one correlation between the Aging Management Review (AMR) line-items in GALL Rev. 0, Rev.1, and Rev. 2 for easy cross-reference.

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ABBREVIATIONS

ACAR	aluminum conductor aluminum alloy reinforced
ACSR	aluminum conductor steel reinforced
ACI	American Concrete Institute
AE/AM	Aging effect/aging mechanism
AERM	aging effect requiring management
AISC	American Institute of Steel Construction
AMP	aging management program
AMR	aging management review
ANSI	American National Standards Institute
AOG	advanced off-gas
ASME	American Society of Mechanical Engineers
ASTM	American Society for Testing and Materials
BAC	boric acid corrosion
BVPS	Beaver Valley Power Station
BWR	boiling water reactor
BWRVIP	Boiling Water Reactor Vessel and Internals Project
B&PV	boiler and pressure vessel (ASME entity)
CASS	cast austenitic stainless steel
CE	Combustion Engineering
CEA	control element assembly
CFR	Code of Federal Regulations
CLB	current licensing basis
CNS	Cooper Nuclear Station
CRD	control rod drive
CRDRL	control rod drive return line
CRGT	control rod guide tube
CUF	cumulative usage factor
DAEC	Duane Arnold Energy Center
DLR	Division of License Renewal (NRC)
ECCS	emergency core cooling system
ECP	electrochemical corrosion potential
EOL	end of life
EPDM	ethylene-propylene diene monomer
EPR	ethylene-propylene rubber
EPRI	Electric Power Research Institute
EQ	environmental qualification

ESF	engineered safety features
EVT	enhanced visual testing
FAC	flow-accelerated corrosion
FER	further evaluation required
FERC	Federal Energy Regulatory Commission
FSAR	Final Safety Analysis Report
F/E	further evaluation
GALL	Generic Aging Lessons Learned
GL	Generic Letter
HDPE	high density polyethylene
HMWPE	high molecular weight polyethylene
HPCI	high-pressure coolant injection
HVAC	heating, ventilation, and air conditioning
IAEA	International Atomic Energy Agency
IASCC	irradiation-assisted stress corrosion cracking
IC	isolation condenser
IGSCC	intergranular stress corrosion cracking
ILRT	integrated leak rate testing
IN	information notice
IR	insulation resistance
IRS	Incident Reporting System (database)
ISG	Interim Staff Guidance
ISI	inservice inspection
JAFNPP	James A. FitzPatrick Nuclear Power Plant
LER	licensee event report
LP	low pressure
LR-ISG	license renewal interim staff guidance
LRA	license renewal application
LRGD	license renewal guidance document
LTCP	low temperature crack propagation
MEAP	material, environment, aging effect and aging management program
MEB	metal enclosed bus
MIC	microbiologically-influenced corrosion

MRP	Materials Reliability Program
NACE	National Association of Corrosion Engineers
NDE	nondestructive examination
NEA	Nuclear Energy Agency
NEI	Nuclear Energy Institute
NFPA	National Fire Protection Association
NPP	nuclear power plant
NPS	nominal pipe size
NRC	Nuclear Regulatory Commission
NSAC	Nuclear Safety Analysis Center
NSSS	nuclear steam supply system
OCCW	open-cycle cooling water
OCNGS	Oyster Creek Nuclear Generating Station
ODSCC	outer diameter stress corrosion cracking
OECD	Organisation for Economic Co-operation and Development
OE	operating experience
PH	precipitation-hardened
PT	penetrant testing
P/T	pressure temperature
PVC	polyvinyl chloride
PWR	pressurized water reactor
PWSCC	primary water stress corrosion cracking
QA	quality assurance
RCCA	rod control cluster assembly
RCPB	reactor coolant pressure boundary
RCS	reactor coolant system
RCSC	Research Council on Structural Connections
RG	Regulatory Guide
RIS	regulatory information summary
RVI	reactor vessel internals
S&P	steam and power
SAW	submerged arc weld
SBO	station blackout

SCC	stress corrosion cracking
SER	safety evaluation report
SFP	spent fuel pool
SG	steam generator
S/G	Standards and guides
SPC	steam and power conversion system
SR	silicone rubber
SRP-LR	standard review plan for license renewal
SS	stainless steel
SSC	systems, structures, and components
SSES	Susquehanna Steam Electric Station
TGSCC	transgranular stress corrosion cracking
TLAA	time-limited aging analysis
TMI	Three-Mile Island
USE	upper-shelf energy
UT	ultrasonic testing
UV	ultraviolet
VYNPS	Vermont Yankee Nuclear Power Station
WCGS	Wolf Creek Generating Station
XLPE	cross-linked polyethylene

I INTRODUCTION

NUREG-1950, "Disposition of Public Comments and Technical Bases for Changes in the License Renewal Guidance Documents NUREG-1801 and NUREG-1800," establishes the changes that constitute Revision 2 of NUREG-1801, "Generic Aging Lessons Learned (GALL) Report," and Revision 2 of NUREG-1800, "Standard Review Plan for Review of License Renewal Applications for Nuclear Power Plants" (SRP-LR). These two license renewal guidance documents (LRGDs) were published in December, 2010. NUREG-1950 is a knowledge management transfer document.

NUREG-1950 provides (1) an evaluation and technical justification for the disposition of all public comments received by the NRC during a 45-day comment period that ended on July 2, 2010 regarding the two LRGDs, and (2) a summary of notable technical changes and the technical bases for the changes made to Revision 1 of these two LRGDs.

Many public comments resulted in changes to the GALL Report and the SRP-LR. Some of the changes to the SRP-LR were derived from the changes to the GALL Report. Consequently, NUREG-1950 provides the underlying rationale that the NRC used to develop the current revisions of NUREG-1800 and -1801.

I.1 Purpose and Organization of the Document

NUREG-1950 contains the significant changes to Revision 1 and the technical bases for the disposition of all public comments, both those that led to revisions to the documents and those that did not. Previously, for Revision 1 of NUREG-1800 and -1801, the information was contained in two separate LRGDs, NUREG-1832 and NUREG-1833. The NRC's desire to streamline its guidance resulted in the combination of all the information into a single document, NUREG-1950.

This document is organized into four sections followed by references and an appendix. Section I contains background and overview information. Section II summarizes the changes to the GALL Report and the technical bases of these changes. Section III presents similar information for the SRP-LR. Section IV summarizes the analysis and disposition of all public comments received on the Revision 2 draft of the GALL Report and the SRP-LR during the public comment period. Appendix A includes a crosswalk between the Rev.0/Rev.1/Rev.2 versions of the GALL Report as well as the staff technical positions as reflected in the License Renewal Interim Staff Guidance (LR-ISGs).

Tables are used to summarize technical materials whenever possible. Generic changes are discussed in the text at the beginning of each subsection of Sections II and III, followed by tables showing changes to the documents. Tables in Section IV show each comment that was received from the public, the disposition of the comment, and the technical basis supporting the action that was taken.

Table I-1 helps the reader navigate between the tables that summarize the notable technical changes and their technical bases and the tables that present the public comments and their dispositions.

Table I-1. Crosswalk Between the Summary of Changes, Technical Bases, and Public Comment Tables in NUREG-1950		
Source Document and Chapter	**Tables with Change Summaries and Technical Bases**	**Associated Tables with Related Public Comments**
New AMRs – Mechanical GALL Chapters IV, V, VII, and VIII	Table II-3 through Table II-6	Table IV-5, Table IV-6, Table IV-8, Table IV-9
New AMRs – Structural GALL Chapters II and III	Table II-1 and Table II-2	Table IV-3 and Table IV-4
New AMRs – Electrical GALL Chapter VI	N/A	N/A
Revised AMRs – Mechanical GALL Chapters IV, V, VII, and VIII	Table II-7 through Table II-10	Table IV-5, Table IV-6, Table IV-8, Table IV-9
Revised AMRs – Structural GALL Chapters II and III	Table II-11 and Table II-12	Table IV-3 and Table IV-4
Revised AMRs – Electrical GALL Chapter VI	Table II-13	Table IV-7
GALL Chapter IX - Definitions	Table II-14 through Table II-19	Table IV-10
GALL Chapter X - TLAAs	Table II-20	Table IV-11
GALL Chapter XI – Mechanical	Table II-21	Table IV-12
GALL Chapter XI – Structural	Table II-22	Table IV-13
GALL Chapter XI - Electrical	Table II-23	Table IV-14
GALL Chapter I – American Society of Mechanical Engineers (ASME) Code	Table II-24	Table IV-2
GALL General BWR Vessel Internals AMP Comments	Table II-25	Table IV-15
SRP-LR Chapter 1	Table III-1	Table IV-16
SRP-LR Chapter 2	Table III-2	Table IV-17
SRP-LR Chapter 3	Table III-3 through Table III-9	Table IV-18
SRP-LR Chapter 4	Table III-10 through Table III-16	Table IV-19
SRP-LR Appendices	Table III-17	Table IV-20

I.2 Overview of Generic Changes from Revision 1 to Revision 2

Changes to the GALL Report and the SRP-LR (the LRGDs) fall into the following categories:

- Additions of new Aging Management Review (AMR) line-items in the GALL Report
- Revisions to or deletions of AMR line-items in the GALL Report
- Revisions to or deletion of Aging Management Programs (AMPs) in the GALL Report

- Addition of new materials and new combinations of component/material/environment to the AMR line items referenced in the SRP-LR
- Incorporation of Volume 1 and Volume 2 of the GALL Report, Rev. 1 into a single volume for Rev. 2
- Changes in roll-up methodology, resulting in changes to tables in the SRP-LR
- NRC positions previously approved in other documents, such as safety evaluation reports and approved interim staff guidance
- Lessons learned
- New operating experience
- Technical clarifications or corrections
- Clarifications to the audit and review process (SRP-LR only)

Many sections in this document begin with a discussion of generic and overarching changes to a chapter of the guidance documents, followed by detailed descriptions of changes, revisions, additions, or disposition of public comments, along with the technical rationale supporting these decisions.

Sometimes there will be slight variation in terminology between NUREG-1950 and NUREGs-1800 and -1801. For example, NUREG-1950 uses the convention "AMR Item" and AMR Line-Item" interchangeably. Note also that SRP-LR is used interchangeably with SRP or NUREG-1800 and that GALL Report is used interchangeably with NUREG-1800. The GALL Report is used interchangeably with the shorthand nomenclature of GALL. An AMP (found in Chapter XI of GALL) may be simply referred to as AMP XI.M- (referencing mechanical systems).

Section II.1, "New AMR Items in Revision 2 of the GALL Report," documents the creation and justification for new AMR entries. Section II.2, "Changes to Existing AMR Items in Revision 2 of the GALL Report," documents the changes in the existing AMR items and the technical bases for these changes. These revisions of the LRGDs describe methods to the staff for implementing the license renewal rule (10 CFR Part 54) as well as techniques used by the staff to evaluate applications for license renewal. The draft revisions incorporated changes that reflect past precedents and other lessons learned since Revision 1, which was published in 2005.

Some explanation as to what constitutes a "change" is in order. Changes that are captured in this guidance document consist of **notable technical changes**. These include:

(1) For AMPs - changes in the scope, methods, or measuring techniques, frequencies, codes or standards, boundary conditions, or other aspects of license renewal that would result in a change to the way an applicant conducts its AMPs based on this guidance,

(2) For AMRs - changes in materials, aging effects or aging mechanisms, aging management programs credited, further evaluation required, additional materials and environment.

Changes such as moving paragraphs from one section to another, deleting superfluous material, making editorial changes, updating citations, AMP title changes, clarifications, etc. are not considered notable technical changes and are not documented in the tables contained in NUREG-1950.

The numerous tables throughout this document have consistent naming protocol and content. Comment or reference numbers are built from a database containing changes made to the GALL Report or the SRP-LR. The "Comment Number" is a unique number that is generated automatically by this database and is given to each public comment. A reference number is assigned to each public comment that allows it to be located in the public comment submittal. For instance, “Comment XI.M2-3” means that the public comment was called “XI.M2-3” by the commenter. Table IV-1 shows the public comments and their associated reference numbers and ADAMS Accession Numbers.

Many tables in Section IV contain a column with the heading “Location in Document and Commenter Reference No.” This refers to the place in the document where the change can be found, such as a chapter, subchapter, section title, AMR item number, or the like.

Another column in many tables in Section III is entitled “Summary of the Change.” This column summarizes the technical changes that were made to a specific portion of the SRP-LR, either as the result of a staff-accepted public comment or because of a need identified by NRC staff. Every notable technical change that was made to the GALL Report, Rev. 1 or the SRP-LR, Rev. 1 is documented in the tables in Sections II and III of NUREG-1950.

If a notable technical change has been made, the technical basis for that change is documented in these tables as well. The technical basis may be a citation of a standard or code, the update of a standard or code, citation of new NRC Interim Staff Guideline (ISG), operating experience, or other technical justification. In addition, public comments that were received during the public comment period but were found by NRC staff not to justify a technical change to the GALL Report or SRP-LR are also provided with a technical basis as to why the comment was not accepted. These bases are found in the tables of Section IV.

Changes that were made to the GALL Report or SRP-LR that were the result of public comments, but did not incorporate notable technical changes, are not captured in the tables in Sections II or III of this document. The changes that are shown in these tables are limited to notable technical changes and do not reflect the changes resulting from typographical errors, editorial changes, or clarifications.

I.3 Incorporation of Previously Approved NRC Staff Technical Positions

The GALL Report, Rev. 2 incorporates specific technical changes. These technical changes are based on the incorporation of NRC-approved positions established in past precedents from approved license renewal Safety Evaluation Reports (SERs), final license renewal interim staff guidance (LR-ISG), and more recent operating experience. NUREG-1950 Appendix A.2 (Table A-8) summarizes the technical changes made to the GALL Report to reflect the NRC staff positions in the LR-ISGs issued since the release of NUREG-1801, Revision 1 in 2005. These specific technical changes introduce new technical content to the updated documents. Section II, “Revision 2 Changes to GALL Report, Rev.1 and Their Technical Bases,” provides a listing of each new or existing AMR line-items that incorporates a technical change and provides a specific basis for this change.

The NRC drew largely upon three sources of information: (a) previous NRC staff comments for improving the license renewal process (collected since the issuance of Revision 1 of the GALL Report and the SRP-LR), (b) the collection of approved SERs, and (c) suggested changes from the Nuclear Energy Institute (NEI). Previous license renewal SERs were reviewed to identify instances where changes to the LRGDs should be made to improve the technical accuracy and consistency of the license renewal process. The NEI also suggested a number of changes based upon the review of prior applications. A large number of items were collected from these three information sources and each was reviewed for its applicability, value, and technical adequacy as part of the NRC review process.

Numerous changes were made to the AMPs to reflect input from the NRC staff’s review of NRC positions previously approved or as necessitated by new operating experience. Section II.5

provides a listing of each new or existing AMP that incorporates notable technical changes and provides the bases for those changes.

In addition, the GALL Report tables were updated to include new **m**aterial, **e**nvironment, **a**ging effect and aging management **p**rogram (MEAP) combinations that are common to most license renewal applications (LRAs), including those that have already been reviewed. In letters dated September 14, 2009 and July 1, 2010, NEI proposed adding a number of new AMR line-items. NRC staff reviewed these items to identify whether the SERs had been accepted with the proposed MEAP combinations in previous LRAs or whether the MEAP combinations were technically appropriate to add. If a previous NRC staff position was identified or the MEAP combination was found technically appropriate, the staff evaluated whether the MEAP combination was sufficiently generic to warrant including this item in the revised LRGD. If so, it was added either in its proposed or in a modified form. Section II.1 of this document further discusses these new AMR line-items.

I.4 Operating Experience

Extended operation of nuclear reactors necessitates a thorough analysis of existing experience. An operating experience review was performed to identify necessary additions or modifications to the GALL Report. Both domestic and foreign operating experience was reviewed.

The staff from the Division of License Renewal (DLR) analyzed operating experience information during a screening review of domestic operating experience, foreign operating experience from the international Incident Reporting System (IRS) database, and NRC generic communications. The information reviewed included operating experience from January 2004 to approximately April 2009.

Domestic Operating Experience: The NRC Office of Research provided a listing of Licensee Event Reports (LERs) related to failures, cracking, degradation, etc. of passive components. These results were reviewed by NRC staff. The operating experience review identified a number of examples where vibration-induced fatigue caused cracking of plant components. The staff subsequently modified GALL AMP XI.M35, "One-time Inspection of ASME Code Class 1 Small-bore Piping," to address these concerns. In addition, the operating experience elements of numerous AMPs were updated to reflect relevant operating experience identified by the review.

Foreign Operating Experience: The international IRS, jointly operated by the International Atomic Energy Agency (IAEA) and the Nuclear Energy Agency (NEA), is used to compile and analyze information on nuclear power plant (NPP) events and also promotes a systematic approach to collecting and disseminating the lessons learned from international operating experience. Events of safety significance and events from which lessons can be learned are reported to the IRS. The main objective of the IRS is to enhance the safety of NPPs by reducing the frequency and severity of safety significant unusual events at NPPs. NRC staff also reviewed international operating experience from: (a) the Organization for Economic Co-operation and Development (OECD) OECD/NEA Piping Failure Data Exchange database (including the data from 1970 to 2009) and (b) the OECD/NEA Stress Corrosion Cracking and Cable Aging database.

The foreign operating experience databases were queried for reports relating to aging effects in passive components. The identified reports were analyzed to determine if there were any revisions necessary for either AMR line-items or AMP content. Many of the reports identified MEAP combinations that were already addressed by the GALL Report. Some of the items were specific to foreign plants and not generically applicable to U.S. pressurized water reactors (PWRs) and boiling water reactors (BWRs). The IRS identified that stainless steel components are subject to chloride-induced stress corrosion cracking (SCC) when they are exposed to the air-outdoor environment that involves a salt-laden atmospheric condition or salt water spray. Based on this review result, relevant SRP-LR chapters were added and further evaluation is now recommended for those environmental conditions.

II REVISION 2 CHANGES TO GALL REPORT, REV. 1 AND THEIR TECHNICAL BASES

Some technical changes to the GALL Report, Rev. 1 were made to clarify or improve the guidance provided in Revision 1. NRC staff believes that these changes make the GALL Report more useful to the applicant and to NRC staff reviewing the safety aspects of applications for license renewal. Additional changes have been made as a result of public comments received during the public comment period that ended July 2, 2010. The final version of NUREG-1801, Rev. 2 incorporates both of these types of technical changes.

Below is a summary of the notable technical changes that were made in Revision 2 of the GALL Report. General and generic changes include:

- Eliminating Volume 1 of the GALL Report by moving Volume 1 information into the SRP-LR and GALL Report.
- Revising Chapter I for the Application of the ASME Code using the applicable 2004 Edition or other editions and addenda allowed as per a new generic footnote in the GALL Report (Section I).
- Revising the AMR line-item-numbering system to include subchapters (e.g., II.A1.CP-33).
- Revising Chapters II and III to split AMR line-items between accessible and inaccessible concrete, where applicable.
- Revising Chapters IV.B2, B3, and B4 to incorporate aspects of the MRP-227, “Materials Reliability Program for PWR Internals Inspection and Evaluation Guidelines”.
- Revising a number of AMR items from a further evaluation required of “Yes” to “No”.
- Combining aging management using both AMPs XI.M2, “Water Chemistry,” and XI.M32, “One-Time Inspection”.
- Combining aging management using both AMPs XI.M39, “Lubricating Oil Analysis,” and XI.M32, “One-Time Inspection”.
- Combining aging management using both AMPs XI.M30, “Fuel Oil Chemistry,” and XI.M32, “One-Time Inspection”.
- Developing a new AMP XI.M41, “Buried and Underground Piping and Tanks,” to address buried and underground piping and tanks.
- Developing a new AMP XI.M40, “Monitoring of Neutron-Absorbing Materials Other than Boraflex," to address neutron-absorbing materials other than Boraflex.
- Including ground water chemistry in the structural AMPs so that further evaluation is not recommended for structural AMRs.
- Using the new AMP XI.M16A, “PWR Vessel Internals” to manage aging effects where the GALL Report, Rev. 1 recommended a license commitment for PWR internals. The revised GALL Report refers to MRP-227 as supplemented by the technical aspects that the staff deems appropriate.
- Using the new AMP XI.M11B, “Cracking of Nickel-Alloy Components and Loss of Material Due to Boric Acid-Induced Corrosion in Reactor Coolant Pressure Boundary Components (PWRs only)” to manage aging effects where the GALL Report, Rev. 1 recommended a license commitment for nickel-alloy components.
- The sampling methodology in AMP XI.M32, “One-Time Inspection,” and AMP XI.M33, “Selective Leaching,” were revised.

- The Time-Limited Aging Analyses (TLAA), X.M1, “Fatigue Monitoring,” was revised to include specific guidance for calculating environmentally-adjusted cumulative usage factor (CUF) for nickel alloys (NUREG/CR-6909), and the need to confirm that the NUREG/CR-6260 locations have been evaluated for the effects of the reactor coolant environment on fatigue usage to ensure that they bound plant-specific locations exposed to water environment that may be more limiting than those considered in NUREG/CR-6260.
- Removing structural bolting from the scope of mechanical AMP XI.M18, “Bolting Integrity” and including it in the scope of structural AMPs; creating separate AMR lines to address structural bolting.
- AMP XI.M3, “Reactor Head Closure Stud Bolting,” was revised to clarify the term "stable lubricants" by drawing attention to molybdenum disulfide (MoS_2).
- AMP XI.M9, “BWR Vessel Internals,” added the thermal aging and neutron irradiation embrittlement of PH martensitic stainless steel (PH 17-4 and 15-5 SS) and martensitic stainless steel, and the irradiation embrittlement of X-750 alloy.
- For steam generator divider plates the effectiveness of the chemistry control program should be verified to ensure that cracking due to Primary Water Stress Corrosion Cracking (PWSCC) is not occurring.
- For steam generator tube-to-tubesheet welds exposed to reactor coolant with Alloy 600/82/182 tubesheet cladding, a plant-specific AMP is evaluated, along with the primary water chemistry program, on a case-by-case basis to ensure that an adequate program will be in place for the management of cracking due to PWSCC,
- AMP XI.M35, “One-time Inspection of ASME Code Class 1 Small Bore-Piping,” the program scope was clarified to include socket welds. The AMP is applicable for plants that have not experienced cracking, or that have effectively mitigated cracking through design changes, otherwise a plant specific program is needed. Included alternative to use opportunistic destructive examination (on a sample basis) for socket welds, and clarified socket weld volumetric examinations.
- AMP XI.S1, “ASME Section XI, Subsection IWE,” was revised to incorporate aspects related to monitoring MK1 drywell corrosion and augment ASME Code IWE requirements to include surface examination of components that are subject to cyclic loading but have no current licensing basis fatigue analysis.
- AMP XI.S5, “Masonry Walls,” revised to specify an inspection frequency of once every five years.
- AMP XI.S6, “Structures Monitoring,” was revised to include recommended frequency of inspection for the in-scope structures, settlement monitoring, and inspection of inaccessible below grade concrete. Also included provisions for monitoring of ground water chemistry. And clarified the use of relevant codes and standards, and incorporated monitoring criteria for structural bolting, and elastomeric vibration isolation elements.
- AMP XI.E3, “Inaccessible Power Cables Not Subject to 10 CFR 50.49 Environmental Qualification Requirements,” was revised to go down to 480v cables. The inspection frequency for manholes was revised and includes event driven inspections. Revised to include energized and de-energized cables. Cable testing frequency revised to not exceed 6 years.

- Adding, as appropriate, additional materials, such as asbestos cement piping, high density polyethylene (HDPE), fiberglass, superaustenitic or precipitation-hardened stainless steel, titanium, and flamastic fire-proofing to AMR items and to the scope of the AMPs.
- Changing many recommendations for plant-specific AMPs in the GALL Report, Rev. 1 to generic AMPs in Rev. 2; these include:
  - Stainless steel components exposed to condensation, diesel exhaust, or outdoor-air are now managed by AMPs XI.M36, “External Surfaces Monitoring of Mechanical Components,” or XI.M38, “Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components”
  - Aluminum and copper alloy components exposed to condensation are now managed by the AMP XI.M38, “Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components”
  - Elastomeric components in all environments are now managed by AMPs XI.M36, “External Surfaces Monitoring of Mechanical Components,” XI.M38, “Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components,” XI.M26, “Fire Protection,” XI.S1, “ASME Section XI, Subsection IWE,” XI.S4, “10 CFR Part 50, Appendix J,” or XI.E4, “Metal Enclosed Bus,” depending on the components. Manual manipulation of polymeric materials is included.
  - Neutron-absorbing materials other than Boraflex are now managed by the AMP XI.M40, “Monitoring of Neutron-Absorbing Materials Other than Boraflex“
  - Piping and tanks exposed to soil are now managed by the AMP XI.M41, “Buried and Underground Piping and Tanks”

Other generic changes to the GALL Report include:

- Relevant operational experience since the issuance of the GALL Report, Rev. 1 was added to Rev. 2.
- References were updated to reflect changes that have occurred since Revision 1.
- The AMP content was aligned more closely with the 10-element template for AMPs per guidance in the SRP-LR, Appendix A.1.
- Relevant information from recent license renewal applications and precedents was added to Rev. 2.

Chapter XI, Aging Management Programs, was the focus of significant revisions and additions.

Changes to Chapter XI include:

- AMP XI.M21, “Closed-Cycle Cooling Water Systems,” is renamed AMP XI.M21A, “Closed Treated Water Systems” due to extensive changes to the program in Revision 2.
- AMP XI.M11A, “Nickel-Alloy Penetration Nozzles Welded to the Upper Reactor Vessel Closure Heads of PWRs,” became a new AMP, AMP XI.11B, “Cracking of Nickel-Alloy Components and Loss of Material Due to Boric Acid-Induced Corrosion in Reactor Coolant Pressure Boundary Components” (PWRs only).
- The AMP XI.M13, “Thermal Aging and Neutron Irradiation Embrittlement of [Cast Austenitic Stainless Steel] CASS,” is subsumed by AMP XI.M9, “BWR Vessel Internals.” In addition, AMP XI.M16A, “PWR Vessel Internals,” also addresses thermal aging and neutron irradiation embrittlement of CASS.

- AMP XI.M28, “Buried Piping and Tank Surveillance,” and AMP XI.M34, “Buried Piping and Tanks Inspection” are combined into a new AMP XI.M41, “Buried and Underground Piping and Tanks”.
- AMP XI.M40, “Monitoring of Neutron-Absorbing Materials Other than Boraflex,“ was developed to address neutron absorbing materials other than Boraflex.

A more detailed summary of these changes along with associated technical bases for making the changes are summarized in Section II of this document.

II.1 New AMR Items in Revision 2 of the GALL Report

As a result of the addition of new materials and environments or the regrouping of components or structures, new AMR items have been added to Revision 2. These additions, along with the technical bases for the additions, are presented for GALL Report Chapters II, III, IV, V, VII, and VIII in Table II-1 through Table II-6 below. (There were no new AMR items added in Revision 2 of the GALL Report, Chapter VI.) The technical bases for these new items also can be found in these tables.

II.2 Changes to Existing AMR Items in Revision 2 of the GALL Report

Table II-7 through Table II-13 present the changes to the AMR items that have been made in the GALL Report, Rev. 2. The following describes the information presented in each column of these tables, consistent also with the format in Table II-1 through Table II-6 for new AMR line items.

Column Heading	Description
New AMR Item No.	Identifies the item number in GALL Chapters II through VIII presenting the detailed information summarized by this row. *Using II.B1.2.CP-114 as an example*: The first Roman numeral presents the GALL Chapter (II) which is followed by the subchapter (B2.1). The following letter identifies the discipline(s) that the precedent (P) is associated with (i.e., “A” for Auxiliary Systems, “E” for Engineered Safety Features Systems, “L” for Electrical Systems, R” for Reactor Coolant Systems, “T” for “Structures and Component Supports, “S” for Steam and Power Conversion Systems, and “C” for Containment Structures). The second letter “P” identifies that there is a precedent for the MEAP combination. This nomenclature convention is found throughout NUREGs-1800 and -1801.
Structure and/or Component	Identifies the NPP structure or components to which the row (aka AMR line-item) applies
Material	Identifies the material of construction for the structure or components to which the row applies
Environment	Identifies the environmental conditions for the structure or components to which the row applies
Aging Effect/ Mechanism (AE/AM)	Identifies the applicable aging effect and mechanism(s). See Chapter IX of the GALL Report for more information.
Aging Management Programs (AMP)	Identifies the time limited aging analysis or aging management program found acceptable for properly managing the effects of aging. See Chapter X and XI of the GALL Report.

Technical Basis for Change	Provides background on the source of NRC positions previously approved (such as pertinent SERs in response to earlier LRAs) that provides further information on this evaluation.

A summary of the revisions to mechanical AMR items is presented in Table II-7 through Table II-10. The revisions to structural AMR items are summarized in Table II-11 and Table II-12. The revisions to electrical AMR items are summarized in Table II-13. **Those cells that have been changed are shown in bold.**

Note: In Table II-7, changed cells are not shown in bold for Revision 2 AMR item numbers with prefixes IV.B2, IV.B3, and IV.B4. These are AMR items related to PWR reactor vessel internals for Westinghouse, Combustion Engineering, and Babcock and Wilcox reactors, respectively. For these AMR items, changes were made based on the staff's review of recommendations in MRP-227, "Materials Reliability Program, Pressurized Water Reactor Internals Inspection and Evaluation Guidelines," Revision 0. These changes typically affected the Structure and/or Component, Aging Management Program, and Aging Effect/Mechanism fields to varying extents, and no benefit was obtained by showing these fields in bold.

II.2.1 Overview of Changes to Mechanical GALL Tables (Chapters IV, V, VII, and VIII)

The AMR items in Revision 2 of the GALL Report Chapters IV, V, VII, and VIII are divided into three categories:

1. AMR items where the MEAP combination has not changed from an equivalent item in Revision 1 of the GALL Report and there is also no change in the recommendation regarding further evaluation.
2. AMR items where there is some change from Revision 1 of the GALL Report with regard to the MEAP combination or the recommendation regarding further evaluation. However, there is a clear relationship between the Revision 2 AMR item and a related AMR item in Revision 1 of the GALL Report. The changes and the bases for these changed AMR items are provided in Table II-7 through Table II-10.
3. AMR items that are new in Revision 2 of the GALL Report. For these items, there is not a clear relationship with a similar item in the same chapter of Revision 1 of the GALL Report. The new AMR items and the bases for their addition are provided in Table II-3 through Table II-6.

II.2.2 Retired Mechanical AMR Items (GALL Report Chapters IV, V, VII, and VIII)

In addition, a limited number of AMR items that were in the GALL Report, Rev. 1 were retired (deleted), without being replaced by a related item. These are tracked in NUREG-1950 Appendix A. For Chapters IV, V, VII, and VIII, the deleted items are as follows:

Chapter IV: A number of AMR items were retired without replacement.

Table IV.B1 AMR item IV.B1-12(R-102) was retired and not replaced. This was an AMR item for stainless steel BWR jet-pump sensing lines (internal to the vessel) exposed to reactor coolant, with an aging effect of cracking due to cyclic loading. The recommended AMP was previously identified as a plant-specific AMP. The staff has previously accepted applicant evaluations showing that this component is not in scope for license renewal and a plant-specific AMP is not needed. On this basis, the AMR item IV.B1-12(R-102) has not been needed to support license renewal applications.

Table IV.B2, VI.B3, and VI.B4 A number of AMR items in Tables IV.B2, B3, and B4 were retired without replacement when recommendations for aging management of PWR internals were added consistent with recommendations in MRP-227, “Materials Reliability Program: Pressurized Water Reactor Internals Inspection and Evaluation Guidelines,” Revision 0. For some existing lines, a clear relationship based on similarity of component description, material, and aging effect was identified between GALL Report Revision 1 AMR items and GALL Report Revision 2 AMR items based on MRP-227 component, material and aging effect descriptions. These items are shown in Table II-7, changes to existing items in Chapter IV. However, for a number of existing lines, there was sufficient difference in component nomenclature and AMR items between Revision 1 items and Revision 2 items in the GALL Report that no benefit was obtained by attempting to relate a Revision 2 item to a retired Revision 1 item. New items were created and are shown in Table II-3. Consequently, the Revision 1 item was treated as “deleted” (retired without replacement). The following Revision 1 AMR items were retired without replacement:

IV.B2-11(R-144); IV.B2-13(R-145); IV.B2-15(R-134); IV.B2-19(R-131); IV.B2-2(R-123); IV.B2-23(R-139); IV.B2-25(R-136); IV.B2-27(R-119); IV.B2-29(R-117); IV.B2-3(R-127); IV.B2-30(R-116); IV.B2-35(R-110); IV.B2-36(R-109); IV.B2-37(R-111); IV.B2-38(R-114); IV.B2-39(R-113); IV.B2-4(R-126); IV.B2-41(R-107); IV.B2-42(R-106); IV.B2-5(R-129); and IV.B2-7(R-121)

IV.B3-1(R-153); IV.B3-10(R-164); IV.B3-11(R-159); IV.B3-12(R-161); IV.B3-13(R-160); IV.B3-14(R-158); IV.B3-16(R-157); IV.B3-18(R-171); IV.B3-19(R-168); IV.B3-20(R-169); IV.B3-21(R-166); IV.B3-26(R-148); IV.B3-27(R-147); IV.B3-28(R-146); IV.B3-3(R-152); IV.B3-4(R-151); IV.B3-5(R-150); and IV.B3-6(R-154)

IV.B4-10(R-193); IV.B4-11(R-195); IV.B4-14(R-197); IV.B4-17(R-187); IV.B4-18(R-185); IV.B4-19(R-192); IV.B4-2(R-180); IV.B4-20(R-186); IV.B4-22(R-209); IV.B4-23(R-211); IV.B4-24(R-212); IV.B4-26(R-213); IV.B4-27(R-208); IV.B4-28(R-206); IV.B4-29(R-202); IV.B4-3(R-182); IV.B4-30(R-204); IV.B4-33(R-207); IV.B4-34(R-172); IV.B4-35(R-174); IV.B4-36(R-173); IV.B4-39(R-215); IV.B4-40(R-214); IV.B4-41(R-216); IV.B4-43(R-176); IV.B4-44(R-175); IV.B4-45(R-177); IV.B4-46(R-178); IV.B4-5(R-181); IV.B4-6(R-184); IV.B4-8(R-199); and IV.B4-9(R-201)

Table IV.C1	AMR Item IV.C1-13(R-29) was retired and not replaced. This was an AMR item for stainless steel or steel pump and valve seal flange closure bolting in an environment of “system temperature up to 288ºC (550ºF),” with an aging effect of loss of material due to wear. The recommended AMP was previously identified as GALL AMP XI.M18, “Bolting Integrity.” This item is very similar to GALL Report Revision 1 AMR Item IV.C1-12(R-26), which was retired and replaced with a more encompassing component, material, and environment description. Consequently, IV.C1-13(R-29) became redundant to Item IV.C1.RP-42, which replaced IV.C1-12(R-26), and VI.C1-13(R-29) was retired without being replaced.
Chapter V:	No AMR items were retired without replacement.
Chapter VI:	AMR Item VI.A-6(LP-03) was retired; however, GALL Rev. 2 Item VI.A.LP-33 encompasses the retired item.
Chapter VII:	No AMR items were retired without replacement.
Chapter VIII:	As part of a simplification effort, the reactor type descriptions were deleted after the words “Water Chemistry” in AMR items where the “Water Chemistry” program was a recommended AMP. The change resulted in some AMR items becoming identical, where in Revision 1 of the GALL Report the difference between two items was caused only by the reactor type description. In Table VIII.A, item VIII.A-13(SP-46) became identical to VIII.A-12(SP-43) and was retired without replacement; also VIII.A-16(S-06) became identical to VIII.A-15(S-04) and was retired without replacement. In Table VIII.C, item VIII.C-4(S-06) became identical to VIII.C-3(S-04) and was retired without replacement; also item VIII.C-7(S-10) became identical to VIII.C-6(S-09) and was retired without replacement. In Table VIII.E, item VIII.E-34(S-10) became identical to VIII.E-33(S-09) and was retired without replacement; VIII.E-31(SP-19) also became identical to VIII.E-30(SP-17) and was retired without replacement

II.2.2.1 AMR Items for Chapter IV - Reactor Vessel, Internals, and Reactor Coolant System

The public comments that led to the technical changes shown in Table II-7 can be found in Table IV-5.

II.2.2.2 AMR Items for Chapter V - Engineered Safety Systems

The public comments that led to the technical changes shown in Table II-8 can be found in Table IV-6.

II.2.2.3 AMR Items for Chapter VII - Auxiliary Systems

The public comments that led to the technical changes shown in Table II-9 can be found in Table IV-8.

II.2.2.4 AMR Items for Chapter VIII - Steam and Power Conversion Systems

The public comments that led to the technical changes shown in Table II-10 can be found in Table IV-9.

II.2.3 Overview of Changes to Structural GALL Tables (Chapters II-III)

II.2.3.1 General Changes

The AMR items in Revision 2 of the GALL Report Chapters II and III are divided into three categories:

1. AMR items where the MEAP combination has not changed from an equivalent item in Revision 1 of the GALL Report and there is also no change in the recommendation regarding further evaluation.
2. AMR items where there is some change from Revision 1 of the GALL Report with regard to the MEAP combination or the recommendation regarding further evaluation. However, there is a clear relationship between the Revision 2 AMR item and a related AMR item in Revision 1 of the GALL Report. The changes and the basis for these changed AMR items are provided in Table II-11 and Table II-12.
3. AMR items that are new in Revision 2 of the GALL Report. For these lines, there is not a clear relationship with a similar item in the same chapter of Revision 1 of the GALL Report. The new AMR items and the basis for their addition are provided in Table II-1 and Table II-2.

II.2.3.2 AMR Items for Chapter II - Containment Structures

The public comments that led to the technical changes shown in Table II-11 can be found in Table IV-3.

II.2.3.3 AMR Items for Chapter III - Structures and Component Supports

The public comments that led to the technical changes shown in Table II-12 can be found in Table IV-4.

II.2.4 Overview of Changes to Electrical GALL Tables (Chapter VI)

II.2.4.1 AMR Items for Chapter VI - Electrical Systems

One AMR item was retired without being replaced by a related item. This was an AMR item for fuse holder insulation exposed to an adverse localized environment caused by heat, radiation, or moisture in the presence of oxygen or >60-year service limiting temperature with an aging effect of embrittlement, cracking, melting, discoloration, swelling, or loss of dielectric strength leading to reduced insulation resistance (IR); electrical failure/degradation (thermal/thermoxidative) of organics/thermoplastics, radiation-induced oxidation, moisture intrusion, and ohmic heating. The recommended AMP was previously identified as XI.E1. The staff has determined that GALL Rev. 2, item VI.A.LP-33 includes fuse holder insulation under electrical cables and connections, which is managed by the same AMP, XI.E1. Therefore, since insulation for fuse holders is included under insulation for cable and cable connections, there is no need to list fuse holder insulation as a separate item, since it is redundant.

There were three instances where changes from Revision 1 of the GALL Report relative to new MEAP combinations caused new AMR items; notwithstanding, there is a clear relationship between the Revision 2 AMR item and its related AMR item in Revision 1 of the GALL Report. The changes and the basis for these changed AMR items are provided in Table II-13.

The public comments that led to the technical changes shown in Table II-13 can be found in Table IV-7.

II.3 Chapter IX – Definitions

II.3.1 General Changes

Changes are made to Chapter IX to include new structures and components, materials, environments, and aging effects/mechanisms, and to help standardize expressions. Changes are also made to clarify some of the definitions that were included in Revision 1. Specific changes to the definitions for subchapters IX.B through IX.G are summarized in Table II-14 through Table II-19. The public comments that led to the technical changes shown in Table II-14 through Table II-19 can be found in Table IV-10.

II.4 Chapter X – Time-Limited Aging Analyses (TLAAs)

Revisions to the TLAAs for mechanical, structural, and electrical analyses are discussed in subsections II.4.1 through II.4.3, respectively. A summary of the changes to these analyses is shown in Table II-20. Public comments associated with these changes are found in Table IV-11.

II.4.1 Mechanical TLAA (X.M1)

- Program Description was updated relative to background basis, assumptions, background information on how the program is applied and basis for environmental fatigue calculations.
- Program Description now specifies that formulae for calculating the environmental fatigue life correction factors are contained in NUREG/CR-5704 for stainless steel, in NUREG/CR-6583 for carbon and low alloy steels, and in NUREG/CR-6909 for carbon and low alloy steel, stainless steel, and nickel alloys.
- Scope of Program now specifies that for a set of sample reactor coolant system components, the program includes fatigue usage calculations that consider the effects of the reactor water environment.
- Preventive Actions was revised to clarify that tracking design basis transients is considered to be a preventive activity for the TLAA.
- Detection of Aging Effects was revised to provide a clear basis on how the tracking of the cycles (the preventive parameter) would be used to ensure the validity of current design basis cumulative usage factor (CUF) fatigue analysis values.
- Monitoring and Trending now clarifies how the program trends the CUF values for ASME Code Class 1 reactor coolant pressure boundary components.
- Operating Experience criteria was updated to include recommendations for fatigue analyses in NRC Regulatory Information Summary (RIS) 2008-30.

II.4.2 Structural TLAA (X.S1)

- Monitoring and Trending was revised to include the NRC Regulatory Guide (RG) 1.35.1 for guidance on trend lines.
- Acceptance Criteria was revised to provide more details on evaluating ASME Code inspection results.

II.4.3 Electrical TLAA (X.E1)

In X.E1, the Program Description was revised to clarify that the 60-year environmental qualification reanalysis is performed prior to entering the period of extended operation and includes 10 CFR 50.49(j) criteria on how the qualification records are maintained for audit purposes, and that reanalysis results are verified accordingly.

II.5 Chapter XI – Aging Management Programs (AMPs)

II.5.1 Mechanical AMPs (XI.M Series of AMPs)

Three new AMPs were added to Revision 2:

- XI.M16A, “PWR Vessel Internals”
- XI.M40, “Monitoring of Neutron-Absorbing Materials Other than Boraflex”
- XI.M41, “Buried and Underground Piping and Tanks”

Two AMPs were eliminated from Revision 2 due to lack of relevance and very limited previous usage in submitted LRAs:

- XI.M14, “Loose Part Monitoring”
- XI.M15, “Neutron Noise Monitoring”

Three AMPs were eliminated because they are now subsumed by another program:

- XI.M13, “Thermal Aging and Neutron Irradiation Embrittlement of Cast Austenitic Stainless Steel (CASS),” is subsumed by XI.M9, “BWR Vessel Internals”
- XI.M28, “Buried Piping and Tanks Surveillance,” and XI.M34, “Buried Piping and Tanks Inspection,” are subsumed by the new XI.M41, “Buried and Underground Piping and Tanks”

Six AMPs were essentially rewritten:

- XI.11B, “Cracking of Nickel-Alloy Components and Loss of Material Due to Boric Acid-Induced Corrosion in Reactor Coolant Pressure Boundary Components (PWRs Only)”
- XI.M21A, “Closed Treated Water Systems”
- XI.M31, “Reactor Vessel Surveillance”
- XI.M35, “One-Time Inspection of ASME Code Class 1 Small-Bore Piping”
- XI.M36, “External Surfaces Monitoring of Mechanical Components”
- XI.M38, “Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components”

There are some generic changes made in the mechanical AMPs in the GALL Report, Rev. 2, including:

- AMPs were revised to reference the 2004 edition of ASME Code Section XI. In addition, a footnote was added referring to the GALL Report, Chapter I, which clarifies the use of alternate editions and addenda of the code. The changes, in general, were not changes of technical intent. The ASME Code Section XI edition referenced was updated to the latest version currently endorsed in 10 CFR 50.55a, and the addition of the footnote provides flexibility to accommodate future endorsed editions/addenda of the code.
- Superfluous or redundant information was deleted and some paragraphs were relocated from one element to another. There was no change in technical intent. It was revised to make the elements consistent with the guidelines of SRP-LR Appendix A.1.2.3 (Aging Management Program Elements).
- Operating Experience and References were updated to include additional information available since the issue of GALL Report Revision 1.

- A preamble was added to Chapter XI to provide guidance on use of later editions/revisions of various industry documents, and to aid applicants in the development of their license renewal applications.
- Preventive Actions for all condition monitoring programs that recommend maintenance of water chemistry were revised to ensure consistency between AMPs.

A summary of specific changes to the 36 mechanical AMPs is shown in Table II-21, along with their technical bases. The public comments that resulted in these changes are found in Table IV-12.

II.5.2 Structural AMPs (XI.S Series of AMPs)

There are some generic changes made in the structural AMPs in the GALL Report, Rev. 2, including:

- Structural and high-strength structural bolting was removed from the scope of AMP XI.M18, "Bolting Integrity," and included in the scope of the XI.S1, XI.S3, XI.S6 and XI.S7 AMPs, along with the appropriate recommendations from preventive actions and detection of aging elements.
- AMR items for structural and high-strength structural bolting associated with AMPs XI.S1, XI.S3, XI.S6, and XI.S7 were included in a manner similar to pressure-retaining bolting associated with the XI.M18 AMP.
- AMPs were revised to reference the 2004 edition of ASME Code Section XI. In addition, a footnote was added referring to the GALL Report, Chapter I, which clarifies the use of alternate editions and addenda of the code. The changes, in general, were not changes of technical intent. The ASME Code Section XI edition referenced was updated to the latest version currently endorsed in 10 CFR 50.55a, and the addition of the footnote provides flexibility to accommodate future endorsed editions/addenda of the code.
- Superfluous material was deleted and some paragraphs were relocated from one element to another. There was no change in technical intent. It was revised to make the elements consistent with the guidelines of SRP-LR Appendix A.1.2.3 (Aging Management Program Elements).
- Operating Experience and References were updated to include additional information available since the issue of GALL Report Revision 1.
- A preamble was added to Chapter XI to provide guidance on use of later editions/revisions of various industry documents, and to aid applicants in the development of their license renewal applications.

A summary of specific changes to the eight structural AMPs and their technical bases is shown in Table II-22. The public comments that resulted in these changes are found in Table IV-13.

II.5.3 Electrical AMPs (XI.E Series of AMPs)

There are some generic changes made in the electrical AMPs in the GALL Report, Rev. 2, including:

- Superfluous material was deleted and some paragraphs were relocated from one element to another. There was no change in technical intent. It was revised to make the elements consistent with the guidelines of SRP-LR Appendix A.1.2.3 (Aging Management Program Elements).

- Definitions and terminology were clarified for consistency within each AMP as applicable and with the other electrical AMPs.
- Operating Experience and References were updated to include additional information available since the issue of GALL Report Revision 1.
- A preamble was added to Chapter XI to provide guidance on use of later editions/revisions of various industry documents, and to aid applicants in the development of their license renewal applications.

A summary of the specific technical changes to the six electrical AMPs and their technical bases is presented in Table II-23. The public comments that resulted in these changes are found in Table IV-14.

II.6 Overview of Changes to GALL Chapter 1, Rev. 1 – Application of the ASME Code

A summary of changes to Chapter I of the GALL Report and their technical bases is shown in Table II-24. The public comments that resulted in these changes are found in Table IV-2.

II.7 Explanation of Tables II-1 through II-13

Table II-1 through Table II-13 present the new AMR items that were added and the existing AMR items that were changed in the GALL Report, Rev. 2. The first column in Table II-1 through Table II-6, "New AMR Item No.", represents the chapter, subchapter, and AMR line-item number assigned to each new item that was developed as a result of either a public comment or NRC staff recommendations. The last column is labeled "Comment No." This is a unique, automatically generated 3- to 4-digit number that corresponds to an entry in the public comments database that the NRC used to manage public comments. The number is useful in that it corresponds to a unique line in a table in Section IV of NUREG-1950 that presents the public comment that inspired the new AMR item. If the new item was not a result of a public comment, the corresponding cell in the Comment No. column will show "N/A." If the NRC did NOT agree with the public comment, as shown in NUREG-1950 Section IV, then that comment did not affect the evolution of the new AMR line-item; the corresponding cell in the Comment No. column will again show "N/A."

Other than the last two columns "Technical Basis for Addition" and "Comment No.", the tables appear as they do in the GALL Report, Rev. 2, with columns 2 through 7 of NUREG-1950 presenting the same information as columns 3 through 8 of GALL (NUREG-1801).

A similar protocol holds true for Table II-7 through Table II-13. These tables present changes to AMR items that existed in the Rev. 1 version of the GALL Report. The tables show the cells that were revised in bold. The first column represents the Rev. 2 AMR item numbers, and also references a chapter and subchapter associated with the item. All AMR items that have been retired (deleted) as a result of staff recommendations are discussed in Section II.2.2 of this document, along with the technical bases for their retirement, and their retirement is not presented in these tables. The public comments that inspired the revisions to these items are presented in Section IV of this NUREG. As provided, public comments that resulted in AMR line-items being retired are also included in Section IV of NUREG-1950.

II.8 Explanation of Tables II-14 through II-25

Table II-14 through Table II-25 summarize the differences between Revision 1 and Revision 2 for various chapters (such as IX, X, and XI) in the GALL Report. Also see the preceding Section II.6. The table title specifies the chapter being discussed. The far right column contains a comment number if the change was triggered by a public comment. Otherwise, this column will show "N/A" if the change is only the result of staff recommendations. As with previous tables, the associated public comments are shown in Section IV of this document. The technical bases for the changes are presented for each notable technical change in the document. Minor changes that have insignificant technical impacts or changes that result from editorial or typographical errors in Revision 1 or that constitute rearrangement of technical material are not presented in these tables but have been made in the Revision 2 document.

GALL Report, Rev. 2, AMP XI.M41 requires further explanation. Since this AMP is newly-generated for Revision 2, there are no changes that were made to Revision 1. However, a draft of this AMP was issued for public comment and several sets of comments were received, resulting in several revisions to the May 2010 draft. The NRC solicited public comments on all drafts of this AMP. Section IV catalogues all public comments received on all versions of XI.M41.

Table II-1. New AMR Items Added in Revision 2 of the GALL Report, Chapter II

New AMR Item No.	Structures and/or Components	Material	Environment	Aging Effect/ Mechanism	Aging Management Program	Further Evaluation Required	Technical Basis for Changes	Comment No.
II.B1.2.CP-114 II.B2.1.CP-114 II.B2.2.CP-114	Steel elements (inaccessible areas): support skirt	Steel	Concrete	None	None	No	The support skirt is fully embedded in concrete that is located in air-indoor environment and not subject to aggressive chemical attack. The aging effect and AMP of none are consistent with GALL Rev.1, Item VII.J-21.	N/A
II.A3.CP-148 II.B4.CP-148	Pressure-retaining bolting	Steel	Air – indoor, uncontrolled or Air – outdoor	Loss of material due to general, pitting, and crevice corrosion	XI.S1, “ASME Section XI, Subsection IWE”	No	Pressure-retaining structural bolting is identified as a separate component for consistency with mechanical systems. The aging effects/mechanisms and the AMP are appropriate for the material/environment combination and found within the GALL Report. XI.S1, “ASME Section XI, Subsection IWE,” applies to containment pressure - retaining bolting.	318
II.A3.CP-150 II.B4.CP-150	Pressure-retaining bolting	Any	Any environment	Loss of preload due to self-loosening	XI.S1, “ASME Section XI, Subsection IWE,” and XI.S4, “10 CFR Part 50, Appendix J”	No	Pressure-retaining structural bolting is identified as a separate component for consistency with mechanical systems. The aging effects/mechanisms and the AMP are appropriate for the material/environment combination and found within the GALL Report. XI.S1, “ASME Section XI, Subsection IWE,” applies to containment pressure - retaining bolting.	316

Table II-1. New AMR Items Added in Revision 2 of the GALL Report, Chapter II

New AMR Item No.	Structures and/or Components	Material	Environment	Aging Effect/ Mechanism	Aging Management Program	Further Evaluation Required	Technical Basis for Changes	Comment No.
II.A3.CP-152 II.B4.CP-152	Service Level I coatings	Coatings	Air – indoor, uncontrolled	Loss of coating integrity due to blistering, cracking, flaking, peeling, physical damage	XI.S8, “Protective Coating Monitoring and Maintenance”	No	Service Level I coatings are used in areas inside the reactor containment where the coating failure could adversely affect the operation of post-accident fluid systems and thereby impair safe shutdown. The maintenance rule requires that licensees monitor the effectiveness of maintenance for protective coatings within its scope (as discrete systems or components or as part of any system, structure or component (SSC)), or demonstrate that their performance or condition is being effectively controlled through the performance of appropriate preventive maintenance, in accordance with 10 CFR 50.65(a)(1) or (a)(2), as appropriate. RG 1.54, “Quality Assurance Requirements for Protective Coatings Applied to Water-Cooled Nuclear Power Plants,” was issued to describe an acceptable method for complying with the NRC's quality assurance requirements with regard to protective coatings applied to ferritic steels, stainless steel, zinc-coated (galvanized) steel, concrete, or masonry surfaces of water-cooled nuclear power	N/A

Table II-1. New AMR Items Added in Revision 2 of the GALL Report, Chapter II

New AMR Item No.	Structures and/or Components	Material	Environment	Aging Effect/ Mechanism	Aging Management Program	Further Evaluation Required	Technical Basis for Changes	Comment No.
							plants. The presumption was that protective coatings that met these guidelines would not degrade over the design life of the plant. However, operating history has shown that undesirable degradation, detachment, and other types of failures of coatings have occurred as described in NRC Bulletin 96-03, and Generic Letter (GL) 04-02. Detached coatings from the substrate that are transported to emergency core cooling system intake structures may make those systems unable to satisfy the requirement in 10 CFR 50.46(b)(5) to provide long-term cooling. Monitoring of the Service Level I Coatings in accordance with RG 1.54 Revision 1, “Service Level I, II, and III Protective Coating Applied to Nuclear Power Plants,” Regulatory Position C.4 provides reasonable assurance that coating failure will be detected and corrected before there is an adverse effect on the safety function of the post-accident fluid systems.	

Table II-1. New AMR Items Added in Revision 2 of the GALL Report, Chapter II

New AMR Item No.	Structures and/or Components	Material	Environment	Aging Effect/ Mechanism	Aging Management Program	Further Evaluation Required	Technical Basis for Changes	Comment No.
II.B1.1.CP-44	Steel elements: drywell support skirt	Steel	Concrete	None	None	No	The support skirt is fully embedded in concrete that is located in Air - indoor environment and not subject to aggressive chemical attack. The aging effect and AMP of none are consistent with GALL Rev.1, Item VII.J-21 (AP-3).	N/A

Table II-2. New AMR Items Added in Revision 2 of the GALL Report, Chapter III

New AMR Item No.	Structures and/or Components	Material	Environment	Aging Effect/ Mechanism	Aging Management Program	Further Evaluation Recommended	Technical Basis for Addition	Comment No.
III.A3.TP-219	Steel components: piles	Steel	Ground water/soil	Loss of material due to corrosion	XI.S6, “Structures Monitoring”	No	The environment of groundwater/soil can cause loss of material due to corrosion in steel components such as piles; therefore, the Structures Monitoring Program is recommended to monitor the aging effect.	N/A
III.A6.TP-221	Structural bolting	Steel	Air – indoor, uncontrolled or Air – outdoor or Water – flowing or standing	Loss of material due to general, pitting, and crevice corrosion	XI.S7, “RG 1.127, Inspection of Water-Control Structures Associated with Nuclear Power Plants,” or the Federal Energy Regulatory Commission (FERC)/ US Army Corp of Engineers dam inspections and maintenance programs.	No	Structural bolting is identified as a separate component for consistency with mechanical systems. The aging effects/mechanisms and the AMPs are appropriate for the material/environment combination and found within NUREG-1801.	N/A
III.A6.TP-223	Group 6: Wooden Piles;	Wood	Air – outdoor or Water – flowing or	Loss of material; change in	XI.S7, “RG 1.127, Inspection of	No	An approved precedent exists for the material/environment, aging effect, and AMP	N/A

Table II-2. New AMR Items Added in Revision 2 of the GALL Report, Chapter III

New AMR Item No.	Structures and/or Components	Material	Environment	Aging Effect/ Mechanism	Aging Management Program	Further Evaluation Recommended	Technical Basis for Addition	Comment No.
	sheeting		standing or Ground water/soil	material properties due to weathering, chemical degradation, insect infestation, repeated wetting and drying, and fungal decay	Water-Control Structures Associated with Nuclear Power Plants," or the FERC/US Army Corps of Engineers' dam inspections and maintenance programs.		combination. As documented in OCGS SER Section 3.0.3.2.2.6, AMP XI.S7 is acceptable for managing wood aging effects during the period of extended operation.	
III.B1.1.TP-226 III.B1.2.TP-226 III.B1.3.TP-226	Structural bolting	Steel	Air – indoor, uncontrolled	Loss of material due to general, pitting, and crevice corrosion	XI.S3, "ASME Section XI, Subsection IWF"	No	Structural bolting is identified as a separate component for consistency with mechanical systems. The aging effects/mechanisms and the AMP are appropriate for the material/environment combination and found within the GALL Report.	N/A
III.B1.1.TP-229 III.B1.2.TP-229 III.B1.3.TP-229	Structural bolting	Any	Any environment	Loss of preload due to self-loosening	XI.S3, "ASME Section XI, Subsection IWF"	No	Structural bolting is identified as a separate component for consistency with mechanical systems. The aging effects/mechanisms and the AMP are appropriate for the material/environment combination and found within the GALL Report.	N/A

Table II-2. New AMR Items Added in Revision 2 of the GALL Report, Chapter III

New AMR Item No.	Structures and/or Components	Material	Environment	Aging Effect/ Mechanism	Aging Management Program	Further Evaluation Recommended	Technical Basis for Addition	Comment No.
III.B1.1.TP-232 III.B1.2.TP-232 III.B1.3.TP-232	Structural bolting	Stainless steel	Treated water	Loss of material due to pitting and crevice corrosion	XI.M2, "Water Chemistry," and XI.S3, "ASME Section XI, Subsection IWF"	No	Structural bolting is identified as a separate component for consistency with mechanical systems. The aging effects/mechanisms and the AMP are appropriate for the material/environment combination and found within the GALL Report.	353
III.B1.1.TP-235 III.B1.2.TP-235 III.B1.3.TP-235	Structural bolting	Steel; galvanized steel	Air – outdoor	Loss of material due to pitting and crevice corrosion	XI.S3, "ASME Section XI, Subsection IWF"	No	Structural bolting is identified as a separate component for consistency with mechanical systems. The aging effects/mechanisms and the AMP are appropriate for the material/environment combination and found within the GALL Report.	N/A
III.A1.TP-248 III.A2.TP-248 III.A3.TP-248 III.A4.TP-248 III.A5.TP-248 III.A6.TP-248 III.A7.TP-248 III.A8.TP-248 III.A9.TP-248 III.B2.TP-248 III.B3.TP-248 III.B4.TP-248 III.B5.TP-248	Structural bolting	Steel	Air – indoor, uncontrolled	Loss of material due to general, pitting, and crevice corrosion	XI.S6, "Structures Monitoring"	No	Structural bolting is identified as a separate component for consistency with mechanical systems. The aging effects/mechanisms and the AMP are appropriate for the material/environment combination and found within the GALL Report.	338

Table II-2. New AMR Items Added in Revision 2 of the GALL Report, Chapter III

New AMR Item No.	Structures and/or Components	Material	Environment	Aging Effect/ Mechanism	Aging Management Program	Further Evaluation Recommended	Technical Basis for Addition	Comment No.
III.A1.TP-261 III.A2.TP-261 III.A3.TP-261 III.A4.TP-261 III.A5.TP-261 III.A6.TP-261 III.A7.TP-261 III.A8.TP-261 III.A9.TP-261 III.B2.TP-261 III.B3.TP-261 III.B4.TP-261 III.B5.TP-261	Structural bolting	Any	Any environment	Loss of preload due to self-loosening	XI.S6, “Structures Monitoring”	No	Structural bolting is identified as a separate component for consistency with mechanical systems. The aging effects/mechanisms and the AMP are appropriate for the material/environment combination and are found within the GALL Report.	N/A
III.A1.TP-274 III.A2.TP-274 III.A3.TP-274 III.A4.TP-274 III.A5.TP-274 III.A7.TP-274 III.A8.TP-274 III.A9.TP-274 III.B2.TP-274 III.B3.TP-274 III.B4.TP-274 III.B5.TP-274	Structural bolting	Steel; galvanized steel	Air – outdoor	Loss of material due to general, pitting, and crevice corrosion	XI.S6, “Structures Monitoring”	No	Structural bolting is identified as a separate component for consistency with mechanical systems. The aging effects/mechanisms and the AMP are appropriate for the material/environment combination and are found within the GALL Report.	338
III.A1.TP-300 III.A2.TP-300 III.A3.TP-300 III.A4.TP-300 III.A5.TP-300 III.A7.TP-300	High-strength structural bolting	Low-alloy steel, actual measured yield strength ≥150 ksi	Air – indoor, uncontrolled or Air – outdoor	Cracking due to SCC	XI.S6, “Structures Monitoring”	No	High-strength structural bolting was monitored under XI.M18, “Bolting Integrity” in Rev. 1 of GALL or SCC. In Rev.2 of GALL, the bolting is added to the scope of XI.S6,	356

Table II-2. New AMR Items Added in Revision 2 of the GALL Report, Chapter III

New AMR Item No.	Structures and/or Components	Material	Environment	Aging Effect/ Mechanism	Aging Management Program	Further Evaluation Recommended	Technical Basis for Addition	Comment No.
III.A8.TP-300 III.A9.TP-300 III.B2.TP-300 III.B3.TP-300 III.B4.TP-300 III.B5.TP-300		(1,034 MPa)					"Structures Monitoring"	
III.A4.TP-301	Service Level I coatings	Coatings	Air – indoor, uncontrolled	Loss of coating integrity due to blistering, cracking, flaking, peeling, physical damage	XI.S8, "Protective Coating Monitoring and Maintenance"	No	Service Level I coatings are used in areas inside the reactor containment where the coating failure could adversely affect the operation of post-accident fluid systems and thereby impair safe shutdown. The maintenance rule requires that licensees monitor the effectiveness of maintenance for protective coatings within its scope (as discrete systems or components or as part of any SSC), or demonstrate that their performance or condition is being effectively controlled through the performance of appropriate preventive maintenance, in accordance with 10 CFR 50.65(a)(1) or (a)(2), as appropriate. RG 1.54, "Quality Assurance Requirements for Protective Coatings Applied to Water-Cooled Nuclear Power Plants," was issued to	N/A

Table II-2. New AMR Items Added in Revision 2 of the GALL Report, Chapter III

New AMR Item No.	Structures and/or Components	Material	Environment	Aging Effect/ Mechanism	Aging Management Program	Further Evaluation Recommended	Technical Basis for Addition	Comment No.
							describe an acceptable method for complying with the NRC's quality assurance requirements with regard to protective coatings applied to ferritic steels, stainless steel, zinc-coated (galvanized) steel, concrete, or masonry surfaces of water-cooled nuclear power plants. The presumption was that protective coatings that met these guidelines would not degrade over the design life of the plant. However, operating history has shown that undesirable degradation, detachment, and other types of failures of coatings have occurred as described in NRC Bulletin 96-03, and GL 04-02. Detached coatings from the substrate that are transported to emergency core cooling system intake structures may make those systems unable to satisfy the requirement in 10 CFR 50.46(b)(5) to provide long-term cooling. Monitoring of the Service Level I Coatings in accordance with RG 1.54 Revision 1, “Service Level I, II, and III Protective Coating Applied to Nuclear	

Table II-2. New AMR Items Added in Revision 2 of the GALL Report, Chapter III

New AMR Item No.	Structures and/or Components	Material	Environment	Aging Effect/ Mechanism	Aging Management Program	Further Evaluation Recommended	Technical Basis for Addition	Comment No.
							Power Plants," Regulatory Position C.4 provides reasonable assurance that coating failure will be detected and corrected before there is an adverse effect on the safety function of the post-accident fluid systems.	
III.A4.TP-304	Concrete: all	Concrete	Soil	Cracking and distortion due to increased stress levels from settlement	XI.S6, "Structures Monitoring." If a de-watering system is relied upon for control of settlement, then the licensee is to ensure proper functioning of the de-watering system through the period of extended operation.	Yes, if a de-watering system is relied upon to control settlement	Further evaluation is required only if a de-watering system is relied upon to control settlement; otherwise further evaluation is not required because AMP XI.S6 requires monitoring concrete for cracking including cracks and distortion due to increased stress levels from settlement.	N/A
III.A4.TP-305	Concrete (inaccessible areas): exterior above- and	Concrete	Water – flowing	Increase in porosity and permeability; loss of strength due	Further evaluation is required to determine if a plant-specific	Yes, if leaching is observed in accessible areas that impact intended	ACI 201.2R was developed after some plants were constructed. Those plants were constructed in	N/A

Table II-2. New AMR Items Added in Revision 2 of the GALL Report, Chapter III

New AMR Item No.	Structures and/or Components	Material	Environment	Aging Effect/ Mechanism	Aging Management Program	Further Evaluation Recommended	Technical Basis for Addition	Comment No.
	below-grade; foundation			to leaching of calcium hydroxide and carbonation	aging management program is needed to manage increase in porosity, and permeability due to leaching of calcium hydroxide and carbonation of concrete in Inaccessible Areas. A plant-specific aging management program is not required if (1) There is evidence in the accessible areas that the flowing water has not caused leaching and carbonation, or (2) Evaluation	function	accordance with ACI 318, which provided the requirements for design and construction of reinforced concrete structures. ACI 318 included factors for water-cement mix proportions, slump, aggregates, type of mixer, mixing time, and temperature for durable concrete, which were later addressed in ACI 201.2R-77. Thus, concrete structures constructed to either ACI 318 or 201.2R are expected to be durable. Since these standards were used for both accessible and inaccessible concrete, it is reasonable to conclude that leaching of calcium hydroxide and carbonation in accessible areas subject to flowing - water represents the condition in inaccessible areas.	

Table II-2. New AMR Items Added in Revision 2 of the GALL Report, Chapter III

New AMR Item No.	Structures and/or Components	Material	Environment	Aging Effect/ Mechanism	Aging Management Program	Further Evaluation Recommended	Technical Basis for Addition	Comment No.
					determined that the observed leaching of calcium hydroxide and carbonation in accessible areas has no impact on the intended function of the concrete structure.			
III.A5.TP-34	Masonry walls: all	Concrete block	Air – outdoor	Loss of material (spalling, scaling) and cracking due to freeze-thaw	XI.S5, “Masonry Walls”	No	As explained in the Electric Power Research Institute (EPRI) Report 1002950, “Aging Effects for Structures and Structural Components (Structural Tools),” Revision 1, masonry block walls are constructed from lightweight concrete blocks, grout, and mortar, and may or may not be reinforced. Thus, the aging effects/mechanisms of masonry block walls are generally the same as those of concrete walls. Concrete walls in this environment are susceptible to loss of material and cracking due to freeze-thaw. Inspections conducted	N/A

Table II-2. New AMR Items Added in Revision 2 of the GALL Report, Chapter III

New AMR Item No.	Structures and/or Components	Material	Environment	Aging Effect/ Mechanism	Aging Management Program	Further Evaluation Recommended	Technical Basis for Addition	Comment No.
							in accordance with the masonry wall AMP will detect loss of material and cracking; thus, a further evaluation is not required.	

Table II-3. New AMR Items Added in Revision 2 of the GALL Report, Chapter IV

New AMR Item No.	Structures and/or Components	Material	Environment	Aging Effect/ Mechanism	Aging Management Program	Further Evaluation Required	Technical Basis for Addition	Comment No.
IV.D2.RP-162	Steam generator (SG): tube bundle wrapper and associated supports and mounting hardware	Steel	Secondary feedwater or steam	Loss of material due to erosion, general, pitting, and crevice corrosion	XI.M19, “Steam Generators,” and XI.M2, “Water Chemistry”	No	Component and MEA combination was not previously in GALL Revision 1. Need to manage the component and MEA combination has been identified by NRC staff.	N/A
IV.A1.RP-165	Top head enclosure: closure studs and nuts	High-strength, low-alloy steel	Air with reactor coolant leakage	Loss of material due to general, pitting, and crevice corrosion or wear	XI.M3, “Reactor Head Closure Stud Bolting”	No	Added for BWRs, similar to Revision 1 item R-72. Loss of material due to general, pitting, and crevice corrosion is a viable aging mechanism for low alloy steel in air with reactor water leakage environment and has been identified by BWR applicants (e.g., Hope Creek Generating Station).	N/A
IV.C2.RP-166	Closure bolting	Steel	Air – indoor, uncontrolled	Loss of material due to general, pitting, and crevice corrosion	XI.M18, "Bolting Integrity"	No	This aging effect for this component has been previously Included under external surfaces, but for consistency with other GALL Report sub-chapters, it has been added as a new AMR Item	N/A
IV.C2.RP-167	Closure bolting	Steel	Air with borated water leakage	Loss of material due to boric acid	XI.M10, “Boric Acid Corrosion”	No	This aging effect for this component has been previously included under external surfaces, but, for	N/A

Table II-3. New AMR Items Added in Revision 2 of the GALL Report, Chapter IV

New AMR Item No.	Structures and/or Components	Material	Environment	Aging Effect/ Mechanism	Aging Management Program	Further Evaluation Required	Technical Basis for Addition	Comment No.
				corrosion			consistency with other GALL Report sub-chapters, it has been added as a new AMR item	
IV.B1.RP-182	Reactor vessel internals components	PH martensitic stainless steel (17-4PH and 15-5PH); martensitic stainless steel (SS 403, 410, 431, etc.)	Reactor coolant >250°C (>482°F) and neutron flux	Loss of fracture toughness due to thermal aging, neutron irradiation embrittlement	XI.M9, "BWR Vessel Internals"	No	Precipitation-hardened (PH) martensitic stainless steels and martensitic stainless steel components are susceptible to loss of fracture toughness due to thermal aging and neutron irradiation embrittlement in reactor water environments. The staff finds AMP XI.M9 acceptable to manage this aging effect during the period of extended operation.	N/A
IV.B1.RP-200	Reactor vessel internals components	X-750 alloy	Reactor coolant and neutron flux	Loss of fracture toughness due to neutron irradiation embrittlement	XI.M9, "BWR Vessel Internals"	No	Some X-750 reactor internals components will be exposed to significant end of life (EOL) neutron fluence, and some irradiation embrittlement could occur. To address both irradiation effects and other concerns, the Boiling Water Reactor Vessel and Internals Project (BWRVIP) is initiating a new testing program for alloy X-750 materials. If necessary, program requirements for X-750 will be revised based on the results of this test program. X-750 jet pump beams are managed by BWRVIP-41 and	N/A

Table II-3. New AMR Items Added in Revision 2 of the GALL Report, Chapter IV

New AMR Item No.	Structures and/or Components	Material	Environment	Aging Effect/ Mechanism	Aging Management Program	Further Evaluation Required	Technical Basis for Addition	Comment No.
							BWRVIP-138. Management of repair hardware is addressed by the repair vendor.	
IV.A1.RP-201	Top head enclosure: closure studs and nuts	High-strength, low-alloy steel	Air with reactor coolant leakage	Cumulative fatigue damage due to fatigue	Fatigue is a TLAA to be evaluated for the period of extended operation. See the SRP, Chapter 4.3, "Metal Fatigue," for acceptable methods for meeting the requirements of 10 CFR 54.21(c)(1).	Yes, TLAA	Added for BWRs, similar to Revision 1 item IV.A2-4 (R-73) for PWRs. Cumulative fatigue damage due to fatigue for reactor top head closure studs and nuts has been identified by BWR applicants as an aging effect managed by TLAA (e.g., Hope Creek Generating Station).	N/A
IV.B4.RP-236	Reactor vessel internal components with no additional measures	Stainless steel; nickel alloy	Reactor coolant and neutron flux	Cracking due to SCC and irradiation-assisted stress corrosion cracking (IASCC)	XI.M2, "Water Chemistry," and XI.M16A, "PWR Vessel Internals" Note: Components with no additional measures are not uniquely	No	This AMR item is based on the staff's review of MRP-227, Rev. 0, for this component, material, environment, aging effect combination. This item was added to generically identify components that do not have aging effects that require aging management, in accordance with the analyses described in MRP-227.	N/A

Table II-3. New AMR Items Added in Revision 2 of the GALL Report, Chapter IV

New AMR Item No.	Structures and/or Components	Material	Environment	Aging Effect/ Mechanism	Aging Management Program	Further Evaluation Required	Technical Basis for Addition	Comment No.
					identified in GALL tables. - Components with no additional measures are defined in Section 3.3.1 of MRP-227, "Materials Reliability Program: Pressurized Water Reactor Internals Inspection and Evaluation Guidelines"			
IV.B4.RP-237	Reactor vessel internal components with no additional measures	Stainless steel; nickel alloy	Reactor coolant and neutron flux	Loss of fracture toughness due to neutron irradiation embrittlement; change in dimension due to void swelling;	XI.M16A, “PWR Vessel Internals” Note: Components with no additional measures are not uniquely identified in GALL tables. Components	No	This AMR item is based on the staff’s review of MRP-227, Rev. 0, for this component, material, environment, aging effect combination. This item was added to generically identify components that do not have aging effects that require aging management, in accordance with the analyses described in MRP-227.	N/A

Table II-3. New AMR Items Added in Revision 2 of the GALL Report, Chapter IV

New AMR Item No.	Structures and/or Components	Material	Environment	Aging Effect/ Mechanism	Aging Management Program	Further Evaluation Required	Technical Basis for Addition	Comment No.
				loss of preload due to thermal and irradiation enhanced stress relaxation; loss of material due to wear	with no additional measures are defined in Section 3.3.1 of MRP-227.			
IV.B4.RP-238	Reactor vessel internal components (inaccessible locations)	Stainless steel; nickel alloy	Reactor coolant and neutron flux	Cracking due to SCC and IASCC	XI.M2, "Water Chemistry," and XI.M16A, "PWR Vessel Internals"	Yes, if accessible Primary, Expansion, or Existing program components indicate aging effects that need management	This AMR item is based on the staff's review of MRP-227, Rev. 0, for this component, material, environment, aging effect combination.	N/A
IV.B4.RP-239	Reactor vessel internal components (inaccessible locations)	Stainless steel; nickel alloy	Reactor coolant and neutron flux	Loss of fracture toughness due to neutron irradiation embrittlement; change in dimension due to void swelling; loss of	XI.M16A, "PWR Vessel Internals"	Yes, if accessible Primary, Expansion, or Existing program components indicate aging effects that need management	This AMR item is based on the staff's review of MRP-227, Rev. 0, for this component, material, environment, aging effect combination.	N/A

Table II-3. New AMR Items Added in Revision 2 of the GALL Report, Chapter IV

New AMR Item No.	Structures and/or Components	Material	Environment	Aging Effect/ Mechanism	Aging Management Program	Further Evaluation Required	Technical Basis for Addition	Comment No.
				preload due to thermal and irradiation enhanced stress relaxation; loss of material due to wear				
IV.B2.RP-265	Reactor vessel internal components with no additional measures	Stainless steel; nickel alloy	Reactor coolant and neutron flux	Cracking due to SCC and IASCC	XI.M2, “Water Chemistry,” and XI.M16A, “PWR Vessel Internals” Note: Components with no additional measures are not uniquely identified in GALL tables. Components with no additional measures are defined in Section 3.3.1 of MRP-227.	No	This AMR item is based on the staff’s review of MRP-227, Rev. 0, for this component, material, environment, aging effect combination. This line item was added to generically identify components that do not have aging effects that require aging management, in accordance with the analyses described in MRP-227.	N/A

Table II-3. New AMR Items Added in Revision 2 of the GALL Report, Chapter IV

New AMR Item No.	Structures and/or Components	Material	Environment	Aging Effect/ Mechanism	Aging Management Program	Further Evaluation Required	Technical Basis for Addition	Comment No.
IV.B2.RP-267	Reactor vessel internal components with no additional measures	Stainless steel; nickel alloy	Reactor coolant and neutron flux	Loss of fracture toughness due to neutron irradiation embrittlement; change in dimension due to void swelling; loss of preload due to thermal and irradiation enhanced stress relaxation; loss of material due to wear	XI.M16A, "PWR Vessel Internals" Note: Components with no additional measures are not uniquely identified in GALL tables. Components with no additional measures are defined in Section 3.3.1 of MRP-227.	No	This AMR item is based on the staff's review of MRP-227, Rev. 0, for this component, material, environment, aging effect combination. This line item was added to generically identify components that do not have aging effects that require aging management, in accordance with the analyses described in MRP-227.	N/A
IV.B2.RP-268	Reactor vessel internal components (inaccessible locations)	Stainless steel; nickel alloy	Reactor coolant and neutron flux	Cracking due to SCC and IASCC	XI.M2, "Water Chemistry," and XI.M16A, "PWR Vessel Internals"	Yes, if accessible Primary, Expansion, or Existing program components indicate aging effects that need	This AMR item is based on the staff's review of MRP-227, Rev. 0, for this component, material, environment, aging effect combination.	N/A

Table II-3. New AMR Items Added in Revision 2 of the GALL Report, Chapter IV

New AMR Item No.	Structures and/or Components	Material	Environment	Aging Effect/ Mechanism	Aging Management Program	Further Evaluation Required	Technical Basis for Addition	Comment No.
						management		
IV.B2.RP-269	Reactor vessel internal components (inaccessible locations)	Stainless steel; nickel alloy	Reactor coolant and neutron flux	Loss of fracture toughness due to neutron irradiation embrittlement; change in dimension due to void swelling; loss of preload due to thermal and irradiation enhanced stress relaxation; loss of material due to wear	XI.M16A, “PWR Vessel Internals”	Yes, if accessible Primary, Expansion, or Existing program components indicate aging effects that need management	This AMR item is based on the staff’s review of MRP-227, Rev. 0, for this component, material, environment, aging effect combination.	N/A
IV.B2.RP-296	Control rod guide tube (CRGT) assemblies: CRGT guide plates (cards)	Stainless steel	Reactor coolant and neutron flux	Loss of material due to wear	XI.M16A, “PWR Vessel Internals” Primary Components (identified in the "Structure	No	This AMR item is based on the staff’s review of MRP-227, Rev. 0, for this component, material, environment, aging effect combination.	N/A

Table II-3. New AMR Items Added in Revision 2 of the GALL Report, Chapter IV

New AMR Item No.	Structures and/or Components	Material	Environment	Aging Effect/ Mechanism	Aging Management Program	Further Evaluation Required	Technical Basis for Addition	Comment No.
					and Components" column) (For expansion components, see AMR line item IV.B2.RP-386)			
IV.B2.RP-297	Control rod guide tube (CRGT) assemblies: CRGT lower flange welds (accessible)	Stainless steel	Reactor coolant and neutron flux	Loss of fracture toughness due to thermal aging and neutron irradiation embrittlement	XI.M16A, "PWR Vessel Internals" Primary components (identified in the "Structure and Components" column) (for Expansion components see AMR Items IV.B2.RP-290 and IV.B2.RP-292)	No	This AMR item is based on the staff's review of MRP-227, Rev. 0, for this component, material, environment, aging effect combination.	981 - see first part of NRC disposition in Table IV-5.

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New AMR Item No.	Structures and/or Components	Material	Environment	Aging Effect/ Mechanism	Aging Management Program	Further Evaluation Required	Technical Basis for Addition	Comment No.
IV.B2.RP-302	Thermal shield assembly: thermal shield flexures	Stainless steel	Reactor coolant and neutron flux	Cracking due to fatigue; loss of material due to wear	XI.M16A, “PWR Vessel Internals” Primary components (identified in the "Structure and Components" column) no Expansion components	No	This AMR item is based on the staff’s review of MRP-227, Rev. 0, for this component, material, environment, aging effect combination.	N/A
IV.B3.RP-306	Reactor vessel internal components with no additional measures	Stainless steel; nickel alloy	Reactor coolant and neutron flux	Cracking due to SCC and IASCC	XI.M2, “Water Chemistry,” and XI.M16A, “PWR Vessel Internals” Note: Components with no additional measures are not uniquely identified in GALL tables. Components with no additional measures are defined in	No	This AMR item is based on the staff’s review of MRP-227, Rev. 0, for this component, material, environment, aging effect combination. This line item was added to generically identify components that do not have aging effects that require aging management, in accordance with the analyses described in MRP-227.	N/A

Table II-3. New AMR Items Added in Revision 2 of the GALL Report, Chapter IV

New AMR Item No.	Structures and/or Components	Material	Environment	Aging Effect/ Mechanism	Aging Management Program	Further Evaluation Required	Technical Basis for Addition	Comment No.
					Section 3.3.1 of MRP-227.			
IV.B3.RP-307	Reactor vessel internal components with no additional measures	Stainless steel; nickel alloy	Reactor coolant and neutron flux	Loss of fracture toughness due to neutron irradiation embrittlement ; change in dimension due to void swelling; loss of preload due to thermal and irradiation enhanced stress relaxation; loss of material due to wear	XI.M16A, "PWR Vessel Internals" Note: Components with no additional measures are not uniquely identified in GALL tables . Components with no additional measures are defined in Section 3.3.1 of MRP-227.	No	This AMR item is based on the staff's review of MRP-227, Rev. 0, for this component, material, environment, aging effect combination. This line item was added to generically identify components that do not have aging effects that require aging management, in accordance with the analyses described in MRP-227.	N/A
IV.B3.RP-309	Reactor vessel internal components (inaccessible locations)	Stainless steel; nickel alloy	Reactor coolant and neutron flux	Cracking due to SCC and IASCC	XI.M2, "Water Chemistry," and XI.M16A, "PWR Vessel Internals"	Yes, if accessible Primary, Expansion, or Existing program components indicate aging effects that need	This AMR item is based on the staff's review of MRP-227, Rev. 0, for this component, material, environment, aging effect combination.	N/A

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New AMR Item No.	Structures and/or Components	Material	Environment	Aging Effect/ Mechanism	Aging Management Program	Further Evaluation Required	Technical Basis for Addition	Comment No.
						management		
IV.B3.RP-311	Reactor vessel internal components (inaccessible locations)	Stainless steel; nickel alloy	Reactor coolant and neutron flux	Loss of fracture toughness due to neutron irradiation embrittlement; change in dimension due to void swelling; loss of preload due to thermal and irradiation enhanced stress relaxation; loss of material due to wear	XI.M16A, "PWR Vessel Internals"	Yes, if accessible Primary, Expansion, or Existing program components indicate aging effects that need management	This AMR item is based on the staff's review of MRP-227, Rev. 0, for this component, material, environment, aging effect combination.	N/A
IV.B3.RP-313	Control Element Assembly (CEA): shroud assemblies: remaining instrument guide tubes	Stainless steel	Reactor coolant and neutron flux	Cracking due to SCC and fatigue	XI.M2, "Water Chemistry," and XI.M16A, "PWR Vessel Internals" Expansion components	No	This AMR item is based on the staff's review of MRP-227, Rev. 0, for this component, material, environment, aging effect combination.	N/A

Table II-3. New AMR Items Added in Revision 2 of the GALL Report, Chapter IV

New AMR Item No.	Structures and/or Components	Material	Environment	Aging Effect/ Mechanism	Aging Management Program	Further Evaluation Required	Technical Basis for Addition	Comment No.
	in CEA assemblies				(identified in the "Structure and Components" column) (for Primary components see AMR Item IV.B3.RP-312)			
IV.B3.RP-322	Core shroud assembly (for welded core shrouds in two vertical sections): Core shroud plate-former plate weld (a) The axial and horizontal weld seams at the core shroud re-entrant corners as visible from the core side of the shroud, within six inches of the central flange	Stainless steel	Reactor coolant and neutron flux	Cracking due to IASCC	XI.M2, “Water Chemistry,” and XI.M16A, “PWR Vessel Internals” Primary components (identified in the "Structure and Components" column) (for Expansion components see AMR Item IV.B3.RP-323)	No	This AMR item is based on the staff’s review of MRP-227, Rev. 0, for this component, material, environment, aging effect combination.	993

Table II-3. New AMR Items Added in Revision 2 of the GALL Report, Chapter IV

New AMR Item No.	Structures and/or Components	Material	Environment	Aging Effect/ Mechanism	Aging Management Program	Further Evaluation Required	Technical Basis for Addition	Comment No.
	and horizontal stiffeners, and (b) the horizontal stiffeners in shroud plate-to-former-plate weld							
IV.B3.RP-323	Core shroud assembly (for welded core shrouds in two vertical sections): remaining axial welds in shroud plate-to-former-plate	Stainless steel	Reactor coolant and neutron flux	Cracking due to IASCC	XI.M2, "Water Chemistry," and XI.M16A, "PWR Vessel Internals" Expansion components (identified in the "Structure and Components" column) (for Primary components see AMR Item IV.B3.RP-322)	No	This AMR item is based on the staff's review of MRP-227, Rev. 0, for this component, material, environment, aging effect combination.	N/A
IV.B3.RP-324	Core shroud assembly (for welded core	Stainless steel	Reactor coolant and neutron flux	Cracking due to IASCC	XI.M2, "Water Chemistry,"	No	This AMR item is based on the staff's review of MRP-227, Rev. 0, for this component,	N/A

Table II-3. New AMR Items Added in Revision 2 of the GALL Report, Chapter IV

New AMR Item No.	Structures and/or Components	Material	Environment	Aging Effect/ Mechanism	Aging Management Program	Further Evaluation Required	Technical Basis for Addition	Comment No.
	shrouds with full-height shroud plates): axial weld seams at the core shroud re-entrant corners, at the core mid-plane (+3 feet in height) as visible from the core side of the shroud				and XI.M16A, "PWR Vessel Internals" Primary components (identified in the "Structure and Components" column) (for Expansion components see AMR Item IV.B3.RP-325)		material, environment, aging effect combination.	
IV.B3.RP-325	Core shroud assembly (for welded core shrouds with full-height shroud plates): remaining axial welds, ribs, and rings	Stainless steel	Reactor coolant and neutron flux	Cracking due to IASCC	XI.M2, "Water Chemistry," and XI.M16A, "PWR Vessel Internals" Expansion components (identified in the "Structure and Components" column)	No	This AMR item is based on the staff's review of MRP-227, Rev. 0, for this component, material, environment, aging effect combination.	N/A

Table II-3. New AMR Items Added in Revision 2 of the GALL Report, Chapter IV

New AMR Item No.	Structures and/or Components	Material	Environment	Aging Effect/ Mechanism	Aging Management Program	Further Evaluation Required	Technical Basis for Addition	Comment No.
					(for Primary components see AMR Item IV.B3.RP-324)			
IV.B3.RP-326	Core shroud assembly (for welded core shrouds in two vertical sections): gap between the upper and lower plates	Stainless steel	Reactor coolant and neutron flux	Change in dimension due to void swelling	XI.M16A, "PWR Vessel Internals" Primary components (identified in the "Structure and Components" column) no Expansion components	No	This AMR item is based on the staff's review of MRP-227, Rev. 0, for this component, material, environment, aging effect combination.	N/A
IV.B3.RP-331	Lower support structure: core support column bolts	Stainless steel	Reactor coolant and neutron flux	Loss of fracture toughness due to neutron irradiation embrittlement	XI.M16A, "PWR Vessel Internals" Expansion components (identified in the "Structure and Components" column) (for Primary components see AMR Item	No	This AMR item is based on the staff's review of MRP-227, Rev. 0, for this component, material, environment, aging effect combination.	N/A

Table II-3. New AMR Items Added in Revision 2 of the GALL Report, Chapter IV

New AMR Item No.	Structures and/or Components	Material	Environment	Aging Effect/ Mechanism	Aging Management Program	Further Evaluation Required	Technical Basis for Addition	Comment No.
					'IV.B3.RP-315)			
IV.B3.RP-333	Core support barrel assembly: lower flange weld, if fatigue life cannot be demonstrated by TLAA	Stainless steel	Reactor coolant and neutron flux	Cracking due to fatigue	XI.M2, "Water Chemistry," and XI.M16A, "PWR Vessel Internals" Primary components (identified in the "Structure and Components" column) no Expansion components	Yes, evaluate to determine the potential locations and extent of fatigue cracking	This AMR item is based on the staff's review of MRP-227, Rev. 0, for this component, material, environment, aging effect combination. As addressed in the technical basis and further evaluation required columns, this item is based on the staff's review of MRP-227, which indicates that examination coverage is to be determined by the plant-specific fatigue analysis.	N/A
IV.B3.RP-338	Upper internals assembly: fuel alignment plate (applicable to plants with core shrouds assembled with full height shroud plates), if fatigue life	Stainless steel	Reactor coolant and neutron flux	Cracking due to fatigue	XI.M2, "Water Chemistry," and XI.M16A, "PWR Vessel Internals" Primary components (identified in the "Structure and Components"	Yes, evaluate to determine the potential locations and extent of fatigue cracking	This AMR item is based on the staff's review of MRP-227, Rev. 0, for this component, material, environment, aging effect combination. As addressed in the technical basis and further evaluation required columns, this item is based on the staff's review of MRP-227, which indicates that examination coverage is to be determined by the plant-specific fatigue analysis.	N/A

Table II-3. New AMR Items Added in Revision 2 of the GALL Report, Chapter IV

New AMR Item No.	Structures and/or Components	Material	Environment	Aging Effect/ Mechanism	Aging Management Program	Further Evaluation Required	Technical Basis for Addition	Comment No.
	cannot be demonstrated by TLAA				column) no Expansion components			
IV.B3.RP-342	Lower support structure: deep beams (applicable assemblies with full height shroud plates)	Stainless steel	Reactor coolant and neutron flux	Cracking due to SCC, IASCC, and fatigue	XI.M2, "Water Chemistry," and XI.M16A, "PWR Vessel Internals" Primary components (identified in the "Structure and Components" column) no Expansion components	No	This AMR item is based on the staff's review of MRP-227, Rev. 0, for this component, material, environment, aging effect combination.	991 998
IV.B3.RP-343	Lower support structure: core support plate (applicable to plants with a core support plate), if fatigue life cannot be demonstrated by TLAA	Stainless steel	Reactor coolant and neutron flux	Cracking due to fatigue	XI.M2, "Water Chemistry", and XI.M16A, "PWR Vessel Internals" Primary components (identified in the "Structure and	Yes, evaluate to determine the potential locations and extent of fatigue cracking	This AMR item is based on the staff's review of MRP-227, Rev. 0, for this component, material, environment, aging effect combination. As addressed in the technical basis and further evaluation recommendation columns, this item is based on the staff's review of MRP-227, which indicates that examination coverage is to be determined by the plant-specific fatigue	N/A

Table II-3. New AMR Items Added in Revision 2 of the GALL Report, Chapter IV

New AMR Item No.	Structures and/or Components	Material	Environment	Aging Effect/ Mechanism	Aging Management Program	Further Evaluation Required	Technical Basis for Addition	Comment No.
					Components" column) no Expansion components		analysis.	
IV.B2.RP-345	Core barrel assembly: core barrel flange	Stainless steel	Reactor coolant and neutron flux	Loss of material due to wear	XI.M16A, “PWR Vessel Internals” Existing Program components (identified in the "Structure and Components" column) no Expansion components	No	This AMR item is based on the staff’s review of MRP-227, Rev. 0, for this component, material, environment, aging effect combination.	N/A
IV.B2.RP-346	Upper internals assembly: upper support ring or skirt	Stainless steel	Reactor coolant and neutron flux	Cracking due to SCC and fatigue	XI.M2, “Water Chemistry,” and XI.M16A, “PWR Vessel Internals” Existing Program components (identified in the "Structure and Components"	No	This AMR item is based on the staff’s review of MRP-227, Rev. 0, for this component, material, environment, aging effect combination.	N/A

Table II-3. New AMR Items Added in Revision 2 of the GALL Report, Chapter IV

New AMR Item No.	Structures and/or Components	Material	Environment	Aging Effect/ Mechanism	Aging Management Program	Further Evaluation Required	Technical Basis for Addition	Comment No.
					column) no Expansion components			
IV.B4.RP-352	Upper grid assembly: alloy X-750 dowel-to-upper fuel assembly support pad welds (all plants except Davis-Besse)	Nickel alloy	Reactor coolant and neutron flux	Cracking due to SCC	XI.M2, “Water Chemistry,” and XI.M16A, “PWR Vessel Internals” Expansion components (identified in the "Structure and Components" column) (for Primary components see AMR Item IV.B4.RP-261)	No	This AMR item is based on the staff’s review of MRP-227, Rev. 0, for this component, material, environment, aging effect combination.	N/A
IV.B2.RP-354	Baffle-to-former assembly: baffle-edge bolts (all plants with baffle-edge bolts)	Stainless steel	Reactor coolant and neutron flux	Loss of fracture toughness due to neutron irradiation embrittlement ; change in	XI.M16A, “PWR Vessel Internals” Primary components (identified in the "Structure and Components"	No	This AMR item is based on the staff’s review of MRP-227, Rev. 0, for this component, material, environment, aging effect combination.	979

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New AMR Item No.	Structures and/or Components	Material	Environment	Aging Effect/ Mechanism	Aging Management Program	Further Evaluation Required	Technical Basis for Addition	Comment No.
				dimension due to void swelling; loss of preload due to thermal and irradiation enhanced stress relaxation	column) no Expansion components			
IV.B2.RP-355	Control rod guide tube assemblies: guide tube support pins	Nickel alloy	Reactor coolant and neutron flux	Cracking due to SCC and fatigue	A plant-specific aging management program is to be evaluated	Yes, plant-specific	MRP-227, Rev. 0, identifies that the aging effect(s) need to be managed for these components. However, MRP-227 does not identify a program to manage the aging effect(s) for these components. Therefore, a plant-specific program is necessary.	982
IV.B2.RP-356	Control rod guide tube assemblies: guide tube support pins	Nickel alloy	Reactor coolant and neutron flux	Loss of material due to wear	A plant-specific aging management program is to be evaluated	Yes, plant-specific	MRP-227, Rev. 0, identifies that the aging effect(s) need to be managed for these components. However, MRP-227 does not identify a program to manage the aging effect(s) for these components. Therefore, a plant-specific program is necessary.	N/A
IV.B3.RP-357	Incore instrumentation (ICI): ICI thimble tubes	Zircaloy-4	Reactor coolant and neutron flux	Loss of material due to wear	A plant-specific aging management program is to	Yes, plant-specific	MRP-227, Rev. 0, identifies that the aging effect(s) need to be managed for these components. However, MRP-	N/A

Table II-3. New AMR Items Added in Revision 2 of the GALL Report, Chapter IV

New AMR Item No.	Structures and/or Components	Material	Environment	Aging Effect/ Mechanism	Aging Management Program	Further Evaluation Required	Technical Basis for Addition	Comment No.
	- lower				be evaluated		227 does not identify a program to manage the aging effect(s) for these components. Therefore, a plant-specific program is necessary.	
IV.B3.RP-358	Core shroud assemblies (for bolted core shroud assemblies): (a) shroud plates and (b) former plates	Stainless steel	Reactor coolant and neutron flux	Cracking due to IASCC	XI.M2, "Water Chemistry," and XI.M16A, "PWR Vessel Internals" Expansion components (identified in the "Structure and Components" column) (for Primary component see AMR Line Item IV.B3.RP-314)	No	This AMR item is based on the staff's review of MRP-227, Rev. 0, for this component, material, environment, aging effect combination.	N/A
IV.B3.RP-359	Core shroud assemblies (welded): (shroud plates and (b) former plates	Stainless steel	Reactor coolant and neutron flux	Loss of fracture toughness due to neutron irradiation embrittlement	XI.M16A, "PWR Vessel Internals," Primary components (identified in the "Structure	No	This AMR item is based on the staff's review of MRP-227, Rev. 0, for this component, material, environment, aging effect combination.	N/A

Table II-3. New AMR Items Added in Revision 2 of the GALL Report, Chapter IV

New AMR Item No.	Structures and/or Components	Material	Environment	Aging Effect/ Mechanism	Aging Management Program	Further Evaluation Required	Technical Basis for Addition	Comment No.
				; change in dimension due to void swelling	and Components" column) no Expansion components			
IV.B3.RP-360	Core shroud assembly (for welded core shrouds with full-height shroud plates): axial weld seams at the core shroud re-entrant corners, at the core mid-plane (+3 feet in height) as visible from the core side of the shroud	Stainless steel	Reactor coolant and neutron flux	Loss of fracture toughness due to neutron irradiation embrittlement	XI.M16A, "PWR Vessel Internals" Primary components (identified in the "Structure and Components" column) (for Expansion components see AMR Items IV.B3.RP-361)	No	This AMR item is based on the staff's review of MRP-227, Rev. 0, for this component, material, environment, aging effect combination.	N/A
IV.B3.RP-361	Core shroud assembly (for welded core shrouds with full-height shroud plates): remaining axial welds,	Stainless steel	Reactor coolant and neutron flux	Loss of fracture toughness due to neutron irradiation embrittlement	XI.M16A, "PWR Vessel Internals" Expansion components (identified in the "Structure and	No	This AMR item is based on the staff's review of MRP-227, Rev. 0, for this component, material, environment, aging effect combination.	N/A

Table II-3. New AMR Items Added in Revision 2 of the GALL Report, Chapter IV

New AMR Item No.	Structures and/or Components	Material	Environment	Aging Effect/ Mechanism	Aging Management Program	Further Evaluation Required	Technical Basis for Addition	Comment No.
	ribs, and rings				Components" column) (for Primary components see AMR Items IV.B3.RP-360)			
IV.B3.RP-362	Core support barrel assembly: lower cylinder welds	Stainless steel	Reactor coolant and neutron flux	Loss of fracture toughness due to neutron irradiation embrittlement	XI.M16A, "PWR Vessel Internals" Expansion components (identified in the "Structure and Components" column) (for Primary components see AMR Items IV.B3.RP-327)	No	This AMR item is based on the staff's review of MRP-227, Rev. 0, for this component, material, environment, aging effect combination.	N/A
IV.B3.RP-363	Lower support structure: core support column	Stainless steel	Reactor coolant and neutron flux	Loss of fracture toughness due to neutron irradiation embrittlement	XI.M16A, "PWR Vessel Internals" Expansion components (identified in the "Structure and	No	This AMR item is based on the staff's review of MRP-227, Rev. 0, for this component, material, environment, aging effect combination.	N/A

Table II-3. New AMR Items Added in Revision 2 of the GALL Report, Chapter IV

New AMR Item No.	Structures and/or Components	Material	Environment	Aging Effect/ Mechanism	Aging Management Program	Further Evaluation Required	Technical Basis for Addition	Comment No.
					Components" column) (for Primary components see AMR Items IV.B3RP-327)			
IV.B3.RP-364	Lower support structure: core support column	Cast austenitic stainless steel	Reactor coolant and neutron flux	Loss of fracture toughness due to neutron irradiation and thermal embrittlement	XI.M16A, "PWR Vessel Internals" Expansion components (identified in the "Structure and Components" column) (for Primary components see AMR Items IV.B3RP-327)	No	This AMR item is based on the staff's review of MRP-227, Rev. 0, for this component, material, environment, aging effect combination.	N/A
IV.B3.RP-365	Lower support structure: core support plate	Stainless steel	Reactor coolant and neutron flux	Loss of fracture toughness due to neutron irradiation embrittlement	XI.M16A, "PWR Vessel Internals" Primary component (identified in the "Structure and Components" column)	No	This AMR item is based on the staff's review of MRP-227, Rev. 0, for this component, material, environment, aging effect combination.	N/A

Table II-3. New AMR Items Added in Revision 2 of the GALL Report, Chapter IV

New AMR Item No.	Structures and/or Components	Material	Environment	Aging Effect/ Mechanism	Aging Management Program	Further Evaluation Required	Technical Basis for Addition	Comment No.
					no Expansion components			
IV.B3.RP-366	Lower support structure: deep beams (applicable assemblies with full height shroud plates)	Stainless steel	Reactor coolant and neutron flux	Loss of fracture toughness due to neutron irradiation embrittlement	XI.M16A, “PWR Vessel Internals” Primary components (identified in the "Structure and Components" column) no Expansion components	No	This AMR item is based on the staff’s review of MRP-227, Rev. 0, for this component, material, environment, aging effect combination.	991
IV.D1.RP-372	Steam generator components: shell assembly	Steel	Secondary feedwater or steam	Loss of material due to general, pitting, and crevice corrosion	XI.M2, “Water Chemistry” and XI.M32, “One-Time Inspection”	No	Component and MEA combination was not previously in GALL Revision 1. Need to manage the component and MEA combination has been identified by NRC staff.	879
IV.B4.RP-375	Core barrel assembly: internal baffle-to-baffle bolts	Stainless steel	Reactor coolant and neutron flux	Cracking due to fatigue	XI.M2, “Water Chemistry,” and XI.M16A, “PWR Vessel Internals” Expansion components	No	This AMR item is based on the staff’s review of MRP-227, Rev. 0, for this component, material, environment, aging effect combination.	N/A

Table II-3. New AMR Items Added in Revision 2 of the GALL Report, Chapter IV

New AMR Item No.	Structures and/or Components	Material	Environment	Aging Effect/ Mechanism	Aging Management Program	Further Evaluation Required	Technical Basis for Addition	Comment No.
					(identified in the "Structure and Components" column) (for Primary components see AMR Item IV.B4.RP-241)			
IV.B4.RP-376	Reactor vessel internal components	Stainless steel; nickel alloy	Reactor coolant and neutron flux	Reduction in ductility and fracture toughness due to neutron irradiation	Ductility - Reduction in Fracture Toughness is a TLAA (BAW-2248A) to be evaluated for the period of extended operation. See the SRP-LR Chapter 4.7, "Other Plant-Specific TLAAs," for acceptable methods for meeting the requirements of 10 CFR 54.21(c)(1).	Yes, TLAA	Ductility - Reduction in Fracture Toughness is a TLAA in accordance with BAW-2248A, Chapter 4.5.2.	1016

Table II-3. New AMR Items Added in Revision 2 of the GALL Report, Chapter IV

New AMR Item No.	Structures and/or Components	Material	Environment	Aging Effect/ Mechanism	Aging Management Program	Further Evaluation Required	Technical Basis for Addition	Comment No.
IV.B1.RP-377	Reactor vessel internals components: Jet pump wedge surface	Stainless steel	Reactor coolant	Loss of material due to wear	XI.M9, "BWR Vessel Internals"	No	AMP XI.M9 also is credited with managing aging of this component, material, environment and aging effect combination.	N/A
IV.E.RP-378	Piping, piping components, and piping elements	Nickel alloy	Air with borated water leakage	None	None	No	GALL Report includes stainless steel material in air with borated water leakage as “None-None.” Nickel-alloy is resistant to borated water environment. Also, staff has previously accepted in SERs that nickel alloy in air with borated water leakage environment has no aging effects requiring management.	447
IV.B1.RP-381	Reactor vessel internals components	X-750 alloy	Reactor coolant and neutron flux	Cracking due to intergranular stress corrosion cracking (IGSCC)	XI.M9, “BWR Vessel Internals” for core plate, and XI.M2, “Water Chemistry”	No	X-750 alloy has been used in components for BWR shroud repair and is susceptible to IGSCC in a BWR environment (ADAMS ML091600672); therefore, aging management for this material, environment and aging effect is needed.	N/A
IV.C2.RP-383	Pressurizer relief tank: tank shell and heads; flanges; nozzles (non-	Stainless steel; steel with stainless steel cladding	Treated borated water >60°C (>140°F)	Cracking due to SCC	XI.M2, “Water Chemistry,” and XI.M32, “One-Time	No	The staff has previously found the combination of “Water Chemistry” and “One-Time Inspection” adequate for aging management of the pressurizer spray head, which	876 963

Table II-3. New AMR Items Added in Revision 2 of the GALL Report, Chapter IV

New AMR Item No.	Structures and/or Components	Material	Environment	Aging Effect/ Mechanism	Aging Management Program	Further Evaluation Required	Technical Basis for Addition	Comment No.
	ASME Section XI components)				Inspection"		is also a non-ASME Code class component with similar material, environment and aging effect.	
IV.D1.RP-385	Tube-to-tube sheet welds	Nickel alloy	Reactor coolant	Cracking due to primary water stress corrosion cracking (PWSCC)	XI.M2, "Water Chemistry" A plant-specific program is to be evaluated; the effectiveness of the water chemistry program should be verified to ensure cracking is not occurring	Yes, plant specific	Added to provide an AMR item for tube-to-tube sheet welds of recirculating SGs consistent with that for OTSGs. Further evaluation is needed if these autogenous welds are associated with Alloy 600 or associated weld materials (Alloy 600 SG tubes and/or Alloy 600 tubesheet cladding), due to chromium content below that of Alloy 690 and associated weld materials. The staff has determined that further evaluation of a plant-specific program is needed. See precedent in Kewaunee and Palo Verde SERs.	N/A
IV.B2.RP-386	Control rod guide tube (CRGT) assemblies: C-tubes and sheaths	Stainless steel	Reactor coolant and neutron flux	Loss of material due to wear	XI.M16A, "PWR Vessel Internals" Expansion components (identified in the "Structure and Components" column) are only the	No	This AMR line-item is added based on Note 2 in Table 3-3 of MRP-227, Rev. 0, for this component, material, environment, aging effect combination (providing defense-in-depth).	N/A

Table II-3. New AMR Items Added in Revision 2 of the GALL Report, Chapter IV

New AMR Item No.	Structures and/or Components	Material	Environment	Aging Effect/ Mechanism	Aging Management Program	Further Evaluation Required	Technical Basis for Addition	Comment No.
					components associated with a primary component that exceeded the acceptance limit. (for Primary components see AMR Item IV.B2.RP-296)			
IV.B2.RP-387	Core barrel assembly: core barrel axial welds	Stainless steel	Reactor coolant and neutron flux	Cracking due to SCC, and IASCC	XI.M2, "Water Chemistry," and XI.M16A, "PWR Vessel Internals" Expansion components (identified in the "Structure and Components" column) (for Primary components see AMR	No	This AMR result is based on the staff's review of MRP-227, Rev. 0, for this component, material, environment, aging effect combination. Added for defense-in-depth.	NA

Table II-3. New AMR Items Added in Revision 2 of the GALL Report, Chapter IV

New AMR Item No.	Structures and/or Components	Material	Environment	Aging Effect/ Mechanism	Aging Management Program	Further Evaluation Required	Technical Basis for Addition	Comment No.
					Item IV.B2.RP-276)			
IV.B2.RP-388	Core barrel assembly: core barrel axial welds	Stainless steel	Reactor coolant and neutron flux	Loss of fracture toughness due to neutron irradiation embrittlement	XI.M16A, "PWR Vessel Internals" Expansion components (identified in the "Structure and Components" column) (for Primary components see AMR Item IV.B2.RP-276)	No	This AMR item is based on the staff's review of MRP-227, Rev. 0, for this component, material, environment, aging effect combination. Added for defense-in-depth.	NA
IV.B3.RP-389	Core support barrel assembly: lower flange weld (if fatigue analysis exists)	Stainless steel	Reactor coolant and neutron flux	Cumulative fatigue damage due to fatigue	Fatigue is a TLAA to be evaluated for the period of extended operation. See the SRP, Chapter 4.3 "Metal Fatigue," for acceptable methods for meeting the	Yes, TLAA	This AMR item is based on the staff's review of MRP-227, Rev. 0, for this component, material, environment, aging effect combination. Table 4-2 in MRP-227 identifies a TLAA as an acceptable approach, which is alternative to the inspection recommended in MRP-227 for the management of the aging effect.	NA

Table II-3. New AMR Items Added in Revision 2 of the GALL Report, Chapter IV

New AMR Item No.	Structures and/or Components	Material	Environment	Aging Effect/ Mechanism	Aging Management Program	Further Evaluation Required	Technical Basis for Addition	Comment No.
					requirements of 10 CFR 54.21(c)(1).			
IV.B3.RP-390	Lower support structure: core support plate (applicable to plants with a core support plate), if fatigue analysis exists	Stainless steel	Reactor coolant and neutron flux	Cumulative fatigue damage due to fatigue	Fatigue is a TLAA to be evaluated for the period of extended operation. See the SRP, Chapter 4.3 “Metal Fatigue,” for acceptable methods for meeting the requirements of 10 CFR 54.21(c)(1).	Yes, TLAA	This AMR item is based on the staff’s review of MRP-227, Rev. 0, for this component, material, environment, aging effect combination. Table 4-2 in MRP-227 identifies a TLAA as an acceptable approach, which is alternative to the inspection recommended in MRP-227 for the management of the aging effect.	NA
IV.B3.RP-391	Upper internals assembly: fuel alignment plate (applicable to plants with core shrouds assembled with full height shroud plates), if fatigue	Stainless steel	Reactor coolant and neutron flux	Cumulative fatigue damage due to fatigue	Fatigue is a TLAA) to be evaluated for the period of extended operation. See the SRP, Chapter 4.3 “Metal Fatigue,” for acceptable methods for meeting the requirements	Yes, TLAA	This AMR item is based on the staff’s review of MRP-227, Rev. 0, for this component, material, environment, aging effect combination. Table 4-2 in MRP-227 identifies a TLAA as an acceptable approach, which is alternative to the inspection recommended in MRP-227 for the management of the aging effect.	NA

Table II-3. New AMR Items Added in Revision 2 of the GALL Report, Chapter IV

New AMR Item No.	Structures and/or Components	Material	Environment	Aging Effect/ Mechanism	Aging Management Program	Further Evaluation Required	Technical Basis for Addition	Comment No.
	analysis exists				of 10 CFR 54.21(c)(1).			

Table II-4. New AMR Items Added in Revision 2 of the GALL Report, Chapter V

New AMR Item No.	Structures and/or Components	Material	Environment	Aging Effect/ Mechanism	Aging Management Program	Further Evaluation Required	Technical Basis for Addition	Comment No.
V.B.EP-103 V.C.EP-103 V.D1.EP-103 V.D2.EP-103	Piping, piping components, and piping elements; tanks	Stainless steel	Air – outdoor	Cracking due to SCC	XI.M36, "External Surfaces Monitoring of Mechanical Components"	Yes, environmental conditions need to be evaluated	Cracking due to SCC could occur in stainless steel components exposed to outdoor air if the outdoor air contains sufficient halides (primarily chlorides). Additional details are in the SRP-LR discussion of this item in SRP-LR Subsection 3.2.2.2.6.	880
V.B.EP-107 V.C.EP-107 V.D1.EP-107 V.D2.EP-107	Piping, piping components, and piping elements; tanks	Stainless steel	Air – outdoor	Loss of material due to pitting and crevice corrosion	XI.M36, "External Surfaces Monitoring of Mechanical Components"	Yes, environmental conditions need to be evaluated	Loss of material due to pitting and crevice corrosion could occur in stainless steel components exposed to outdoor air if the outdoor air contains sufficient halides (primarily chlorides). Additional details are in the SRP-LR discussion of this item in SRP-LR Subsection 3.2.2.2.3.2.	947
V.E.EP-114	Piping, piping components, and piping elements	Aluminum	Air - outdoor	Loss of material due to pitting and crevice corrosion	XI.M36, "External Surfaces Monitoring of Mechanical Components"	No	GALL Report includes steel, stainless steel and copper alloy piping, piping components, and piping elements in air outdoor environment. Since some nuclear plants also include aluminum piping, piping components, and piping elements in this environment, aluminum should also be added. The GALL Report	439

Table II-4. New AMR Items Added in Revision 2 of the GALL Report, Chapter V

New AMR Item No.	Structures and/or Components	Material	Environment	Aging Effect/ Mechanism	Aging Management Program	Further Evaluation Required	Technical Basis for Addition	Comment No.
							provides a precedent because electrical and structures component chapters VI and III include aluminum material components in an air-outdoor environment. XI. M36 was revised to include all metallic components.	
V.F.EP-115	Piping, piping components, and piping elements	Nickel alloy	Air with borated water leakage	None	None	No	GALL Report includes stainless steel material in air with borated water leakage as “None-None.” Nickel-alloy material is also resistant to borated water environment. Also, staff has previously accepted in SERs that nickel alloy in air with borated water leakage environment has no aging effects requiring management.	447
V.E.EP-116	Bolting	Copper alloy	Any environment	Loss of preload due to thermal effects, gasket creep, and self-loosening	XI.M18, "Bolting Integrity"	No	The GALL Report addresses steel and stainless steel material; however, loss of preload would also be an applicable aging effect for copper alloy and nickel-alloy materials. Environment was specified as "any environment" because this aging effect is not dependent on the external environment to which the bolting is	451

Table II-4. New AMR Items Added in Revision 2 of the GALL Report, Chapter V

New AMR Item No.	Structures and/or Components	Material	Environment	Aging Effect/ Mechanism	Aging Management Program	Further Evaluation Required	Technical Basis for Addition	Comment No.
							exposed.	
V.E.EP-117	Bolting	Nickel alloy	Any environment	Loss of preload due to thermal effects, gasket creep, and self-loosening	XI.M18, "Bolting Integrity"	No	The GALL Report addresses steel and stainless steel material; however, loss of preload would also be an applicable aging effect for copper alloy and nickel-alloy materials. Environment was specified as "any environment" because this aging effect is not dependent on the external environment to which the bolting is exposed.	451
V.E.EP-118	Bolting	Steel; stainless steel	Air – outdoor (External)	Loss of preload due to thermal effects, gasket creep, and self-loosening	XI.M18, "Bolting Integrity"	No	Loss of preload is an aging effect that is not dependent on the external environment. Gasket creep and self-loosening can occur in bolted connections in any air environment. AMR items already exist for the environment of indoor air. This AMR item is added to include the outdoor air environment.	454
V.E.EP-119	Bolting	Steel; stainless steel	Raw water	Loss of preload due to thermal effects, gasket creep, and	XI.M18, "Bolting Integrity"	No	Various applicants have identified steel or stainless steel bolting in a raw water environment. AMP XI.M18 is credited to manage loss of preload in all environments.	457

Table II-4. New AMR Items Added in Revision 2 of the GALL Report, Chapter V

New AMR Item No.	Structures and/or Components	Material	Environment	Aging Effect/ Mechanism	Aging Management Program	Further Evaluation Required	Technical Basis for Addition	Comment No.
				self-loosening				
V.E.EP-120	Bolting	Stainless steel	Treated borated water	Loss of preload due to thermal effects, gasket creep, and self-loosening	XI.M18, "Bolting Integrity"	No	Various applicants have identified stainless steel bolting in a treated, borated water environment. AMP XI.M18 is credited to manage loss of preload in all environments.	457
V.E.EP-121	Bolting	Steel; stainless steel	Fuel oil	Loss of preload due to thermal effects, gasket creep, and self-loosening	XI.M18, "Bolting Integrity"	No	Various applicants have identified steel or stainless steel bolting in a fuel oil environment. AMP XI.M18 is credited to manage loss of preload in all environments.	457
V.E.EP-122	Bolting	Steel; stainless steel	Treated water	Loss of preload due to thermal effects, gasket creep, and self-loosening	XI.M18, "Bolting Integrity"	No	Various applicants have identified steel or stainless steel bolting in a treated water environment. AMP XI.M18 is credited to manage loss of preload in all environments.	457
V.E.EP-123	Underground piping, piping components, and piping elements	Steel; stainless steel	Air-indoor, uncontrolled (External) or condensation (External)	Loss of material due to general (steel only), pitting and crevice	XI.M41, “Buried and Underground Piping and Tanks”	No	GALL AMP XI.M41 includes underground piping, which is defined in GALL Report Chapter IX.B as “Underground piping and tanks are below grade, but	N/A

Table II-4. New AMR Items Added in Revision 2 of the GALL Report, Chapter V

New AMR Item No.	Structures and/or Components	Material	Environment	Aging Effect/ Mechanism	Aging Management Program	Further Evaluation Required	Technical Basis for Addition	Comment No.
				corrosion			are contained within a tunnel or vault such that they are in contact with air and are located where access for inspection is restricted.”	
V.F.EP-65	Piping elements	Glass	Air with borated water leakage	None	None	No	No failure due to an aging effect of glass components in environments free of hydrofluoric acid, caustics, or hot water have been recorded in industry at the temperatures or during the periods of concern for extended operation. Precedent exists in Beaver Valley SER, Section 3.3.2.3.3, where the staff has accepted that for this material and environment there is no aging effect requiring management during the period of extended operation.	N/A
V.F.EP-66	Piping elements	Glass	Condensation (Internal/External)	None	None	No	No failure due to an aging effect of glass components in environments free of hydrofluoric acid, caustics, or hot water have been recorded in industry at the temperatures or during the periods of concern for extended operation. Precedent exists in Beaver Valley SER, Section	N/A

Table II-4. New AMR Items Added in Revision 2 of the GALL Report, Chapter V

New AMR Item No.	Structures and/or Components	Material	Environment	Aging Effect/ Mechanism	Aging Management Program	Further Evaluation Required	Technical Basis for Addition	Comment No.
							3.3.2.3.5, where the staff has accepted that for this material and environment there is no aging effect requiring management during the period of extended operation.	
V.F.EP-67	Piping elements	Glass	Gas	None	None	No	No failure due to an aging effect of glass components in environments free of hydrofluoric acid, caustics, or hot water have been recorded in industry at the temperatures or during the periods of concern for extended operation. GALL Report items VIII.I-12, VIII.I-3, and VIII.I-15 address stainless steel, copper alloy, and steel materials in gas environment with no aging effects identified.	N/A
V.F.EP-68	Piping elements	Glass	Closed-cycle cooling water	None	None	No	No failure due to an aging effect of glass components in environments free of hydrofluoric acid, caustics, or hot water have been recorded in industry at the temperatures or during the periods of concern for extended operation. Precedent exists in Beaver Valley SER, Section 3.3.2.3.6, where the staff has	N/A

Table II-4. New AMR Items Added in Revision 2 of the GALL Report, Chapter V

New AMR Item No.	Structures and/or Components	Material	Environment	Aging Effect/ Mechanism	Aging Management Program	Further Evaluation Required	Technical Basis for Addition	Comment No.
							accepted that for this material and environment there is no aging effect requiring management during the period of extended operation.	
V.F.EP-82	Piping, piping components, and piping elements	Stainless steel	Air – indoor, uncontrolled (Internal)	None	None	No	The same MEAP combination exists in the GALL Report as item VII.J-15. The only difference in this item and the proposed item is that the air is internal instead of external. The location of the environment has no impact on aging effects if the material is the same. This conclusion is also based on the fact that stainless steels are highly resistant to corrosion in dry atmospheres in the absence of corrosive species (which would be reflective of indoor uncontrolled air) as cited in Metals Handbook, Volumes 3 (p. 65) and 13 (p. 555), Ninth Edition, American Society for Metals International, 1980 and 1987. Components are not subject to moisture in a dry air environment (and indoor uncontrolled air would have limited humidity and condensation).	N/A
V.F.EP-87	Piping	Glass	Air – outdoor	None	None	No	No failure due to an aging	N/A

Table II-4. New AMR Items Added in Revision 2 of the GALL Report, Chapter V

New AMR Item No.	Structures and/or Components	Material	Environment	Aging Effect/ Mechanism	Aging Management Program	Further Evaluation Required	Technical Basis for Addition	Comment No.
	elements						effect of glass components in environments free of hydrofluoric acid, caustics, and hot water has been recorded in industry operating experience. The staff has accepted that for this material and environment there is no aging effect requiring management during the period of extended operation.	

Table II-5. New AMR Items Added in Revision 2 of the GALL Report, Chapter VII

New AMR Item No.	Structures and/or Components	Material	Environment	Aging Effect/ Mechanism	Aging Management Program	Further Evaluation Required	Technical Basis for Addition	Comment No.
VII.J.AP-123	Piping, piping components, and piping elements	Stainless steel	Air – indoor, uncontrolled (Internal/External)	None	None	No	GALL Rev. 1 item VII.J-15 is virtually equivalent to this new item in terms of MEAP combination. The only difference between the GALL Rev. 1 item and this new item is that the air is internal/external instead of external. The location of the environment has no impact on aging effects if the material is the same. This conclusion is also based on the fact that stainless steels are highly resistant to corrosion in dry atmospheres in the absence of corrosive species (which would be reflective of indoor uncontrolled air) as cited in Metals Handbook, Volumes 3 (p. 65) and 13 (p. 555), Ninth Edition, American Society for Metals International, 1980 and 1987. Components are not subject to moisture in a dry air environment (and indoor uncontrolled air would have limited humidity and condensation).	N/A
VII.J.AP-134	Piping, piping components,	Aluminum	Air – dry (Internal/	None	None	No	Aluminum has an excellent resistance to corrosion in dry	N/A

Table II-5. New AMR Items Added in Revision 2 of the GALL Report, Chapter VII

New AMR Item No.	Structures and/or Components	Material	Environment	Aging Effect/ Mechanism	Aging Management Program	Further Evaluation Required	Technical Basis for Addition	Comment No.
	and piping elements		External)				air environments. On a surface freshly abraded and then exposed to air, the oxide film is only 5 to 10 nanometers thick but is highly effective in protecting the aluminum from corrosion (Hollingsworth and Hunsicker 1979). This conclusion is because, based on current industry research and operating experience, dry air on metal will not result in aging that will be of concern during the period of extended operation. Therefore, aluminum exposed to a dried air environment does not have any applicable aging effect. Reference: Hollingsworth, E. H., and Hunsicker, H. Y. 1979. “Corrosion Resistance of Aluminum and Aluminum Alloys,” Metals Handbook Ninth Edition, Volume 2, Properties and Selection: Nonferrous Alloys and Pure Metals, pp. 204-236.	

Table II-5. New AMR Items Added in Revision 2 of the GALL Report, Chapter VII

New AMR Item No.	Structures and/or Components	Material	Environment	Aging Effect/ Mechanism	Aging Management Program	Further Evaluation Required	Technical Basis for Addition	Comment No.
VII.J.AP-135	Piping, piping components, and piping elements	Aluminum	Air – indoor, uncontrolled (Internal/External)	None	None	No	This MEAP combination exists in the GALL Report as item V.F-2. Added here for consistency in Chapter VII.	N/A
VII.J.AP-144	Piping, piping components, and piping elements	Copper alloy	Air – indoor, uncontrolled (Internal/External)	None	None	No	This MEAP combination is consistent with GALL Report Rev. 1, item V.F-3 (EP-10) which is for external surfaces. Added here for consistency to address internal/external surfaces.	N/A
VII.G.AP-149	Fire Hydrants	Steel	Air – outdoor	Loss of material due to general, pitting, and crevice corrosion	XI.M27, "Fire Water System"	No	This recommendation is specific to the external surfaces of Fire Hydrants in fire water systems. The steel, outdoor air (external), and loss of material combination is consistent with other identical material, environment, and aging effects combinations for component external surfaces in the GALL Report, Chapter VII.I, “External Surfaces of Components and Miscellaneous Bolting.” In XI.M27, “Fire Water System,” the AMP includes recommendations for inspections of external surfaces of fire hydrants.	N/A

Table II-5. New AMR Items Added in Revision 2 of the GALL Report, Chapter VII

New AMR Item No.	Structures and/or Components	Material	Environment	Aging Effect/ Mechanism	Aging Management Program	Further Evaluation Required	Technical Basis for Addition	Comment No.
VII.G.AP-150	Halon/carbon dioxide fire suppression system piping, piping components, and piping elements	Steel	Air – indoor, uncontrolled (External)	Loss of material due to general, pitting, and crevice corrosion	XI.M26, "Fire Protection"	No	This recommendation is specific to the external surfaces of Halon and carbon dioxide fire suppression system components. The steel, indoor air (external), and loss of material combination is consistent with other identical material, environment, and aging effects combinations for component external surfaces in the GALL Report, Chapter VII.I, "External Surfaces of Components and Miscellaneous Bolting." The Fire Protection program is revised to recommend visual inspection of halon/carbon dioxide piping during the performance testing of the system.	N/A

Table II-5. New AMR Items Added in Revision 2 of the GALL Report, Chapter VII

New AMR Item No.	Structures and/or Components	Material	Environment	Aging Effect/ Mechanism	Aging Management Program	Further Evaluation Required	Technical Basis for Addition	Comment No.
VII.J.AP-151	Heat exchanger components	Titanium	Air – indoor, uncontrolled or Air – outdoor	None	None	No	The corrosion resistance of titanium to indoor or outdoor air environments is a result of the formation of a continuous, stable, highly adherent protective oxide layer on the metal surface. The metal itself is very reactive, with a high affinity for oxygen, and reforms damage to this layer instantaneously. The oxide film on titanium and titanium alloys provides an effective barrier to attack by most gases in wet or dry conditions, including oxygen, nitrogen, NH_3 CO_2, CO, and H_2S. This protection extends to temperatures in excess of 300ºF. The outstanding resistance of titanium and titanium alloys to rural, marine, and urban atmospheric exposure has been documented (Metals Handbook, Ninth Edition, Volume 13, “Corrosion,” pages 676, 677 and 681, American Society of Metals International) An approved precedent	N/A

Table II-5. New AMR Items Added in Revision 2 of the GALL Report, Chapter VII

New AMR Item No.	Structures and/or Components	Material	Environment	Aging Effect/ Mechanism	Aging Management Program	Further Evaluation Required	Technical Basis for Addition	Comment No.
							exists for adding this material, environment, aging effect, and program combination to the GALL Report. As shown in Oyster Creek SER Section 3.3.2.3 page 3-370, the staff accepted the position that titanium in an outdoor air environment has no aging effects that require aging management.	
VII.C1.AP-152	Heat exchanger components	Titanium (American Society for	Raw water	None	None	No	Titanium has excellent corrosion resistance properties, specifically in	N/A

Table II-5. New AMR Items Added in Revision 2 of the GALL Report, Chapter VII

New AMR Item No.	Structures and/or Components	Material	Environment	Aging Effect/ Mechanism	Aging Management Program	Further Evaluation Required	Technical Basis for Addition	Comment No.
	other than tubes	Testing and Materials (ASTM) Grades 1,2, 7, 11, or 12 that contains > 5% aluminum or more than 0.20% oxygen or any amount of tin)					chlorine-containing fluids with temperatures less than 160°F. The corrosion resistance of titanium is a result of the formation of a continuous, stable, highly adherent protective oxide layer on the metal surface. Titanium and its alloys are fully resistant to all natural waters (raw, untreated fresh or salt water). For these reasons, loss of material due to general, pitting, and crevice corrosion is not considered applicable. SCC of titanium and its alloys is considered applicable in sea water or brackish raw water systems if the titanium alloy is not ASTM Grade 1, 2, 7, 11, or 12 and contains more than 5% aluminum or more than 0.20% oxygen or any amount of tin. References: Metals Handbook, Ninth Edition, Volume 13, "Corrosion," page 674, Volume 3, "Properties and Selection: Stainless Steels, Tool Materials and Special-Purpose Metals," page 415, and Volume 11, "Failure	

Table II-5. New AMR Items Added in Revision 2 of the GALL Report, Chapter VII

New AMR Item No.	Structures and/or Components	Material	Environment	Aging Effect/ Mechanism	Aging Management Program	Further Evaluation Required	Technical Basis for Addition	Comment No.
							Analysis and Prevention," pages 223-224, American Society of Metals International.	
VII.C1.AP-153	Heat exchanger tubes	Titanium	Raw water	Reduction of heat transfer due to fouling	XI.M20, "Open-Cycle Cooling Water System"	No	Instances of macrofouling typically occur early in the service life of a component, and are corrected well before the end of the initial license period. However, macrofouling is an applicable mechanism for degradation of metals exposed to raw water if there is a potential for recurrence. As such, macrofouling is considered to be an applicable aging mechanism for titanium and titanium alloys if there is a potential for macrofouling in the raw water environment and flow velocities are less than 5 ft/s.	N/A
VII.H2.AP-154	Heat exchanger tubes	Aluminum	Lubricating oil	Reduction of heat transfer due to fouling	XI.M39, "Lubricating Oil Analysis," and XI.M32, "One-Time Inspection"	No	Fouling is an applicable mechanism for reduction of heat transfer of heat exchangers in a lubricating oil environment, as noted by GALL line V.D1-8. Aluminum has been added to account for an additional heat exchanger material susceptible to reduction of	N/A

Table II-5. New AMR Items Added in Revision 2 of the GALL Report, Chapter VII

New AMR Item No.	Structures and/or Components	Material	Environment	Aging Effect/ Mechanism	Aging Management Program	Further Evaluation Required	Technical Basis for Addition	Comment No.
							heat transfer due to fouling. As shown in Beaver Valley SER Section 3.3.2.3.15, Lubricating Oil Analysis program and a One-Time Inspection program consistent with GALL AMP XI.M32 to verify the effectiveness of the Lubricating Oil Analysis program are adequate to manage the aging effect of reduction of heat transfer.	
VII.C1.AP-155	Piping, piping components, and piping elements	Reinforced concrete, asbestos cement	Raw water	Cracking due to aggressive chemical attack and leaching; changes in material properties due to aggressive chemical attack	XI.M20, "Open-Cycle Cooling Water System"	No	Reinforced concrete and asbestos cement pipe/components and mechanical components in raw water have the same aging effects as structural concrete. An approved precedent exists for adding this material, environment, aging effect, and program combination to the GALL Report. As shown in Harris SER page 3-560, the staff accepted the position that cracking, loss of material, and changes in material properties for reinforced concrete and asbestos cement pipe/components in a raw water environment can be managed with the Open	885 505 430

Table II-5. New AMR Items Added in Revision 2 of the GALL Report, Chapter VII

New AMR Item No.	Structures and/or Components	Material	Environment	Aging Effect/ Mechanism	Aging Management Program	Further Evaluation Required	Technical Basis for Addition	Comment No.
							Cycle Cooling Water AMP (XI.M20).	
VII.C1.AP-156	Piping, piping components, and piping elements	Reinforced concrete, asbestos cement	Air – outdoor	Cracking due to aggressive chemical attack and leaching; Changes in material properties due to aggressive chemical attack	XI.M36, "External Surfaces Monitoring of Mechanical Components"	No	Reinforced concrete and asbestos cement pipe/components and mechanical components in an outdoor air environment have the same aging effects as structural concrete. An approved precedent exists for adding this material, environment, aging effect, and program combination to the GALL Report. As shown in Harris SER page 3-560, the staff accepted the position that cracking, loss of material, and changes in material properties for reinforced concrete and asbestos cement pipe/components in an outdoor air environment can be managed with XI.M36. Ref: ASTM C296, Standard Specification for Asbestos-Cement Pipe	430
VII.C1.AP-157	Piping, piping components, and piping elements	Reinforced concrete, asbestos cement	Soil or concrete	Cracking due to aggressive chemical	XI.M41, "Buried and Underground Piping and	No	Reinforced concrete and asbestos cement pipe/components and mechanical components	885

Table II-5. New AMR Items Added in Revision 2 of the GALL Report, Chapter VII

New AMR Item No.	Structures and/or Components	Material	Environment	Aging Effect/ Mechanism	Aging Management Program	Further Evaluation Required	Technical Basis for Addition	Comment No.
				attack and leaching; Changes in material properties due to aggressive chemical attack	Tanks"		buried in a soil environment have the same aging effects as structural concrete. An approved precedent exists for adding this material, environment, and aging effect combination to the GALL Report. As shown in Harris SER page 3-560, the staff accepted the position that cracking, loss of material, and changes in material properties are appropriate aging effects for reinforced concrete and asbestos cement pipe/components buried in a soil environment. Ref: ASTM C296, Standard Specification for Asbestos-Cement Pipe	
VII.I.AP-159	Piping, piping components, and piping elements	Copper alloy	Air – outdoor (External)	Loss of material due to pitting and crevice corrosion	XI.M36, "External Surfaces Monitoring of Mechanical Components"	No	An approved precedent exists for adding this material, environment, aging effect, and program combination to the GALL Report. As shown in Three Mile Island (TMI) SER Section 3.3.2.1.3, the staff accepted the position that copper alloy in an outdoor air environment exhibits a loss of material aging effect and	N/A

Table II-5. New AMR Items Added in Revision 2 of the GALL Report, Chapter VII

New AMR Item No.	Structures and/or Components	Material	Environment	Aging Effect/ Mechanism	Aging Management Program	Further Evaluation Required	Technical Basis for Addition	Comment No.
							accepted GALL AMP XI.M36 to manage this aging effect. The GALL AMP is revised to include more metallic materials besides steel.	
VII.J.AP-160	Piping, piping components, and piping elements	Titanium	Air – indoor, uncontrolled or Air – outdoor	None	None	No	The corrosion resistance of titanium to indoor or outdoor air environments is a result of the formation of a continuous, stable, highly adherent protective oxide layer on the metal surface. The metal itself is very reactive, with a high affinity for oxygen, and reforms damage to this layer instantaneously. The oxide film on titanium and titanium alloys provides an effective barrier to attack by most gases in wet or dry conditions, including oxygen, nitrogen, NH_3 CO_2, CO, and H_2S. This protection extends to temperatures in excess of 300ºF. The outstanding resistance of titanium and titanium alloys to rural, marine, and urban atmospheric exposure has been documented (Metals Handbook, Ninth Edition, Volume 13, "Corrosion," pages 676, 677 and 681,	N/A

Table II-5. New AMR Items Added in Revision 2 of the GALL Report, Chapter VII

New AMR Item No.	Structures and/or Components	Material	Environment	Aging Effect/ Mechanism	Aging Management Program	Further Evaluation Required	Technical Basis for Addition	Comment No.
							American Society of Metals International). An approved precedent exists for adding this material, environment, aging effect, and program combination to the GALL Report. As shown in Oyster Creek SER Section 3.3.2.3 page 3-370, the staff accepted the position that titanium in an outdoor air environment has no aging effects that require aging management.	
VII.C1.AP-161	Piping, piping components, and piping elements	Titanium (ASTM Grades 1,2, 7, 11, or 12 that contains > 5% aluminum or more than 0.20% oxygen or any amount of tin)	Raw water	None	None	No	Titanium has excellent corrosion resistance properties, specifically in chlorine-containing fluids with temperatures less than 160°F. The corrosion resistance of titanium is a result of the formation of a continuous, stable, highly adherent protective oxide layer on the metal surface. Titanium and its alloys are fully resistant to all natural waters (raw, untreated fresh or salt water). For these reasons, loss of material due to general, pitting, and crevice corrosion is not	N/A

Table II-5. New AMR Items Added in Revision 2 of the GALL Report, Chapter VII

New AMR Item No.	Structures and/or Components	Material	Environment	Aging Effect/ Mechanism	Aging Management Program	Further Evaluation Required	Technical Basis for Addition	Comment No.
							considered applicable. SCC of titanium and its alloys is considered applicable in sea water or brackish raw water systems if the titanium alloy is not ASTM Grade 1, 2, 7, 11, or 12 and contains more than 5% aluminum or more than 0.20% oxygen or any amount of tin. References: Metals Handbook, Ninth Edition, Volume 13, “Corrosion,” page 674, Volume 3, “Properties and Selection: Stainless Steels, Tool Materials and Special-Purpose Metals,” page 415, and Volume 11, “Failure Analysis and Prevention,” pages 223-224, American Society of Metals International.	
VII.H2.AP-162	Piping, piping components, and piping elements	Aluminum	Lubricating oil	Loss of material due to pitting and crevice corrosion	XI.M39, "Lubricating Oil Analysis," and XI.M32, “One-Time Inspection”	No	Loss of material is an applicable aging effect in a lubricating oil environment, as noted by GALL line VIII.G-19. Aluminum has been added to account for an additional heat exchanger material susceptible to loss of material. As shown in Beaver Valley SER Section	N/A

Table II-5. New AMR Items Added in Revision 2 of the GALL Report, Chapter VII

New AMR Item No.	Structures and/or Components	Material	Environment	Aging Effect/ Mechanism	Aging Management Program	Further Evaluation Required	Technical Basis for Addition	Comment No.
							3.3.2.3.15, Lubricating Oil Analysis program and a One-Time Inspection program consistent with GALL AMP XI.M32 to verify the effectiveness of the Lubricating Oil Analysis program are adequate to manage the aging effect of loss of material.	
VII.J.AP-166	Piping elements	Glass	Closed-cycle cooling water	None	None	No	No failure due to an aging effect of glass components in environments free of hydrofluoric acid, caustics, or hot water have been recorded in industry at the temperatures or during the periods of concern for extended operation. Precedent exists in Beaver Valley SER Section 3.3.2.3.6, where the staff has accepted that no aging effect exists for this environment and no aging management program is required.	N/A
VII.J.AP-167	Piping elements	Glass	Air – outdoor	None	None	No	No failure due to an aging effect of glass components in an outdoor air environment have been recorded in industry at the temperatures.	N/A

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New AMR Item No.	Structures and/or Components	Material	Environment	Aging Effect/ Mechanism	Aging Management Program	Further Evaluation Required	Technical Basis for Addition	Comment No.
VII.C1.AP-171	Piping, piping components, and piping elements	Titanium	Soil or concrete	Loss of material due to pitting and crevice corrosion	XI.M41, "Buried and Underground Piping and Tanks"	No	An approved precedent exists for adding this material, environment, aging effect, and program combination to the GALL Report. As shown in Susquehanna Steam Electric Station (SSES) SER Section 3.3.2.3.2, the staff accepted the position that titanium in a soil environment is adequately managed by the Buried and Underground Piping and Tanks Program.	N/A
VII.C1.AP-172	Piping, piping components, and piping elements	Super austenitic	Soil or concrete	Loss of material due to pitting and crevice corrosion	XI.M41, "Buried and Underground Piping and Tanks"	No	Super austenitic stainless steel is more resistant than austenitic stainless steel to pitting and crevice corrosion. However, a search of the available literature (e.g., “Super-austenitic Steel for Piping and Tubing Applications,” Nippon Steel Technical Report No. 90, July 2004) indicates that pitting and crevice corrosion can still occur in this material exposed to potentially harsh environments such as soil. Therefore, loss of material due to pitting and crevice corrosion needs to be managed for this material.	N/A

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New AMR Item No.	Structures and/or Components	Material	Environment	Aging Effect/ Mechanism	Aging Management Program	Further Evaluation Required	Technical Basis for Addition	Comment No.
VII.C1.AP-173	Piping, piping components, and piping elements	Aluminum	Soil or concrete	Loss of material due to pitting and crevice corrosion	XI.M41, "Buried and Underground Piping and Tanks"	No	Aluminum piping is subject to pitting and crevice corrosion in wet environments such as raw water (e.g., GALL Report Item VII.G.AP-180). Since moisture typically is not controlled in a soil environment, aluminum piping will also be subject to pitting and crevice corrosion, and loss of material due to pitting and crevice corrosion must also be managed for aluminum piping exposed to a soil environment.	N/A
VII.C1.AP-174	Piping, piping components, and piping elements	Copper Alloy	Soil or concrete	Loss of material due to pitting and crevice corrosion	XI.M41, "Buried and Underground Piping and Tanks"	No	Included in SP0169-2007. The material was changed from copper to copper alloy to be consistent with other copper alloy AMR items.	888
VII.C1.AP-175	Piping, piping components, and piping elements	HDPE	Soil or concrete	Cracking, blistering, change in color due to water absorption	XI.M41, "Buried and Underground Piping and Tanks"	No	Applicants have used this material to replace existing pipe or have utilized this material in buried piping environment. The AMP has been revised to address aging management of this material.	887
VII.C1.AP-176	Piping, piping components, and piping	Fiberglass	Soil or concrete	Cracking, blistering, change in	XI.M41, "Buried and Underground	No	Applicants have used this material to replace existing pipe or have utilized this	N/A

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New AMR Item No.	Structures and/or Components	Material	Environment	Aging Effect/ Mechanism	Aging Management Program	Further Evaluation Required	Technical Basis for Addition	Comment No.
	elements			color due to water absorption	Piping and Tanks"		material in buried piping environment. The AMP has been revised to address aging management of this material.	
VII.C1.AP-177	Piping, piping components, and piping elements	Concrete cylinder piping	Soil or concrete	Cracking, spalling, corrosion of rebar due to exposure of rebar	XI.M41, "Buried and Underground Piping and Tanks"	No	Applicants have used this material to replace existing pipe or have utilized this material in buried piping environment. The AMP has been revised to address aging management of this material.	N/A
VII.C1.AP-178	Piping, piping components, and piping elements	Concrete	Soil or concrete	Cracking, spalling, corrosion of rebar due to exposure of rebar	XI.M41, "Buried and Underground Piping and Tanks"	No	Applicants have used this material to replace existing pipe or have utilized this material in buried piping environment. The AMP has been revised to address aging management of this material.	N/A
VII.C1.AP-209 VII.C2.AP-209 VII.C3.AP-209 VII.D.AP-209 VII.E1.AP-209 VII.E4.AP-209 VII.F1.AP-209 VII.F2.AP-209 VII.F4.AP-209 VII.G.AP-209 VII.H1.AP-209	Piping, piping components, and piping elements; tanks	Stainless steel	Air – outdoor	Cracking due to SCC	XI.M36, "External Surfaces Monitoring of Mechanical Components"	Yes, environmental conditions need to be evaluated	Cracking due to SCC could occur in stainless steel components exposed to outdoor air if the outdoor air contains sufficient halides (primarily chlorides). Additional details are in the SRP-LR discussion of this item.	880

Table II-5. New AMR Items Added in Revision 2 of the GALL Report, Chapter VII

New AMR Item No.	Structures and/or Components	Material	Environment	Aging Effect/ Mechanism	Aging Management Program	Further Evaluation Required	Technical Basis for Addition	Comment No.
VII.H2.AP-209								
VII.C1.AP-221 VII.C2.AP-221 VII.C3.AP-221 VII.D.AP-221 VII.E1.AP-221 VII.E4.AP-221 VII.F1.AP-221 VII.F2.AP-221 VII.F4.AP-221 VII.G.AP-221 VII.H1.AP-221 VII.H2.AP-221	Piping, piping components, and piping elements; tanks	Stainless steel	Air – outdoor	Loss of material due to pitting and crevice corrosion	XI.M36, "External Surfaces Monitoring of Mechanical Components"	Yes, environmental conditions need to be evaluated	Loss of material due to pitting and crevice corrosion could occur in stainless steel components exposed to outdoor air if the outdoor air contains sufficient halides (primarily chlorides). Additional details are in the SRP-LR discussion of this item.	947
VII.C1.AP-237	Piping, piping components, and piping elements	Asbestos cement pipe	Soil or concrete	Cracking, spalling, corrosion of rebar due to exposure of rebar	XI.M41, "Buried and Underground Piping and Tanks"	No	The new AMP XI.M41, “Buried and Underground Piping and Tanks,” includes asbestos cement pipe within its scope because it is susceptible to cracking, spalling and corrosion of rebar in a soil or concrete environment. This line item was added to the GALL Report to be consistent with AMP XI.M41.	N/A
VII.C1.AP-238	Piping, piping components, and piping elements	Fiberglass	Raw water (internal)	Cracking, blistering, change in color due to water absorption	XI.M20, “Open-Cycle Cooling Water System”	No	Applicants have used this material to replace existing pipe or have utilized this material in buried piping environment. The AMP has been revised to address	886

Table II-5. New AMR Items Added in Revision 2 of the GALL Report, Chapter VII

New AMR Item No.	Structures and/or Components	Material	Environment	Aging Effect/ Mechanism	Aging Management Program	Further Evaluation Required	Technical Basis for Addition	Comment No.
							aging management of this material.	
VII.C1.AP-239	Piping, piping components, and piping elements	HDPE	Raw water (internal)	Cracking, blistering, change in color due to water absorption	XI.M20, “Open-Cycle Cooling Water System”	No	Applicants have used this material to replace existing pipe or have utilized this material in buried piping environment. The AMP has been revised to address aging management of this material.	887
VII.D.AP-240	Piping, piping components, and piping elements	Copper alloy	Condensation	Loss of material due to general, pitting, and crevice corrosion	XI.M24, “Compressed Air Monitoring”	No	GALL Report Rev. 1 item VII.D-4 (AP-81) addresses loss of material in stainless steel exposed to a condensation environment, which is managed by AMP XI.M24. Copper alloy is also susceptible to loss of material due to corrosion in the condensation environment as described in Salem LRA Table 3.3.2-6. In a consistent manner with GALL Report Rev. 1 item VII.D-4 (AP-81), AMP XI.M24 is adequate to manage the aging effect for copper alloy.	948
VII.I.AP-241	Bolting	Steel	Soil	Loss of material due to general, pitting, and	XI.M41, "Buried and Underground Piping and	No	AMP XI.M41 includes managing this aging effect for this component, material, environment combination.	N/A

Table II-5. New AMR Items Added in Revision 2 of the GALL Report, Chapter VII

New AMR Item No.	Structures and/or Components	Material	Environment	Aging Effect/ Mechanism	Aging Management Program	Further Evaluation Required	Technical Basis for Addition	Comment No.
				crevice corrosion	Tanks"			
VII.I.AP-242	Bolting	Steel	Soil	Loss of preload	XI.M18, "Bolting Integrity "	No	AMP XI.M18 includes managing this aging effect for this component, material, environment combination.	N/A
VII.I.AP-243	Bolting	Stainless Steel	Soil	Loss of material due to pitting and crevice corrosion	XI.M41, "Buried and Underground Piping and Tanks"	No	AMP XI.M41 includes managing this aging effect for this component, material, environment combination.	N/A
VII.I.AP-244	Bolting	Stainless Steel	Soil	Loss of preload	XI.M18, "Bolting Integrity "	No	AMP XI.M18 includes managing this aging effect for this component, material, environment combination.	N/A
VII.C1.AP-248	Piping, piping components, and piping elements	Concrete; cementitious material	Raw Water	Cracking due to settling	XI.M20, "Open-Cycle Cooling Water System"	No	Concrete, cementitious material was added to the GALL Report in soil environment for external surface (see VII.C1.AP-157); therefore, the internal environment of raw water item should be added.	N/A
VII.C1.AP-249	Piping, piping components, and piping elements	Concrete; cementitious material	Raw Water	Loss of material due to abrasion, cavitation, aggressive chemical attack, and leaching	XI.M20, "Open-Cycle Cooling Water System"	No	Concrete, cementitious material was added to the GALL Report in soil environment for external surface (see VII.C1.AP-157); therefore, the internal environment of raw water item should be added.	N/A

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New AMR Item No.	Structures and/or Components	Material	Environment	Aging Effect/ Mechanism	Aging Management Program	Further Evaluation Required	Technical Basis for Addition	Comment No.
VII.C1.AP-250	Piping, piping components, and piping elements	Concrete; cementitious material	Raw Water	Changes in material properties due to aggressive chemical attack	XI.M20, "Open-Cycle Cooling Water System"	No	Concrete, cementitious material was added to the GALL Report in soil environment for external surface (see VII.C1.AP-157); therefore, the internal environment of raw water item should be added	N/A
VII.C1.AP-251	Piping, piping components, and piping elements	Concrete; cementitious material	Air - outdoor	Cracking due to settling	XI.M36, "External Surfaces Monitoring of Mechanical Components"	No	Concrete, cementitious material was added to the GALL Report in raw water environment; therefore, the air-outdoor external environment was added.	N/A
VII.C1.AP-252	Piping, piping components, and piping elements	Concrete; cementitious material	Air - outdoor	Loss of material due to abrasion, cavitation, aggressive chemical attack, and leaching	XI.M36, "External Surfaces Monitoring of Mechanical Components"	No	Concrete, cementitious material was added to the GALL Report in raw water environment; therefore, the air-outdoor external environment was added.	N/A
VII.C1.AP-253	Piping, piping components, and piping elements	Concrete; cementitious material	Air - outdoor	Changes in material properties due to aggressive chemical attack	XI.M36, "External Surfaces Monitoring of Mechanical Components"	No	Concrete, cementitious material was added to the GALL Report in raw water environment; therefore, the air-outdoor external environment was added.	N/A
VII.C2.AP-254	Piping, piping components, and piping	Aluminum	Closed-cycle cooling water	Loss of material due to pitting	XI.M21A, "Closed Treated Water	No	The GALL Report includes stainless steel, steel and copper alloy piping with the	437

Table II-5. New AMR Items Added in Revision 2 of the GALL Report, Chapter VII

New AMR Item No.	Structures and/or Components	Material	Environment	Aging Effect/ Mechanism	Aging Management Program	Further Evaluation Required	Technical Basis for Addition	Comment No.
	elements			and crevice corrosion	Systems"		same aging effects and AMP. Aluminum piping should also be included. The same aging effects/aging mechanism (AE/AM) is included for aluminum material in treated water environment and is therefore, valid for closed-cycle cooling water environment.	
VII.H2.AP-255	Piping, piping components, and piping elements	Aluminum	Closed-cycle cooling water	Loss of material due to pitting and crevice corrosion	XI.M21A, "Closed Treated Water Systems"	No	The GALL Report includes stainless steel, steel and copper alloy piping with the same aging effects and AMP. Aluminum piping should also be included. The same AE/AM is included for aluminum material in treated water environment and is therefore, valid for closed-cycle cooling water environment.	437
VII.I.AP-256	Piping, piping components, and piping elements	Aluminum	Air - outdoor	Loss of material due to pitting and crevice corrosion	XI.M36, "External Surfaces Monitoring of Mechanical Components"	No	The GALL Report includes steel, stainless steel and copper alloy piping, and piping components and piping elements in air outdoor environment; therefore, aluminum should also be added. Both electrical and structures component chapters VI and	439

Table II-5. New AMR Items Added in Revision 2 of the GALL Report, Chapter VII

New AMR Item No.	Structures and/or Components	Material	Environment	Aging Effect/ Mechanism	Aging Management Program	Further Evaluation Required	Technical Basis for Addition	Comment No.
							III include aluminum material components in an air-outdoor environment. XI. M36 was revised to include all metallic components.	
VII.C2.AP-257	Piping, piping components, and piping elements	Aluminum	Treated water	Loss of material due to pitting and crevice corrosion	XI.M2, “Water Chemistry,” and XI.M32, “One-Time Inspection”	No	The GALL Report includes this MEAP combination in several systems; therefore, this MEAP combination can be added to VII.C2 and VII.H2. There is already an existing line in VIII.E (see VIII.E.SP-90)	442
VII.H2.AP-258	Piping, piping components, and piping elements	Aluminum	Treated water	Loss of material due to pitting and crevice corrosion	XI.M2, “Water Chemistry,” and XI.M32, “One-Time Inspection”	No	The GALL Report includes this MEAP combination in several systems; therefore, this MEAP combination can be added to VII.C2 and VII.H2. There is already an existing line in VIII.E (see VIII.E.SP-90)	442
VII.C2.AP-259	Elastomer seals and components	Elastomers	Closed-cycle cooling water	Hardening and loss of strength due to elastomer degradation	XI.M38, "Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components"	No	Elastomers are included in the GALL Report for treated water and raw water environment, and should be added for closed-cycle cooling water. AMP XI.M38 is acceptable to be used for closed-cycle cooling water environment.	446
VII.J.AP-260	Piping, piping components,	Nickel alloy	Air with borated water	None	None	No	The GALL Report includes stainless steel material in air	447

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New AMR Item No.	Structures and/or Components	Material	Environment	Aging Effect/ Mechanism	Aging Management Program	Further Evaluation Required	Technical Basis for Addition	Comment No.
	and piping elements		leakage				with borated water leakage as “None-None.” Nickel-alloy material is also resistant to borated water environment. Also, staff has previously accepted in SERs that nickel alloy in air with borated water leakage environment has no aging effects requiring management.	
VII.I.AP-261	Bolting	Copper alloy	Any environment	Loss of preload due to thermal effects, gasket creep, and self-loosening	XI.M18, "Bolting Integrity"	No	The GALL Report addresses steel and stainless steel material; however, loss of preload would also be an applicable aging effect for copper alloy and nickel-alloy materials. Environment was specified as "any environment" because this aging effect is not dependent on the external environment to which the bolting is exposed.	451
VII.I.AP-262	Bolting	Nickel alloy	Any environment	Loss of preload due to thermal effects, gasket creep, and self-loosening	XI.M18, "Bolting Integrity"	No	The GALL Report addresses steel and stainless steel material; however, loss of preload would also be an applicable aging effect for copper alloy and nickel-alloy materials. Environment was specified as "any environment" because this aging effect is not dependent	451

Table II-5. New AMR Items Added in Revision 2 of the GALL Report, Chapter VII

New AMR Item No.	Structures and/or Components	Material	Environment	Aging Effect/ Mechanism	Aging Management Program	Further Evaluation Required	Technical Basis for Addition	Comment No.
							on the external environment to which the bolting is exposed.	
VII.I.AP-263	Bolting	Steel; stainless steel	Air – outdoor (External)	Loss of preload due to thermal effects, gasket creep, and self-loosening	XI.M18, "Bolting Integrity"	No	Loss of preload is an aging effect that is not dependent on the external environment. Gasket creep and self-loosening can occur in bolted connections in any air environment. AMR items already exist, with the environment being indoor air. This adds AMR lines for an outdoor environment.	454
VII.I.AP-264	Bolting	Steel; stainless steel	Raw water	Loss of preload due to thermal effects, gasket creep, and self-loosening	XI.M18, "Bolting Integrity"	No	Various applicants have identified steel or stainless steel bolting in a raw water environment. AMP XI.M18 is credited to manage loss of preload in all environments.	457
VII.I.AP-265	Bolting	Stainless steel	Treated borated water	Loss of preload due to thermal effects, gasket creep, and self-loosening	XI.M18, "Bolting Integrity"	No	Various applicants have identified stainless steel bolting in a treated, borated water environment. AMP XI.M18 is credited to manage loss of preload in all environments.	457
VII.I.AP-266	Bolting	Steel; stainless	Fuel oil	Loss of preload due	XI.M18, "Bolting	No	Various applicants have identified steel or stainless	457

Table II-5. New AMR Items Added in Revision 2 of the GALL Report, Chapter VII

New AMR Item No.	Structures and/or Components	Material	Environment	Aging Effect/ Mechanism	Aging Management Program	Further Evaluation Required	Technical Basis for Addition	Comment No.
		steel		to thermal effects, gasket creep, and self-loosening	Integrity"		steel bolting in a fuel oil environment. AMP XI.M18 is credited to manage loss of preload in all environments.	
VII.I.AP-267	Bolting	Steel; stainless steel	Treated water	Loss of preload due to thermal effects, gasket creep, and self-loosening	XI.M18, "Bolting Integrity"	No	Various applicants have identified steel or stainless steel bolting in a treated water environment. AMP XI.M18 is credited to manage loss of preload in all environments.	457
VII.J.AP-268	Piping, piping components, and piping elements	PVC	Air – indoor, uncontrolled	None	None	No	The staff has accepted this AMR result in Vogtle SER Section 3.3.2.3.23, where it states that there is no indication in the industry that PVC or thermoplastics exposed to an internal indoor air environment have any aging effects requiring management. The generally low operating temperatures and historical good chemical resistance data for PVC components, combined with a lack of historic negative operating experience, indicate that PVC is not likely to experience any degradation from the	459

Table II-5. New AMR Items Added in Revision 2 of the GALL Report, Chapter VII

New AMR Item No.	Structures and/or Components	Material	Environment	Aging Effect/ Mechanism	Aging Management Program	Further Evaluation Required	Technical Basis for Addition	Comment No.
							nonaggressive indoor air. PVC materials do not display corrosion rates as metals do, but rather rely on chemical resistance to the environments to which they are exposed. Therefore, based on industry experience and the assumption of proper design and application of the material, the staff finds that PVC piping components exposed to an interior indoor air environment exhibit no aging effects requiring management for the period of extended operation.	
VII.J.AP-269	Piping, piping components, and piping elements	PVC	Condensation (Internal)	None	None	No	The staff has accepted this AMR result in Vogtle SER Section 3.3.2.3.23, where it states that there is no indication in the industry that PVC or thermoplastics exposed to an internal indoor air environment have any aging effects requiring management. The generally low operating temperatures and historical good chemical resistance data for PVC components, combined with a lack of historic negative operating experience,	459

Table II-5. New AMR Items Added in Revision 2 of the GALL Report, Chapter VII

New AMR Item No.	Structures and/or Components	Material	Environment	Aging Effect/ Mechanism	Aging Management Program	Further Evaluation Required	Technical Basis for Addition	Comment No.
							indicate that PVC is not likely to experience any degradation from the nonaggressive indoor air. PVC materials do not display corrosion rates as metals do, but rather rely on chemical resistance to the environments to which they are exposed. Therefore, based on industry experience and the assumption of proper design and application of the material, the staff finds that PVC piping components exposed to an interior indoor air environment exhibit no aging effects requiring management for the period of extended operation.	
VII.E5.AP-270	Piping, piping components, and piping elements	Steel; stainless steel	Raw water (potable)	Loss of material due to general (steel only), pitting, and crevice corrosion	XI.M38, "Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components"	No	Potable water is water that is acceptable for drinking purposes. A potable water environment may occur in a nonsafety-related system in scope for 10 CFR 54.4(a)(2), and potable water is considered a sub-set of raw water (see GALL Chapter IX). GALL AMP XI.M38 is revised to include other	434

Table II-5. New AMR Items Added in Revision 2 of the GALL Report, Chapter VII

New AMR Item No.	Structures and/or Components	Material	Environment	Aging Effect/ Mechanism	Aging Management Program	Further Evaluation Required	Technical Basis for Addition	Comment No.
							materials in addition to steel in the scope of the AMP. The staff finds that AMP XI.M38 is adequate to manage the aging effect of loss of material for this component, material, environment and aging effect combination.	
VII.E5.AP-271	Piping, piping components, and piping elements	Copper alloy	Raw water (potable)	Loss of material due to pitting and crevice corrosion	XI.M38, "Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components"	No	Potable water is water that is acceptable for drinking purposes. A potable water environment may occur in a nonsafety-related system in scope for 10 CFR 54.4(a)(2), and potable water is considered a sub-set of raw water (see GALL Chapter IX). GALL AMP XI.M38 is revised to include other materials in addition to steel in the scope of the AMP. The staff finds that AMP XI.M38 is adequate to manage the aging effect of loss of material for this component, material, environment and aging effect combination.	434
VII.E5.AP-272	Piping, piping components, and piping elements	Copper alloy	Waste water	Loss of material due to pitting, crevice, and microbiologi	XI.M38, "Inspection of Internal Surfaces in Miscellaneous	No	The waste water system and related components are nonsafety-related SSCs that could spatially interact with safety-related SSCs and	N/A

Table II-5. New AMR Items Added in Revision 2 of the GALL Report, Chapter VII

New AMR Item No.	Structures and/or Components	Material	Environment	Aging Effect/ Mechanism	Aging Management Program	Further Evaluation Required	Technical Basis for Addition	Comment No.
				cally-influenced corrosion (MIC)	Piping and Ducting Components"		may be in scope of license renewal in accordance with 10 CFR 54.4(a)(2). GALL AMP XI.M38 is revised to include other materials in addition to steel in the scope of the program. The staff finds that GALL AMP XI.M38 is adequate to manage the aging effect of loss of material for this component, material, environment and aging effect combination.	
VII.E5.AP-273	Piping, piping components, and piping elements	Stainless steel	Condensation (Internal)	Loss of material due to pitting, crevice, and MIC	XI.M38, "Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components"	No	An approved precedent exists for accepting Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components program. As shown in WCGS SER, Section 3.3.2.2.10.5, the staff has accepted the position that the Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components program consistent with GALL AMP XI.M38 is adequate to manage the aging effect of loss of material because visual inspections are performed	N/A

Table II-5. New AMR Items Added in Revision 2 of the GALL Report, Chapter VII

New AMR Item No.	Structures and/or Components	Material	Environment	Aging Effect/ Mechanism	Aging Management Program	Further Evaluation Required	Technical Basis for Addition	Comment No.
							on internal surfaces during surveillance testing or maintenance activities. AMP XI.M38 is revised to include other materials besides steel.	
VII.E5.AP-274	Piping, piping components, and piping elements	Nickel alloy	Condensation (Internal)	Loss of material due to pitting, crevice, and MIC	XI.M38, "Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components"	No	Because corrosion properties of nickel alloy are similar to stainless steel, nickel alloy in a condensation environment will have an aging effect of loss of material similar to stainless steel as addressed in AP-273. As shown in several SERs, the staff has accepted the position that GALL AMP XI.M38 is adequate to manage this component, material, environment and aging effect combination. AMP XI.M38 has been revised to include other materials in addition to steel.	948
VII.E5.AP-275	Heat exchanger components	Stainless steel	Waste Water	Loss of material due to pitting, crevice, and MIC	XI.M38, "Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components"	No	The waste water system and related components are nonsafety-related SSCs that could spatially interact with safety-related SSCs and may be in scope of license renewal in accordance with 10 CFR 54.4(a)(2). As	N/A

Table II-5. New AMR Items Added in Revision 2 of the GALL Report, Chapter VII

New AMR Item No.	Structures and/or Components	Material	Environment	Aging Effect/ Mechanism	Aging Management Program	Further Evaluation Required	Technical Basis for Addition	Comment No.
							shown in several SERs, the staff has accepted the position that GALL AMP XI.M38 is adequate to manage this component, material, environment and aging effect combination. AMP XI.M38 has been revised to include other materials in addition to steel.	
VII.E5.AP-276	Heat exchanger components	Nickel alloy	Waste Water	Loss of material due to pitting, crevice, and MIC	XI.M38, "Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components"	No	The waste water system and related components are nonsafety-related SSCs that could spatially interact with safety-related SSCs and may be in scope of license renewal in accordance with 10 CFR 54.4(a)(2). As shown in several SERs, the staff has accepted the position that GALL AMP XI.M38 is adequate to manage this component, material, environment and aging effect combination. AMP XI.M38 has been revised to include other materials in addition to steel.	N/A
VII.J.AP-277	Piping, piping components, and piping elements	Glass	Waste Water	None	None	No	The staff has previously accepted that glass in a water environment does not have an aging effect.	N/A

Table II-5. New AMR Items Added in Revision 2 of the GALL Report, Chapter VII

New AMR Item No.	Structures and/or Components	Material	Environment	Aging Effect/ Mechanism	Aging Management Program	Further Evaluation Required	Technical Basis for Addition	Comment No.
VII.E5.AP-278	Piping, piping components, and piping elements; tanks	Stainless steel	Waste Water	Loss of material due to pitting, crevice, and MIC	XI.M38, "Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components"	No	The waste water system and related components are nonsafety-related SSCs that could spatially interact with safety-related SSCs and may be in scope of license renewal in accordance with 10 CFR 54.4(a)(2). As shown in several SERs, the staff has accepted the position that GALL AMP XI.M38 is adequate to manage this component, material, environment and aging effect combination. AMP XI.M38 has been revised to include other materials in addition to steel.	N/A
VII.E5.AP-279	Piping, piping components, and piping elements; tanks	Nickel alloy	Waste water	Loss of material due to pitting, crevice, and MIC	XI.M38, "Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components"	No	The waste water system and related components are nonsafety-related SSCs that could spatially interact with safety-related SSCs and may be in scope of license renewal in accordance with 10 CFR 54.4(a)(2). As shown in several SERs, the staff has accepted the position that GALL AMP XI.M38 is adequate to manage this component, material, environment and aging effect combination.	N/A

Table II-5. New AMR Items Added in Revision 2 of the GALL Report, Chapter VII

New AMR Item No.	Structures and/or Components	Material	Environment	Aging Effect/ Mechanism	Aging Management Program	Further Evaluation Required	Technical Basis for Addition	Comment No.
							AMP XI.M38 has been revised to include other materials in addition to steel.	
VII.E5.AP-280	Piping, piping components, and piping elements; tanks	Steel	Condensation (Internal)	Loss of material due to pitting, crevice, and MIC	XI.M38, "Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components"	No	GALL Report has ducting components with steel in a condensation environment with the same aging effect, such as A-08. As shown in several SERs, the staff has accepted the position that GALL AMP XI.M38 is adequate to manage this component, material, environment and aging effect combination. AMP XI.M38 has been revised to include other materials in addition to steel.	N/A
VII.E5.AP-281	Piping, piping components, and piping elements; tanks	Steel	Waste water	Loss of material due to general, pitting, crevice, and MIC	XI.M38, "Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components"	No	The waste water system and related components are nonsafety-related SSCs that could spatially interact with safety-related SSCs and may be in scope of license renewal in accordance with 10 CFR 54.4(a)(2). As shown in several SERs, the staff has accepted the position that GALL AMP XI.M38 is adequate to manage this component, material, environment and aging effect combination.	N/A

Table II-5. New AMR Items Added in Revision 2 of the GALL Report, Chapter VII

New AMR Item No.	Structures and/or Components	Material	Environment	Aging Effect/ Mechanism	Aging Management Program	Further Evaluation Required	Technical Basis for Addition	Comment No.
							AMP XI.M38 has been revised to include other materials in addition to steel.	
VII.I.AP-284	Underground piping, piping components, and piping elements	Steel; stainless steel; copper alloy; aluminum	Air-indoor, uncontrolled (External) or condensation (External)	Loss of material due to general (steel only), pitting and crevice corrosion	XI.M41, “Buried and Underground Piping and Tanks”	No	GALL AMP XI.M41 includes underground piping, which is defined in GALL Chapter IX.B as “Underground piping and tanks are below grade, but are contained within a tunnel or vault such that they are in contact with air and are located where access for inspection is restricted.”	N/A
VII.J.AP-96	Piping elements	Glass	Air with borated water leakage	None	None	No	No failure due to an aging effect of glass components in environments free of hydrofluoric acid, caustics, or hot water have been recorded in industry at the temperatures or during the time periods of concern for extended operation. Precedent exists in Beaver Valley SER, Section 3.3.2.3.5, where the staff has accepted that no aging effects exist for this environment and no aging management program is required.	N/A
VII.J.AP-97	Piping elements	Glass	Condensation (Internal/Exter	None	None	No	No failure due to an aging effect of glass components	N/A

Table II-5. New AMR Items Added in Revision 2 of the GALL Report, Chapter VII

New AMR Item No.	Structures and/or Components	Material	Environment	Aging Effect/ Mechanism	Aging Management Program	Further Evaluation Required	Technical Basis for Addition	Comment No.
			nal)				in environments free of hydrofluoric acid, caustics, or hot water have been recorded in industry at the temperatures or during the time periods of concern for extended operation. Precedent exists in Beaver Valley SER, Section 3.3.2.3.5, where the staff has accepted that no aging effects exist for this environment and no aging management program is required.	
VII.J.AP-98	Piping elements	Glass	Gas	None	None	No	No failure due to an aging effect of glass components in environments free of hydrofluoric acid, caustics, or hot water have been recorded in industry at the temperatures or during the time periods of concern for extended operation. The GALL Report items VIII.1-12, VIII 1-3, and VIII.1-5 address stainless steel, copper alloy, and steel materials in gas environment with no aging effects identified. with no aging effects	N/A

Table II-6. New AMR Items Added in Revision 2 of the GALL Report, Chapter VIII

New AMR Item No.	Structures and/or Components	Material	Environment	Aging Effect/ Mechanism	Aging Management Program	Further Evaluation Required	Technical Basis for Addition	Comment No.
VIII.I.SP-104	Piping, piping components, and piping elements	Copper alloy (≤15% Zn and ≤8% Al)	Air with borated water leakage	None	None	No	The same MEAP combination exists in the GALL Report items V.F-5 and VII.J-5. The addition of the limit on Al is considered editorial because the Al limitation is discussed in Revision 1 of the GALL Report, Table IX.C.	N/A
VIII.I.SP-108	Piping elements	Glass	Air – outdoor	None	None	No	No failure due to an aging effect of glass components in an air-outdoor environment have been recorded in industry at the temperatures or during the time periods of concern for extended operation.	N/A
VIII.BI.SP-110 VIII.B2.SP-110	Piping, piping components, and piping elements	Stainless steel	Condensation (Internal)	Loss of material due to pitting and crevice corrosion	XI.M38, "Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components"	No	An approved precedent exists for accepting Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components program. As shown in WCGS SER, Section 3.3.2.2.10.5, the staff has accepted the position that the Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components program consistent with GALL AMP XI.M38 is adequate to manage the aging effect of loss of material because visual inspections are performed on internal surfaces during	N/A

Table II-6. New AMR Items Added in Revision 2 of the GALL Report, Chapter VIII

New AMR Item No.	Structures and/or Components	Material	Environment	Aging Effect/ Mechanism	Aging Management Program	Further Evaluation Required	Technical Basis for Addition	Comment No.
							surveillance testing or maintenance activities. AMP XI.M38 is revised to include other materials besides steel.	
VIII.I.SP-111	Piping elements	Glass	Condensation (Internal/External)	None	None	No	No failure due to an aging effect of glass components in environments free of hydrofluoric acid, caustics, or hot water have been recorded in industry at the temperatures or during the time periods of concern for extended operation. Precedent exists in Beaver Valley SER, Section 3.3.2.3.3, where the staff has accepted that no aging effect exists for this environment and no aging management program is required.	N/A
VIII.G.SP-113	Heat exchanger components and tubes	Aluminum	Lubricating oil	Reduction of heat transfer due to fouling	XI.M39, "Lubricating Oil Analysis," and XI.M32, “One-Time Inspection”	No	An approved precedent exists for accepting One-Time Inspection program as verification of effectiveness of the Lubricating Oil Analysis program. As shown in WCGS SER, Section 3.3.2.2.7.1, the staff has accepted the position that a One-Time Inspection program consistent with GALL AMP XI.M32 is adequate to verify the effectiveness of the Lubricating Oil Analysis program.	N/A

Table II-6. New AMR Items Added in Revision 2 of the GALL Report, Chapter VIII

New AMR Item No.	Structures and/or Components	Material	Environment	Aging Effect/ Mechanism	Aging Management Program	Further Evaluation Required	Technical Basis for Addition	Comment No.
VIII.G.SP-114	Piping, piping components, and piping elements	Aluminum	Lubricating oil	Loss of material due to pitting and crevice corrosion	XI.M39, "Lubricating Oil Analysis," and XI.M32, "One-Time Inspection"	No	An approved precedent exists for accepting One-Time Inspection program as verification of effectiveness of the Lubricating Oil Analysis program. As shown in WCGS SER, Section 3.3.2.2.7.1, the staff has accepted the position that a One-Time Inspection program consistent with GALL AMP XI.M32 is adequate to verify the effectiveness of the Lubricating Oil Analysis program.	N/A
VIII.E.SP-115 VIII.G.SP-115	Tanks	Steel	Soil or Concrete	Loss of material due to general, pitting, and crevice corrosion	XI.M29, "Aboveground Metallic Tanks"	No	GALL AMP XI.M29, "Aboveground Steel Tanks," addresses corrosion of steel storage tanks at inaccessible locations, such as tank bottoms supported on earthen or concrete foundations. These lines are proposed to address the aging management for corrosion of steel tanks bottoms noted in AMP.	N/A
VIII.A.SP-118 VIII.B1.SP-118 VIII.B2.SP-118 VIII.C.SP-118 VIII.D1.SP-118 VIII.D2.SP-118 VIII.E.SP-118	Piping, piping components, and piping elements; tanks	Stainless steel	Air – outdoor	Cracking due to SCC	XI.M36, "External Surfaces Monitoring of Mechanical Components"	Yes, environmental conditions need to be evaluated	Cracking due to SCC could occur in stainless steel components exposed to outdoor air if the outdoor air contains sufficient halides (primarily chlorides). Additional details are in the SRP-LR	880

Table II-6. New AMR Items Added in Revision 2 of the GALL Report, Chapter VIII

New AMR Item No.	Structures and/or Components	Material	Environment	Aging Effect/ Mechanism	Aging Management Program	Further Evaluation Required	Technical Basis for Addition	Comment No.
VIII.F.SP-118 VIII.G.SP-118							discussion of this item.	
VIII.A.SP-127 VIII.B1.SP-127 VIII.B2.SP-127 VIII.C.SP-127 VIII.D1.SP-127 VIII.D2.SP-127 VIII.E.SP-127 VIII.F.SP-127 VIII.G.SP-127	Piping, piping components, and piping elements; tanks	Stainless steel	Air – outdoor	Loss of material due to pitting and crevice corrosion	XI.M36, "External Surfaces Monitoring of Mechanical Components"	Yes, environmental conditions need to be evaluated	Loss of material due to pitting and crevice corrosion could occur in stainless steel components exposed to outdoor air if the outdoor air contains sufficient halides (primarily chlorides). Additional details are in the SRP-LR discussion of this item.	947
VIII.E.SP-137	Tanks	Stainless steel	Soil or Concrete	Loss of material due to pitting, and crevice corrosion	XI.M29, “Aboveground Metallic Tanks”	No	AMP XI.M29 was revised to include other metallic tanks as well as steel tanks. Loss of material is an applicable aging effect to aboveground stainless steel tanks exposed to soil or concrete.	N/A
VIII.E.SP-138	Tanks	Stainless Steel	Air – outdoor (External)	Loss of material due to general, pitting, and crevice corrosion	XI.M29, “Aboveground Metallic Tanks”	No	AMP XI.M29 was revised to include other metallic tanks as well as steel tanks. Loss of material is an applicable aging effect to aboveground stainless steel tanks exposed to air - outdoor.	N/A
VIII.E.SP-139	Tanks	Aluminum	Soil or Concrete	Loss of material due to pitting, and crevice corrosion	XI.M29, “Aboveground Metallic Tanks”	No	AMP XI.M29 was revised to include other metallic tanks as well as steel tanks. Loss of material is an applicable aging effect to aboveground aluminum tanks exposed to	N/A

Table II-6. New AMR Items Added in Revision 2 of the GALL Report, Chapter VIII

New AMR Item No.	Structures and/or Components	Material	Environment	Aging Effect/ Mechanism	Aging Management Program	Further Evaluation Required	Technical Basis for Addition	Comment No.
							soil or concrete.	
VIII.E.SP-140	Tanks	Aluminum	Air – outdoor (External)	Loss of material due to general, pitting, and crevice corrosion	XI.M29, “Aboveground Metallic Tanks”	No	AMP XI.M29 was revised to include other metallic tanks as well as steel tanks. Loss of material is an applicable aging effect to aboveground aluminum tanks exposed to air - outdoor.	N/A
VIII.H.SP-141	Bolting	Steel	Soil	Loss of material due to general, pitting and crevice corrosion	XI.M41, "Buried and Underground Piping and Tanks"	No	AMP XI.M41 includes managing this aging effect for this component, material, environment combination.	N/A
VIII.H.SP-142	Bolting	Steel	Soil	Loss of preload	XI.M18, "Bolting Integrity"	No	AMP XI.M18 includes managing this aging effect for this component, material, environment combination.	N/A
VIII.H.SP-143	Bolting	Stainless Steel	Soil	Loss of material due to pitting and crevice corrosion	XI.M41, "Buried and Underground Piping and Tanks"	No	AMP XI.M41 includes managing this aging effect for this component, material, environment combination.	N/A
VIII.H.SP-144	Bolting	Stainless Steel	Soil	Loss of preload	XI.M18, "Bolting Integrity"	No	AMP XI.M18 includes managing this aging effect for this component, material, environment combination.	N/A
VIII.H.SP-147	Piping, piping components, and piping	Aluminum	Air - outdoor	Loss of material due to pitting and crevice	XI.M36, "External Surfaces Monitoring of	No	The GALL Report includes steel, stainless steel and copper alloy piping, and piping components and piping	439

Table II-6. New AMR Items Added in Revision 2 of the GALL Report, Chapter VIII

New AMR Item No.	Structures and/or Components	Material	Environment	Aging Effect/ Mechanism	Aging Management Program	Further Evaluation Required	Technical Basis for Addition	Comment No.
	elements			corrosion	Mechanical Components"		elements in air outdoor environment; aluminum should also be added. Both electrical and structures component chapters VI and III include aluminum material components in an air-outdoor environment. XI. M36 was revised to include all metallic components.	
VIII.I.SP-148	Piping, piping components, and piping elements	Nickel alloy	Air with borated water leakage	None	None	No	The GALL Report includes stainless steel material in air with borated water leakage as “None-None.” Nickel-alloy material is also resistant to borated water environment. Also, staff has previously accepted in SERs that nickel alloy in air with borated water leakage environment has no aging effects requiring management.	447
VIII.H.SP-149	Bolting	Copper alloy	Any environment	Loss of preload due to thermal effects, gasket creep, and self-loosening	XI.M18, "Bolting Integrity"	No	The GALL Report addresses steel and stainless steel material; however, loss of preload would also be an applicable aging effect for copper alloy and nickel-alloy materials. Environment was specified as "any environment" because this aging effect is not dependent on the external environment to which the	451

Table II-6. New AMR Items Added in Revision 2 of the GALL Report, Chapter VIII

New AMR Item No.	Structures and/or Components	Material	Environment	Aging Effect/ Mechanism	Aging Management Program	Further Evaluation Required	Technical Basis for Addition	Comment No.
							bolting is exposed.	
VIII.H.SP-150	Bolting	Nickel alloy	Any environment	Loss of preload due to thermal effects, gasket creep, and self-loosening	XI.M18, "Bolting Integrity"	No	The GALL Report addresses steel and stainless steel material; however, loss of preload would also be an applicable aging effect for copper alloy and nickel-alloy materials. Environment was specified as "any environment" because this aging effect is not dependent on the external environment to which the bolting is exposed.	451
VIII.H.SP-151	Bolting	Steel; stainless steel	Air – outdoor (External)	Loss of preload due to thermal effects, gasket creep, and self-loosening	XI.M18, "Bolting Integrity"	No	Loss of preload is an aging effect that is not dependent on the external environment. Gasket creep and self-loosening can occur in bolted connections in any air environment. AMR items already exist, with the environment being indoor air. This adds AMR lines for an outdoor environment.	454
VIII.I.SP-152	Piping, piping components, and piping elements	PVC	Air – indoor, uncontrolled	None	None	No	The staff has accepted this AMR result in Vogtle SER Section 3.3.2.3.23, where it states that there is no indication in the industry that PVC or thermoplastics exposed to an internal indoor air environment have any	459

Table II-6. New AMR Items Added in Revision 2 of the GALL Report, Chapter VIII

New AMR Item No.	Structures and/or Components	Material	Environment	Aging Effect/ Mechanism	Aging Management Program	Further Evaluation Required	Technical Basis for Addition	Comment No.
							aging effects requiring management. The generally low operating temperatures and historical good chemical resistance data for PVC components, combined with a lack of historic negative operating experience, indicate that PVC is not likely to experience any degradation from the nonaggressive indoor air. PVC materials do not display corrosion rates as metals do, but rather rely on chemical resistance to the environments to which they are exposed. Therefore, based on industry experience and the assumption of proper design and application of the material, the staff finds that PVC piping components exposed to an interior indoor air environment exhibit no aging effects requiring management for the period of extended operation.	
VIII.I.SP-153	Piping, piping components, and piping elements	PVC	Condensation (Internal)	None	None	No	PVC materials do not display corrosion rates as metals do, but rather rely on chemical resistance to the environments to which they are exposed. Therefore, based on industry experience and the assumption of proper design	459

Table II-6. New AMR Items Added in Revision 2 of the GALL Report, Chapter VIII

New AMR Item No.	Structures and/or Components	Material	Environment	Aging Effect/ Mechanism	Aging Management Program	Further Evaluation Required	Technical Basis for Addition	Comment No.
							and application of the material, the staff finds that PVC piping components exposed to a condensation environment exhibit no aging effects requiring management for the period of extended operation.	
VIII.H.SP-161	Underground piping, piping components, and piping elements	Steel; stainless steel; copper alloy; aluminum	Air-indoor uncontrolled or condensation (external)	Loss of material due to general (steel only), pitting and crevice corrosion	XI.M41, “Buried and Underground Piping and Tanks”	No	GALL AMP XI.M41 includes underground piping, which is defined in GALL Chapter IX.B as “Underground piping and tanks are below grade, but are contained within a tunnel or vault such that they are in contact with air and are located where access for inspection is restricted.”	N/A
VIII.I.SP-67	Piping elements	Glass	Air with borated water leakage	None	None	No	No failure due to an aging effect of glass components in environments free of hydrofluoric acid, caustics, or hot water has been recorded in industry at the temperatures or during the time periods of concern for extended operation. Precedent exists in Beaver Valley SER, Section 3.3.2.3.3, where the staff has accepted that no aging effects exist for this environment and no aging management program is required.	N/A

Table II-6. New AMR Items Added in Revision 2 of the GALL Report, Chapter VIII

New AMR Item No.	Structures and/or Components	Material	Environment	Aging Effect/ Mechanism	Aging Management Program	Further Evaluation Required	Technical Basis for Addition	Comment No.
VIII.I.SP-68	Piping elements	Glass	Condensation	None	None	No	No failure due to an aging effect of glass components in condensation environment has been recorded in industry at the temperatures or during the time periods of concern for extended operation. Precedent exists in Beaver Valley SER, Section 3.3.2.3.3, where the staff has accepted that no aging effects exist for this environment and no aging management program is required.	N/A
VIII.I.SP-69	Piping elements	Glass	Gas	None	None	No	No failure due to an aging effect of glass components in gas environment has been recorded in industry at the temperatures or during the time periods of concern for extended operation. Precedent exists in Beaver Valley SER, Section 3.3.2.3.3, where the staff has accepted that no aging effects exist for this environment and no aging management program is required.	N/A
VIII.I.SP-70	Piping elements	Glass	Closed-cycle cooling water	None	None	No	No failure due to an aging effect of glass components in closed-cycle environment has been recorded in industry at the temperatures or during the	N/A

Table II-6. New AMR Items Added in Revision 2 of the GALL Report, Chapter VIII

New AMR Item No.	Structures and/or Components	Material	Environment	Aging Effect/ Mechanism	Aging Management Program	Further Evaluation Required	Technical Basis for Addition	Comment No.
							time periods of concern for extended operation. Precedent exists in Beaver Valley SER, Section 3.3.2.3.3, where the staff has accepted that no aging effects exist for this environment and no aging management program is required.	
VIII.I.SP-86	Piping, piping components, and piping elements	Stainless steel	Air – indoor, uncontrolled (Internal)	None	None	No	The same MEAP combination exists in the GALL Report as item VII.J-15. The only difference in this item and the proposed item is that the air is internal instead of external. The location of the environment has no impact on aging effects if the material and environment are the same.	N/A
VIII.I.SP-93	Piping, piping components, and piping elements	Aluminum	Air – indoor, uncontrolled (Internal/ External)	None	None	No	This MEAP combination exists in the GALL Report as item V.F-2. Added here for consistency in Chapter VIII.	N/A

Table II-7. Changes to Existing GALL Report Rev. 1 Chapter IV AMR Items for Reactor Vessel, Internals, and Reactor Coolant and Their Technical Bases (cells where changes have been made are shown in bold –except for items prefixed by IV.B2, B3 and B4 (refer to the note in Section II.2), see Table II-14 for new definitions related to MRP-227 component categorizations)

Rev. 2 AMR Item No.	Rev. 1 AMR Link	Structures and/or Components	Material	Environment	Aging Effect/ Mechanism	Aging Management Program	Further Evaluation Required	Technical Basis for Changes	Comment No.
IV.D2.RP-153	IV.D2-8(R-224)	Steam generator components: shell assembly	Steel	Secondary feedwater or steam	Loss of material due to general, pitting, and crevice corrosion	**XI.M2, "Water Chemistry," and XI.M32, "One-Time Inspection"**	**No**	Further evaluation was changed from "Yes" to "No." An approved precedent exists for accepting "One-Time Inspection" program as verification of the effectiveness of the "Water Chemistry" program. As shown in TMI, Unit 1, SER, Section 3.3.2.2.2.2 the staff has accepted the position that a "One-Time Inspection" program consistent with AMP XI.M32 is adequate to confirm effectiveness of the "Water Chemistry" program.	N/A
IV.A2.RP-154	IV.A2-1(RP-13)	**Bottom-mounted instrument guide tube (external to bottom head)**	Stainless steel	Reactor coolant	Cracking due to SCC	A plant-specific aging management program is to be evaluated	Yes, plant-specific	The component description was revised to add the words "(external to bottom head)." This change is a clarification of the previously existing component	N/A

Table II-7. Changes to Existing GALL Report Rev. 1 Chapter IV AMR Items for Reactor Vessel, Internals, and Reactor Coolant and Their Technical Bases (cells where changes have been made are shown in bold –except for items prefixed by IV.B2, B3 and B4 (refer to the note in Section II.2), see Table II-14 for new definitions related to MRP-227 component categorizations)

Rev. 2 AMR Item No.	Rev. 1 AMR Link	Structures and/or Components	Material	Environment	Aging Effect/ Mechanism	Aging Management Program	Further Evaluation Required	Technical Basis for Changes	Comment No.
								description. There is no change of technical contents.	
IV.B1.RP-155	IV.B1-16(RP-18)	Steam dryers	Stainless steel	Reactor coolant	Cracking due to flow-induced vibration	**XI.M9, "BWR Vessel Internals"**	**No**	AMP was changed from "plant-specific" with further evaluation to AMP XI.M9 with no further evaluation. BWRVIP-139, "Steam Dryer Inspection and Flaw Evaluation Guidelines," has been issued and included in the revised AMP XI.M9.	N/A
IV.C2.RP-156	IV.C2-24(RP-22)	Pressurizer surge and steam space nozzles; welds	Nickel alloy	Reactor coolant or steam	Cracking due to PWSCC	**XI.M1, "ASME Section XI Inservice Inspection, Subsections IWB, IWC, and IWD," for Class 1 components, XI.M2, "Water Chemistry," and XI.M11B, "Cracking of Nickel-Alloy Components and Loss of**	**No**	The AMP description has been revised to include GALL AMP XI.M11B. The staff has approved AMP XI.M11B for license renewal, and this AMP replaces the previous recommendation for a commitment in the Final Safety Analysis Report (FSAR) supplement related to this AMR line.	N/A

Table II-7. Changes to Existing GALL Report Rev. 1 Chapter IV AMR Items for Reactor Vessel, Internals, and Reactor Coolant and Their Technical Bases (cells where changes have been made are shown in bold –except for items prefixed by IV.B2, B3 and B4 (refer to the note in Section II.2), see Table II-14 for new definitions related to MRP-227 component categorizations)

Rev. 2 AMR Item No.	Rev. 1 AMR Link	Structures and/or Components	Material	Environment	Aging Effect/ Mechanism	Aging Management Program	Further Evaluation Required	Technical Basis for Changes	Comment No.
						Material Due to Boric Acid-Induced Corrosion in RCPB [reactor coolant pressure boundary] Components (PWRs Only)"			
IV.A1.RP-157	IV.A1-8(RP-25)	Reactor Vessel: flanges; nozzles; penetrations; safe ends; vessel shells, heads and welds	Steel (with stainless steel or nickel-alloy cladding); stainless steel; nickel alloy	Reactor coolant	Loss of material due to pitting and crevice corrosion	**XI.M2, “Water Chemistry,” and XI.M32, “One-Time Inspection”**	**No**	Further Evaluation Changed from "Yes" to "No." An approved precedent exists for accepting a “One-Time Inspection” program to verify effectiveness of the “Water Chemistry” program. As shown in Pilgrim Nuclear Power Station SER, Section 3.1.2.2.2, the staff has accepted the position that a “One-Time Inspection” program consistent with GALL AMP XI.M32 is capable of detecting the aging effect(s) in this AMR Item.	N/A

Table II-7. Changes to Existing GALL Report Rev. 1 Chapter IV AMR Items for Reactor Vessel, Internals, and Reactor Coolant and Their Technical Bases (cells where changes have been made are shown in bold –except for items prefixed by IV.B2, B3 and B4 (refer to the note in Section II.2), see Table II-14 for new definitions related to MRP-227 component categorizations)

Rev. 2 AMR Item No.	Rev. 1 AMR Link	Structures and/or Components	Material	Environment	Aging Effect/ Mechanism	Aging Management Program	Further Evaluation Required	Technical Basis for Changes	Comment No.
IV.C1.RP-158	IV.C1-14(RP-27)	Reactor coolant pressure boundary components	Steel (with stainless steel or nickel-alloy cladding); stainless steel; nickel alloy	Reactor coolant	Loss of material due to pitting and crevice corrosion	XI.M2, “Water Chemistry,” and XI.M32, “One-Time Inspection”	**No**	Further Evaluation Changed from "Yes" to "No." An approved precedent exists for accepting a “One-Time Inspection” program to verify effectiveness of the “Water Chemistry” program. As shown in Pilgrim Nuclear Power Station SER, Section 3.1.2.2.2, the staff has accepted the position that a “One-Time Inspection” program consistent with GALL AMP XI.M32 is capable of detecting the aging effect(s) in this AMR Item.	N/A
IV.C2.RP-159	IV.C2-13(RP-31)	Piping, piping components, and piping elements	Nickel alloy	Reactor coolant or steam	Cracking due to primary water stress corrosion cracking	**XI.M1, “ASME Section XI Inservice Inspection, Subsections IWB, IWC, and IWD,” for Class 1 components, XI.M2, “Water Chemistry,” and**	**No**	The AMP description has been revised to include GALL AMP XI.M11B. The staff has approved AMP XI.M11B for license renewal, and this AMP replaces the previous recommendation for a commitment in the	N/A

Table II-7. Changes to Existing GALL Report Rev. 1 Chapter IV AMR Items for Reactor Vessel, Internals, and Reactor Coolant and Their Technical Bases (cells where changes have been made are shown in bold –except for items prefixed by IV.B2, B3 and B4 (refer to the note in Section II.2), see Table II-14 for new definitions related to MRP-227 component categorizations)

Rev. 2 AMR Item No.	Rev. 1 AMR Link	Structures and/or Components	Material	Environment	Aging Effect/ Mechanism	Aging Management Program	Further Evaluation Required	Technical Basis for Changes	Comment No.
						XI.M11B, “Cracking of Nickel-Alloy Components and Loss of Material Due to Boric Acid-Induced Corrosion in RCPB [reactor coolant pressure boundary] Components (PWRs Only)"		Final Safety Analysis Report (FSAR) supplement related to this AMR line.	
IV.D1.RP-161	IV.D1-9(RP-16)	**Steam generator: Tube bundle wrapper and associated supports and mounting hardware**	Steel	Secondary feedwater or steam	Loss of material due to erosion, general, pitting, and crevice corrosion	XI.M19, “Steam Generators,” and XI.M2, “Water Chemistry”	No	The change in Structures/Components field is made because the scope of AMP XI.M19 has been expanded to include these additional components. Additional editorial changes, including the AMP XI.M19 title.	N/A
IV.D2.RP-185	IV.D2-4(R-35)	**Tube-to-tube sheet welds**	**Nickel alloy**	Reactor coolant	**Cracking due to PWSCC**	**XI.M2, “Water Chemistry” A plant-specific program is to be evaluated;**	**Yes, plant-specific**	Added to restore an AMR item for tube-to-tube sheet welds that was deleted from IV.D2.RP-47, with	N/A

Table II-7. Changes to Existing GALL Report Rev. 1 Chapter IV AMR Items for Reactor Vessel, Internals, and Reactor Coolant and Their Technical Bases (cells where changes have been made are shown in bold –except for items prefixed by IV.B2, B3 and B4 (refer to the note in Section II.2), see Table II-14 for new definitions related to MRP-227 component categorizations)

Rev. 2 AMR Item No.	Rev. 1 AMR Link	Structures and/or Components	Material	Environment	Aging Effect/ Mechanism	Aging Management Program	Further Evaluation Required	Technical Basis for Changes	Comment No.
						the effectiveness of the water chemistry program should be verified to ensure cracking is not occurring		disposition changed to "Further Evaluation – Yes, plant-specific". Further evaluation is needed if these autogenous welds are associated with Alloy 600 or associated weld materials (Alloy 600 SG tubes and/or Alloy 600 tubesheet cladding), due to chromium content below that of Alloy 690 and associated weld materials. The staff has determined that further evaluation of a plant-specific program is needed. See precedent in Kewaunee and Palo Verde SERs.	
IV.A2.RP-186	IV.A2-9(R-75)	Control rod drive (CRD) head penetration: nozzle welds	Nickel alloy	Reactor coolant	Cracking due to PWSCC	**XI.M1, "ASME Section XI Inservice Inspection, Subsections IWB, IWC, and IWD," for Class 1 components,**	No	AMP was changed from XI.M11A to XI.M11B. XI.M11B has been created for all nickel-alloy components and includes the scope of previous XI.M11A.	N/A

Table II-7. Changes to Existing GALL Report Rev. 1 Chapter IV AMR Items for Reactor Vessel, Internals, and Reactor Coolant and Their Technical Bases (cells where changes have been made are shown in bold –except for items prefixed by IV.B2, B3 and B4 (refer to the note in Section II.2), see Table II-14 for new definitions related to MRP-227 component categorizations)

Rev. 2 AMR Item No.	Rev. 1 AMR Link	Structures and/or Components	Material	Environment	Aging Effect/ Mechanism	Aging Management Program	Further Evaluation Required	Technical Basis for Changes	Comment No.
						XI.M2, "Water Chemistry," and XI.M11B, "Cracking of Nickel-Alloy Components and Loss of Material Due to Boric Acid-Induced Corrosion in RCPB Components (PWRs Only)"			
IV.B1.RP-219	IV.B1-11(R-101)	Jet pump assemblies: castings	Cast austenitic stainless steel	Reactor coolant >250°C (>482°F) and neutron flux	Loss of fracture toughness due to thermal aging, neutron irradiation embrittlement	**XI.M9, "BWR Vessel Internals"**	No	AMP was changed from XI.M13 to XI.M9. XI.M13 was cancelled. Management of this aging effect in this component is within the scope of XI.M9.	N/A
IV.B1.RP-220	IV.B1-9(R-103)	Fuel supports and CRD assemblies: orificed fuel support	Cast austenitic stainless steel	Reactor coolant >250°C (>482°F) and neutron flux	Loss of fracture toughness due to thermal aging, neutron irradiation embrittlement	**XI.M9, "BWR Vessel Internals"**	No	AMP was changed from XI.M13 to XI.M9. XI.M13 was cancelled. Management of this aging effect in this component is within the scope of XI.M9.	N/A
IV.C2.RP-221	IV.C2-14(RP-	Piping, piping components,	Steel	Closed-cycle cooling water	Loss of material due to general,	**XI.M21A, "Closed Treated**	No	AMP name was changed based on the	N/A

Table II-7. Changes to Existing GALL Report Rev. 1 Chapter IV AMR Items for Reactor Vessel, Internals, and Reactor Coolant and Their Technical Bases (cells where changes have been made are shown in bold –except for items prefixed by IV.B2, B3 and B4 (refer to the note in Section II.2), see Table II-14 for new definitions related to MRP-227 component categorizations)

Rev. 2 AMR Item No.	Rev. 1 AMR Link	Structures and/or Components	Material	Environment	Aging Effect/ Mechanism	Aging Management Program	Further Evaluation Required	Technical Basis for Changes	Comment No.
	10)	and piping elements			pitting, and crevice corrosion	**Water Systems"**		increased scope of the AMP.	
IV.C2.RP-222	IV.C2-11(RP-11)	Piping, piping components, and piping elements	Copper alloy	Closed-cycle cooling water	Loss of material due to pitting, crevice, and galvanic corrosion	**XI.M21A, "Closed Treated Water Systems"**	No	AMP name was changed based on the increased scope of the AMP.	N/A
IV.D1.RP-225	IV.D1-15(RP-15)	Steam generator structural: U-bend supports including anti-vibration bars	**Steel;** chrome plated steel; stainless steel; nickel alloy	Secondary feedwater or steam	Loss of material due to fretting	XI.M19, “Steam Generators”	No	Revision 1 Item RP-15 was split into two AMR lines, RP-225 and RP-226, with AMP XI.M19 credited in RP-225 and with AMPs XI.M19 and XI.M2 credited in RP-226. In RP-225, the aging mechanism is fretting, which is not affected by “Water Chemistry” (XI.M2). In RP-226, the aging mechanism is crevice corrosion, which is affected by “Water Chemistry.” Steel material was added because some U-bend supports are made out of steel.	N/A

Table II-7. Changes to Existing GALL Report Rev. 1 Chapter IV AMR Items for Reactor Vessel, Internals, and Reactor Coolant and Their Technical Bases (cells where changes have been made are shown in bold –except for items prefixed by IV.B2, B3 and B4 (refer to the note in Section II.2), see Table II-14 for new definitions related to MRP-227 component categorizations)

Rev. 2 AMR Item No.	Rev. 1 AMR Link	Structures and/or Components	Material	Environment	Aging Effect/ Mechanism	Aging Management Program	Further Evaluation Required	Technical Basis for Changes	Comment No.
IV.D1.RP-226	IV.D1-15(RP-15)	**Steam generator structural: U-bend supports including anti-vibration bars**	**Steel; chrome plated steel; stainless steel; nickel alloy**	Secondary feedwater or steam	**Loss of material due to general (steel only), pitting, and crevice corrosion**	**XI.M19, "Steam Generators," and XI.M2, "Water Chemistry"**	No	Revision 1 Item RP-15 was split into two AMR lines, RP-225 and RP-226, with AMP XI.M19 credited in RP-225 and with AMPs and XI.M19 and XI.M2 credited in RP-226. In RP-225, the aging mechanism is fretting, which is not affected by "Water Chemistry" (XI.M2). In RP-226, the aging mechanism is crevice corrosion, which is affected by "Water Chemistry." Steel was added as a material because some U-bend supports are made of steel.	N/A
IV.A1.RP-227	IV.A1-14(R-63)	**Vessel shell (including applicable beltline) components: shell; shell plates or forgings; shell welds; nozzle**	**Steel (with or without cladding)**	Reactor coolant and neutron flux	Loss of fracture toughness due to neutron irradiation embrittlement	XI.M31, "Reactor Vessel Surveillance"	**Yes, plant-specific or integrated surveillance program**	Change in "Component" description provides clarifying details; there is no change of intent. Change in "Material" provides a more general description, and the aging effect is	N/A

Table II-7. Changes to Existing GALL Report Rev. 1 Chapter IV AMR Items for Reactor Vessel, Internals, and Reactor Coolant and Their Technical Bases (cells where changes have been made are shown in bold –except for items prefixed by IV.B2, B3 and B4 (refer to the note in Section II.2), see Table II-14 for new definitions related to MRP-227 component categorizations)

Rev. 2 AMR Item No.	Rev. 1 AMR Link	Structures and/or Components	Material	Environment	Aging Effect/ Mechanism	Aging Management Program	Further Evaluation Required	Technical Basis for Changes	Comment No.
		plates or forgings; nozzle welds						not affected by the type of cladding material. Change in "Further Evaluation" corrects an inconsistency that existed between the GALL Report and SRP-LR, Table 1, Item 18 in Revision 1 of those documents.	
IV.A2.RP-228	IV.A2-17(R-82)	Nozzles: inlet; outlet; safety injection	**Steel (with or without cladding)**	Reactor coolant and neutron flux	Loss of fracture toughness due to neutron irradiation embrittlement	XI.M31, "Reactor Vessel Surveillance"	**Yes, plant-specific or integrated surveillance program**	Change in "Material" provides a more general description, and the aging effect is not affected by the type of cladding material. Change in "Further Evaluation" corrects an inconsistency that existed between the GALL Report and SRP-LR, Table 1, Item 18 in Revision 1 of those documents.	N/A
IV.A2.RP-229	IV.A2-24(R-86)	Vessel shell: upper shell; intermediate shell; lower shell (including	**Steel (with or without cladding)**	Reactor coolant and neutron flux	Loss of fracture toughness due to neutron irradiation embrittlement	XI.M31, "Reactor Vessel Surveillance"	**Yes, plant-specific or integrated surveillance program**	Change in "Material" provides a more general description, and the aging effect is not affected by the	N/A

Table II-7. Changes to Existing GALL Report Rev. 1 Chapter IV AMR Items for Reactor Vessel, Internals, and Reactor Coolant and Their Technical Bases (cells where changes have been made are shown in bold –except for items prefixed by IV.B2, B3 and B4 (refer to the note in Section II.2), see Table II-14 for new definitions related to MRP-227 component categorizations)

Rev. 2 AMR Item No.	Rev. 1 AMR Link	Structures and/or Components	Material	Environment	Aging Effect/ Mechanism	Aging Management Program	Further Evaluation Required	Technical Basis for Changes	Comment No.
		beltline welds)						type of cladding material. Change in “Further Evaluation” corrects an inconsistency that existed between the GALL Report and SRP-LR, Table 1, Item 18 in Revision 1 of those documents.	
IV.C1.RP-230	IV.C1-1(R-03)	Class 1 piping, fittings and branch connections < nominal pipe size (NPS) 4	Steel; stainless steel	Reactor coolant	**Cracking due to SCC, IGSCC (for stainless steel only), and thermal, mechanical, and vibratory loading**	XI.M1, “ASME Section XI Inservice Inspection, Subsections IWB, IWC, and IWD,” for Class 1 components, XI.M2, “Water Chemistry,” XI.M35, "One-Time Inspection of ASME Code Class 1 Small-bore Piping"	No	Changed aging effect/mechanism to include vibratory loading consistent with change in AMP Scope.	N/A
IV.C2.RP-231	IV.C2-22(R-14)	Pressurizer relief tank: tank shell and heads; flanges; nozzles	Stainless steel; steel with stainless steel	Treated borated water >60°C (>140°F)	Cracking due to SCC	**XI.M1, “ASME Section XI Inservice Inspection, Subsections**	No	Revised AMP description to say "ASME Code components" rather than "Class 1	876

Table II-7. Changes to Existing GALL Report Rev. 1 Chapter IV AMR Items for Reactor Vessel, Internals, and Reactor Coolant and Their Technical Bases (cells where changes have been made are shown in bold –except for items prefixed by IV.B2, B3 and B4 (refer to the note in Section II.2), see Table II-14 for new definitions related to MRP-227 component categorizations)

Rev. 2 AMR Item No.	Rev. 1 AMR Link	Structures and/or Components	Material	Environment	Aging Effect/ Mechanism	Aging Management Program	Further Evaluation Required	Technical Basis for Changes	Comment No.
			cladding			**IWB, IWC, and IWD," for ASME Code components,** **XI.M2, "Water Chemistry"**		components." Pressurizer relief tank components typically are ASME class components but are not typically Class 1 components.	
IV.D1.RP-232	IV.D1-1(R-07)	**Steam generator: primary nozzles; nozzle to safe end welds; manways; flanges**	Stainless steel; steel with stainless steel cladding	Reactor coolant	Cracking due to SCC	XI.M1, "ASME Section XI Inservice Inspection, Subsections IWB, IWC, and IWD," for Class 1 components, XI.M2, "Water Chemistry"	No	Former AMR Item R-07 split in two with Class 1 piping and piping elements (fittings and flanges) assigned to Chapter IV.C2 and primary nozzles, safe ends, and manways assigned to Chapter IV.D1. This change provides a clearer distinction between components that are part of the piping system and components that are part of the steam generator assembly.	N/A
IV.D1.RP-233 IV.D2.RP-233	IV.D1-24(R-49) IV.D2-18(R-49)	Tubes and sleeves	Nickel alloy	Secondary feedwater or steam	Loss of material due to fretting and wear	**XI.M19, "Steam Generators"**	No	The AMP field was revised to delete XI.M2 because "Water Chemistry" does not mitigate this aging	N/A

Table II-7. Changes to Existing GALL Report Rev. 1 Chapter IV AMR Items for Reactor Vessel, Internals, and Reactor Coolant and Their Technical Bases (cells where changes have been made are shown in bold –except for items prefixed by IV.B2, B3 and B4 (refer to the note in Section II.2), see Table II-14 for new definitions related to MRP-227 component categorizations)

Rev. 2 AMR Item No.	Rev. 1 AMR Link	Structures and/or Components	Material	Environment	Aging Effect/ Mechanism	Aging Management Program	Further Evaluation Required	Technical Basis for Changes	Comment No.
								mechanism.	
IV.A2.RP-234	IV.A2-15(R-83)	Nozzle safe ends and welds: inlet; outlet; safety injection	Stainless steel; nickel-alloy welds and/or buttering	Reactor coolant	Cracking due to SCC, PWSCC	**XI.M1, "ASME Section XI Inservice Inspection, Subsections IWB, IWC, and IWD," for Class 1 components, XI.M2, "Water Chemistry," and XI.M11B, "Cracking of Nickel-Alloy Components and Loss of Material Due to Boric Acid-Induced Corrosion in RCPB Components (PWRs Only)" for nickel-alloy components**	No	The AMP description has been revised to add AMP XI.M11B. The staff has approved AMP XI.M11B for aging management of nickel-alloy components in the reactor coolant pressure boundary.	N/A
IV.C2.RP-235	IV.C2-1(R-02)	Class 1 piping, fittings, and branch connections < NPS 4	Stainless steel; steel with stainless steel	Reactor coolant	**Cracking due to SCC, IGSCC (for stainless steel only), and thermal,**	XI.M1, "ASME Section XI Inservice Inspection, Subsections	No	Changed aging effect/mechanism to include vibratory loading consistent with change in AMP	N/A

Table II-7. Changes to Existing GALL Report Rev. 1 Chapter IV AMR Items for Reactor Vessel, Internals, and Reactor Coolant and Their Technical Bases (cells where changes have been made are shown in bold –except for items prefixed by IV.B2, B3 and B4 (refer to the note in Section II.2), see Table II-14 for new definitions related to MRP-227 component categorizations)

Rev. 2 AMR Item No.	Rev. 1 AMR Link	Structures and/or Components	Material	Environment	Aging Effect/ Mechanism	Aging Management Program	Further Evaluation Required	Technical Basis for Changes	Comment No.
			cladding		**mechanical, and vibratory loading**	IWB, IWC, and IWD," for Class 1 components, XI.M2, "Water Chemistry," and XI.M35, "One-Time Inspection of ASME Code Class 1 Small-bore Piping"		Scope.	
IV.B4.RP-240	IV.B4-1(R-128)	Core barrel assembly: baffle/former assembly: (a) accessible baffle-to-former bolts and screws; (b) accessible locking devices (including welds) of baffle-to-former bolts	Stainless steel	Reactor coolant and neutron flux	Loss of fracture toughness due to neutron irradiation embrittlement; loss of preload due to thermal and irradiation enhanced stress relaxation; loss of material due to wear	XI.M16A, "PWR Vessel Internals." Primary components (identified in the "Structure and Components" column) (for Expansion components, see AMR Item IV.B4.RP-243.)	No	This AMR item is based on the staff's review of MRP-227, Rev. 0, for this component, material, environment, aging effect combination.	1002 1013
IV.B4.RP-241	IV.B4-7(R-125)	Core barrel assembly: baffle/former assembly: (a) accessible baffle-to-former	Stainless steel	Reactor coolant and neutron flux	Cracking due to SCC, IASCC	XI.M2, "Water Chemistry," and XI.M16A, "PWR Vessel Internals" Primary Components	No	This AMR item is based on the staff's review of MRP-227, Rev. 0, for this component, material, environment, aging	1001 1014

Table II-7. Changes to Existing GALL Report Rev. 1 Chapter IV AMR Items for Reactor Vessel, Internals, and Reactor Coolant and Their Technical Bases (cells where changes have been made are shown in bold –except for items prefixed by IV.B2, B3 and B4 (refer to the note in Section II.2), see Table II-14 for new definitions related to MRP-227 component categorizations)

Rev. 2 AMR Item No.	Rev. 1 AMR Link	Structures and/or Components	Material	Environment	Aging Effect/ Mechanism	Aging Management Program	Further Evaluation Required	Technical Basis for Changes	Comment No.
		bolts and screws; (b) accessible locking devices (including welds) of baffle-to-former bolts				(identified in the "Structure and Components" column) (for Expansion components see AMR Items IV.B4.RP-244 and IV.B4.RP-375)		effect combination.	
IV.B4.RP-242	IV.B4-4(R-183)	Control rod guide tube (CRGT) assembly: accessible surfaces at four screw locations (every 90 degrees) for CRGT spacer castings	Cast austenitic stainless steel	Reactor coolant and neutron flux	Loss of fracture toughness due to thermal aging embrittlement	XI.M16A, “PWR Vessel Internals” Expansion components (identified in the "Structure and Components" column) (for Primary components see AMR Items IV.B4.RP-253 and IV.B4.RP-258)	No	This AMR item is based on the staff’s review of MRP-227, Rev. 0, for this component, material, environment, aging effect combination.	N/A
IV.B4.RP-243	IV.B4-1(R-128)	Core barrel assembly; (a) external baffle-to-baffle bolts; (b) core barrel-to-former bolts;	Stainless steel	Reactor coolant and neutron flux	Loss of fracture toughness due to neutron irradiation embrittlement; loss of preload	XI.M16A, "PWR Vessel Internals" Expansion components (identified in the "Structure and	No	This AMR item is based on the staff’s review of MRP-227, Rev. 0, for this component, material, environment, aging	1001

Table II-7. Changes to Existing GALL Report Rev. 1 Chapter IV AMR Items for Reactor Vessel, Internals, and Reactor Coolant and Their Technical Bases (cells where changes have been made are shown in bold –except for items prefixed by IV.B2, B3 and B4 (refer to the note in Section II.2), see Table II-14 for new definitions related to MRP-227 component categorizations)

Rev. 2 AMR Item No.	Rev. 1 AMR Link	Structures and/or Components	Material	Environment	Aging Effect/ Mechanism	Aging Management Program	Further Evaluation Required	Technical Basis for Changes	Comment No.
		(c) locking devices (including welds) of external baffle-to-baffle bolts and core barrel-to-former bolts; (d) internal baffle-to-baffle bolts			due to thermal and irradiation enhanced stress relaxation; loss of material due to wear	Components" column) (for Primary components see AMR Item IV.B4.RP-240)		effect combination.	
IV.B4.RP-244	IV.B4-7(R-125)	Core barrel assembly; (a) external baffle-to-baffle bolts; (b) core barrel-to-former bolts; (c) locking devices (including welds) of external baffle-to-baffle bolts and core barrel-to-former bolts	Stainless steel	Reactor coolant and neutron flux	Cracking due to IASCC	XI.M2, "Water Chemistry," and XI.M16A, "PWR Vessel Internals" Expansion components (identified in the "Structure and Components" column) (for Primary components see AMR Item IV.B4.RP-241)	No	This AMR item is based on the staff's review of MRP-227, Rev. 0, for this component, material, environment, aging effect combination.	1003
IV.B4.RP-245	IV.B4-13(R-194)	Core barrel assembly: (a) upper thermal shield bolts; (b) surveillance specimen holder	Stainless steel; nickel alloy	Reactor coolant and neutron flux	Cracking due to SCC	XI.M2, "Water Chemistry," and XI.M16A, "PWR Vessel Internals" Expansion	No	This AMR item is based on the staff's review of MRP-227, Rev. 0, for this component, material, environment, aging	1000 1015

Table II-7. Changes to Existing GALL Report Rev. 1 Chapter IV AMR Items for Reactor Vessel, Internals, and Reactor Coolant and Their Technical Bases (cells where changes have been made are shown in bold –except for items prefixed by IV.B2, B3 and B4 (refer to the note in Section II.2), see Table II-14 for new definitions related to MRP-227 component categorizations)

Rev. 2 AMR Item No.	Rev. 1 AMR Link	Structures and/or Components	Material	Environment	Aging Effect/ Mechanism	Aging Management Program	Further Evaluation Required	Technical Basis for Changes	Comment No.
		tube bolts (Davis-Besse, only); (c) surveillance specimen tube holder studs, and nuts (Crystal River Unit 3, only)				components (identified in the "Structure and Components" column) (for Primary components see AMR Items IV.B4.RP-247 and IV.B4.RP-248)		effect combination.	
IV.B4.RP-246	IV.B4-12(R-196)	Lower grid assembly: lower thermal shield (LTS) bolts	Stainless steel; nickel alloy	Reactor coolant and neutron flux	Cracking due to SCC	XI.M2, “Water Chemistry,” and XI.M16A, “PWR Vessel Internals” Expansion components (identified in the "Structure and Components" column) (for Primary components see AMR Items IV.B4.RP-247 and IV.B4.RP-248)	No	This AMR item is based on the staff’s review of MRP-227, Rev. 0, for this component, material, environment, aging effect combination.	1010
IV.B4.RP-247	IV.B4-13(R-194)	Core barrel assembly: accessible lower	Stainless steel;	Reactor coolant and neutron flux	Cracking due to SCC	XI.M2, “Water Chemistry,” and XI.M16A, “PWR	No	This AMR item is based on the staff’s review of MRP-227,	N/A

Table II-7. Changes to Existing GALL Report Rev. 1 Chapter IV AMR Items for Reactor Vessel, Internals, and Reactor Coolant and Their Technical Bases (cells where changes have been made are shown in bold –except for items prefixed by IV.B2, B3 and B4 (refer to the note in Section II.2), see Table II-14 for new definitions related to MRP-227 component categorizations)

Rev. 2 AMR Item No.	Rev. 1 AMR Link	Structures and/or Components	Material	Environment	Aging Effect/ Mechanism	Aging Management Program	Further Evaluation Required	Technical Basis for Changes	Comment No.
		core barrel (LCB) bolts and locking devices	nickel alloy			Vessel Internals" Primary components (identified in the "Structure and Components" column) (for Expansion components see AMR Items IV.B4.RP-245, IV.B4.RP-246, IV.B4.RP-254, and IV.B4.RP-256)		Rev. 0, for this component, material, environment, aging effect combination.	
IV.B4.RP-248	IV.B4-12(R-196)	Core support shield (CSS) assembly: accessible upper core barrel (UCB) bolts and locking devices	Stainless steel; nickel alloy	Reactor coolant and neutron flux	Cracking due to SCC	XI.M2, "Water Chemistry," and XI.M16A, "PWR Vessel Internals" Primary components (identified in the "Structure and Components" column) (for Expansion components see AMR Items IV.B4.RP-245, IV.B4.RP-246,	No	This AMR item is based on the staff's review of MRP-227, Rev. 0, for this component, material, environment, aging effect combination.	1004

Table II-7. Changes to Existing GALL Report Rev. 1 Chapter IV AMR Items for Reactor Vessel, Internals, and Reactor Coolant and Their Technical Bases (cells where changes have been made are shown in bold –except for items prefixed by IV.B2, B3 and B4 (refer to the note in Section II.2), see Table II-14 for new definitions related to MRP-227 component categorizations)

Rev. 2 AMR Item No.	Rev. 1 AMR Link	Structures and/or Components	Material	Environment	Aging Effect/ Mechanism	Aging Management Program	Further Evaluation Required	Technical Basis for Changes	Comment No.
						IV.B4.RP-254, IV.B4.RP-247, and IV.B4.RP-256)			
IV.B4.RP-249	IV.B4-12(R-196)	Core barrel assembly: baffle plate accessible surfaces within one inch around each baffle plate flow and bolt hole	Stainless steel	Reactor coolant and neutron flux	Loss of fracture toughness due to neutron irradiation embrittlement	XI.M16A, "PWR Vessel Internals" Primary components (identified in the "Structure and Components" column) (for Expansion components see AMR Item IV.B4.RP-250)	No	This AMR item is based on the staff's review of MRP-227, Rev. 0, for this component, material, environment, aging effect combination.	N/A
IV.B4.RP-250	IV.B4-12(R-196)	Core barrel assembly: core barrel cylinder (including vertical and circumferential seam welds); former plates	Stainless steel	Reactor coolant and neutron flux	Loss of fracture toughness due to neutron irradiation embrittlement	XI.M16A, "PWR Vessel Internals" Expansion components (identified in the "Structure and Components" column) (for Primary components see AMR Item IV.B4.RP-249)	No	This AMR item is based on the staff's review of MRP-227, Rev. 0, for this component, material, environment, aging effect combination.	N/A
IV.B4.RP-	IV.B4-15(R-	Core support	Stainless	Reactor coolant	Loss of material	XI.M16A, "PWR	No	This AMR item is	1006

Table II-7. Changes to Existing GALL Report Rev. 1 Chapter IV AMR Items for Reactor Vessel, Internals, and Reactor Coolant and Their Technical Bases (cells where changes have been made are shown in bold –except for items prefixed by IV.B2, B3 and B4 (refer to the note in Section II.2), see Table II-14 for new definitions related to MRP-227 component categorizations)

Rev. 2 AMR Item No.	Rev. 1 AMR Link	Structures and/or Components	Material	Environment	Aging Effect/ Mechanism	Aging Management Program	Further Evaluation Required	Technical Basis for Changes	Comment No.
251	190)	shield (CSS) assembly: CSS top flange; plenum cover assembly: plenum cover weldment rib pads and plenum cover support flange	steel	and neutron flux	due to wear	Vessel Internals" Primary component (identified in the "Structure and Components" column) No Expansion components		based on the staff's review of MRP-227, Rev. 0, for this component, material, environment, aging effect combination.	
IV.B4.RP-252	IV.B4-16(R-188)	Core support shield (CSS) assembly: (a) CSS vent valve disc shaft or hinge pin (b) CSS vent valve top retaining ring (c) CSS vent valve bottom retaining ring	Stainless steel	Reactor coolant and neutron flux	Loss of fracture toughness due to thermal aging embrittlement	XI.M16A, "PWR Vessel Internals" Primary components (identified in the "Structure and Components" column) No Expansion components	No	This AMR item is based on the staff's review of MRP-227, Rev. 0, for this component, material, environment, aging effect combination.	1005
IV.B4.RP-253	IV.B4-21(R-191)	Core support shield (CSS) assembly: (a) CSS cast outlet nozzles (Oconee Unit 3 and Davis-Besse, only); (b) CSS vent valve discs	Cast austenitic stainless steel	Reactor coolant and neutron flux	Loss of fracture toughness due to thermal aging embrittlement	XI.M16A, "PWR Vessel Internals" Primary components (identified in the "Structure and Components" column) (for Expansion	No	This AMR item is based on the staff's review of MRP-227, Rev. 0, for this component, material, environment, aging effect combination.	N/A

Table II-7. Changes to Existing GALL Report Rev. 1 Chapter IV AMR Items for Reactor Vessel, Internals, and Reactor Coolant and Their Technical Bases (cells where changes have been made are shown in bold –except for items prefixed by IV.B2, B3 and B4 (refer to the note in Section II.2), see Table II-14 for new definitions related to MRP-227 component categorizations)

Rev. 2 AMR Item No.	Rev. 1 AMR Link	Structures and/or Components	Material	Environment	Aging Effect/ Mechanism	Aging Management Program	Further Evaluation Required	Technical Basis for Changes	Comment No.
						components see ARM Line Item IV.B4.RP-242)			
IV.B4.RP-254	IV.B4-25(R-210)	Lower grid assembly: alloy X-750 lower grid shock pad bolts and locking devices (TMI-1, only)	Nickel alloy	Reactor coolant and neutron flux	Cracking due to SCC	XI.M2, “Water Chemistry,” and XI.M16A, “PWR Vessel Internals,” Expansion components (identified in the "Structure and Components" column) (for Primary components see ARM Line Items IV.B4.RP-247 and IV.B4.RP-248)	No	This AMR item is based on the staff’s review of MRP-227, Rev. 0, for this component, material, environment, aging effect combination.	1009
IV.B4.RP-256	IV.B4-25(R-210)	Flow distributor assembly: flow distributor bolts and locking devices	Stainless steel; nickel alloy	Reactor coolant and neutron flux	Cracking due to SCC	XI.M2, “Water Chemistry,” and XI.M16A, “PWR Vessel Internals,” Expansion components (identified in the "Structure and Components" column) (for Primary	No	This AMR item is based on the staff’s review of MRP-227, Rev. 0, for this component, material, environment, aging effect combination.	1007

Table II-7. Changes to Existing GALL Report Rev. 1 Chapter IV AMR Items for Reactor Vessel, Internals, and Reactor Coolant and Their Technical Bases (cells where changes have been made are shown in bold –except for items prefixed by IV.B2, B3 and B4 (refer to the note in Section II.2), see Table II-14 for new definitions related to MRP-227 component categorizations)

Rev. 2 AMR Item No.	Rev. 1 AMR Link	Structures and/or Components	Material	Environment	Aging Effect/ Mechanism	Aging Management Program	Further Evaluation Required	Technical Basis for Changes	Comment No.
						components see ARM Line Items IV.B4.RP-247 and IV.B4.RP-248)			
IV.B4.RP-258	IV.B4-4(R-183)	Incore Monitoring Instrumentation (IMI) guide tube assembly: accessible top surfaces of IMI Incore guide tube spider castings	Cast austenitic stainless steel	Reactor coolant and neutron flux	Loss of fracture toughness due to thermal aging, neutron irradiation embrittlement	XI.M16A, "PWR Vessel Internals" Primary components (identified in the "Structure and Components" column) (for Expansion components see Line Item IV.B4.RP-242)	No	This AMR item is based on the staff's review of MRP-227, Rev. 0, for this component, material, environment, aging effect combination.	1008
IV.B4.RP-259	IV.B4-31(R-205)	Incore Monitoring Instrumentation (IMI) guide tube assembly: accessible top surfaces of IMI guide tube spider-to-lower grid rib sections welds	Stainless steel; nickel alloy	Reactor coolant and neutron flux	Loss of fracture toughness due to thermal aging, neutron irradiation embrittlement	XI.M16A, "PWR Vessel Internals" Primary components (identified in the "Structure and Components" column) (for Expansion components see Line Item IV.B4.RP-260)	No	This AMR item is based on the staff's review of MRP-227, Rev. 0, for this component, material, environment, aging effect combination.	N/A

Table II-7. Changes to Existing GALL Report Rev. 1 Chapter IV AMR Items for Reactor Vessel, Internals, and Reactor Coolant and Their Technical Bases (cells where changes have been made are shown in bold –except for items prefixed by IV.B2, B3 and B4 (refer to the note in Section II.2), see Table II-14 for new definitions related to MRP-227 component categorizations)

Rev. 2 AMR Item No.	Rev. 1 AMR Link	Structures and/or Components	Material	Environment	Aging Effect/ Mechanism	Aging Management Program	Further Evaluation Required	Technical Basis for Changes	Comment No.
IV.B4.RP-260	IV.B4-31(R-205)	Lower grid assembly: (a) accessible pads; (b) accessible pad-to-rib section welds; (c) accessible alloy X-750 dowels, cap screws and locking devices	Stainless steel; nickel alloy	Reactor coolant and neutron flux	Loss of fracture toughness due to neutron irradiation embrittlement	XI.M16A, "PWR Vessel Internals" Expansion components (identified in the "Structure and Components" column) (for Primary components see AMR Item IV.B4.RP-259)	No	This AMR item is based on the staff's review of MRP-227, Rev. 0, for this component, material, environment, aging effect combination.	1011
IV.B4.RP-261	IV.B4-32(R-203)	Lower grid assembly: alloy X-750 dowel-to-guide block welds	Nickel alloy	Reactor coolant and neutron flux	Cracking due to SCC	XI.M2, "Water Chemistry," and XI.M16A, "PWR Vessel Internals" Primary components (identified in the "Structure and Components" column) (for Expansion components see AMR Item IV.B4.RP-262 and IV.B4.RP-352)	No	This AMR item is based on the staff's review of MRP-227, Rev. 0, for this component, material, environment, aging effect combination.	N/A
IV.B4.RP-	IV.B4-32(R-	Lower grid	Nickel alloy	Reactor coolant	Cracking due to	XI.M2, "Water	No	This AMR item is	1012

Table II-7. Changes to Existing GALL Report Rev. 1 Chapter IV AMR Items for Reactor Vessel, Internals, and Reactor Coolant and Their Technical Bases (cells where changes have been made are shown in bold –except for items prefixed by IV.B2, B3 and B4 (refer to the note in Section II.2), see Table II-14 for new definitions related to MRP-227 component categorizations)

Rev. 2 AMR Item No.	Rev. 1 AMR Link	Structures and/or Components	Material	Environment	Aging Effect/ Mechanism	Aging Management Program	Further Evaluation Required	Technical Basis for Changes	Comment No.
262	203)	assembly: accessible alloy X-750 dowel-to-lower fuel assembly support pad welds		and neutron flux	SCC	Chemistry," and XI.M16A, "PWR Vessel Internals" Expansion components (identified in the "Structure and Components" column) (for Primary components see AMR Item IV.B4.RP-261)		based on the staff's review of MRP-227, Rev. 0, for this component, material, environment, aging effect combination.	
IV.B2.RP-270	IV.B2-1(R-124)	Baffle-to-former assembly: baffle and former plates	Stainless steel	Reactor coolant and neutron flux	Change in dimension due to void swelling	XI.M16A, "PWR Vessel Internals" Primary components (identified in the "Structure and Components" column) no Expansion components	No	This AMR item is based on the staff's review of MRP-227, Rev. 0, for this component, material, environment, aging effect combination.	N/A
IV.B2.RP-271	IV.B2-10(R-125)	Baffle-to-former assembly: accessible baffle-to-former bolts	Stainless steel	Reactor coolant and neutron flux	Cracking due to IASCC and fatigue	XI.M2, "Water Chemistry," and XI.M16A, "PWR Vessel Internals" Primary components	No	This AMR item is based on the staff's review of MRP-227, Rev. 0, for this component, material, environment, aging	N/A

Table II-7. Changes to Existing GALL Report Rev. 1 Chapter IV AMR Items for Reactor Vessel, Internals, and Reactor Coolant and Their Technical Bases (cells where changes have been made are shown in bold –except for items prefixed by IV.B2, B3 and B4 (refer to the note in Section II.2), see Table II-14 for new definitions related to MRP-227 component categorizations)

Rev. 2 AMR Item No.	Rev. 1 AMR Link	Structures and/or Components	Material	Environment	Aging Effect/ Mechanism	Aging Management Program	Further Evaluation Required	Technical Basis for Changes	Comment No.
						(identified in the "Structure and Components" column) (for Expansion components see AMR Items IV.B2.RP-273 and IV.B2.RP-286)		effect combination.	
IV.B2.RP-272	IV.B2-6(R-128)	Baffle-to-former assembly: accessible baffle-to-former bolts	Stainless steel	Reactor coolant and neutron flux	Loss of fracture toughness due to neutron irradiation embrittlement; change in dimension due to void swelling; loss of preload due to thermal and irradiation enhanced stress relaxation	XI.M16A, "PWR Vessel Internals" Primary components (identified in the "Structure and Components" column) (for Expansion components see AMR Items IV.B2.RP-274 and IV.B2.RP-287)	No	This AMR item is based on the staff's review of MRP-227, Rev. 0, for this component, material, environment, aging effect combination.	973
IV.B2.RP-273	IV.B2-10(R-125)	Baffle-to-former assembly: barrel-to-former bolts	Stainless steel	Reactor coolant and neutron flux	Cracking due to IASCC and fatigue	XI.M2, "Water Chemistry," and XI.M16A, "PWR Vessel Internals" Expansion	No	This AMR item is based on the staff's review of MRP-227, Rev. 0, for this component, material, environment, aging	N/A

Table II-7. Changes to Existing GALL Report Rev. 1 Chapter IV AMR Items for Reactor Vessel, Internals, and Reactor Coolant and Their Technical Bases (cells where changes have been made are shown in bold –except for items prefixed by IV.B2, B3 and B4 (refer to the note in Section II.2), see Table II-14 for new definitions related to MRP-227 component categorizations)

Rev. 2 AMR Item No.	Rev. 1 AMR Link	Structures and/or Components	Material	Environment	Aging Effect/ Mechanism	Aging Management Program	Further Evaluation Required	Technical Basis for Changes	Comment No.
						components (identified in the "Structure and Components" column) (for Primary components see AMR Item IV.B2.RP-271)		effect combination.	
IV.B2.RP-274	IV.B2-6(R-128)	Baffle-to-former assembly: barrel-to-former bolts	Stainless steel	Reactor coolant and neutron flux	Loss of fracture toughness due to neutron irradiation embrittlement; change in dimension due to void swelling; loss of preload due to thermal and irradiation enhanced stress relaxation	XI.M16A, “PWR Vessel Internals” Expansion components (identified in the "Structure and Components" column) (for Primary components see AMR Item IV.B2.RP-272)	No	This AMR item is based on the staff’s review of MRP-227, Rev. 0, for this component, material, environment, aging effect combination.	N/A
IV.B2.RP-275	IV.B2-6(R-128)	Baffle-to-former assembly: baffle-edge bolts (all plants with baffle-edge bolts)	Stainless steel	Reactor coolant and neutron flux	Cracking due to IASCC cracking and fatigue	XI.M2, “Water Chemistry,” and XI.M16A, “PWR Vessel Internals” Primary components (identified in the "Structure and	No	This AMR item is based on the staff’s review of MRP-227, Rev. 0, for this component, material, environment, aging effect combination.	979

Table II-7. Changes to Existing GALL Report Rev. 1 Chapter IV AMR Items for Reactor Vessel, Internals, and Reactor Coolant and Their Technical Bases (cells where changes have been made are shown in bold –except for items prefixed by IV.B2, B3 and B4 (refer to the note in Section II.2), see Table II-14 for new definitions related to MRP-227 component categorizations)

Rev. 2 AMR Item No.	Rev. 1 AMR Link	Structures and/or Components	Material	Environment	Aging Effect/ Mechanism	Aging Management Program	Further Evaluation Required	Technical Basis for Changes	Comment No.
						Components" column) no Expansion components			
IV.B2.RP-276	IV.B2-8(R-120)	Core barrel assembly: upper core barrel flange weld	Stainless steel	Reactor coolant and neutron flux	Cracking due SCC and IASCC	XI.M2, “Water Chemistry,” and XI.M16A, “PWR Vessel Internals” Primary components (identified in the "Structure and Components" column) (for Expansion components, see AMR Items IV.B2.RP-278, IV.B2.RP-280, IV.B2.RP-282, IV.B2.RP-294, IV.B2.RP-295, IV. B4.RP-281, IV.B2.RP-387, and IV.B2.RP-288)	No	This AMR item is based on the staff’s review of MRP-227, Rev. 0, for this component, material, environment, aging effect combination.	N/A
IV.B2.RP-278	IV.B2-8(R-120)	Core barrel assembly: core barrel outlet	Stainless steel	Reactor coolant and neutron flux	Cracking due to SCC and fatigue	XI.M2, “Water Chemistry,” and XI.M16A, “PWR	No	This AMR item is based on the staff’s review of MRP-227, Rev. 0, for this	N/A

Table II-7. Changes to Existing GALL Report Rev. 1 Chapter IV AMR Items for Reactor Vessel, Internals, and Reactor Coolant and Their Technical Bases (cells where changes have been made are shown in bold –except for items prefixed by IV.B2, B3 and B4 (refer to the note in Section II.2), see Table II-14 for new definitions related to MRP-227 component categorizations)

Rev. 2 AMR Item No.	Rev. 1 AMR Link	Structures and/or Components	Material	Environment	Aging Effect/ Mechanism	Aging Management Program	Further Evaluation Required	Technical Basis for Changes	Comment No.
		nozzle welds				Vessel Internals" Expansion component (identified in the "Structure and Components" column) (for Primary components see AMR Item IV.B2.RP-276)		component, material, environment, aging effect combination.	
IV.B2.RP-280	IV.B2-8(R-120)	Core barrel assembly: lower core barrel flange weld	Stainless steel	Reactor coolant and neutron flux	Cracking due to SCC and IASCC	XI.M2, "Water Chemistry," and XI.M16A, "PWR Vessel Internals" Expansion component (identified in the "Structure and Components" column) (for Primary components see AMR Item IV.B2.RP-276)	No	This AMR item is based on the staff's review of MRP-227, Rev. 0, for this component, material, environment, aging effect combination.	983
IV.B2.RP-281	IV.B2-9(R-122)	Core barrel assembly: lower core barrel flange weld	Stainless steel	Reactor coolant and neutron flux	Loss of fracture toughness due to neutron irradiation	XI.M16A, "PWR Vessel Internals" Expansion Components	No	This AMR item is based on the staff's review of MRP-227, Rev. 0, for this	983

Table II-7. Changes to Existing GALL Report Rev. 1 Chapter IV AMR Items for Reactor Vessel, Internals, and Reactor Coolant and Their Technical Bases (cells where changes have been made are shown in bold –except for items prefixed by IV.B2, B3 and B4 (refer to the note in Section II.2), see Table II-14 for new definitions related to MRP-227 component categorizations)

Rev. 2 AMR Item No.	Rev. 1 AMR Link	Structures and/or Components	Material	Environment	Aging Effect/ Mechanism	Aging Management Program	Further Evaluation Required	Technical Basis for Changes	Comment No.
					embrittlement	(identified in the "Structure and Components" column) (for Primary components see AMR Item IV.B2.RP-276)		component, material, environment, aging effect combination.	
IV.B2.RP-282	IV.B2-8(R-120)	Core barrel assembly: core barrel flange	Stainless steel	Reactor coolant and neutron flux	Cracking due to SCC and fatigue	XI.M2, "Water Chemistry," and XI.M16A, "PWR Vessel Internals" Expansion components (identified in the "Structure and Components" column) (for Primary components see AMR Item IV.B2.RP-276)	No	This AMR item is based on the staff's review of MRP-227, Rev. 0, for this component, material, environment, aging effect combination.	983
IV.B2.RP-284	IV.B2-12(R-143)	Bottom mounted instrument system: flux thimble tubes	Stainless steel (with or without chrome plating)	Reactor coolant and neutron flux	Loss of material due to wear	XI.M16A, "PWR Vessel Internals" Existing Program components (identified in the "Structure and Components"	No	This AMR item is based on the staff's review of MRP-227, Rev. 0, for this component, material, environment, aging effect combination. In addition, XI.M37 is	N/A

Table II-7. Changes to Existing GALL Report Rev. 1 Chapter IV AMR Items for Reactor Vessel, Internals, and Reactor Coolant and Their Technical Bases (cells where changes have been made are shown in bold –except for items prefixed by IV.B2, B3 and B4 (refer to the note in Section II.2), see Table II-14 for new definitions related to MRP-227 component categorizations)

Rev. 2 AMR Item No.	Rev. 1 AMR Link	Structures and/or Components	Material	Environment	Aging Effect/ Mechanism	Aging Management Program	Further Evaluation Required	Technical Basis for Changes	Comment No.
						column) No expansion components; and XI.M37, "Flux Thimble Tube Inspection"		credited for managing this aging effect in this component.	
IV.B2.RP-285	IV.B2-14(R-137)	Lower internals assembly: clevis insert bolts	Nickel alloy	Reactor coolant and neutron flux	Loss of material due to wear	XI.M16A, “PWR Vessel Internals” Existing Program components (identified in the "Structure and Components" column) no Expansion components	No	This AMR item is based on the staff’s review of MRP-227, Rev. 0, for this component, material, environment, aging effect combination.	N/A
IV.B2.RP-286	IV.B2-16(R-133)	Lower support assembly: lower support column bolts	Stainless steel; nickel alloy	Reactor coolant and neutron flux	Cracking due to IASCC and fatigue	XI.M2, “Water Chemistry,” and XI.M16A, “PWR Vessel Internals” Expansion components (identified in the "Structure and Components" column) (for Primary components see AMR Item	No	This AMR item is based on the staff’s review of MRP-227, Rev. 0, for this component, material, environment, aging effect combination.	N/A

Table II-7. Changes to Existing GALL Report Rev. 1 Chapter IV AMR Items for Reactor Vessel, Internals, and Reactor Coolant and Their Technical Bases (cells where changes have been made are shown in bold –except for items prefixed by IV.B2, B3 and B4 (refer to the note in Section II.2), see Table II-14 for new definitions related to MRP-227 component categorizations)

Rev. 2 AMR Item No.	Rev. 1 AMR Link	Structures and/or Components	Material	Environment	Aging Effect/ Mechanism	Aging Management Program	Further Evaluation Required	Technical Basis for Changes	Comment No.
						IV.B2.RP-271)			
IV.B2.RP-287	IV.B2-17(R-135)	Lower support assembly: lower support column bolts	Stainless steel; nickel alloy	Reactor coolant and neutron flux	Loss of fracture toughness due to neutron irradiation embrittlement; loss of preload due to thermal and irradiation enhanced stress relaxation	XI.M16A, "PWR Vessel Internals" Expansion component (identified in the "Structure and Components" column) (for Primary components see AMR Item IV.B2.RP-272)	No	This AMR item is based on the staff's review of MRP-227, Rev. 0, for this component, material, environment, aging effect combination.	N/A
IV.B2.RP-288	IV.B2-18(R-132)	Lower internals assembly: lower core plate and extra-long (XL) lower core plate	Stainless steel	Reactor coolant and neutron flux	Loss of fracture toughness due to neutron irradiation embrittlement; loss of material due to wear	XI.M16A, "PWR Vessel Internals" Existing Program components (identified in the "Structure and Components" column) no Expansion components	No	This AMR item is based on the staff's review of MRP-227, Rev. 0, for this component, material, environment, aging effect combination.	N/A
IV.B2.RP-289	IV.B2-20(R-130)	Lower internals assembly: lower core plate and extra-long (XL) lower core plate	Stainless steel	Reactor coolant and neutron flux	Cracking due to IASCC and fatigue	XI.M2, "Water Chemistry," and XI.M16A, "PWR Vessel Internals" Existing Program components	No	This AMR item is based on the staff's review of MRP-227, Rev. 0, for this component, material, environment, aging	N/A

Table II-7. Changes to Existing GALL Report Rev. 1 Chapter IV AMR Items for Reactor Vessel, Internals, and Reactor Coolant and Their Technical Bases (cells where changes have been made are shown in bold –except for items prefixed by IV.B2, B3 and B4 (refer to the note in Section II.2), see Table II-14 for new definitions related to MRP-227 component categorizations)

Rev. 2 AMR Item No.	Rev. 1 AMR Link	Structures and/or Components	Material	Environment	Aging Effect/ Mechanism	Aging Management Program	Further Evaluation Required	Technical Basis for Changes	Comment No.
						(identified in the "Structure and Components" column) no Expansion components		effect combination.	
IV.B2.RP-290	IV.B2-21(R-140)	Lower support assembly: lower support column bodies (cast)	Cast austenitic stainless steel	Reactor coolant and neutron flux	Loss of fracture toughness due to thermal aging and neutron irradiation embrittlement	XI.M16A, "PWR Vessel Internals" Expansion components (identified in the "Structure and Components" column) (for Primary components see AMR Item IV.B2.RP-297)	No	This AMR item is based on the staff's review of MRP-227, Rev. 0, for this component, material, environment, aging effect combination.	N/A
IV.B2.RP-291	IV.B2-24(R-138)	Lower support assembly: lower support column bodies (cast)	Cast austenitic stainless steel	Reactor coolant and neutron flux	Cracking due to IASCC	XI.M2, "Water Chemistry," and XI.M16A, "PWR Vessel Internals" Expansion components (identified in the "Structure and Components" column) (for Primary	No	This AMR item is based on the staff's review of MRP-227, Rev. 0, for this component, material, environment, aging effect combination.	N/A

Table II-7. Changes to Existing GALL Report Rev. 1 Chapter IV AMR Items for Reactor Vessel, Internals, and Reactor Coolant and Their Technical Bases (cells where changes have been made are shown in bold –except for items prefixed by IV.B2, B3 and B4 (refer to the note in Section II.2), see Table II-14 for new definitions related to MRP-227 component categorizations)

Rev. 2 AMR Item No.	Rev. 1 AMR Link	Structures and/or Components	Material	Environment	Aging Effect/ Mechanism	Aging Management Program	Further Evaluation Required	Technical Basis for Changes	Comment No.
						components see AMR Item IV.B2.RP-298)			
IV.B2.RP-292	IV.B2-21(R-140)	Bottom-mounted instrumentation system: bottom-mounted instrumentation (BMI) column bodies	Stainless steel	Reactor coolant and neutron flux	Loss of fracture toughness due to neutron irradiation embrittlement	XI.M16A, “PWR Vessel Internals” Expansion components (identified in the "Structure and Components" column) (for Primary components see AMR Item IV.B2.RP-297)	No	This AMR item is based on the staff’s review of MRP-227, Rev. 0, for this component, material, environment, aging effect combination.	N/A
IV.B2.RP-293	IV.B2-24(R-138)	Bottom-mounted instrumentation system: bottom-mounted instrumentation (BMI) column bodies	Stainless steel	Reactor coolant and neutron flux	Cracking due to fatigue	XI.M2, “Water Chemistry,” and XI.M16A, “PWR Vessel Internals” Expansion components (identified in the "Structure and Components" column) (for Primary components see AMR Item IV.B2.RP-298)	No	This AMR item is based on the staff’s review of MRP-227, Rev. 0, for this component, material, environment, aging effect combination.	N/A

Table II-7. Changes to Existing GALL Report Rev. 1 Chapter IV AMR Items for Reactor Vessel, Internals, and Reactor Coolant and Their Technical Bases (cells where changes have been made are shown in bold –except for items prefixed by IV.B2, B3 and B4 (refer to the note in Section II.2), see Table II-14 for new definitions related to MRP-227 component categorizations)

Rev. 2 AMR Item No.	Rev. 1 AMR Link	Structures and/or Components	Material	Environment	Aging Effect/ Mechanism	Aging Management Program	Further Evaluation Required	Technical Basis for Changes	Comment No.
IV.B2.RP-294	IV.B2-24(R-138)	Lower support assembly: lower support column bodies (non-cast)	Stainless steel	Reactor coolant and neutron flux	Cracking due to IASCC	XI.M2, “Water Chemistry,” and XI.M16A, “PWR Vessel Internals” Expansion components (identified in the "Structure and Components" column) (for Primary components see AMR Item IV.B2.RP-276)	No	This AMR item is based on the staff’s review of MRP-227, Rev. 0, for this component, material, environment, aging effect combination.	N/A
IV.B2.RP-295	IV.B2-22(R-141)	Lower support assembly: lower support column bodies (non-cast)	Stainless steel	Reactor coolant and neutron flux	Loss of fracture toughness due to neutron irradiation embrittlement	XI.M16A, “PWR Vessel Internals” Expansion Components (identified in the "Structure and Components" column) (for Primary components see AMR Item IV.B2.RP-276)	No	This AMR item is based on the staff’s review of MRP-227, Rev. 0, for this component, material, environment, aging effect combination.	N/A
IV.B2.RP-298	IV.B2-28(R-118)	Control rod guide tube (CRGT)	Stainless steel	Reactor coolant and neutron flux	Cracking due to SCC and fatigue	XI.M2, “Water Chemistry,” and XI.M16A, “PWR	No	This AMR item is based on the staff’s review of MRP-227,	981 - see first part of NRC

Table II-7. Changes to Existing GALL Report Rev. 1 Chapter IV AMR Items for Reactor Vessel, Internals, and Reactor Coolant and Their Technical Bases (cells where changes have been made are shown in bold –except for items prefixed by IV.B2, B3 and B4 (refer to the note in Section II.2), see Table II-14 for new definitions related to MRP-227 component categorizations)

Rev. 2 AMR Item No.	Rev. 1 AMR Link	Structures and/or Components	Material	Environment	Aging Effect/ Mechanism	Aging Management Program	Further Evaluation Required	Technical Basis for Changes	Comment No.
		assemblies: CRGT lower flange welds (accessible)				Vessel Internals" Primary components (identified in the "Structure and Components" column) (for Expansion components see AMR Items IV.B2.RP-291 and IV.B2.RP-293)		Rev. 0, for this component, material, environment, aging effect combination.	disposition in Table IV-5.
IV.B2.RP-299	IV.B2-34(R-115)	Alignment and interfacing components: upper core plate alignment pins	Stainless steel	Reactor coolant and neutron flux	Loss of material due to wear	XI.M16A, "PWR Vessel Internals" Existing Program components (identified in the "Structure and Components" column) no Expansion components	No	This AMR item is based on the staff's review of MRP-227, Rev. 0, for this component, material, environment, aging effect combination.	N/A
IV.B2.RP-300	IV.B2-33(R-108)	Alignment and interfacing components: internals hold down spring	Stainless steel	Reactor coolant and neutron flux	Loss of preload due to thermal and irradiation enhanced stress relaxation; loss of material	XI.M16A, "PWR Vessel Internals" Primary components (identified in the "Structure and	No	This AMR item is based on the staff's review of MRP-227, Rev. 0, for this component, material, environment, aging	N/A

Table II-7. Changes to Existing GALL Report Rev. 1 Chapter IV AMR Items for Reactor Vessel, Internals, and Reactor Coolant and Their Technical Bases (cells where changes have been made are shown in bold –except for items prefixed by IV.B2, B3 and B4 (refer to the note in Section II.2), see Table II-14 for new definitions related to MRP-227 component categorizations)

Rev. 2 AMR Item No.	Rev. 1 AMR Link	Structures and/or Components	Material	Environment	Aging Effect/ Mechanism	Aging Management Program	Further Evaluation Required	Technical Basis for Changes	Comment No.
					due to wear	Components" column) no Expansion components		effect combination.	
IV.B2.RP-301	IV.B2-40(R-112)	Alignment and interfacing components: upper core plate alignment pins	Stainless steel	Reactor coolant and neutron flux	Cracking due to SCC	XI.M2, "Water Chemistry," and XI.M16A, "PWR Vessel Internals" Existing Program components (identified in the "Structure and Components" column) no Expansion components	No	This AMR item is based on the staff's review of MRP-227, Rev. 0, for this component, material, environment, aging effect combination.	974
IV.B2.RP-303	IV.B2-31(R-53)	Reactor vessel internal components	Stainless steel; nickel alloy	Reactor coolant and neutron flux	Cumulative fatigue damage due to fatigue	Fatigue is a TLAA to be evaluated for the period of extended operation. See the SRP Chapter 4.3, "Metal Fatigue," for acceptable methods for meeting the requirements of 10 CFR	Yes, TLAA	This AMR item is based on the staff's review of MRP-227, Rev. 0, for this component, material, environment, aging effect combination.	N/A

Table II-7. Changes to Existing GALL Report Rev. 1 Chapter IV AMR Items for Reactor Vessel, Internals, and Reactor Coolant and Their Technical Bases (cells where changes have been made are shown in bold –except for items prefixed by IV.B2, B3 and B4 (refer to the note in Section II.2), see Table II-14 for new definitions related to MRP-227 component categorizations)

Rev. 2 AMR Item No.	Rev. 1 AMR Link	Structures and/or Components	Material	Environment	Aging Effect/ Mechanism	Aging Management Program	Further Evaluation Required	Technical Basis for Changes	Comment No.
						54.21(c)(1).			
IV.B3.RP-312	IV.B3-2(R-149)	CEA: shroud assemblies: instrument guide tubes in peripheral CEA assemblies	Stainless steel	Reactor coolant and neutron flux	Cracking due to SCC and fatigue	XI.M2, “Water Chemistry,” and XI.M16A, “PWR Vessel Internals” Primary components (identified in the "Structure and Components" column) (for Expansion components see AMR Item IV.B3.RP-313)	No	This AMR item is based on the staff’s review of MRP-227, Rev. 0, for this component, material, environment, aging effect combination.	N/A
IV.B3.RP-314	IV.B3-9(R-162)	Core shroud assemblies (for bolted core shroud assemblies): core shroud bolts (accessible)	Stainless steel	Reactor coolant and neutron flux	Cracking due to IASCC and fatigue	XI.M2, “Water Chemistry,” and XI.M16A, “PWR Vessel Internals” Primary components (identified in the "Structure and Components" column) (for Expansion components see AMR Items IV.B3.RP-316,	No	This AMR item is based on the staff’s review of MRP-227, Rev. 0, for this component, material, environment, aging effect combination.	987

Table II-7. Changes to Existing GALL Report Rev. 1 Chapter IV AMR Items for Reactor Vessel, Internals, and Reactor Coolant and Their Technical Bases (cells where changes have been made are shown in bold –except for items prefixed by IV.B2, B3 and B4 (refer to the note in Section II.2), see Table II-14 for new definitions related to MRP-227 component categorizations)

Rev. 2 AMR Item No.	Rev. 1 AMR Link	Structures and/or Components	Material	Environment	Aging Effect/ Mechanism	Aging Management Program	Further Evaluation Required	Technical Basis for Changes	Comment No.
						IV.B3.RP-330, and IV.B3.RP-358)			
IV.B3.RP-315	IV.B3-7(R-165)	Core shroud assemblies (for bolted core shroud assemblies): core shroud bolts (accessible)	Stainless steel	Reactor coolant and neutron flux	Loss of preload due to thermal and irradiation enhanced stress relaxation; loss of fracture toughness due to neutron irradiation embrittlement; change in dimension due to void swelling	XI.M16A, "PWR Vessel Internals," Primary components (identified in the "Structure and Components" column) (for Expansion components see AMR Items IV.B3.RP-317, and IV.B3.RP-331)	No	This AMR item is based on the staff's review of MRP-227, Rev. 0, for this component, material, environment, aging effect combination.	N/A
IV.B3.RP-316	IV.B3-9(R-162)	Core shroud assemblies (for bolted core shroud assemblies): barrel-shroud bolts with neutron exposures greater than 3 dpa	Stainless steel	Reactor coolant and neutron flux	Cracking due to IASCC	XI.M2, "Water Chemistry," and XI.M16A, "PWR Vessel Internals" Expansion components (identified in the "Structure and Components" column) (for Primary components see	No	This AMR item is based on the staff's review of MRP-227, Rev. 0, for this component, material, environment, aging effect combination.	987

Table II-7. Changes to Existing GALL Report Rev. 1 Chapter IV AMR Items for Reactor Vessel, Internals, and Reactor Coolant and Their Technical Bases (cells where changes have been made are shown in bold –except for items prefixed by IV.B2, B3 and B4 (refer to the note in Section II.2), see Table II-14 for new definitions related to MRP-227 component categorizations)

Rev. 2 AMR Item No.	Rev. 1 AMR Link	Structures and/or Components	Material	Environment	Aging Effect/ Mechanism	Aging Management Program	Further Evaluation Required	Technical Basis for Changes	Comment No.
						AMR Item IV.B3.RP-314)			
IV.B3.RP-317	IV.B3-7(R-165)	Core shroud assemblies (for bolted core shroud assemblies): barrel-shroud bolts with neutron exposures greater than 3 dpa	Stainless steel; nickel alloy	Reactor coolant and neutron flux	Loss of preload due to thermal and irradiation enhanced stress relaxation; loss of fracture toughness due to neutron irradiation embrittlement	XI.M16A, "PWR Vessel Internals" Expansion components (identified in the "Structure and Components" column) (for Primary components see AMR Item IV.B3.RP-315)	No	This AMR item is based on the staff's review of MRP-227, Rev. 0, for this component, material, environment, aging effect combination.	N/A
IV.B3.RP-318	IV.B3-8(R-163)	Core shroud assemblies (for bolted core shroud assemblies): (a) shroud plates and (b) former plates	Stainless steel	Reactor coolant and neutron flux	Loss of fracture toughness due to neutron irradiation embrittlement; change in dimension due to void swelling	XI.M16A, "PWR Vessel Internals" Primary components (identified in the "Structure and Components" column) no Expansion components	No	This AMR item is based on the staff's review of MRP-227, Rev. 0, for this component, material, environment, aging effect combination.	N/A
IV.B3.RP-319	IV.B3-9(R-162)	Core shroud assemblies (all plants): guide lugs and guide lug insert bolts	Stainless steel	Reactor coolant and neutron flux	Loss of material due to wear; Loss of preload due to thermal	XI.M16A, "PWR Vessel Internals" Existing Program components (identified in the	No	This AMR item is based on the staff's review of MRP-227, Rev. 0, for this component, material,	987 988

Table II-7. Changes to Existing GALL Report Rev. 1 Chapter IV AMR Items for Reactor Vessel, Internals, and Reactor Coolant and Their Technical Bases (cells where changes have been made are shown in bold –except for items prefixed by IV.B2, B3 and B4 (refer to the note in Section II.2), see Table II-14 for new definitions related to MRP-227 component categorizations)

Rev. 2 AMR Item No.	Rev. 1 AMR Link	Structures and/or Components	Material	Environment	Aging Effect/ Mechanism	Aging Management Program	Further Evaluation Required	Technical Basis for Changes	Comment No.
					and irradiation enhanced stress relaxation	"Structure and Components" column) no Expansion components		environment, aging effect combination.	
IV.B3.RP-320	IV.B3-9(R-162)	Core shroud assemblies (all plants): guide lugs and guide lug insert bolts	Stainless steel	Reactor coolant and neutron flux	Cracking due to fatigue	XI.M2, “Water Chemistry,” and XI.M16A, “PWR Vessel Internals” Existing Program components (identified in the "Structure and Components" column) no Expansion components	No	This AMR item is based on the staff’s review of MRP-227, Rev. 0, for this component, material, environment, aging effect combination.	987
IV.B3.RP-327	IV.B3-15(R-155)	Core support barrel assembly: upper core support barrel flange weld (accessible surfaces)	Stainless steel	Reactor coolant and neutron flux	Cracking due to SCC	XI.M2, “Water Chemistry,” and XI.M16A, “PWR Vessel Internals” Primary components (identified in the "Structure and Components" column) (for Expansion components see	No	This AMR item is based on the staff’s review of MRP-227, Rev. 0, for this component, material, environment, aging effect combination.	995

Table II-7. Changes to Existing GALL Report Rev. 1 Chapter IV AMR Items for Reactor Vessel, Internals, and Reactor Coolant and Their Technical Bases (cells where changes have been made are shown in bold –except for items prefixed by IV.B2, B3 and B4 (refer to the note in Section II.2), see Table II-14 for new definitions related to MRP-227 component categorizations)

Rev. 2 AMR Item No.	Rev. 1 AMR Link	Structures and/or Components	Material	Environment	Aging Effect/ Mechanism	Aging Management Program	Further Evaluation Required	Technical Basis for Changes	Comment No.
						AMR Items IV.B3.RP-329, IV.B3.RP-335, IV.B3.RP-362, IV.B3.RP-363, IV.B3.RP-364)			
IV.B3.RP-328	IV.B3-15(R-155)	Core support barrel assembly: surfaces of the lower core barrel flange weld (accessible surfaces)	Stainless steel	Reactor coolant and neutron flux	Cracking due to SCC and fatigue	XI.M2, “Water Chemistry,” and XI.M16A, “PWR Vessel Internals” Primary components (identified in the "Structure and Components" column) no Expansion components	No	This AMR item is based on the staff’s review of MRP-227, Rev. 0, for this component, material, environment, aging effect combination.	995
IV.B3.RP-329	IV.B3-15(R-155)	Core support barrel assembly: lower cylinder welds and remaining core barrel assembly welds	Stainless steel	Reactor coolant and neutron flux	Cracking due to SCC	XI.M2, “Water Chemistry,” and XI.M16A, “PWR Vessel Internals” Expansion components (identified in the "Structure and Components" column) (for Primary	No	This AMR item is based on the staff’s review of MRP-227, Rev. 0, for this component, material, environment, aging effect combination.	N/A

Table II-7. Changes to Existing GALL Report Rev. 1 Chapter IV AMR Items for Reactor Vessel, Internals, and Reactor Coolant and Their Technical Bases (cells where changes have been made are shown in bold –except for items prefixed by IV.B2, B3 and B4 (refer to the note in Section II.2), see Table II-14 for new definitions related to MRP-227 component categorizations)

Rev. 2 AMR Item No.	Rev. 1 AMR Link	Structures and/or Components	Material	Environment	Aging Effect/ Mechanism	Aging Management Program	Further Evaluation Required	Technical Basis for Changes	Comment No.
						components see AMR Item IV.B3.RP-327)			
IV.B3.RP-330	IV.B3-23(R-167)	Lower support structure: core support column bolts	Stainless steel	Reactor coolant and neutron flux	Cracking due to IASCC and fatigue	XI.M2, "Water Chemistry," and XI.M16A, "PWR Vessel Internals" Expansion components (identified in the "Structure and Components" column) (for Primary components see AMR Item 'IV.B3.RP-314)	No	This AMR item is based on the staff's review of MRP-227, Rev. 0, for this component, material, environment, aging effect combination.	N/A
IV.B3.RP-332	IV.B3-17(R-156)	Core support barrel assembly: upper core barrel flange	Stainless steel	Reactor coolant and neutron flux	Loss of material due to wear	XI.M16A, "PWR Vessel Internals" Existing Program components (identified in the "Structure and Components" column) no Expansion components	No	This AMR item is based on the staff's review of MRP-227, Rev. 0, for this component, material, environment, aging effect combination.	N/A
IV.B3.RP-334	IV.B3-23(R-	Lower support structure: A286	Stainless steel	Reactor coolant and neutron flux	Cracking due to IASCC and	XI.M2, "Water Chemistry," and	No	This AMR item is based on the staff's	N/A

Table II-7. Changes to Existing GALL Report Rev. 1 Chapter IV AMR Items for Reactor Vessel, Internals, and Reactor Coolant and Their Technical Bases (cells where changes have been made are shown in bold –except for items prefixed by IV.B2, B3 and B4 (refer to the note in Section II.2), see Table II-14 for new definitions related to MRP-227 component categorizations)

Rev. 2 AMR Item No.	Rev. 1 AMR Link	Structures and/or Components	Material	Environment	Aging Effect/ Mechanism	Aging Management Program	Further Evaluation Required	Technical Basis for Changes	Comment No.
	167)	fuel alignment pins (all plants with core shroud assembled with full-height shroud plates)			fatigue	XI.M16A, "PWR Vessel Internals" Existing Program components (identified in the "Structure and Components" column) no Expansion components		review of MRP-227, Rev. 0, for this component, material, environment, aging effect combination.	
IV.B3.RP-335	IV.B3-23(R-167)	Lower support structure: core support column welds, applicable to all plants except those assembled with full-height shroud plates	Stainless steel	Reactor coolant and neutron flux	Cracking due to SCC, IASCC, and fatigue	XI.M2, "Water Chemistry," and XI.M16A, "PWR Vessel Internals" Expansion components (identified in the "Structure and Components" column) (for Primary components see AMR Item IV.B3.RP-327)	No	This AMR item is based on the staff's review of MRP-227, Rev. 0, for this component, material, environment, aging effect combination.	995
IV.B3.RP-336	IV.B3-22(R-170)	Lower support structure: A286 fuel alignment pins (all plants with core shroud	Stainless steel	Reactor coolant and neutron flux	Loss of material due to wear; loss of fracture toughness due to neutron	XI.M16A, "PWR Vessel Internals" Existing Program components (identified in the	No	This AMR item is based on the staff's review of MRP-227, Rev. 0, for this component, material,	N/A

Table II-7. Changes to Existing GALL Report Rev. 1 Chapter IV AMR Items for Reactor Vessel, Internals, and Reactor Coolant and Their Technical Bases (cells where changes have been made are shown in bold –except for items prefixed by IV.B2, B3 and B4 (refer to the note in Section II.2), see Table II-14 for new definitions related to MRP-227 component categorizations)

Rev. 2 AMR Item No.	Rev. 1 AMR Link	Structures and/or Components	Material	Environment	Aging Effect/ Mechanism	Aging Management Program	Further Evaluation Required	Technical Basis for Changes	Comment No.
		assembled in two vertical sections)			irradiation embrittlement; loss of preload due to thermal and irradiation enhanced stress relaxation	"Structure and Components" column) no Expansion components		environment, aging effect combination.	
IV.B3.RP-339	IV.B3-24(R-53)	Reactor vessel internal components	Stainless steel; nickel alloy	Reactor coolant and neutron flux	Cumulative fatigue damage due to fatigue	Fatigue is a TLAA to be evaluated for the period of extended operation. See the SRP 4.3, “Metal Fatigue,” for acceptable methods for meeting the requirements of 10 CFR 54.21(c)(1).	Yes, TLAA	This AMR item is based on the staff’s review of MRP-227, Rev. 0, for this component, material, environment, aging effect combination.	N/A
IV.C2.RP-344	IV.C2-2(R-07)	**Class 1 piping, piping components, and piping elements**	Stainless steel; steel with stainless steel cladding	Reactor coolant	Cracking due to SCC	XI.M1, “ASME Section XI Inservice Inspection, Subsections IWB, IWC, and IWD,” for Class 1 components, XI.M2, “Water	No	Former Line R-07 split in two with Class 1 piping and piping elements (fittings and flanges) assigned to Chapter IV.C2 and primary nozzles, safe ends, and manways assigned to Chapter IV.D1.This change	N/A

Table II-7. Changes to Existing GALL Report Rev. 1 Chapter IV AMR Items for Reactor Vessel, Internals, and Reactor Coolant and Their Technical Bases (cells where changes have been made are shown in bold –except for items prefixed by IV.B2, B3 and B4 (refer to the note in Section II.2), see Table II-14 for new definitions related to MRP-227 component categorizations)

Rev. 2 AMR Item No.	Rev. 1 AMR Link	Structures and/or Components	Material	Environment	Aging Effect/ Mechanism	Aging Management Program	Further Evaluation Required	Technical Basis for Changes	Comment No.
						Chemistry”		provides a clearer distinction between components that are parts of the piping system and components that are parts of the steam generator assembly.	
IV.E.RP-353	IV.E-6(RP-01)	Piping, piping components, and piping elements	Steel	Concrete	None	**None, provided that** **(1) attributes of the concrete are consistent with ACI 318 or ACI 349 (low water-to-cement ratio, low permeability, and adequate air entrainment) as cited in NUREG-1557 and** **(2) plant OE indicates no degradation of the concrete**	**No, if conditions are met.**	The AMP column has been changed to describe the conditions of the concrete that are needed to support a “none-none” conclusion to allow inclusion in the “Common Miscellaneous Material/Environment Combination” (subchapter IV.E). In such “none-none” AMR line-items, no AMPs are required because aging effects are not expected to degrade the ability of the structure or component to perform its intended function	N/A

Table II-7. Changes to Existing GALL Report Rev. 1 Chapter IV AMR Items for Reactor Vessel, Internals, and Reactor Coolant and Their Technical Bases (cells where changes have been made are shown in bold –except for items prefixed by IV.B2, B3 and B4 (refer to the note in Section II.2), see Table II-14 for new definitions related to MRP-227 component categorizations)

Rev. 2 AMR Item No.	Rev. 1 AMR Link	Structures and/or Components	Material	Environment	Aging Effect/ Mechanism	Aging Management Program	Further Evaluation Required	Technical Basis for Changes	Comment No.
								for the extended period of operation.	
IV.D1.RP-36 IV.D2.RP-36	IV.D1-4(R-01) IV.D2-2(R-01)	Instrument penetrations and primary side nozzles; safe ends; welds	Steel (with nickel-alloy cladding); nickel alloy	Reactor coolant	Cracking due to PWSCC	**XI.M1, “ASME Section XI Inservice Inspection, Subsections IWB, IWC, and IWD,” for Class 1 components,** **XI.M2, “Water Chemistry,” and** **XI.M11B, “Cracking of Nickel-Alloy Components and Loss of Material Due to Boric Acid-Induced Corrosion in RCPB Components (PWRs Only)"**	**No**	The staff has approved AMP XI.M11B for license renewal, and this AMP replaces the previous recommendation for a commitment in the FSAR supplement related to this AMR Item.	N/A
IV.D1.RP-367	IV.D1-6(RP-21)	Primary side components: divider plate	Steel (with nickel-alloy cladding); nickel alloy	Reactor coolant	Cracking due to PWSCC	**XI.M2, “Water Chemistry”** **For nickel-alloy divider plate assemblies and associated**	**Yes, detection of aging effects is to be evaluated**	AMP revised to include discussion of nickel-alloy divider plate assemblies and associated welds made of Alloy 600.	877

Table II-7. Changes to Existing GALL Report Rev. 1 Chapter IV AMR Items for Reactor Vessel, Internals, and Reactor Coolant and Their Technical Bases (cells where changes have been made are shown in bold –except for items prefixed by IV.B2, B3 and B4 (refer to the note in Section II.2), see Table II-14 for new definitions related to MRP-227 component categorizations)

Rev. 2 AMR Item No.	Rev. 1 AMR Link	Structures and/or Components	Material	Environment	Aging Effect/ Mechanism	Aging Management Program	Further Evaluation Required	Technical Basis for Changes	Comment No.
						welds made of Alloy 600, effectiveness of the chemistry control program should be verified to ensure that cracking due to PWSCC is not occurring.		Further evaluation was changed from "No" to "Yes." Based on new operating experience, the staff has determined that further evaluation of a plant-specific program may be needed.	
IV.D1.RP-368	IV.D1-12(R-34)	**Steam generator components: upper and lower shell; transition cone; new transition cone closure weld**	Steel	Secondary feedwater or steam	Loss of material due to general, pitting, and crevice corrosion	**XI.M1, “ASME Section XI Inservice Inspection, Subsections IWB, IWC, and IWD,” for Class 2 components, XI.M2, “Water Chemistry” As noted in NRC IN 90-04, if general and pitting corrosion of the shell exists, XI.M1 methods may not be sufficient to detect general**	Yes, detection of aging effects is to be evaluated	Structure was changed to add "new transition cone closure weld." AMP was changed to state that new transition is applicable only to replacement steam generators. The staff has determined that for the added component the aging effect also should be managed by these AMPs.	N/A

Table II-7. Changes to Existing GALL Report Rev. 1 Chapter IV AMR Items for Reactor Vessel, Internals, and Reactor Coolant and Their Technical Bases (cells where changes have been made are shown in bold –except for items prefixed by IV.B2, B3 and B4 (refer to the note in Section II.2), see Table II-14 for new definitions related to MRP-227 component categorizations)

Rev. 2 AMR Item No.	Rev. 1 AMR Link	Structures and/or Components	Material	Environment	Aging Effect/ Mechanism	Aging Management Program	Further Evaluation Required	Technical Basis for Changes	Comment No.
						and pitting corrosion (and the resulting corrosion-fatigue cracking), and additional inspection procedures are to be developed. This issue is limited to Westinghouse Model 44 and 51 Steam Generators where a high stress region exists at the shell to transition cone weld. The new transition is only applicable to replacement recirculating steam generators.			
IV.A1.RP-369	IV.A1-5(R-69)	**Penetrations: CRD stub**	Stainless steel;	Reactor coolant	Cracking due to SCC, IGSCC,	XI.M8, "BWR Penetrations,"	No	Penetrations for bottom head drain line	N/A

Table II-7. Changes to Existing GALL Report Rev. 1 Chapter IV AMR Items for Reactor Vessel, Internals, and Reactor Coolant and Their Technical Bases (cells where changes have been made are shown in bold –except for items prefixed by IV.B2, B3 and B4 (refer to the note in Section II.2), see Table II-14 for new definitions related to MRP-227 component categorizations)

Rev. 2 AMR Item No.	Rev. 1 AMR Link	Structures and/or Components	Material	Environment	Aging Effect/ Mechanism	Aging Management Program	Further Evaluation Required	Technical Basis for Changes	Comment No.
		tubes; in core monitor housings; jet pump instrument; standby liquid control; flux monitor	nickel alloy		cyclic loading	and XI.M2, "Water Chemistry"		are moved to IV.A1.RP-371, where they are managed by AMPs XI.M1 and XI.M2.	
IV.C2.RP-37	IV.C2-21(R-06)	Pressurizer instrumentation penetrations; heater sheaths and sleeves; heater bundle diaphragm plate; manways and flanges	Nickel alloy; nickel-alloy cladding	Reactor coolant	Cracking due to PWSCC	**XI.M1, "ASME Section XI Inservice Inspection, Subsections IWB, IWC, and IWD," for Class 1 components, XI.M2, "Water Chemistry," and XI.M11B, "Cracking of Nickel-Alloy Components and Loss of Material Due to Boric Acid-Induced Corrosion in RCPB Components (PWRs Only)"**	No	The AMP description has been revised to include AMP XI.M11B.The staff has approved AMP XI.M11B for license renewal, and this AMP replaces the previous recommendation for a commitment in the FSAR supplement related to this AMR line.	N/A

Table II-7. Changes to Existing GALL Report Rev. 1 Chapter IV AMR Items for Reactor Vessel, Internals, and Reactor Coolant and Their Technical Bases (cells where changes have been made are shown in bold –except for items prefixed by IV.B2, B3 and B4 (refer to the note in Section II.2), see Table II-14 for new definitions related to MRP-227 component categorizations)

Rev. 2 AMR Item No.	Rev. 1 AMR Link	Structures and/or Components	Material	Environment	Aging Effect/ Mechanism	Aging Management Program	Further Evaluation Required	Technical Basis for Changes	Comment No.
IV.A1.RP-371	IV.A1-5(R-69)	**Penetrations: drain line**	Stainless steel; nickel alloy	Reactor coolant	Cracking due to SCC, IGSCC, cyclic loading	**XI.M1, "ASME Section XI Inservice Inspection, Subsections IWB, IWC, and IWD," and XI.M2, "Water Chemistry"**	No	This revised AMR Item is based on Revision 1 item R-69, which had this component misaligned with AMP XI.M8. This component is included within the scope of AMP XI.M1.	N/A
IV.A2.RP-379	IV.A2-13(R-17)	**External surfaces: reactor vessel top head and bottom head**	Steel	Air with borated water leakage	Loss of material due to boric acid corrosion	**XI.M10, "Boric Acid Corrosion," and XI.M11B, "Cracking of Nickel-Alloy Components and Loss of Material Due to Boric Acid-Induced Corrosion in RCPB Components (PWRs Only)"**	No	Scope of AMP XI.M11B was revised to include managing loss of material for steel external surfaces near nickel-alloy RCPB components. This includes the reactor vessel top and bottom head and steel piping adjacent to dissimilar metal welds.	N/A
IV.C2.RP-380	IV.C2-9(R-17)	**External surfaces: reactor coolant pressure boundary piping or**	Steel	Air with borated water leakage	Loss of material due to boric acid corrosion	**XI.M10, "Boric Acid Corrosion," and XI.M11B, "Cracking of Nickel-Alloy**	No	Scope of AMP XI.M11B was revised to include managing loss of material for steel external surfaces near nickel-alloy	N/A

Table II-7. Changes to Existing GALL Report Rev. 1 Chapter IV AMR Items for Reactor Vessel, Internals, and Reactor Coolant and Their Technical Bases (cells where changes have been made are shown in bold –except for items prefixed by IV.B2, B3 and B4 (refer to the note in Section II.2), see Table II-14 for new definitions related to MRP-227 component categorizations)

Rev. 2 AMR Item No.	Rev. 1 AMR Link	Structures and/or Components	Material	Environment	Aging Effect/ Mechanism	Aging Management Program	Further Evaluation Required	Technical Basis for Changes	Comment No.
		components adjacent to dissimilar metal (Alloy 82/182) welds				**Components and Loss of Material Due to Boric Acid-Induced Corrosion in RCPB Components (PWRs Only)"**		RCPB components. This includes the reactor vessel top and bottom head and steel piping adjacent to dissimilar metal welds.	
IV.B2.RP-382 IV.B3.RP-382 IV.B4.RP-382	IV.B2-26(R-142) IV.B3-22(R-170) IV.B4-42(R-179)	**Reactor vessel internals: core support structure**	**Stainless steel; nickel alloy; cast austenitic stainless steel**	Reactor coolant and neutron flux	**Cracking, or loss of material due to wear**	XI.M1, "ASME Section XI Inservice Inspection, Subsections IWB, IWC, and IWD"	No	ASME Code IWB-3520.2 identifies the relevant conditions that VT-3 is credited for detecting cracked parts, general corrosion and wear. General corrosion is not a concern for the materials used for PWR vessel internals. Therefore, the only applicable relevant conditions that VT-3 could be used for is cracking and wear in PWR vessel internals.	N/A
IV.D1.RP-384	IV.D1-14(RP-14)	**Steam generator structural: U-bend supports including anti-**	**Steel; chrome plated steel; stainless**	Secondary feedwater or steam	**Cracking due to SCC or other mechanism(s)**	XI.M19, "Steam Generators," and XI.M2, "Water Chemistry"	No	Steel was added as a material because cracking has been found in steel components. Specific	N/A

Table II-7. Changes to Existing GALL Report Rev. 1 Chapter IV AMR Items for Reactor Vessel, Internals, and Reactor Coolant and Their Technical Bases (cells where changes have been made are shown in bold –except for items prefixed by IV.B2, B3 and B4 (refer to the note in Section II.2), see Table II-14 for new definitions related to MRP-227 component categorizations)

Rev. 2 AMR Item No.	Rev. 1 AMR Link	Structures and/or Components	Material	Environment	Aging Effect/ Mechanism	Aging Management Program	Further Evaluation Required	Technical Basis for Changes	Comment No.
		vibration bars	**steel; nickel alloy**					mechanism was not identified, but SCC typically does not apply for steel.	
IV.C1.RP-39	IV.C1-6(R-16)	Isolation condenser components	Steel; stainless steel	Reactor coolant	**Loss of material due to general (steel only), pitting, and crevice corrosion**	**XI.M1, "ASME Section XI Inservice Inspection, Subsections IWB, IWC, and IWD," and XI.M2, "Water Chemistry"**	**No**	Further Evaluation Changed from "Yes" to "No." An approved precedent exists for crediting XI.M1 to verify the effectiveness of the "Water Chemistry" program. Oyster Creek SER Section 3.1.2.2.2.2 credited XI.M1 for verification of effectiveness of water chemistry. Dresden SER Section 3.1.2.2.4.3 also credits XI.M1 for verification of effectiveness of "Water Chemistry."	N/A
IV.C2.RP-40	IV.C2-17(R-24)	Pressurizer: spray head	**Nickel alloy**	Reactor coolant	Cracking due to SCC, PWSCC	**XI.M2, "Water Chemistry," and XI.M32, "One-Time Inspection"**	**No**	Revised previous AMR Item into two Items, one for stainless steel and the other for nickel alloy. Deleted further evaluation statement	N/A

Table II-7. Changes to Existing GALL Report Rev. 1 Chapter IV AMR Items for Reactor Vessel, Internals, and Reactor Coolant and Their Technical Bases (cells where changes have been made are shown in bold –except for items prefixed by IV.B2, B3 and B4 (refer to the note in Section II.2), see Table II-14 for new definitions related to MRP-227 component categorizations)

Rev. 2 AMR Item No.	Rev. 1 AMR Link	Structures and/or Components	Material	Environment	Aging Effect/ Mechanism	Aging Management Program	Further Evaluation Required	Technical Basis for Changes	Comment No.
								related to applicant's commitment. Separated R-24 into two AMR Items because aging effects are different between nickel alloy and stainless steel. An approved precedent exists for accepting "One-Time Inspection" program as verification of effectiveness of "Water Chemistry" program (e.g., TMI-1 SER).	
IV.C2.RP-41	IV.C2-17(R-24)	Pressurizer: spray head	**Stainless Steel**	Reactor coolant	**Cracking due to SCC**	XI.M2, "Water Chemistry," and XI.M32, "One-Time Inspection"	**No**	Separated R-24 into two AMR Items because aging effects are different between nickel alloy and stainless steel. Deleted further evaluation information related to commitment associated with nickel alloy.	N/A
IV.C1.RP-42	IV.C1-12(R-26)	**Closure bolting**	**Steel; stainless steel**	**Air with reactor coolant leakage**	**Loss of material due to general (steel**	XI.M18, "Bolting Integrity"	No	Component was changed from "Pump and valve closure	N/A

Table II-7. Changes to Existing GALL Report Rev. 1 Chapter IV AMR Items for Reactor Vessel, Internals, and Reactor Coolant and Their Technical Bases (cells where changes have been made are shown in bold –except for items prefixed by IV.B2, B3 and B4 (refer to the note in Section II.2), see Table II-14 for new definitions related to MRP-227 component categorizations)

Rev. 2 AMR Item No.	Rev. 1 AMR Link	Structures and/or Components	Material	Environment	Aging Effect/ Mechanism	Aging Management Program	Further Evaluation Required	Technical Basis for Changes	Comment No.
					only), pitting, and crevice corrosion or wear			bolting" to "Closure bolting." Material was changed to include "Stainless steel." Environment was changed to "Air with reactor coolant leakage" because this environment relates more closely to the aging effect requiring management (AERM). AERM was changed to list additional mechanisms of "general (steel only), pitting, and crevice corrosion" in addition to "wear." Component description is more generally applicable. Bolts may be either stainless steel or steel.	
IV.C1.RP-43	IV.C1-10(R-27)	**Closure bolting**	**Steel; stainless steel**	**Air**	Loss of preload due to thermal effects, gasket creep, and self-loosening	XI.M18, "Bolting Integrity"	No	Component was changed from "Pump and valve closure bolting" to "Closure bolting." Material was changed to include "Stainless steel."	N/A

Table II-7. Changes to Existing GALL Report Rev. 1 Chapter IV AMR Items for Reactor Vessel, Internals, and Reactor Coolant and Their Technical Bases (cells where changes have been made are shown in bold –except for items prefixed by IV.B2, B3 and B4 (refer to the note in Section II.2), see Table II-14 for new definitions related to MRP-227 component categorizations)

Rev. 2 AMR Item No.	Rev. 1 AMR Link	Structures and/or Components	Material	Environment	Aging Effect/ Mechanism	Aging Management Program	Further Evaluation Required	Technical Basis for Changes	Comment No.
								Environment was changed from "system temperature up to 288^{o} C" to "Air." Closure bolting is a more general description. Loss of preload can occur with both steel and stainless steel bolts. Environment changed for consistency with other bolting environments.	
IV.C1.RP-44	IV.C1-11(R-28)	Pump and valve closure bolting	**Steel; stainless steel**	System temperature up to 288°C (550°F)	Cumulative fatigue damage due to fatigue	Fatigue is a TLAA evaluated for the period of extended operation; check ASME Code limits for allowable cycles (<7000 cycles) of thermal stress range.(SRP Sec 4.3, “Metal Fatigue,” for acceptable methods to comply with 10 CFR 54.21(c)(1))	Yes, TLAA	Material was changed to include "Stainless steel." The same aging effect applies for stainless steel pump and valve closure bolting.	N/A

Table II-7. Changes to Existing GALL Report Rev. 1 Chapter IV AMR Items for Reactor Vessel, Internals, and Reactor Coolant and Their Technical Bases (cells where changes have been made are shown in bold –except for items prefixed by IV.B2, B3 and B4 (refer to the note in Section II.2), see Table II-14 for new definitions related to MRP-227 component categorizations)

Rev. 2 AMR Item No.	Rev. 1 AMR Link	Structures and/or Components	Material	Environment	Aging Effect/ Mechanism	Aging Management Program	Further Evaluation Required	Technical Basis for Changes	Comment No.
IV.D1.RP-46 IV.D2.RP-46	IV.D1-10(R-32) IV.D2-6(R-32)	Closure bolting	**Steel; stainless steel**	**Air – indoor, uncontrolled (External)**	Loss of preload due to thermal effects, gasket creep, and self-loosening	XI.M18, "Bolting Integrity"	No	Material was revised to include "Stainless steel." Material was changed because loss of preload can occur with both steel and stainless steel bolts. Environment was revised to be "Air - indoor, uncontrolled (external)." Environment was changed for consistency with other bolting environments.	N/A
IV.D2.RP-47	IV.D2-4(R-35)	**Primary side components: upper and lower heads, and tube sheet welds exposed to reactor coolant**	Steel (with stainless steel or nickel-alloy cladding)	Reactor coolant	Cracking due to SCC, PWSCC	**XI.M1, "ASME Section XI Inservice Inspection, Subsections IWB, IWC, and IWD," for Class 1 components,** **XI.M2, "Water Chemistry"**	**No**	AMP description was revised to delete the commitment that is related to nickel alloy pressure boundary components such as reactor vessel penetrations, nozzles and safe ends. The component description was also clarified. This AMR result applies only for nickel-alloy cladding, which is not nickel-alloy pressure	N/A

Table II-7. Changes to Existing GALL Report Rev. 1 Chapter IV AMR Items for Reactor Vessel, Internals, and Reactor Coolant and Their Technical Bases (cells where changes have been made are shown in bold –except for items prefixed by IV.B2, B3 and B4 (refer to the note in Section II.2), see Table II-14 for new definitions related to MRP-227 component categorizations)

Rev. 2 AMR Item No.	Rev. 1 AMR Link	Structures and/or Components	Material	Environment	Aging Effect/ Mechanism	Aging Management Program	Further Evaluation Required	Technical Basis for Changes	Comment No.
								boundary material; therefore, the additional commitment related to nickel-alloy pressure boundary material is no longer needed.	
IV.D1.RP-48	IV.D1-16(R-41)	Steam generator structural: tube support lattice bars	Steel	Secondary feedwater or steam	**Wall thinning due to flow-accelerated corrosion (FAC) and general corrosion**	**XI.M19, “Steam Generators,” and XI.M2, “Water Chemistry”**	No	AERM was changed to add mechanism of general corrosion. AMP XI.M19 title was changed from "Steam Generator Tube Integrity" to "Steam Generators." Scope of the AMP was expanded to include more than the steam generator tubes.	N/A
IV.D1.RP-49	IV.D1-26(R-51)	Upper assembly and separators, including: feedwater inlet ring and support	Steel	Secondary feedwater or steam	Wall thinning due to flow-accelerated corrosion	**XI.M19, “Steam Generators,” and XI.M2, “Water Chemistry”**	**No**	AMP was changed from "plant-specific" to “XI.M19” and “XI.M2.” “Further Evaluation” was changed from "Yes" to "No." The scope of AMP XI.M19 was revised to include these components and management of this aging effect/ mechanism.	N/A

Table II-7. Changes to Existing GALL Report Rev. 1 Chapter IV AMR Items for Reactor Vessel, Internals, and Reactor Coolant and Their Technical Bases (cells where changes have been made are shown in bold –except for items prefixed by IV.B2, B3 and B4 (refer to the note in Section II.2), see Table II-14 for new definitions related to MRP-227 component categorizations)

Rev. 2 AMR Item No.	Rev. 1 AMR Link	Structures and/or Components	Material	Environment	Aging Effect/ Mechanism	Aging Management Program	Further Evaluation Required	Technical Basis for Changes	Comment No.
IV.A1.RP-50	IV.A1-11(R-59)	Top head enclosure (without cladding): top head; nozzles (vent, top head spray or RCIC, and spare)	Steel	Reactor coolant	Loss of material due to general, pitting, and crevice corrosion	**XI.M2, "Water Chemistry," and XI.M32, "One-Time Inspection"**	**No**	"Further Evaluation" changed from "Yes" to "No." An approved precedent exists for accepting a "One-Time Inspection" program to verify effectiveness of the "Water Chemistry" program. As shown in Pilgrim Nuclear Power Station SER, Section 3.1.2.2.2, the staff has accepted the position that a "One-Time Inspection" program consistent with GALL AMP XI.M32 is capable of detecting the aging effect(s) in this AMR Item.	N/A
IV.A1.RP-51	IV.A1-9(R-60)	Top head enclosure: closure studs and nuts	**High-strength, low-alloy steel**	Air with reactor coolant leakage	Cracking due to SCC, IGSCC	XI.M3, "Reactor Head Closure Stud Bolting"	No	"Material" was revised to delete the condition related to maximum tensile strength. In NUREG-1339 and RG 1.65, Revision 1, the staff has recommended that actual measured yield strength of high-	N/A

Table II-7. Changes to Existing GALL Report Rev. 1 Chapter IV AMR Items for Reactor Vessel, Internals, and Reactor Coolant and Their Technical Bases (cells where changes have been made are shown in bold –except for items prefixed by IV.B2, B3 and B4 (refer to the note in Section II.2), see Table II-14 for new definitions related to MRP-227 component categorizations)

Rev. 2 AMR Item No.	Rev. 1 AMR Link	Structures and/or Components	Material	Environment	Aging Effect/ Mechanism	Aging Management Program	Further Evaluation Required	Technical Basis for Changes	Comment No.
								strength, low-alloy bolting material not exceed 1,034 MPa (150 ksi) to reduce the potential for SCC and IGSCC. This recommended limit for high-strength bolting material is stated in AMP XI.M3, and therefore is not repeated in this AMR Item.	
IV.A2.RP-52	IV.A2-2(R-71)	Closure head: stud assembly	**High-strength, low-alloy steel**	Air with reactor coolant leakage	Cracking due to SCC	XI.M3, “Reactor Head Closure Stud Bolting”	No	“Material” was revised to delete the condition related to maximum tensile strength. In NUREG-1339 and RG 1.65, Revision 1, the staff has recommended that actual measured yield strength of high-strength, low-alloy bolting material not exceed 1,034 MPa (150 ksi) to reduce the potential for SCC and IGSCC. This recommended limit for high-strength bolting	N/A

Table II-7. Changes to Existing GALL Report Rev. 1 Chapter IV AMR Items for Reactor Vessel, Internals, and Reactor Coolant and Their Technical Bases (cells where changes have been made are shown in bold –except for items prefixed by IV.B2, B3 and B4 (refer to the note in Section II.2), see Table II-14 for new definitions related to MRP-227 component categorizations)

Rev. 2 AMR Item No.	Rev. 1 AMR Link	Structures and/or Components	Material	Environment	Aging Effect/ Mechanism	Aging Management Program	Further Evaluation Required	Technical Basis for Changes	Comment No.
								material is stated in AMP XI.M3, and therefore is not repeated in this AMR Item.	
IV.A2.RP-53 IV.B4.RP-53	IV.A2-3(R-72)	Closure head: stud assembly	**High-strength, low-alloy steel**	Air with reactor coolant leakage	**Loss of material due to general, pitting, and crevice corrosion or wear**	XI.M3, “Reactor Head Closure Stud Bolting”	No	In NUREG-1339 and RG 1.65, Revision 1, the staff has recommended that actual measured yield strength of high-strength, low-alloy bolting material not exceed 1,034 MPa (150 ksi) to reduce the potential for SCC and IGSCC. This recommended limit for high-strength bolting material is stated in AMP XI.M3, and therefore is not repeated in this AMR Item. Also, this aging effect is not dependent on the yield strength of the bolting material. These additional aging mechanisms for loss of material in	N/A

Table II-7. Changes to Existing GALL Report Rev. 1 Chapter IV AMR Items for Reactor Vessel, Internals, and Reactor Coolant and Their Technical Bases (cells where changes have been made are shown in bold –except for items prefixed by IV.B2, B3 and B4 (refer to the note in Section II.2), see Table II-14 for new definitions related to MRP-227 component categorizations)

Rev. 2 AMR Item No.	Rev. 1 AMR Link	Structures and/or Components	Material	Environment	Aging Effect/ Mechanism	Aging Management Program	Further Evaluation Required	Technical Basis for Changes	Comment No.
								these components have been cited by previous applicants and acknowledged by the staff in the associated safety evaluations (e.g., SER for TMI, Unit 1, Section 3.0.3.2.3).	
IV.A2.RP-54	IV.A2-4(R-73)	Closure head: stud assembly	**High-strength, low-alloy steel**	Air with reactor coolant leakage	Cumulative fatigue damage due to fatigue	Fatigue is a TLAA to be evaluated for the period of extended operation. See the SRP, 4.3, “Metal Fatigue,” for acceptable methods for meeting the requirements of 10 CFR 54.21(c)(1).	Yes, TLAA	“Material” was changed to add the words "high strength." Material properties may affect the fatigue calculations; also changed for consistency with other closure head stud assembly AMR Item.	N/A
IV.A2.RP-55	IV.A2-11(R-76)	CRD head penetration: pressure housing	Stainless steel; nickel alloy	Reactor coolant	Cracking due to SCC, PWSCC	**XI.M1, “ASME Section XI Inservice Inspection, Subsections IWB, IWC, and IWD,” for Class 1 components,**	**No**	AMPs XI.M1 and XI.M2 provide adequate aging management for these components. The previous reference to an additional commitment is no	N/A

Table II-7. Changes to Existing GALL Report Rev. 1 Chapter IV AMR Items for Reactor Vessel, Internals, and Reactor Coolant and Their Technical Bases (cells where changes have been made are shown in bold –except for items prefixed by IV.B2, B3 and B4 (refer to the note in Section II.2), see Table II-14 for new definitions related to MRP-227 component categorizations)

Rev. 2 AMR Item No.	Rev. 1 AMR Link	Structures and/or Components	Material	Environment	Aging Effect/ Mechanism	Aging Management Program	Further Evaluation Required	Technical Basis for Changes	Comment No.
						XI.M2, "Water Chemistry"		longer needed. AMP XI.M11B is not applicable for stainless steel.	
IV.A2.RP-57	IV.A2-12(R-88)	Core support pads; core guide lugs	Nickel alloy	Reactor coolant	Cracking due to PWSCC	**XI.M1, "ASME Section XI Inservice Inspection, Subsections IWB, IWC, and IWD," for Class 1 components, and XI.M2, "Water Chemistry"**	**No**	The AMP description has been revised to delete the commitment, which is not intended for reactor vessel internals.	N/A
IV.A2.RP-59	IV.A2-19(R-89)	Penetrations: instrument tubes (bottom head)	Nickel alloy	Reactor coolant	Cracking due to PWSCC	**XI.M1, "ASME Section XI Inservice Inspection, Subsections IWB, IWC, and IWD," for Class 1 components, XI.M2, "Water Chemistry," and XI.M11B, "Cracking of Nickel-Alloy Components and Loss of**	**No**	The AMP description has been revised to include AMP XI.M11B. The staff has approved AMP XI.M11B for license renewal, and this AMP replaces the previous recommendation for a commitment in the FSAR supplement related to this AMR Item.	N/A

Table II-7. Changes to Existing GALL Report Rev. 1 Chapter IV AMR Items for Reactor Vessel, Internals, and Reactor Coolant and Their Technical Bases (cells where changes have been made are shown in bold –except for items prefixed by IV.B2, B3 and B4 (refer to the note in Section II.2), see Table II-14 for new definitions related to MRP-227 component categorizations)

Rev. 2 AMR Item No.	Rev. 1 AMR Link	Structures and/or Components	Material	Environment	Aging Effect/ Mechanism	Aging Management Program	Further Evaluation Required	Technical Basis for Changes	Comment No.
						Material Due to Boric Acid-Induced Corrosion in RCPB Components (PWRs Only)"			

Table II-8. Changes to Existing GALL Report Rev. 1 Chapter V AMR Items for Engineered Safety Systems and Their Technical Bases (cells where changes have been made are shown in bold)

Rev. 2 AMR Item No.	Rev. 1 AMR Link	Structures and/or Components	Material	Environment	Aging Effect/ Mechanism	Aging Management Program	Further Evaluation Required	Technical Basis for Changes	Comment No.
V.A.EP-100	V.A-11(EP-39)	Heat exchanger tubes	Copper alloy	Closed-cycle cooling water	Reduction of heat transfer due to fouling	**XI.M21A, "Closed Treated Water Systems"**	No	AMP name was changed because AMP was expanded to encompass other closed treated water environments.	N/A
V.D1.EP-101	V.D2-18(EP-2)	Piping, piping components, and piping elements	Aluminum	Air with borated water leakage	Loss of material due to boric acid corrosion	XI.M10, "Boric Acid Corrosion"	No	This Item replaces the previous Item V.D2-18(EP-2) in Rev.1 that originally should have been associated with subchapter D1. Except for the chapter assignment, technical content of this Item is not changed.	N/A
V.B.EP-111	V.B-9(E-42)	Piping, piping components, and piping elements	**Steel (with coating or wrapping)**	**Soil or concrete**	Loss of material due to general, pitting, crevice, and MIC	**XI.M41, "Buried and Underground Piping and Tanks"**	**No**	"Material" changed from "with or without" to "with" coating or wrapping. New AMP XI.M41 has been issued and applies only to steel with coating or wrapping. Buried piping definition includes soil or concrete environment. For this AMP and this material, further evaluation is not required.	N/A

Table II-8. Changes to Existing GALL Report Rev. 1 Chapter V AMR Items for Engineered Safety Systems and Their Technical Bases (cells where changes have been made are shown in bold)

Rev. 2 AMR Item No.	Rev. 1 AMR Link	Structures and/or Components	Material	Environment	Aging Effect/ Mechanism	Aging Management Program	Further Evaluation Required	Technical Basis for Changes	Comment No.
V.F.EP-112	V.F-17(EP-5)	Piping, piping components, and piping elements	Steel	Concrete	None	**None, provided that (1) attributes of the concrete are consistent with ACI 318 or ACI 349 (low water-to-cement ratio, low permeability, and adequate air entrainment) as cited in NUREG-1557 and (2) plant OE indicates no degradation of the concrete**	**No, if conditions are met.**	The AMP column has been changed to describe the conditions of the concrete that are needed to support a “none-none” conclusion to allow inclusion in the “Common Miscellaneous Material/Environment Combination” (subchapter V.F). In such “none-none” AMR line-items, no AMPs are required because aging effects are not expected to degrade the ability of the structure or component to perform its intended function for the extended period of operation.	N/A
V.D2.EP-113	V.D2-1(E-04)	Drywell and suppression chamber spray system (internal surfaces): flow orifice; spray nozzles	Steel	Air – indoor, uncontrolled (Internal)	**Loss of material due to general corrosion; fouling that leads to corrosion**	A plant-specific aging management program is to be evaluated	Yes, plant-specific	AERM changed to say "fouling that leads to corrosion" for clarification. Fouling can be an indirect contributor to corrosion but does not directly cause loss of material.	NA

Table II-8. Changes to Existing GALL Report Rev. 1 Chapter V AMR Items for Engineered Safety Systems and Their Technical Bases (cells where changes have been made are shown in bold)

Rev. 2 AMR Item No.	Rev. 1 AMR Link	Structures and/or Components	Material	Environment	Aging Effect/ Mechanism	Aging Management Program	Further Evaluation Required	Technical Basis for Changes	Comment No.
V.B.EP-58	V.B-4(E-06)	Elastomer seals and components	Elastomers	Air – indoor, uncontrolled (Internal)	Hardening and loss of strength due to elastomer degradation	**XI.M38, "Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components"**	**No**	AMP was changed from "plant-specific" to XI.M38 for external surfaces; further evaluation was changed from "Yes" to "No." AMP XI.M38 is appropriate for managing this MEAP combination because the scope of AMP XI.M38 was revised to include aging management of elastomer components	N/A
V.B.EP-59	V.B-4(E-06)	Elastomer seals and components	Elastomers	Air – indoor, uncontrolled (External)	Hardening and loss of strength due to elastomer degradation	**XI.M36, "External Surfaces Monitoring of Mechanical Components"**	**No**	AMP was changed from "plant-specific" to XI.M36 for external surfaces; further evaluation was changed from "Yes" to "No." Scope of AMP XI.M36 was revised to include aging management of elastomer components	N/A
V.D2.EP-60	V.D2-33(E-08)	Piping, piping components, and piping elements	Steel	Treated water	Loss of material due to general, pitting, and crevice	**XI.M2, "Water Chemistry," and XI.M32, "One-**	**No**	Text in the AMP column was revised. Further evaluation was changed from "Yes" to "No." An approved	N/A

Table II-8. Changes to Existing GALL Report Rev. 1 Chapter V AMR Items for Engineered Safety Systems and Their Technical Bases (cells where changes have been made are shown in bold)

Rev. 2 AMR Item No.	Rev. 1 AMR Link	Structures and/or Components	Material	Environment	Aging Effect/ Mechanism	Aging Management Program	Further Evaluation Required	Technical Basis for Changes	Comment No.
					corrosion	**Time Inspection”**		precedent exists for accepting “One-Time Inspection” program as verification of effectiveness of “Water Chemistry” program. As shown in DAEC SER, Section 3.2.2.2.8.1, the staff has accepted the position that a “One-Time Inspection” program consistent with GALL AMP XI.M32 is adequate to verify the effectiveness of the “Water Chemistry” program	
V.D2.EP-61	V.D2-35(E-14)	Piping, piping components, and piping elements (Internal surfaces)	Stainless steel	Condensation (Internal)	Loss of material due to pitting and crevice corrosion	**XI.M38, "Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components"**	**No**	AMP was changed from "plant-specific" to XI.M38; “Further Evaluation” was changed from "Yes" to "No." An approved precedent exists for accepting “Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components” program as verification of effectiveness of “Water	N/A

Table II-8. Changes to Existing GALL Report Rev. 1 Chapter V AMR Items for Engineered Safety Systems and Their Technical Bases (cells where changes have been made are shown in bold)

Rev. 2 AMR Item No.	Rev. 1 AMR Link	Structures and/or Components	Material	Environment	Aging Effect/ Mechanism	Aging Management Program	Further Evaluation Required	Technical Basis for Changes	Comment No.
								Chemistry" program. As shown in DAEC (Duane Arnold Energy Center) SER, Section 3.2.2.2.3.6, the staff has accepted the position that the "Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components" program consistent with GALL AMP XI.M38 is adequate to manage the aging effect of loss of material because visual inspections are performed on internal surfaces during surveillance testing or maintenance activities. AMP XI.M38 is revised to include other materials besides steel.	
V.C.EP-62	V.C-6(E-31)	Containment isolation piping and components (Internal surfaces)	Steel	Treated water	Loss of material due to general, pitting, and crevice corrosion	**XI.M2, "Water Chemistry," and XI.M32, "One-Time Inspection"**	**No**	Text in the AMP column was revised. Further evaluation was changed from "Yes" to "No." An approved precedent exists for	N/A

Table II-8. Changes to Existing GALL Report Rev. 1 Chapter V AMR Items for Engineered Safety Systems and Their Technical Bases (cells where changes have been made are shown in bold)

Rev. 2 AMR Item No.	Rev. 1 AMR Link	Structures and/or Components	Material	Environment	Aging Effect/ Mechanism	Aging Management Program	Further Evaluation Required	Technical Basis for Changes	Comment No.
								accepting "One-Time Inspection" program as verification of effectiveness of "Water Chemistry" program. As shown in DAEC SER, Section 3.2.2.2.8.2, the staff has accepted the position that a "One-Time Inspection" program consistent with GALL AMP XI.M32 is adequate to verify the effectiveness of the "Water Chemistry" program	
V.C.EP-63	V.C-4(E-33)	Containment isolation piping and components (Internal surfaces)	Stainless steel	Treated water	Loss of material due to pitting and crevice corrosion	**XI.M2, "Water Chemistry," and XI.M32, "One-Time Inspection"**	**No**	Text in the AMP column was revised. Further evaluation was changed from "Yes" to "No." An approved precedent exists for accepting "One-Time Inspection" program as verification of effectiveness of "Water Chemistry" program. As shown in DAEC SER Section 3.2.2.2.3.1, the staff has accepted the position that a "One-	N/A

Table II-8. Changes to Existing GALL Report Rev. 1 Chapter V AMR Items for Engineered Safety Systems and Their Technical Bases (cells where changes have been made are shown in bold)

Rev. 2 AMR Item No.	Rev. 1 AMR Link	Structures and/or Components	Material	Environment	Aging Effect/ Mechanism	Aging Management Program	Further Evaluation Required	Technical Basis for Changes	Comment No.
								Time Inspection" program consistent with GALL AMP XI.M32 is adequate to verify the effectiveness of the "Water Chemistry" program	
V.E.EP-64	V.E-1(EP-1)	Bolting	**Steel; stainless steel**	Air – outdoor (External)	**Loss of material due to general (steel only), pitting, and crevice corrosion**	XI.M18, "Bolting Integrity"	No	"Material" was changed from "Steel" to "Steel; stainless steel." AERM was changed to say "due to general (steel only)...corrosion" rather than "due to general ... corrosion" because general corrosion does not apply to stainless steel in this environment. Bolting may be either steel or stainless steel. The aging effects and mechanisms are applicable in the stated environment	N/A
V.E.EP-69	V.E-5(EP-24)	Closure bolting	**Steel; stainless steel**	Air – indoor, uncontrolled (External)	Loss of preload due to thermal effects, gasket creep, and	XI.M18, "Bolting Integrity"	No	"Material" was changed from "Steel" to "Steel; stainless steel." Loss of preload can occur with both steel and stainless steel bolts.	N/A

Table II-8. Changes to Existing GALL Report Rev. 1 Chapter V AMR Items for Engineered Safety Systems and Their Technical Bases (cells where changes have been made are shown in bold)

Rev. 2 AMR Item No.	Rev. 1 AMR Link	Structures and/or Components	Material	Environment	Aging Effect/ Mechanism	Aging Management Program	Further Evaluation Required	Technical Basis for Changes	Comment No.
					self-loosening				
V.E.EP-70	V.E-4(EP-25)	Closure bolting	**Steel; stainless steel**	Air – indoor, uncontrolled (External)	**Loss of material due to general (steel only), pitting, and crevice corrosion**	XI.M18, "Bolting Integrity"	No	“Material” was changed from "Steel" to "Steel; stainless steel." AERM was changed to say "due to general (steel only)...corrosion" rather than "due to general ... corrosion" because general corrosion does not apply to stainless steel in this environment. Bolting may be either steel or stainless steel. The aging effects and mechanisms are applicable in the stated environment	N/A
V.D2.EP-71	V.D2-19(EP-26)	Piping, piping components, and piping elements	Aluminum	Treated water	Loss of material due to pitting and crevice corrosion	**XI.M2, “Water Chemistry,” and XI.M32, “One-Time Inspection”**	**No**	Text in the AMP column was revised. Further evaluation was changed from "Yes" to "No." An approved precedent exists for accepting “One-Time Inspection” program as verification of effectiveness of “Water Chemistry” program. As	N/A

Table II-8. Changes to Existing GALL Report Rev. 1 Chapter V AMR Items for Engineered Safety Systems and Their Technical Bases (cells where changes have been made are shown in bold)

Rev. 2 AMR Item No.	Rev. 1 AMR Link	Structures and/or Components	Material	Environment	Aging Effect/ Mechanism	Aging Management Program	Further Evaluation Required	Technical Basis for Changes	Comment No.
								shown in TMI SER, Section 3.2.2.2.3.3, the staff has accepted the position that a "One-Time Inspection" program consistent with GALL AMP XI.M32 is adequate to verify the effectiveness of the "Water Chemistry" program	
V.D1.EP-72 V.D2.EP-72	V.D1-26(EP-31) V.D2-27(EP-31)	Piping, piping components, and piping elements	Stainless steel	**Soil or concrete**	Loss of material due to pitting and crevice corrosion	**XI.M41, "Buried and Underground Piping and Tanks"**	No	New AMP XI.M41 was issued and buried piping definition includes soil or concrete environment. No Further evaluation is needed.	N/A
V.D2.EP-73	V.D2-28(EP-32)	Piping, piping components, and piping elements	Stainless steel	Treated water	Loss of material due to pitting and crevice corrosion	**XI.M2, "Water Chemistry," and** **XI.M32, "One-Time Inspection"**	**No**	Text in the AMP column was revised. Further evaluation changed from "Yes" to "No." An approved precedent exists for accepting "One-Time Inspection" program as verification of effectiveness of "Water Chemistry" program. As shown in DAEC SER, Section 3.2.2.2.3.3, the staff	N/A

Table II-8. Changes to Existing GALL Report Rev. 1 Chapter V AMR Items for Engineered Safety Systems and Their Technical Bases (cells where changes have been made are shown in bold)

Rev. 2 AMR Item No.	Rev. 1 AMR Link	Structures and/or Components	Material	Environment	Aging Effect/ Mechanism	Aging Management Program	Further Evaluation Required	Technical Basis for Changes	Comment No.
								has accepted the position that a "One-Time Inspection" program consistent with GALL AMP XI.M32 is adequate to verify the effectiveness of the "Water Chemistry" program	
V.A.EP-74 V.D2.EP-74	V.A-16(EP-34) V.D2-13(EP-34)	Heat exchanger tubes	Stainless steel	Treated water	Reduction of heat transfer due to fouling	**XI.M2, "Water Chemistry," and XI.M32, "One-Time Inspection"**	**No**	Text in the AMP column was revised. Further evaluation was changed from "Yes" to "No." An approved precedent exists for accepting "One-Time Inspection" program as verification of effectiveness of "Water Chemistry" program. As shown in DAEC SER, Section 3.2.2.2.4.2, the staff has accepted the position that a "One-Time Inspection" program consistent with GALL AMP XI.M32 is adequate to verify the effectiveness of the "Water Chemistry" program	N/A

Table II-8. Changes to Existing GALL Report Rev. 1 Chapter V AMR Items for Engineered Safety Systems and Their Technical Bases (cells where changes have been made are shown in bold)

Rev. 2 AMR Item No.	Rev. 1 AMR Link	Structures and/or Components	Material	Environment	Aging Effect/ Mechanism	Aging Management Program	Further Evaluation Required	Technical Basis for Changes	Comment No.
V.A.EP-75 V.D1.EP-75 V.D2.EP-75	V.A-17(EP-40) V.D1-12(EP-40) V.D2-14(EP-40)	Heat exchanger tubes	Steel	Lubricating oil	Reduction of heat transfer due to fouling	**XI.M39, "Lubricating Oil Analysis," and** **XI.M32, "One-Time Inspection"**	**No**	Text in the AMP column was revised. Further evaluation was changed from "Yes" to "No." An approved precedent exists for accepting "One-Time Inspection" program as verification of effectiveness of "Lubricating Oil Analysis" program. As shown in WCGS SER, Section 3.2.2.2.4.1, the staff has accepted the position that a "One-Time Inspection " program consistent with GALL AMP XI.M32 is adequate to verify the effectiveness of the "Lubricating Oil Analysis" program	N/A
V.A.EP-76 V.D1.EP-76 V.D2.EP-76	V.A-21(EP-45) V.D1-19(EP-45) V.D2-22(EP-45)	Piping, piping components, and piping elements	Copper alloy	Lubricating oil	Loss of material due to pitting and crevice corrosion	**XI.M39, "Lubricating Oil Analysis," and** **XI.M32, "One-Time Inspection"**	**No**	Text in the AMP column was revised. Further evaluation was changed from "Yes" to "No." An approved precedent exists for accepting "One-Time Inspection" program as	N/A

Table II-8. Changes to Existing GALL Report Rev. 1 Chapter V AMR Items for Engineered Safety Systems and Their Technical Bases (cells where changes have been made are shown in bold)

Rev. 2 AMR Item No.	Rev. 1 AMR Link	Structures and/or Components	Material	Environment	Aging Effect/ Mechanism	Aging Management Program	Further Evaluation Required	Technical Basis for Changes	Comment No.
								verification of effectiveness of “Lubricating Oil Analysis” program. As shown in WCGS SER, Section 3.2.2.2.3.4, the staff has accepted the position that a “One-Time Inspection” program consistent with GALL AMP XI.M32 is adequate to verify the effectiveness of the “Lubricating Oil Analysis” program	
V.A.EP-77 V.D1.EP-77 V.D2.EP-77	V.A-25(EP-46) V.D1-28(EP-46) V.D2-30(EP-46)	Piping, piping components, and piping elements	Steel	Lubricating oil	Loss of material due to general, pitting, and crevice corrosion	**XI.M39, "Lubricating Oil Analysis," and** **XI.M32, “One-Time Inspection”**	**No**	Text in the AMP column was revised. Further evaluation was changed from "Yes" to "No." An approved precedent exists for accepting “One-Time Inspection” program as verification of effectiveness of “Lubricating Oil Analysis” program. As shown in DAEC SER, Section 3.2.2.2.8.3, the staff has accepted the position that a “One-	N/A

Table II-8. Changes to Existing GALL Report Rev. 1 Chapter V AMR Items for Engineered Safety Systems and Their Technical Bases (cells where changes have been made are shown in bold)

Rev. 2 AMR Item No.	Rev. 1 AMR Link	Structures and/or Components	Material	Environment	Aging Effect/ Mechanism	Aging Management Program	Further Evaluation Required	Technical Basis for Changes	Comment No.
								Time Inspection" program consistent with GALL AMP XI.M32 is adequate to verify the effectiveness of the "Lubricating Oil Analysis" program	
V.A.EP-78 V.D1.EP-78 V.D2.EP-78	V.A-12(EP-47) V.D1-8(EP-47) V.D2-9(EP-47)	Heat exchanger tubes	Copper alloy	Lubricating oil	Reduction of heat transfer due to fouling	**XI.M39, "Lubricating Oil Analysis," and** **XI.M32, "One-Time Inspection"**	**No**	Text in the AMP column was revised. Further evaluation was changed from "Yes" to "No." An approved precedent exists for accepting "One-Time Inspection" program as verification of effectiveness of "Lubricating Oil Analysis" program. As shown in WCGS SER, Section 3.2.2.2.4.1, the staff has accepted the position that a "One-Time Inspection" program consistent with GALL AMP XI.M32 is adequate to verify the effectiveness of the "Lubricating Oil Analysis" program	N/A
V.A.EP-	V.A-	Heat exchanger	Stainless	Lubricating oil	Reduction of	**XI.M39,**	**No**	Text in the AMP column	N/A

Table II-8. Changes to Existing GALL Report Rev. 1 Chapter V AMR Items for Engineered Safety Systems and Their Technical Bases (cells where changes have been made are shown in bold)

Rev. 2 AMR Item No.	Rev. 1 AMR Link	Structures and/or Components	Material	Environment	Aging Effect/ Mechanism	Aging Management Program	Further Evaluation Required	Technical Basis for Changes	Comment No.
79 V.D1.EP-79 V.D2.EP-79	14(EP-50) V.D1-10(EP-50) V.D2-11(EP-50)	tubes	steel		heat transfer due to fouling	**"Lubricating Oil Analysis," and XI.M32, "One-Time Inspection"**		was revised. Further evaluation was changed from "Yes" to "No." An approved precedent exists for accepting "One-Time Inspection" program as verification of effectiveness of "Lubricating Oil Analysis" program. As shown in WCGS SER, Section 3.2.2.2.4.1, the staff has accepted the position that a "One-Time Inspection" program consistent with GALL AMP XI.M32 is adequate to verify the effectiveness of the "Lube Oil Analysis" program	
V.D1.EP-80	V.D1-24(EP-51)	Piping, piping components, and piping elements	Stainless steel	Lubricating oil	Loss of material due to pitting and crevice corrosion	**XI.M39, "Lubricating Oil Analysis," and XI.M32, "One-Time Inspection"**	**No**	Text in the AMP column was revised. Further Evaluation was changed from "Yes" to "No." An approved precedent exists for accepting "One-Time Inspection" program as verification of	N/A

Table II-8. Changes to Existing GALL Report Rev. 1 Chapter V AMR Items for Engineered Safety Systems and Their Technical Bases (cells where changes have been made are shown in bold)

Rev. 2 AMR Item No.	Rev. 1 AMR Link	Structures and/or Components	Material	Environment	Aging Effect/ Mechanism	Aging Management Program	Further Evaluation Required	Technical Basis for Changes	Comment No.
								effectiveness of "Lubricating Oil Analysis" program. As shown in WCGS SER, Section 3.2.2.2.3.4, the staff has accepted the position that a "One-Time Inspection" program consistent with GALL AMP XI.M32 is adequate to verify the effectiveness of the "Lubricating Oil Analysis" program	
V.A.EP-81 V.D1.EP-81	V.A-26(EP-53) V.D1-29(EP-53)	Piping, piping components, and piping elements (Internal surfaces); tanks	Stainless steel	Condensation (Internal)	Loss of material due to pitting and crevice corrosion	**XI.M38, "Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components"**	**No**	AMP was changed from "plant-specific" to XI.M38, and further evaluation was changed from "Yes" to "No." An approved precedent exists for accepting "Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components" program as verification of effectiveness of "Water Chemistry" program. As shown in DAEC SER, Section 3.2.2.2.3.3, the	N/A

Table II-8. Changes to Existing GALL Report Rev. 1 Chapter V AMR Items for Engineered Safety Systems and Their Technical Bases (cells where changes have been made are shown in bold)

Rev. 2 AMR Item No.	Rev. 1 AMR Link	Structures and/or Components	Material	Environment	Aging Effect/ Mechanism	Aging Management Program	Further Evaluation Required	Technical Basis for Changes	Comment No.
								staff has accepted the position that the “Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components” program consistent with GALL AMP XI.M38 is adequate to manage the aging effect of loss of material because visual inspections are performed on internal surfaces during surveillance testing or maintenance activities. AMP XI.M38 is revised to include other materials besides steel.	
V.A.EP-90 V.D1.EP-90 V.D2.EP-90	V.A-10(E-18) V.D1-7(E-18) V.D2-8(E-18)	Heat exchanger components	Steel	Raw water	**Loss of material due to general, pitting, crevice, and MIC; fouling that leads to corrosion**	XI.M20, "Open-Cycle Cooling Water System"	No	AERM was changed to say "fouling that leads to corrosion" for clarification. “Fouling” can be an indirect contributor to corrosion but does not directly cause loss of material.	N/A
V.A.EP-	V.A-	Heat exchanger	Stainless	Raw water	**Loss of**	XI.M20, "Open-	No	AERM was changed to	N/A

Table II-8. Changes to Existing GALL Report Rev. 1 Chapter V AMR Items for Engineered Safety Systems and Their Technical Bases (cells where changes have been made are shown in bold)

Rev. 2 AMR Item No.	Rev. 1 AMR Link	Structures and/or Components	Material	Environment	Aging Effect/ Mechanism	Aging Management Program	Further Evaluation Required	Technical Basis for Changes	Comment No.
91 V.D1.EP-91 V.D2.EP-91	8(E-20) V.D1-5(E-20) V.D2-6(E-20)	components	steel		**material due to pitting, crevice, and MIC; fouling that leads to corrosion**	Cycle Cooling Water System"		say "fouling that leads to corrosion" for clarification. "Fouling" can be an indirect contributor to corrosion but does not directly cause loss of material.	
V.A.EP-92 V.D1.EP-92 V.D2.EP-92	V.A-9(E-17) V.D1-6(E-17) V.D2-7(E-17)	Heat exchanger components	Steel	Closed-cycle cooling water	Loss of material due to general, pitting, crevice, and galvanic corrosion	**XI.M21A, "Closed Treated Water Systems"**	No	AMP name was changed because AMP was expanded to encompass other closed, treated water environments.	N/A
V.A.EP-93 V.D1.EP-93 V.D2.EP-93	V.A-7(E-19) V.D1-4(E-19) V.D2-5(E-19)	Heat exchanger components	Stainless steel	Closed-cycle cooling water	Loss of material due to pitting and crevice corrosion	**XI.M21A, "Closed Treated Water Systems"**	No	AMP name was changed because AMP was expanded to encompass other closed, treated water environments.	N/A
V.A.EP-94 V.D1.EP-94 V.D2.EP-94	V.A-5(EP-13) V.D1-2(EP-13) V.D2-3(EP-	Heat exchanger components	Copper alloy	Closed-cycle cooling water	Loss of material due to pitting, crevice, and galvanic corrosion	**XI.M21A, "Closed Treated Water Systems"**	No	AMP name was changed because AMP was expanded to encompass other closed, treated water environments.	N/A

Table II-8. Changes to Existing GALL Report Rev. 1 Chapter V AMR Items for Engineered Safety Systems and Their Technical Bases (cells where changes have been made are shown in bold)

Rev. 2 AMR Item No.	Rev. 1 AMR Link	Structures and/or Components	Material	Environment	Aging Effect/ Mechanism	Aging Management Program	Further Evaluation Required	Technical Basis for Changes	Comment No.
	13)								
V.A.EP-95 V.C.EP-95 V.D1.EP-95 V.D2.EP-95	V.A-23(EP-33) V.C-7(EP-33) V.D1-22(EP-33) V.D2-25(EP-33)	Piping, piping components, and piping elements	Stainless steel	Closed-cycle cooling water	Loss of material due to pitting and crevice corrosion	**XI.M21A, "Closed Treated Water Systems"**	No	AMP name was changed because AMP was expanded to encompass other closed treated water environments.	N/A
V.A.EP-96 V.D1.EP-96 V.D2.EP-96	V.A-13(EP-35) V.D1-19(EP-35) V.D2-10(EP-35)	Heat exchanger tubes	Stainless steel	Closed-cycle cooling water	Reduction of heat transfer due to fouling	**XI.M21A, "Closed Treated Water Systems"**	No	AMP name was changed because AMP was expanded to encompass other closed, treated water environments.	N/A
V.A.EP-97 V.B.EP-97 V.D1.EP-97 V.D2.EP-97	V.A-20(EP-36) V.B-6(EP-36) V.D1-17(EP-36) V.D2-21(EP-36)	Piping, piping components, and piping elements	Copper alloy	Closed-cycle cooling water	Loss of material due to pitting, crevice, and galvanic corrosion	**XI.M21A, "Closed Treated Water Systems"**	No	AMP name was changed because AMP was expanded to encompass other closed, treated water environments.	N/A

Table II-8. Changes to Existing GALL Report Rev. 1 Chapter V AMR Items for Engineered Safety Systems and Their Technical Bases (cells where changes have been made are shown in bold)

Rev. 2 AMR Item No.	Rev. 1 AMR Link	Structures and/or Components	Material	Environment	Aging Effect/ Mechanism	Aging Management Program	Further Evaluation Required	Technical Basis for Changes	Comment No.
V.A.EP-98 V.C.EP-98 V.D1.EP-98 V.D2.EP-98	V.A-24(EP-44) V.C-8(EP-44) V.D1-23(EP-44) V.D2-26(EP-44)	Piping, piping components, and piping elements	Stainless steel	Closed-cycle cooling water >60°C (>140°F)	Cracking due to SCC	**XI.M21A, "Closed Treated Water Systems"**	No	AMP name was changed because AMP was expanded to encompass other closed, treated water environments.	N/A
V.C.EP-99	V.C-9(EP-48)	Piping, piping components, and piping elements	Steel	Closed-cycle cooling water	Loss of material due to general, pitting, and crevice corrosion	**XI.M21A, "Closed Treated Water Systems"**	No	AMP name was changed because AMP was expanded to encompass other closed, treated water environments.	N/A

Table II-9. Changes to Existing Rev. 1 Chapter VII AMR Items for Auxiliary Systems and Their Technical Bases (cells where changes have been made are shown in bold)

Rev. 2 AMR Item No.	Rev. 1 AMR Link	Structures and/or Components	Material	Environment	Aging Effect/ Mechanism	Aging Management Program	Further Evaluation Required	Technical Basis for Changes	Comment No.
VII.A3.AP-100	VII.A3-1(A-15)	Elastomers, linings	Elastomers	Treated borated water	Hardening and loss of strength due to elastomer degradation	**XI.M38, "Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components"**	**No**	AMP XI.M38 has been revised to include management of “hardening and loss of strength” in elastomer components.	N/A
VII.A4.AP-101	VII.A4-1(A-16)	Elastomers, linings	Elastomers	Treated water	Hardening and loss of strength due to elastomer degradation	**XI.M38, "Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components"**	**No**	AMP XI.M38 has been revised to include management of “hardening and loss of strength” in elastomer components.	N/A
VII.F1.AP-102 VII.F2.AP-102 VII.F3.AP-102 VII.F4.AP-102	VII.F1-7(A-17) VII.F2-7(A-17) VII.F3-7(A-17) VII.F4-6(A-17)	Elastomer: seals and components	Elastomers	Air – indoor, uncontrolled (Internal/External)	Hardening and loss of strength due to elastomer degradation	**XI.M36, "External Surfaces Monitoring of Mechanical Components"**	**No**	AMP XI.M36 has been revised to include management of “hardening and loss of strength” in elastomer components. The AMP can be used both for external surfaces of elastomers and for internal surfaces where the environment is the same for both internal and external surfaces.	950
VII.F1.AP-103	VII.F1-6(A-18)	Elastomer: seals and components	Elastomers	Air – indoor, uncontrolled	Loss of material	**XI.M38, "Inspection of**	**No**	AMP M38 is revised to include the aging	N/A

Table II-9. Changes to Existing Rev. 1 Chapter VII AMR Items for Auxiliary Systems and Their Technical Bases (cells where changes have been made are shown in bold)

Rev. 2 AMR Item No.	Rev. 1 AMR Link	Structures and/or Components	Material	Environment	Aging Effect/ Mechanism	Aging Management Program	Further Evaluation Required	Technical Basis for Changes	Comment No.
VII.F2.AP-103 VII.F3.AP-103 VII.F4.AP-103	VII.F2-6(A-18) VII.F3-6(A-18) VII.F4-5(A-18)			(Internal)	due to wear	**Internal Surfaces in Miscellaneous Piping and Ducting Components"**		management of elastomer components. The program includes visual inspection and physical manipulations to detect loss of material.	
VII.H2.AP-104	VII.H2-2(A-27)	Piping, piping components, and piping elements, diesel engine exhaust	Steel; stainless steel	Diesel exhaust	Loss of material due to general (steel only), pitting, and crevice corrosion	**XI.M38, "Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components"**	**No**	An approved precedent exists for accepting "Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components" program. As shown in WCGS SER Section 3.3.2.2.7.3, the staff has accepted the position that the "Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components" program consistent with GALL AMP XI.M38 is adequate to manage the aging effect. AMP XI.M38 is revised to include stainless steel material.	N/A
VII.H1.AP-105	VII.H1-10(A-	Piping, piping components, and	Steel	Fuel oil	Loss of material due	**XI.M30, "Fuel Oil Chemistry,"**	**No**	An approved precedent exists for accepting	N/A

Table II-9. Changes to Existing Rev. 1 Chapter VII AMR Items for Auxiliary Systems and Their Technical Bases (cells where changes have been made are shown in bold)

Rev. 2 AMR Item No.	Rev. 1 AMR Link	Structures and/or Components	Material	Environment	Aging Effect/ Mechanism	Aging Management Program	Further Evaluation Required	Technical Basis for Changes	Comment No.
VII.H2.AP-105	30) VII.H2-24(A-30)	piping elements; tanks			to general, pitting, crevice, and MIC; fouling that leads to corrosion	**and** **XI.M32, "One-Time Inspection"**		"One-Time Inspection" program as verification of effectiveness of "Fuel Oil Chemistry" program. As shown in WCGS SER Section 3.3.2.2.9.1, the staff has accepted the position that a "One-Time Inspection" program consistent with GALL AMP XI.M32 is adequate to verify the effectiveness of the "Fuel Oil Chemistry" program	
VII.E3.AP-106 VII.E4.AP-106	VII.E3-18(A-35) VII.E4-17(A-35)	Piping, piping components, and piping elements	Steel	Treated water	Loss of material due to general, pitting, and crevice corrosion	**XI.M2, "Water Chemistry," and** **XI.M32, "One-Time Inspection"**	**No**	An approved precedent exists for accepting "One-Time Inspection" program as verification of effectiveness of "Water Chemistry" program. As shown in JAFNPP (James A. FitzPatrick Nuclear Power Plant) SER Section 3.3.2.2.7.2, the staff has accepted the position that a "One-Time Inspection" program consistent with GALL AMP XI.M32 is	N/A

Table II-9. Changes to Existing Rev. 1 Chapter VII AMR Items for Auxiliary Systems and Their Technical Bases (cells where changes have been made are shown in bold)

Rev. 2 AMR Item No.	Rev. 1 AMR Link	Structures and/or Components	Material	Environment	Aging Effect/ Mechanism	Aging Management Program	Further Evaluation Required	Technical Basis for Changes	Comment No.
								adequate to verify the effectiveness of the “Water Chemistry” program.	
VII.A3.AP-107	VII.A3-9(A-39)	Piping, piping components, and piping elements	Steel (with elastomer lining)	Treated water	Loss of material due to pitting and crevice corrosion (only for steel after lining/cladding degradation)	**XI.M2, “Water Chemistry,” and** **XI.M32, “One-Time Inspection”**	**No**	An approved precedent exists for accepting “One-Time Inspection” program as verification of effectiveness of “Water Chemistry” program. As shown in CNS (Cooper Nuclear Station) SER Section 3.3.2.2.10.1, the staff has accepted the position that a “One-Time Inspection” program consistent with GALL AMP XI.M32 is adequate to verify the effectiveness of the “Water Chemistry” program	N/A
VII.A4.AP-108	VII.A4-12(A-40)	Piping, piping components, and piping elements	Steel (with elastomer lining or stainless steel cladding)	Treated water	Loss of material due to pitting and crevice corrosion (only for steel after lining/cladding degradation)	**XI.M2, “Water Chemistry,” and** **XI.M32, “One-Time Inspection”**	**No**	An approved precedent exists for accepting “One-Time Inspection” program as verification of effectiveness of “Water Chemistry.” As shown in CNS SER Section 3.3.2.2.10.1, the staff has accepted	N/A

Table II-9. Changes to Existing Rev. 1 Chapter VII AMR Items for Auxiliary Systems and Their Technical Bases (cells where changes have been made are shown in bold)

Rev. 2 AMR Item No.	Rev. 1 AMR Link	Structures and/or Components	Material	Environment	Aging Effect/ Mechanism	Aging Management Program	Further Evaluation Required	Technical Basis for Changes	Comment No.
								the position that a "One-Time Inspection" program consistent with GALL AMP XI.M32 is adequate to verify the effectiveness of the "Water Chemistry" program.	
VII.F1.AP-109 VII.F2.AP-109 VII.F3.AP-109 VII.F4.AP-109	VII.F1-16(A-46) VII.F2-14(A-46) VII.F3-16(A-46) VII.F4-12(A-46)	Piping, piping components, and piping elements	Copper alloy	Condensation (External)	Loss of material due to general, pitting, and crevice corrosion	**XI.M36, "External Surfaces Monitoring of Mechanical Components"**	**No**	An approved precedent exists for accepting GALL AMP XI.M36, for the management of the aging effect of copper alloy. As shown in WCGS SER Section 3.3.2.2.10.3, the staff has accepted the position that the External Surfaces Monitoring of Mechanical Components program, consistent with GALL AMP XI.M36, is adequate to manage the aging effect of "loss of material."	N/A
VII.A4.AP-110 VII.E3.AP-110 VII.E4.AP-	VII.A4-11(A-58) VII.E3-15(A-58)	Piping, piping components, and piping elements	Stainless steel	Treated water	Loss of material due to pitting and crevice corrosion	**XI.M2, "Water Chemistry," and** **XI.M32, "One-Time**	**No**	An approved precedent exists for accepting "One-Time Inspection" program as verification of effectiveness of	N/A

Table II-9. Changes to Existing Rev. 1 Chapter VII AMR Items for Auxiliary Systems and Their Technical Bases (cells where changes have been made are shown in bold)

Rev. 2 AMR Item No.	Rev. 1 AMR Link	Structures and/or Components	Material	Environment	Aging Effect/ Mechanism	Aging Management Program	Further Evaluation Required	Technical Basis for Changes	Comment No.
110	VII.E4-14(A-58)					**Inspection”**		“Water Chemistry” program. As shown in CNS SER Section 3.3.2.2.10.2, the staff has accepted the position that a “One-Time Inspection” program consistent with GALL AMP XI.M32 is adequate to verify the effectiveness of the “Water Chemistry” program.	
VII.A4.AP-111	VII.A4-2(A-70)	Heat exchanger components	Stainless steel; steel with stainless steel cladding	Treated water	Loss of material due to pitting and crevice corrosion	**XI.M2, “Water Chemistry,” and XI.M32, “One-Time Inspection”**	**No**	An approved precedent exists for accepting “One-Time Inspection” program as verification of effectiveness of “Water Chemistry” program. As shown in Pilgrim SER Section 3.3.2.2.10.2, the staff has accepted the position that a “One-Time Inspection” program consistent with GALL AMP XI.M32 is adequate to verify the effectiveness of the “Water Chemistry” program.	N/A
VII.E3.AP-	VII.E3-	Heat exchanger	Stainless	Treated water	Cracking due	**XI.M2, “Water**	**No**	An approved precedent	N/A

Table II-9. Changes to Existing Rev. 1 Chapter VII AMR Items for Auxiliary Systems and Their Technical Bases (cells where changes have been made are shown in bold)

Rev. 2 AMR Item No.	Rev. 1 AMR Link	Structures and/or Components	Material	Environment	Aging Effect/ Mechanism	Aging Management Program	Further Evaluation Required	Technical Basis for Changes	Comment No.
112	3(A-71)	components	steel; steel with stainless steel cladding	>60°C (>140°F)	to SCC	**Chemistry," and** **XI.M32, "One-Time Inspection"**		exists for accepting "One-Time Inspection" program as verification of effectiveness of "Water Chemistry" program. As shown in CNS SER Section 3.3.2.2.3.2, the staff has accepted the position that a "One-Time Inspection" program consistent with GALL AMP XI.M32 is adequate to verify the effectiveness of the "Water Chemistry" program.	
VII.F1.AP-113 VII.F2.AP-113 VII.F3.AP-113 VII.F4.AP-113	VII.F1-5(A-73) VII.F2-5(A-73) VII.F3-5(A-73) VII.F4-4(A-73)	Elastomer: seals and components	Elastomers	Air – indoor, uncontrolled (External)	Loss of material due to wear	**XI.M36, "External Surfaces Monitoring of Mechanical Components"**	No	AMP M36 is revised to include the aging management of elastomer components. The program includes visual inspection and physical manipulations to detect loss of material.	949
VII.E1.AP-114	VII.E1-7(A-76)	High-pressure pump, casing	Stainless steel	**Treated borated water >60°C (>140°F)**	**Cracking due to SCC**	**XI.M2, "Water Chemistry," and** **XI.M32, "One-Time**	**No**	An approved precedent exists for accepting "One-Time Inspection" program as verification of effectiveness of "Water Chemistry"	N/A

Table II-9. Changes to Existing Rev. 1 Chapter VII AMR Items for Auxiliary Systems and Their Technical Bases (cells where changes have been made are shown in bold)

Rev. 2 AMR Item No.	Rev. 1 AMR Link	Structures and/or Components	Material	Environment	Aging Effect/ Mechanism	Aging Management Program	Further Evaluation Required	Technical Basis for Changes	Comment No.
						Inspection”		program. As shown in WCGS SER Section 3.3.2.2.4.3, the staff has accepted the position that a “One-Time Inspection” program consistent with GALL AMP XI.M32 is adequate to verify the effectiveness of the “Water Chemistry” program	
VII.E1.AP-115	VII.E1-5(A-76)	High-pressure pump, casing	Stainless steel	Treated borated water	**Cracking due to cyclic loading**	**XI.M1, "ASME Section XI Inservice Inspection, Subsections IWB, IWC, and IWD"**	**No**	“Water Chemistry” will not manage cracking due to cyclic loading	N/A
VII.G.AP-116	VII.G-27(A-82)	Reactor coolant pump oil collection system: tanks	Steel	Lubricating oil	Loss of material due to general, pitting, and crevice corrosion	**XI.M39, "Lubricating Oil Analysis," and XI.M32, “One-Time Inspection”**	**No**	An approved precedent exists for accepting “One-Time Inspection” program as verification of effectiveness of “Lubricating Oil Analysis” program. As shown in CNS SER Section 3.3.2.2.7.1, the staff has accepted the position that a “One-Time Inspection” program consistent with	N/A

Table II-9. Changes to Existing Rev. 1 Chapter VII AMR Items for Auxiliary Systems and Their Technical Bases (cells where changes have been made are shown in bold)

Rev. 2 AMR Item No.	Rev. 1 AMR Link	Structures and/or Components	Material	Environment	Aging Effect/ Mechanism	Aging Management Program	Further Evaluation Required	Technical Basis for Changes	Comment No.
								GALL AMP XI.M32 is adequate to verify the effectiveness of the "Lubricating Oil Analysis" program	
VII.G.AP-117	VII.G-26(A-83)	Reactor coolant pump oil collection system: piping, tubing, valve bodies	Steel	Lubricating oil	Loss of material due to general, pitting, and crevice corrosion	**XI.M39, "Lubricating Oil Analysis," and XI.M32, "One-Time Inspection"**	**No**	An approved precedent exists for accepting "One-Time Inspection" program as verification of effectiveness of "Lubricating Oil Analysis" program. As shown in CNS SER Section 3.3.2.2.7.1, the staff has accepted the position that a "One-Time Inspection" program consistent with GALL AMP XI.M32 is adequate to verify the effectiveness of the "Lubricating Oil Analysis" program	N/A
VII.E1.AP-118	VII.E1-5(A-84)	Heat exchanger components	Stainless steel	Treated borated water >60°C (>140°F)	**Cracking due to SCC**	**XI.M2, "Water Chemistry," and XI.M32, "One-Time Inspection"**	**No**	An approved precedent exists for accepting "One-Time Inspection" program as verification of effectiveness of "Water Chemistry" program. As shown in WCGS SER Section 3.3.2.2.4.2, the staff has	N/A

Table II-9. Changes to Existing Rev. 1 Chapter VII AMR Items for Auxiliary Systems and Their Technical Bases (cells where changes have been made are shown in bold)

Rev. 2 AMR Item No.	Rev. 1 AMR Link	Structures and/or Components	Material	Environment	Aging Effect/ Mechanism	Aging Management Program	Further Evaluation Required	Technical Basis for Changes	Comment No.
								accepted the position that a "One-Time Inspection" program consistent with GALL AMP XI.M32 is adequate to verify the effectiveness of the "Water Chemistry" program	
VII.E1.AP-119	VII.E1-5(A-84)	Heat exchanger components and tubes	Stainless steel	Treated borated water >60°C (>140°F)	**Cracking due to cyclic loading**	**XI.M1, "ASME Section XI Inservice Inspection, Subsections IWB, IWC, and IWD"**	**No**	Water chemistry will not manage cracking due to cyclic loading.	N/A
VII.E3.AP-120	VII.E3-19(A-85)	Regenerative heat exchanger components	Stainless steel	Treated water >60°C (>140°F)	Cracking due to SCC	**XI.M2, "Water Chemistry," and XI.M32, "One-Time Inspection"**	**No**	An approved precedent exists for accepting "One-Time Inspection" program as verification of effectiveness of "Water Chemistry" program. As shown in CNS SER Section 3.3.2.2.3.2, the staff has accepted the position that a "One-Time Inspection" program consistent with GALL AMP XI.M32 is adequate to verify the effectiveness of the	N/A

Table II-9. Changes to Existing Rev. 1 Chapter VII AMR Items for Auxiliary Systems and Their Technical Bases (cells where changes have been made are shown in bold)

Rev. 2 AMR Item No.	Rev. 1 AMR Link	Structures and/or Components	Material	Environment	Aging Effect/ Mechanism	Aging Management Program	Further Evaluation Required	Technical Basis for Changes	Comment No.
								"Water Chemistry" program	
VII.D.AP-121	VII.D-1(A-103)	Closure bolting	**Steel; stainless steel**	Condensation	**Loss of material due to general (steel only), pitting, and crevice corrosion**	XI.M18, "Bolting Integrity"	No	Bolting may be either steel or stainless steel; this line item addresses the applicable aging effects and mechanisms of the component in the stated environment	N/A
VII.E1.AP-122	VII.E1-8(A-104)	High-pressure pump, closure bolting	Steel, high-strength	Air with steam or water leakage	Cracking due to SCC; cyclic loading	**XI.M18, "Bolting Integrity"**	**No**	XI.M18 has been revised to include recommendations for high-strength bolting	N/A
VII.I.AP-124	VII.I-5(AP-26)	Closure bolting	**Steel; stainless steel**	Air – indoor, uncontrolled (External)	Loss of preload due to thermal effects, gasket creep, and self-loosening	XI.M18, "Bolting Integrity"	No	"Loss of preload" can occur with both steel and stainless steel bolts.	N/A
VII.I.AP-125	VII.I-4(AP-27)	Closure bolting	**Steel; stainless steel**	Air – indoor, uncontrolled (External)	Loss of material due to general (steel only), pitting, and crevice corrosion	XI.M18, "Bolting Integrity"	No	Bolting may be either steel or stainless steel; this line item addresses the applicable aging effects and mechanisms of the component in the stated environment	N/A
VII.I.AP-126	VII.I-1(AP-28)	Bolting	**Steel; stainless steel**	Air – outdoor (External)	Loss of material due to general	XI.M18, "Bolting Integrity"	No	Bolting may be either steel or stainless steel; this line item addresses	N/A

Table II-9. Changes to Existing Rev. 1 Chapter VII AMR Items for Auxiliary Systems and Their Technical Bases (cells where changes have been made are shown in bold)

Rev. 2 AMR Item No.	Rev. 1 AMR Link	Structures and/or Components	Material	Environment	Aging Effect/ Mechanism	Aging Management Program	Further Evaluation Required	Technical Basis for Changes	Comment No.
					(steel only), pitting, and crevice corrosion			the applicable aging effects and mechanisms of the component in the stated environment	
VII.C1.AP-127 VII.C2.AP-127 VII.E1.AP-127 VII.E4.AP-127 VII.F1.AP-127 VII.F2.AP-127 VII.F3.AP-127 VII.F4.AP-127 VII.G.AP-127 VII.H2.AP-127	VII.C1-17(AP-30) VII.C2-13(AP-30) VII.E1-19(AP-30) VII.E4-16(AP-30) VII.F1-19(AP-30) VII.F2-17(AP-30) VII.F3-19(AP-30) VII.F4-15(AP-30) VII.G-22(AP-30) VII.H2-20(AP-30)	Piping, piping components, and piping elements	Steel	Lubricating oil	Loss of material due to general, pitting, and crevice corrosion	**XI.M39, "Lubricating Oil Analysis," and** **XI.M32, "One-Time Inspection"**	**No**	An approved precedent exists for accepting "One-Time Inspection" program as verification of effectiveness of "Lubricating Oil Analysis" program. As shown in CNS SER Section 3.3.2.2.7.1, the staff has accepted the position that a "One-Time Inspection" program consistent with GALL AMP XI.M32 is adequate to verify the effectiveness of the "Lubricating Oil Analysis" program	N/A
VII.H2.AP-128	VII.H2-1(AP-	Diesel engine exhaust piping,	Stainless	Diesel exhaust	Cracking due	**XI.M38, "Inspection of**	No	An approved precedent exists for accepting	N/A

Table II-9. Changes to Existing Rev. 1 Chapter VII AMR Items for Auxiliary Systems and Their Technical Bases (cells where changes have been made are shown in bold)

Rev. 2 AMR Item No.	Rev. 1 AMR Link	Structures and/or Components	Material	Environment	Aging Effect/ Mechanism	Aging Management Program	Further Evaluation Required	Technical Basis for Changes	Comment No.
	33)	piping components, and piping elements	steel		to SCC	**Internal Surfaces in Miscellaneous Piping and Ducting Components"**		"Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components" program. As shown in WCGS SER Section 3.3.2.2.3.3, the staff has accepted the position that the "Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components" program consistent with GALL AMP XI.M38 has been revised to add stainless steel in scope and is adequate to manage the aging effect because visual inspections are performed on internal surfaces during surveillance testing or maintenance activities.	
VII.H1.AP-129 VII.H2.AP-129	VII.H1-1(AP-35) VII.H2-7(AP-35)	Piping, piping components, and piping elements	Aluminum	Fuel oil	Loss of material due to pitting, crevice, and MIC	**XI.M30, "Fuel Oil Chemistry," and** **XI.M32, "One-Time Inspection"**	**No**	An approved precedent exists for accepting "One-Time Inspection" program as verification of effectiveness of "Fuel Oil Chemistry" program.	N/A

Table II-9. Changes to Existing Rev. 1 Chapter VII AMR Items for Auxiliary Systems and Their Technical Bases (cells where changes have been made are shown in bold)

Rev. 2 AMR Item No.	Rev. 1 AMR Link	Structures and/or Components	Material	Environment	Aging Effect/ Mechanism	Aging Management Program	Further Evaluation Required	Technical Basis for Changes	Comment No.
								As shown in WCGS and SER Section 3.3.2.2.12.1, the staff has accepted the position that a "One-Time Inspection" program consistent with GALL AMP XI.M32 is adequate to verify the effectiveness of the "Fuel Oil Chemistry" program	
VII.A4.AP-130 VII.E3.AP-130 VII.E4.AP-130	VII.A4-5(AP-38) VII.E3-7(AP-38) VII.E4-4(AP-38)	Piping, piping components, and piping elements	Aluminum	Treated water	Loss of material due to pitting and crevice corrosion	**XI.M2, "Water Chemistry," and** **XI.M32, "One-Time Inspection"**	**No**	An approved precedent exists for accepting "One-Time Inspection" program as verification of effectiveness of "Water Chemistry" program. As shown in CNS SER Section 3.3.2.2.10.2, the staff has accepted the position that a "One-Time Inspection" program consistent with GALL AMP XI.M32 is adequate to verify the effectiveness of the "Water Chemistry" program	N/A
VII.H2.AP-131	VII.H2-5(AP-	Heat exchanger components	Steel	Lubricating oil	**Loss of material due**	**XI.M39, "Lubricating**	**No**	An approved precedent exists for accepting	N/A

Table II-9. Changes to Existing Rev. 1 Chapter VII AMR Items for Auxiliary Systems and Their Technical Bases (cells where changes have been made are shown in bold)

Rev. 2 AMR Item No.	Rev. 1 AMR Link	Structures and/or Components	Material	Environment	Aging Effect/ Mechanism	Aging Management Program	Further Evaluation Required	Technical Basis for Changes	Comment No.
	39)				**to general, pitting, crevice, and MIC; fouling that leads to corrosion**	**Oil Analysis," and XI.M32, "One-Time Inspection"**		"One-Time Inspection" program as verification of effectiveness of "Lubricating Oil Analysis" program. As shown in WCGS SER Section 3.3.2.2.9.2, the staff has accepted the position that a "One-Time Inspection" program consistent with GALL AMP XI.M32 is adequate to verify the effectiveness of the "Lubricating Oil Analysis" program	
VII.G.AP-132 VII.H1.AP-132 VII.H2.AP-132	VII.G-10(AP-44) VII.H1-3(AP-44) VII.H2-9(AP-44)	Piping, piping components, and piping elements	Copper alloy	Fuel oil	Loss of material due to general, pitting, crevice, and MIC	**XI.M30, "Fuel Oil Chemistry," and XI.M32, "One-Time Inspection"**	**No**	An approved precedent exists for accepting "One-Time Inspection" program as verification of effectiveness of "Fuel Oil Chemistry" program. As shown in WCGS SER Section 3.3.2.2.12.1, the staff has accepted the position that a "One-Time Inspection" program consistent with GALL AMP XI.M32 is adequate to verify the effectiveness of the	N/A

Table II-9. Changes to Existing Rev. 1 Chapter VII AMR Items for Auxiliary Systems and Their Technical Bases (cells where changes have been made are shown in bold)

Rev. 2 AMR Item No.	Rev. 1 AMR Link	Structures and/or Components	Material	Environment	Aging Effect/ Mechanism	Aging Management Program	Further Evaluation Required	Technical Basis for Changes	Comment No.
								"Fuel Oil Chemistry" program	
VII.C1.AP-133 VII.C2.AP-133 VII.E1.AP-133 VII.E4.AP-133 VII.G.AP-133 VII.H2.AP-133	VII.C1-8(AP-47) VII.C2-5(AP-47) VII.E1-12(AP-47) VII.E4-6(AP-47) VII.G-11(AP-47) VII.H2-10(AP-47)	Piping, piping components, and piping elements	Copper alloy	Lubricating oil	Loss of material due to pitting and crevice corrosion	**XI.M39, "Lubricating Oil Analysis," and** **XI.M32, "One-Time Inspection"**	**No**	An approved precedent exists for accepting "One-Time Inspection" program as verification of effectiveness of "Lubricating Oil Analysis" program. As shown in WCGS SER Section 3.3.2.2.10.4, the staff has accepted the position that a "One-Time Inspection" program consistent with GALL AMP XI.M32 is adequate to verify the effectiveness of the "Lubricating Oil Analysis" program	N/A
VII.G.AP-136 VII.H1.AP-136 VII.H2.AP-136	VII.G-17(AP-54) VII.H1-6(AP-54) VII.H2-16(AP-54)	Piping, piping components, and piping elements	Stainless steel	Fuel oil	Loss of material due to pitting, crevice, and MIC	**XI.M30, "Fuel Oil Chemistry," and** **XI.M32, "One-Time Inspection"**	**No**	An approved precedent exists for accepting "One-Time Inspection" program as verification of effectiveness of "Fuel Oil Chemistry" program. As shown in WCGS and SER Section 3.3.2.2.12.1, the staff has accepted the position that a "One-Time Inspection"	N/A

Table II-9. Changes to Existing Rev. 1 Chapter VII AMR Items for Auxiliary Systems and Their Technical Bases (cells where changes have been made are shown in bold)

Rev. 2 AMR Item No.	Rev. 1 AMR Link	Structures and/or Components	Material	Environment	Aging Effect/ Mechanism	Aging Management Program	Further Evaluation Required	Technical Basis for Changes	Comment No.
								program consistent with GALL AMP XI.M32 is adequate to verify the effectiveness of the “Fuel Oil Chemistry” program	
VII.C1.AP-137 VII.C3.AP-137 VII.G.AP-137 VII.H1.AP-137 VII.H2.AP-137	VII.C1-16(AP-56) VII.C3-8(AP-56) VII.G-20(AP-56) VII.H1-7(AP-56) VII.H2-19(AP-56)	Piping, piping components, and piping elements	Stainless steel	**Soil or concrete**	Loss of material due to pitting and crevice corrosion	**XI.M41, "Buried and Underground Piping and Tanks"**	**No**	An approved precedent exists for accepting “Buried Piping and Tanks Inspection” program to manage loss of material for stainless steel piping in soil environment. As shown in TMI SER 3.3.2.2.10.7, the staff has accepted the position that the “Buried Piping and Tank Inspection” program consistent with GALL AMP XI.M34 is adequate to manage this aging effect. This GALL AMP is revised to include other materials besides steel. XI.M28, “Buried Piping and Tanks Surveillance,” and XI.M34, “Buried Piping and Tanks Inspection,” were	N/A

Table II-9. Changes to Existing Rev. 1 Chapter VII AMR Items for Auxiliary Systems and Their Technical Bases (cells where changes have been made are shown in bold)

Rev. 2 AMR Item No.	Rev. 1 AMR Link	Structures and/or Components	Material	Environment	Aging Effect/ Mechanism	Aging Management Program	Further Evaluation Required	Technical Basis for Changes	Comment No.
								combined into XI.M41, “Buried and Underground Piping and Tanks Inspection”	
VII.C1.AP-138 VII.C2.AP-138 VII.E1.AP-138 VII.E4.AP-138 VII.G.AP-138 VII.H2.AP-138	VII.C1-14(AP-59) VII.C2-12(AP-59) VII.E1-15(AP-59) VII.E4-12(AP-59) VII.G-18(AP-59) VII.H2-17(AP-59)	Piping, piping components, and piping elements	Stainless steel	Lubricating oil	Loss of material due to pitting, crevice, and MIC	**XI.M39, "Lubricating Oil Analysis," and** **XI.M32, “One-Time Inspection”**	**No**	An approved precedent exists for accepting “One-Time Inspection” program as verification of effectiveness of “Lubricating Oil Analysis” program. As shown in WCGS SER Section 3.3.2.2.12.2, the staff has accepted the position that a “One-Time Inspection” program consistent with GALL AMP XI.M32 is adequate to verify the effectiveness of the “Lubricating Oil Analysis” program	N/A
VII.A4.AP-139 VII.E3.AP-139	VII.A4-4(AP-62) VII.E3-6(AP-62)	Heat exchanger tubes	Stainless steel	Treated water	Reduction of heat transfer due to fouling	**XI.M2, “Water Chemistry,” and** **XI.M32, “One-Time Inspection”**	**No**	An approved precedent exists for accepting “One-Time Inspection” program as verification of effectiveness of “Water Chemistry” program. As shown in VYNPS SER Section 3.3.2.2.2, the staff has accepted the position	N/A

Table II-9. Changes to Existing Rev. 1 Chapter VII AMR Items for Auxiliary Systems and Their Technical Bases (cells where changes have been made are shown in bold)

Rev. 2 AMR Item No.	Rev. 1 AMR Link	Structures and/or Components	Material	Environment	Aging Effect/ Mechanism	Aging Management Program	Further Evaluation Required	Technical Basis for Changes	Comment No.
								that a “One-Time Inspection” program consistent with GALL AMP XI.M32 is adequate to verify the effectiveness of the “Water Chemistry” program	
VII.A4.AP-140 VII.E3.AP-140 VII.E4.AP-140	VII.A4-7(AP-64) VII.E3-9(AP-64) VII.E4-7(AP-64)	Piping, piping components, and piping elements	Copper alloy	Treated water	Loss of material due to general, pitting, crevice, and galvanic corrosion	**XI.M2, “Water Chemistry,” and** **XI.M32, “One-Time Inspection”**	**No**	An approved precedent exists for accepting “One-Time Inspection” program as verification of effectiveness of “Water Chemistry” program. As shown in VYNPS SER Section 3.3.2.2.11, the staff has accepted the position that a “One-Time Inspection” program consistent with GALL AMP XI.M32 is adequate to verify the effectiveness of the “Water Chemistry” program	N/A
VII.E2.AP-141	VII.E2-1(AP-73)	Piping, piping components, and piping elements	Stainless steel	Sodium pentaborate solution	Loss of material due to pitting and crevice corrosion	**XI.M2, “Water Chemistry,” and** **XI.M32, “One-Time**	**No**	An approved precedent exists for accepting “One-Time Inspection” program as verification of effectiveness of “Water Chemistry”	N/A

Table II-9. Changes to Existing Rev. 1 Chapter VII AMR Items for Auxiliary Systems and Their Technical Bases (cells where changes have been made are shown in bold)

Rev. 2 AMR Item No.	Rev. 1 AMR Link	Structures and/or Components	Material	Environment	Aging Effect/ Mechanism	Aging Management Program	Further Evaluation Required	Technical Basis for Changes	Comment No.
						Inspection”		program. As shown in VYNPS SER Section 3.3.2.2.10.8, the staff has accepted the position that a “One-Time Inspection” program consistent with GALL AMP XI.M32 is adequate to verify the effectiveness of the “Water Chemistry” program	
VII.F1.AP-142 VII.F2.AP-142 VII.F3.AP-142 VII.F4.AP-142	VII.F1-14(AP-74) VII.F2-12(AP-74) VII.F3-14(AP-74) VII.F4-10(AP-74)	Piping, piping components, and piping elements	Aluminum	Condensation (Internal)	Loss of material due to pitting and crevice corrosion	**XI.M38, "Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components"**	**No**	An approved precedent exists for accepting “Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components” program. As shown in WCGS SER Section 3.3.2.2.10.5, the staff has accepted the position that the “Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components” program consistent with GALL AMP XI.M38 is adequate to manage	951

Table II-9. Changes to Existing Rev. 1 Chapter VII AMR Items for Auxiliary Systems and Their Technical Bases (cells where changes have been made are shown in bold)

Rev. 2 AMR Item No.	Rev. 1 AMR Link	Structures and/or Components	Material	Environment	Aging Effect/ Mechanism	Aging Management Program	Further Evaluation Required	Technical Basis for Changes	Comment No.
								the aging effect of loss of material because visual inspections are performed on internal surfaces during surveillance testing or maintenance activities. AMP XI.M38 is revised to include other materials besides steel.	
VII.G.AP-143	VII.G-9(AP-78)	Piping, piping components, and piping elements	Copper alloy	Condensation (Internal)	Loss of material due to general, pitting, and crevice corrosion	**XI.M38, "Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components"**	**No**	An approved precedent exists for accepting Inspection of "Internal Surfaces in Miscellaneous Piping and Ducting Components" program. As shown in WCGS SER Section 3.3.2.2.10.6, the staff has accepted the position that the "Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components" program consistent with GALL AMP XI.M38 is adequate to manage the aging effect of loss of material because	N/A

Table II-9. Changes to Existing Rev. 1 Chapter VII AMR Items for Auxiliary Systems and Their Technical Bases (cells where changes have been made are shown in bold)

Rev. 2 AMR Item No.	Rev. 1 AMR Link	Structures and/or Components	Material	Environment	Aging Effect/ Mechanism	Aging Management Program	Further Evaluation Required	Technical Basis for Changes	Comment No.
								visual inspections are performed on internal surfaces during surveillance testing or maintenance activities. AMP XI.M38 is revised to include other materials besides steel.	
VII.C1.AP-179	VII.C1-3(A-65)	Heat exchanger components	Copper alloy	Raw water	**Loss of material due to general, pitting, crevice, galvanic, and MIC; fouling that leads to corrosion**	XI.M20, "Open-Cycle Cooling Water System"	No	Aging mechanism of “fouling” is revised to “fouling that leads to corrosion,” which could cause loss of material. Fouling itself without corrosion does not cause loss of material..	N/A
VII.G.AP-180	VII.G-8(AP-83)	Piping, piping components, and piping elements	Aluminum	Raw water	Loss of material due to pitting and crevice corrosion	**XI.M27, "Fire Water System"**	No	Error in 2005 version of the GALL Report was corrected. The AMP column was corrected from XI.M26, “Fire Protection” to XI.M27, “Fire Water System.”	N/A
VII.E2.AP-181	VII.E2-2(A-59)	Piping, piping components, and piping elements	Stainless steel	Sodium pentaborate solution >60°C (>140°F)	Cracking due to SCC	**XI.M2, “Water Chemistry,” and XI.M32, “One-Time Inspection”**	**No**	The staff finds that a “One-Time Inspection” program consistent with GALL AMP XI.M32 is acceptable to verify the effectiveness of the “Water Chemistry”	N/A

Table II-9. Changes to Existing Rev. 1 Chapter VII AMR Items for Auxiliary Systems and Their Technical Bases (cells where changes have been made are shown in bold)

Rev. 2 AMR Item No.	Rev. 1 AMR Link	Structures and/or Components	Material	Environment	Aging Effect/ Mechanism	Aging Management Program	Further Evaluation Required	Technical Basis for Changes	Comment No.
								program so that the aging effect is managed adequately.	
VII.C1.AP-183	VII.C1-5(A-64)	Heat exchanger components	Steel	Raw water	**Loss of material due to general, pitting, crevice, galvanic, and MIC; fouling that leads to corrosion**	XI.M20, "Open-Cycle Cooling Water System"	No	Aging mechanism of “fouling” is revised to “fouling that leads to corrosion,” which could cause loss of material. Fouling itself without corrosion does not cause loss of material.	N/A
VII.C2.AP-186 VII.E3.AP-186 VII.E4.AP-186	VII.C2-11(AP-60) VII.E3-13(AP-60) VII.E4-11(AP-60)	Piping, piping components, and piping elements	Stainless steel	Closed-cycle cooling water >60°C (>140°F)	Cracking due to SCC	**XI.M21A, "Closed Treated Water Systems"**	No	AMP name was changed because AMP was expanded to encompass other closed treated water environments.	N/A
VII.C2.AP-188 VII.E3.AP-188 VII.E4.AP-188	VII.C2-3(AP-63) VII.E3-5(AP-63) VII.E4-3(AP-63)	Heat exchanger tubes	Stainless steel	Closed-cycle cooling water	Reduction of heat transfer due to fouling	**XI.M21A, "Closed Treated Water Systems"**	No	AMP name was changed because AMP was expanded to encompass other closed treated water environments.	N/A
VII.A3.AP-	VII.A3-	Heat exchanger	Steel	Closed-cycle	Loss of	**XI.M21A,**	No	AMP name was	N/A

Table II-9. Changes to Existing Rev. 1 Chapter VII AMR Items for Auxiliary Systems and Their Technical Bases (cells where changes have been made are shown in bold)

Rev. 2 AMR Item No.	Rev. 1 AMR Link	Structures and/or Components	Material	Environment	Aging Effect/ Mechanism	Aging Management Program	Further Evaluation Required	Technical Basis for Changes	Comment No.
189 VII.A4.AP-189 VII.C2.AP-189 VII.E1.AP-189 VII.E3.AP-189 VII.E4.AP-189 VII.F1.AP-189 VII.F2.AP-189 VII.F3.AP-189 VII.F4.AP-189	3(A-63) VII.A4-3(A-63) VII.C2-1(A-63) VII.E1-6(A-63) VII.E3-4(A-63) VII.E4-2(A-63) VII.F1-11(A-63) VII.F2-9(A-63) VII.F3-11(A-63) VII.F4-8(A-63)	components		cooling water	material due to general, pitting, crevice, and galvanic corrosion	**"Closed Treated Water Systems"**		changed because AMP was expanded to encompass other closed treated water environments.	
VII.E3.AP-191 VII.E4.AP-191	VII.E3-1(A-67) VII.E4-1(A-67)	Heat exchanger components	Stainless steel; steel with stainless steel cladding	Closed-cycle cooling water	Loss of material due to MIC	**XI.M21A, "Closed Treated Water Systems"**	No	AMP name was changed because AMP was expanded to encompass other closed treated water environments.	N/A
VII.E3.AP-192	VII.E3-2(A-68)	Heat exchanger components	Stainless steel; steel with stainless steel	Closed-cycle cooling water >60°C (>140°F)	Cracking due to SCC	**XI.M21A, "Closed Treated Water Systems"**	No	AMP name was changed because AMP was expanded to encompass other closed treated water	N/A

Table II-9. Changes to Existing Rev. 1 Chapter VII AMR Items for Auxiliary Systems and Their Technical Bases (cells where changes have been made are shown in bold)

Rev. 2 AMR Item No.	Rev. 1 AMR Link	Structures and/or Components	Material	Environment	Aging Effect/ Mechanism	Aging Management Program	Further Evaluation Required	Technical Basis for Changes	Comment No.
			cladding					environments.	
VII.H2.AP-193	VII.H2-11(AP-45)	Piping, piping components, and piping elements	Copper alloy	Raw water	**Loss of material due to general, pitting, crevice, and MIC**	XI.M20, "Open-Cycle Cooling Water System"	No	As described in ASM International, Metals Handbook, Ninth edition, Volume 13, "Corrosion," (pages 622 – 624), copper alloy exposed to the raw water environment, which includes seawater with sulfide and polluted cooling water, is susceptible to loss of material due to general, pitting, and crevice corrosion.	N/A
VII.C1.AP-194 VII.C3.AP-194 VII.H2.AP-194	VII.C1-19(A-38) VII.C3-10(A-38) VII.H2-22(A-38)	Piping, piping components, and piping elements	**Steel (with coating or lining)**	Raw water	**Loss of material due to general, pitting, crevice, and MIC; fouling that leads to corrosion; lining/coating degradation**	XI.M20, "Open-Cycle Cooling Water System"	No	As described in ASM International, Metals Handbook, Ninth edition, Volume 13, "Corrosion," (pages 622 – 624), copper alloy exposed to the raw water environment, which includes seawater with sulfide and polluted cooling water, is susceptible to loss of material due to general, pitting, and crevice corrosion.	N/A

Table II-9. Changes to Existing Rev. 1 Chapter VII AMR Items for Auxiliary Systems and Their Technical Bases (cells where changes have been made are shown in bold)

Rev. 2 AMR Item No.	Rev. 1 AMR Link	Structures and/or Components	Material	Environment	Aging Effect/ Mechanism	Aging Management Program	Further Evaluation Required	Technical Basis for Changes	Comment No.
VII.C3.AP-195	VII.C3-2(A-43)	Piping, piping components, and piping elements	Copper alloy	Raw water	**Loss of material due to general, pitting, and crevice corrosion**	XI.M20, "Open-Cycle Cooling Water System"	No	As described in ASM International, Metals Handbook, Ninth edition, Volume 13, "Corrosion," (pages 622 – 624), copper alloy exposed to the raw water environment, which includes seawater with sulfide and polluted cooling water, is susceptible to loss of material due to general, pitting, and crevice corrosion.	N/A
VII.C1.AP-196	VII.C1-9(A-44)	Piping, piping components, and piping elements	Copper alloy	Raw water	**Loss of material due to general, pitting, crevice, and MIC; fouling that leads to corrosion**	XI.M20, "Open-Cycle Cooling Water System"	No	As described in ASM International, Metals Handbook, Ninth edition, Volume 13, "Corrosion," (pages 622 – 624), copper alloy exposed to the raw water environment, which includes seawater with sulfide and polluted cooling water, is susceptible to loss of material due to general, pitting, and crevice corrosion.	N/A
VII.G.AP-197	VII.G-12(A-	Piping, piping components, and	Copper alloy	Raw water	**Loss of material due**	XI.M27, "Fire	No	As described in ASM International, Metals	N/A

Table II-9. Changes to Existing Rev. 1 Chapter VII AMR Items for Auxiliary Systems and Their Technical Bases (cells where changes have been made are shown in bold)

Rev. 2 AMR Item No.	Rev. 1 AMR Link	Structures and/or Components	Material	Environment	Aging Effect/ Mechanism	Aging Management Program	Further Evaluation Required	Technical Basis for Changes	Comment No.
	45)	piping elements			**to general, pitting, crevice, and MIC; fouling that leads to corrosion**	Water System"		Handbook, Ninth edition, Volume 13, "Corrosion," (pages 622 – 624), copper alloy exposed to the raw water environment, which includes seawater with sulfide and polluted cooling water, is susceptible to loss of material due to general, pitting, and crevice corrosion.	
VII.C1.AP-198 VII.C3.AP-198 VII.G.AP-198 VII.H1.AP-198	VII.C1-18(A-01) VII.C3-9(A-01) VII.G-25(A-01) VII.H1-9(A-01)	Piping, piping components, and piping elements	**Steel (with coating or wrapping)**	**Soil or concrete**	Loss of material due to general, pitting, crevice, and MIC	**XI.M41, "Buried and Underground Piping and Tanks"**	**No**	"Material" changed from "with or without" to "with" coating or wrapping. New AMP XI.M41 has been issued and applies only to steel with coating or wrapping. Buried piping definition includes soil or concrete environment. For this AMP and this material, further evaluation is not required. AMP XI.M28, "Buried Piping and Tanks Surveillance," and XI.M34, "Buried Piping and Tanks Inspection,"	N/A

Table II-9. Changes to Existing Rev. 1 Chapter VII AMR Items for Auxiliary Systems and Their Technical Bases (cells where changes have been made are shown in bold)

Rev. 2 AMR Item No.	Rev. 1 AMR Link	Structures and/or Components	Material	Environment	Aging Effect/ Mechanism	Aging Management Program	Further Evaluation Required	Technical Basis for Changes	Comment No.
								were combined into XI.M41, "Buried and Underground Piping and Tanks Inspection."	
VII.A3.AP-199 VII.A4.AP-199 VII.C2.AP-199 VII.E1.AP-199 VII.E3.AP-199 VII.E4.AP-199 VII.F1.AP-199 VII.F2.AP-199 VII.F3.AP-199 VII.F4.AP-199 VII.H1.AP-199 VII.H2.AP-199	VII.A3-5(AP-12) VII.A4-6(AP-12) VII.C2-4(AP-12) VII.E1-11(AP-12) VII.E3-8(AP-12) VII.E4-5(AP-12) VII.F1-15(AP-12) VII.F2-13(AP-12) VII.F3-15(AP-12) VII.F4-11(AP-12) VII.H1-2(AP-	Piping, piping components, and piping elements	Copper alloy	Closed-cycle cooling water	Loss of material due to general, pitting, crevice, and galvanic corrosion	**XI.M21A, "Closed Treated Water Systems"**	No	AMP name was changed because AMP was expanded to encompass other closed treated water environments.	N/A

Table II-9. Changes to Existing Rev. 1 Chapter VII AMR Items for Auxiliary Systems and Their Technical Bases (cells where changes have been made are shown in bold)

Rev. 2 AMR Item No.	Rev. 1 AMR Link	Structures and/or Components	Material	Environment	Aging Effect/ Mechanism	Aging Management Program	Further Evaluation Required	Technical Basis for Changes	Comment No.
	12) VII.H2-8(AP-12)								
VII.C2.AP-202 VII.F1.AP-202 VII.F2.AP-202 VII.F3.AP-202 VII.F4.AP-202 VII.H2.AP-202	VII.C2-14(A-25) VII.F1-20(A-25) VII.F2-18(A-25) VII.F3-20(A-25) VII.F4-16(A-25) VII.H2-23(A-25)	Piping, piping components, and piping elements; tanks	Steel	Closed-cycle cooling water	Loss of material due to general, pitting, and crevice corrosion	**XI.M21A, "Closed Treated Water Systems"**	No	AMP name was changed because AMP was expanded to encompass other closed treated water environments.	N/A
VII.E1.AP-203 VII.F1.AP-203 VII.F3.AP-203	VII.E1-2(AP-34) VII.F1-8(AP-34) VII.F3-8(AP-34)	Heat exchanger components	Copper alloy	Closed-cycle cooling water	Loss of material due to general, pitting, crevice, and galvanic corrosion	**XI.M21A, "Closed Treated Water Systems"**	No	AMP name was changed because AMP was expanded to encompass other closed treated water environments.	N/A
VII.F1.AP-204 VII.F2.AP-204	VII.F1-13(AP-77) VII.F2-	Heat exchanger tubes	Steel	Closed-cycle cooling water	Reduction of heat transfer due to fouling	**XI.M21A, "Closed Treated Water**	No	AMP name was changed because AMP was expanded to	N/A

Table II-9. Changes to Existing Rev. 1 Chapter VII AMR Items for Auxiliary Systems and Their Technical Bases (cells where changes have been made are shown in bold)

Rev. 2 AMR Item No.	Rev. 1 AMR Link	Structures and/or Components	Material	Environment	Aging Effect/ Mechanism	Aging Management Program	Further Evaluation Required	Technical Basis for Changes	Comment No.
VII.F3.AP-204 VII.F4.AP-204	11(AP-77) VII.F3-13(AP-77) VII.F4-9(AP-77)					**Systems"**		encompass other closed treated water environments.	
VII.C2.AP-205 VII.F1.AP-205 VII.F2.AP-205 VII.F3.AP-205	VII.C2-2(AP-80) VII.F1-12(AP-80) VII.F2-10(AP-80) VII.F3-12(AP-80)	Heat exchanger tubes	Copper Alloy	Closed-cycle cooling water	Reduction of heat transfer due to fouling	**XI.M21A, "Closed Treated Water Systems"**	No	AMP name was changed because AMP was expanded to encompass other closed treated water environments.	N/A
VII.C1.AP-206 VII.C3.AP-206	VII.C1-13(AP-53) VII.C3-6(AP-53)	Piping, piping components, and piping elements	Nickel alloy	Raw water	**Loss of material due to general, pitting, and crevice corrosion**	Chapter XI.M20, "Open-Cycle Cooling Water System"	No	Mistakenly added general corrosion as aging mechanism. This was an inadvertent error and the pre-existing AMR line item should not have been revised.	N/A
VII.G.AP-234	VII.G-21(A-28)	Piping, piping components, and piping elements	Steel	Fuel oil	Loss of material due to general, pitting, and crevice corrosion	**XI.M30, "Fuel Oil Chemistry", and** **XI.M32, "One-Time**	**No**	Removed from scope of AMP XI.M26. Will be managed by AMP XI.M30 and AMP XI.M32. In most SERs, the staff has accepted	N/A

Table II-9. Changes to Existing Rev. 1 Chapter VII AMR Items for Auxiliary Systems and Their Technical Bases (cells where changes have been made are shown in bold)

Rev. 2 AMR Item No.	Rev. 1 AMR Link	Structures and/or Components	Material	Environment	Aging Effect/ Mechanism	Aging Management Program	Further Evaluation Required	Technical Basis for Changes	Comment No.
						Inspection"		Fuel Oil Chemistry and One-Time Inspection as AMPS in managing this material/environment/aging effect combination.	
VII.A2.AP-235	VII.A2-5(A-88)	Spent fuel storage racks: neutron-absorbing sheets (PWR)	**Boral; boron steel and other materials (excluding Boraflex)**	Treated borated water	**Reduction of neutron-absorbing capacity; change in dimensions and loss of material due to effects of a spent fuel pool (SFP) environment**	**XI.M40, "Monitoring of Neutron-Absorbing Materials other than Boraflex"**	No	New AMP created for Boral and other materials	884
VII.A2.AP-236	VII.A2-3(A-89)	Spent fuel storage racks: neutron-absorbing sheets (BWR)	**Boral; boron steel and other materials (excluding Boraflex)**	Treated water	**Reduction of neutron-absorbing capacity; change in dimensions and loss of material due to effects of SFP environment**	**XI.M40, "Monitoring of Neutron-Absorbing Materials other than Boraflex"**	No	New AMP created for Boral and other materials	883
VII.J.AP-282	VII.J-21(AP-3)	Piping, piping components, and piping elements	Steel	Concrete	None	**None, provided that (1) attributes of**	**No, if conditions are met.**	The AMP column has been changed to describe the conditions	N/A

Table II-9. Changes to Existing Rev. 1 Chapter VII AMR Items for Auxiliary Systems and Their Technical Bases (cells where changes have been made are shown in bold)

Rev. 2 AMR Item No.	Rev. 1 AMR Link	Structures and/or Components	Material	Environment	Aging Effect/ Mechanism	Aging Management Program	Further Evaluation Required	Technical Basis for Changes	Comment No.
						the concrete are consistent with ACI 318 or ACI 349 (low water-to-cement ratio, low permeability, and adequate air entrainment) as cited in NUREG-1557 and (2) plant OE indicates no degradation of the concrete		of the concrete that are needed to support a "none-none" conclusion to allow inclusion in the "Common Miscellaneous Material/Environment Combination" (subchapter VII.J). In such "none-none" AMR line-items, no AMPs are required because aging effects are not expected to degrade the ability of the structure or component to perform its intended function for the extended period of operation.	
VII.E3.AP-283	VII.E3-16(A-60)	Piping, piping components, and piping elements	Stainless steel	Treated water >60°C (>140°F)	Cracking due to SCC, IGSCC	**XI.M2, "Water Chemistry," and XI.M25, "BWR Reactor Water Cleanup System"**	No	The "Water Chemistry" program provides mitigation and the "BWR Reactor Water Cleanup System" program provides detection for the aging effect of cracking due to SCC in this piping. The AMP XI.M25 was revised to identify AMP XI.M2 as a companion AMP to manage this	NA

Table II-9. Changes to Existing Rev. 1 Chapter VII AMR Items for Auxiliary Systems and Their Technical Bases (cells where changes have been made are shown in bold)

Rev. 2 AMR Item No.	Rev. 1 AMR Link	Structures and/or Components	Material	Environment	Aging Effect/ Mechanism	Aging Management Program	Further Evaluation Required	Technical Basis for Changes	Comment No.
								aging effect. This change is consistent with the change in AMP XI.M25.	
VII.F1.AP-99 VII.F2.AP-99 VII.F3.AP-99	VII.F1-1(A-09) VII.F2-1(A-09) VII.F3-1(A-09)	Ducting and components	Stainless steel	Condensation	Loss of material due to pitting and crevice corrosion	**XI.M38, "Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components"**	**No**	An approved precedent exists for accepting Inspection of "Internal Surfaces in Miscellaneous Piping and Ducting Components" program. As shown in WCGS SER Section 3.3.2.2.10.5, the staff has accepted the position that the "Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components" program consistent with GALL AMP XI.M38 is adequate to manage the aging effect of loss of material because visual inspections are performed on internal surfaces during surveillance testing or maintenance activities. AMP XI.M38 is revised	951

Table II-9. Changes to Existing Rev. 1 Chapter VII AMR Items for Auxiliary Systems and Their Technical Bases (cells where changes have been made are shown in bold)

Rev. 2 AMR Item No.	Rev. 1 AMR Link	Structures and/or Components	Material	Environment	Aging Effect/ Mechanism	Aging Management Program	Further Evaluation Required	Technical Basis for Changes	Comment No.
								to include other materials besides steel.	

Table II-10. Changes to Existing GALL Report Rev. 1 Chapter VIII AMR Items for Steam and Power Conversion Systems and Their Technical Bases (cells where changes have been made are shown in bold)

Rev. 2 AMR Item No.	Rev. 1 AMR Link	Structures and/or Components	Material	Environment	Aging Effect/ Mechanism	Aging Management Program	Further Evaluation Required	Technical Basis for Changes	Comment No.
VIII.E.SP-100 VIII.F.SP-100 VIII.G.SP-100	VIII.E-10(SP-58) VIII.F-7(SP-58) VIII.G-10(SP-58)	Heat exchanger tubes	Copper alloy	Treated water	Reduction of heat transfer due to fouling	**XI.M2, "Water Chemistry," and** **XI.M32, "One-Time Inspection"**	**No**	An approved precedent exists for accepting "One-Time Inspection" program as verification of effectiveness of "Water Chemistry" program. As shown in Pilgrim SER Section 3.3.2.2.10.2, the staff has accepted the position that a "One-Time Inspection" program consistent with GALL AMP XI.M32 is adequate to verify the effectiveness of the "Water Chemistry" program.	N/A
VIII.A.SP-101 VIII.F.SP-101	VIII.A-5(SP-61) VIII.F-15(SP-61)	Piping, piping components, and piping elements	Copper alloy	Treated water	Loss of material due to pitting and crevice corrosion	**XI.M2, "Water Chemistry," and** **XI.M32, "One-Time**	**No**	An approved precedent exists for accepting "One-Time Inspection" program as	N/A

Table II-10. Changes to Existing GALL Report Rev. 1 Chapter VIII AMR Items for Steam and Power Conversion Systems and Their Technical Bases (cells where changes have been made are shown in bold)

Rev. 2 AMR Item No.	Rev. 1 AMR Link	Structures and/or Components	Material	Environment	Aging Effect/ Mechanism	Aging Management Program	Further Evaluation Required	Technical Basis for Changes	Comment No.
						Inspection”		verification of effectiveness of “Water Chemistry” program. As shown in Pilgrim SER Section 3.3.2.2.10.2, the staff has accepted the position that a “One-Time Inspection” program consistent with GALL AMP XI.M32 is adequate to verify the effectiveness of the “Water Chemistry” program.	
VIII.G.SP-102	VIII.G-12(SP-62)	Heat exchanger tubes	Stainless steel	Lubricating oil	Reduction of heat transfer due to fouling	**XI.M39, "Lubricating Oil Analysis," and XI.M32, “One-Time Inspection”**	**No**	An approved precedent exists for accepting “One-Time Inspection” program as verification of effectiveness of “Lubricating Oil Analysis” program. As shown in WCGS	N/A

Table II-10. Changes to Existing GALL Report Rev. 1 Chapter VIII AMR Items for Steam and Power Conversion Systems and Their Technical Bases (cells where changes have been made are shown in bold)

Rev. 2 AMR Item No.	Rev. 1 AMR Link	Structures and/or Components	Material	Environment	Aging Effect/ Mechanism	Aging Management Program	Further Evaluation Required	Technical Basis for Changes	Comment No.
								SER Section 3.3.2.2.7.1, the staff has accepted the position that a “One-Time Inspection” program consistent with GALL AMP XI.M32 is adequate to verify the effectiveness of the “Lubricating Oil Analysis” program.	
VIII.G.SP-103	VIII.G-15(SP-63)	Heat exchanger tubes	Steel	Lubricating oil	Reduction of heat transfer due to fouling	**XI.M39, "Lubricating Oil Analysis," and XI.M32, “One-Time Inspection”**	**No**	An approved precedent exists for accepting “One-Time Inspection” program as verification of effectiveness of “Lubricating Oil Analysis” program. As shown in WCGS SER Section 3.3.2.2.7.1, the staff has accepted the position that a “One-Time	N/A

Table II-10. Changes to Existing GALL Report Rev. 1 Chapter VIII AMR Items for Steam and Power Conversion Systems and Their Technical Bases (cells where changes have been made are shown in bold)

Rev. 2 AMR Item No.	Rev. 1 AMR Link	Structures and/or Components	Material	Environment	Aging Effect/ Mechanism	Aging Management Program	Further Evaluation Required	Technical Basis for Changes	Comment No.
								Inspection" program consistent with GALL AMP XI.M32 is adequate to verify the effectiveness of the "Lubricating Oil Analysis" program.	
VIII.E.SP-117 VIII.F.SP-117 VIII.G.SP-117	VIII.E-3(S-26) VIII.F-2(S-26) VIII.G-4(S-26)	Heat exchanger components	Stainless steel	Raw water	**Loss of material due to general, pitting, crevice, galvanic, and MIC; fouling that leads to corrosion**	XI.M20, "Open-Cycle Cooling Water System"	No	Aging mechanism of "fouling" is revised to "fouling that leads to corrosion," which could cause loss of material. Fouling itself without corrosion is not regarded to cause loss of material..	N/A
VIII.G.SP-136	VIII.G-36(S-12)	Steel Piping, piping components, and piping elements exposed to Raw water	Steel	Raw water	**Loss of material due to general, pitting, crevice, galvanic, and MIC; fouling that leads to corrosion**	XI.M38, "Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components"	No	Aging mechanism of "fouling" is revised to "fouling that leads to corrosion," which could cause loss of material. Fouling itself without corrosion is not regarded to	N/A

Table II-10. Changes to Existing GALL Report Rev. 1 Chapter VIII AMR Items for Steam and Power Conversion Systems and Their Technical Bases (cells where changes have been made are shown in bold)

Rev. 2 AMR Item No.	Rev. 1 AMR Link	Structures and/or Components	Material	Environment	Aging Effect/ Mechanism	Aging Management Program	Further Evaluation Required	Technical Basis for Changes	Comment No.
								cause loss of material..	
VIII.E.SP-145 VIII.G.SP-145	VIII.E-1(S-01) VIII.G-1(S-01)	Piping, piping components, and piping elements; tanks	**Steel (with coating or wrapping)**	**Soil or concrete**	Loss of material due to general, pitting, crevice, and MIC	**XI.M41, "Buried and Underground Piping and Tanks"**	**No**	AMR XI.M41 includes aging management for this component, material, environment, and aging effect combination.	N/A
VIII.E.SP-146 VIII.F.SP-146 VIII.G.SP-146	VIII.E-6(S-24) VIII.F-5(S-24) VIII.G-7(S-24)	Heat exchanger components	Steel	Raw water	**Loss of material due to general, pitting, crevice, galvanic, and MIC; fouling that leads to corrosion**	XI.M20, "Open-Cycle Cooling Water System"	No	Aging mechanism of “fouling” is specific for loss of material.	N/A
VIII.I.SP-154	VIII.I-14(SP-2)	Piping, piping components, and piping elements	Steel	Concrete	None	**None, provided that (1) attributes of the concrete are consistent with ACI 318 or ACI 349 (low water-to-cement ratio, low permeability, and adequate air**	**No, if conditions are met.**	The AMP column has been changed to describe the conditions of the concrete that are needed to support a “none-none” conclusion	N/A

Table II-10. Changes to Existing GALL Report Rev. 1 Chapter VIII AMR Items for Steam and Power Conversion Systems and Their Technical Bases (cells where changes have been made are shown in bold)

Rev. 2 AMR Item No.	Rev. 1 AMR Link	Structures and/or Components	Material	Environment	Aging Effect/ Mechanism	Aging Management Program	Further Evaluation Required	Technical Basis for Changes	Comment No.
						entrainment) as cited in NUREG-1557 and **(2) plant OE indicates no degradation of the concrete**			
VIII.A.SP-155 VIII.B1.SP-155 VIII.B2.SP-155	VIII.A-12(SP-43) VIII.B1-3(SP-43) VIII.B2-2(SP43)	Piping, piping components, and piping elements	Stainless steel	Steam	Loss of material due to pitting and crevice corrosion	**XI.M2, "Water Chemistry," and XI.M32, "One-Time Inspection"**	No	The GALL Report recommends use of AMP XI.M32 to verify the effectiveness of AMP XI.M2 to mitigate loss of material due to pitting and crevice corrosion for this component and material in an environment of treated water (e.g., SP-16 in Tables VIII.C, VIII.D1, and VIII.D2). Since the steam environment in this AMR item is steam from treated water, the	NA

Table II-10. Changes to Existing GALL Report Rev. 1 Chapter VIII AMR Items for Steam and Power Conversion Systems and Their Technical Bases (cells where changes have been made are shown in bold)

Rev. 2 AMR Item No.	Rev. 1 AMR Link	Structures and/or Components	Material	Environment	Aging Effect/ Mechanism	Aging Management Program	Further Evaluation Required	Technical Basis for Changes	Comment No.
								same combination of AMPs should be used to manage this aging effect.	
VIII.B1.SP-157	VIII.B1-1(SP-18)	Piping, piping components, and piping elements	Nickel alloy	Steam	Loss of material due to pitting and crevice corrosion	**XI.M2, “Water Chemistry,” and XI.M32, “One-Time Inspection”**	No	The GALL Report recommends use of AMP XI.M32 to verify the effectiveness of AMP XI.M2 to mitigate loss of material due to pitting and crevice corrosion for this component and stainless steel in an environment of treated water (e.g., SP-16 in Tables VIII.C, VIII.D1, and VIII.D2). Since corrosion properties of nickel-alloy piping are similar to stainless steel and because the steam environment in this AMR item is	NA

Table II-10. Changes to Existing GALL Report Rev. 1 Chapter VIII AMR Items for Steam and Power Conversion Systems and Their Technical Bases (cells where changes have been made are shown in bold)

Rev. 2 AMR Item No.	Rev. 1 AMR Link	Structures and/or Components	Material	Environment	Aging Effect/ Mechanism	Aging Management Program	Further Evaluation Required	Technical Basis for Changes	Comment No.
								steam from treated water, the same combination of AMPs is conservatively used to manage this aging effect for this component, material and environment combination.	
VIII.B2.SP-160	VIII.B2-3(S-05)	Piping, piping components, and piping elements	Steel	Steam	Loss of material due to general, pitting, and crevice corrosion	**XI.M2, "Water Chemistry," and XI.M32, "One-Time Inspection"**	No	In GALL Tables VIII.A and VIII.C, item SP-71 provides AMR results for the same component, material, environment and aging effect. SP-71 credits AMP XI.M2 together with AMP XI.M32. The AMP column in this line was revised by adding AMP XI.M32 to verify effectiveness of the "Water Chemistry"	NA

Table II-10. Changes to Existing GALL Report Rev. 1 Chapter VIII AMR Items for Steam and Power Conversion Systems and Their Technical Bases (cells where changes have been made are shown in bold)

Rev. 2 AMR Item No.	Rev. 1 AMR Link	Structures and/or Components	Material	Environment	Aging Effect/ Mechanism	Aging Management Program	Further Evaluation Required	Technical Basis for Changes	Comment No.
								program and to maintain consistency with GALL item SP-71.	
VIII.A.SP-71 VIII.B1.SP-71 VIII.C.SP-71	VIII.A-15(S-04) VIII.B1-8(S-07) VIII.C-3(S-04)	Piping, piping components, and piping elements	Steel	Steam	Loss of material due to general, pitting, and crevice corrosion	**XI.M2, "Water Chemistry," and XI.M32, "One-Time Inspection"**	**No**	An approved precedent exists for accepting "One-Time Inspection" program as verification of effectiveness of "Water Chemistry" program. As shown in Pilgrim SER Section 3.3.2.2.10.2, the staff has accepted the position that a "One-Time Inspection" program consistent with GALL AMP XI.M32 is adequate to verify the effectiveness of the "Water Chemistry" program.	N/A
VIII.B2.SP-73	VIII.B2-6(S-09)	Piping, piping components,	Steel	Treated water	Loss of material due to general,	**XI.M2, "Water**	**No**	An approved precedent exists	N/A

Table II-10. Changes to Existing GALL Report Rev. 1 Chapter VIII AMR Items for Steam and Power Conversion Systems and Their Technical Bases (cells where changes have been made are shown in bold)

Rev. 2 AMR Item No.	Rev. 1 AMR Link	Structures and/or Components	Material	Environment	Aging Effect/ Mechanism	Aging Management Program	Further Evaluation Required	Technical Basis for Changes	Comment No.
VIII.C.SP-73 VIII.D2.SP-73 VIII.E.SP-73	VIII.C-6(S-09) VIII.D2-7(S-09) VIII.E-33(S-09)	and piping elements			pitting, and crevice corrosion	**Chemistry," and** **XI.M32, "One-Time Inspection"**		for accepting "One-Time Inspection" program as verification of effectiveness of "Water Chemistry" program. As shown in Pilgrim SER Section 3.3.2.2.10.2, the staff has accepted the position that a "One-Time Inspection" program consistent with GALL AMP XI.M32 is adequate to verify the effectiveness of the "Water Chemistry" program.	
VIII.B1.SP-74 VIII.D1.SP-74 VIII.F.SP-74 VIII.G.SP-74	VIII.B1-11(S-10) VIII.D1-8(S-10) VIII.F-25(S-10) VIII.G-38(S-10)	Piping, piping components, and piping elements	Steel	Treated water	Loss of material due to general, pitting, and crevice corrosion	**XI.M2, "Water Chemistry," and** **XI.M32, "One-Time Inspection"**	**No**	An approved precedent exists for accepting "One-Time Inspection" program as verification of effectiveness of	N/A

Table II-10. Changes to Existing GALL Report Rev. 1 Chapter VIII AMR Items for Steam and Power Conversion Systems and Their Technical Bases (cells where changes have been made are shown in bold)

Rev. 2 AMR Item No.	Rev. 1 AMR Link	Structures and/or Components	Material	Environment	Aging Effect/ Mechanism	Aging Management Program	Further Evaluation Required	Technical Basis for Changes	Comment No.
								"Water Chemistry" program. As shown in Pilgrim SER Section 3.3.2.2.10.2, the staff has accepted the position that a "One-Time Inspection" program consistent with GALL AMP XI.M32 is adequate to verify the effectiveness of the "Water Chemistry" program.	
VIII.E.SP-75 VIII.G.SP-75	VIII.E-40(S-13) VIII.G-41(S-13)	Tanks	Steel; stainless steel	Treated water	Loss of material due to general (steel only), pitting, and crevice corrosion	**XI.M2, "Water Chemistry," and XI.M32, "One-Time Inspection"**	**No**	An approved precedent exists for accepting "One-Time Inspection" program as verification of effectiveness of "Water Chemistry" program. As shown in Pilgrim SER Section 3.3.2.2.10.2, the staff has accepted	N/A

Table II-10. Changes to Existing GALL Report Rev. 1 Chapter VIII AMR Items for Steam and Power Conversion Systems and Their Technical Bases (cells where changes have been made are shown in bold)

Rev. 2 AMR Item No.	Rev. 1 AMR Link	Structures and/or Components	Material	Environment	Aging Effect/ Mechanism	Aging Management Program	Further Evaluation Required	Technical Basis for Changes	Comment No.
								the position that a “One-Time Inspection” program consistent with GALL AMP XI.M32 is adequate to verify the effectiveness of the “Water Chemistry” program.	
VIII.G.SP-76	VIII.G-6(S-17)	Heat exchanger components	Steel	Lubricating oil	Loss of material due to general, pitting, crevice, and MIC	**XI.M39, "Lubricating Oil Analysis," and XI.M32, “One-Time Inspection”**	**No**	An approved precedent exists for accepting “One-Time Inspection” program as verification of effectiveness of “Lubricating Oil Analysis” program. As shown in WCGS SER Section 3.3.2.2.7.1, the staff has accepted the position that a “One-Time Inspection” program consistent with	N/A

Table II-10. Changes to Existing GALL Report Rev. 1 Chapter VIII AMR Items for Steam and Power Conversion Systems and Their Technical Bases (cells where changes have been made are shown in bold)

Rev. 2 AMR Item No.	Rev. 1 AMR Link	Structures and/or Components	Material	Environment	Aging Effect/ Mechanism	Aging Management Program	Further Evaluation Required	Technical Basis for Changes	Comment No.
								GALL AMP XI.M32 is adequate to verify the effectiveness of the “Lubricating Oil Analysis” program.	
VIII.E.SP-77	VIII.E-7(S-18)	Heat exchanger components	Steel	Treated water	Loss of material due to general, pitting, crevice, and galvanic corrosion	**XI.M2, “Water Chemistry,” and XI.M32, “One-Time Inspection”**	**No**	An approved precedent exists for accepting “One-Time Inspection” program as verification of effectiveness of “Water Chemistry” program. As shown in Pilgrim SER Section 3.3.2.2.10.2, the staff has accepted the position that a “One-Time Inspection” program consistent with GALL AMP XI.M32 is adequate to verify the effectiveness of the “Water Chemistry”	N/A

Table II-10. Changes to Existing GALL Report Rev. 1 Chapter VIII AMR Items for Steam and Power Conversion Systems and Their Technical Bases (cells where changes have been made are shown in bold)

Rev. 2 AMR Item No.	Rev. 1 AMR Link	Structures and/or Components	Material	Environment	Aging Effect/ Mechanism	Aging Management Program	Further Evaluation Required	Technical Basis for Changes	Comment No.
								program.	
VIII.E.SP-78 VIII.F.SP-78	VIII.E-37(S-19) VIII.F-28(S-19)	PWR heat exchanger components	Steel	Treated water	Loss of material due to general, pitting, and crevice corrosion	**XI.M2, "Water Chemistry," and XI.M32, "One-Time Inspection"**	**No**	An approved precedent exists for accepting "One-Time Inspection" program as verification of effectiveness of "Water Chemistry" program. As shown in Pilgrim SER Section 3.3.2.2.10.2, the staff has accepted the position that a "One-Time Inspection" program consistent with GALL AMP XI.M32 is adequate to verify the effectiveness of the "Water Chemistry" program.	N/A
VIII.G.SP-79	VIII.G-3(S-20)	Heat exchanger components	Stainless steel	Lubricating oil	Loss of material due to pitting, crevice, and MIC	**XI.M39, "Lubricating Oil Analysis," and**	**No**	An approved precedent exists for accepting "One-Time Inspection"	N/A

Table II-10. Changes to Existing GALL Report Rev. 1 Chapter VIII AMR Items for Steam and Power Conversion Systems and Their Technical Bases (cells where changes have been made are shown in bold)

Rev. 2 AMR Item No.	Rev. 1 AMR Link	Structures and/or Components	Material	Environment	Aging Effect/ Mechanism	Aging Management Program	Further Evaluation Required	Technical Basis for Changes	Comment No.
						XI.M32, "One-Time Inspection"		program as verification of effectiveness of "Lubricating Oil Analysis" program. As shown in WCGS SER Section 3.3.2.2.7.1, the staff has accepted the position that a "One-Time Inspection" program consistent with GALL AMP XI.M32 is adequate to verify the effectiveness of the "Lubricating Oil Analysis" program.	
VIII.E.SP-80	VIII.E-4(S-21)	Heat exchanger components and tubes	Stainless steel	Treated water	Loss of material due to pitting and crevice corrosion	**XI.M2, "Water Chemistry," and XI.M32, "One-Time Inspection"**	**No**	An approved precedent exists for accepting "One-Time Inspection" program as verification of effectiveness of "Water Chemistry" program. As	N/A

Table II-10. Changes to Existing GALL Report Rev. 1 Chapter VIII AMR Items for Steam and Power Conversion Systems and Their Technical Bases (cells where changes have been made are shown in bold)

Rev. 2 AMR Item No.	Rev. 1 AMR Link	Structures and/or Components	Material	Environment	Aging Effect/ Mechanism	Aging Management Program	Further Evaluation Required	Technical Basis for Changes	Comment No.
								shown in Pilgrim SER Section 3.3.2.2.10.2, the staff has accepted the position that a "One-Time Inspection" program consistent with GALL AMP XI.M32 is adequate to verify the effectiveness of the "Water Chemistry" program.	
VIII.E.SP-81 VIII.F.SP-81	VIII.E-36(S-22) VIII.F-27(S-22)	PWR heat exchanger components	Stainless steel	Treated water	Loss of material due to pitting and crevice corrosion	**XI.M2, "Water Chemistry," and XI.M32, "One-Time Inspection"**	**No**	An approved precedent exists for accepting "One-Time Inspection" program as verification of effectiveness of "Water Chemistry" program. As shown in Pilgrim SER Section 3.3.2.2.10.2, the staff has accepted the position that a "One-Time	N/A

Table II-10. Changes to Existing GALL Report Rev. 1 Chapter VIII AMR Items for Steam and Power Conversion Systems and Their Technical Bases (cells where changes have been made are shown in bold)

Rev. 2 AMR Item No.	Rev. 1 AMR Link	Structures and/or Components	Material	Environment	Aging Effect/ Mechanism	Aging Management Program	Further Evaluation Required	Technical Basis for Changes	Comment No.
								Inspection" program consistent with GALL AMP XI.M32 is adequate to verify the effectiveness of the "Water Chemistry" program.	
VIII.H.SP-82	VIII.H-1(S-32)	Bolting	**Steel; stainless steel**	Air – outdoor (External)	**Loss of material due to general (steel only), pitting, and crevice corrosion**	XI.M18, "Bolting Integrity"	No	Bolting may be either steel or stainless steel; these are the aging effects mechanisms in the stated environment	N/A
VIII.H.SP-83	VIII.H-5(S-33)	Closure bolting	**Steel; stainless steel**	Air – indoor, uncontrolled (External)	Loss of preload due to thermal effects, gasket creep, and self-loosening	XI.M18, "Bolting Integrity"	No	"Loss of preload" can occur with both steel and stainless steel bolts.	N/A
VIII.H.SP-84	VIII.H-4(S-34)	Closure bolting	**Steel; stainless steel**	Air – indoor, uncontrolled (External)	**Loss of material due to general (steel only), pitting, and crevice corrosion**	XI.M18, "Bolting Integrity"	No	Bolting may be either steel or stainless steel; these are the aging effects mechanisms in the stated environment	N/A

Table II-10. Changes to Existing GALL Report Rev. 1 Chapter VIII AMR Items for Steam and Power Conversion Systems and Their Technical Bases (cells where changes have been made are shown in bold)

Rev. 2 AMR Item No.	Rev. 1 AMR Link	Structures and/or Components	Material	Environment	Aging Effect/ Mechanism	Aging Management Program	Further Evaluation Required	Technical Basis for Changes	Comment No.
VIII.F.SP-85	VIII.F-3(S-39)	Heat exchanger components	Stainless steel	Treated water >60°C (>140°F)	Cracking due to SCC	**XI.M2, "Water Chemistry," and XI.M32, "One-Time Inspection"**	**No**	An approved precedent exists for accepting "One-Time Inspection" program as verification of effectiveness of "Water Chemistry" program. As shown in Pilgrim SER Section 3.3.2.2.10.2, the staff has accepted the position that a "One-Time Inspection" program consistent with GALL AMP XI.M32 is adequate to verify the effectiveness of the "Water Chemistry" program.	N/A
VIII.B1.SP-87 VIII.C.SP-87 VIII.D1.SP-87 VIII.D2.SP-	VIII.B1-4(SP-16) VIII.C-1(SP-16) VIII.D1-4(SP-16) VIII.D2-	Piping, piping components, and piping elements	Stainless steel	Treated water	Loss of material due to pitting and crevice corrosion	**XI.M2, "Water Chemistry," and XI.M32, "One-Time**	**No**	An approved precedent exists for accepting "One-Time Inspection" program as	N/A

Table II-10. Changes to Existing GALL Report Rev. 1 Chapter VIII AMR Items for Steam and Power Conversion Systems and Their Technical Bases (cells where changes have been made are shown in bold)

Rev. 2 AMR Item No.	Rev. 1 AMR Link	Structures and/or Components	Material	Environment	Aging Effect/ Mechanism	Aging Management Program	Further Evaluation Required	Technical Basis for Changes	Comment No.
87 VIII.E.SP-87 VIII.F.SP-87 VIII.G.SP-87	4(SP-16) VIII.E-29(SP-16) VIII.F-23(SP-16) VIII.G-32(SP-16)					**Inspection"**		verification of effectiveness of "Water Chemistry" program. As shown in Pilgrim SER Section 3.3.2.2.10.2, the staff has accepted the position that a "One-Time Inspection" program consistent with GALL AMP XI.M32 is adequate to verify the effectiveness of the "Water Chemistry" program.	
VIII.B1.SP-88 VIII.C.SP-88 VIII.D1.SP-88 VIII.E.SP-88 VIII.F.SP-88 VIII.G.SP-88	VIII.B1-5(SP-17) VIII.C-2(SP-17) VIII.D1-5(SP-17) VIII.E-30(SP-17) VIII.F-24(SP-17) VIII.G-33(SP-	Piping, piping components, and piping elements	Stainless steel	Treated water >60°C (>140°F)	Cracking due to SCC	**XI.M2, "Water Chemistry," and XI.M32, "One-Time Inspection"**	**No**	An approved precedent exists for accepting "One-Time Inspection" program as verification of effectiveness of "Water Chemistry" program. As shown in Pilgrim SER Section	N/A

Table II-10. Changes to Existing GALL Report Rev. 1 Chapter VIII AMR Items for Steam and Power Conversion Systems and Their Technical Bases (cells where changes have been made are shown in bold)

Rev. 2 AMR Item No.	Rev. 1 AMR Link	Structures and/or Components	Material	Environment	Aging Effect/ Mechanism	Aging Management Program	Further Evaluation Required	Technical Basis for Changes	Comment No.
	17)							3.3.2.2.10.2, the staff has accepted the position that a “One-Time Inspection” program consistent with GALL AMP XI.M32 is adequate to verify the effectiveness of the “Water Chemistry” program.	
VIII.D1.SP-90 VIII.D2.SP-90 VIII.E.SP-90 VIII.F.SP-90 VIII.G.SP-90	VIII.D1-1(SP-24) VIII.D2-1(SP-24) VIII.E-15(SP-24) VIII.F-12(SP-24) VIII.G-17(SP-24)	Piping, piping components, and piping elements	Aluminum	Treated water	Loss of material due to pitting and crevice corrosion	**XI.M2, “Water Chemistry,” and XI.M32, “One-Time Inspection”**	**No**	An approved precedent exists for accepting “One-Time Inspection” program as verification of effectiveness of “Water Chemistry” program. As shown in Pilgrim SER Section 3.3.2.2.10.2, the staff has accepted the position that a “One-Time Inspection” program	N/A

Table II-10. Changes to Existing GALL Report Rev. 1 Chapter VIII AMR Items for Steam and Power Conversion Systems and Their Technical Bases (cells where changes have been made are shown in bold)

Rev. 2 AMR Item No.	Rev. 1 AMR Link	Structures and/or Components	Material	Environment	Aging Effect/ Mechanism	Aging Management Program	Further Evaluation Required	Technical Basis for Changes	Comment No.
								consistent with GALL AMP XI.M32 is adequate to verify the effectiveness of the “Water Chemistry” program.	
VIII.A.SP-91 VIII.D1.SP-91 VIII.D2.SP-91 VIII.E.SP-91 VIII.G.SP-91	VIII.A-14(SP-25) VIII.D1-6(SP-25) VIII.D2-5(SP-25) VIII.E-32(SP-25) VIII.G-35(SP-25)	Piping, piping components, and piping elements	Steel	Lubricating oil	Loss of material due to general, pitting, and crevice corrosion	**XI.M39, "Lubricating Oil Analysis," and XI.M32, “One-Time Inspection”**	**No**	An approved precedent exists for accepting “One-Time Inspection” program as verification of effectiveness of “Lubricating Oil Analysis” program. As shown in WCGS SER Section 3.3.2.2.7.1, the staff has accepted the position that a “One-Time Inspection” program consistent with GALL AMP XI.M32 is adequate to verify the effectiveness	N/A

Table II-10. Changes to Existing GALL Report Rev. 1 Chapter VIII AMR Items for Steam and Power Conversion Systems and Their Technical Bases (cells where changes have been made are shown in bold)

Rev. 2 AMR Item No.	Rev. 1 AMR Link	Structures and/or Components	Material	Environment	Aging Effect/ Mechanism	Aging Management Program	Further Evaluation Required	Technical Basis for Changes	Comment No.
								of the “Lubricating Oil Analysis” program.	
VIII.A.SP-92 VIII.D1.SP-92 VIII.D2.SP-92 VIII.E.SP-92 VIII.G.SP-92	VIII.A-3(SP-32) VIII.D1-2(SP-32) VIII.D2-2(SP-32) VIII.E-17(SP-32) VIII.G-19(SP-32)	Piping, piping components, and piping elements	Copper alloy	Lubricating oil	Loss of material due to pitting and crevice corrosion	**XI.M39, "Lubricating Oil Analysis," and** **XI.M32, “One-Time Inspection”**	**No**	An approved precedent exists for accepting “One-Time Inspection” program as verification of effectiveness of “Lubricating Oil Analysis” program. As shown in WCGS SER Section 3.3.2.2.7.1, the staff has accepted the position that a “One-Time Inspection” program consistent with GALL AMP XI.M32 is adequate to verify the effectiveness of the “Lubricating Oil Analysis” program.	N/A
VIII.E.SP-94	VIII.E-28(SP-	Piping, piping components,	Stainless steel	**Soil or concrete**	Loss of material due to pitting and	**XI.M41, "Buried and**	**No**	An approved precedent exists	N/A

Table II-10. Changes to Existing GALL Report Rev. 1 Chapter VIII AMR Items for Steam and Power Conversion Systems and Their Technical Bases (cells where changes have been made are shown in bold)

Rev. 2 AMR Item No.	Rev. 1 AMR Link	Structures and/or Components	Material	Environment	Aging Effect/ Mechanism	Aging Management Program	Further Evaluation Required	Technical Basis for Changes	Comment No.
VIII.G.SP-94	37) VIII.G-31(SP-37)	and piping elements			crevice corrosion	**Underground Piping and Tanks"**		for accepting “Buried and Underground Piping and Tanks Inspection” program to manage loss of material for stainless steel piping in soil environment. As shown in SSES SER 3.4.2.2.7.3, the staff has accepted the position that the “Buried and Underground Piping and Tank Inspection” program is adequate to manage this aging effect. This GALL AMP is revised to include other materials besides steel. (See also AP-137)	
VIII.A.SP-95 VIII.D1.SP-95	VIII.A-9(SP-38) VIII.D1-3(SP-38)	Piping, piping components, and piping	Stainless steel	Lubricating oil	Loss of material due to pitting, crevice, and MIC	**XI.M39, "Lubricating Oil**	**No**	An approved precedent exists for accepting	N/A

Table II-10. Changes to Existing GALL Report Rev. 1 Chapter VIII AMR Items for Steam and Power Conversion Systems and Their Technical Bases (cells where changes have been made are shown in bold)

Rev. 2 AMR Item No.	Rev. 1 AMR Link	Structures and/or Components	Material	Environment	Aging Effect/ Mechanism	Aging Management Program	Further Evaluation Required	Technical Basis for Changes	Comment No.
VIII.D2.SP-95 VIII.E.SP-95 VIII.G.SP-95	VIII.D2-3(SP-38) VIII.E-26(SP-38) VIII.G-29(SP-38)	elements				**Analysis," and XI.M32, "One-Time Inspection"**		"One-Time Inspection" program as verification of effectiveness of "Lubricating Oil Analysis" program. As shown in WCGS SER Section 3.3.2.2.7.1, the staff has accepted the position that a "One-Time Inspection" program consistent with GALL AMP XI.M32 is adequate to verify the effectiveness of the "Lubricating Oil Analysis" program.	
VIII.E.SP-96 VIII.F.SP-96	VIII.E-13(SP-40) VIII.F-10(SP-40)	Heat exchanger tubes	Stainless steel	Treated water	Reduction of heat transfer due to fouling	**XI.M2, "Water Chemistry," and XI.M32, "One-Time Inspection"**	**No**	An approved precedent exists for accepting "One-Time Inspection" program as verification of effectiveness of	N/A

Table II-10. Changes to Existing GALL Report Rev. 1 Chapter VIII AMR Items for Steam and Power Conversion Systems and Their Technical Bases (cells where changes have been made are shown in bold)

Rev. 2 AMR Item No.	Rev. 1 AMR Link	Structures and/or Components	Material	Environment	Aging Effect/ Mechanism	Aging Management Program	Further Evaluation Required	Technical Basis for Changes	Comment No.
								"Water Chemistry" program. As shown in Pilgrim SER Section 3.3.2.2.10.2 the staff has accepted the position that a "One-Time Inspection" program consistent with GALL AMP XI.M32 is adequate to verify the effectiveness of the "Water Chemistry" program.	
VIII.E.SP-97	VIII.E-38(SP-42)	Tanks	Stainless steel	Treated water >60°C (>140°F)	Cracking due to SCC	**XI.M2, "Water Chemistry," and XI.M32, "One-Time Inspection"**	**No**	An approved precedent exists for accepting "One-Time Inspection" program as verification of effectiveness of "Water Chemistry" program. As shown in Pilgrim SER Section 3.3.2.2.10.2, the staff has accepted	N/A

Table II-10. Changes to Existing GALL Report Rev. 1 Chapter VIII AMR Items for Steam and Power Conversion Systems and Their Technical Bases (cells where changes have been made are shown in bold)

Rev. 2 AMR Item No.	Rev. 1 AMR Link	Structures and/or Components	Material	Environment	Aging Effect/ Mechanism	Aging Management Program	Further Evaluation Required	Technical Basis for Changes	Comment No.
								the position that a "One-Time Inspection" program consistent with GALL AMP XI.M32 is adequate to verify the effectiveness of the "Water Chemistry" program.	
VIII.A.SP-98 VIII.B2.SP-98	VIII.A-11(SP-45) VIII.B2-1(SP-45)	Piping, piping components, and piping elements	Stainless steel	Steam	Cracking due to SCC	**XI.M2, "Water Chemistry," and XI.M32, "One-Time Inspection"**	**No**	An approved precedent exists for accepting "One-Time Inspection" program as verification of effectiveness of "Lubricating Oil Analysis" program. As shown in WCGS SER Section 3.3.2.2.7.1, the staff has accepted the position that a "One-Time Inspection" program consistent with	N/A

Table II-10. Changes to Existing GALL Report Rev. 1 Chapter VIII AMR Items for Steam and Power Conversion Systems and Their Technical Bases (cells where changes have been made are shown in bold)

Rev. 2 AMR Item No.	Rev. 1 AMR Link	Structures and/or Components	Material	Environment	Aging Effect/ Mechanism	Aging Management Program	Further Evaluation Required	Technical Basis for Changes	Comment No.
								GALL AMP XI.M32 is adequate to verify the effectiveness of the "Lubricating Oil Analysis" program.	
VIII.G.SP-99	VIII.G-8(SP-53)	Heat exchanger tubes	Copper alloy	Lubricating oil	Reduction of heat transfer due to fouling	**XI.M39, "Lubricating Oil Analysis," and XI.M32, "One-Time Inspection"**	**No**	An approved precedent exists for accepting "One-Time Inspection" program as verification of effectiveness of "Lubricating Oil Analysis" program. As shown in WCGS SER Section 3.3.2.2.7.1, the staff has accepted the position that a "One-Time Inspection" program consistent with GALL AMP XI.M32 is adequate to verify the effectiveness of the "Lubricating	N/A

Table II-10. Changes to Existing GALL Report Rev. 1 Chapter VIII AMR Items for Steam and Power Conversion Systems and Their Technical Bases (cells where changes have been made are shown in bold)

Rev. 2 AMR Item No.	Rev. 1 AMR Link	Structures and/or Components	Material	Environment	Aging Effect/ Mechanism	Aging Management Program	Further Evaluation Required	Technical Basis for Changes	Comment No.
								Oil Analysis" program.	

Table II-11. Changes to Existing GALL Report Rev. 1 Chapter II AMR Items for Containment and Their Technical Bases (cells where changes have been made are shown in bold)

Rev. 2 AMR Item No.	Rev. 1 AMR Link	Structures and/or Components	Material	Environment	Aging Effect/ Mechanism	Aging Management Program	Further Evaluation Required	Technical Basis for Changes	Comment No.
II.A1.CP-100	II.A1-4(C-03)	**Concrete (inaccessible areas): dome; wall; basemat; ring girders; buttresses**	Concrete	Air – indoor, uncontrolled or Air – outdoor or Ground water/soil	Increase in porosity and permeability; cracking; loss of material (spalling, scaling) due to aggressive chemical attack	**XI.S2, "ASME Section XI, Subsection IWL," or XI.S6, "Structure Monitoring"**	**No**	GALL Rev.1, Line item C-03 is split to differentiate between accessible and inaccessible areas. XI.S6, "Structures Monitoring" program is revised to require monitoring of the aging effect/mechanism for this component. Further evaluation is not required.	N/A
II.A1.CP-101	II.A1-5(C-37)	Concrete: dome; wall; basemat; ring girders; buttresses	Concrete	Soil	Cracking and distortion due to increased stress levels from settlement	**XI.S2, "ASME Section XI, Subsection IWL," or XI.S6, "Structure Monitoring" If a de-watering system is relied upon for control of settlement, then the licensee is to ensure**	**Yes, if a de-watering system is relied upon to control settlement**	ASME Section XI, Subsection IWL or Structures Monitoring is the applicable aging management program for concrete elements of the BWR and PWR containments. The program	298

Table II-11. Changes to Existing GALL Report Rev. 1 Chapter II AMR Items for Containment and Their Technical Bases (cells where changes have been made are shown in bold)

Rev. 2 AMR Item No.	Rev. 1 AMR Link	Structures and/or Components	Material	Environment	Aging Effect/ Mechanism	Aging Management Program	Further Evaluation Required	Technical Basis for Changes	Comment No.
						proper functioning of the de-watering system through the period of extended operation.		element 3, Parameters Monitored, includes monitoring concrete for cracking.	
II.A1.CP-102	II.A1-6(C-02)	**Concrete (inaccessible areas): dome; wall; basemat; ring girders; buttresses**	Concrete	Water – flowing	**Increase in porosity and permeability; loss of strength due to leaching of calcium hydroxide and carbonation**	**Further evaluation is required to determine if a plant-specific aging management program is needed to manage increase in porosity, and permeability due to leaching of calcium hydroxide and carbonation of concrete in Inaccessible Areas. A plant-specific aging management program is not required if (1) There is evidence**	**Yes, if leaching is observed in accessible areas that impact intended function**	GALL Rev. 1, Line Item C-02 is split to differentiate between accessible and inaccessible areas. ACI 201.2R was developed after some plants were constructed. Those plants were constructed in accordance with ACI 318, which provided the requirements for design and construction of reinforced concrete structures. ACI 318 included	N/A

Table II-11. Changes to Existing GALL Report Rev. 1 Chapter II AMR Items for Containment and Their Technical Bases (cells where changes have been made are shown in bold)

Rev. 2 AMR Item No.	Rev. 1 AMR Link	Structures and/or Components	Material	Environment	Aging Effect/ Mechanism	Aging Management Program	Further Evaluation Required	Technical Basis for Changes	Comment No.
						in the accessible areas that the flowing water has not caused leaching and carbonation, or (2) Evaluation determined that the observed leaching of calcium hydroxide and carbonation in accessible areas has no impact on the intended function of the concrete structure.		factors for water-cement mix proportions, slump, aggregates, type of mixer, mixing time, and temperature for durable concrete that were later addressed in ACI 201.2R-77. Thus, concrete structures constructed to either ACI 318 or 201.2R are expected to be durable. Since these standards were used for both accessible and inaccessible concrete, it is reasonable to conclude that leaching of calcium hydroxide and carbonation in accessible areas subject to flowing	

Table II-11. Changes to Existing GALL Report Rev. 1 Chapter II AMR Items for Containment and Their Technical Bases (cells where changes have been made are shown in bold)

Rev. 2 AMR Item No.	Rev. 1 AMR Link	Structures and/or Components	Material	Environment	Aging Effect/ Mechanism	Aging Management Program	Further Evaluation Required	Technical Basis for Changes	Comment No.
								water represent inaccessible areas. This is consistent with ASME Section XI, Subsection IWL, as augmented by 10CFR Part 50.55a.	
II.A2.CP-104	II.A2-3(C-38)	**Concrete (inaccessible areas): basemat**	Concrete	Any environment	Cracking due to expansion from reaction with aggregates	**Further evaluation is required to determine if a plant-specific aging management program is needed to manage cracking and expansion due to reaction with aggregate of concrete in Inaccessible Areas. A plant-specific aging management program is not required if (1) as described in NUREG-1557,**	**Yes, if concrete is not constructed as stated**	GALL Rev. 1, Line Item C-38 is split to differentiate between accessible and inaccessible areas. Current licensing basis of some plants may not require testing of aggregate reactivity based on ASTM C295 or ASTM C227. Deletion of the year for ASTM C295 and ASTM C227 and the addition of other ASTM reactivity	N/A

Table II-11. Changes to Existing GALL Report Rev. 1 Chapter II AMR Items for Containment and Their Technical Bases (cells where changes have been made are shown in bold)

Rev. 2 AMR Item No.	Rev. 1 AMR Link	Structures and/or Components	Material	Environment	Aging Effect/ Mechanism	Aging Management Program	Further Evaluation Required	Technical Basis for Changes	Comment No.
						investigations, tests, and petrographic examinations of aggregates performed in accordance with ASTM C295 and other ASTM reactivity tests, as required, can demonstrate that those aggregates do not adversely react within concrete, or (2) For potentially reactive aggregates, aggregate concrete reaction is not significant if it is demonstrated that the in-place concrete can perform its intended function.		tests provide alternate acceptable technical basis for plants that are not committed to a specific year of the standard or ASTM C227. For potentially reactive aggregate, the single reference to ACI 201.2R as a basis why reaction with aggregate is not significant does not include provisions for the concrete structures constructed in accordance with ACI 318. ACI 201.2R guidance was developed after many of the earlier nuclear plants were	

Table II-11. Changes to Existing GALL Report Rev. 1 Chapter II AMR Items for Containment and Their Technical Bases (cells where changes have been made are shown in bold)

Rev. 2 AMR Item No.	Rev. 1 AMR Link	Structures and/or Components	Material	Environment	Aging Effect/ Mechanism	Aging Management Program	Further Evaluation Required	Technical Basis for Changes	Comment No.
								constructed. They were constructed in accordance with ACI 318, which provided the requirements for design and construction of reinforced concrete structures. It included the factors for water cement mix proportions, slump, aggregates, type of mixer, mixing time, and temperature for durable concrete which were later addressed in ACI 201.2R. An approved precedent exists in TMI SER, Sections 3.5.2.2.1 and 3.5.2.2.2 for accepting concrete	

Table II-11. Changes to Existing GALL Report Rev. 1 Chapter II AMR Items for Containment and Their Technical Bases (cells where changes have been made are shown in bold)

Rev. 2 AMR Item No.	Rev. 1 AMR Link	Structures and/or Components	Material	Environment	Aging Effect/ Mechanism	Aging Management Program	Further Evaluation Required	Technical Basis for Changes	Comment No.
								designed, constructed, and inspected in accordance with applicable ACI and ASTM standards.	
II.B1.2.CP-105 II.B2.2.CP-105 II.B3.2.CP-105	II.B1.2-1(C-06) II.B2.2-1(C-06) II.B3.2-1(C-06)	Concrete elements, all	Concrete	Soil	Cracking and distortion due to increased stress levels from settlement	**XI.S2, "ASME Section XI, Subsection IWL," or** **XI.S6, "Structures Monitoring"** **If a de-watering system is relied upon for control of settlement, then the licensee is to ensure proper functioning of the de-watering system through the period of extended operation.**	Yes, if a de-watering system is relied upon to control settlement	ASME Section XI, Subsection IWL or Structures Monitoring is the applicable aging management program for concrete elements of the BWR and PWR containments. The program Element 3, parameters monitored, includes monitoring concrete for cracking.	301
II.B1.2.CP-106 II.B2.2.CP-106	II.B1.2-5(C-26) II.B2.2-5(C-26)	Concrete: containment; wall; basemat	Concrete	Air – indoor, uncontrolled or Air – outdoor	Increase in porosity and permeability; cracking; loss	**XI.S2, "ASME Section XI, Subsection IWL," or**	**No**	GALL Rev. 1, AMR item C-26 is split to differentiate	N/A

Table II-11. Changes to Existing GALL Report Rev. 1 Chapter II AMR Items for Containment and Their Technical Bases (cells where changes have been made are shown in bold)

Rev. 2 AMR Item No.	Rev. 1 AMR Link	Structures and/or Components	Material	Environment	Aging Effect/ Mechanism	Aging Management Program	Further Evaluation Required	Technical Basis for Changes	Comment No.
					of material (spalling, scaling) due to aggressive chemical attack	**XI.S6, "Structure Monitoring"**		between accessible and inaccessible areas. Inspections of accessible areas performed in accordance with IWL will detect the presence of increase in porosity and permeability, cracking, loss of material (spalling, scaling) due to aggressive chemical attack. Thus, a further evaluation is not required for accessible areas. Mark 2 and Mark 3 basements are enclosed within the reactor building, so soil and ground water are not an issue	
II.B2.1.CP-107	II.B2.1-3(C-44)	**Suppression pool shell**	Steel; stainless	Air – indoor, uncontrolled	Cracking due to cyclic	**XI.S1, "ASME Section XI,**	**No**	GALL Rev.1, AMR Item C-44 is	N/A

Table II-11. Changes to Existing GALL Report Rev. 1 Chapter II AMR Items for Containment and Their Technical Bases (cells where changes have been made are shown in bold)

Rev. 2 AMR Item No.	Rev. 1 AMR Link	Structures and/or Components	Material	Environment	Aging Effect/ Mechanism	Aging Management Program	Further Evaluation Required	Technical Basis for Changes	Comment No.
			steel; dissimilar metal welds	or Treated Water	loading (current licensing basis (CLB) fatigue analysis does not exist)	**Subsection IWE," and XI.S4, "10 CFR Part 50, Appendix J"**		split to separate suppression pool shell component from unbraced downcomers. Unbraced downcomers are not in the scope of XI.S4 and only XI.S1 is applicable. AMP XI.S1 Element 4 includes augmented inspection to detect cracking by surface examination. Therefore, further evaluation is changed from Yes to No.	
II.B3.2.CP-108	II.B3.2-2(C-33)	Concrete: dome; wall; basemat	Concrete	Air – indoor, uncontrolled or Air – outdoor	Reduction of strength and modulus due to elevated temperature (>150°F general; >200°F local)	**Plant-specific aging management program The implementation of 10 CFR 50.55a and ASME Section XI,**	Yes, if temperature limits are exceeded	As indicated in ACI 349, sustained exposure of concrete to elevated temperature can cause a loss of its mechanical	N/A

Table II-11. Changes to Existing GALL Report Rev. 1 Chapter II AMR Items for Containment and Their Technical Bases (cells where changes have been made are shown in bold)

Rev. 2 AMR Item No.	Rev. 1 AMR Link	Structures and/or Components	Material	Environment	Aging Effect/ Mechanism	Aging Management Program	Further Evaluation Required	Technical Basis for Changes	Comment No.
						Subsection IWL would not be able to identify the reduction of strength and modulus of elasticity due to elevated temperature. Thus, for any portions of concrete containment that exceed specified temperature limits, further evaluations are warranted. Subsection CC-3400 of ASME Section III, Division 2, specifies the concrete temperature limits for normal operation or any other long-term period. The temperatures shall not exceed 150°F except for		properties (modulus of elasticity and strength) and result in cracking. The reduction in strength and modulus of elasticity may be accepted by engineering calculation. The term, “design allowables” is replaced with “design calculations” because the “design allowables” are specified in the ACI Code and the “design calculations” are performed to determine that the plant conditions are acceptable against the “design allowables”.	

Table II-11. Changes to Existing GALL Report Rev. 1 Chapter II AMR Items for Containment and Their Technical Bases (cells where changes have been made are shown in bold)

Rev. 2 AMR Item No.	Rev. 1 AMR Link	Structures and/or Components	Material	Environment	Aging Effect/ Mechanism	Aging Management Program	Further Evaluation Required	Technical Basis for Changes	Comment No.
						local areas, such as around penetrations, which are not allowed to exceed 200°F. If significant equipment loads are supported by concrete at temperatures exceeding 150°F, an evaluation of the ability to withstand the postulated design loads is to be made. **Higher temperatures than given above may be allowed in the concrete if tests and/or calculations are provided to evaluate the reduction in strength and modulus of elasticity, and these reductions**		Therefore, the term "design calculations" is used at relevant locations in GALL Report Rev. 2	

Table II-11. Changes to Existing GALL Report Rev. 1 Chapter II AMR Items for Containment and Their Technical Bases (cells where changes have been made are shown in bold)

Rev. 2 AMR Item No.	Rev. 1 AMR Link	Structures and/or Components	Material	Environment	Aging Effect/ Mechanism	Aging Management Program	Further Evaluation Required	Technical Basis for Changes	Comment No.
						are applied to the design calculations.			
II.B1.1.CP-109	II.B1.1-2(C-19)	**Steel elements: torus ring girders; downcomers;**	Steel	Air – indoor, uncontrolled or Treated water	Loss of material due to general, pitting, and crevice corrosion	**XI.S1, "ASME Section XI, Subsection IWE"** **Plant-specific aging management program is required if plant operating experience identified significant corrosion of the torus ring girders and downcomers. If protective coating is credited for preventing corrosion of the torus shell, the coating should be included in scope of license renewal and subject to aging management review.**	**Yes, if corrosion is significant**	Torus ring girders and downcomers are not containment pressure boundary and not in the scope of 10 CFR Part 50 Appendix J, thus XI.S4 is not applicable. ASME Section XI, Subsection IWE, XI.S1 is the applicable aging management program.	N/A

Table II-11. Changes to Existing GALL Report Rev. 1 Chapter II AMR Items for Containment and Their Technical Bases (cells where changes have been made are shown in bold)

Rev. 2 AMR Item No.	Rev. 1 AMR Link	Structures and/or Components	Material	Environment	Aging Effect/ Mechanism	Aging Management Program	Further Evaluation Required	Technical Basis for Changes	Comment No.
II.B1.2.CP-110 II.B2.2.CP-110	II.B1.2-6(C-31) II.B2.2-6(C-31)	**Concrete (inaccessible areas): containment; wall; basemat**	Concrete	Water – flowing	**Increase in porosity and permeability; loss of strength due to leaching of calcium hydroxide and carbonation**	**Further evaluation is required to determine if a plant-specific aging management program is needed to manage increase in porosity, and permeability due to leaching of calcium hydroxide and carbonation of concrete in Inaccessible Areas. A plant-specific aging management program is not required if (1) There is evidence in the accessible areas that the flowing water has not caused leaching and carbonation, or (2) Evaluation determined that**	**Yes, if leaching is observed in accessible areas that impact intended function**	GALL Rev. 1, AMR Item C-31 is split to differentiate between accessible and inaccessible areas. ACI 201.2R was developed after some plants were constructed. Those plants were constructed in accordance with ACI 318, which provided the requirements for design and construction of reinforced concrete structures. ACI 318 included factors for water-cement mix proportions, slump, aggregates, type of mixer, mixing	N/A

Table II-11. Changes to Existing GALL Report Rev. 1 Chapter II AMR Items for Containment and Their Technical Bases (cells where changes have been made are shown in bold)

Rev. 2 AMR Item No.	Rev. 1 AMR Link	Structures and/or Components	Material	Environment	Aging Effect/ Mechanism	Aging Management Program	Further Evaluation Required	Technical Basis for Changes	Comment No.
						the observed leaching of calcium hydroxide and carbonation in accessible areas has no impact on the intended function of the concrete structure.		time, and temperature for durable concrete, which were later addressed in ACI 201.2R-77. Thus, concrete structures constructed to either ACI 318 or 201.2R are expected to be durable. Since these standards were used for both accessible and inaccessible concrete, it is reasonable to conclude that leaching of calcium hydroxide and carbonation in accessible areas subject to flowing - water represents the condition in inaccessible areas. This is consistent with	

Table II-11. Changes to Existing GALL Report Rev. 1 Chapter II AMR Items for Containment and Their Technical Bases (cells where changes have been made are shown in bold)

Rev. 2 AMR Item No.	Rev. 1 AMR Link	Structures and/or Components	Material	Environment	Aging Effect/ Mechanism	Aging Management Program	Further Evaluation Required	Technical Basis for Changes	Comment No.
								ASME Section XI, Subsection IWL, as augmented by 10 CFR Part 50.55a.	
II.B3.1.CP-113	II.B3.1-8(C-19)	**Steel elements (inaccessible areas): drywell shell; drywell head; and drywell shell in sand pocket regions**	Steel	**Air – indoor, uncontrolled or Concrete**	Loss of material due to general, pitting, and crevice corrosion	**XI.S1, "ASME Section XI, Subsection IWE," and XI.S4, "10 CFR Part 50, Appendix J"**	**Yes, if corrosion is indicated from the IWE examinations**	GALL Rev. 1, AMR item C-19 is split to distinguish between accessible and inaccessible areas and separate components located in different environment and those that are not containment pressure boundary. Torus ring girder, downcomers, and drywell support skirt are not a containment pressure boundary, thus 10 CFR Part 50 Appendix J is not applicable. The	N/A

Table II-11. Changes to Existing GALL Report Rev. 1 Chapter II AMR Items for Containment and Their Technical Bases (cells where changes have been made are shown in bold)

Rev. 2 AMR Item No.	Rev. 1 AMR Link	Structures and/or Components	Material	Environment	Aging Effect/ Mechanism	Aging Management Program	Further Evaluation Required	Technical Basis for Changes	Comment No.
								components are addressed separately, and the applicable aging management program (XI.S1) is identified. The ECCS Suction Header is removed from the list because it is evaluated with ECCS piping system as permitted by IWE. The basis for further evaluation is not changed.	
II.B1.2.CP-117 II.B2.1.CP-117 II.B2.2.CP-117	II.B1.2-8(C-46) II.B2.1-1(C-46) II.B2.2-10(C-46)	**Steel elements: downcomer pipes**	Steel	Air – indoor, uncontrolled or Treated water	Loss of material due to general, pitting, and crevice corrosion	**XI.S1, “ASME Section XI, Subsection IWE”**	**No**	ASME Section XI, Subsection IWE is the applicable aging management program. The components are not containment pressure boundary; thus are not in scope of 10 CFR Part	N/A

Table II-11. Changes to Existing GALL Report Rev. 1 Chapter II AMR Items for Containment and Their Technical Bases (cells where changes have been made are shown in bold)

Rev. 2 AMR Item No.	Rev. 1 AMR Link	Structures and/or Components	Material	Environment	Aging Effect/ Mechanism	Aging Management Program	Further Evaluation Required	Technical Basis for Changes	Comment No.
								50 Appendix J.	
II.B3.2.CP-121	II.B3.2-4(C-40)	**Concrete (inaccessible areas): dome; wall; basemat**	Concrete	Any environment	Cracking due to expansion from reaction with aggregates	**Further evaluation is required to determine if a plant-specific aging management program is needed to manage cracking and expansion due to reaction with aggregate of concrete in Inaccessible Areas. A plant-specific aging management program is not required if (1) As described in NUREG-1557, investigations, tests, and petrographic examinations of aggregates performed in accordance with ASTM C295 and**	**Yes, if concrete is not constructed as stated**	GALL Rev. 1, AMR Item C-40 is split to differentiate between accessible and inaccessible areas. Current licensing basis of some plants may not require testing of aggregate reactivity based on ASTM C295 or ASTM C227.Deletion of the year for ASTM C295 and ASTM C227 and the addition of other ASTM reactivity tests provide alternate acceptable technical basis for plants that are not committed to a specific year of the standard or	N/A

Table II-11. Changes to Existing GALL Report Rev. 1 Chapter II AMR Items for Containment and Their Technical Bases (cells where changes have been made are shown in bold)

Rev. 2 AMR Item No.	Rev. 1 AMR Link	Structures and/or Components	Material	Environment	Aging Effect/ Mechanism	Aging Management Program	Further Evaluation Required	Technical Basis for Changes	Comment No.
						other ASTM reactivity tests, as required, can demonstrate that those aggregates do not adversely react within concrete, or (2) For potentially reactive aggregates, aggregate concrete reaction is not significant if it is demonstrated that the in-place concrete can perform its intended function.		ASTM C227.. For potentially reactive aggregate, the single reference to ACI 201.2R as a basis why reaction with aggregate is not significant does not include provisions for the concrete structures constructed in accordance with ACI 318. ACI 201.2R guidance was developed after many of the earlier nuclear plants were constructed. They were constructed in accordance with ACI 318, which provided the requirements for design and construction of reinforced concrete	

Table II-11. Changes to Existing GALL Report Rev. 1 Chapter II AMR Items for Containment and Their Technical Bases (cells where changes have been made are shown in bold)

Rev. 2 AMR Item No.	Rev. 1 AMR Link	Structures and/or Components	Material	Environment	Aging Effect/ Mechanism	Aging Management Program	Further Evaluation Required	Technical Basis for Changes	Comment No.
								structures. It included the factors for water cement mix proportions, slump, aggregates, type of mixer, mixing time, and temperature for durable concrete which were later addressed in ACI 201.2R. An approved precedent exists in TMI SER, Sections 3.5.2.2.1 and 3.5.2.2.2 for accepting concrete designed, constructed, and inspected in accordance with applicable ACI and ASTM standards.	
II.B3.2.CP-122	II.B3.2-6(C-32)	**Concrete (inaccessible**	Concrete	Water – flowing	Increase in porosity and	**Further evaluation is**	**Yes, if leaching is**	GALL Rev.1, AMR Item C-32 is	N/A

Table II-11. Changes to Existing GALL Report Rev. 1 Chapter II AMR Items for Containment and Their Technical Bases (cells where changes have been made are shown in bold)

Rev. 2 AMR Item No.	Rev. 1 AMR Link	Structures and/or Components	Material	Environment	Aging Effect/ Mechanism	Aging Management Program	Further Evaluation Required	Technical Basis for Changes	Comment No.
		areas): dome; wall; basemat			permeability; loss of strength due to leaching of calcium hydroxide and carbonation	**required to determine if a plant-specific aging management program is needed to manage increase in porosity, and permeability due to leaching of calcium hydroxide and carbonation of concrete in Inaccessible Areas. A plant-specific aging management program is not required if (1) There is evidence in the accessible areas that the flowing water has not caused leaching and carbonation, or (2) Evaluation determined that the observed leaching of**	**observed in accessible areas that impact intended function**	split to differentiate between accessible and inaccessible areas. ACI 201.2R was developed after some plants were constructed. Those plants were constructed in accordance with ACI 318, which provided the requirements for design and construction of reinforced concrete structures. ACI 318 included factors for water-cement mix proportions, slump, aggregates, type of mixer, mixing time, and temperature for	

Table II-11. Changes to Existing GALL Report Rev. 1 Chapter II AMR Items for Containment and Their Technical Bases (cells where changes have been made are shown in bold)

Rev. 2 AMR Item No.	Rev. 1 AMR Link	Structures and/or Components	Material	Environment	Aging Effect/ Mechanism	Aging Management Program	Further Evaluation Required	Technical Basis for Changes	Comment No.
						calcium hydroxide and carbonation in accessible areas has no impact on the intended function of the concrete structure.		durable concrete, which were later addressed in ACI 201.2R-77. Thus, concrete structures constructed to either ACI 318 or 201.2R are expected to be durable. Since these standards were used for both accessible and inaccessible concrete, it is reasonable to conclude that leaching of calcium hydroxide and carbonation in accessible areas subject to flowing - water represents the condition in inaccessible areas. This is consistent with ASME Section XI, Subsection IWL,	

Table II-11. Changes to Existing GALL Report Rev. 1 Chapter II AMR Items for Containment and Their Technical Bases (cells where changes have been made are shown in bold)

Rev. 2 AMR Item No.	Rev. 1 AMR Link	Structures and/or Components	Material	Environment	Aging Effect/ Mechanism	Aging Management Program	Further Evaluation Required	Technical Basis for Changes	Comment No.
								as augmented by 10 CFR Part 50.55a.	
II.B3.2.CP-135	II.B3.2-3(C-29)	Concrete (inaccessible areas): dome; wall; basemat	Concrete	Air – outdoor or Ground water/soil	Loss of material (spalling, scaling) and cracking due to freeze-thaw	**Further evaluation is required for plants that are located in moderate to severe weathering conditions (weathering index >100 day-inch/yr) (NUREG-1557) to determine if a plant-specific aging management program is needed. A plant-specific aging management program is not required if documented evidence confirms that the existing concrete had air entrainment**	**Yes, for plants located in moderate to severe weathering conditions**	GALL Rev.1 AMR Item C-29 is split to differentiate between accessible and inaccessible areas. The increase in air content from 6% to 8% is acceptable based on ACI-201.2R and ACI 301-66 Table 304(b). Ground water/soil is applicable to the wall and the basemat.	N/A

Table II-11. Changes to Existing GALL Report Rev. 1 Chapter II AMR Items for Containment and Their Technical Bases (cells where changes have been made are shown in bold)

Rev. 2 AMR Item No.	Rev. 1 AMR Link	Structures and/or Components	Material	Environment	Aging Effect/ Mechanism	Aging Management Program	Further Evaluation Required	Technical Basis for Changes	Comment No.
						content (as per Table CC-2231-2 of the ASME Section III Division 2), and subsequent inspections of accessible areas did not exhibit degradation related to freeze-thaw. Such inspections should be considered a part of the evaluation. If this condition is not satisfied, then a plant-specific aging management program is required to manage loss of material (spalling, scaling) and cracking due to freeze-thaw of concrete in inaccessible areas. **The weathering**			

Table II-11. Changes to Existing GALL Report Rev. 1 Chapter II AMR Items for Containment and Their Technical Bases (cells where changes have been made are shown in bold)

Rev. 2 AMR Item No.	Rev. 1 AMR Link	Structures and/or Components	Material	Environment	Aging Effect/ Mechanism	Aging Management Program	Further Evaluation Required	Technical Basis for Changes	Comment No.
						index for the continental U.S. is shown in ASTM C33-90, Fig. 1.			
II.B2.1.CP-142	II.B2.1-3(C-44)	**Unbraced downcomers**	Steel; stainless steel; dissimilar metal welds	Air – indoor, uncontrolled or Treated water	Cracking due to cyclic loading (CLB fatigue analysis does not exist)	**XI.S1, "ASME Section XI, Subsection IWE"**	**No**	GALL Rev.1, AMR Item C-44 is split to separate suppression pool shell component from unbraced downcomers. Unbraced downcomers are not in scope of XI.S4 and only XI.S1 is applicable. AMP XI.S1 element 4 includes augmented inspection to detect cracking by surface examination. Therefore, further evaluation changed from Yes to No	N/A
II.A1.CP-147	II.A1-2(C-01)	**Concrete (inaccessible areas):**	Concrete	**Air – outdoor or Ground**	Loss of material (spalling,	**Further evaluation is required for**	**Yes, for plants located in moderate to**	GALL Rev.1 AMR Item C-01 is split to differentiate	N/A

Table II-11. Changes to Existing GALL Report Rev. 1 Chapter II AMR Items for Containment and Their Technical Bases (cells where changes have been made are shown in bold)

Rev. 2 AMR Item No.	Rev. 1 AMR Link	Structures and/or Components	Material	Environment	Aging Effect/ Mechanism	Aging Management Program	Further Evaluation Required	Technical Basis for Changes	Comment No.
		dome; wall; basemat; ring girders; buttresses		**water/soil**	scaling) and cracking due to freeze-thaw	**plants that are located in moderate to severe weathering conditions (weathering index >100 day-inch/yr) (NUREG-1557) to determine if a plant-specific aging management program is needed. A plant-specific aging management program is not required if documented evidence confirms that the existing concrete had air entrainment content (as per Table CC-2231-2 of the ASME Section III Division 2), and subsequent inspections of**	**severe weathering conditions**	between accessible and inaccessible areas. The increase in air content from 6% to 8% is acceptable based on ACI-201.2R and ACI 301-66 Table 304(b)	

Table II-11. Changes to Existing GALL Report Rev. 1 Chapter II AMR Items for Containment and Their Technical Bases (cells where changes have been made are shown in bold)

Rev. 2 AMR Item No.	Rev. 1 AMR Link	Structures and/or Components	Material	Environment	Aging Effect/ Mechanism	Aging Management Program	Further Evaluation Required	Technical Basis for Changes	Comment No.
						accessible areas did not exhibit degradation related to freeze-thaw. Such inspections should be considered a part of the evaluation. If this condition is not satisfied, then a plant-specific aging management program is required to manage loss of material (spalling, scaling) and cracking due to freeze-thaw of concrete in inaccessible areas. **The weathering index for the continental U.S. is shown in ASTM C33-90, Fig. 1.**			
II.A2.CP-155	II.A2-6(C-30)	**Concrete (accessible**	Concrete	Water – flowing	Increase in porosity and	**XI.S2, "ASME Section XI,**	**No**	GALL Rev. 1, AMR Item C-30 is	N/A

Table II-11. Changes to Existing GALL Report Rev. 1 Chapter II AMR Items for Containment and Their Technical Bases (cells where changes have been made are shown in bold)

Rev. 2 AMR Item No.	Rev. 1 AMR Link	Structures and/or Components	Material	Environment	Aging Effect/ Mechanism	Aging Management Program	Further Evaluation Required	Technical Basis for Changes	Comment No.
		areas): basemat			permeability; loss of strength due to leaching of calcium hydroxide and carbonation	**Subsection IWL"**		corrected to remove accessible areas because a basemat subject to "Water – flowing" environment should only be inaccessible. ACI 201.2R was developed after some plants were constructed. Those plants were constructed in accordance with ACI 318, which provided the requirements for design and construction of reinforced concrete structures. ACI 318 included factors for water-cement mix proportions, slump,	

Table II-11. Changes to Existing GALL Report Rev. 1 Chapter II AMR Items for Containment and Their Technical Bases (cells where changes have been made are shown in bold)

Rev. 2 AMR Item No.	Rev. 1 AMR Link	Structures and/or Components	Material	Environment	Aging Effect/ Mechanism	Aging Management Program	Further Evaluation Required	Technical Basis for Changes	Comment No.
								aggregates, type of mixer, mixing time, and temperature for durable concrete, which were later addressed in ACI 201.2R-77. Thus, concrete structures constructed to either ACI 318 or 201.2R are expected to be durable. Since these standards were used for both accessible and inaccessible concrete, it is reasonable to conclude that leaching of calcium hydroxide and carbonation in accessible areas subject to flowing - water represents the condition in inaccessible	

Table II-11. Changes to Existing GALL Report Rev. 1 Chapter II AMR Items for Containment and Their Technical Bases (cells where changes have been made are shown in bold)

Rev. 2 AMR Item No.	Rev. 1 AMR Link	Structures and/or Components	Material	Environment	Aging Effect/ Mechanism	Aging Management Program	Further Evaluation Required	Technical Basis for Changes	Comment No.
								areas. This is consistent with ASME Section XI, Subsection IWL, as augmented by 10 CFR Part 50.55a. The line item was split for accessible/ inaccessible areas.	
II.B3.1.CP-156	II.B3.1-3(C-30)	**Concrete (accessible areas): basemat**	Concrete	Water – flowing	Increase in porosity and permeability; loss of strength due to leaching of calcium hydroxide and carbonation	**XI.S2, “ASME Section XI, Subsection IWL”**	**No**	GALL Rev.1, AMR Item C-30 is corrected to remove accessible areas because a basemat subject to “water – flowing” environment should only be inaccessible. ACI 201.2R was developed after some plants were constructed. Those plants were constructed in accordance	N/A

Table II-11. Changes to Existing GALL Report Rev. 1 Chapter II AMR Items for Containment and Their Technical Bases (cells where changes have been made are shown in bold)

Rev. 2 AMR Item No.	Rev. 1 AMR Link	Structures and/or Components	Material	Environment	Aging Effect/ Mechanism	Aging Management Program	Further Evaluation Required	Technical Basis for Changes	Comment No.
								with ACI 318, which provided the requirements for design and construction of reinforced concrete structures. ACI 318 included factors for water-cement mix proportions, slump, aggregates, type of mixer, mixing time, and temperature for durable concrete, which were later addressed in ACI 201.2R-77. Thus, concrete structures constructed to either ACI 318 or 201.2R are expected to be durable. Since these standards were used for both accessible and inaccessible	

Table II-11. Changes to Existing GALL Report Rev. 1 Chapter II AMR Items for Containment and Their Technical Bases (cells where changes have been made are shown in bold)

Rev. 2 AMR Item No.	Rev. 1 AMR Link	Structures and/or Components	Material	Environment	Aging Effect/ Mechanism	Aging Management Program	Further Evaluation Required	Technical Basis for Changes	Comment No.
								concrete, it is reasonable to conclude that leaching of calcium hydroxide and carbonation in accessible areas subject to flowing - water represents the condition in inaccessible areas. This is consistent with ASME Section XI, Subsection IWL, as augmented by 10 CFR Part 50.55a. The line item was split for accessible/ inaccessible areas.	
II.B3.1.CP-158	II.B3.1-8(C-19)	**Steel elements: suppression chamber shell (interior surface)**	Steel	Air – indoor, uncontrolled or Treated water	Loss of material due to general, pitting, and crevice corrosion	XI.S1, “ASME Section XI, Subsection IWE” Plant-specific aging management program is required if plant	Yes, if corrosion is significant	Torus ring girders and downcomers are not containment pressure boundary and not in the scope of 10	N/A

Table II-11. Changes to Existing GALL Report Rev. 1 Chapter II AMR Items for Containment and Their Technical Bases (cells where changes have been made are shown in bold)

Rev. 2 AMR Item No.	Rev. 1 AMR Link	Structures and/or Components	Material	Environment	Aging Effect/ Mechanism	Aging Management Program	Further Evaluation Required	Technical Basis for Changes	Comment No.
						operating experience identified significant corrosion. If protective coating is credited for preventing corrosion, the coating should be included in scope of license renewal and subject to aging management review.		CFR Part 50 Appendix J, thus XI.S4 is not applicable. ASME Section XI, Subsection IWE, XI.S1 is the applicable aging management program.	
II.A1.CP-31	II.A1-2(C-01)	**Concrete (accessible areas): dome; wall; basemat; ring girders; buttresses**	Concrete	Air – outdoor	Loss of material (spalling, scaling) and cracking due to freeze-thaw	**XI.S2, “ASME Section XI, Subsection IWL”**	**No**	GALL Rev. 1 AMR Item C-01 is split to differentiate between accessible and inaccessible areas. Inspections of accessible areas performed in accordance with IWL will detect the presence of loss of material (spalling, scaling)	N/A

Table II-11. Changes to Existing GALL Report Rev. 1 Chapter II AMR Items for Containment and Their Technical Bases (cells where changes have been made are shown in bold)

Rev. 2 AMR Item No.	Rev. 1 AMR Link	Structures and/or Components	Material	Environment	Aging Effect/ Mechanism	Aging Management Program	Further Evaluation Required	Technical Basis for Changes	Comment No.
								and cracking due to freeze-thaw. Thus, a further evaluation is not required for accessible areas.	
II.A1.CP-32	II.A1-6(C-02)	**Concrete (accessible areas): dome; wall; basemat; ring girders; buttresses**	Concrete	Water – flowing	**Increase in porosity and permeability; loss of strength due to leaching of calcium hydroxide and carbonation**	**XI.S2, "ASME Section XI, Subsection IWL"**	**No**	GALL Rev. 1 AMR Item C-02 is split to differentiate between accessible and inaccessible areas. Inspections of accessible areas performed in accordance with IWL will detect the presence of increase in porosity, permeability due to leaching of calcium hydroxide, and carbonation. Thus, a further evaluation is not required for accessible areas.	N/A

Table II-11. Changes to Existing GALL Report Rev. 1 Chapter II AMR Items for Containment and Their Technical Bases (cells where changes have been made are shown in bold)

Rev. 2 AMR Item No.	Rev. 1 AMR Link	Structures and/or Components	Material	Environment	Aging Effect/ Mechanism	Aging Management Program	Further Evaluation Required	Technical Basis for Changes	Comment No.
II.A1.CP-33	II.A1-3(C-04)	**Concrete (accessible areas): dome; wall; basemat; ring girders; buttresses**	Concrete	Any environment	Cracking due to expansion from reaction with aggregates	**XI.S2, "ASME Section XI, Subsection IWL"**	**No**	GALL Rev. 1, Line item C-04 is split to differentiate between accessible and inaccessible areas. Inspections of accessible areas performed in accordance with IWL will detect the presence of surface cracking due to expansion from reaction with aggregates. Thus, a further evaluation is not required.	N/A
II.A1.CP-34	II.A1-1(C-08)	Concrete: dome; wall; basemat; ring girders; buttresses	Concrete	Air – indoor, uncontrolled or Air – outdoor	Reduction of strength and modulus due to elevated temperature (>150°F general; >200°F local)	**Plant-specific aging management program.** **The implementation of 10 CFR 50.55a and ASME Section XI,**	Yes, if temperature limits are exceeded	As indicated in ACI 349, sustained exposure of concrete to elevated temperature can cause a loss of its mechanical properties	N/A

Table II-11. Changes to Existing GALL Report Rev. 1 Chapter II AMR Items for Containment and Their Technical Bases (cells where changes have been made are shown in bold)

Rev. 2 AMR Item No.	Rev. 1 AMR Link	Structures and/or Components	Material	Environment	Aging Effect/ Mechanism	Aging Management Program	Further Evaluation Required	Technical Basis for Changes	Comment No.
						Subsection IWL would not be able to identify the reduction of strength and modulus of elasticity due to elevated temperature. Thus, for any portions of concrete containment that exceed specified temperature limits, further evaluations are warranted. Subsection CC-3400 of ASME Section III, Division 2, specifies the concrete temperature limits for normal operation or any other long-term period. The temperatures shall not exceed 150°F except for		(modulus of elasticity and strength) and result in cracking. The reduction in strength and modulus of elasticity may be accepted by engineering calculation. The term, “design allowables” is replaced with “design calculations” because the “design allowables” are specified in the ACI Code and the “design calculations” are performed to determine that the plant conditions are acceptable against the “design allowables.” Therefore, the	

Table II-11. Changes to Existing GALL Report Rev. 1 Chapter II AMR Items for Containment and Their Technical Bases (cells where changes have been made are shown in bold)

Rev. 2 AMR Item No.	Rev. 1 AMR Link	Structures and/or Components	Material	Environment	Aging Effect/ Mechanism	Aging Management Program	Further Evaluation Required	Technical Basis for Changes	Comment No.
						local areas, such as around penetrations, which are not allowed to exceed 200°F. If significant equipment loads are supported by concrete at temperatures exceeding 150°F, an evaluation of the ability to withstand the postulated design loads is to be made. **Higher temperatures than given above may be allowed in the concrete if tests and/or calculations are provided to evaluate the reduction in strength and modulus of**		term "design calculations" is used at relevant locations in GALL Report Rev. 2	

Table II-11. Changes to Existing GALL Report Rev. 1 Chapter II AMR Items for Containment and Their Technical Bases (cells where changes have been made are shown in bold)

Rev. 2 AMR Item No.	Rev. 1 AMR Link	Structures and/or Components	Material	Environment	Aging Effect/ Mechanism	Aging Management Program	Further Evaluation Required	Technical Basis for Changes	Comment No.
						elasticity, and these reductions are applied to the design calculations.			
II.A1.CP-35 II.A2.CP-35 II.B3.2.CP-35	II.A1-11(C-09) II.A2-9(C-09) II.B3.2-9(C-09)	**Steel elements (accessible areas): liner; liner anchors; integral attachments**	Steel	Air – indoor, uncontrolled	Loss of material due to general, pitting, and crevice corrosion	**XI.S1, "ASME Section XI, Subsection IWE," and** **XI.S4, "10 CFR Part 50, Appendix J"**	**No**	GALL Rev. 1, AMR item C-09 is split to differentiate between accessible and inaccessible areas. Inspections of accessible areas performed in accordance with IWE and 10 CFR Part 50 Appendix J will indicate the presence of Loss of material due to general, pitting, and crevice corrosion. Thus, a further evaluation is not required.	N/A
II.A3.CP-36 II.B4.CP-	II.A3-1(C-12) II.B4-	Penetration sleeves	Steel; dissimilar metal welds	Air – indoor, uncontrolled or Air –	Loss of material due to general,	**XI.S1, "ASME Section XI, Subsection IWE,"**	No	Removed note about recommending	319

Table II-11. Changes to Existing GALL Report Rev. 1 Chapter II AMR Items for Containment and Their Technical Bases (cells where changes have been made are shown in bold)

Rev. 2 AMR Item No.	Rev. 1 AMR Link	Structures and/or Components	Material	Environment	Aging Effect/ Mechanism	Aging Management Program	Further Evaluation Required	Technical Basis for Changes	Comment No.
36	1(C-12)			outdoor	pitting, and crevice corrosion	**and** **XI.S4, "10 CFR Part 50, Appendix J"**		IWE category E-F examination of dissimilar metal welds because XI.S1 is augmented to include the recommendation. The purpose of the augmented inspection is to detect cracking in stainless steel penetration sleeves, dissimilar metal welds and bellows that are subject to cyclic loading but have no current licensing basis fatigue analysis.	
II.A3.CP-37 II.B4.CP-37	II.A3-3(C-14) II.B4-3(C-14)	Penetration sleeves; penetration bellows	Steel; stainless steel; dissimilar metal welds	Air – indoor, uncontrolled or Air – outdoor	Cracking due to cyclic loading (CLB fatigue analysis does not exist)	**XI.S1, "ASME Section XI, Subsection IWE," and** **XI.S4, "10 CFR Part 50, Appendix J"**	**No**	The 2004 edition of ASME Section XI, Subsection IWE, specifies VT-3 examination for containment pressure boundary	N/A

Table II-11. Changes to Existing GALL Report Rev. 1 Chapter II AMR Items for Containment and Their Technical Bases (cells where changes have been made are shown in bold)

Rev. 2 AMR Item No.	Rev. 1 AMR Link	Structures and/or Components	Material	Environment	Aging Effect/ Mechanism	Aging Management Program	Further Evaluation Required	Technical Basis for Changes	Comment No.
								components, including stainless steel and dissimilar metal welds. The stainless steel bellows are not in scope of ASME of IWE; but are in scope of 10 CFR Part 50 Appendix J. VT-3 examination may not detect fine cracks that could occur as a result of cyclic loading and some penetration sleeves and bellows are not designed to allow for a local pressure test (Type B test) and are only pressure-tested as part of the containment Type A Integrated Leak Rate Test (ILRT). The frequency of	

Table II-11. Changes to Existing GALL Report Rev. 1 Chapter II AMR Items for Containment and Their Technical Bases (cells where changes have been made are shown in bold)

Rev. 2 AMR Item No.	Rev. 1 AMR Link	Structures and/or Components	Material	Environment	Aging Effect/ Mechanism	Aging Management Program	Further Evaluation Required	Technical Basis for Changes	Comment No.
								Type A test is every 10 years and could be extended for up to 15 years if a licensee implements Option B, performance based test, in accordance with 10 CFR Part 50 Appendix J. The ILRT frequency thus may not provide for early detection of cracking such that corrective actions are taken to prevent loss of primary containment leak-tightness. ASME Section XI, Subsection IWE (XI.S1) is therefore augmented to require surface examination for detection of	

Table II-11. Changes to Existing GALL Report Rev. 1 Chapter II AMR Items for Containment and Their Technical Bases (cells where changes have been made are shown in bold)

Rev. 2 AMR Item No.	Rev. 1 AMR Link	Structures and/or Components	Material	Environment	Aging Effect/ Mechanism	Aging Management Program	Further Evaluation Required	Technical Basis for Changes	Comment No.
								cracking during the period of extended operation as recommended in GALL Revision 1, line item C-14.	
II.A3.CP-38 II.B4.CP-38	II.A3-2(C-15) II.B4-2(C-15)	Penetration sleeves; penetration bellows	Stainless steel; dissimilar metal welds	Air – indoor, uncontrolled or Air – outdoor	Cracking due to SCC	**XI.S1, "ASME Section XI, Subsection IWE," and** **XI.S4, "10 CFR Part 50, Appendix J"**	Yes, detection of aging effects is to be evaluated	Transgranular Stress corrosion cracking (TGSCC) is a concern for dissimilar metal welds. In the case of bellows assemblies, SCC may cause aging effects particularly if the material is not shielded from a corrosive environment. The 2004 edition of ASME Section XI, Subsection IWE specifies VT-3 examination for containment pressure boundary	NA

Table II-11. Changes to Existing GALL Report Rev. 1 Chapter II AMR Items for Containment and Their Technical Bases (cells where changes have been made are shown in bold)

Rev. 2 AMR Item No.	Rev. 1 AMR Link	Structures and/or Components	Material	Environment	Aging Effect/ Mechanism	Aging Management Program	Further Evaluation Required	Technical Basis for Changes	Comment No.
								components, including stainless steel and dissimilar metal welds. Examination of stainless steel bellows is not in scope of IWE; but in scope of 10 CFR Part 50 Appendix J.VT-3 examination may not detect fine cracks that could occur as a result of SCC and TGSCC, and some penetration sleeves and bellows are not designed to allow for a local pressure test (Type B test) and are only pressure-tested as part of the containment Type A test, Integrated Leak Rate Test (ILRT). The	

Table II-11. Changes to Existing GALL Report Rev. 1 Chapter II AMR Items for Containment and Their Technical Bases (cells where changes have been made are shown in bold)

Rev. 2 AMR Item No.	Rev. 1 AMR Link	Structures and/or Components	Material	Environment	Aging Effect/ Mechanism	Aging Management Program	Further Evaluation Required	Technical Basis for Changes	Comment No.
								frequency of Type A test is every 10 years and could be extended for up to 15 years if a licensee implements the Option B, performance based test, in accordance with 10 CFR Part 50 Appendix J. The ILRT frequency thus may not provide for early detection of cracking such that corrective actions are taken to prevent loss of primary containment leak-tightness. ASME Section XI, Subsection IWE (XI.S1) is therefore augmented to require surface examination for	

Table II-11. Changes to Existing GALL Report Rev. 1 Chapter II AMR Items for Containment and Their Technical Bases (cells where changes have been made are shown in bold)

Rev. 2 AMR Item No.	Rev. 1 AMR Link	Structures and/or Components	Material	Environment	Aging Effect/ Mechanism	Aging Management Program	Further Evaluation Required	Technical Basis for Changes	Comment No.
								detection of cracking during the period of extended operation.	
II.A3.CP-39 II.B4.CP-39	II.A3-5(C-17) II.B4-5(C-17)	Personnel airlock, equipment hatch, CRD hatch: locks, hinges, and closure mechanisms	Steel	Air – indoor, uncontrolled or Air – outdoor	Loss of leak tightness due to mechanical wear of locks, hinges and closure mechanisms	**XI.S1, "ASME Section XI, Subsection IWE," and** **XI.S4, "10 CFR Part 50, Appendix J"**	No	The reference to "Plant Technical Specifications" is deleted from the AMP column because Plant Technical Specifications are not an aging management program. The Technical Specifications provide acceptance criteria for Appendix J testing as clearly stated in XI.S4.	NA
II.A3.CP-40 II.B4.CP-40	II.A3-7(C-18) II.B4-7(C-18)	Moisture barriers (caulking, flashing, and other sealants)	Elastomers, rubber, and other similar materials	Air – indoor, uncontrolled	**Loss of sealing due to wear, damage, erosion, tear, surface cracks, or**	**XI.S1, "ASME Section XI, Subsection IWE"**	No	GALL Rev. 1, AMR item C-18 is split to remove components not covered by IWE. Gaskets are not in scope of ASME	N/A

Table II-11. Changes to Existing GALL Report Rev. 1 Chapter II AMR Items for Containment and Their Technical Bases (cells where changes have been made are shown in bold)

Rev. 2 AMR Item No.	Rev. 1 AMR Link	Structures and/or Components	Material	Environment	Aging Effect/ Mechanism	Aging Management Program	Further Evaluation Required	Technical Basis for Changes	Comment No.
					other defects			Section XI, Subsection IWE Program. The AE/AM "Loss of sealing due to wear, damage, erosion, tear, surface cracks, or other defects" is specified in ASME Section XI, Subsection IWE for the moisture barrier	
II.A3.CP-41 II.B4.CP-41	II.A3-7(C-18) II.B4-7(C-18)	Seals and gaskets	Elastomers, rubber, and other similar materials	Air – indoor, uncontrolled or Air – outdoor	**Loss of sealing due to wear, damage, erosion, tear, surface cracks, or other defects**	**XI.S4, "10 CFR Part 50, Appendix J "**	No	GALL Rev. 1, AMR item C-18 is split to remove components not in scope of IWE. The scope of 2004 edition of ASME Section XI, Subsection IWE as approved in 10 CFR 50.55a does not include seals and gaskets. Seals and gaskets are covered in scope of 10 CFR Part	N/A

Table II-11. Changes to Existing GALL Report Rev. 1 Chapter II AMR Items for Containment and Their Technical Bases (cells where changes have been made are shown in bold)

Rev. 2 AMR Item No.	Rev. 1 AMR Link	Structures and/or Components	Material	Environment	Aging Effect/ Mechanism	Aging Management Program	Further Evaluation Required	Technical Basis for Changes	Comment No.
								50 Appendix J. Thus, XI.S4, “10 CFR Part 50, Appendix J" is the applicable aging management program	
II.B1.1.CP-43 II.B3.1.CP-43	II.B1.1-2(C-19) II.B3.1-8(C-19)	**Steel elements (accessible areas): drywell shell; drywell head**	Steel	**Air – indoor, uncontrolled**	Loss of material due to general, pitting, and crevice corrosion	**XI.S1, “ASME Section XI, Subsection IWE,” and** **XI.S4, “10 CFR Part 50, Appendix J”**	**No**	GALL Rev. 1, AMR item C-19 is split to distinguish between accessible and inaccessible areas. Torus ring girder, downcomers, and drywell support skirt are not a containment pressure boundary, thus 10 CFR Part 50 Appendix J is not applicable. These components are addressed separately, and the applicable aging management	N/A

Table II-11. Changes to Existing GALL Report Rev. 1 Chapter II AMR Items for Containment and Their Technical Bases (cells where changes have been made are shown in bold)

Rev. 2 AMR Item No.	Rev. 1 AMR Link	Structures and/or Components	Material	Environment	Aging Effect/ Mechanism	Aging Management Program	Further Evaluation Required	Technical Basis for Changes	Comment No.
								program (XI.S1) is identified. The ECCS Suction Header is removed from the list because it is evaluated with ECCS piping system as permitted by IWE.	
II.B1.2.CP-46 II.B2.1.CP-46 II.B2.2.CP-46	II.B1.2-8(C-46) II.B2.1-1(C-46) II.B2.2-10(C-46)	**Steel elements (accessible areas): suppression chamber; drywell; drywell head; embedded shell; region shielded by diaphragm floor (as applicable)**	Steel	Air – indoor, uncontrolled or Treated water	Loss of material due to general, pitting, and crevice corrosion	**XI.S1, "ASME Section XI, Subsection IWE," and** **XI.S4, "10 CFR Part 50, Appendix J"**	**No**	GALL Rev.1, AMR item C-46 is split to differentiate between accessible and inaccessible areas. Downcomer pipes, and support skirt are not a containment pressure boundary, thus 10 CFR Part 50 Appendix J is not applicable. These components are addressed separately, and the applicable	N/A

Table II-11. Changes to Existing GALL Report Rev. 1 Chapter II AMR Items for Containment and Their Technical Bases (cells where changes have been made are shown in bold)

Rev. 2 AMR Item No.	Rev. 1 AMR Link	Structures and/or Components	Material	Environment	Aging Effect/ Mechanism	Aging Management Program	Further Evaluation Required	Technical Basis for Changes	Comment No.
								aging management program (XI.S1) is identified.	
II.B1.1.CP-48	II.B1.1-2(C-19)	**Steel elements: torus shell**	Steel	Air – indoor, uncontrolled or Treated water	Loss of material due to general, pitting, and crevice corrosion	**XI.S1, "ASME Section XI, Subsection IWE," and** **XI.S4, "10 CFR Part 50, Appendix J"** **License renewal applicants are advised to address their plant-specific operating experience related to torus shell corrosion. If the identified corrosion is significant, a plant-specific aging management program is required. If protective coating is credited for preventing**	**Yes, if corrosion is significant** **Recoating of the torus is recommended.**	Further evaluation of torus shell corrosion is warranted as a result of OE identified In NRC IN 88-82 and other industry-wide operating experience that identified a number of incidences of torus corrosion. Therefore, recoating is also needed.	N/A

Table II-11. Changes to Existing GALL Report Rev. 1 Chapter II AMR Items for Containment and Their Technical Bases (cells where changes have been made are shown in bold)

Rev. 2 AMR Item No.	Rev. 1 AMR Link	Structures and/or Components	Material	Environment	Aging Effect/ Mechanism	Aging Management Program	Further Evaluation Required	Technical Basis for Changes	Comment No.
						corrosion of the torus shell, the coating should be included in scope of license renewal and subject to aging management review.			
II.B1.1.CP-49	II.B1.1-3(C-20)	Steel elements: torus; vent line; vent header; vent line bellows; downcomers	Steel; stainless steel	Air – indoor, uncontrolled	Cracking due to cyclic loading (CLB fatigue analysis does not exist)	**XI.S1, "ASME Section XI, Subsection IWE," and XI.S4, "10 CFR Part 50, Appendix J"**	**No**	ASME Section XI, Subsection IWE is augmented to require surface examination to detect cracking of these components during the period of extended operation.	N/A
II.B1.1.CP-50	II.B1.1-5(C-22)	Steel elements: vent line bellows	Stainless steel	Air – indoor, uncontrolled	Cracking due to SCC	**XI.S1, "ASME Section XI, Subsection IWE," and XI.S4, "10 CFR Part 50, Appendix J"**	**No**	ASME Section XI, Subsection IWE Element 4 is augmented to require surface examination to detect cracking of these components during the period of extended	N/A

Table II-11. Changes to Existing GALL Report Rev. 1 Chapter II AMR Items for Containment and Their Technical Bases (cells where changes have been made are shown in bold)

Rev. 2 AMR Item No.	Rev. 1 AMR Link	Structures and/or Components	Material	Environment	Aging Effect/ Mechanism	Aging Management Program	Further Evaluation Required	Technical Basis for Changes	Comment No.
								operation. IN 92-20 was added to element 10 Operating Experience.	
II.A2.CP-51	II.A2-2(C-28)	**Concrete (accessible areas): basemat**	Concrete	Air – outdoor	Loss of material (spalling, scaling) and cracking due to freeze-thaw	**XI.S2, "ASME Section XI, Subsection IWL"**	**No**	GALL Rev. 1 AMR Item C-28 is split to differentiate between accessible and inaccessible areas. Inspections of accessible areas performed in accordance with IWL will indicate the presence of loss of material (spalling, scaling) and cracking due to freeze-thaw. Thus, a further evaluation is not required for accessible areas.	N/A
II.B3.2.CP-52	II.B3.2-3(C-29)	**Concrete (accessible areas): dome; wall;**	Concrete	Air – outdoor or Ground water/soil	Loss of material (spalling, scaling) and	**XI.S2, "ASME Section XI, Subsection IWL"**	**No**	GALL Rev.1 AMR item C-29 is split to differentiate between	N/A

Table II-11. Changes to Existing GALL Report Rev. 1 Chapter II AMR Items for Containment and Their Technical Bases (cells where changes have been made are shown in bold)

Rev. 2 AMR Item No.	Rev. 1 AMR Link	Structures and/or Components	Material	Environment	Aging Effect/ Mechanism	Aging Management Program	Further Evaluation Required	Technical Basis for Changes	Comment No.
		basemat			cracking due to freeze-thaw			accessible and inaccessible areas. Inspections of accessible areas performed in accordance with IWL will indicate the presence of loss of material (spalling, scaling) and cracking due to freeze-thaw. Thus, a further evaluation is not required for accessible areas.	
II.A2.CP-53 II.B3.1.CP-53	II.A2-6(C-30) II.B3.1-3(C-30)	**Concrete (inaccessible areas): basemat**	Concrete	Water – flowing	Increase in porosity and permeability; loss of strength due to leaching of calcium hydroxide and carbonation	**Further evaluation is required to determine if a plant-specific aging management program is needed to manage increase in porosity, and permeability due to leaching of calcium**	**Yes, if leaching is observed in accessible areas that impact intended function**	GALL Rev. 1, AMR Item C-30 is corrected to remove accessible areas because a basemat subject to “Water – flowing” environment should only be inaccessible. ACI 201.2R was	N/A

Table II-11. Changes to Existing GALL Report Rev. 1 Chapter II AMR Items for Containment and Their Technical Bases (cells where changes have been made are shown in bold)

Rev. 2 AMR Item No.	Rev. 1 AMR Link	Structures and/or Components	Material	Environment	Aging Effect/ Mechanism	Aging Management Program	Further Evaluation Required	Technical Basis for Changes	Comment No.
						hydroxide and carbonation of concrete in Inaccessible Areas. A plant-specific aging management program is not required if **(1) There is evidence in the accessible areas of adjacent structures that the flowing water has not caused leaching and carbonation, or** **(2) Evaluation determined that the observed leaching of calcium hydroxide and carbonation in accessible areas has no impact on the intended function of the concrete structure.**		developed after some plants were constructed. Those plants were constructed in accordance with ACI 318, which provided the requirements for design and construction of reinforced concrete structures. ACI 318 included factors for water-cement mix proportions, slump, aggregates, type of mixer, mixing time, and temperature for durable concrete, which were later addressed in ACI 201.2R-77. Thus, concrete structures constructed to either ACI 318 or 201.2R are	

Table II-11. Changes to Existing GALL Report Rev. 1 Chapter II AMR Items for Containment and Their Technical Bases (cells where changes have been made are shown in bold)

Rev. 2 AMR Item No.	Rev. 1 AMR Link	Structures and/or Components	Material	Environment	Aging Effect/ Mechanism	Aging Management Program	Further Evaluation Required	Technical Basis for Changes	Comment No.
								expected to be durable. Since these standards were used for both accessible and inaccessible concrete, it is reasonable to conclude that leaching of calcium hydroxide and carbonation in accessible areas subject to flowing - water represents the condition in inaccessible areas. This is consistent with ASME Section XI, Subsection IWL, as augmented by 10 CFR Part 50.55a.	
II.B1.2.CP-54 II.B2.2.CP-54	II.B1.2-6(C-31) II.B2.2-6(C-31)	**Concrete (accessible areas): containment; wall;**	Concrete	Water – flowing	**Increase in porosity and permeability; loss of strength due**	**XI.S2, "ASME Section XI, Subsection IWL"**	**No**	GALL Rev. 1 AMR Item C-31 is split to differentiate between	N/A

Table II-11. Changes to Existing GALL Report Rev. 1 Chapter II AMR Items for Containment and Their Technical Bases (cells where changes have been made are shown in bold)

Rev. 2 AMR Item No.	Rev. 1 AMR Link	Structures and/or Components	Material	Environment	Aging Effect/ Mechanism	Aging Management Program	Further Evaluation Required	Technical Basis for Changes	Comment No.
		basemat			**to leaching of calcium hydroxide and carbonation**			accessible and inaccessible areas. Inspections of accessible areas performed in accordance with IWL will indicate the presence of increase in porosity, permeability due to leaching of calcium hydroxide, and carbonation. Thus, a further evaluation is not required for accessible areas.	
II.B3.2.CP-55	II.B3.2-6(C-32)	**Concrete (accessible areas): dome; wall; basemat**	Concrete	Water – flowing	**Increase in porosity and permeability; loss of strength due to leaching of calcium hydroxide and carbonation**	**XI.S2, “ASME Section XI, Subsection IWL”**	**No**	GALL Rev. 1 AMR Item C-32 is split to differentiate between accessible and inaccessible areas. Inspections of accessible areas performed in	N/A

Table II-11. Changes to Existing GALL Report Rev. 1 Chapter II AMR Items for Containment and Their Technical Bases (cells where changes have been made are shown in bold)

Rev. 2 AMR Item No.	Rev. 1 AMR Link	Structures and/or Components	Material	Environment	Aging Effect/ Mechanism	Aging Management Program	Further Evaluation Required	Technical Basis for Changes	Comment No.
								accordance with IWL will indicate the presence of increase in porosity, permeability due to leaching of calcium hydroxide, and carbonation. Thus, a further evaluation is not required for accessible areas.	
II.B1.2.CP-57 II.B2.2.CP-57	II.B1.2-3(C-35) II.B2.2-3(C-35)	Concrete: containment; wall; basemat	Concrete	Air – indoor, uncontrolled or Air – outdoor	Reduction of strength and modulus due to elevated temperature (>150°F general; >200°F local)	**Plant-specific aging management program** **The implementation of 10 CFR 50.55a and ASME Section XI, Subsection IWL would not be able to identify the reduction of strength and modulus due to elevated**	Yes, if temperature limits are exceeded	As indicated in ACI 349, sustained exposure of concrete to elevated temperature can cause a loss of its mechanical properties (modulus of elasticity and strength) and result in cracking. The reduction in strength and modulus of	N/A

Table II-11. Changes to Existing GALL Report Rev. 1 Chapter II AMR Items for Containment and Their Technical Bases (cells where changes have been made are shown in bold)

Rev. 2 AMR Item No.	Rev. 1 AMR Link	Structures and/or Components	Material	Environment	Aging Effect/ Mechanism	Aging Management Program	Further Evaluation Required	Technical Basis for Changes	Comment No.
						temperature. Thus, for any portions of concrete containment that exceed specified temperature limits, further evaluations are warranted. Subsection CC-3400 of ASME Section III, Division 2, specifies the concrete temperature limits for normal operation or any other long-term period. The temperatures shall not exceed 150°F except for local areas, such as around penetrations, which are not allowed to exceed 200°F. If significant equipment loads		elasticity may be accepted by engineering calculation. The term, “design allowables” is replaced with “design calculations” because the “design allowables” are specified in the ACI Code and the “design calculations” are performed to determine that the plant conditions are acceptable against the “design allowables.” Therefore, the term “design calculations” is used at relevant locations in GALL Report Rev. 2	

Table II-11. Changes to Existing GALL Report Rev. 1 Chapter II AMR Items for Containment and Their Technical Bases (cells where changes have been made are shown in bold)

Rev. 2 AMR Item No.	Rev. 1 AMR Link	Structures and/or Components	Material	Environment	Aging Effect/ Mechanism	Aging Management Program	Further Evaluation Required	Technical Basis for Changes	Comment No.
						are supported by concrete at temperatures exceeding 150°F, an evaluation of the ability to withstand the postulated design loads is to be made. **Higher temperatures than given above may be allowed in the concrete if tests and/or calculations are provided to evaluate the reduction in strength and modulus of elasticity, and these reductions are applied to the design calculations.**			
II.A2.CP-58	II.A2-3(C-38)	**Concrete (accessible areas): basemat**	Concrete	Any environment	Cracking due to expansion from reaction with	**XI.S2, "ASME Section XI, Subsection IWL"**	**No**	GALL Rev. 1, AMR item C-38 is split to differentiate	N/A

Table II-11. Changes to Existing GALL Report Rev. 1 Chapter II AMR Items for Containment and Their Technical Bases (cells where changes have been made are shown in bold)

Rev. 2 AMR Item No.	Rev. 1 AMR Link	Structures and/or Components	Material	Environment	Aging Effect/ Mechanism	Aging Management Program	Further Evaluation Required	Technical Basis for Changes	Comment No.
					aggregates			between accessible and inaccessible areas. Inspections of accessible areas performed in accordance with IWL will indicate the presence of surface cracking due to expansion from reaction with aggregates. Thus, a further evaluation is not required.	
II.B1.2.CP-59 II.B2.2.CP-59	II.B1.2-4(C-39) II.B2.2-4(C-39)	**Concrete (accessible areas): containment; wall; basemat**	Concrete	Any environment	Cracking due to expansion from reaction with aggregates	**XI.S2, “ASME Section XI, Subsection IWL”**	**No**	GALL Rev. 1, AMR item C-39 is split to differentiate between accessible and inaccessible areas. Inspections of accessible areas performed in accordance with IWL will indicate the presence of	N/A

Table II-11. Changes to Existing GALL Report Rev. 1 Chapter II AMR Items for Containment and Their Technical Bases (cells where changes have been made are shown in bold)

Rev. 2 AMR Item No.	Rev. 1 AMR Link	Structures and/or Components	Material	Environment	Aging Effect/ Mechanism	Aging Management Program	Further Evaluation Required	Technical Basis for Changes	Comment No.
								surface cracking due to expansion from reaction with aggregates. Thus, a further evaluation is not required.	
II.B3.2.CP-60	II.B3.2-4(C-40)	**Concrete (accessible areas): dome; wall; basemat**	Concrete	Any environment	Cracking due to expansion from reaction with aggregates	**XI.S2, "ASME Section XI, Subsection IWL"**	**No**	GALL Rev. 1, AMR item C-40 is split to differentiate between accessible and inaccessible areas. Inspections of accessible areas performed in accordance with IWL will indicate the presence of surface cracking due to expansion from reaction with aggregates. Thus, a further evaluation is not required.	N/A
II.B1.2.CP-63 II.B2.1.CP-	II.B1.2-8(C-46) II.B2.1-	**Steel elements (inaccessible**	Steel	Air – indoor, uncontrolled or Treated	Loss of material due to general,	**XI.S1, "ASME Section XI, Subsection IWE"**	**Yes, if corrosion is indicated from**	GALL Rev.1, AMR item C-46 is split to	N/A

Table II-11. Changes to Existing GALL Report Rev. 1 Chapter II AMR Items for Containment and Their Technical Bases (cells where changes have been made are shown in bold)

Rev. 2 AMR Item No.	Rev. 1 AMR Link	Structures and/or Components	Material	Environment	Aging Effect/ Mechanism	Aging Management Program	Further Evaluation Required	Technical Basis for Changes	Comment No.
63 II.B2.2.CP-63	1(C-46) II.B2.2-10(C-46)	**areas): suppression chamber; drywell; drywell head; embedded shell; region shielded by diaphragm floor (as applicable)**		water	pitting, and crevice corrosion	**and** **XI.S4, "10 CFR Part 50, Appendix J"** **Additional plant-specific activities are warranted if loss of material due to corrosion is significant for inaccessible areas (embedded containment steel shell or liner).** **Loss of material due to corrosion is not significant if the following conditions are satisfied:** **(1) Concrete meeting the requirements of ACI 318 or 349 and the guidance of 201.2R was used for the concrete in**	**the IWE examinations**	differentiate between accessible and inaccessible areas. Technical basis for further evaluation is not changed.	

Table II-11. Changes to Existing GALL Report Rev. 1 Chapter II AMR Items for Containment and Their Technical Bases (cells where changes have been made are shown in bold)

Rev. 2 AMR Item No.	Rev. 1 AMR Link	Structures and/or Components	Material	Environment	Aging Effect/ Mechanism	Aging Management Program	Further Evaluation Required	Technical Basis for Changes	Comment No.
						contact with the embedded containment shell or liner. **(2) The moisture barrier, at the junction where the shell or liner becomes embedded, is subject to aging management activities in accordance with ASME Section XI, Subsection IWE requirements.** **(3) The 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.** **(4) Borated water spills and water ponding on the**			

Table II-11. Changes to Existing GALL Report Rev. 1 Chapter II AMR Items for Containment and Their Technical Bases (cells where changes have been made are shown in bold)

Rev. 2 AMR Item No.	Rev. 1 AMR Link	Structures and/or Components	Material	Environment	Aging Effect/ Mechanism	Aging Management Program	Further Evaluation Required	Technical Basis for Changes	Comment No.
						concrete floor are common and when detected are cleaned up or diverted to a sump in a timely manner. **Operating experience has identified significant corrosion in some plants.** **If any of the above conditions cannot be satisfied, then a plant-specific aging management program for corrosion is necessary.**			
II.B2.2.CP-64	II.B2.2-13(C-47)	Steel elements: vent header; downcomers	Steel; stainless steel	**Air – indoor, uncontrolled or Treated water**	Cracking due to cyclic loading (CLB fatigue analysis does not exist)	**XI.S1, "ASME Section XI, Subsection IWE"**	**No**	XI.S4 is not applicable because the components are not in its scope. ASME Section XI, Subsection IWE Element 4 is	N/A

Table II-11. Changes to Existing GALL Report Rev. 1 Chapter II AMR Items for Containment and Their Technical Bases (cells where changes have been made are shown in bold)

Rev. 2 AMR Item No.	Rev. 1 AMR Link	Structures and/or Components	Material	Environment	Aging Effect/ Mechanism	Aging Management Program	Further Evaluation Required	Technical Basis for Changes	Comment No.
								augmented to require surface examination to detect cracking of these components during the period of extended operation.	
II.B3.1.CP-65	II.B3.1-4(C-50)	Concrete: basemat, concrete fill-in annulus	Concrete	Air – indoor, uncontrolled or Air – outdoor	Reduction of strength and modulus due to elevated temperature (>150°F general; >200°F local)	**Plant-specific aging management program** **The implementation of 10 CFR 50.55a and ASME Section XI, Subsection IWL would not be able to identify the reduction of strength and modulus of elasticity due to elevated temperature. Thus, for any portions of concrete**	Yes, if temperature limits are exceeded	As indicated in ACI 349, sustained exposure of concrete to elevated temperature can cause a loss of its mechanical properties (modulus of elasticity and strength) and result in cracking. The reduction in strength and modulus of elasticity may be accepted by engineering calculation. The term, “design	N/A

Table II-11. Changes to Existing GALL Report Rev. 1 Chapter II AMR Items for Containment and Their Technical Bases (cells where changes have been made are shown in bold)

Rev. 2 AMR Item No.	Rev. 1 AMR Link	Structures and/or Components	Material	Environment	Aging Effect/ Mechanism	Aging Management Program	Further Evaluation Required	Technical Basis for Changes	Comment No.
						containment that exceed specified temperature limits, further evaluations are warranted. Subsection CC-3400 of ASME Section III, Division 2, specifies the concrete temperature limits for normal operation or any other long-term period. The temperatures shall not exceed 150°F except for local areas, such as around penetrations, which are not allowed to exceed 200°F. If significant equipment loads are supported by concrete at temperatures exceeding 150°F,		allowables" is replaced with "design calculations" because the "design allowables" are specified in the ACI Code and the "design calculations" are performed to determine that the plant conditions are acceptable against the "design allowables." Therefore, the term "design calculations" is used at relevant locations in GALL Report Rev. 2	

Table II-11. Changes to Existing GALL Report Rev. 1 Chapter II AMR Items for Containment and Their Technical Bases (cells where changes have been made are shown in bold)

Rev. 2 AMR Item No.	Rev. 1 AMR Link	Structures and/or Components	Material	Environment	Aging Effect/ Mechanism	Aging Management Program	Further Evaluation Required	Technical Basis for Changes	Comment No.
						an evaluation of the ability to withstand the postulated design loads is to be made. **Higher temperatures than given above may be allowed in the concrete if tests and/or calculations are provided to evaluate the reduction in strength and modulus of elasticity and these reductions are applied to the design calculations.**			
II.B3.1.CP-66	II.B3.1-5(C-51)	**Concrete (accessible areas): basemat, concrete fill-in annulus**	Concrete	Any environment	Cracking due to expansion from reaction with aggregates	**XI.S2, "ASME Section XI, Subsection IWL"**	**No**	GALL Rev. 1, AMR item C-51 is split to differentiate between accessible and inaccessible areas.	N/A

Table II-11. Changes to Existing GALL Report Rev. 1 Chapter II AMR Items for Containment and Their Technical Bases (cells where changes have been made are shown in bold)

Rev. 2 AMR Item No.	Rev. 1 AMR Link	Structures and/or Components	Material	Environment	Aging Effect/ Mechanism	Aging Management Program	Further Evaluation Required	Technical Basis for Changes	Comment No.
								Inspections of accessible areas performed in accordance with IWL will indicate the presence of surface cracking due to expansion from reaction with aggregates. Thus, a further evaluation is not required.	
II.A1.CP-67	II.A1-3(C-04)	**Concrete (inaccessible areas): dome; wall; basemat; ring girders; buttresses**	Concrete	Any environment	Cracking due to expansion from reaction with aggregates	**Further evaluation is required to determine if a plant-specific aging management program is needed to manage cracking and expansion due to reaction with aggregate of concrete in Inaccessible Areas. A plant-specific aging management**	**Yes, if concrete is not constructed as stated**	GALL Rev. 1, AMR Item C-04 is split to differentiate between accessible and inaccessible areas. Current licensing basis of some plants may not require testing of aggregate reactivity based on ASTM C295 or ASTM C227. Deletion of the year for ASTM	N/A

Table II-11. Changes to Existing GALL Report Rev. 1 Chapter II AMR Items for Containment and Their Technical Bases (cells where changes have been made are shown in bold)

Rev. 2 AMR Item No.	Rev. 1 AMR Link	Structures and/or Components	Material	Environment	Aging Effect/ Mechanism	Aging Management Program	Further Evaluation Required	Technical Basis for Changes	Comment No.
						program is not required if (1) As described in NUREG-1557, investigations, tests, and petrographic examinations of aggregates performed in accordance with ASTM C295 and other ASTM reactivity tests, as required, can demonstrate that those aggregates do not adversely react within concrete, or (2) For potentially reactive aggregates, aggregate concrete reaction is not significant if it is demonstrated that the in-place concrete can perform its intended		C295 and ASTM C227 and the addition of other ASTM reactivity tests provide alternate acceptable technical basis for plants that are not committed to a specific year of the standard or ASTM C227. For potentially reactive aggregate, the single reference to ACI 201.2R as a basis why reaction with aggregate is not significant does not include provisions for the concrete structures constructed in accordance with ACI 318. ACI 201.2R guidance was developed after many of the	

Table II-11. Changes to Existing GALL Report Rev. 1 Chapter II AMR Items for Containment and Their Technical Bases (cells where changes have been made are shown in bold)

Rev. 2 AMR Item No.	Rev. 1 AMR Link	Structures and/or Components	Material	Environment	Aging Effect/ Mechanism	Aging Management Program	Further Evaluation Required	Technical Basis for Changes	Comment No.
						function.		earlier nuclear plants were constructed. They were constructed in accordance with ACI 318, which provided the requirements for design and construction of reinforced concrete structures. It included the factors for water cement mix proportions, slump, aggregates, type of mixer, mixing time, and temperature for durable concrete which were later addressed in ACI 201.2R. An approved precedent exists in TMI SER Sections 3.5.2.2.1 and 3.5.2.2.2 for	

Table II-11. Changes to Existing GALL Report Rev. 1 Chapter II AMR Items for Containment and Their Technical Bases (cells where changes have been made are shown in bold)

Rev. 2 AMR Item No.	Rev. 1 AMR Link	Structures and/or Components	Material	Environment	Aging Effect/ Mechanism	Aging Management Program	Further Evaluation Required	Technical Basis for Changes	Comment No.
								accepting concrete designed, constructed, and inspected in accordance with applicable ACI and ASTM standards.	
II.A1.CP-68	II.A1-7(C-05)	**Concrete (accessible areas): dome; wall; basemat; ring girders; buttresses; reinforcing steel**	Concrete; steel	Air – indoor, uncontrolled or Air – outdoor	Cracking; loss of bond; and loss of material (spalling, scaling) due to corrosion of embedded steel	**XI.S2, "ASME Section XI, Subsection IWL"**	**No**	GALL Rev.1, AMR item C-05 is split to differentiate between accessible and inaccessible areas. Inspections of accessible areas performed in accordance with IWL will indicate the presence of surface cracking, loss of bond, and loss of material (spalling, scaling) due to corrosion of embedded steel. Thus, a further evaluation	N/A

Table II-11. Changes to Existing GALL Report Rev. 1 Chapter II AMR Items for Containment and Their Technical Bases (cells where changes have been made are shown in bold)

Rev. 2 AMR Item No.	Rev. 1 AMR Link	Structures and/or Components	Material	Environment	Aging Effect/ Mechanism	Aging Management Program	Further Evaluation Required	Technical Basis for Changes	Comment No.
								is not required.	
II.A2.CP-69 II.B3.1.CP-69	II.A2-5(C-36) II.B3.1-2(C-36)	Concrete: basemat	Concrete	Soil	Cracking and distortion due to increased stress levels from settlement	**XI.S2, "ASME Section XI, Subsection IWL," or** **XI.S6, "Structure Monitoring"** **If a de-watering system is relied upon for control of settlement, then the licensee is to ensure proper functioning of the de-watering system through the period of extended operation.**	**Yes, if a de-watering system is relied upon to control settlement**	ASME Section XI, Subsection IWL or Structures Monitoring is the applicable aging management program for concrete elements of the BWR and PWR containments. The program Element 3, Parameters Monitored, includes monitoring concrete for cracking.	301
II.A2.CP-70	II.A2-2(C-28)	**Concrete (inaccessible areas): basemat**	Concrete	Air – outdoor or Ground water/soil	Loss of material (spalling, scaling) and cracking due to freeze-thaw	**Further evaluation is required for plants that are located in moderate to severe weathering conditions (weathering index**	**Yes, for plants located in moderate to severe weathering conditions**	GALL Rev.1 AMR Item C-28 is split to differentiate between accessible and inaccessible areas. The increase in air content from 6% to 8% is	N/A

Table II-11. Changes to Existing GALL Report Rev. 1 Chapter II AMR Items for Containment and Their Technical Bases (cells where changes have been made are shown in bold)

Rev. 2 AMR Item No.	Rev. 1 AMR Link	Structures and/or Components	Material	Environment	Aging Effect/ Mechanism	Aging Management Program	Further Evaluation Required	Technical Basis for Changes	Comment No.
						>100 day-inch/yr) (NUREG-1557) to determine if a plant-specific aging management program is needed. A plant-specific aging management program is not required if documented evidence confirms that the existing concrete had air entrainment content (as per Table CC-2231-2 of the ASME Section III Division 2), and subsequent inspections of accessible areas did not exhibit degradation related to freeze-thaw. Such inspections should be		acceptable based on ACI-201.2R and ACI 301-66 Table 304(b)	

Table II-11. Changes to Existing GALL Report Rev. 1 Chapter II AMR Items for Containment and Their Technical Bases (cells where changes have been made are shown in bold)

Rev. 2 AMR Item No.	Rev. 1 AMR Link	Structures and/or Components	Material	Environment	Aging Effect/ Mechanism	Aging Management Program	Further Evaluation Required	Technical Basis for Changes	Comment No.
						considered a part of the evaluation. If this condition is not satisfied, then a plant-specific aging management program is required to manage loss of material (spalling, scaling) and cracking due to freeze-thaw of concrete in inaccessible areas. **The weathering index for the continental U.S. is shown in ASTM C33-90, Fig. 1.**			
II.A2.CP-71 II.B3.1.CP-71	II.A2-4(C-25) II.B3.1-1(C-25)	**Concrete (inaccessible areas): basemat**	Concrete	Ground water/soil	Increase in porosity and permeability; cracking; loss of material (spalling, scaling) due to aggressive chemical	**XI.S2, "ASME Section XI, Subsection IWL," or** **XI.S6, "Structures Monitoring"**	**No**	GALL Rev.1, AMR item C-25 is split to differentiate between accessible and inaccessible areas. XI.S6, "Structures	299

Table II-11. Changes to Existing GALL Report Rev. 1 Chapter II AMR Items for Containment and Their Technical Bases (cells where changes have been made are shown in bold)

Rev. 2 AMR Item No.	Rev. 1 AMR Link	Structures and/or Components	Material	Environment	Aging Effect/ Mechanism	Aging Management Program	Further Evaluation Required	Technical Basis for Changes	Comment No.
					attack			Monitoring" program is revised to require monitoring of the aging effect/ mechanism for this component. XI.S2 may be used for monitoring containment basemats. Further evaluation is not required.	
II.A2.CP-72 II.B3.1.CP-72	II.A2-4(C-25) II.B3.1-1(C-25)	**Concrete (accessible areas): basemat**	Concrete	Ground water/soil	Increase in porosity and permeability; cracking; loss of material (spalling, scaling) due to aggressive chemical attack	**XI.S2, "ASME Section XI, Subsection IWL," or** **XI.S6, "Structures Monitoring"**	**No**	GALL Rev. 1, Line item C-25 is split to differentiate between accessible and inaccessible areas. Inspections of accessible areas performed in accordance with IWL will indicate the presence of increase in porosity and	N/A

Table II-11. Changes to Existing GALL Report Rev. 1 Chapter II AMR Items for Containment and Their Technical Bases (cells where changes have been made are shown in bold)

Rev. 2 AMR Item No.	Rev. 1 AMR Link	Structures and/or Components	Material	Environment	Aging Effect/ Mechanism	Aging Management Program	Further Evaluation Required	Technical Basis for Changes	Comment No.
								permeability, cracking, loss of material (spalling, scaling) due to aggressive chemical attack. Thus, a further evaluation is not required for accessible areas.	
II.B3.2.CP-73	II.B3.2-5(C-27)	**Concrete (inaccessible areas): dome; wall; basemat**	Concrete	Air – indoor, uncontrolled or Air – outdoor or Ground water/soil	Increase in porosity and permeability; cracking; loss of material (spalling, scaling) due to aggressive chemical attack	**XI.S2, "ASME Section XI, Subsection IWL," or XI.S6, "Structures Monitoring"**	**No**	GALL Rev.1, AMR item C-27 is split to differentiate between accessible and inaccessible areas. The evaluation basis for a plant-specific program is not changed. AMP XI .S6 has been changed to address ground water	N/A
II.A2.CP-74 II.B3.1.CP-74	II.A2-7(C-43) II.B3.1-6(C-43)	**Concrete (accessible areas): basemat; reinforcing**	Concrete; steel	Air – indoor, uncontrolled or Air – outdoor	Cracking; loss of bond; and loss of material (spalling,	**XI.S2, "ASME Section XI, Subsection IWL"**	**No**	GALL Rev.1, AMR item C-43 is split to differentiate between	N/A

Table II-11. Changes to Existing GALL Report Rev. 1 Chapter II AMR Items for Containment and Their Technical Bases (cells where changes have been made are shown in bold)

Rev. 2 AMR Item No.	Rev. 1 AMR Link	Structures and/or Components	Material	Environment	Aging Effect/ Mechanism	Aging Management Program	Further Evaluation Required	Technical Basis for Changes	Comment No.
		steel			scaling) due to corrosion of embedded steel			accessible and inaccessible areas. Inspections of accessible areas performed in accordance with IWL will indicate the presence of surface cracking, loss of bond, and loss of material (spalling, scaling) due to corrosion of embedded steel. Thus, a further evaluation is not required.	
II.A2.CP-75 II.B3.1.CP-75	II.A2-7(C-43) II.B3.1-6(C-43)	**Concrete (inaccessible areas): basemat; reinforcing steel**	Concrete; steel	Air – indoor, uncontrolled or Air – outdoor	Cracking; loss of bond; and loss of material (spalling, scaling) due to corrosion of embedded steel	**XI.S2, “ASME Section XI, Subsection IWL,” or** **XI.S6, "Structures Monitoring"**	**No**	GALL Rev.1, AMR item C-43 is split to differentiate between accessible and inaccessible areas. Revised AMP includes ground water monitoring.	N/A
II.B1.2.CP-79	II.B1.2-2(C-41)	**Concrete (accessible**	Concrete; steel	Air – indoor, uncontrolled	Cracking; loss of bond;	**XI.S2, “ASME Section XI,**	**No**	GALL Rev.1, AMR item C-41 is	N/A

Table II-11. Changes to Existing GALL Report Rev. 1 Chapter II AMR Items for Containment and Their Technical Bases (cells where changes have been made are shown in bold)

Rev. 2 AMR Item No.	Rev. 1 AMR Link	Structures and/or Components	Material	Environment	Aging Effect/ Mechanism	Aging Management Program	Further Evaluation Required	Technical Basis for Changes	Comment No.
II.B2.2.CP-79	II.B2.2-2(C-41)	**areas): basemat; reinforcing steel**		or Air – outdoor	and loss of material (spalling, scaling) due to corrosion of embedded steel	**Subsection IWL"**		split to differentiate between accessible and inaccessible areas. Inspections of accessible areas performed in accordance with IWL will indicate the presence of surface cracking, loss of bond, and loss of material (spalling, scaling) due to corrosion of embedded steel. Thus, a further evaluation is not required.	
II.B1.2.CP-80 II.B2.2.CP-80	II.B1.2(C-41) II.B2.2-2(C-41)	**Concrete (inaccessible areas): basemat; reinforcing steel**	Concrete; steel	Air – indoor, uncontrolled or Air – outdoor	Cracking; loss of bond; and loss of material (spalling, scaling) due to corrosion of embedded steel	**XI.S6, "Structures Monitoring"**	**No**	GALL Rev.1, AMR item C-41 is split to differentiate between accessible and inaccessible areas. Revised AMP includes ground water	N/A

Table II-11. Changes to Existing GALL Report Rev. 1 Chapter II AMR Items for Containment and Their Technical Bases (cells where changes have been made are shown in bold)

Rev. 2 AMR Item No.	Rev. 1 AMR Link	Structures and/or Components	Material	Environment	Aging Effect/ Mechanism	Aging Management Program	Further Evaluation Required	Technical Basis for Changes	Comment No.
								monitoring. Further evaluation changed from Yes to No.	
II.B3.1.CP-83	II.B3.1-5(C-51)	**Concrete (inaccessible areas): basemat, concrete fill-in annulus**	Concrete	Any environment	Cracking due to expansion from reaction with aggregates	**Further evaluation is required to determine if a plant-specific aging management program is needed to manage cracking and expansion due to reaction with aggregate of concrete in Inaccessible Areas. A plant-specific aging management program is not required if (1) As described in NUREG-1557, investigations, tests, and petrographic examinations of**	**Yes, if concrete is not constructed as stated**	GALL Rev. 1, AMR Item C-51 is split to differentiate between accessible and inaccessible areas. Current licensing basis of some plants may not require testing of aggregate reactivity based on ASTM C295 or ASTM C227. Deletion of the year for ASTM C295 and ASTM C227 and the addition of other ASTM reactivity tests provide alternate acceptable	N/A

Table II-11. Changes to Existing GALL Report Rev. 1 Chapter II AMR Items for Containment and Their Technical Bases (cells where changes have been made are shown in bold)

Rev. 2 AMR Item No.	Rev. 1 AMR Link	Structures and/or Components	Material	Environment	Aging Effect/ Mechanism	Aging Management Program	Further Evaluation Required	Technical Basis for Changes	Comment No.
						aggregates performed in accordance with ASTM C295 and other ASTM reactivity tests, as required, can demonstrate that those aggregates do not adversely react within concrete, or (2) For potentially reactive aggregates, aggregate concrete reaction is not significant if it is demonstrated that the in-place concrete can perform its intended function.		technical basis for plants that are not committed to a specific year of the standard or ASTM C227. For potentially reactive aggregate, the single reference to ACI 201.2R as a basis why reaction with aggregate is not significant does not include provisions for the concrete structures constructed in accordance with ACI 318. ACI 201.2R guidance was developed after many of the earlier nuclear plants were constructed. They were constructed in accordance with ACI 318, which provided	

Table II-11. Changes to Existing GALL Report Rev. 1 Chapter II AMR Items for Containment and Their Technical Bases (cells where changes have been made are shown in bold)

Rev. 2 AMR Item No.	Rev. 1 AMR Link	Structures and/or Components	Material	Environment	Aging Effect/ Mechanism	Aging Management Program	Further Evaluation Required	Technical Basis for Changes	Comment No.
								the requirements for design and construction of reinforced concrete structures. It included the factors for water cement mix proportions, slump, aggregates, type of mixer, mixing time, and temperature for durable concrete, which were later addressed in ACI 201.2R. An approved precedent exists in TMI SER, Sections 3.5.2.2.1 and 3.5.2.2.2 for accepting concrete designed, constructed, and inspected in accordance with applicable ACI	

Table II-11. Changes to Existing GALL Report Rev. 1 Chapter II AMR Items for Containment and Their Technical Bases (cells where changes have been made are shown in bold)

Rev. 2 AMR Item No.	Rev. 1 AMR Link	Structures and/or Components	Material	Environment	Aging Effect/ Mechanism	Aging Management Program	Further Evaluation Required	Technical Basis for Changes	Comment No.
								and ASTM standards.	
II.B3.2.CP-84	II.B3.2-5(C-27)	**Concrete (accessible areas): dome; wall; basemat**	Concrete	Air – indoor, uncontrolled or Air – outdoor or Ground water/soil	Increase in porosity and permeability; cracking; loss of material (spalling, scaling) due to aggressive chemical attack	**XI.S2, "ASME Section XI, Subsection IWL," or XI.S6, "Structure Monitoring"**	No	GALL Rev. 1, AMR item C-27 is split to differentiate between accessible and inaccessible areas. Inspections of accessible areas performed in accordance with IWL will indicate the presence of increase in porosity and permeability, cracking, loss of material (spalling, scaling) due to aggressive chemical attack. Thus, a further evaluation is not required for accessible areas. AMP has been changed to address ground	N/A

Table II-11. Changes to Existing GALL Report Rev. 1 Chapter II AMR Items for Containment and Their Technical Bases (cells where changes have been made are shown in bold)

Rev. 2 AMR Item No.	Rev. 1 AMR Link	Structures and/or Components	Material	Environment	Aging Effect/ Mechanism	Aging Management Program	Further Evaluation Required	Technical Basis for Changes	Comment No.
								water.	
II.A1.CP-87	II.A1-4(C-03)	**Concrete (accessible areas): dome; wall; basemat; ring girders; buttresses**	Concrete	**Air – indoor, uncontrolled or Air – outdoor**	Increase in porosity and permeability; cracking; loss of material (spalling, scaling) due to aggressive chemical attack	**XI.S2, "ASME Section XI, Subsection IWL"**	No	GALL Rev.1, AMR item C-03 is split to differentiate between accessible and inaccessible areas. Inspections of accessible areas performed in accordance with IWL will indicate the presence of increase in porosity and permeability, cracking, loss of material (spalling, scaling) due to aggressive chemical attack. Thus, a further evaluation is not required for accessible areas.	N/A
II.B3.2.CP-88	II.B3.2-7(C-42)	**Concrete (accessible areas): dome; wall;**	Concrete; steel	Air – indoor, uncontrolled or Air – outdoor	Cracking; loss of bond; and loss of material	**XI.S2, "ASME Section XI, Subsection IWL"**	**No**	GALL Rev.1, AMR item C-42 is split to differentiate	N/A

Table II-11. Changes to Existing GALL Report Rev. 1 Chapter II AMR Items for Containment and Their Technical Bases (cells where changes have been made are shown in bold)

Rev. 2 AMR Item No.	Rev. 1 AMR Link	Structures and/or Components	Material	Environment	Aging Effect/ Mechanism	Aging Management Program	Further Evaluation Required	Technical Basis for Changes	Comment No.
		basemat; reinforcing steel			(spalling, scaling) due to corrosion of embedded steel			between accessible and inaccessible areas. Inspections of accessible areas performed in accordance with IWL will indicate the presence of surface cracking, loss of bond, and loss of material (spalling, scaling) due to corrosion of embedded steel. Thus, a further evaluation is not required.	
II.B3.2.CP-89	II.B3.2-7(C-42)	**Concrete (inaccessible areas): dome; wall; basemat; reinforcing steel**	Concrete; steel	Air – indoor, uncontrolled or Air – outdoor	Cracking; loss of bond; and loss of material (spalling, scaling) due to corrosion of embedded steel	**XI.S2, "ASME Section XI, Subsection IWL," or XI.S6, "Structures Monitoring"**	**No**	GALL Rev. 1, AMR item C-42 is split to differentiate between accessible and inaccessible areas. Revised AMP includes ground water monitoring. Further	N/A

Table II-11. Changes to Existing GALL Report Rev. 1 Chapter II AMR Items for Containment and Their Technical Bases (cells where changes have been made are shown in bold)

Rev. 2 AMR Item No.	Rev. 1 AMR Link	Structures and/or Components	Material	Environment	Aging Effect/ Mechanism	Aging Management Program	Further Evaluation Required	Technical Basis for Changes	Comment No.
								evaluation changed from Yes to No	
II.A1.CP-97	II.A1-7(C-05)	**Concrete (inaccessible areas): dome; wall; basemat; ring girders; buttresses; reinforcing steel**	Concrete; steel	Air – indoor, uncontrolled or Air – outdoor	Cracking; loss of bond; and loss of material (spalling, scaling) due to corrosion of embedded steel	**XI.S2, "ASME Section XI, Subsection IWL," or** **XI.S6, "Structure Monitoring"**	**No**	GALL Rev. 1, AMR item C-05 is split to differentiate between accessible and inaccessible areas. Revised AMP includes ground water monitoring.	N/A
II.A1.CP-98 II.A2.CP-98 II.B3.2.CP-98	II.A1-11(C-09) II.A2-9(C-09) II.B3.2-9(C-09)	**Steel elements (inaccessible areas): liner; liner anchors; integral attachments**	Steel	Air – indoor, uncontrolled	Loss of material due to general, pitting, and crevice corrosion	**XI.S1, "ASME Section XI, Subsection IWE" and** **XI.S4, "10 CFR Part 50, Appendix J"** **Additional plant-specific activities are warranted if loss of material due to corrosion is significant for inaccessible areas (embedded containment steel**	**Yes, if corrosion is indicated from the IWE examinations**	GALL Rev.1, AMR Item C-09 is split to differentiate between accessible and inaccessible areas. Technical basis for further evaluation is not changed.	NA

Table II-11. Changes to Existing GALL Report Rev. 1 Chapter II AMR Items for Containment and Their Technical Bases (cells where changes have been made are shown in bold)

Rev. 2 AMR Item No.	Rev. 1 AMR Link	Structures and/or Components	Material	Environment	Aging Effect/ Mechanism	Aging Management Program	Further Evaluation Required	Technical Basis for Changes	Comment No.
						shell or liner). **Loss of material due to corrosion is not significant if the following conditions are satisfied:** **(1) Concrete meeting the requirements of ACI 318 or 349 and the guidance of 201.2R was used for the containment concrete in contact with the embedded containment shell or liner.** **(2) The moisture barrier, at the junction where the shell or liner becomes embedded, is subject to aging management activities in accordance with ASME Section XI,**			

Table II-11. Changes to Existing GALL Report Rev. 1 Chapter II AMR Items for Containment and Their Technical Bases (cells where changes have been made are shown in bold)

Rev. 2 AMR Item No.	Rev. 1 AMR Link	Structures and/or Components	Material	Environment	Aging Effect/ Mechanism	Aging Management Program	Further Evaluation Required	Technical Basis for Changes	Comment No.
						Subsection IWE requirements. **(3) The 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.** **(4) Borated water spills and water ponding on the concrete floor are common and when detected are cleaned up or diverted to a sump in a timely manner.** **Operating experience has identified significant corrosion in some plants.** **If any of the above conditions**			

Table II-11. Changes to Existing GALL Report Rev. 1 Chapter II AMR Items for Containment and Their Technical Bases (cells where changes have been made are shown in bold)

Rev. 2 AMR Item No.	Rev. 1 AMR Link	Structures and/or Components	Material	Environment	Aging Effect/ Mechanism	Aging Management Program	Further Evaluation Required	Technical Basis for Changes	Comment No.
						cannot be satisfied, then a plant-specific aging management program for corrosion is necessary.			
II.B1.2.CP-99 II.B2.2.CP-99	II.B1.2-4(C-39) II.B2.2-4(C-39)	**Concrete (inaccessible areas): containment; wall; basemat**	Concrete	Any environment	Cracking due to expansion from reaction with aggregates	**Further evaluation is required to determine if a plant-specific aging management program is needed to manage cracking and expansion due to reaction with aggregate of concrete in Inaccessible Areas. A plant-specific aging management program is not required if (1) As described in NUREG-1557, investigations,**	**Yes, if concrete is not constructed as stated**	GALL Rev. 1, AMR Item C-39 is split to differentiate between accessible and inaccessible areas. Current licensing basis of some plants may not require testing of aggregate reactivity based on ASTM C295 or ASTM C227. Deletion of the year for ASTM C295 and ASTM C227 and the addition of other ASTM reactivity tests provide	N/A

Table II-11. Changes to Existing GALL Report Rev. 1 Chapter II AMR Items for Containment and Their Technical Bases (cells where changes have been made are shown in bold)

Rev. 2 AMR Item No.	Rev. 1 AMR Link	Structures and/or Components	Material	Environment	Aging Effect/ Mechanism	Aging Management Program	Further Evaluation Required	Technical Basis for Changes	Comment No.
						tests, and petrographic examinations of aggregates performed in accordance with ASTM C295 and other ASTM reactivity tests, as required, can demonstrate that those aggregates do not adversely react within concrete, or (2) For potentially reactive aggregates, aggregate concrete reaction is not significant if it is demonstrated that the in-place concrete can perform its intended function.		alternate acceptable technical basis for plants that are not committed to a specific year of the standard or ASTM C227. For potentially reactive aggregate, the single reference to ACI 201.2R as a basis why reaction with aggregate is not significant does not include provisions for the concrete structures constructed in accordance with ACI 318. ACI 201.2R guidance was developed after many of the earlier nuclear plants were constructed. They were constructed in accordance	

Table II-11. Changes to Existing GALL Report Rev. 1 Chapter II AMR Items for Containment and Their Technical Bases (cells where changes have been made are shown in bold)

Rev. 2 AMR Item No.	Rev. 1 AMR Link	Structures and/or Components	Material	Environment	Aging Effect/ Mechanism	Aging Management Program	Further Evaluation Required	Technical Basis for Changes	Comment No.
								with ACI 318, which provided the requirements for design and construction of reinforced concrete structures. It included the factors for water cement mix proportions, slump, aggregates, type of mixer, mixing time, and temperature for durable concrete, which were later addressed in ACI 201.2R. An approved precedent exists in TMI SER, Sections 3.5.2.2.1 and 3.5.2.2.2 for accepting concrete designed, constructed, and inspected in	

Table II-11. Changes to Existing GALL Report Rev. 1 Chapter II AMR Items for Containment and Their Technical Bases (cells where changes have been made are shown in bold)

Rev. 2 AMR Item No.	Rev. 1 AMR Link	Structures and/or Components	Material	Environment	Aging Effect/ Mechanism	Aging Management Program	Further Evaluation Required	Technical Basis for Changes	Comment No.
								accordance with applicable ACI and ASTM standards.	

Table II-12. Changes to Existing GALL Report Rev. 1 Chapter III AMR Items for Structures and Component Supports and Their Technical Bases (cells where changes have been made are shown in bold)

Rev. 2 AMR Item No.	Rev. 1 AMR Link	Structures and/or Components	Material	Environment	Aging Effect/ Mechanism	Aging Management Program	Further Evaluation Required	Technical Basis for Changes	Comment No.
III.A6.TP-104	III.A6-1(T-18)	**Concrete (inaccessible areas): all**	**Concrete**	**Air – indoor, uncontrolled or Air – outdoor or Ground water/soil**	Cracking; loss of bond; and loss of material (spalling, scaling) due to corrosion of embedded steel	**XI.S6, "Structures Monitoring"**	**No**	GALL Rev. 1, AMR item T-18 is split to differentiate between accessible and inaccessible areas. Revised AMP includes ground water monitoring. Further evaluation changed from Yes to No. "Reinforced concrete" was changed to "Concrete" for consistency with Chapter II. Ground water/soil environment is applicable to this component and the aging effects/ mechanisms are applicable consistent with TP-212.	N/A
III.A6.TP-107	III.A6-3(T-19)	**Concrete (inaccessible areas): all**	Concrete	Ground water/soil	Increase in porosity and permeability; cracking; loss of material (spalling,	**XI.S6, "Structures Monitoring"**	**No**	GALL Rev.1, AMR item T-19 is split to differentiate between accessible and inaccessible areas. AMP XI.S6	N/A

Table II-12. Changes to Existing GALL Report Rev. 1 Chapter III AMR Items for Structures and Component Supports and Their Technical Bases (cells where changes have been made are shown in bold)

Rev. 2 AMR Item No.	Rev. 1 AMR Link	Structures and/or Components	Material	Environment	Aging Effect/ Mechanism	Aging Management Program	Further Evaluation Required	Technical Basis for Changes	Comment No.
					scaling) due to aggressive chemical attack			is revised to include ground water monitoring.	
III.A1.TP-108 III.A2.TP-108 III.A3.TP-108 III.A5.TP-108 III.A7.TP-108 III.A8.TP-108 III.A9.TP-108	III.A1-6(T-01) III.A2-6(T-01) III.A3-6(T-01) III.A5-6(T-01) III.A7-5(T-01) III.A8-5(T-01) III.A9-5(T-01)	**Concrete (inaccessible areas): foundation**	Concrete	Air – outdoor	Loss of material (spalling, scaling) and cracking due to freeze-thaw	**Further evaluation is required for plants that are located in moderate to severe weathering conditions (weathering index >100 day-inch/yr) (NUREG-1557) to determine if a plant-specific aging management program is needed. A plant-specific aging management program is not required if documented evidence confirms that the existing**	**Yes, for plants located in moderate to severe weathering conditions**	GALL Rev.1 AMR Item T-01 is split to differentiate between accessible and inaccessible areas. The increase in air content is acceptable based on ACI-201.2R and ACI 301-66 Table 304(b). "Reinforced concrete" is changed to "Concrete" for consistency with Chapter II.	N/A

Table II-12. Changes to Existing GALL Report Rev. 1 Chapter III AMR Items for Structures and Component Supports and Their Technical Bases (cells where changes have been made are shown in bold)

Rev. 2 AMR Item No.	Rev. 1 AMR Link	Structures and/or Components	Material	Environment	Aging Effect/ Mechanism	Aging Management Program	Further Evaluation Required	Technical Basis for Changes	Comment No.
						concrete had air entrainment content (as per Table CC-2231-2 of the ASME Section III Division 2), and subsequent inspections of accessible areas did not exhibit degradation related to freeze-thaw. Such inspections should be considered a part of the evaluation. If this condition is not satisfied, then a plant-specific aging management program is required to manage loss of material (spalling, scaling) and			

Table II-12. Changes to Existing GALL Report Rev. 1 Chapter III AMR Items for Structures and Component Supports and Their Technical Bases (cells where changes have been made are shown in bold)

Rev. 2 AMR Item No.	Rev. 1 AMR Link	Structures and/or Components	Material	Environment	Aging Effect/ Mechanism	Aging Management Program	Further Evaluation Required	Technical Basis for Changes	Comment No.
						cracking due to freeze-thaw of concrete in inaccessible areas. **The weathering index for the continental U.S. is shown in ASTM C33-90, Fig. 1.**			
III.A6.TP-109	III.A6-6(T-16)	**Concrete (inaccessible areas): exterior above- and below-grade; foundation; interior slab**	**Concrete**	Water – flowing	**Increase in porosity and permeability; loss of strength due to leaching of calcium hydroxide and carbonation**	**Further evaluation is required to determine if a plant-specific aging management program is needed to manage increase in porosity, and permeability due to leaching of calcium hydroxide and carbonation of concrete in Inaccessible Areas. A plant-specific aging**	**Yes, if leaching is observed in accessible areas that impact intended function**	GALL Rev. 1, AMR Item T-16 is split to differentiate between accessible and inaccessible areas. ACI 201.2R was developed after some plants were constructed. Those plants were constructed in accordance with ACI 318, which provided the requirements for design and construction of reinforced concrete structures. ACI 318	N/A

Table II-12. Changes to Existing GALL Report Rev. 1 Chapter III AMR Items for Structures and Component Supports and Their Technical Bases (cells where changes have been made are shown in bold)

Rev. 2 AMR Item No.	Rev. 1 AMR Link	Structures and/or Components	Material	Environment	Aging Effect/ Mechanism	Aging Management Program	Further Evaluation Required	Technical Basis for Changes	Comment No.
						management program is not required if (1) There is evidence in the accessible areas that the flowing water has not caused leaching and carbonation, or (2) Evaluation determined that the observed leaching of calcium hydroxide and carbonation in accessible areas has no impact on the intended function of the concrete structure.		included factors for water-cement mix proportions, slump, aggregates, type of mixer, mixing time, and temperature for durable concrete, which were later addressed in ACI 201.2R-77. Thus, concrete structures constructed to either ACI 318 or 201.2R are expected to be durable. Since these standards were used for both accessible and inaccessible concrete, it is reasonable to conclude that leaching of calcium hydroxide and carbonation in accessible areas subject to flowing - water represents the condition in inaccessible areas.	
III.A6.TP-110	III.A6-5(T-15)	**Concrete**	**Concrete**	Air – outdoor	Loss of	**Further**	**Yes, for plants**	GALL Rev.1 AMR	N/A

Table II-12. Changes to Existing GALL Report Rev. 1 Chapter III AMR Items for Structures and Component Supports and Their Technical Bases (cells where changes have been made are shown in bold)

Rev. 2 AMR Item No.	Rev. 1 AMR Link	Structures and/or Components	Material	Environment	Aging Effect/ Mechanism	Aging Management Program	Further Evaluation Required	Technical Basis for Changes	Comment No.
		(inaccessible areas): exterior above- and below-grade; foundation; interior slab			material (spalling, scaling) and cracking due to freeze-thaw	**evaluation is required for plants that are located in moderate to severe weathering conditions (weathering index >100 day-inch/yr) (NUREG-1557) to determine if a plant-specific aging management program is needed. A plant-specific aging management program is not required if documented evidence confirms that the existing concrete had air entrainment content (as per Table CC-2231-2 of the ASME Section III**	**located in moderate to severe weathering conditions**	Item T-15 is split to differentiate between accessible and inaccessible areas. Entrapped air content is based on ASME Code per ACI-201.2R and ACI 301-66 Table 304(b). "Reinforced concrete" is changed to "Concrete" for consistency with Chapter II.	

Table II-12. Changes to Existing GALL Report Rev. 1 Chapter III AMR Items for Structures and Component Supports and Their Technical Bases (cells where changes have been made are shown in bold)

Rev. 2 AMR Item No.	Rev. 1 AMR Link	Structures and/or Components	Material	Environment	Aging Effect/ Mechanism	Aging Management Program	Further Evaluation Required	Technical Basis for Changes	Comment No.
						Division 2), and subsequent inspections of accessible areas did not exhibit degradation related to freeze-thaw. Such inspections should be considered a part of the evaluation. If this condition is not satisfied, then a plant-specific aging management program is required to manage loss of material (spalling, scaling) and cracking due to freeze-thaw of concrete in inaccessible areas. The weathering			

Table II-12. Changes to Existing GALL Report Rev. 1 Chapter III AMR Items for Structures and Component Supports and Their Technical Bases (cells where changes have been made are shown in bold)

Rev. 2 AMR Item No.	Rev. 1 AMR Link	Structures and/or Components	Material	Environment	Aging Effect/ Mechanism	Aging Management Program	Further Evaluation Required	Technical Basis for Changes	Comment No.
						index for the continental U.S. is shown in ASTM C33-90, Fig. 1.			
III.A1.TP-114 III.A2.TP-114 III.A3.TP-114 III.A4.TP-114 III.A5.TP-114	III.A1-1(T-10) III.A2-1(T-10) III.A3-1(T-10) III.A4-1(T-10) III.A5-1(T-10)	Concrete: all	Concrete	Air – indoor, uncontrolled	Reduction of strength and modulus due to elevated temperature (>150°F general; >200°F local)	**Plant-specific aging management program** **Subsection CC-3400 of ASME Section III, Division 2, and Appendix A of ACI 349 specifies the concrete temperature limits for normal operation or any other long-term period. The temperatures shall not exceed 150°F except for local areas, such as around**	Yes, if temperature limits are exceeded	As indicated in ACI 349, sustained exposure of concrete to elevated temperature can cause a loss of its mechanical properties (modulus of elasticity and strength) and result in cracking. The reduction in strength and modulus of elasticity may be accepted by engineering calculation. The term, “design allowables” is replaced with “design calculations” because the “design allowables” are specified in the	321

Table II-12. Changes to Existing GALL Report Rev. 1 Chapter III AMR Items for Structures and Component Supports and Their Technical Bases (cells where changes have been made are shown in bold)

Rev. 2 AMR Item No.	Rev. 1 AMR Link	Structures and/or Components	Material	Environment	Aging Effect/ Mechanism	Aging Management Program	Further Evaluation Required	Technical Basis for Changes	Comment No.
						penetrations, where the temperatures are not allowed to exceed 200°F. If significant equipment loads are supported by concrete at temperatures exceeding 150°F, an evaluation of the ability to withstand the postulated design loads is to be made. **Higher temperatures than those given above may be allowed in the concrete if tests and/or calculations are provided to evaluate the reduction in strength and**		ACI Code and the “design calculations” are performed to determine that the plant conditions are acceptable against the “design allowables.” Therefore, the term “design calculations” is used at relevant locations in GALL Report Rev. 2	

Table II-12. Changes to Existing GALL Report Rev. 1 Chapter III AMR Items for Structures and Component Supports and Their Technical Bases (cells where changes have been made are shown in bold)

Rev. 2 AMR Item No.	Rev. 1 AMR Link	Structures and/or Components	Material	Environment	Aging Effect/ Mechanism	Aging Management Program	Further Evaluation Required	Technical Basis for Changes	Comment No.
						modulus of elasticity and these reductions are applied to the design calculations.			
III.A1.TP-204 III.A2.TP-204 III.A3.TP-204 III.A4.TP-204 III.A5.TP-204 III.A7.TP-204 III.A8.TP-204 III.A9.TP-204	III.A1-2(T-03) III.A2-2(T-03) III.A3-2(T-03) III.A4-2(T-03) III.A5-2(T-03) III.A7-1(T-03) III.A8-1(T-03) III.A9-1(T-03)	**Concrete (inaccessible areas): all**	**Concrete**	Any environment	Cracking due to expansion from reaction with aggregates	**Further evaluation is required to determine if a plant-specific aging management program is needed to manage cracking and expansion due to reaction with aggregate of concrete in Inaccessible Areas. A plant-specific aging management program is not required if (1) As described in NUREG-1557, investigations,**	**Yes, if concrete is not constructed as stated**	GALL Rev. 1, AMR Item T-03 is split to differentiate between accessible and inaccessible areas. Current licensing basis of some plants may not require testing of aggregate reactivity based on ASTM C295 or ASTM C227. Deletion of the year for ASTM C295 and ASTM C227 and the addition of other ASTM reactivity tests provide alternate acceptable technical basis for plants that are not committed to a	N/A

Table II-12. Changes to Existing GALL Report Rev. 1 Chapter III AMR Items for Structures and Component Supports and Their Technical Bases (cells where changes have been made are shown in bold)

Rev. 2 AMR Item No.	Rev. 1 AMR Link	Structures and/or Components	Material	Environment	Aging Effect/ Mechanism	Aging Management Program	Further Evaluation Required	Technical Basis for Changes	Comment No.
						tests, and petrographic examinations of aggregates performed in accordance with ASTM C295 and other ASTM reactivity tests, as required, can demonstrate that those aggregates do not adversely react within concrete, or (2) For potentially reactive aggregates, aggregate concrete reaction is not significant if it is demonstrated that the in-place concrete can perform its intended function.		specific year of the standard or ASTM C227. For potentially reactive aggregate, the single reference to ACI 201.2R as a basis why reaction with aggregate is not significant does not include provisions for the concrete structures constructed in accordance with ACI 318. ACI 201.2R guidance was developed after many of the earlier nuclear plants were constructed. They were constructed in accordance with ACI 318, which provided the requirements for design and construction of reinforced concrete structures. It included the factors for water cement	

Table II-12. Changes to Existing GALL Report Rev. 1 Chapter III AMR Items for Structures and Component Supports and Their Technical Bases (cells where changes have been made are shown in bold)

Rev. 2 AMR Item No.	Rev. 1 AMR Link	Structures and/or Components	Material	Environment	Aging Effect/ Mechanism	Aging Management Program	Further Evaluation Required	Technical Basis for Changes	Comment No.
								mix proportions, slump, aggregates, type of mixer, mixing time, and temperature for durable concrete, which were later addressed in ACI 201.2R. An approved precedent exists in TMI SER, Sections 3.5.2.2.1 and 3.5.2.2.2 for accepting concrete designed, constructed, and inspected in accordance with applicable ACI and ASTM standards.	
III.A1.TP-212 III.A2.TP-212 III.A3.TP-212 III.A5.TP-212 III.A7.TP-212 III.A8.TP-212 III.A9.TP-	III.A1-4(T-05) III.A2-4(T-05) III.A3-4(T-05) III.A5-4(T-05) III.A7-3(T-05) III.A8-3(T-05) III.A9-	**Concrete (inaccessible areas): below-grade exterior; foundation**	**Concrete**	Ground water/soil	Cracking; loss of bond; and loss of material (spalling, scaling) due to corrosion of embedded steel	**XI.S6, "Structures Monitoring"**	**No**	GALL Rev.1, AMR item T-05 is split to differentiate between accessible and inaccessible areas. Revised AMP includes ground water monitoring. Further evaluation changed from Yes to No. "Reinforced	N/A

Table II-12. Changes to Existing GALL Report Rev. 1 Chapter III AMR Items for Structures and Component Supports and Their Technical Bases (cells where changes have been made are shown in bold)

Rev. 2 AMR Item No.	Rev. 1 AMR Link	Structures and/or Components	Material	Environment	Aging Effect/ Mechanism	Aging Management Program	Further Evaluation Required	Technical Basis for Changes	Comment No.
212	3(T-05)							concrete" was changed to "Concrete" for consistency with Chapter II.	
III.A6.TP-220	III.A6-2(T-17)	**Concrete (inaccessible areas): all**	**Concrete**	Any environment	Cracking due to expansion from reaction with aggregates	**Further evaluation is required to determine if a plant-specific aging management program is needed to manage cracking and expansion due to reaction with aggregate of concrete in Inaccessible Areas. A plant-specific aging management program is not required if (1) As described in NUREG-1557, investigations, tests, and petrographic**	**Yes, if concrete is not constructed as stated**	GALL Rev. 1, AMR Item T-17 is split to differentiate between accessible and inaccessible areas. Current licensing basis of some plants may not require testing of aggregate reactivity based on ASTM C295 or ASTM C227. Deletion of the year for ASTM C295 and ASTM C227 and the addition of other ASTM reactivity tests provide alternate acceptable technical basis for plants that are not committed to a specific year of the standard or ASTM	N/A

Table II-12. Changes to Existing GALL Report Rev. 1 Chapter III AMR Items for Structures and Component Supports and Their Technical Bases (cells where changes have been made are shown in bold)

Rev. 2 AMR Item No.	Rev. 1 AMR Link	Structures and/or Components	Material	Environment	Aging Effect/ Mechanism	Aging Management Program	Further Evaluation Required	Technical Basis for Changes	Comment No.
						examinations of aggregates performed in accordance with ASTM C295 and other ASTM reactivity tests, as required, can demonstrate that those aggregates do not adversely react within concrete, or (2) For potentially reactive aggregates, aggregate concrete reaction is not significant if it is demonstrated that the in-place concrete can perform its intended function.		C227. For potentially reactive aggregate, the single reference to ACI 201.2R as a basis why reaction with aggregate is not significant does not include provisions for the concrete structures constructed in accordance with ACI 318. ACI 201.2R guidance was developed after many of the earlier nuclear plants were constructed. They were constructed in accordance with ACI 318, which provided the requirements for design and construction of reinforced concrete structures. It included the factors for water cement mix proportions, slump, aggregates,	

Table II-12. Changes to Existing GALL Report Rev. 1 Chapter III AMR Items for Structures and Component Supports and Their Technical Bases (cells where changes have been made are shown in bold)

Rev. 2 AMR Item No.	Rev. 1 AMR Link	Structures and/or Components	Material	Environment	Aging Effect/ Mechanism	Aging Management Program	Further Evaluation Required	Technical Basis for Changes	Comment No.
								type of mixer, mixing time, and temperature for durable concrete, which were later addressed in ACI 201.2R. An approved precedent exists in TMI SER, Sections 3.5.2.2.1 and 3.5.2.2.2 for accepting concrete designed, constructed, and inspected in accordance with applicable ACI and ASTM standards.	
III.A1.TP-23 III.A2.TP-23 III.A3.TP-23 III.A5.TP-23 III.A7.TP-23 III.A8.TP-23 III.A9.TP-23	III.A1-6(T-01) III.A2-6(T-01) III.A3-6(T-01) III.A5-6(T-01) III.A7-5(T-01) III.A8-5(T-01) III.A9-5(T-01)	**Concrete (accessible areas): exterior above- and below-grade; foundation**	**Concrete**	Air – outdoor	Loss of material (spalling, scaling) and cracking due to freeze-thaw	**XI.S6, "Structures Monitoring"**	**No**	GALL Rev.1 AMR Item T-01 is split to differentiate between accessible and inaccessible areas. Inspections of accessible areas performed in accordance with the structures monitoring program will indicate the presence of loss of material (spalling,	N/A

Table II-12. Changes to Existing GALL Report Rev. 1 Chapter III AMR Items for Structures and Component Supports and Their Technical Bases (cells where changes have been made are shown in bold)

Rev. 2 AMR Item No.	Rev. 1 AMR Link	Structures and/or Components	Material	Environment	Aging Effect/ Mechanism	Aging Management Program	Further Evaluation Required	Technical Basis for Changes	Comment No.
								scaling) and cracking due to freeze-thaw. Thus, a further evaluation is not required for accessible areas."Reinforced Concrete" is changed to "Concrete" for consistency with Chapter II.	
III.A1.TP-24 III.A2.TP-24 III.A3.TP-24 III.A5.TP-24 III.A7.TP-24 III.A8.TP-24 III.A9.TP-24	III.A1-7(T-02) III.A2-7(T-02) III.A3-7(T-02) III.A5-7(T-02) III.A7-6(T-02) III.A8-6(T-02) III.A9-6(T-02)	**Concrete (accessible areas): exterior above- and below-grade; foundation**	**Concrete**	Water – flowing	Increase in porosity and permeability; loss of strength due to leaching of calcium hydroxide and carbonation	**XI.S6, "Structures Monitoring"**	**No**	GALL Rev.1 AMR item T-02 is split to differentiate between accessible and inaccessible areas. Inspections of accessible areas performed in accordance with the structures monitoring program will indicate the presence of increase in porosity, permeability due to leaching of calcium hydroxide, and carbonation. Thus, a further evaluation is not required for	N/A

Table II-12. Changes to Existing GALL Report Rev. 1 Chapter III AMR Items for Structures and Component Supports and Their Technical Bases (cells where changes have been made are shown in bold)

Rev. 2 AMR Item No.	Rev. 1 AMR Link	Structures and/or Components	Material	Environment	Aging Effect/ Mechanism	Aging Management Program	Further Evaluation Required	Technical Basis for Changes	Comment No.
								accessible areas.	
III.A1.TP-25 III.A2.TP-25 III.A3.TP-25 III.A4.TP-25 III.A5.TP-25 III.A7.TP-25 III.A8.TP-25 III.A9.TP-25	III.A1-2(T-03) III.A2-2(T-03) III.A3-2(T-03) III.A4-2(T-03) III.A5-2(T-03) III.A7-1(T-03) III.A8-1(T-03) III.A9-1(T-03)	**Concrete (accessible areas): all**	**Concrete**	Any environment	Cracking due to expansion from reaction with aggregates	**XI.S6, "Structures Monitoring"**	**No**	GALL Rev.1, AMR item T-03 is split to differentiate between accessible and inaccessible areas. Inspections of accessible areas performed in accordance with the structures monitoring program will indicate the presence of surface cracking due to expansion from reaction with aggregates. Thus, a further evaluation is not required.	N/A
III.A1.TP-26 III.A2.TP-26 III.A3.TP-26 III.A4.TP-26 III.A5.TP-26 III.A7.TP-26 III.A9.TP-	III.A1-9(T-04) III.A2-9(T-04) III.A3-9(T-04) III.A4-3(T-04) III.A5-9(T-04) III.A7-8(T-04) III.A9-	**Concrete (accessible areas): interior and above-grade exterior**	**Concrete**	Air – indoor, uncontrolled or Air – outdoor	Cracking; loss of bond; and loss of material (spalling, scaling) due to corrosion of embedded steel	**XI.S6, "Structures Monitoring"**	**No**	XI.S6, "Structures Monitoring" program is revised to require monitoring of the aging effect/mechanism for this component. Further evaluation is not required. "Reinforced concrete" was	N/A

Table II-12. Changes to Existing GALL Report Rev. 1 Chapter III AMR Items for Structures and Component Supports and Their Technical Bases (cells where changes have been made are shown in bold)

Rev. 2 AMR Item No.	Rev. 1 AMR Link	Structures and/or Components	Material	Environment	Aging Effect/ Mechanism	Aging Management Program	Further Evaluation Required	Technical Basis for Changes	Comment No.
26	8(T-04)							changed to "Concrete" for consistency with Chapter II.	
III.A1.TP-27 III.A2.TP-27 III.A3.TP-27 III.A5.TP-27 III.A7.TP-27 III.A8.TP-27 III.A9.TP-27	III.A1-4(T-05) III.A2-4(T-05) III.A3-4(T-05) III.A5-4(T-05) III.A7-3(T-05) III.A8-3(T-05) III.A9-3(T-05)	**Concrete (accessible areas): below-grade exterior; foundation**	**Concrete**	Ground water/soil	Cracking; loss of bond; and loss of material (spalling, scaling) due to corrosion of embedded steel	**XI.S6, "Structures Monitoring"**	**No**	GALL Rev.1, AMR item T-05 is split to differentiate between accessible and inaccessible areas. Inspections of accessible areas performed in accordance with the structures monitoring program will indicate the presence of surface cracking, loss of bond, and loss of material (spalling, scaling) due to corrosion of embedded steel. Thus, a further evaluation is not required. "Reinforced concrete" was changed to "Concrete" for consistency with Chapter II.	N/A

Table II-12. Changes to Existing GALL Report Rev. 1 Chapter III AMR Items for Structures and Component Supports and Their Technical Bases (cells where changes have been made are shown in bold)

Rev. 2 AMR Item No.	Rev. 1 AMR Link	Structures and/or Components	Material	Environment	Aging Effect/ Mechanism	Aging Management Program	Further Evaluation Required	Technical Basis for Changes	Comment No.
III.A1.TP-28 III.A2.TP-28 III.A3.TP-28 III.A4.TP-28 III.A5.TP-28 III.A7.TP-28 III.A9.TP-28	III.A1-10(T-06) III.A2-10(T-06) III.A3-10(T-06) III.A4-4(T-06) III.A5-10(T-06) III.A7-9(T-06) III.A9-9(T-06)	Concrete: interior; above-grade exterior	**Concrete**	Air – indoor, uncontrolled or Air – outdoor	Increase in porosity and permeability; cracking; loss of material (spalling, scaling) due to aggressive chemical attack	**XI.S6, "Structures Monitoring"**	**No**	XI.S6, “Structures Monitoring” program is revised to require monitoring of the aging effect/mechanism for this component. Further evaluation is not required. "Reinforced concrete" was changed to "Concrete" for consistency with Chapter II.	N/A
III.A1.TP-29 III.A2.TP-29 III.A3.TP-29 III.A5.TP-29 III.A7.TP-29 III.A8.TP-29 III.A9.TP-29	III.A1-5(T-07) III.A2-5(T-07) III.A3-5(T-07) III.A5-5(T-07) III.A7-4(T-07) III.A8-4(T-07) III.A9-4(T-07)	**Concrete (inaccessible areas): below-grade exterior; foundation**	**Concrete**	Ground water/soil	Increase in porosity and permeability; cracking; loss of material (spalling, scaling) due to aggressive chemical attack	**XI.S6, "Structures Monitoring"**	**No**	“Reinforced concrete” was changed to "Concrete" for consistency with Chapter II. Revised AMP includes ground water monitoring. Further evaluation changed from “Yes” to “No.”	N/A
III.A1.TP-30	III.A1-3(T-08)	Concrete: all	**Concrete**	Soil	Cracking and distortion due	XI.S6, “Structures	**Yes, if a de-watering**	“Reinforced concrete” was	N/A

Table II-12. Changes to Existing GALL Report Rev. 1 Chapter III AMR Items for Structures and Component Supports and Their Technical Bases (cells where changes have been made are shown in bold)

Rev. 2 AMR Item No.	Rev. 1 AMR Link	Structures and/or Components	Material	Environment	Aging Effect/ Mechanism	Aging Management Program	Further Evaluation Required	Technical Basis for Changes	Comment No.
III.A2.TP-30 III.A3.TP-30 III.A5.TP-30 III.A6.TP-30 III.A7.TP-30 III.A8.TP-30 III.A9.TP-30	III.A2-3(T-08) III.A3-3(T-08) III.A5-3(T-08) III.A6-4(T-08) III.A7-2(T-08) III.A8-2(T-08) III.A9-2(T-08)				to increased stress levels from settlement	Monitoring” If a de-watering system is relied upon for control of settlement, then the licensee is to ensure proper functioning of the de-watering system through the period of extended operation.	**system is relied upon to control settlement**	changed to "Concrete" for consistency with Chapter II. Further evaluation is required only if a de-watering system is relied upon to control settlement; otherwise further evaluation is not required because AMP XI.S6 requires monitoring concrete for cracking including cracks and distortion due to increased stress levels from settlement.	
III.A1.TP-302 III.A2.TP-302 III.A3.TP-302 III.A4.TP-302 III.A5.TP-302 III.A7.TP-302 III.A8.TP-	III.A1-12(T-11) III.A2-12(T-11) III.A3-12(T-11) III.A4-5(T-11) III.A5-12(T-11)	Steel components: all structural steel	Steel	Air – indoor, uncontrolled or Air – outdoor	Loss of material due to corrosion	XI.S6, “Structures Monitoring” If protective coatings are relied upon to manage the effects of aging, the structures monitoring program is to include	**No**	XI.S6, “Structures Monitoring” program is revised to require monitoring of the aging effect/ mechanism for this component. Further evaluation is not required.	N/A

Table II-12. Changes to Existing GALL Report Rev. 1 Chapter III AMR Items for Structures and Component Supports and Their Technical Bases (cells where changes have been made are shown in bold)

Rev. 2 AMR Item No.	Rev. 1 AMR Link	Structures and/or Components	Material	Environment	Aging Effect/ Mechanism	Aging Management Program	Further Evaluation Required	Technical Basis for Changes	Comment No.
302	III.A7-10(T-11) III.A8-8(T-11)					provisions to address protective coating monitoring and maintenance.			
III.A1.TP-31 III.A2.TP-31 III.A3.TP-31 III.A5.TP-31 III.A6.TP-31 III.A7.TP-31 III.A8.TP-31 III.A9.TP-31	III.A1-8(T-09) III.A2-8(T-09) III.A3-8(T-09) III.A5-8(T-09) III.A6-8(T-09) III.A7-7(T-09) III.A8-7(T-09) III.A9-7(T-09)	Concrete: foundation; subfoundation	**Concrete; porous concrete**	Water – flowing under foundation	Reduction in foundation strength, cracking due to differential settlement, erosion of porous concrete subfoundation	XI.S6, "Structures Monitoring" If a de-watering system is relied upon for control of settlement, then the licensee is to ensure proper functioning of the de-watering system through the period of extended operation.	**Yes, if a de-watering system is relied upon to control settlement**	Reinforced concrete was changed to "concrete" for consistency with Chapter II. Porous concrete, if incorporated in design of the foundation, is part of foundation and is included in the scope of the structures monitoring program.	N/A
III.A4.TP-35	III.A4-6(T-13)	**Sliding surfaces: radial beam seats in BWR drywell**	**Lubrite; Fluorogold; Lubrofluor**	Air – indoor, uncontrolled	**Loss of mechanical function due to corrosion, distortion, dirt, overload, wear**	**XI.S6, "Structures Monitoring"**	**No**	Deleted RPV support shoes for PWR with nozzle supports and steam generator supports, XI.S3 .These components are classified ASME Class 1 component supports, which are	N/A

Table II-12. Changes to Existing GALL Report Rev. 1 Chapter III AMR Items for Structures and Component Supports and Their Technical Bases (cells where changes have been made are shown in bold)

Rev. 2 AMR Item No.	Rev. 1 AMR Link	Structures and/or Components	Material	Environment	Aging Effect/ Mechanism	Aging Management Program	Further Evaluation Required	Technical Basis for Changes	Comment No.
								evaluated in GALL Rev. 1, AMR Item III.B1.1-5. The added materials were identified as alternate to Lubrite in previous LRAs.	
III.A6.TP-36	III.A6-5(T-15)	**Concrete (accessible areas): exterior above- and below-grade; foundation**	**Concrete**	Air – outdoor	Loss of material (spalling, scaling) and cracking due to freeze-thaw	**XI.S7, "RG 1.127, Inspection of Water-Control Structures Associated with Nuclear Power Plants," or the FERC/ US Army Corp of Engineers' dam inspections and maintenance programs.**	**No**	GALL Rev.1 AMR item T-15 is split to differentiate between accessible and inaccessible areas. Inspections of accessible areas performed in accordance with RG. 1.127 or FERC/US Army Corp of Engineers' dam inspections and maintenance programs will indicate the presence of loss of material (spalling, scaling) and cracking due to freeze-thaw. Thus, a further evaluation is not required for accessible areas. "Reinforced	N/A

Table II-12. Changes to Existing GALL Report Rev. 1 Chapter III AMR Items for Structures and Component Supports and Their Technical Bases (cells where changes have been made are shown in bold)

Rev. 2 AMR Item No.	Rev. 1 AMR Link	Structures and/or Components	Material	Environment	Aging Effect/ Mechanism	Aging Management Program	Further Evaluation Required	Technical Basis for Changes	Comment No.
								concrete" is changed to "Concrete" for consistency with Chapter II.	
III.A6.TP-37	III.A6-6(T-16)	**Concrete (accessible areas): exterior above- and below-grade; foundation; interior slab**	**Concrete**	Water – flowing	**Increase in porosity and permeability; loss of strength due to leaching of calcium hydroxide and carbonation**	**XI.S7, RG 1.127, “Inspection of Water-Control Structures Associated with Nuclear Power Plants,” or the FERC / US Army Corp of Engineers dam inspections and maintenance programs.**	**No**	GALL Rev.1 AMR item T-16 is split to differentiate between accessible and inaccessible areas. Inspections of accessible areas performed in accordance with RG 1.127, “Inspection of Water-Control Structures Associated with Nuclear Power Plants,” or the FERC /US Army Corp of Engineers dam inspections and maintenance programs will indicate the presence of increase in porosity, permeability due to leaching of calcium hydroxide, and	N/A

Table II-12. Changes to Existing GALL Report Rev. 1 Chapter III AMR Items for Structures and Component Supports and Their Technical Bases (cells where changes have been made are shown in bold)

Rev. 2 AMR Item No.	Rev. 1 AMR Link	Structures and/or Components	Material	Environment	Aging Effect/ Mechanism	Aging Management Program	Further Evaluation Required	Technical Basis for Changes	Comment No.
								carbonation. Thus, a further evaluation is not required for accessible areas.	
III.A6.TP-38	III.A6-1(T-18)	**Concrete (accessible areas): all**	**Concrete**	**Air – indoor, uncontrolled or Air – outdoor or Ground water/soil**	Cracking; loss of bond; and loss of material (spalling, scaling) due to corrosion of embedded steel	**XI.S7, RG 1.127, "Inspection of Water-Control Structures Associated with Nuclear Power Plants," or the FERC/ US Army Corp of Engineers dam inspections and maintenance programs.**	**No**	GALL Rev.1, AMR item T-18 is split to differentiate between accessible and inaccessible areas. Inspections of accessible areas performed in accordance with RG 1.127, "Inspection of Water-Control Structures Associated with Nuclear Power Plants," or the FERC /US Army Corp of Engineers dam inspections and maintenance programs will indicate the presence of surface cracking, loss of bond, and loss of material (spalling, scaling) due to corrosion of	N/A

Table II-12. Changes to Existing GALL Report Rev. 1 Chapter III AMR Items for Structures and Component Supports and Their Technical Bases (cells where changes have been made are shown in bold)

Rev. 2 AMR Item No.	Rev. 1 AMR Link	Structures and/or Components	Material	Environment	Aging Effect/ Mechanism	Aging Management Program	Further Evaluation Required	Technical Basis for Changes	Comment No.
								embedded steel. Thus, a further evaluation is not required. "Reinforced concrete" was changed to "Concrete" for consistency with Chapter II. Ground water/soil environment is applicable to this component and the aging effects/ mechanisms are applicable consistent with TP-212.	
III.B1.1.TP-41	III.B1.1-3(T-27)	**High-strength structural bolting**	**Low-alloy steel, actual measured yield strength ≥ 150 ksi (1,034 MPa)**	Air – indoor, uncontrolled	Cracking due to SCC	**XI.S3, "ASME Section XI, Subsection IWF"**	No	Changed the component name to High-strength structural bolting to be more generic and cover high-strength bolting used for ASME Class 1, 2, 3, and MC component supports. High-strength structural bolting was in	356

Table II-12. Changes to Existing GALL Report Rev. 1 Chapter III AMR Items for Structures and Component Supports and Their Technical Bases (cells where changes have been made are shown in bold)

Rev. 2 AMR Item No.	Rev. 1 AMR Link	Structures and/or Components	Material	Environment	Aging Effect/ Mechanism	Aging Management Program	Further Evaluation Required	Technical Basis for Changes	Comment No.
								scope of XI.M18, "Bolting Integrity" AMP in Rev. 1 of the GALL Report. For Rev. 2 of the GALL, high-strength structural bolting associated with ASME Component supports is added to the scope of XI.S3, "ASME Section XI, Subsection IWF." The IWF visual examination is augmented to require surface examination of high-strength bolting to detect cracking as required by the Bolting Integrity program (XI.M18)	
III.B1.1.TP-42 III.B1.2.TP-42 III.B1.3.TP-42 III.B2.TP-	III.B1.1-1(T-29) III.B1.2-1(T-29) III.B1.3-1(T-29) III.B2-	Building concrete at locations of expansion and grouted anchors;	**Concrete; grout**	Air – indoor, uncontrolled or Air – outdoor	Reduction in concrete anchor capacity due to local concrete	XI.S6, "Structures Monitoring"	**No**	The scope of XI.S6, “Structures Monitoring” program includes monitoring of this component. Thus, a	N/A

Table II-12. Changes to Existing GALL Report Rev. 1 Chapter III AMR Items for Structures and Component Supports and Their Technical Bases (cells where changes have been made are shown in bold)

Rev. 2 AMR Item No.	Rev. 1 AMR Link	Structures and/or Components	Material	Environment	Aging Effect/ Mechanism	Aging Management Program	Further Evaluation Required	Technical Basis for Changes	Comment No.
42 III.B3.TP-42 III.B4.TP-42 III.B5.TP-42	1(T-29) III.B3-1(T-29) III.B4-1(T-29) III.B5-1(T-29)	grout pads for support base plates			degradation/ service-induced cracking or other concrete aging mechanisms			further evaluation is not required. "Reinforced concrete" was changed to "Concrete for consistency with Chapter II.	
III.B2.TP-43 III.B3.TP-43 III.B4.TP-43 III.B5.TP-43	III.B2-10(T-30) III.B3-7(T-30) III.B4-10(T-30) III.B5-7(T-30)	Support members; welds; bolted connections; support anchorage to building structure	Steel	Air – indoor, uncontrolled or Air – outdoor	Loss of material due to general and pitting corrosion	XI.S6, "Structures Monitoring"	**No**	The scope of XI.S6, “Structures Monitoring” program includes monitoring of this component. Thus, a further evaluation is not required	N/A
III.B4.TP-44	III.B4-12(T-31)	Vibration isolation elements	Non-metallic (e.g., rubber)	Air – indoor, uncontrolled or Air – outdoor	Reduction or loss of isolation function due to radiation hardening, temperature, humidity, sustained vibratory loading	XI.S3, “ASME Section XI, Subsection IWF”	**No**	The scope of XI.S6, “Structures Monitoring” program includes monitoring of this component. Thus, a further evaluation is not required	N/A
III.B1.1.TP-45 III.B1.2.TP-	III.B1.1-5(T-32) III.B1.2-	Sliding surfaces	**Lubrite®; graphitic**	Air – indoor, uncontrolled	**Loss of mechanical**	XI.S3, “ASME Section XI,	No	Fatigue due to vibratory and cyclic	N/A

Table II-12. Changes to Existing GALL Report Rev. 1 Chapter III AMR Items for Structures and Component Supports and Their Technical Bases (cells where changes have been made are shown in bold)

Rev. 2 AMR Item No.	Rev. 1 AMR Link	Structures and/or Components	Material	Environment	Aging Effect/ Mechanism	Aging Management Program	Further Evaluation Required	Technical Basis for Changes	Comment No.
45 III.B1.3.TP-45	3(T-32) III.B1.3-3(T-32)		**tool steel; Fluorogold; Lubrofluor**	or Air – outdoor	**function due to corrosion, distortion, dirt, debris, overload, wear**	Subsection IWF”		thermal loads is removed from the aging effect/ mechanism because the design codes do not require fatigue consideration for sliding surfaces. Excessive wear and debris accumulation can prevent sliding of the surface as required by design. Fluorogold and Lubrofluor were identified by previous applicants as sliding surfaces materials.	
III.B2.TP-46 III.B4.TP-46	III.B2-2(TP-1) III.B4-2(TP-1)	Sliding support bearings; sliding support surfaces	**Lubrite®; graphitic tool steel; Fluorogold; Lubrofluor**	Air – indoor, uncontrolled	**Loss of mechanical function due to corrosion, distortion, dirt, debris, overload, wear**	XI.S6, "Structures Monitoring"	No	Fatigue due to vibratory and cyclic thermal loads is removed from the aging effect/ mechanism because the design codes do not require fatigue consideration for sliding surfaces. Excessive wear and	N/A

Table II-12. Changes to Existing GALL Report Rev. 1 Chapter III AMR Items for Structures and Component Supports and Their Technical Bases (cells where changes have been made are shown in bold)

Rev. 2 AMR Item No.	Rev. 1 AMR Link	Structures and/or Components	Material	Environment	Aging Effect/ Mechanism	Aging Management Program	Further Evaluation Required	Technical Basis for Changes	Comment No.
								debris accumulation can prevent sliding of the surface as required by design. Fluorogold and Lubrofluor were identified by previous applicants as sliding surfaces materials.	
III.B2.TP-47 III.B4.TP-47	III.B2-3(TP-2) III.B4-3(TP-2)	Sliding support bearings; sliding support surfaces	**Lubrite®; graphitic tool steel; Fluorogold; Lubrofluor**	Air – outdoor	**Loss of mechanical function due to corrosion, distortion, dirt, debris, overload, wear**	Chapter XI.S6, "Structures Monitoring"	No	Fatigue due to vibratory and cyclic thermal loads is removed from the aging effect/ mechanism because the design codes do not require fatigue consideration for sliding surfaces. Excessive wear and debris accumulation can prevent sliding of the surface as required by design. Fluorogold and Lubrofluor were identified by previous applicants as sliding surfaces materials.	N/A

Table II-12. Changes to Existing GALL Report Rev. 1 Chapter III AMR Items for Structures and Component Supports and Their Technical Bases (cells where changes have been made are shown in bold)

Rev. 2 AMR Item No.	Rev. 1 AMR Link	Structures and/or Components	Material	Environment	Aging Effect/ Mechanism	Aging Management Program	Further Evaluation Required	Technical Basis for Changes	Comment No.
III.A1.TP-67 III.A2.TP-67 III.A3.TP-67 III.A5.TP-67 III.A7.TP-67 III.A8.TP-67 III.A9.TP-67	III.A1-7(T-02) III.A2-7(T-02) III.A3-7(T-02) III.A5-7(T-02) III.A7-6(T-02) III.A8-6(T-02) III.A9-6(T-02)	**Concrete (inaccessible areas): exterior above- and below-grade; foundation**	**Concrete**	Water – flowing	Increase in porosity and permeability; loss of strength due to leaching of calcium hydroxide and carbonation	**Further evaluation is required to determine if a plant-specific aging management program is needed to manage increase in porosity, and permeability due to leaching of calcium hydroxide and carbonation of concrete in Inaccessible Areas. A plant-specific aging management program is not required if (1) There is evidence in the accessible areas that the flowing water has not caused leaching and carbonation, or (2) Evaluation**	**Yes, if leaching is observed in accessible areas that impact intended function**	GALL Rev.1, AMR Item T-02 is split to differentiate between accessible and inaccessible areas. ACI 201.2R was developed after some plants were constructed. Those plants were constructed in accordance with ACI 318, which provided the requirements for design and construction of reinforced concrete structures. ACI 318 included factors for water-cement mix proportions, slump, aggregates, type of mixer, mixing time, and temperature for durable concrete, which were later addressed in ACI 201.2R-77. Thus, concrete structures constructed to	N/A

Table II-12. Changes to Existing GALL Report Rev. 1 Chapter III AMR Items for Structures and Component Supports and Their Technical Bases (cells where changes have been made are shown in bold)

Rev. 2 AMR Item No.	Rev. 1 AMR Link	Structures and/or Components	Material	Environment	Aging Effect/ Mechanism	Aging Management Program	Further Evaluation Required	Technical Basis for Changes	Comment No.
						determined that the observed leaching of calcium hydroxide and carbonation in accessible areas has no impact on the intended function of the concrete structure.		either ACI 318 or 201.2R are expected to be durable. Since these standards were used for both accessible and inaccessible concrete, it is reasonable to conclude that leaching of calcium hydroxide and carbonation in accessible areas subject to flowing - water inaccessible areas.	
III.B1.1.TP-8 III.B1.2.TP-8 III.B1.3.TP-8	III.B1.1-6 (TP-8) III.B1.1-7(TP-11) III.B1.1-9(TP-5) III.B1.2-4(TP-8) III.B1.2-5(TP-11) III.B1.2-7(TP-5) III.B1.3-4(TP-8) III.B1.3-5(TP-	Support members; welds; bolted connections; support anchorage to building structure	**Aluminum; galvanized steel; stainless steel**	Air – indoor, uncontrolled	None	None	No	TP-5 for stainless steel and TP-11 for galvanized steel were deleted, and the materials were combined with TP-8, aluminum.	N/A

Table II-12. Changes to Existing GALL Report Rev. 1 Chapter III AMR Items for Structures and Component Supports and Their Technical Bases (cells where changes have been made are shown in bold)

Rev. 2 AMR Item No.	Rev. 1 AMR Link	Structures and/or Components	Material	Environment	Aging Effect/ Mechanism	Aging Management Program	Further Evaluation Required	Technical Basis for Changes	Comment No.
III.B2.TP-8 III.B3.TP-8 III.B4.TP-8 III.B5.TP-8	11) III.B1.3-7(TP-5) III.B2-4(TP-8) III.B2-5(TP-11) III.B2-8(TP-5) III.B3-2(TP-8) III.V3-3(TP-11) III.B3-5(TP-5) III.B4-4(TP-8) III.B4-5(TP-11) III.B4-8(TP-5) III.B5-2(TP-8) III.B5-3(TP-11) III.B5-5(TP-5)								

Table II-13. Changes to Existing GALL Report Rev. 1 Chapter VI AMR Items for Electrical Systems and Their Technical Bases (cells where changes have been made are shown in bold)

Rev. 2 AMR Item No.	Rev. 1 AMR Link	Structures and/or Components	Material	Environment	Aging Effect/ Mechanism	Aging Management Program	Further Evaluation Required	Technical Basis for Changes	Comment No.
VI.A.LP-23	VI.A-8(LP-01)	**Fuse holders (not part of active equipment): metallic clamps**	**Various metals used for electrical connections**	**Air – indoor, uncontrolled**	**Increased resistance of connection due to chemical contamination, corrosion, and oxidation (in an air, indoor controlled environment, increased resistance of connection due to chemical contamination, corrosion and oxidation do not apply); fatigue due to ohmic heating, thermal cycling, electrical transients**	XI.E5, "Fuse Holders"	No	Component name was changed to provide a technically accurate exclusion boundary for fuse holders. For AMR purposes, the term “active equipment” more closely aligns with the LR Rule than the term “larger assembly.” Air – indoor was changed to Air – Indoor, uncontrolled to be consistent with other chapters of the GALL Report. “Material” changed to account for various other metals that may be used for the clamp. The term “increased	N/A

Table II-13. Changes to Existing GALL Report Rev. 1 Chapter VI AMR Items for Electrical Systems and Their Technical Bases (cells where changes have been made are shown in bold)

Rev. 2 AMR Item No.	Rev. 1 AMR Link	Structures and/or Components	Material	Environment	Aging Effect/ Mechanism	Aging Management Program	Further Evaluation Required	Technical Basis for Changes	Comment No.
								resistance of connection" more accurately describes the actual aging effect resulting from chemical contamination, corrosion, and oxidation. "Increased resistance of connection" resistance is also the term defined in GALL Table IX.E. The previously listed terms chemical contamination, corrosion, and oxidation do not cause fatigue. Ohmic heating, thermal cycling, electrical transients, frequent manipulation, or vibration are aging	

Table II-13. Changes to Existing GALL Report Rev. 1 Chapter VI AMR Items for Electrical Systems and Their Technical Bases (cells where changes have been made are shown in bold)

Rev. 2 AMR Item No.	Rev. 1 AMR Link	Structures and/or Components	Material	Environment	Aging Effect/ Mechanism	Aging Management Program	Further Evaluation Required	Technical Basis for Changes	Comment No.
								mechanisms that may cause fatigue. Deleted frequent manipulation and vibration as aging mechanisms for LP-23 and added them to LP-31.	
VI.A.LP-24	VI.A-7(LP-02)	**Fuse holders (not part of active equipment): insulation material**	Insulation material: bakelite; phenolic melamine or ceramic; molded polycarbonate; other	**Air – indoor, controlled or uncontrolled**	None	None	No	Component name changed to provide a technically accurate exclusion boundary for fuse holders. For AMR purposes, the term "active equipment" more closely aligns with the LR Rule than the previously used term "larger assembly." "Air – indoor uncontrolled (Internal/External" was changed to "Air – Indoor, controlled or	N/A

Table II-13. Changes to Existing GALL Report Rev. 1 Chapter VI AMR Items for Electrical Systems and Their Technical Bases (cells where changes have been made are shown in bold)

Rev. 2 AMR Item No.	Rev. 1 AMR Link	Structures and/or Components	Material	Environment	Aging Effect/ Mechanism	Aging Management Program	Further Evaluation Required	Technical Basis for Changes	Comment No.
								uncontrolled" to be consistent with other chapters of the GALL Report.	
VI.A.LP-25	VI.A-11(LP-04)	Metal enclosed bus (MEB): bus/connections	**Various metals used for electrical bus and connections**	**Air – indoor, controlled or uncontrolled or Air – outdoor**	**Increased resistance of connection due to the loosening of bolts caused by thermal cycling and ohmic heating**	XI.E4, "Metal Enclosed Bus"	No	Material change to account for various other metals that may be used for the MEB bus and connections. "Air – indoor and outdoor" was changed to "Air – Indoor, controlled or uncontrolled or air-outdoor" to be consistent with other chapters of the GALL Report. The term "increased resistance of connection" more accurately describes the actual aging effect resulting from thermal cycling and ohmic heating; the aging	N/A

Table II-13. Changes to Existing GALL Report Rev. 1 Chapter VI AMR Items for Electrical Systems and Their Technical Bases (cells where changes have been made are shown in bold)

Rev. 2 AMR Item No.	Rev. 1 AMR Link	Structures and/or Components	Material	Environment	Aging Effect/ Mechanism	Aging Management Program	Further Evaluation Required	Technical Basis for Changes	Comment No.
								effects apply to both controlled and uncontrolled. Increased resistance of connection is also the term defined in GALL Table IX.E. Loosening of bolted connections was deleted.	
VI.A.LP-26	VI.A-14(LP-05)	Metal enclosed bus: insulation; insulators	Porcelain; xenoy; thermo-plastic organic polymers	**Air – indoor, controlled or uncontrolled or Air – outdoor**	**Reduced insulation resistance due to thermal/thermoxidative degradation of organics/thermoplastics, radiation-induced oxidation, moisture/debris intrusion, and ohmic heating**	XI.E4, "Metal Enclosed Bus"	No	“Air – indoor and outdoor” was changed to “Air – indoor, controlled or uncontrolled or Air – outdoor” to be consistent with other chapters of the GALL Report. The previously used terms “embrittlement, cracking, melting, discoloration, swelling, or loss of dielectric strength leading to reduced insulation	N/A

Table II-13. Changes to Existing GALL Report Rev. 1 Chapter VI AMR Items for Electrical Systems and Their Technical Bases (cells where changes have been made are shown in bold)

Rev. 2 AMR Item No.	Rev. 1 AMR Link	Structures and/or Components	Material	Environment	Aging Effect/ Mechanism	Aging Management Program	Further Evaluation Required	Technical Basis for Changes	Comment No.
								resistance; electrical failure" were consolidated into the actual aging effect "reduced insulation resistance" for better technical clarity. "Reduced insulation resistance" accurately defines the aging effect associated with MEB insulation and insulators. The previously used term electrical failure was removed because it is a loss of intended function potentially caused by an aging effect. It is not an aging effect and is not a term defined in GALL Table IX.E.	

Table II-13. Changes to Existing GALL Report Rev. 1 Chapter VI AMR Items for Electrical Systems and Their Technical Bases (cells where changes have been made are shown in bold)

Rev. 2 AMR Item No.	Rev. 1 AMR Link	Structures and/or Components	Material	Environment	Aging Effect/ Mechanism	Aging Management Program	Further Evaluation Required	Technical Basis for Changes	Comment No.
VI.A.LP-28	VI.A-9(LP-07)	High-voltage insulators	Porcelain; malleable iron; aluminum; galvanized steel; cement	Air – outdoor	**Reduced insulation resistance due to presence of salt deposits or surface contamination**	A plant-specific aging management program is to be evaluated for plants located such that the potential exists for salt deposits or surface contamination (e.g., in the vicinity of salt water bodies or industrial pollution)	Yes, plant-specific	The term "reduced insulation resistance" more accurately defines the aging effect associated with high-voltage insulators."Reduced insulation resistance" is also the term defined in GALL Table IX.E. Degradation of insulator quality was deleted.	N/A
VI.A.LP-29	VI.A-12(LP-10)	Metal enclosed bus: enclosure assemblies	Elastomers	**Air – indoor, controlled or uncontrolled or Air – outdoor**	**Surface cracking, crazing, scuffing, dimensional change (e.g., "ballooning" and "necking"), shrinkage, discoloration, hardening and loss of strength due to elastomer degradation**	**XI.E4, "Metal Enclosed Bus," or XI.M38, "Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components"**	No	"Air – indoor and outdoor" was changed to "Air – indoor, controlled or uncontrolled or Air – outdoor "to be consistent with other chapters of the GALL Report. During conduct of XI.E4 inspections, accessible gaskets and sealants will be	N/A

Table II-13. Changes to Existing GALL Report Rev. 1 Chapter VI AMR Items for Electrical Systems and Their Technical Bases (cells where changes have been made are shown in bold)

Rev. 2 AMR Item No.	Rev. 1 AMR Link	Structures and/or Components	Material	Environment	Aging Effect/ Mechanism	Aging Management Program	Further Evaluation Required	Technical Basis for Changes	Comment No.
								inspected for degradation that could permit water to enter the bus. Modified XI.E4 and the AEM for this item to include some of the M38 criteria for inspection parameters to manage the aging effects of elastomers. Also added XI.M38 because it is identified as an option in AMP XI.E4 for managing the aging effects of elastomeric components.	
VI.A.LP-30	VI.A-1(LP-12)	Cable connections (metallic parts)	Various metals used for electrical contacts	**Air – indoor, controlled or uncontrolled or Air – outdoor**	**Increased resistance of connection due to thermal cycling, ohmic heating, electrical transients, vibration, chemical contamination,**	XI.E6, "Electrical Cable Connections Not Subject to 10 CFR 50.49 Environmental	No	"Air – indoor and outdoor" was changed to "Air – Indoor, controlled or uncontrolled or Air-outdoor" to be consistent with	N/A

Table II-13. Changes to Existing GALL Report Rev. 1 Chapter VI AMR Items for Electrical Systems and Their Technical Bases (cells where changes have been made are shown in bold)

Rev. 2 AMR Item No.	Rev. 1 AMR Link	Structures and/or Components	Material	Environment	Aging Effect/ Mechanism	Aging Management Program	Further Evaluation Required	Technical Basis for Changes	Comment No.
					corrosion, and oxidation	Qualification Requirements"		other chapters of the GALL Report.. The term "increased connection resistance" more accurately describes the actual aging effect resulting from a loosening of cable connections. "Increased resistance of connection" is also the term defined in GALL Table IX.E. Loosening of bolted connections was deleted.	
VI.A.LP-31	VI.A-8(LP-01)	**Fuse holders (not part of active equipment): metallic clamps**	**Various metals used for electrical connections**	**Air – indoor, controlled or uncontrolled**	**Increased resistance of connection due to fatigue caused by frequent manipulation or vibration**	**XI.E5, "Fuse Holders"** **No aging management program is required for those applicants**	No	In some of previous LRAs, applicants indicated that fuse holders are subject to surveillance or equivalent tests	N/A

Table II-13. Changes to Existing GALL Report Rev. 1 Chapter VI AMR Items for Electrical Systems and Their Technical Bases (cells where changes have been made are shown in bold)

Rev. 2 AMR Item No.	Rev. 1 AMR Link	Structures and/or Components	Material	Environment	Aging Effect/ Mechanism	Aging Management Program	Further Evaluation Required	Technical Basis for Changes	Comment No.
						who can demonstrate these fuse holders are located in an environment that does not subject them to environmental aging mechanisms or fatigue caused by frequent manipulation or vibration		such that the holders experience fatigue as a result of the tests. Based on the operating experience, the staff finds that the aging effect due to fatigue of the component is independent of the environment and AMP XI.E5 is adequate to manage the aging effect.	
VI.A.LP-32	VI.A-10(LP-11)	High-voltage insulators	Porcelain; malleable iron; aluminum; galvanized steel; cement	Air – outdoor	**Loss of material due to mechanical wear caused by wind blowing on transmission conductors**	A plant-specific aging management program is to be evaluated	Yes, plant-specific	AEM wording changed to maintain consistency with revision of AMP.	N/A
VI.A.LP-33	VI.A-2(L-01)	**Insulation material for electrical cables and connections (including terminal blocks,**	Various organic polymers (e.g., ethylene-propylene rubber (EPR), silicon rubber	**Adverse localized environment caused by heat, radiation, or moisture**	**Reduced insulation resistance due to thermal/thermoxidative degradation of organics, radiolysis, and photolysis (UV sensitive materials**	**XI.E1, "Insulation Material for Electrical Cables and Connections Not Subject to**	No	Component name (added "insulation material for") changed for technical accuracy. Connections do	N/A

Table II-13. Changes to Existing GALL Report Rev. 1 Chapter VI AMR Items for Electrical Systems and Their Technical Bases (cells where changes have been made are shown in bold)

Rev. 2 AMR Item No.	Rev. 1 AMR Link	Structures and/or Components	Material	Environment	Aging Effect/ Mechanism	Aging Management Program	Further Evaluation Required	Technical Basis for Changes	Comment No.
		fuse holders, etc.)	(SR), ethylene-propylene diene monomer (EPDM), cross-linked polyethylene (XLPE)		**only) of organics;** **radiation-induced oxidation;** **moisture intrusion**	**10 CFR 50.49 Environmental Qualification Requirements**		not have a conductor, only insulation. Deleted "in the presence of oxygen" from the environment as it is not a major determinant. Parenthetical statement added to component for technical clarification. "Connections" include items such as terminal blocks, fuse holders, splices, etc. The previously cited aging effects of "embrittlement, cracking, melting, discoloration, swelling, or loss of dielectric strength leading to reduced insulation resistance/electric	

Table II-13. Changes to Existing GALL Report Rev. 1 Chapter VI AMR Items for Electrical Systems and Their Technical Bases (cells where changes have been made are shown in bold)

Rev. 2 AMR Item No.	Rev. 1 AMR Link	Structures and/or Components	Material	Environment	Aging Effect/ Mechanism	Aging Management Program	Further Evaluation Required	Technical Basis for Changes	Comment No.
								al failure" were consolidated into the actual aging effect term "reduced insulation resistance" for better technical clarity. "Reduced insulation resistance" accurately defines the aging effect associated with cable and connection insulation materials. The previously cited electrical failure was removed because it is a loss of intended function potentially caused by an aging effect. It is not an aging effect and is not a term defined in GALL Table IX.E.	

Table II-13. Changes to Existing GALL Report Rev. 1 Chapter VI AMR Items for Electrical Systems and Their Technical Bases (cells where changes have been made are shown in bold)

Rev. 2 AMR Item No.	Rev. 1 AMR Link	Structures and/or Components	Material	Environment	Aging Effect/ Mechanism	Aging Management Program	Further Evaluation Required	Technical Basis for Changes	Comment No.
VI.A.LP-34	VI.A-3(L-02)	**Insulation material for electrical cables and connections used in instrumentation circuits that are sensitive to reduction in conductor insulation resistance (IR)**	Various organic polymers (e.g., EPR, SR, EPDM, XLPE)	**Adverse localized environment caused by heat, radiation, or moisture**	**Reduced insulation resistance** **due to thermal/thermoxidative degradation of organics, radiolysis, and photolysis (UV sensitive materials only) of organics;** **radiation-induced oxidation;** **moisture intrusion**	**XI.E2, "Insulation Material for Electrical Cables and Connections Not Subject to 10 CFR 50.49 Environmental Qualification Requirements Used in Instrumentation Circuits"**	No	Component name (added “insulation for”) changed for technical accuracy. Connections do not have a conductor, only insulation. Deleted “in the presence of oxygen” from the environment as it is not a major determinant. The previously-cited aging effects of “embrittlement, cracking, melting, discoloration, swelling, loss of dielectric strength leading to reduced insulation resistance, and electrical failure” were consolidated into the actual aging effect “reduced	N/A

Table II-13. Changes to Existing GALL Report Rev. 1 Chapter VI AMR Items for Electrical Systems and Their Technical Bases (cells where changes have been made are shown in bold)

Rev. 2 AMR Item No.	**Rev. 1 AMR Link**	**Structures and/or Components**	**Material**	**Environment**	**Aging Effect/ Mechanism**	**Aging Management Program**	**Further Evaluation Required**	**Technical Basis for Changes**	**Comment No.**
								insulation resistance" for better technical clarity. "Reduced insulation resistance" accurately defines the aging effect associated with cable and connection insulation materials used in instrumentation circuits. The previously cited electrical failure was removed because it is a loss of intended function potentially caused by an aging effect. It is not an aging effect and is not a term defined in GALL Table IX.E.	
VI.A.LP-35	VI.A-4(L-03)	**Conductor insulation for inaccessible**	Various organic polymers (e.g.,	**Adverse localized environment**	**Reduced insulation resistance due to moisture**	**XI.E3, "Inaccessible Power Cables**	No	The change from "Medium Voltage" to "Power"	N/A

Table II-13. Changes to Existing GALL Report Rev. 1 Chapter VI AMR Items for Electrical Systems and Their Technical Bases (cells where changes have been made are shown in bold)

Rev. 2 AMR Item No.	Rev. 1 AMR Link	Structures and/or Components	Material	Environment	Aging Effect/ Mechanism	Aging Management Program	Further Evaluation Required	Technical Basis for Changes	Comment No.
		power cables greater than or equal to 400 volts (e.g., installed in conduit or direct buried)	EPR, SR, EPDM, XLPE)	**caused by significant moisture**		**Not Subject to 10 CFR 50.49 Environmental Qualification Requirements"**		lowered the voltage range this AMP will be dealing with to ≥ 400 v from the traditional medium voltage range (>1 kv to 35 kv) and was made to include 480 volt ECCS motors at one plant based on a commitment with NEI. Summary Report: GL 2007-01 supports and justifies the change from medium voltage to “Power” and the voltage range to ≥400 volt. AE/M was changed to accurately define the aging effect associated with wetted power cables. “Reduced insulation resistance” is also	

Table II-13. Changes to Existing GALL Report Rev. 1 Chapter VI AMR Items for Electrical Systems and Their Technical Bases (cells where changes have been made are shown in bold)

Rev. 2 AMR Item No.	Rev. 1 AMR Link	Structures and/or Components	Material	Environment	Aging Effect/ Mechanism	Aging Management Program	Further Evaluation Required	Technical Basis for Changes	Comment No.
								the term defined in GALL Table IX.E. Electrical failure was removed because it is a loss of intended function potentially caused by an aging effect. It is not an aging effect and is not a term defined in GALL Table IX.E. "Water treeing" is a degradation and long-term failure phenomenon. The degradation mechanism for wetted power cables is moisture. Voltage stress was removed.	
VI.A.LP-36	VI.A-5(L-04)	Connector contacts for electrical connectors exposed to	Various metals used for electrical contacts	Air with borated water leakage	**Increased resistance of connection** **due to corrosion of connector contact surfaces caused by**	XI.M10, "Boric Acid Corrosion"	No	The AE/M was changed to accurately define the aging effect associated with	N/A

Table II-13. Changes to Existing GALL Report Rev. 1 Chapter VI AMR Items for Electrical Systems and Their Technical Bases (cells where changes have been made are shown in bold)

Rev. 2 AMR Item No.	Rev. 1 AMR Link	Structures and/or Components	Material	Environment	Aging Effect/ Mechanism	Aging Management Program	Further Evaluation Required	Technical Basis for Changes	Comment No.
		borated water leakage			**intrusion of borated water**			connector contacts exposed to borated water. The term “increased resistance of connection” more accurately describes the actual aging effect resulting from corrosion of connector contact surfaces due to intrusion of borated water. “Increased resistance of connection” is also the term defined in GALL Table IX.E.	
VI.A.LP-38	VI.A-16(LP-08)	**Transmission conductors**	Aluminum; steel	Air – outdoor	**Loss of conductor strength due to corrosion**	**A plant-specific aging management program is to be evaluated for Aluminum Conductor Steel Reinforced**	Yes, plant-specific	This AERM was split out to separately address the corrosion aging mechanism effects on aluminum conductor steel	N/A

Table II-13. Changes to Existing GALL Report Rev. 1 Chapter VI AMR Items for Electrical Systems and Their Technical Bases (cells where changes have been made are shown in bold)

Rev. 2 AMR Item No.	Rev. 1 AMR Link	Structures and/or Components	Material	Environment	Aging Effect/ Mechanism	Aging Management Program	Further Evaluation Required	Technical Basis for Changes	Comment No.
						(ACSR)		reinforced (ACSR) cable.	
VI.A.LP-39	VI.A-15(LP-09)	Switchyard bus and connections	Aluminum; copper; bronze; stainless steel; galvanized steel	Air – outdoor	**Loss of material due to wind-induced abrasion;** **Increased resistance of connection due to oxidation or loss of pre-load**	A plant-specific aging management program is to be evaluated	Yes, plant-specific	The previously listed fatigue will not cause a loss of material, so it was removed. The previously listed loss of conductor strength is not an aging effect for switchyard bus and connections. The previously listed corrosion aging mechanism is covered under the oxidation aging mechanism. The term increased resistance of connection more accurately describes the actual aging effect due to oxidation or loss of pre-load.	N/A

Table II-13. Changes to Existing GALL Report Rev. 1 Chapter VI AMR Items for Electrical Systems and Their Technical Bases (cells where changes have been made are shown in bold)

Rev. 2 AMR Item No.	Rev. 1 AMR Link	Structures and/or Components	Material	Environment	Aging Effect/ Mechanism	Aging Management Program	Further Evaluation Required	Technical Basis for Changes	Comment No.
								Increased resistance of connection resistance is also the term defined in GALL Table IX.E.	
VI.A.LP-41	VI.A-13(LP-06)	**Metal enclosed bus: external surface of enclosure assemblies**	**Galvanized steel; aluminum**	**Air – indoor, controlled or uncontrolled**	**None**	**None**	No	Galvanized steel and aluminum in this environment does not require aging management. This line is similar to existing line AP-13 for galvanized steel and EP-3 for aluminum.	N/A
VI.A.LP-42	VI.A-13(LP-06)	**Metal enclosed bus: external surface of enclosure assemblies**	**Galvanized steel; aluminum**	**Air – outdoor**	**Loss of material due to pitting and crevice corrosion**	**XI.E4, "Metal Enclosed Bus," or XI.S6, "Structures Monitoring"**	No	Galvanized steel and aluminum in this environment requires aging management; changed general corrosion to pitting and crevice corrosion; general corrosion for aluminum or galvanized steel	N/A

Table II-13. Changes to Existing GALL Report Rev. 1 Chapter VI AMR Items for Electrical Systems and Their Technical Bases (cells where changes have been made are shown in bold)

Rev. 2 AMR Item No.	Rev. 1 AMR Link	Structures and/or Components	Material	Environment	Aging Effect/ Mechanism	Aging Management Program	Further Evaluation Required	Technical Basis for Changes	Comment No.
								does not apply in this environment. XI.E4, "Metal Enclosed Bus" was added as an option since the AMP has been modified to address these aging effects.	
VI.A.LP-43	VI.A-13(LP-06)	**Metal enclosed bus: external surface of enclosure assemblies**	**Steel**	**Air – indoor, uncontrolled or Air – outdoor**	**Loss of material due to general, pitting, and crevice corrosion**	**XI.E4, "Metal Enclosed Bus," or XI.S6, "Structures Monitoring"**	No	Steel in this environment is susceptible to pitting and crevice corrosion in addition to general corrosion, which is consistent with other similar material/environment lines in the GALL Report. XI.E4, "Metal Enclosed Bus" was added as an option since the AMP has been modified to address these aging effects.	N/A

Table II-13. Changes to Existing GALL Report Rev. 1 Chapter VI AMR Items for Electrical Systems and Their Technical Bases (cells where changes have been made are shown in bold)

Rev. 2 AMR Item No.	Rev. 1 AMR Link	Structures and/or Components	Material	Environment	Aging Effect/ Mechanism	Aging Management Program	Further Evaluation Required	Technical Basis for Changes	Comment No.
VI.A.LP-44	VI.A-13(LP-06)	**Metal enclosed bus: external surface of enclosure assemblies**	**Steel**	**Air – indoor, controlled**	**None**	**None**	No	Steel was split up between "Air - indoor, controlled and "Air - indoor, uncontrolled;" now is consistent with mechanical AMRs	N/A
VI.A.LP-46	VI.A-16(LP-08)	**Transmission conductors**	**Aluminum**	Air – outdoor	**Loss of conductor strength due to corrosion**	**None - for Aluminum Conductor Aluminum Alloy Reinforced (ACAR)**	**None**	ACARs are not susceptible to the same aging mechanism as aluminum conductor steel reinforced (ACSR) cable based on an aluminum alloy core that is corrosion resistant.	N/A
VI.A.LP-47	VI.A-16(LP-08)	**Transmission conductors**	Aluminum; Steel	Air – outdoor	**Loss of material due to wind-induced abrasion**	**A plant-specific aging management program is to be evaluated for ACAR and ACSR**	Yes, plant-specific	The previously listed fatigue will not cause a loss of material and was removed.	NA
VI.A.LP-48	VI.A-16(LP-	**Transmission connectors**	Aluminum; steel	Air – outdoor	**Increased resistance of connection**	A plant-specific aging	Yes, plant-specific	The term "increased	NA

Table II-13. Changes to Existing GALL Report Rev. 1 Chapter VI AMR Items for Electrical Systems and Their Technical Bases (cells where changes have been made are shown in bold)

Rev. 2 AMR Item No.	Rev. 1 AMR Link	Structures and/or Components	Material	Environment	Aging Effect/ Mechanism	Aging Management Program	Further Evaluation Required	Technical Basis for Changes	Comment No.
	08)				**due to oxidation or loss of pre-load**	management program is to be evaluated		resistance of connection" more accurately describes the actual aging effect due to oxidation or loss of pre-load. "Increased resistance of connection resistance" is also the term defined in GALL Table IX.E.	

Table II-14. Chapter IX.B - Revision 2 Differences from Chapter IX, GALL Report, Rev. 1 and Their Technical Bases

Defined Term	Summary of Significant Changes	Technical Basis for Change	Comment No.
Existing programs	Added the following definition for “Existing programs” components: Per EPRI MRP-227 guidance on inspection and evaluation, PWR vessel internals (AMP XI.M16A) were assigned to one of the following four groups: Primary, Expansion, Existing Programs, and No Additional Measures. “Existing Programs” components are those PWR internals that are susceptible to the effects of at least one of the aging mechanisms addressed by MRP-227 and for which generic and plant-specific existing AMP elements are capable of managing those effects (See MRP-227, Section 3.3)	This term is consistent with the definition as stated in EPRI MRP-227, Revision 0, Section 3.3.1.	N/A
Expansion components	Added the following definition for “Expansion” components: Per EPRI MRP-227 guidance on inspection and evaluation, PWR vessel internals (AMP XI.M16A) were assigned to one of the following four groups: Primary, Expansion, Existing Programs, and No Additional Measures. “Expansion” components are those PWR internals that are highly or moderately susceptible to the effects of at least one of the aging mechanisms addressed by MRP-227, but for which functionality assessment has shown a degree of tolerance to those effects. (See MRP-227, Section 3.3)	This term is consistent with the definition as stated in EPRI MRP-227, Revision 0, Section 3.3.1.	N/A

Table II-14. Chapter IX.B - Revision 2 Differences from Chapter IX, GALL Report, Rev. 1 and Their Technical Bases

Defined Term	Summary of Significant Changes	Technical Basis for Change	Comment No.
No Additional Measures	A new definition was added for “No Additional Measures” components: Per EPRI MRP-227 guidance on inspection and evaluation, PWR vessel internals (AMP XI.M16A) were assigned to one of the following four groups: Primary, Expansion, Existing Programs, and No Additional Measures. Additional components were placed in the “No Additional Measures,” group as a result of the Failure Mode, Effects, and Criticality Analysis and the functionality assessment. “No Additional Measures” encompasses those PWR internals for which the effects of all aging mechanisms addressed by MRP-227 (Section 3.3) are below the screening criteria. Since no further action is required by MRP-227 guidelines for managing the aging of the “No Additional Measures” components, there are no corresponding AMR items.	This term is consistent with the definition as stated in EPRI MRP-227, Revision 0, Section 3.3.1.	N/A
Primary components	A new definition was added for “Primary” components: Per EPRI MRP-227 guidance on inspection and evaluation, PWR vessel internals (GALL AMP XI.M16A) were assigned to one of the following four groups: Primary, Expansion, Existing Programs, and No Additional Measures. Primary components are those PWR internals that are highly susceptible to the effects of at least one of the aging mechanisms addressed by MRP-227. The Primary group also includes components which have shown a degree of tolerance to a specific aging degradation effect, but for which no highly susceptible component exists or for which no highly susceptible component is accessible.	This term is consistent with the definition as stated in EPRI MRP-227, Revision 0, Section 3.3.1.	N/A

Table II-15. Chapter IX.C - Revision 2 Differences from Chapter IX, GALL Report, Rev. 1 and Their Technical Bases

Defined Term	Summary of Significant Changes	Technical Basis for Change	Comment No.
Boral, boron steel	The definition of "boral, boron steel" was amended to define boron steel as having "boron, with a content ranging from one to several percent	Although "boron steel" may, in general, include steel alloy with as little as 0.05 percent boron added, the boron steel typically used in spent fuel pools has boron content in the range of one to several percent.	N/A
Copper alloys	The term "Copper alloy <15% Zn" was revised to state "Copper alloy (≤15% Zn and ≤8% Al)"	Copper alloys could include zinc or aluminum as an alloy. Also, the definition includes aluminum.	N/A
Galvanized steel	The definition of "galvanized steel" had this sentence added to its definition: "In the presence of moisture, galvanized steel is classified under the category "Steel."	When moisture is present, galvanized steel could have an aging effect of loss of material, in which case it behaves like steel.	N/A
Gray cast iron	The definition of "gray cast iron" had this sentence added to its definition: "In the presence of moisture, gray cast iron is classified under the category "Steel."	In an environment where gray cast iron is susceptible to selective leaching, it is listed separately. Otherwise, gray cast iron is included in the definition of steel.	N/A
Low-alloy steel, yield strength > 150ksi	The definition of "low-alloy steel, yield strength > 150ksi" had this added to its definition: "Low-alloy steel bolting material, SA 193 Gr. B7, is a ferritic, low-alloy steel for high-temperature service. High-strength low-alloy (Fe-Cr-Ni-Mo) steel bolting materials have a maximum tensile strength of <1172 MPa (<170 ksi). They may be subject to SCC if the actual measured yield strength, S_y, ≥ 150 ksi (1034 MPa)."	This change provides clarification with regard to recommended values for maximum tensile strength and maximum actual measured yield strength and is consistent with the staff's NRC position stated on page 13 of NUREG-1339, "Resolution of Generic Safety Issue 29: Bolting Degradation or Failure in Nuclear Power Plants."	N/A
Polymers used in electrical applications	The following term was modified: "Polymers used in electrical applications" Its definition is: "Polymers used in electrical applications include EPR, SR, EPDM, and XLPE. XLPE is a cross-linked polyethylene thermoplastic resin, such as polyethylene and polyethylene copolymers. EPR and EPDM are ethylene-propylene rubbers in the category of thermosetting	The ""Polymers used in electrical applications" was simplified to provide clarification. Changed "…cross-linked polyethylene in the category of thermoplastic resins as polyethylene and polyethylene copolymers…" to "…cross-linked polyethylene thermoplastic resin, such as polyethylene and polyethylene copolymers…"	N/A

Table II-15. Chapter IX.C - Revision 2 Differences from Chapter IX, GALL Report, Rev. 1 and Their Technical Bases

Defined Term	Summary of Significant Changes	Technical Basis for Change	Comment No.
	elastomers."		
Porcelain	The following term was modified: "Porcelain" Its definition is: "Hard-quality porcelain is used as an insulator for supporting high-voltage electrical insulators. Porcelain is a hard, fine-grained ceramic that consists of kaolin, quartz, and feldspar fired at high temperatures."	The term “Porcelain” was simplified to provide clarification. Deleted the word “essentially,” which was between the words “that” and “consists of.	N/A
Superaustenitic stainless steel	The following term was added: "Superaustenitic stainless steel" Its definition states: "Superaustenitic stainless steels have the same structure as the common austenitic alloys, but they have enhanced levels of elements such as chromium, nickel, molybdenum, copper, and nitrogen, which give them superior strength and corrosion resistance. Compared to conventional austenitic stainless steels, Superaustenitic materials have a superior resistance to pitting and crevice corrosion in environments containing halides. Several NPPs have installed superaustenitic stainless steel (AL-6XN) buried piping."	Super austenitic stainless steel was added to the XI.M41, "Buried and Underground Piping and Tanks," and a definition was added to identify this material.	N/A
Titanium	The following term was added: "Titanium" Its definition states: "The category titanium includes unalloyed titanium (ASTM grades 1-4) and various related alloys (ASTM grades 5, 7. 9, and 12). The corrosion resistance of titanium is a result of the formation of a continuous, stable, highly adherent protective oxide layer on the metal surface. Titanium and titanium alloys may be susceptible to crevice corrosion in saltwater environments at elevated temperatures (>160°F). Titanium Grades 5 and 12 are resistant to crevice corrosion in seawater at temperatures as high as 500 ^{o}F. SCC	Titanium was added to the XI.M41, "Buried and Underground Piping and Tanks," and a definition was added to identify this material.	N/A

Table II-15. Chapter IX.C - Revision 2 Differences from Chapter IX, GALL Report, Rev. 1 and Their Technical Bases

Defined Term	Summary of Significant Changes	Technical Basis for Change	Comment No.
	of titanium and its alloys is considered applicable in sea water or brackish raw water systems if the titanium alloy contains more than 5% aluminum or more than 0.20% oxygen or any amount of tin. ASTM Grades 1, 2, 7, 11, or 12 are not susceptible to SCC in seawater or brackish raw water."		
Wood	The following term was added: "Wood" Its definition states: "Wood piles or sheeting exposed to flowing or standing water is subject to loss of material or changes in material properties due to weathering, chemical degradation, insect infestation, repeated wetting and drying, or fungal decay."	Several LRAs have included "wood" as a material of construction for in-scope structures. This change provides a definition for the material.	N/A

Table II-16. Chapter IX.D - Revision 2 Differences from Chapter IX, GALL Report, Rev. 1 and Their Technical Bases

Defined Term	Summary of Significant Changes	Technical Basis for Change	Comment No.
Adverse localized environment	"Adverse localized environment" definition was modified to include: "An adverse localized environment is an environment limited to the immediate vicinity of a component that is hostile to the component material, thereby leading to potential aging effects." The definition also was modified to read: "As represented by a specific GALL AMR line item, an adverse localized environment can be due to any of the following: (1) exposure to significant moisture (LP-35) (2) heat, radiation, or moisture (LP-33 or LP-34), or (3) heat, radiation, moisture, or voltage (L-05)."	Provides appropriate words to define adverse localized environment and the most limiting parameter in its boundary envelope. The envelope of the adverse environment for the component material is determined and bounded by that component material's most limiting parameter's specification (heat, radiation or moisture).	N/A
Buried and underground	Added this definition consistent with the resolution of the scope of the buried components AMP.	There was no previous definition for buried and underground. Made definition consistent with the resolution of the scope of the buried components AMP.	955
Degradation of insulator quality	This term was deleted.	The term "reduced insulation resistance" more accurately defines the aging effect associated with high-voltage insulators. "Reduced insulation resistance" is also defined in GALL Table IX.E, thereby allowing "degradation of insulator quality" to be deleted.	N/A
Raw water	Raw water consists of untreated surface or ground water, whether fresh, brackish, or saline in nature. This includes water for use in open-cycle cooling water systems and may include potable water, water that is used for drinking or other personal use. See also "condensation."	Revised the definition of raw water to include only water used in open-cycle cooling water systems.	507
Treated water	The definition of "treated water" was expanded to include demineralized water, whose chemistry has been altered and is maintained in a state which is the base water for all clean systems.	The previous definition of treated water was expanded to include both reactor water and other water, such as closed cycle cooling water, that may require additional processing to maintain	NA

Table II-16. Chapter IX.D - Revision 2 Differences from Chapter IX, GALL Report, Rev. 1 and Their Technical Bases

Defined Term	Summary of Significant Changes	Technical Basis for Change	Comment No.
	Treated water generally falls into one of two categories. (1) The first category is based on demineralized water. This water is generally characterized by high purity, low conductivity, and very low oxygen content. This category of treated water is generally used as BWR coolant and PWR primary and secondary water. PWR primary water also contains boron, a recognized corrosion inhibitor. (2) The second category may require additional processing. This category of treated water is generally used in HVAC systems, auxiliary boilers and diesel engine cooling systems. Closed-cycle cooling water is a subset of this category of treated water	appropriate water chemistry.	
Waste water	Radioactive, potentially radioactive, or non-radioactive waters that are collected from equipment and floor drains. Waste waters may contain contaminants, including oil and boric acid, depending on location, as well as originally treated water that is not monitored by a chemistry program.	Create a new definition for waste water that includes radioactive, potentially radioactive, or non-radioactive waters that are collected from equipment and floor drains. (This was included in raw water definition in the GALL Report, Rev. 1)	507

Table II-17. Chapter IX.E - Revision 2 Differences from Chapter IX, GALL Report, Rev. 1 and Their Technical Bases

Defined Term	Summary of Significant Changes	Technical Basis for Change	Comment No.
Increased resistance of connection	The definition of "Increased resistance of connection" has been deleted and replaced with: "Increased resistance of connection in electrical transmission conductors due to the loosening of bolted bus duct connections can be caused by thermal cycling and ohmic heating. A connection can exhibit increased resistance due to chemical contamination, corrosion, and oxidation or fatigue caused by ohmic heating, thermal cycling, electrical transients, frequent manipulation, or vibration.	The changes are consistent with the following GALL Chapter VI AMR Line Items “Aging Effects” and Mechanisms: The term “increased resistance of connection” more accurately describes the actual aging effect resulting from: • thermal cycling and ohmic heating; the aging effects apply to both controlled and uncontrolled (LP-25) • chemical contamination, corrosion, and oxidation. Chemical contamination, corrosion, and oxidation do not cause fatigue. Ohmic heating, thermal cycling, electrical transients, frequent manipulation, or vibration are aging mechanisms that may cause fatigue (LP-23) • frequent manipulation or vibration if the metallic clamps of the fuseholders are located in an air-indoor controlled or uncontrolled environment (LP-31) or • association with connector contacts exposed to borated water (LP-36)	N/A
Loosening of bolted connections	This term was deleted.	The term "increased connection resistance" more accurately describes the actual aging effect resulting from a loosening of cable connections. "Increased resistance of connection" is also defined in GALL Table IX.E, thereby allowing “loosening of bolted connections” to be deleted.	N/A
Reduced insulation resistance	The changes are consistent with the following GALL Chapter VI AMR Items "Aging Effects" and Mechanisms. The term "Reduction of insulation resistance" has been added, with the following definitions:	The changes are consistent with the following GALL Chapter VI AMR Line Items "Aging Effects" and Mechanisms. The term "Reduction of insulation resistance" has been added. Reduced insulation resistance may be due to:	N/A

Table II-17. Chapter IX.E - Revision 2 Differences from Chapter IX, GALL Report, Rev. 1 and Their Technical Bases

Defined Term	Summary of Significant Changes	Technical Basis for Change	Comment No.
	- Reduced insulation resistance due to the presence of salt deposits or surface contamination (LP-28). This aging mechanism (presence of salt deposits or surface contamination) may be due to temporary, transient environmental conditions; the net result may be long-lasting and cumulative. • Reduced insulation resistance also may be due to thermal/thermoxidative degradation of organics, radiolysis and photolysis (UV sensitive materials only) of organics; radiation-induced oxidation, and moisture intrusion (LP-33 and LP-34). The term "embrittlement, cracking, melting, discoloration, swelling, or loss of dielectric strength leading to reduced insulation resistance; electrical failure" should be consolidated into the actual aging effect reduced insulation resistance for better technical clarity. Reduced insulation resistance accurately defines the aging effect associated with cable and connection insulation materials. Electrical failure is a loss of intended function potentially caused by an aging effect. It is not an aging effect and is not a term defined in GALL Table IX.E. • Reduced insulation resistance may also be due to thermal/thermoxidative degradation of organics/thermoplastics, radiation-induced oxidation, moisture/debris intrusion, and ohmic heating (LP-26). The term embrittlement, cracking, melting, discoloration, swelling, or loss of dielectric	- the presence of salt deposits or surface contamination (LP-28). This aging mechanism (presence of salt deposits or surface contamination) may be due to temporary, transient environmental conditions, the net result may be long-lasting and cumulative. • thermal/thermoxidative degradation of organics, radiolysis and photolysis (UV sensitive materials only) of organics; radiation-induced oxidation, and moisture intrusion (LP-33 and LP-34). The term "embrittlement, cracking, melting, discoloration, swelling, or loss of dielectric strength leading to reduced insulation resistance; electrical failure" should be consolidated into the actual aging effect reduced insulation resistance for better technical clarity. Reduced insulation resistance accurately defines the aging effect associated with cable and connection insulation materials. Electrical failure is a loss of intended function potentially caused by an aging effect. It is not an aging effect and is not a term defined in GALL Table IX.E. • thermal/thermoxidative degradation of organics/thermoplastics, radiation-induced oxidation, moisture/debris intrusion, and ohmic heating (LP-26). The terms embrittlement, cracking, melting, discoloration, swelling, or loss of dielectric strength leading to reduced insulation resistance; electrical failure should be consolidated into the actual aging effect reduced insulation resistance for better technical clarity. Reduced insulation resistance accurately defines the aging effect associated with MEB insulation and insulators. • moisture (LP-35). To accurately define the aging effect associated with wetted power cables	

Table II-17. Chapter IX.E - Revision 2 Differences from Chapter IX, GALL Report, Rev. 1 and Their Technical Bases

Defined Term	Summary of Significant Changes	Technical Basis for Change	Comment No.
	strength leading to reduced insulation resistance; electrical failure should be consolidated into the actual aging effect reduced insulation resistance for better technical clarity. Reduced insulation resistance accurately defines the aging effect associated with MEB insulation and insulators. • Reduced insulation resistance may be due to moisture (LP-35). To accurately define the aging effect associated with wetted power cables associated with power cables greater than or equal to 400 volts in accordance with GL 2007 Summary Report - Dated November 12, 2008.	associated with power cables greater than or equal to 400 volts in accordance with GL 2007 Summary Report - Dated November 12, 2008.	

Table II-18. Chapter IX.F - Revision 2 Differences from Chapter IX, GALL Report, Rev. 1 and Their Technical Bases

Defined Term	Summary of Significant Changes	Technical Basis for Change	Location in Document and Comment No.
Aggressive chemical attack	The definition of "Aggressive chemical attack" has been clarified to refer to "concrete"	Aggressive chemical attack was added to the GALL Report as an age related degradation that could occur for concrete structures, and a definition for aggressive chemical attack was added specifically for concrete.	N/A
Chemical contamination	The definition of "Chemical contamination" has been replaced with: "Presence of chemicals that do not occur under normal conditions at concentrations that could result in the degradation of the component."	The previous definition addressed the effect of chemical contamination. This change provides a more appropriate definition of "chemical contamination."	N/A
Elevated Temperature	The definition of "Elevated temperature" has been clarified to state: "Elevated temperature is referenced as an aging mechanism only in the context of LWR containments (GALL Chapter II)."	If light water reactor containments are exposed to elevated temperatures for extended periods of time, the concrete containment can undergo age related degradation, and the definition of elevated temperature had to be specified.	N/A
Low-temperature crack propagation	The term "Low-temperature crack propagation" has been added and defined as: "Low-temperature crack propagation (LTCP) is IGSCC at low temperatures (~130-170^{o} F)."	Low-temperature crack propagation was added to the GALL Report for intergranular stress corrosion cracking (IGSCC) at temperatures lower than previously was thought to initiate IGSCC.	N/A
Outer diameter stress corrosion cracking (ODSCC)	The definition of "Outer diameter stress corrosion cracking (ODSCC)" has been modified to state: "ODSCC is SCC initiating in the outer diameter (secondary side) surface of steam generator tubes. The secondary side is part of the secondary system consisting of the shell side of the steam generator, high and low pressure turbines, moisture/separator reheaters, main electrical stages and interconnecting piping. This differs from PWSCC, which describes	This change provides clarification by drawing a more detailed distinction between the secondary side of the steam generator, where ODSCC occurs, and the primary side of the steam generator where PWSCC occurs.	N/A

Table II-18. Chapter IX.F - Revision 2 Differences from Chapter IX, GALL Report, Rev. 1 and Their Technical Bases

Defined Term	Summary of Significant Changes	Technical Basis for Change	Location in Document and Comment No.
	inner diameter (SG primary side) initiated cracking. The primary loop basically consists of the reactor vessel, reactor coolant pumps, pressurizer steam generator tubes, and interconnecting piping."		
Stress corrosion cracking (SCC)	The definition of " SCC" has been replaced by "SCC is the cracking of a metal produced by the combined action of corrosion and tensile stress (applied or residual), especially at elevated temperature. SCC is highly chemically specific in that certain alloys are likely to undergo SCC only when exposed to a small number of chemical environments. For PWR internal components, in Chapters IV.B2, IV.B3 and IV.B4, SCC includes IGSCC, TGSCC, PWSCC, and low temperature crack propagation as aging mechanisms."	The change provides a more detailed explanation of SCC and the relationship of corrosion, tensile stress and chemical environment. In addition, it provides clarification of SCC with regard to PWR internal components that is consistent with the usage in MRP-227, Rev. 0.	N/A
Thermal fatigue	The definition of "Thermal fatigue" has been modified to include: "Fatigue is the progressive and localized structural damage that occurs when a material is subjected to cyclic loading. The maximum stress values are less than the ultimate tensile stress limit, and may be below the yield stress limit of the material. Higher temperatures generally decrease fatigue strength."	The change provides a better definition based on compilation of ASTM Standard Definitions, 5th Edition, 1982.	N/A
Transgranular stress corrosion cracking	The term "Transgranular stress corrosion cracking" has been added. The definition states: "Transgranular stress corrosion cracking (TGSCC) is SCC in which cracking occurs across the grains"	For IV.B2, B3, and B4, per MRP-227, SCC includes the TGSCC.	N/A
Water trees	Deleted the word “continuous” from the	Change was made to include all inaccessible	N/A

Table II-18. Chapter IX.F - Revision 2 Differences from Chapter IX, GALL Report, Rev. 1 and Their Technical Bases

Defined Term	Summary of Significant Changes	Technical Basis for Change	Location in Document and Comment No.
	definition to be consistent with the changes implemented in AMP XI.E3 deemphasizing voltage stress	or underground cables down to and including 400 volts within the scope of LR subject to significant moisture. Deemphasized water trees and revised to primarily consider water intrusion (significant moisture).	

Table II-19. Chapter IX.G - Revision 2 Differences from Chapter IX, GALL Report, Rev. 1 and Their Technical Bases

Defined Term	Summary of Significant Changes	Technical Basis for Change	Location in Document and Comment No.
References	The following references have been added to GALL Report, Chapter IX.G: EPRI-1016596, EPRI Materials Reliability Program: Pressurized Water Reactor Internals Inspection and Evaluation Guidelines (MRP-227-Rev. 0)," Electric Power Research Institute, Palo Alto, CA: 12/22/2008. Gillen and Clough, Rad. Phys. Chem. Vol. 18, p. 679, 1981.	These references were added because they are source documents that had not previously been used in developing information presented in Chapter IX of the GALL Report.	N/A

Table II-20. Revision 2 Differences from Chapter X, Time-Limited Aging Analyses, GALL Report, Rev. 1 and Their Technical Bases

Location of Change	Summary of Significant Changes	Technical Basis for Change	Comment No.
X.M1 Fatigue Monitoring			
Program Description Scope of Program Preventive Actions Detection of Aging Effects	Changed the program title from "Metal Fatigue of Reactor Coolant Pressure Boundary" to "Fatigue Monitoring." Accordingly modified the scope to state that this program includes those components that have been identified to have a fatigue TLAA. Program description was revised to clarify how to calculate environmentally-adjusted Cumulative Usage Factor, and which NUREG provides the environment correction factors for carbon or low-alloy steel, stainless steel, and nickel-alloys. Added in Program Description a statement that the program also verifies that the severity of the monitored transients are bounded by the design transient definition for which they are classified. Deleted last paragraph of program description that addresses that this program is an acceptable option under 10 CFR 54.21(c)(1)(iii). Added in Scope of Program a statement that the scope includes those components that have been identified to have a fatigue TLAA. Added in Preventive Actions a statement that tracking of design basis transients are considered preventive activities. Revised Detection of Aging Effects to indicate when updates of the fatigue usage calculations need to be performed.	Scope includes more than reactor coolant system. Therefore, elements are revised accordingly to remove reactor coolant pressure boundary. Cumulative fatigue damage exists for far more than the reactor coolant pressure boundary components as stated in the AMP. Containment, supports, steam generator secondary sides, reactor internals, ESF, Auxiliary, and steam and power (S&P) systems all have cumulative fatigue damage entries in the GALL AMR tables. Provides clear guidance for which NUREG to use for calculating Fen for different materials. Provides additional clarity on transients. The GALL Report would not contain a detailed description of a program that was not acceptable. Provides guidance on what is included in scope. Provides clear basis how the tracking of the cycles would be used to ensure the validity of the CUF fatigue analysis.	133 134 135 136 137 138 139 395
X.S1 Concrete Containment Tendon Prestress			
No notable technical changes were made to this TLAA			
X.E1 Environmental Qualification (EQ) of Electric Components			

Table II-20. Revision 2 Differences from Chapter X, Time-Limited Aging Analyses, GALL Report, Rev. 1 and Their Technical Bases

Location of Change	Summary of Significant Changes	Technical Basis for Change	Comment No.
Program Description	Revised to clarify that the 60-year EQ reanalysis is performed prior to entering the period of extended operation and include 10 CFR 50.49(i) criteria on how the qualification records are maintained for audit purposes and verified accordingly.	Not a technical issue. This clarification, editorial in nature, does not require a technical basis.	N/A

Table II-21. Revision 2 Differences from Chapter XI, Mechanical Aging Management Programs, GALL Report, Rev. 1 and Their Technical Bases

Location of Change	Summary of Significant Changes	Technical Basis for Change	Comment No.
XI.M1 ASME Section XI Inservice Inspection, Subsections IWB, IWC, and IWD			
General Preventive Actions Detection of Aging Effects	Revised to include implementing the generic changes described in Section II.5.1. The Preventive Actions program element was revised to state that this program is a monitoring program that does not implement preventive actions. The Detection of Aging Effects program element was revised to refer to ASME Code Section XI examination categories and to delete the detailed information that is also contained in the code; and the paragraph related to NDE techniques for BWRs was revised to eliminate reference to some of the BWRVIPs.	The changes, in general, were not changes in technical content. Revisions in the Preventive Actions program element deleted the previous statement about operation within technical specification limits, which was not directly related to aging management. The change in Detection of Aging Effects eliminated possible future conflicts if changes in the code are approved in accordance with 10 CFR 50.55a; however, the deleted information is still provided in the referenced ASME Code Section XI examination category specifications. The paragraph related to BWRVIPs was changed to eliminate reference to documents that are more appropriately referenced in other AMPs.	NA
XI.M2 Water Chemistry			
Program Description Scope of Program Preventive Actions Parameters Monitored/ Inspected Detection of Aging Effects Monitoring and Trending Acceptance Criteria	Revised to include implementing the generic changes described in Section II.5.1. The Program Description was revised to reference the latest revisions of EPRI reactor water chemistry guidelines approved by the staff for license renewal application; in addition, the previous provision related to use of later revisions of the guidelines was deleted. Scope of Program was revised to more explicitly describe the components within scope of the program. Preventive Actions was revised to provide additional details with regard to impurities and additives. Parameters Monitored/Inspected, Monitoring and Trending, and Acceptance Criteria were revised to eliminate details that are contained in the referenced water chemistry guidelines.	The EPRI water chemistry guidelines referenced in this AMP are the latest revisions that have been reviewed by the staff and approved for use during the period of extended operation. In addition, the staff determined that the previous provision related to use of later revisions of EPRI guidelines did not provide sufficient assurance that appropriate staff review would be obtained prior to implementation of later guideline revisions. However, a new preface has been provided in the GALL Report, Chapter XI, to provide more detailed guidance on the use of later revisions/editions of various industry documents referenced therein.	897 920 921 922 944 1037

Table II-21. Revision 2 Differences from Chapter XI, Mechanical Aging Management Programs, GALL Report, Rev. 1 and Their Technical Bases

Location of Change	Summary of Significant Changes	Technical Basis for Change	Comment No.
XI.M3 Reactor Head Closure Stud Bolting			
Detection of Aging Effects	Deleted the surface and volumetric examination of studs when removed and clarified the ASME Code Section XI, Table IWB-2500-1 providing inspection requirements.	The staff has aligned the program element with ASME Code provisions that are considered sufficient for aging management purposes.	
XI.M4 BWR Vessel ID Attachment Welds			
Scope of Program Parameters Monitored/ Inspected Acceptance Criteria	AMP was clarified as an augmented inservice inspection program and identified the component to which this program focusing on specific components. Deleted the sentence that states that the applicant may use the guidelines of BWRVIP-62 for hydrogen water chemistry, provided a relief request has been submitted and is approved by NRC staff. Revised to state that acceptance criteria are given in BWRVIP-48-A and ASME Code, Section XI.	Provides the structures/components that are within the scope of the program. Reliefs are on a case-by-case basis. While a licensee has the right to request inspection relief under 10 CFR 50.55a(a)(3) for use of hydrogen water chemistry, such a relief would only be approved for the 10-year interval during which it was requested. Identifies the codes/standard used for acceptance criteria.	149 375 376
XI.M5 BWR Feedwater Nozzle			
Program Description Corrective Actions	Explicitly identifies NUREG-0619, "BWR Feedwater Nozzle and CRD Return Line Nozzle Cracking." Added statement that modifications were completed during the initial license period. Removed reference to IWB-4000 and IWB-7000 and replaced with IWA-4000.	NUREG-0619 is added because it addresses the results of analysis of BWR reactor vessel nozzle cracking caused by cycling of water temperature in systems connected to the vessel. It includes stresses caused by thermal stratification, thermal oscillations, and thermal striping. These modifications were committed to by the licensees in their response to NUREG-0619. Subsections IWB-4000 and IWB-7000 do not exist in ASME Section XI 2004 edition, as they were incorporated into Subsection IWA-4000 in a previous edition of the code.	N/A
XI.M6 BWR Control Rod Drive Return Line Nozzle			

Table II-21. Revision 2 Differences from Chapter XI, Mechanical Aging Management Programs, GALL Report, Rev. 1 and Their Technical Bases

Location of Change	Summary of Significant Changes	Technical Basis for Change	Comment No.
General Program Description Scope of Work Parameters Monitored/ Inspected	Revised to implement generic changes described in Section II.5.1. Added the regulatory framework related to NUREG-0619. Deleted from program description part (b) that the program includes system modifications and maintenance programs to mitigate cracking. Revised to include the different configurations of control rod drive return line (CRDRL) nozzles Revised to establish a link between parameters monitored and management of aging effects.	See Section II.5.1 for technical basis. Adds a discussion on how the NRC's concerns in Generic Technical Activity A-10 and recommendations in NUREG-0619 relate to the program elements for this AMP. The basis in the GALL Report Revision 1 was clarified. These are system modifications that were completed. They do not need to be part of license renewal. NUREG-0619 was issued as the NRC's final basis for establishing what needed to be done to resolve the generic cracking issue for BWR feedwater nozzles and CRDRL nozzles in NRC Generic Technical Activity A-10. The actions to resolve Generic Technical Activity A-10 were dependent on three things: (1) BWR Model type, (2) BWR vessel size, and (3) whether or not a BWR licensee could demonstrate adequate core re-coverage using CRDRL flow only. Thus, the system modification recommendations under NUREG-0619 were not mandatory for all BWRs, and thus were not the same for every BWR in the U.S. fleet of BWRs. The AMP monitors for linear dye penetration indications that may indicate a surface-breaking crack and UT indications that may indicate the presence of a planar flaw (crack).	N/A
XI.M7 BWR Stress Corrosion Cracking			
General Monitoring and Trending, Acceptance Criteria Corrective Actions	Revised to implement generic changes described in Section II.5.1. Deleted reference to Subsections IWB-4000 and IWB-7000, IWC-4000 and IWC-7000 or IWD-4000 and IWD-7000, and ASME Code Case N-504-1.	See Section II.5.1 for technical basis. Subsections IWB-4000, IWB-7000, IWC-4000, IWC-7000, IWD-4000, and IWD-7000 do not exist in ASME Section XI 2004 edition, as they were incorporated into Subsection IWA-4000 in a	154 378 379

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Location of Change	Summary of Significant Changes	Technical Basis for Change	Comment No.
	Replaced with IWA-4000.	previous edition of the code.	
XI.M8 BWR Penetrations			
General Scope of Program Parameters Monitored/ Inspected Detection of Aging Effects Corrective Actions	Revised to implement generic changes described in Section II.5.1. Revised to include incore-monitoring housings and CRD stub tubes within the scope of this program. Deleted the sentence that states that the applicant may use the guidelines of BWRVIP-62 for hydrogen water chemistry provided a relief request has been submitted and is approved by the NRC staff. Removed reference to Categories B-D, B-F, and B-J. Revised to state that these examination categories include volumetric examination methods (UT or radiography testing), surface examination methods (liquid penetrant testing or magnetic particle testing for ferritic components), and VT-2 visual examination methods. Clarified that repairs in accordance with ASME Code are acceptable.	See Section II.5.1 for technical basis. BWRVIP-47-A addresses these components. Reliefs are on a case-by-case basis. While a licensee has the right to request inspection relief under 10 CFR 50.55a(a)(3) for use of hydrogen water chemistry, such a relief would only be approved for the 10-year interval during which it was requested. The BWRVIP reports and ASME Code Section XI, as referenced in the GALL Report, provide detailed information for the examination categories; therefore, the examination categories do not need to be reiterated. Inspection methods are summarized. Provides the option that repairs performed in accordance with ASME Code are also acceptable.	380 381 383
XI.M9 BWR Vessel Internals			

Table II-21. Revision 2 Differences from Chapter XI, Mechanical Aging Management Programs, GALL Report, Rev. 1 and Their Technical Bases

Location of Change	Summary of Significant Changes	Technical Basis for Change	Comment No.
General Program Description Scope of Program Parameters Monitored/ Inspected Detection of Aging Effects Monitoring and Trending Corrective Actions Operating Experience	Revised to implement generic changes described in Section II.5.1. Revised to include the recommendations of GALL AMP XI.M13, “Thermal Aging and Neutron Irradiation Embrittlement of Cast Austenitic Stainless Steel,” within the scope of this program. All elements were accordingly revised to address these recommendations, with the following changes from XI.M13, Rev.1. Element 3 is revised to state that the program does not directly monitor loss of fracture toughness, but the impact is indirectly monitored by visual or volumetric techniques to detect cracking. Element 4 is revised to recommend that initial inspection be performed within 5 years of entering the period of extended operation, and, if cracking is detected, then frequency of reinspection is to be justified. Element 5 is revised to provide a fracture toughness value to differentiate between susceptible and non-susceptible CASS materials. Added PH martensitic stainless steel, martensitic stainless steel, and X-750 material in the scope of this AMP. Elements 3, 4, 5, and 6 are revised to provide recommendations for these materials. Clarified the SA-351 grades for low molybdenum and high molybdenum stainless steels. Added aging effects of cracking due to fatigue and loss of material due to wear. Deleted BWRVIPs-07, -63 from core shroud applicability. Added BWRVIP-139 for steam dryer components. Added BWRVIP-74-A for RPV Internals.	See Section II.5.1 for technical basis. BWRVIPs address thermal aging and neutron irradiation embrittlement of CASS. Therefore, XI.M13 is deleted and necessary information is added into XI.M9. Acknowledges that loss of fracture toughness cannot be directly measured, but can be indirectly managed by visual or volumetric examination to monitor for cracking. Inspection and/or reinspection frequency was not addressed in XI.M13, Revision 1. Extensive research data indicate that for non-susceptible CASS materials, the saturated lower-bound fracture toughness is greater than 255 kJ/m^2 (NUREG/CR-4513, Rev. 1). IGSCC was identified in Alloy X-750 material in the upper support location of the tie rod repair. Presence of any high stress region that exceeds the threshold limits for IGSCC can cause IGSCC in the tie rod repair hardware. Also, BWRVIP-189 and MRP-228 are the technical bases for expanding scope for thermal embrittlement of X750 and PH steels. Do not require molybdenum (Mo) verification. Cracking due to fatigue is added to make the AMP consistent with the AMR line IV.B1.RP-155. Added new line for loss of material due to wear because it is a valid aging effect for jet pump wedge surfaces, which are in scope of AMP XI.M9. BWRVIP-07 and BWRVIP-63 have been superseded by BWRVIP-76-A. BWRVIP-139 has been approved for steam dryers.	157 384 387 393 395 396 397 398 399 401 402 403 778 1019

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Location of Change	Summary of Significant Changes	Technical Basis for Change	Comment No.
	Added BWRVIP-183 for top guide in addition to BWRVIP-26-A. Deleted the alternative statement relative to inspection guidelines for top guide locations that are projected to exceed the threshold for IASCC after entering the period of extended operation. Added reinspection criteria. Added a sentence to state that aging management strategies for repairs are provided by the repair designer, not the BWRVIP. Deleted sentence regarding hydrogen water chemistry and relief requests. Added a sentence to state that BWRVIP program requirements provide for inspection of BWR reactor internals to manage loss of material and cracking using appropriate examination techniques, such as visual examinations (e.g., enhanced visual test (EVT) -1, visual test (VT)-1) and volumetric examinations (e.g., UT). Added frequencies and sample sizes for CASS and other components' detection of aging effects. Added a statement to identify a fracture toughness value to distinguish between susceptible and non-susceptible components. Add BRVIP-80-A and BWRVIP-99-A to the list of BWRVIPs that provide guidance for crack growth. Added trending information and acceptance criteria for PH-martensitic steels, martensitic stainless steels, and X-750 alloys to be on a case-by-case basis. Added specific corrective action for top guide if cracking is observed. Added BWRVIP-06R1-A and BWRVIP-25 for the	This is the parent document for BWR internals. Added here for completeness. Provides guidance for top guide beam inspection. Most BWRs exceed this threshold in the 4th or 5th fuel cycle; therefore, alternative statement does not apply. Provides guidance for reinspection after the initial 12-year period after entering period of extended operation. Added clarification to indicate that BWRVIP does not provide aging management strategies for repairs. Reliefs are on a case-by-case basis. While a licensee has the right to request inspection relief under 10 CFR 50.55a(a)(3) for use of hydrogen water chemistry, such a relief would only be approved for the 10-year interval for which it was requested . Provides inspection guidance for internal components. Provides appropriate frequencies to ensure that aging is detected prior to loss of intended functions. Extensive research data indicate that for non-susceptible CASS materials, the saturated lower-bound fracture toughness is greater than 255 kJ/m^2 (NUREG/CR-4513, Rev. 1). BWRVIP-80-A provides CGR curves for shroud vertical welds. BWRVIP-99-A provides CGR curves for irradiated stainless steels. Include recommendations for the added materials. Frequencies and sampling size are established based on no cracking being observed. If cracking is observed, increased sampling and more frequent	

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Location of Change	Summary of Significant Changes	Technical Basis for Change	Comment No.
	core plate assembly. Clarified that cracking of dry tubes relates to incore monitoring dry tubes. Added operating experience related to vertical core shroud welds and core spray pipe.	inspections are performed. BWRVIP-06R1-A and BWRVIP-25 address the safety significance and inspection requirements for the core plate assembly. Only inspection of core plate bolts (for plants without retaining wedges) or inspection of the retaining wedges is required. To distinguish from CRD dry tubes. BWRVIP-18 addresses core spray pipe cracking.	
XI.M10 Boric Acid Corrosion (BAC)			
General Program Description Scope of Program Detection of Aging Effects Corrective Actions	The AMP was revised to implement generic changes described in Section II.5.1. Clarifies that the effects of BAC on RCPB materials near nickel-alloy components are managed by the AMP XI.M11B. Added copper alloy >15% Zn. Added recommendations for detection of leakage for components with external insulation surfaces and joints under insulation or not visible for direct visual examination. Clarify that 10 CFR 50 Appendix B and guidance in GL88-05 are necessary for corrective action.	See Section II.5.1 for basis. Staff decision to include the effects of BAC on RCPB susceptible materials near nickel-alloy components in the new XI.M11B program. Copper alloy > 15% zinc is susceptible to BAC. There are line items in the GALL Report that recommend XI.M10 to manage these aging effects. If insulation cannot be removed because of inaccessibility, the revised words include provisions to inspect, detect, or monitor boric acid leakage in inaccessible locations. To clarify that 10 CFR Part 50, Appendix B requirements for performing corrective actions is acceptable, however, applicant needs to consider guidance of NRC GL 88-05 as established here.	N/A
XI.M11B Cracking of Nickel-Alloy Components and Loss of Material Due to Boric Acid-Induced Corrosion in Reactor Coolant Pressure			

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Location of Change	Summary of Significant Changes	Technical Basis for Change	Comment No.
Boundary Components (PWRs only)			
General	This is a general revision that replaces both XI.M11, “Nickel Alloy Nozzles and Penetrations,” and XI.M11A, “Nickel-Alloy Penetration Nozzles Welded to the Upper Reactor Vessel Closure Heads of Pressurized Water Reactors,” in Revision 1 of the GALL Report. In the GALL Report, Revision 1, XI.M11 stated that except for the guidance provided in XI.M11A, guidance for aging management of other nickel-alloy nozzles is provided in the AMR items of Chapter IV, as appropriate. Removed discussion of the water chemistry guidelines and just referred to the GALL water chemistry program in Program Description. Wording was revised to clarify that PWSCC applies to nickel-alloy components and BAC applies to steel components. PWSCC causes cracking in nickel-alloy components, but is not a degradation mechanism applicable to steel components. BAC applies primarily to steel components. This revised AMP, XI.M11B, combines lessons learned from and key strengths of the GALL Report, Revision 1, XI.M11, XI.M11A and also NRC communications and requirements related to examination of nickel-alloy RCPB components. In addition, it includes provisions for examination of steel surfaces near dissimilar metal welds for potential effects of reactor coolant leakage and BAC.	This program replaces AMPs XI.M11, “Nickel-Alloy Nozzles and Penetrations” and XI.M11A, “Nickel-Alloy Penetration Nozzles Welded to the Upper Reactor Vessel Closure Heads of Pressurized Water Reactors.” It addresses the issue of cracking of nickel-alloy components and loss of material due to BAC in susceptible, safety-related components near nickel-alloy reactor coolant pressure boundary components. A final rule (September 2008) in updating 10 CFR 50.55a requires the following ASME Boiler and Pressure Vessel (B&PV) Code Cases: (a) N-722, “Additional Examinations for PWR Pressure-Retaining Welds in Class 1 Components Fabricated with Alloy 600/82/182 Materials, Section XI, Division 1,” to establish long-term inspection requirements for the PWR vessel, steam generator, pressurizer components, and piping if they contain the PWSCC susceptible materials designated alloys 600/82/182 and (b) N-729-1, “Alternative Examination Requirements for PWR Reactor Vessel Upper Heads With Nozzles Having Pressure-Retaining Partial-Penetration Welds, Section XI, Division 1” to establish new requirements for the long-term inspection of reactor pressure vessel upper heads. In addition, dissimilar metal welds need additional examinations to provide reasonable assurance of structural integrity. The NRC issued RIS 2008-25, “Regulatory Approach for Primary Water Stress Corrosion Cracking (PWSCC) of Dissimilar Metal Butt Welds in Pressurized Water Reactor Primary Coolant System Piping” (October 2008), which stated the regulatory approach for addressing	158 160

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Location of Change	Summary of Significant Changes	Technical Basis for Change	Comment No.
		PWSCC of dissimilar metal butt welds. The RIS documents the NRC's approach for ensuring the integrity of primary coolant system piping containing dissimilar metal butt welds in PWRs, and, in conjunction with the mandated inspections of ASME Code Case N-722, ensures that augmented ISI of all nickel-based alloy components and welds in the RCS continue to perform their intended functions. As stated in this RIS, the NRC has found that MRP-139, "Primary System Piping Butt Weld Inspection and Evaluation Guideline" (2005), and MRP interim guidance letters provide adequate protection of public health and safety for addressing PWSCC in dissimilar metal butt welds pending the incorporation of ASME Code Case N-770 containing comprehensive inspection requirements into 10 CFR 50.55a. It is the intention of the NRC to replace MRP-139 by incorporating the requirements of ASME Code Case N-770 into 10 CFR 50.55a.	
XI.M12 Thermal Aging Embrittlement of Cast Austenitic Stainless Steel (CASS)			
General Program Description Scope of Program Detection of Aging Effects	Revised to implement generic changes described in Section II.5.1. Clarified that aging management for BWR and PWR CASS internals is covered in XI.M9 and XI.M16A, respectively. Clarified to distinguish between low molybdenum and high-molybdenum cast stainless steels. States that AMP applies only to Class 1 piping components. Provides additional guidance for flaw tolerance evaluation and clarifies that current UT methodology cannot detect and size cracks;	See Section II.5.1 for basis. Clarifies that this program does not address BWR and PWR internals and identifies where these components are addressed. Clarified to ensure preventive actions should be the same as other condition monitoring programs. Clarified to distinguish between low molybdenum and high-molybdenum cast stainless steels. Identifies the components in scope of the program Gives a more complete guide for performing component-specific flaw tolerance evaluation.	162 163 164

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Location of Change	Summary of Significant Changes	Technical Basis for Change	Comment No.
	therefore, EVT-1 is used until qualified UT methodology for CASS can be established. Also identifies that description of EVT-1 is found in BWRVIP-03 and MRP-228. Added a paragraph about detection of reduction in fracture toughness.	These documents define EVT-1 for BWR and PWR respectively. Use of EVT-1 provides a means of detecting and sizing cracks. Acknowledges that loss of fracture toughness cannot be directly measured, but can be indirectly managed by visual or volumetric examination to monitor for cracking. Inspection and/or reinspection frequency was not addressed in XI.M13, Revision 1. Extensive research data indicate that for non-susceptible CASS materials, the saturated lower-bound fracture toughness is greater than 255 kJ/m^2 (NUREG/CR-4513, Rev. 1).	
XI.M16A PWR Vessel Internals			
This is a new AMP	This is an entirely new AMP to replace Section XI.M16 of the GALL Report, Revision 1, which stated, “Guidance for the aging management of PWR Vessel Internals is provided in the AMR line items of [GALL Report] Chapter IV, as appropriate.” The AMR line items for PWR Vessel Internals in the GALL Report, Revision 1, Chapter IV, in general, stated that no further aging management review was necessary if an applicant provided a commitment in the FSAR supplement to (1) participate in the industry programs for investigating and managing aging effects on reactor internals, (2) evaluate and implement the results on the industry programs as applicable to the reactor internals, and (3) upon completion of these programs, but not less than 24 months before entering the period of extended operation, submit an inspection plan for reactor internals to the NRC for review and approval.	The new AMP is based on the staff’s current review of EPRI 1016596, “Materials Reliability Program: Pressurized Water Reactor Internals Inspection and Evaluation Guidelines (MRP-227-Rev. 0).” This program is used to manage the effects of age-related degradation mechanisms that are applicable in general to the PWR RVI components at the facility. These aging effects include (a) various forms of cracking, including SCC, which also encompasses PWSCC, IASCC, or cracking due to fatigue/cyclical loading; (b) loss of material induced by wear; (c) loss of fracture toughness due to either thermal aging or neutron irradiation embrittlement; (d) changes in dimension due to void swelling; and (e) loss of preload due to thermal and irradiation-enhanced stress relaxation or creep. The program applies the guidance in MRP-227 for inspecting, evaluating, and, if applicable, dispositioning non-conforming RVI components at	N/A

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Location of Change	Summary of Significant Changes	Technical Basis for Change	Comment No.
		the facility. The program conforms to the definition of a sampling-based condition monitoring program, as defined by the Branch Technical Position RSLB-1, with periodic examinations and other inspections of highly affected internals locations.	
XI.M17 Flow-Accelerated Corrosion			
General Detection of Aging Effects Monitoring and Trending Corrective Actions	The AMP was revised to implement generic changes described in Section II.5.1. Added frequency and sampling information. Changed "ultrasonic and radiography" to "ultrasonic or radiography." Added that when measurements show the predictions to be non-conservative, the model must be recalibrated using the latest field data. Clarifies that wear rates need to be evaluated with respect to power uprate effects. Added a statement that when susceptible components are replaced with resistant materials, such as high Cr material, the downstream components should be monitored closely to mitigate any increased wear.	See Section II.5.1 for basis. Recommended that sampling is based on most susceptible locations and the frequency is in accordance with Nuclear Safety Analysis Center (NSAC) 202L requirements. There is no technical basis for requiring that radiographic testing is included in the program in addition to ultrasonic testing. This change allows the use of either technique. Most, if not all applicants, use ultrasonic testing. It is recognized that CHECWORKS is not always conservative in predicting component thickness. The bounding and conservatism aspects are both subject to (a) input (parameters) assumptions being matched (or not being exceeded) in the service conditions and (b) uncertainty resulting from these conditions, as well as from the model. Ensures that power uprate results are evaluated as operating conditions could change and therefore impact wear rates. Addresses "partial" replacements with high-Cr parts in an otherwise susceptible carbon steel line.	169 526 527
XI.M18 Bolting Integrity			
General	The AMP revision includes implementing the generic changes described in Section II.5.1. The	The change to remove structural and component support bolting from this AMP is consistent with the	171 173

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Location of Change	Summary of Significant Changes	Technical Basis for Change	Comment No.
	scope of the AMP was changed to address only closure bolting for pressure-retaining components. Management of aging effects for component support and structural bolting was changed to other appropriate AMPs. The Program Description was revised to list all other AMPs that provide aging management for structural or component support bolting. Scope of Program was revised consistent with the revised scope of the AMP. Preventive Actions was revised to include specific recommendations with regard to material yield strength and use of molybdenum disulfide. Parameters Monitored/Inspected was revised to include recommendations for monitoring high strength closure bolting. Detection of Aging Effects was revised to delete recommendations related only to structural bolting and to eliminate details of examinations specifications that are included in referenced documents. Monitoring and Trending, Acceptance Criteria, and Corrective Actions were revised to eliminate recommendations related only to structural or containment support bolting.	staff's experience reviewing license renewal applications since issuance of Revision 1 of the GALL Report. The staff has found that for management of structural and component support bolting, many applicants credit alternative programs (e.g., AMPs XI.S1, "ASME Section XI, Subsection IWE"; XI.S3, "ASME Section XI, Subsection IWF"; XI.S6, "Structures Monitoring"; XI.S7, "RG 1.127, "Inspection of Water-Control Structures Associated with Nuclear Power Plants"; and XI.M23, "Inspection of Overhead Heavy Load and Light Load (Related to Refueling) Handling Systems," and the staff has typically found use of these alternative program acceptable. The change to remove structural and component support bolting from this AMP aligns the AMP more closely with typical industry practice and provides recommendations for aging management of structural and component support bolting in other AMPs that typically are credited for aging management of these components. Using bolting material with maximum yield strength less than 1,034 MPa (150 ksi) and prohibiting lubricants containing molybdenum disulfide both decrease the likelihood of SCC in the bolting material. Monitoring of high-strength closure bolting, if used, is recommended because such bolting is more susceptible to cracking due to SCC.	
XI.M19 Steam Generators			
General	The title of the AMP was changed, and the AMP was substantially rewritten, with changes in the Program Description, all of the Program Elements, and the References.	In Revision 1 of the GALL Report, AMP XI.M19, "Steam Generator Tube Integrity" program was based on NEI 97-06, Revision 1, "Steam Generator Program Guidelines." Since the issuance of Revision 1 of the GALL Report, NEI 97-06 has	1039

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Location of Change	Summary of Significant Changes	Technical Basis for Change	Comment No.
		been substantially revised and updated. NEI 97-06, Revision 2, has been accepted by the staff as providing adequate guidance for aging management of steam generator components within its scope during the period of extended operation. This AMP references a number of industry guidelines (e.g., the EPRI PWR Steam Generator Examination Guidelines, PWR Primary-to-Secondary Leak Guidelines, PWR Primary Water Chemistry Guidelines, PWR Secondary Water Chemistry Guidelines, Steam Generator Integrity Assessment Guidelines, Steam Generator In Situ Pressure Test Guidelines) and incorporates a balance of prevention, mitigation, inspection, evaluation, repair, and leakage monitoring measures. NEI 97-06 (a) includes performance criteria that are intended to provide assurance that tube integrity is being maintained consistent with the plant's licensing basis and (b) provides guidance for monitoring and maintaining the tubes to provide assurance that the performance criteria are met at all times between scheduled inspections of the tubes. Steam generator tube integrity can be affected by degradation of steam generator plugs, sleeves, and secondary side internals. Therefore, all these components are addressed by this AMP. The NEI 97-06 program has been effective at managing the aging effects associated with steam generator tubes, plugs, sleeves, and secondary side internals.	
XI.M20 Open-Cycle Cooling Water System (OCCW)			
General	AMP XI.M20 was revised to address aging affects of asbestos cement, reinforced concrete piping, piping components and piping elements in raw	Adding new materials to AMP better matches the materials used in existing OCCW systems that have previously been approved by the staff. GL 89-	505

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Location of Change	Summary of Significant Changes	Technical Basis for Change	Comment No.
	water managed by M20. Revised to implement generic changes described in Section II.5.1. Materials commonly used in Open-Cycle Cooling Water Systems are added (i.e., stainless steel, aluminum, copper alloy, polymeric linings, and concrete). Adds operating experience with MIC. New AMR Items are added for titanium exposed to raw water causing reduction in heat transfer due to fouling; and reinforced concrete or asbestos cement exposed to raw water, causing cracking, settling, and emphasis placed on loss of material relating to recent occurrences of MIC.	13 and associated applicant's docketed response are the foundation for managing the aging effects in OCCW systems; however, some aspects of 89-13 are operational and not related to aging management. Several plants have experienced problems associated with MIC.	
XI.M21A Closed Treated Water Systems			
General	Revised to implement generic changes described in Section II.5.1. This AMP is expanded from Closed Cycle Cooling Water Systems (as defined in GL 89-13) and includes HVAC, auxiliary boilers, etc. Avoids misapplication of this AMP to non-GL 89-13 systems. Recognizes that water chemistry standards are application-specific. Uses changed definition of "treated water" from Chapter IX. Adds AMR Items for copper alloy exposed to closed-cycle cooling water, causing loss of material due to general, pitting, crevice, and galvanic corrosion.	A number of treated water systems did not have a GALL AMP, and applicants took an exception to XI.M21 to include these systems. The staff accepted these exceptions. This AMP applies only to non-GL 89-13 systems. This AMP manages aging for all treated water sources, and different sources have different water chemistry standards. A new definition for "treated water" was developed in Chapter IX and was revised for this AMP. The addition of copper alloy reflects materials used in closed treated water systems, which have been approved by the staff in past applications.	N/A
XI.M22 Boraflex Monitoring			
General	Revised to implement generic changes described in Section II.5.1.	There was no change in the technical intention of the recommendations.	N/A
X***I.M23 Inspection of Overhead Heavy Load and Light Load (Related to Refueling) Handling Systems***			
General	Updated AMP to endorse industry standard ASME	The industry standard has been used by applicants	N/A

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Location of Change	Summary of Significant Changes	Technical Basis for Change	Comment No.
Scope of Program Detection of Aging Effects	B30.2 - 2005, “Overhead and Gantry Cranes (Top Running Bridge, Multiple Girder),” for inspection of overhead cranes and light load handling systems used for refueling. Includes managing loss of preload of bolted connections consistent with XI.M18. Clarified to recommend inspection frequency in accordance with ASME B30.2 or other appropriate standards in ASME B30 series.	in their applications and been accepted by staff in various SERs. The bolting is now included in individual AMPs and, therefore, is now in scope of this AMP. Provided inspection frequency guidance from the accepted ASME standard. These frequencies were acceptable to staff in previous SERs.	
XI.M24 Compressed Air Monitoring			
General	Revised to implement generic changes described in Section II.5.1. In Element 3, erosion is not an aging effect in GALL for air systems such that there is no need for inspection. Refocuses AMP content on license renewal considerations by deleting operational program testing that is not relevant to age-related degradation and focusing on environments that are relevant for age-related degradation. Program focuses on aging management issues, not operational issues associated with the current licensing term. Emphasizes that the commitments to GL 88-14 are not changed by this AMP and that this AMP uses only those aspects of GL 88-14 that affect aging, primarily the loss of material due to corrosion. Corrosion is a result of moisture in the system. Operational issues, such as pressure decay leak testing, emergency procedures and training, were deleted from the AMP. These changes were made in Program Description and in Elements 1-5. Revised Elements 3, 4, 5, and 6 to provide specific	See Section II.5.1 for basis. Ensures that this AMP only focuses on the aging management aspects of the systems, not the operational activities. The pressure decay leak testing is mainly intended to indicate performance degradation of active components. Visual examinations and control of moisture in the system, including pressure dew point monitoring, provide reasonable assurance of adequate aging management. Provides specific recommendations and identifies the use of ANSI/ISA 7.0.01-96 and ASME O/M-S/G, Part 17 as standards. The comment that recommends removing the reference to “erosion” is acceptable because operating experience indicates corrosion is the major mechanism that causes the aging effect of loss of material in the compressed air system.	179 180 181

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Location of Change	Summary of Significant Changes	Technical Basis for Change	Comment No.
	recommendations for parameters monitored, frequency and sampling recommendations for analysis and inspection, and trending recommendations for dew point measurements, and acceptance criteria for air quality moisture limits are established based on accepted industry standards.		
XI.M25 BWR Reactor Water Cleanup System			
Program Description Parameters Monitored/ Inspected Detection of Aging Effects	Included implementing the generic changes described in Section II.5.1. Program Description was revised to augment the regulatory background information. Parameters Monitored/Inspected and Detection of Aging Effects were updated to acknowledge that all licensees have completed implementation of GL 89-10 actions. References were updated.	The AMP wording revisions did not change the technical intent of previous recommendations. Additional regulatory background information was provided, and parts of the AMP were reworded to acknowledge that all affected licensees have completed the implementation actions described in GL 89-10.	NA
XI.M26 Fire Protection			
General Scope of Program Parameters Monitored/ Inspected Detection of Aging Effects	Revised to implement generic changes described in Section II.5.1. Deleted diesel-driven fire pump performance test and inspection of the fuel oil supply line from the scope of the program and from all other elements Added other fire barrier material, such as flamastic, 3M fire wrapping, spray-on fire proofing material, intumescent coating, etc. Added that the AMP manages the aging effects of loss of material and cracking, increased hardness, shrinkage and loss of strength. Changed visual inspection of “approximately” 10% of each type of seal to “not less than” 10%. Changed frequency of Halon/carbon dioxide testing	See Section II.5.1 for basis. Diesel-driven fire pump fuel oil supply line is managed by the Fuel Oil Analysis and the One-Time Inspection Programs. Staff has accepted this in numerous license renewal SERs. Applicants have used these materials as fire barrier materials. Scope of program did not identify what aging effects were managed by the program. Use of the word “approximately” was very vague. The intent of the GALL frequency is to ensure that 100% of the fire barrier penetration seals are inspected over the 20-year period of extended operation. Industry standards do not define inspection samples for fire barrier penetration seal	182 360

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Location of Change	Summary of Significant Changes	Technical Basis for Change	Comment No.
	and inspection to state 6 months or on a schedule in accordance with an NRC-approved fire protection program.	inspections. The 10% sample was selected so that over the 20-year period, essentially all penetration seals will be inspected. Halon and CO2 systems are highly reliable, and current testing practices (in either the Fire Protection Plan or plant Technical Specifications) have proven to be adequate for the current license term. The frequencies for inspections specified in NUREG-1801 for Halon and CO2 system testing are much shorter than often practiced. More frequent testing will not increase reliability of these systems. Most applicants use the current licensing basis frequency of refueling outage (18 or 24 months) for performance testing. However, the inspection frequencies are 6 to 12 months with review of operating experience as a consideration for higher intervals.	
XI.M27 Fire Water System			
Scope of Program Acceptance Criteria	Clarified that hoses and gaskets can be excluded from scope based on prescribed replacement. Clarified that minimum wall thickness should be maintained.	If hoses and gaskets are replaced based on prescribed frequency, then these components are considered short-lived and therefore do not need to managed. Provides criteria for acceptance of wall thickness measurement.	N/A
XI.M29 Aboveground Metallic Tanks			
Title Change Preventive Actions Detection of Aging Effects Corrective Actions	Revised to implement generic changes described in Section II.5.1. Title is changed from “Above Ground Steel Tanks” to “Above Ground Metallic Tanks.” The recommendation for coatings is removed because it is a design issue. Specified UT for thickness measurements.	Tanks are constructed from other materials than steel, such as aluminum and stainless steel, and the AMP is also applicable to them. The use of coatings is a design issue. Added details that conform to guidance provided in A.1.2.3 for this element.	N/A

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Location of Change	Summary of Significant Changes	Technical Basis for Change	Comment No.
	Revised to state that flaws in the caulking or sealant are repaired.	Added details that conform to guidance provided in A.1.2.3 for this element.	
XI.M30 Fuel Oil Chemistry			
General	Revised to include implementing the generic changes described in Section II.5.1. The Program Description was revised to provide an updated list of ASTM standards. Scope of Program was revised to delete the listing of ASTM standards and to clarify the description of components in scope of the program. Preventive Actions was revised to provide clarification of the recommended preventive actions included in this program. Parameters Monitored/Inspected and Detection of Aging Effects were revised to provide recommendations that focus more clearly on aging management, rather than on general operational practices and added the aging mechanisms of crevice corrosion and fouling that leads to corrosion. In addition, Detection of Aging Effects was revised to include an explicit recommendation with regard to frequency of diesel fuel oil storage tanks' cleaning and inspection. AMP now clarifies the need for a volumetric inspection. Monitoring and Trending, and Acceptance Criteria were revised to remove overly prescriptive and superfluous information.	Information related to ASME standards was previously listed in several program elements and was consolidated in the Program Descriptions and the Acceptance Criteria program element. The explicit recommendation regarding frequency for cleaning and inspection of diesel fuel oil storage tanks is based on RG 1.137, "Fuel Oil Systems for Standby Diesel Generators," Revision 1, Regulatory Position C.2.f. ASTM D0975-04 was added into the Acceptance Criteria and other standards were deleted because the added standard provides more appropriate guidance with regard to maintaining acceptable fuel oil quality during the period of extended operation. Different designs should be reviewed on a case-by-case basis to ensure they are either equivalent or more conservative to multi-level sampling. For tank designs that do not allow for multi-level sampling, the staff has determined that a representative sample taken from the bottom of the tank provides an acceptable alternative to multi-level sampling. Precedents for accepting tank bottom samples as an alternative to multi-level sampling are documented in Oyster Creek and Three Mile Island, Unit 1, license renewal SERs. A volumetric inspection should be performed to further assess the condition if the visual inspection provided indications of degradation, or, if a visual inspection is not physically possible.	186 187 188
XI.M31 Reactor Vessel Surveillance			

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Location of Change	Summary of Significant Changes	Technical Basis for Change	Comment No.
General	The AMP was substantially rewritten, with changes in the Program Description and in all elements of the program. Clarified that the intention of Element 5b is to be consistent with Regulatory Position 2 in NRC RG 1.99, Revision 2. Reworded first paragraph to correct the citation to ASTM with the current title by replacing "American Society for Testing and Materials (ASTM) E 185 Standard" with "ASTM International Standard Practice E 185-82" and to enable an automatic update to the GALL to include the new provisions going into Appendix H within the next year or two. Reworded Element 3 to ensure the program uses neutron dosimeters to benchmark the neutron fluence calculations. Low melting point elements or eutectic alloys may be used as a check on peak specimen irradiation temperature. Monitoring and Trending was revised to say, "When two or more credible surveillance data sets are available, the extent of reactor vessel neutron embrittlement for the period of operation may be projected according to Regulatory Position 2 in NRC RG 1.99, Rev. 2, based on best fit of the surveillance data." Element 5 changed to make it consistent with requirements of 10 CFR 50.61 and 10 CFR 50.61a, and with RG 1.99. Element 10, Operating Experience. In Element 10, "neutron spectrum" has been changed to "neutron fluence" because fluence is tied directly to vessel integrity through TLAAs and can be more unambiguously monitored and managed than	The Code of Federal Regulations (CFR), 10 CFR Part 50, Appendix H, requires that peak neutron fluence at the end of the design life of the vessel will not exceed 10^{17} n/cm^2 (E >1MeV), or that reactor vessel beltline materials will be monitored by a surveillance program to meet the ASTM E 185 Standard. The objective of the reactor vessel material surveillance program is to provide sufficient material data and dosimetry to (a) monitor irradiation embrittlement at the end of the period of extended operation and (b) determine the need for operating restrictions on the inlet temperature, neutron spectrum, and neutron flux. The program is a condition-monitoring program that measures the increase in Charpy V-notch 30 foot-pound (ft-lb) transition temperature and the drop in the upper shelf energy as a function of neutron fluence and irradiation temperature. The data from this surveillance program are used to monitor neutron irradiation embrittlement, and are used in the TLAAs that are described in Section 4.2 of the SRP-LR. Changes to the AMP were made consistent with the objective of implementing the requirements in 10 CFR 50, Appendix H, during the period of extended operation. Monitoring and Trending was revised to make wording is consistent with what is used in Regulatory Position 2 in NRC RG 1.99, Revision 2.	189 492 495 496 498

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Location of Change	Summary of Significant Changes	Technical Basis for Change	Comment No.
	"neutron spectrum." Updated the dates associated with the references.		
XI.M32 One-Time Inspection			
General Elements 1, 3, 4, 5, 6, 7, 10	Revised to include implementing the generic changes described in Section II.5.1. The Program Description was substantially revised to (a) more clearly identify the conditions in which use of a one-time inspection is appropriate, (b) explicitly list the mitigation AMPs in the GALL Report where a one-time inspection is credited to confirm effectiveness of the mitigation actions, and (c) more clearly identify conditions where a one-time inspection is not appropriate and a periodic inspection is recommended. Scope of Program was revised to more clearly describe components that are within scope of the AMP. Parameters Monitored/Inspected, and the associated table of examples, were revised to add surface condition as a parameter to be monitored when the aging effect is loss of condition or cracking. Detection of Aging Effects was revised to add specificity with regard to representative sample sizes and to provide clarification with regard to qualifications for inspectors and examination techniques. Monitoring and Trending was revised to state that for a one-time inspection program, monitoring and trending are not applicable. Acceptance Criteria was revised to provide examples of appropriate source documentation.	The staff's experience reviewing and evaluating license renewal applications over the past several years had identified a need to more clearly describe the conditions in which a one-time inspection program is adequate to provide confirmation that aging effects are not occurring or are occurring at a sufficiently slow rate during the period of extended operation; the changes in the Program Description provide this clarification. The tabulated examples in Parameters Monitored/Inspected added surface condition to the list of parameters monitored because surface condition provides a reliable leading indicator for potential loss of material or surface cracking. The changes in Detection of Aging Effects eliminate uncertainty with regard to adequate sample sizes and provide clearer guidance with regard to adequate inspector qualifications and examination techniques for non-ASME components.	190

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Location of Change	Summary of Significant Changes	Technical Basis for Change	Comment No.
	Corrective Actions was revised to state that such actions may include implementation of periodic inspections under a different program. Operating Experience was revised to state that an applicant's experience with detection of aging effects evaluated by this AMP should be included in the applicant's operating experience review.		
XI.M33 Selective Leaching of Materials			
Scope of Program Detection of Aging Effects Acceptance Criteria	Revised to implement generic changes described in Section II.5.1, Scope of Program, more clearly identifies the materials susceptible materials and adds additional environments that could cause selective leaching (water-contaminated fuel oil and water-contaminated lubricating oil). Detection of Aging Effects is revised to include other mechanical examination techniques, such as destructive testing, chipping, or scraping. Detection of Aging Effects establishes a sample size of 20 percent of the population, with a maximum sample size of 25 or other technically justified methodology and sample size. Acceptance Criteria specifies that no visible evidence of selective leaching or no more than a 20 percent decrease in hardness and no noticeable change in color for copper alloys containing more than 15 percent zinc. AMR items are added for steel exposed to soil or concrete, causing loss of material due to general, pitting, and crevice corrosion (Condensate System and Auxiliary Feedwater System).	Bronze is subject to selective leaching in hot brine and steam. The GALL does not include any AMR entries for copper alloys in steam. Aluminum bronze is subject to selective leaching in hydrofluoric acid and acid chlorides. Neither of these environments is expected at a nuclear power plant. Several applicants have identified these as applicable environments. They should be added to avoid unnecessary exceptions to be declared. Hardness testing is not always feasible or meaningful. Other mechanical testing methods, including destructive testing, provide a means of detecting selective leaching. It is difficult to get random samples of piping to use normal sampling techniques. Use of 20% with a maximum of 25 is a practical compromise to have meaningful sample size for small populations. Criteria are to demonstrate that selective leaching is not present. Hardness criterion and copper color criterion are commonly used.	NA
XI.M35 One-time Inspection of ASME Code Class 1 Small Bore-Piping			
Program Description	Revised to include implementing the generic	Changes in the Program Description are based on	191

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Location of Change	Summary of Significant Changes	Technical Basis for Change	Comment No.
Scope of Program Detection of Aging Effects Monitoring and Trending	changes described in Section II.5.1. The Program Description was revised to state that the recommendations apply for both full penetration welds and socket welds; in addition, discussion of opportunistic inspections and sampling were included. The Program Description also was revised to describe the conditions under which this one-time inspection program may be used and conditions under which a periodic program would be more appropriate. Monitoring and Trending was revised to update EPRI report references. Detection of Aging Effects and Monitoring and Trending were revised to state that cyclic loading (including thermal, mechanical, and vibration fatigue) are included in the aging effects managed by this program. Detection of Aging Effects was revised to provide additional recommendations related to examination of socket welds and use of a sampling basis for examination.	the staff's review of industry operating experience related to cracking in small bore piping and the staff's review of license renewal applications during the past several years. These reviews indicated that a recommendation for inspection of socket welds needed to be explicitly included in this program and that conditions under which periodic inspection should be used needed to be more clearly described. The updated references in Scope of Program are more recent guidelines that the staff has found appropriate for identifying the locations of potentially susceptible piping. Addition of vibration fatigue to the examples of cyclic loading is based on the staff's determination that cracking due to vibration fatigue is an aging effect that is within the scope of this AMP. Additional information describes the conditions under which the staff has found use of a sampling basis for opportunistic, destructive examinations of removed welds to be acceptable.	192 193 194
XI.M36 External Surfaces Monitoring of Mechanical Components			
Scope of Program Acceptance Criteria	The AMP was revised to implement generic changes described in Section II.5.1. An incorrect aging effect was given for polymeric materials. The acceptance criteria for polymers were too restrictive and were made less restrictive. Scope of Program is expanded to include external surfaces of all metallic and polymeric materials instead of just steel. Scope of Program is expanded to include additional aging effects, including loss of material (metallic materials), cracking (metallic and polymeric	AMP XI.M36 was revised to address aging affects of asbestos cement, reinforced concrete piping, piping components and piping elements in soil managed by M36. The correct aging effects needed to be entered. The acceptance criteria for polymeric materials are too restrictive, and the NEI suggestion is accepted. Adding new materials to AMP better matches the materials used in existing buried and underground systems that have previously been approved by the staff. AMP was revised to include other metals such as stainless steel; polymeric	197 971 972 430

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Location of Change	Summary of Significant Changes	Technical Basis for Change	Comment No.
	materials), and change in material properties (polymeric materials). Addresses manual manipulation of polymeric materials. Includes acceptance criteria for non-metallic material. Better defines acceptance criteria for metallic materials. .	material, such as PVC and HDPE; and elastomer materials. Staff has accepted in previous SERs, such as SSES, TMI, Beaver Valley etc., that this AMP can be credited for metallic, polymers and elastomer components using visual inspection and manipulation where necessary to manage the aging effects of loss of material, cracking, and change in material properties.	
XI.M37 Flux Thimble Tube Inspection			
General	Revised to implement generic changes described in Section II.5.1.	There was no change in the technical intention of the recommendations.	NA
XI.M38 Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components			
Program Description Scope of Program Parameters Monitored/Inspected Detection of Aging Effects Acceptance Criteria	Revised to implement generic changes described in Section II.5.1. The reference to repetitive failures was revised to make the meaning clear. Program description was revised to state that XI.M38 is applicable to any water system other than open-cycle cooling water system (XI.M20), closed treated water system (XI.M21A), and fire water system (XI.M27). Scope of Program expands to include polymeric materials (rigid and elastomers) and additional metallic materials (old scope was steel only). Parameters Monitored/Inspected is revised to add examples of inspection parameters for metallic and polymeric components. Acceptance Criteria is revised to provide inspection methods and acceptance criteria for each type of material.	The reference to repetitive failures was revised to make the meaning clear. The staff modified the AMP content to more clearly describe situations where the AMP is appropriate and when a plant-specific program is warranted. The paragraph was rewritten to address the comment and aligns with wording used in AMP M35 for similar situations. Several applicants proposed an exception to this AMP to include polymeric materials, and the staff approved these exceptions. The original AMP was only for steel, and since additional metallic and polymeric components were added to this AMP, inspection parameters for these additional components were added to the Parameters Monitored/Inspected program element. The original AMP was only for steel and because additional metallic and polymeric materials were added to the AMP, acceptance criteria are provided for each type of material.	198 434

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Location of Change	Summary of Significant Changes	Technical Basis for Change	Comment No.
XI.M39 Lubricating Oil Analysis			
General	Revised to include implementing the generic changes described in Section II.5.1. The Program Description has been revised to include a discussion of how program effectiveness is verified. Scope of Program has been revised to more clearly identify components within the scope and aging effects managed by the program; a statement has been added stating that non-water based hydraulic fluids are within scope of the program. Parameters Monitored/Inspected has been revised to state that the program performs a check for moisture and particle count to detect evidence of moisture contamination and corrosion. Detection of Aging Effects has been revised to focus more clearly on detections of moisture or corrosion products and to recommend sampling following oil changes or periodic sampling. Acceptance Criteria has been revised to state that water or particle concentrations should not exceed manufacturer recommendations or industry standards and that phase-separated water in any amount is not acceptable. Corrective Actions has been revised to delete the previous recommendation related to vibration analysis. References have been revised to include ASTM D 6224-02, *Standard Practice for InService Monitoring of Lubricating Oil for Auxiliary Power Plant Equipment.*	The staff noted that, as presented in Revision 1 of the GALL Report, this AMP included a number of recommendations for a robust Lubricating Oil Analysis program that were not, in fact, related to managing aging effects of metal components exposed to a lubricating oil environment. In a lubricating oil environment that does not experience water intrusion or contamination, metal components are not expected to experience aging effects during the period of extended operation. The changes in Program Description, Scope of Program and Parameters Monitored/Inspected are made to refocus the AMP on monitoring for and preventing water intrusion or contamination of the lubricating oil. In addition, the staff has found that the same activities related to aging management of lubricating oil are also applicable for non-water based hydraulic fluid, so this environment was added to the scope of the AMP. Corrective Actions was revised to delete recommendation for vibration analysis, which is a parameter related to operational issues but not typically related to aging management. The staff has reviewed the ASTM standard added to the references and has found it applicable for this program.	898
XI.M40 Monitoring of Neutron-Absorbing Materials Other than Boraflex			
This is a new AMP.	This is a new AMP that provides for monitoring to ensure that for neutron absorbing material (other than Boraflex) used in spent fuel pools, any age-related degradation of the material is detected and	This AMP implements the AMP described in Interim Staff Guidance LR-ISG-2009-01, *Aging Management of Spent Fuel Pool Neutron-Absorbing Materials Other Than Boraflex*, 2010.	201 202

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Location of Change	Summary of Significant Changes	Technical Basis for Change	Comment No.
	corrective actions are taken before results of spent fuel pool criticality analysis can be compromised.		
XI.M41 Buried and Underground Piping and Tanks			
N/A	AMP XI.M41 is new. Comments on the Public Comment Draft and several subsequent drafts were received from the public on several occasions. Piping and tanks exposed to soil are now managed by AMP XI.M41 In summary, NRC combined AMPs XI.M28, Buried Piping and Tank Surveillance, and XI.M34, Buried Piping and Tanks inspection, into a new AMP XI.M41, Buried and Underground Piping and Tanks. The new AMP incorporates aspects of both prior programs. Adds additional features. Considers Industry Initiative Actions for buried and underground (in a tunnel or vault), environments. Materials that are considered include all metallics, polymers, and cementitious materials. Preventive actions and inspection intervals are defined, depending on the environment and type of materials.	The technical basis for combining XI.M28, "Buried Piping and Tanks Surveillance," and XI.M34, Buried Piping and Tanks Inspection," to produce XI.M41, "Buried and Underground Piping and Tanks," is to make the program more in line with the Industry Initiative for buried piping and tanks and to rely more heavily on industry standards such as the NACE International standards.	106 491 111 113 115 117 120 121 122 410 411 877 430 889 929 437 932 933 934 475 939 941 478 966 967 969 1154 1054 487 1057 488 1059

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Location of Change	Summary of Significant Changes	Technical Basis for Change	Comment No.
			489 1064 490 1070 505 1071 508 1078 509 1157 1193 1194 1196 1197 1198 1199 1228 1210 1222

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Location of Change	Summary of Significant Changes	Technical Basis for Change	Comment No.
XI.S1 ASME Section XI, Subsection IWE			
General Program Description Scope of Program Parameters Monitored/ Inspected Detection of Aging Effects Monitoring and Trending Acceptance Criteria Corrective Actions References	Revised to implement generic changes described in Section II.5.2. The program attributes are augmented to incorporate aging management activities needed to address the potential loss of material due to corrosion in the inaccessible areas of the boiling water reactor (BWR) Mark I steel containment. The program attributes are augmented to include surface examination to detect cracking in stainless steel (SS) penetration sleeves and dissimilar metal welds. If surface examination is not possible, appropriate 10 CFR50 Appendix J test may be conducted for pressure boundary components. Identified that Subsection IWE requires examination of coatings that are intended to prevent corrosion and recommends AMP XI.S8 to ensure Emergency Core Cooling System (ECCS) operability. Deleted containment seals and gaskets. Deleted the table showing the ASME Code Table IWE-2500-1 categories. Defined the parameters to be monitored for non-coated surfaces, painted or coated surfaces, penetration seals/bellows, moisture barriers, and bolting. Deleted the sentence, "In addition, a general visual examination is performed once each inspection period." Augmented the program to require surface examination of steel components that are subject to cyclic loading but have no current licensing	See Section II.5.2 for basis. Incorporate LR-ISG-2006-01. The 2004 edition of ASME Section XI, Subsection IWE, specifies VT-3 examination for containment pressure boundary components, including stainless steel and dissimilar metal welds. The stainless steel bellows are not in scope of ASME Subsection IWE but are in scope of 10 CFR Part 50 Appendix J. VT-3 examination may not detect fine cracks that could occur as a result of cyclic loading, and some penetration sleeves and bellows are not designed to allow for a local pressure test (Type B test) and are only pressure-tested as part of the containment Type A Integrated Leak Rate Test (ILRT). The frequency of Type A test is every 10 years and could be extended for up to 15 years if a licensee implements Option B, performance-based test, in accordance with 10 CFR Part 50 Appendix J. The ILRT frequency thus may not provide for early detection of cracking such that corrective actions are taken to prevent loss of primary containment leak-tightness. The AMP is therefore augmented to require surface examination for detection of cracking during the period of extended operation. Ensures that coatings are properly examined. The scope of 2004 edition of ASME Section XI, Subsection IWE, as approved in 10 CFR 50.55a, does not include Seals and Gaskets. Seals and Gaskets are covered in scope of 10 CFR Part 50 Appendix J. Thus XI.S4, "10 CFR Part 50,	899 902

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Location of Change	Summary of Significant Changes	Technical Basis for Change	Comment No.
	basis fatigue analysis. Changed IWE-2430 to IWE-2420. Accordingly, the requirements based on IWE-2420 are defined, which are different from what was defined in Revision 1, when IWE-2430 was used. Added acceptance criteria for cracking of stainless steel penetration sleeves, dissimilar metal welds, bellows, and steel components that are subject to cyclic loading but have no current licensing basis fatigue analysis. Deleted reference to Table-3410-1 and replaced with IWE-3500. Deleted reference to 10 CFR 50.55a(b)(ix)(D).	Appendix J," is the applicable AMP. The deletion of the Table IWE-2500-1 categories eliminates the need for revising GALL Report program elements each time the ASME Code Edition is issued. The parameters monitored for coated surfaces are specified in ASME Section XI, Subsection IWE-2310.Components subject to cyclic loading are susceptible to cracking consistent with the GALL Report. ASME Section XI, Subsection IWE 2004 edition Table 2500-1, as incorporated in 10 CFR 50.55a, provides the requirements for the extent and frequency of examinations. Table 2500-1 requires no additional general visual examinations each inspection period. VT-3 examination may not detect fine cracks that could occur as a result of cyclic loading and are only pressure-tested as part of the containment Type A Integrated Leak Rate Test (ILRT). The frequency of Type A test is every 10 years and could be extended for up to 15 years if a licensee implements Option B, performance-based test, in accordance with 10 CFR Part 50 Appendix J. The ILRT frequency thus may not provide for early detection of cracking such that corrective actions are taken to prevent loss of primary containment leak-tightness. The program is therefore augmented to require surface examination for detection of cracking during the period of extended operation. The reference to IWE-2430 is incorrect. The paragraph has been replaced by IWE-2420 in a later edition of ASME Section XI, Subsection IWE.	

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Location of Change	Summary of Significant Changes	Technical Basis for Change	Comment No.
		The added acceptance criteria provides reasonable assurance that identified cracking is evaluated or corrected prior to a loss of an intended function. The criteria are consistent with provisions of IWE and the requirements of 10 CFR Part 50 Appendix B. Table 3410-1 does not exist in later editions of IWE. IWE-3500 specifies the corrective actions if acceptance standards are not met. 10 CFR 50.55a(b)(ix)(D) does not exist in the 2009 issue of the regulation. 10 CFR 50.55a (b)(2)(ix)(D) exists but refers to IWE-2430, which has been replaced by IWE-2420.	
XI.S2 ASME Section XI, Subsection IWL			
General Preventive Actions Parameters Monitored/ Inspected Detection of Aging Effects	In the program description and in various elements as appropriate, added to monitor free water in the prestressing tendon anchorage areas. Revised to implement generic changes described in Section II.5.2. Clarified for monitoring of prestressing tendon corrosion protection medium so that its chemistry stays within the limits established in IWL. Parameters Monitored is revised to include additional monitoring of tendons, when removed when containment cutout is needed to facilitate replacement of steam generator or reactor vessel head. Added monitoring for free water. Deleted the description of tendon type, and added “accessible” to concrete surfaces that require visual examination.	Several changes made for consistency with ASME Code Section XI, 2004 edition. See Section II.5.2 for basis. Provides mitigation actions. Tables IWL-2521-1 and 2521-2, referenced in Element 3, provide sufficient details for examination requirements. Inaccessible concrete surface areas are exempt from visual examination in accordance with IWL-1220. VT 3C, VT 1, VT 1C are replaced by General Visual and Detailed Visual Examination in IWL-2500 Subsection of 2004 edition of ASME Section XI Code years. General Visual Examination and Detailed Visual Examination are not modified in 10 CFR 50.55a, except for qualification of personnel performing the visual examinations.	N/A

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Location of Change	Summary of Significant Changes	Technical Basis for Change	Comment No.
	Deleted VT-3C, VT-1, and VT-1C visual examinations and replaced with General Visual and Detailed Visual Examinations.		
XI.S3 ASME Section XI, Subsection IWF			
General Scope of Program Preventive Actions Parameters Monitored/ Inspected Detection of Aging Effects Monitoring and Trending Acceptance Criteria	Revised to implement generic changes described in Section II.5.2. Deleted duplicate information that is already included in the ASME Code. Revised to include the components included in the scope of the program. Accordingly revised Elements 3, 4, and 5 to include recommendations for in-scope components. For structural bolting moved into this program from mechanical AMP XI.M18, added a statement that for structural bolting consisting of ASTM A325, ASTM F1852, and/or ASTM A490 bolts, the preventive actions for storage, lubricants, and SCC potential discussed in Section 2 of RCSC (Research Council for Structural Connections) publication "Specification for Structural Joints Using ASTM A325 or A490 Bolts" need to be used. Deleted information from Table IWF-2500-1. Added parameters to be monitored and inspected for each component in scope of program. Clarified that high-strength structural bolting susceptible to SCC is monitored for cracking. Added guidance for detecting aging effects of all components in the scope of the program. VT-3 examination specified by IWF is supplemented by surface, volumetric, or feel for components whose	Section II.5.2 for basis. Information existing in ASME Code does not need to be repeated in the program. Components were not identified. High-strength bolting is used for nuclear steam supply system (NSSS) and piping support components, where these preventive actions are applicable. A provision of preventive actions for other structural bolting recommended using RCSC publication. No need to repeat information from the ASME Code. Not all high-strength bolts are susceptible to SCC. The supplemental detection requirements are added consistent with IWF and to ensure that aging effects are detected prior to a loss of component- or structure-intended function. These requirements are specified in ASME Code, Subsection IWL. Ensure that all components in scope of program have acceptance criteria defined.	210 906

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Location of Change	Summary of Significant Changes	Technical Basis for Change	Comment No.
	aging effects cannot be detected by VT-3 examination alone. Added trending recommendations based on ASME Code. Specific criteria are provided for unacceptable conditions, either based on ASME Code or, if not covered by the Code, then unacceptable conditions are identified.		
XI.S4 10 CFR Part 50, Appendix J			
General Program Description	Revised to implement generic changes described in Section II.5.2. Added that “Appendix J requires a general inspection of the accessible interior and exterior surfaces of the containment structure and components be performed prior to any Type A test.”	See Section II.5.2 for basis. The program description does not discuss the pretest requirements, such as the structural inspection of containment surfaces. It is required by 10 CFR Part 50 Appendix J.	N/A
XI.S5 Masonry Walls			
General Parameters Monitored/ Inspected Detection of Aging Effects	Revised to implement generic changes described in Section II.5.2. Clarified that fire barrier masonry walls are covered by the fire protection AMP XI.M26 and associated steel supports are covered by structures monitoring AMP XI.S6. Added cracking, separation, and shrinkage. Added an inspection frequency of once every 5 years, or more frequently, in areas where cracking is observed.	See Section II.5.2 for basis Provides an option to use XI.M26 or XI.S6. As explained in EPRI Report 1002950, Aging Effects for Structures and Structural Components (Structural Tools) Revision 1, masonry block walls are constructed from lightweight concrete blocks, grout, and mortar, and may or may not be reinforced. Thus, the aging effects/mechanisms of masonry block walls are generally the same as those of concrete walls. Concrete walls in this environment are susceptible to loss of material and cracking due to freeze-thaw. Makes it consistent with ACI-349-3R, Edition	N/A

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Location of Change	Summary of Significant Changes	Technical Basis for Change	Comment No.
		1996.	
XI.S6 Structures Monitoring			
General Scope of Program Parameters Monitored/ Inspected Detection of Aging Effects	Revised to implement generic changes described in Section II.5.2. Revised to include periodic sampling and testing of groundwater and the need to assess the impact of any changes in its chemistry on below grade concrete structures. Clarifies that the scope of this program includes all structures, structural components, component supports, and structural commodities in the scope of license renewal that are not covered by other structural AMPs. Revised to clarify the parameters to be monitored for concrete, steel, structural bolting, structural sealants, elastomeric vibration isolators, ground water chemistry, settlement monitoring, etc. Revised to include a recommended inspection frequency not to exceed 5 years for the in-scope structures, settlement monitoring, and monitoring of ground water chemistry. Also revised to provide recommendations for plants with non-aggressive water and for plants with aggressive water.	See Section II.5.2 for basis. Periodic sampling and testing of ground water is necessary to establish whether groundwater chemistry is aggressive. Its results establish whether plant-specific activities are necessary to ensure that aging effects of concrete in inaccessible areas are required. All applicants have committed to periodically sample and test ground water during the period of extended operation. Provides information on structures and components within the scope of the program. Establishes a link between parameters monitored and the aging effect being addressed Establishes frequencies. Establishes that for plants with aggressive water, a plant-specific program needs to be implemented.	N/A
XI.S7 RG 1.127, Inspection of Water-Control Structures Associated with Nuclear Power Plants			
General Scope of Program Detection of Aging Effects	Revised to implement generic changes described in Section II.5.2. Revised to include steel or wood piles, and sheeting required for the stability of embankments and channel slopes, and miscellaneous steel, such as sluice gates and trash racks. Also added	See Section II.5.2 for basis Some applicants have identified these components in their scope of water-control structures Periodic sampling and testing of ground water is necessary to establish if ground water chemistry is	NA

Table II-22. Revision 2 Differences from Chapter XI, Structural Aging Management Programs, GALL Report, Rev. 1 and Their Technical Bases

Location of Change	Summary of Significant Changes	Technical Basis for Change	Comment No.
	recommendations for monitoring and inspecting and acceptance criteria for these components in Elements 3, 4 and 5. Revised to include ground water monitoring for inaccessible, below-grade, and submerged concrete structural elements.	aggressive. Its results establish if plant-specific activities are necessary to ensure that aging effects of concrete in inaccessible areas are required. All applicants have committed to periodically sample and test ground water during the period of extended operation.	
XI.S8 Protective Coating Monitoring and Maintenance Program			
Program Description Scope of Program	Added ASTM D5163-08 and EPRI Report 1003102 Revised to include any Service Level I coatings that are credited by the licensee for preventing loss of material due to corrosion in accordance with XI.S1.	The ASTM standard is endorsed by RG 1.54 and is considered consistent with this program. In addition, Electric Power Research Institute (EPRI) Report 1003102, “Guidelines for Inspection and Maintenance of Safety-related Protective Coatings,” provides additional information on the ASTM standard guidelines. As stated in RG 1.54, Service Level I coatings are used in areas inside the containment where the coating failure could adversely affect the operation of post-accident fluid systems and thereby impair safe shutdown. Thus, the evaluated program attributes are for the purpose of effectively managing aging effects of coatings to prevent degradations that could prevent clogging of ECCS suction strainers. Applicants who credit preventive actions of the AMP for managing loss of material due to corrosion should provide plant-specific operating experience to demonstrate that their program is effective.	N/A

Table II-23. Revision 2 Differences from Chapter XI, Electrical Aging Management Programs, GALL Report, Rev. 1 and Their Technical Bases

Changed Program Elements	Summary of Significant Changes	Technical Basis for Change	Comment No.
XI.E1 Insulation Material for Electrical Cables and Connections Not Subject to 10 CFR 50.49 Environmental Qualification Requirements			
Title Program Description Parameters Monitored/ Inspected Detection of Aging Effects General	The definition for adverse localized environment in the Program Description was revised. Parameters Monitored and Detection of Aging Effects were both revised to include new aging effects degradation indications. Removed sampling discussion and references to sampling throughout AMP.	The AMP's title was changed to provide technical accuracy and clarification and to differentiate it from AMP XI.E6. The definition and discussion for adverse localized environment in the Program Description was revised for the purposes of clarification, simplification, and consistency. The term "reduced insulation resistance" in Parameters Monitored and Detection of Aging Effects more accurately defines the aging effect associated with cable and connection insulation materials and is consistent with the terminology in GALL Chapter VI. Operating Experience has shown the population of these affected components to be small enough to eliminate sampling and visually inspect "all accessible electrical cables and connections installed in adverse localized environments."	259 260 262 263
XI.E2 Insulation Material for Electrical Cables and Connections Not Subject to 10 CFR 50.49 Environmental Qualification Requirements Used in Instrumentation Circuits			
Title Program Description Preventive Actions Corrective Actions	The title of the AMP was changed. Consolidated and rearranged the "adverse localized environment" discussion in the Program Description. Preventive Actions and Corrective Actions clarified.	The AMP's title was changed for technical accuracy and clarification. The adverse localized environment discussion in the Program Description was revised for clarification and consistency with AMP XI.E1, "Preventive Actions," changed from "No actions are taken as part of this program…" to "This is a performance monitoring program and no actions are taken as part of this program." Corrective Actions clarified to include actions required on when an unacceptable condition or situation is identified.	265

Table II-23. Revision 2 Differences from Chapter XI, Electrical Aging Management Programs, GALL Report, Rev. 1 and Their Technical Bases

Changed Program Elements	Summary of Significant Changes	Technical Basis for Change	Comment No.
XI.E3 Inaccessible Power Cables Not Subject to 10 CFR 50.49 Environmental Qualification Requirements			
Title Program Description Scope of the Program Preventive Actions Parameters Monitored/ Inspected Detection of Aging Effects Operating Experience	The title of the AMP was changed and a change was made to include all inaccessible or underground cables down to and including 400 volts within the scope of LR subject to significant moisture. Deemphasized water trees and revised to primarily consider water intrusion (significant moisture) in the Program Description and Scope of Program. Preventive Actions was revised to include event driven inspections for water collection and the manhole inspection frequency was revised to annually. The frequency for testing power cables in Detection of Aging Effects was revised to at least once every 6 years.	The change from "Medium Voltage" to "Power" lowered the voltage range this AMP will be dealing with to≥ 400 v from the traditional medium voltage range (>1 kv to 35 kv) and was made to include 480 volt ECCS motors at one plant based on a commitment with NEI. Summary Report: GL 2007-01 supports and justifies the change from medium voltage to "Power" and the voltage range to ≥400 v. Current NRC inspections have identified that ensuring operability of dewatering devices prior to any known or predicted flooding events is key to preventing potential cable submergence and that a 2-year manhole inspection frequency is not adequate to prevent cable submergence. Requiring that manhole inspections be performed at least annually is consistent with NRC Inspection Procedures. Staff revised the testing frequency based on Operating Experience but not to exceed 6 years. More frequent testing is required to monitor the cable performance and the test frequency should be adjusted based on test results as determined through the corrective action process.	250 252
XI.E4 Metal Enclosed Bus			
Program Description Parameters Monitored Detection of Aging Effects Acceptance Criteria	Revised Program Description to include the three different types of MEB buses. The Scope of Program was revised to include different AMP options for inspecting external surfaces and elastomers. The Program Description, Parameters Monitored, and Detection of Aging Effects were all revised to include a new aging effect: increased resistance of connection.	The Program Description was revised to provide clarification on each of the different types of MEB buses. The Program Description and Scope of Program were revised to include external surfaces and elastomers with options to inspect under XI.S6 or XI.M38, as applicable. In addition, the AMR line items for the external surfaces of MEB enclosure assemblies was expanded to include different applicable MEAP combinations. The term "increased resistance of connection" more accurately	283 285 286 288 289

Table II-23. Revision 2 Differences from Chapter XI, Electrical Aging Management Programs, GALL Report, Rev. 1 and Their Technical Bases

Changed Program Elements	Summary of Significant Changes	Technical Basis for Change	Comment No.
	In Parameters Monitored/Inspected, Detection of Aging Effects, and Acceptance Criteria, the inspection criteria for components was revised. In addition, the sampling criteria was revised in Detection of Aging Effects.	describes the actual aging effect resulting from thermal cycling and ohmic heating. The sampling criteria in Detection of Aging Effects was revised to be consistent with the criteria approved in XI.M-32, "One-Time Inspection."	
XI.E5 Fuse Holders			
Program Description Scope of Program Parameters Monitored	Added a new purpose statement as the 1st paragraph in Program Description. Revised the aging stressors as applicable in the Program Description, Scope of Program, and Parameters Monitored.	A new Purpose Statement was added to maintain consistency with the format established in AMPs XI.E1 through XI.E4. Revised Program Description, Scope of Program, and Parameters Monitored to include the term increased resistance of connection as it more accurately describes the actual aging effect resulting from chemical contamination, corrosion, and oxidation and maintain consistency with GALL Chapter VI.	290 291 293
XI.E6 Electrical Cable Connections Not Subject to 10 CFR 50.49 Environmental Qualification Requirements			
General Program Description	Major change to incorporate Final License Renewal Interim Staff Guidance LR-ISG-2007-02. Added a new purpose statement as the 1st paragraph in Program Description. New sampling criteria were added in Detection of Aging Effects.	Incorporated Final License Renewal Interim Staff Guidance LR-ISG-2007-02, which provides for one-time testing. A new Purpose Statement was added to maintain consistency with the format established in AMPs XI.E1 through XI.E4 and revised to include a 10 CFR 50.49 reference. Detection of Aging Effects added sampling criteria that is consistent with XI.E4 and XI.M32, One Time Inspection.	294 297

Table II-24. Revision 2 Chapter I Differences from GALL Report, Rev. 1 and Their Technical Bases

Location of Change	Summary of Significant Changes	Technical Basis for Change	Comment or Ref. No.
General	Revised to provide guidance when an exception is needed in the LRA for ASME Code editions. Revised to state that in some AMPs, specific requirements in ASME Section XI need to be augmented in order to ensure adequate aging management consistent with the license renewal rule. Revised to provide guidance for plants whose 10-year ISI term expires and the plant updates to a later version of the Code during the LRA review process. Revised to provide guidance for relief requests when the ten-year inspection period extends into the period of extended operation.	To clarify that an exception is to be justified to use an ASME Section XI edition or addenda that is (1) earlier than the 1995 edition, (2) not endorsed in 10 CFR 50.55a, or (3) not adequate for license renewal as discussed in the FRN issuing the 10 CFR 50.55a amendment. The AMP may make additional recommendations for managing aging above and beyond the code requirements. For example, the code-required VT-1 may not detect fine cracks, and the AMP is augmented to have volumetric examination performed. Ensures that the LRA is updated for those AMPs that are impacted by the change in edition of the ASME Code. The approved relief request remains in place until the 10-year period ends.	NA

Table II-25. Revision 2 General BWR Vessel Internals Aging Management Programs Differences from GALL Report, Rev. 1 and Technical Bases

Location of Change	Summary of Significant Changes	Technical Basis for Change	Comment or Ref. No.
General	The BWRVIP is an active program. It was recognized that it is not feasible for the SRP-LR and GALL Reports to be kept up to date with the EPRI BWRVIP program. Discrepancies between member utility BWRVIP program implementation and the program documents and recommendations cited in the SRP-LR and GALL Report were corrected. The BWRVIP maintains that license renewal guidance related to program implementation focuses on describing program elements and the related means of NRC oversight.	The staff will continue to use the Interim Staff guidance (ISG) process for interim updates to the license renewal guidance documents. Updated industry guidance can be incorporated via an ISG. No changes are necessary for the GALL or SRP-LR. An alternative approach is being adopted (preamble to Chapter XI) that will allow use of later revisions of industry guidance that have been approved by the staff for generic use (via ISG, RG, topical report review, incorporation into 10 CFR). If only plant specific precedent exists for use, then applicants may request to use the later revision by taking an exception to the GALL Report and reference the precedent which provides high degree of confidence the exception will be acceptable. The BWRVIP program provides design criteria. When accepted by the NRC they are incorporated into the GALL. The GALL has been revised to reflect that actual plant procedures to implement the BWRVIP repair and design criteria are plant specific.	917

III REVISION 2 CHANGES TO SRP-LR, REV. 1 AND THEIR TECHNICAL BASES

There are many changes that have been made to the NUREG-1800 (SRP-LR), Rev. 1 document. Some changes are the result of the drafting of the May 2010 Public Comment version of Revision 2. Additional changes are the result of public comments that were received during the public comment period. The final version of NUREG-1800, Rev. 2 has consolidated these changes. This section of NUREG-1950 provides a summary of notable technical changes that were made in Revision 2 and provides the technical basis for each change.

Several generic and general changes were made to the SRP-LR, Rev. 1. These include:

- FSAR Supplements for all AMPs are now included as Table 3.0-1 in Chapter 3.0 (Old Table 3.X-2). This change provides one location where the FSAR Supplement information for each AMP is provided in one table, instead of in Tables in Chapters 3.1, 3.2, 3.3, 3.4, 3.5, and 3.6.
- Table 3.X-2 now lists the AMPs applicable to that chapter. This table used to show FSAR Supplement information. Instead it now identifies only the AMPs, with the titles that are applicable to the chapter.
- In the Chapter 3.X.2, Acceptance Criteria, and Chapter 3.X.3, Review Procedures, information related to AMRs and AMPs was separated. AMRs are now included in Chapters 3.X.2.1 and 3.X.3.1; AMPs are included in new Chapters 3.X.2.4 and 3.X.3.4.
- Extra columns were added in Table 3.X-1 to identify the GALL Report Rev. 1 and Rev. 2 AMR item numbers (as “Rev1 Item” and “Rev2 Item”).
- Tables 4.1-2 and 4.1-3 were clarified to distinguish between generic TLAAs and potential plant-specific TLAAs.
- Appendix A, Chapter A.1.2. 3 (Aging Management Program Elements) was revised to clarify the information in each element. Appropriate information was provided in each element. This Appendix was used to ensure that the GALL Report AMPs provided recommendations in each element that are consistent with this Appendix.

The specific changes to each SRP-LR chapter are discussed in Sections III.1 through III.4 of this document. A summary of the changes to each chapter and their technical bases are presented in Table III-1 through Table III-17. The public comments that resulted in these changes are found in Table IV-15 through Table IV-19.

III.1 Chapter 1 – Administrative Information

There are no major technical changes in Chapter 1 of the SRP-LR. The title of Table 1.1-1 has been clarified to indicate that the checklist is used to determine the renewal application’s acceptability for docketing. Language in the table has been clarified. Number VII has been added to ensure that the conclusions drawn from the completion of the checklist are clearly stated in a manner that allows the reviewer to determine whether the application is reasonably complete, meets the Acceptance Review Checklist criteria I through V, and is recommended for docketing.

III.2 Chapter 2 – Scoping and Screening Methodology

There are no major technical changes to SRP-LR Chapter 2. The references have been updated, and the review responsibilities have been changed to “Assigned branch(es)” rather than to any particular branch. Some clarification has been made to individual subchapters.

III.3 Chapter 3 – Aging Management Reviews (AMRs) Rollup Tables

The AMR items presented in the GALL Report, Rev. 2 tables are combined and grouped according to function or material, environment, aging effect and aging management program (MEAP) to better categorize the aging of certain systems in specific environments and to facilitate the review of AMRs when conducting safety reviews at plants applying for license renewal. The tables of these groupings are found in the SRP-LR and are referred to as "AMR rollup tables." New MEAP combinations are discussed in Section III.3.1 below. The method for combining or "rolling up" these AMRs is discussed in Section III.3.2.

In addition to a discussion of the rollup tables, this section of NUREG-1950 presents the changes that were made in individual subchapters of the SRP-LR and the technical bases for these changes. Chapter 3.0 of the SRP-LR provides guidance to the staff conducting safety reviews of the AMPs or AMRs. A new table was added to this subchapter to provide a FSAR supplement for the aging management of applicable systems. This was formerly found under individual subchapters 3.1 through 3.6, but has been consolidated in subchapter 3.0 to make the SRP-LR more streamlined. Other changes to subchapter 3.0 are presented in Table III-3. Table III-4 through Table III-9 summarize the changes and technical bases for the changes to subchapters 3.1 through 3.6, respectively. The public comments associated with these changes are found in Table IV-17.

III.3.1 Discussion of New MEAP Combinations

New MEAP combinations in NUREG-1800, Rev. 2, result from the addition of new AMR items in the GALL Report, Chapters II through VIII, as described in Section II.1. New MEAP combinations are included in the rollup methodology described in Section III.3.2 and may result in new items in the AMR rollup tables or may be included in previously existing items if the new combination is closely related to an MEAP combination already in Revision 1 or the GALL Report.

III.3.2 AMR Rollup Methodology

The methodology for developing the AMR rollup tables in the SRP-LR is based on a principal of grouping together components, materials, and environments in which a single aging effect or a small group of closely related aging effects can be adequately managed by an AMP or by a combination of programs that is consistent with the AMPs described in Chapter XI of the GALL Report. The rollup tables are intended to (a) aid the applicant in preparation of the LRA by providing groups of component, material, environment, aging effect, and AMP combinations that have been previously reviewed and evaluated by the staff and (b) provide a process roadmap for the staff to follow in preparing its safety evaluation of a license renewal application.

The methodology used in the rollup tables is similar, but not identical, for all chapters in the GALL Report and the SRP-LR.

- <u>For AMR items in Chapters V, VI, VII, and VIII</u>, a single rollup methodology is used. Within a single GALL chapter, AMR items with identical values for AMP, AERM, further evaluation, and further evaluation reference are initially collected together in individual groups. The initial rolled-up component description is then reviewed to determine whether the initial grouping, based solely on AMP, AERM, and further evaluation, has resulted in a grouping in which the individual relationships of component, material, and environment are not clearly maintained. If, based on technical review, an initial grouping is found to result in an unacceptable rolled-up component description, the initial grouping is subdivided into smaller groupings with identical AMP, AERM, and Further Evaluation content, but with different component, material, and/or environment descriptions.

- For AMR items in the GALL Chapters II, III, and IV, the rollup methodology differs from that of the previously described chapters by grouping on an AMP description that is consistent with, but not directly contained in, the underlying GALL Report AMR items. Also, the rolled up component description typically does not include the environment, and, for some rolled-up lines in Chapter III, the component description encompasses the components in the AMR items that are grouped together.

III.4 Chapter 4 – Time-Limited Aging Analyses (TLAAs)

There are six subchapters to the SRP-LR Chapter 4 on generic Time-Limited Aging Analyses (TLAAs). Subchapter 4.1 discusses how to recognize when a TLAA may be appropriate, and changes to that subchapter are summarized in Table III-10, along with the technical bases for these changes. Subchapter 4.2 deals with reactor vessel neutron embrittlement; subchapter 4.3 covers metal fatigue; subchapter 4.4 discusses the environmental qualification of electrical equipment; subchapter 4.5 presents a discussion of concrete containment tendon prestress; and subchapter 4.6 discusses inservice local metal containment corrosion analyses. The changes and technical bases for these changes are shown in Table III-11 through Table III-16, respectively. The public comments associated with these changes are found in Table IV-18.

III.5 SRP-LR Appendices A.1, A.2, and A.3

Changes to the three appendices in the SRP-LR are summarized in Table III-17, along with the technical bases for these changes. These appendices are A.1 – Generic Aging Management Reviews, A.2 – Quality Assurance for Aging Management Programs (Branch Technical Position IQMB-1), and A.3 – Generic Safety Issues Related to Aging (Branch Technical Position RLSB-2). The public comments associated with these changes are found in Table IV-19.

Table III-1. Revision 2 Chapter 1 Differences from SRP-LR, Rev. 1 and Their Technical Bases

Location of Change	Summary of the Change	Technical Basis for Change	Comment or Ref. No.
N/A	There are no notable technical changes to Chapter 1 of the SRP-LR.	N/A	N/A

Table III-2. Revision 2 Chapter 2 Differences from SRP-LR, Rev. 1 and Their Technical Bases

Location of Change	Summary of the Change	Technical Basis for Change	Comment No.
2.1.3.1.3 Paragraph 5	Added new final sentence “However, the staff review is based on the plant-specific current licensing basis, regulatory requirements, and offsite power design configurations.” This is similar to Chapter 2.5.2.1.1.	To clarify that for SBO "coping duration" and "recovery" phase, plant-specific CLB, regulatory requirements and offsite power design should be considered.	242
2.5.2.1.1 Third bullet; Components Within the Scope of SBO (10 CFR 50.63)	Clarified that the electrical distribution equipment out to the first circuit breaker with the offsite distribution system (i.e., equipment in the switchyard) should be included within the SBO restoration equipment scope. Added new final sentence "However, the staff review is based on the plant-specific current licensing basis, regulatory requirements, and offsite power design configurations."	Identified the scope of SBO restoration equipment. Also clarified that plant-specific CLB, regulatory requirements and offsite power design should be considered.	243

Table III-3. Revision 2 Chapter 3.0 Differences from SRP-LR, Rev. 1 and Their Technical Bases

Location of Change	Summary of the Change	Technical Basis for Change	Comment No.
Table 3.0-1	Revised to reflect the changes that were made to the AMPs in Chapter XI of the GALL Report.		
Table 3.0-1 XI.E3	The frequency for cable testing was reduced from once every 10 years to at least once every 6 years.	The once every 10 year testing protocol was based on historical data. However, GL 2007-01 provides data on failures to increase the frequency. Based on plant-specific operating experience, but not to exceed a maximum testing interval of once every 6 years. Change to 6 years is consistent with wording in AMP XI.E3.	250 252
Table 3.0-1 XI.E3	The frequency for water collection inspections are established and performed based on plant-specific operating experience with water accumulation in the manholes (i.e., operation of dewatering devices should be inspected and operation verified prior to any known or predicted flooding events). The inspection frequency was reduced from once every two (2) years. to at least annually.	All changes incorporated are consistent with XI.E3.	
Table 3.0-1 XI.S1	The ASME Section XI, Subsection IWE program Code edition and addenda information was corrected.	All changes incorporated are consistent with XI.S1.	358

Table III-4. Revision 2 Chapter 3.1 (Reactor Vessels, Internals, Coolant System) Differences from SRP-LR, Rev. 1 and Their Technical Bases

Location of Change	Summary of the Change	Technical Basis for Change	Comment No.
3.1 General	Revised to implement generic changes described in Section III. Revised to reflect the changes that were made to the AMR items in Chapter IV of the GALL Report.	See Section III for basis for generic changes. See Section II for basis of specific AMR line-item changes.	N/A

Table III-5. Revision 2 Chapter 3.2 (Engineered Safety Features) Differences from SRP-LR, Rev. 1 and Their Technical Bases

Location of Change	Summary of the Change	Technical Basis for Change	Comment No.
3.2 General	Revised to implement generic changes described in Section III. Revised to reflect the changes that were made to the AMR items in Chapter IV of the GALL Report.	See Section III for basis for generic changes. See Section II for basis of specific AMR line-item changes.	N/A

Table III-6. Revision 2 Chapter 3.3 (Auxiliary Systems) Differences from SRP-LR, Rev. 1 and Their Technical Bases

Location of Change	Summary of the Change	Technical Basis for Change	Comment No.
3.3 General	Revised to implement generic changes described in Section III. The chapters were revised to reflect the changes that were made to the AMR items in Chapter IV of the GALL Report.	See Section III for basis for generic changes. See Section II for basis of specific AMR line-item changes.	N/A

Table III-7. Revision 2 Chapter 3.4 (Steam and Power Conversion Systems) Differences from SRP-LR, Rev. 1 and Their Technical Bases

Location of Change	Summary of the Change	Technical Basis for Change	Comment No.
3.4 General	Revised to implement generic changes described in Section III. Revised to reflect the changes that were made to the AMR items in Chapter IV of the GALL Report.	See Section III for basis for generic changes. See Section II for basis of specific AMR line-item changes.	N/A

Table III-8. Revision 2 Chapter 3.5 (Structures and Components) Differences from SRP-LR, Rev. 1 and Their Technical Bases

Location of Change	Summary of the Change	Technical Basis for Change	Comment No.
3.5 General	Revised to implement generic changes described in Section III.	See Section III for basis for generic changes. See Section II for basis of specific AMR line-item changes.	N/A

Table III-9. Revision 2 Chapter 3.6 (Electrical and Instrumentation Controls) Differences from SRP-LR, Rev. 1 and Their Technical Bases

Location of Change	Summary of the Change	Technical Basis for Change	Comment No.
3.6 General 3.6.3.2	The SRP was revised to implement generic changes described in Section III. Two of the subchapter titles were revised to reflect the changes that were made to the AMR line items in Chapter VI of the GALL Report.	See Section III for basis for generic changes. The titles for subchapters 3.6.2.2.2 and 3.6.2.2.3 were revised to be in concert with GALL Chapter VI.A AMR Item changes. See Section II for basis of specific AMR line-item changes.	N/A

Table III-10. Revision 2 Chapter 4.1 (Identification of TLAA) Differences from SRP-LR, Rev. 1 and Their Technical Bases

Location of Change	Summary of the Change	Technical Basis for Change	Comment No.
Tables 4.1-2 and 4.1-3	Removed metal corrosion allowance, inservice flaw growth analyses that demonstrate structure stability for 40 years, and high-energy line-break postulation based on fatigue cumulative usage factor from Table 4.1-2 and added them to Table 4.1-3.	Table 4.1-2 is for generic TLAA. These three items are plant-specific TLAAs and are therefore included in Table 4.1-3, which gives examples of potential plant-specific TLAAs.	N/A

Table III-11. Revision 2 Chapter 4.2 (Neutron Irradiation Embrittlement) Differences from SRP-LR, Rev. 1 and Their Technical Bases

Location of Change	Summary of the Change	Technical Basis for Change	Comment No.
4.2.3.1.1.1	Added a statement that the applicant needs to identify the neutron fluence at the expiration of the license renewal period, that a staff-approved methodology must be used to determine neutron fluence, and that the methodology follows the guidance of NRC RG 1.190.	This statement is included in subsection 4.2.3.1.1.2, and is included here for consistency.	N/A
4.2.3.1.1.2	Added the statement of Action Item 10 from the staff's SER for BWRVIP-74.	Specifies the action in addition to referencing the action item number.	N/A
4.2.3.1.2.1	Added a statement that the applicant needs to identify the neutron fluence at the expiration of the license renewal period, that a staff-approved methodology must be used to determine neutron fluence, and whether the methodology followed the guidance in NRC RG 1.190.	This statement is included in subchapter 4.2.3.1.2.2, and is included here for consistency.	N/A
4.2.3.1.2.3	Added C(5) to state and/or Use of the Alternative PTS Rule.	To meet the requirements of 75 FR 23, "Alternative Fracture Toughness Requirements for Protection Against Pressurized Thermal Shock Events," January 4, 2010.	N/A

Table III-11. Revision 2 Chapter 4.2 (Neutron Irradiation Embrittlement) Differences from SRP-LR, Rev. 1 and Their Technical Bases

Location of Change	Summary of the Change	Technical Basis for Change	Comment No.
4.2.3.1.3.1 and 4.2.3.1.3.2	Added a statement that the applicant needs to identify the neutron fluence at the expiration of the license renewal period, that a staff-approved methodology must be used to determine neutron fluence, and that the methodology follows the guidance of NRC RG 1.190.	This statement is included in these subchapters to make it consistent with a similar statement for neutron fluence in subchapters 4.2.3.1.1.1 and 4.2.3.1.1.2.	N/A
4.2.3.1.3.3	Added new paragraph for pressure temperature (P/T) limits TLAA dispositioned per 10 CFR 54.21(c)(1)(iii) to state that updated P-T limits for the period of extended operation must be available prior to entering the period of extended operation. It also references and specifies Renewal Applicant Action Item 9 in the staff's SER for BWRVIP-74 (Letter to C. Terry dated October 18, 2001).	Provides the applicant guidance on how to disposition this TLAA when category (iii) is used to manage aging.	N/A
4.2.3.1.4	Deleted existing paragraph. Replaced with a new paragraph that provides guidance if an applicant desires inspection relief for elimination of circumferential weld inspection (BWRs) for the period of extended operation.	Based on this guidance, the applicant could disposition the TLAA under 10 CFR 54.21(c)(1)(iii).	N/A
4.2.3.1.5	Added the statement of Action Item 12 from the staff's SER for BWRVIP-74.	Specifies the action in addition to referencing the action item number.	N/A
Table 4.2-1	Revised the FSAR Supplement summary for elimination of circumferential weld inspection and analysis of axial welds (for BWRs) to include the statement about inspection relief, and that the re-submittal under 10 CFR 50.55a(a)(3) should be completed before the period of extended operation.	This change is needed based on the change made in subsection 4.2.3.1.4.	N/A

Table III-12. Revision 2 Chapter 4.3 (Metal Fatigue, Piping, and Components) Differences from SRP-LR, Rev. 1 and Their Technical Bases

Location of Change	Summary of the Change	Technical Basis for Change	Comment No.
4.3.1	Revised the Areas of Review to specifically identify five areas: (1) CUF calculations for Code Class 1 components designed to ASME Section III requirements, (2) B31.1 and ASME Code Class 2 and 3 components, (3) environmental fatigue calculations for ASME Code Class 1 reactor coolant pressure boundary components, (4) potential fatigue assessments for BWR vessel internals components (potential TLAAs based on applicable applicant action items identified in applicable BWRVIP reports), and (5) potential fatigue-based flaw growth analyses or fatigue-based fracture mechanics analyses, including those for high-energy line breaks, reactor coolant pump (RCP) flywheels, reactor vessel metal bellows, and reactor vessel underclad cracking analyses.	This provides a listing of the generic and potential areas of fatigue as listed in Tables 4.1-2, and 4.1-3. Provides guidance to applicants in development of license renewal applications.	518
4.3.2.1.1.3	GALL X.M1 title has been changed to "Fatigue Monitoring," and reference to reactor coolant system (RCS) pressure boundary components only has been removed.	The staff agrees that more components than RCS pressure boundary have cycles that need monitoring.	519
4.3.2.1.2 and 4.3.2.1.4	Combined these two sections for Piping Components Designed to USAS ANSI B31.1 Requirements and ASME Code Class 2 and 3 Components Designed to ASME Section III Requirements.	Subsection 4.3.2.1.4 referenced subsection 4.3.2.1.2 in SRP-LR Rev. 1, so it makes sense to combine these two subsections.	N/A
4.3.2.1.2.3	Identified that AMP X.M1 provides an acceptable method for accepting implicit fatigue analyses under 10 CFR 54.21(c)(1)(iii).	If components designed to USAS ANSI B31.1 requirements, and ASME Code Class 2 and 3 Components Designed to ASME Section III Requirements have a fatigue analysis performed per ASME Code Section III requirements, then AMP X.M1 is acceptable for aging management.	N/A
4.3.2.1.3 and 4.3.3.1.3	Deleted 4.3.2.2, Generic Safety Issues. Added new subsections to address Environmental Fatigue	This paragraph has been revised to provide guidance and options for Fen calculations	520

Table III-12. Revision 2 Chapter 4.3 (Metal Fatigue, Piping, and Components) Differences from SRP-LR, Rev. 1 and Their Technical Bases

Location of Change	Summary of the Change	Technical Basis for Change	Comment No.
	Calculations for Code Class 1 Components. Identified the NUREG-CRs appropriate for calculating environmental correction factors for carbon and low-alloy steels, stainless steel, and nickel-alloy materials.	for carbon and low-alloy steels, stainless steel, and nickel-alloy components.	
4.3.2.1.4 and 4.3.3.1.4	Added new subsections for Potential Fatigue Assessments for BWR Vessel Internals Components.	Provides clarity and ensures consistency. The revised information in the elements is used to provide consistency within each AMP for that element. Appropriate information is moved from one element to another to ensure that the element is consistent with the revised chapter A.1.2.3.	521
4.3.2.1.5 and 4.3.3.1.5	Added new subsections for Potential Flaw Growth and Fracture Mechanics Analysis. It states that Chapter X.M1 in the GALL Report may not be used as a basis for accepting fatigue-based flaw growth analyses or fracture mechanics analyses in accordance with 10 CFR 54.21(c)(1)(iii).	Provides clarity and ensures consistency. The revised information in the elements is used to provide consistency within each AMP for that element. Appropriate information is moved from one element to another to ensure that the element is consistent with the revised chapter A.1.2.3.	N/A

Table III-13. Revision 2 Chapter 4.4 (Environmental Qualification of Electrical Equipment) Differences from SRP-LR, Rev. 1 and Their Technical Bases

Location of Change	Summary of the Change	Technical Basis for Change	Comment No.
Chapter 4.4	Only programmatic and generic changes were made; no notable technical changes incorporated in Rev. 2, Chapter 4.4 of the SRP-LR.	N/A	N/A

Table III-14. Revision 2 Chapter 4.5 (Concrete Tendon Prestress) Differences from SRP-LR, Rev. 1 and Their Technical Bases

Location of Change	Summary of the Change	Technical Basis for Change	Comment or Ref. No.
Table 4.5-1	Added example of FSAR Supplement summary for 10 CFR 54.21(c)(1)(iii).	Provides an example in case TLAA is dispositioned per 10 CFR 54.21(c)(1)(iii).	N/A

Table III-15. Revision 2 Chapter 4.6 (Metal Containment, Liner Plate, Penetrations Fatigue) Differences from SRP-LR, Rev. 1 and Their Technical Bases

Location of Change	Summary of the Change	Technical Basis for Change	Comment or Ref. No.
Chapter 4.6	There are no notable technical changes, only clarifications that are editorial in nature.	N/A	N/A

Table III-16. Revision 2 Chapter 4.7 (Plant-Specific TLAA) Differences from SRP-LR, Rev. 1 and Their Technical Bases

Location of Change	Summary of the Change	Technical Basis for Change	Comment or Ref. No.
Chapter 4.7	There are no notable technical changes, only clarifications that are editorial in nature.	N/A	N/A

Table III-17. Revision 2 Appendix Differences from SRP-LR, Rev. 1 and Their Technical Bases

Location of Change	Summary of the Change	Technical Basis for Change	Comment or Ref. No.
Appendix A.1	Appendix A, Chapter A.1.2.3, and AMP Elements were revised to clarify the information in each element.	Provides clarity and ensures consistency. The revised information in the elements is used to provide consistency within each AMP for that	N/A

Table III-17. Revision 2 Appendix Differences from SRP-LR, Rev. 1 and Their Technical Bases

Location of Change	Summary of the Change	Technical Basis for Change	Comment or Ref. No.
		element. Appropriate information is moved from one element to another to ensure that the element is consistent with the revised Chapter A.1.2.3.	
Appendix A.2 Appendix A.3	There are no notable technical changes, only clarifications that are editorial in nature.	N/A	N/A

IV ANALYSIS AND DISPOSITION OF PUBLIC COMMENTS ON MAY 2010 PUBLIC COMMENT DRAFT, REVISION 2

IV.1 Public Comment Solicitation and Management

The NRC issued a public comment draft of NUREG-1800 and -1801, Rev. 2 on April 1, 2010. The Federal Register Notice (FR Vol. 75, No. 95 page 27838 - 27840), published on May 18, 2010, began a 45-day public comment period. In addition, the NRC conducted a public workshop from May 26-28, 2010 at its Rockville, MD headquarters to initiate a dialogue with the public and to introduce them to some of the major changes between Revisions 1 and 2 of the guidance documents. The purpose of the workshop was to provide:

- an opportunity for the staff to inform the public about the draft GALL and SRP-LR NUREGs
- an opportunity for an exchange of information about the draft NUREGs
- an opportunity for stakeholders to ask questions about the draft NUREGs
- a forum for stakeholders to provide informal feedback on the drafts

The staff was particularly interested in comments that addressed the safety review, effectiveness, and efficiency of the license renewal process. Formal comments on the draft NUREGs were to be provided through means identified in the Federal Register Notice (e.g., written letter, e-mail, fax, and web forms) and were not accepted during the workshop. The workshop was not intended as a forum to resolve comments on the draft NUREGs. The staff anticipated that some topics would not be discussed fully due to time limitations. The staff also conducted focused public meetings following the close of the comment period for in-depth technical discussions of some AMPs, particularly XI.M41.

The staff previously made available to the public a draft preliminary version of portions of the guidance documents on December 19, 2009. These preliminary drafts were also discussed at a public meeting held from January 4-6, 2010 at NRC headquarters. All public comments were put into a public comments database developed specifically for the purpose of managing and dispositioning public comments. The database allowed the input of the comments, identification of the commenter and their affiliation, acceptance or rejection of comment's recommended actions, and the technical basis of each decision. Each comment in the database received a unique comment number related to the document and chapter/subchapter or AMR Item to which it applied. This unique number can be used to identify and track comments, their disposition, and the resulting changes throughout this guidance document in the appropriate tables.

Table IV-1 presents a list of commenters, their affiliation, their reference number, and the ADAMS Accession Number for each comment. The first column contains a comment number that allows each comment to be cross-referenced in various tables throughout this document.

Over 500 public comments were received on the SRP-LR and GALL Report.

Any changes to the LRGDs that have a technical basis that states that the change is editorial in nature, simple clarification, or the correction of typographical errors does not constitute a notable technical change and will not be captured in the Tables of Section II or III in this document. For a number of public comments, the NRC staff took the liberty to clarify and/or paraphrase the comment. Those comments are denoted with a "[…]" around the text which the staff clarified and/or paraphrased.

IV.2 Disposition of Public Comments on the May 2010 Draft GALL Report, Rev. 2

All of the public comments on the May 2010 Public Comment Draft, GALL Report, Rev. 2 that were received as a result of the public comment period are presented in Table IV-2 through Table IV-15 below. The comments are divided by GALL Report chapter; Chapter XI is subdivided into mechanical, structural, and electrical AMP comments. Each comment has a unique comment number. The comment, along with any rationale or justification provided by the commenter, is summarized. The disposition of each comment is provided, particularly whether the comment was accepted by NRC staff and resulted in a change to the GALL Report, Rev. 1, or whether the comment was rejected and did not cause any changes to the GALL Report. Finally, the technical basis for each comment disposition is provided, explaining either why the comment was rejected, or why the changes prompted by the comments were implemented.

The summary of the comments for each GALL chapter, their dispositions, and the technical basis for the dispositions are presented in Table IV-2 through Table IV-15.

IV.3 Disposition of Public Comments on the May 2010 Draft SRP-LR, Rev. 2

All of the public comments on the May 2010 Public Comment Draft SRP-LR, Rev. 2 that were received as a result of the public comment period are presented in Table IV-16 through Table IV-20 below. Each comment has a unique comment number and references the comment number provided by the commenter. The comment, along with any rationale or justification provided by the commenter, is summarized. The disposition of each comment is provided, particularly whether the comment was accepted by NRC staff and resulted in a change to the SRP-LR, Rev. 1, or whether the comment was rejected and did not cause any changes to the SRP-LR. Finally, the technical basis for each comment disposition is provided, explaining either why the comment was rejected or why the changes were implemented.

The summary of the comments for each SRP-LR chapter, their dispositions, and the technical basis for the dispositions are presented in Table IV-16 through Table IV-20.

Table IV-1. Identification of Public Comments on May 2010 Draft GALL Report, Rev. 2, Originator, and ADAMS Accession Number		
Commenter Ref. No.	**Comment No.**	**ADAMS Accession No.**
Boyd Taylor, Pacific Northwest National Laboratory (PNNL) 6/8/10		
1	132	ML101610407
Omesh Chopra 6/10/2010		
1 (SRP)	130	ML101660084
2 (SRP)	131	ML101660084
Nuclear Energy Institute 6/30/2010		
X.M1-1	133	ML101830328
X.M1-2	134	ML101830328
X.M1-3	135	ML101830328
X.M1-4	136	ML101830328
X.M1-5	137	ML101830328
X.M1-6	138	ML101830328
X.M1-7	139	ML101830328
X.M1-8	140	ML101830328
X.M1-9	895	ML101830328
X.M1-10	142	ML101830328
X.M1-11	143	ML101830328
XI.M2-1	896	ML101830328
XI.M2-2	897	ML101830328
XI.M2-3	1037	ML101830328
XI.M3-1	1036	ML101830328
XI.M4-1	149	ML101830328
XI.M6-1	150	ML101830328
XI.M6-2	151	ML101830328
XI.M6-3	152	ML101830328
XI.M7-1	153	ML101830328
XI.M7-2	154	ML101830328
XI.M9-1	155	ML101830328
XI.M9-2	156	ML101830328
XI.M9-3	157	ML101830328
XI.M9-4	777	ML101830328

Table IV-1. Identification of Public Comments on May 2010 Draft GALL Report, Rev. 2, Originator, and ADAMS Accession Number		
Commenter Ref. No.	**Comment No.**	**ADAMS Accession No.**
XI.M9-5	778	ML101830328
XI.M9-6	779	ML101830328
XI.M9-7	780	ML101830328
XI.M11B-1	158	ML101830328
XI.M11B-2	159	ML101830328
XI.M11B-3	160	ML101830328
XI.M11B-4	161	ML101830328
XI.M12-1	162	ML101830328
XI.M12-2	163	ML101830328
XI.M12-3	164	ML101830328
XI.M16A-1	165	ML101830328
XI.M16A-2	166	ML101830328
XI.M16A-3	167	ML101830328
XI.M17-1	168	ML101830328
XI.M17-2	169	ML101830328
XI.M18-1	170	ML101830328
XI.M18-2	171	ML101830328
XI.M18-3	172	ML101830328
XI.M18-4	173	ML101830328
XI.M18-5	174	ML101830328
XI.M18-6	175	ML101830328
XI.M19-1	1038	ML101830328
XI.M19-2	1039	ML101830328
XI.M22-1	1035	ML101830328
XI.M24-1	179	ML101830328
XI.M24-2	180	ML101830328
XI.M24-3	181	ML101830328
XI.M26-1	182	ML101830328
XI.M26-2	183	ML101830328
XI.M26-3	184	ML101830328
XI.M26-4	185	ML101830328
XI.M30-1	186	ML101830328
XI.M30-2	187	ML101830328

Table IV-1. Identification of Public Comments on May 2010 Draft GALL Report, Rev. 2, Originator, and ADAMS Accession Number		
Commenter Ref. No.	**Comment No.**	**ADAMS Accession No.**
XI.M30-3	188	ML101830328
XI.M31-1	189	ML101830328
XI.M32-1	190	ML101830328
XI.M35-1	191	ML101830328
XI.M35-2	192	ML101830328
XI.M35-3	193	ML101830328
XI.M35-4	194	ML101830328
XI.M36-1	971	ML101830328
XI.M36-2	972	ML101830328
XI.M36-4	197	ML101830328
XI.M38-1	198	ML101830328
XI.M39-1	898	ML101830328
XI.M40-1	200	ML101830328
XI.M40-2	201	ML101830328
XI.M40-3	202	ML101830328
XI.S1-1	899	ML101830328
XI.S1-2	900	ML101830328
XI.S1-3	901	ML101830328
XI.S1-4	902	ML101830328
XI.S1-5	903	ML101830328
XI.S1-6	208	ML101830328
XI.S3-1	904	ML101830328
XI.S3-2	210	ML101830328
XI.S3-3	906	ML101830328
XI.S5-1	907	ML101830328
XI.S6-1	908	ML101830328
XI.S6-2	214	ML101830328
XI.S6-3	909	ML101830328
XI.S7-1	910	ML101830328
XI.S7-2	911	ML101830328
XI.S7-3	912	ML101830328
XI.S8-1	913	ML101830328
1	298	ML101830328

Table IV-1. Identification of Public Comments on May 2010 Draft GALL Report, Rev. 2, Originator, and ADAMS Accession Number		
Commenter Ref. No.	**Comment No.**	**ADAMS Accession No.**
2	299	ML101830328
3	301	ML101830328
4	306	ML101830328
5	311	ML101830328
6	313	ML101830328
7	316	ML101830328
8	318	ML101830328
10	319	ML101830328
11	321	ML101830328
12	326	ML101830328
13	338	ML101830328
14	350	ML101830328
15	351	ML101830328
16	353	ML101830328
17	356	ML101830328
18 (SRP)	358	ML101830328
19 (SRP)	360	ML101830328
20 (SRP)	361	ML101830328
21 (SRP)	362	ML101830328
22 (SRP)	363	ML101830328
23 (SRP)	364	ML101830328
24 (SRP)	365	ML101830328
25 (SRP)	366	ML101830328
4.2.2.1.1.2 (SRP)	511	ML101830328
4.2.2.1.4.1 (SRP)	512	ML101830328
4.2.3.1.1 (SRP)	513	ML101830328
4.2.3.1.1.2 (SRP)	514	ML101830328
4.2.3.1.3 (SRP)	515	ML101830328
4.2.3.1.3.1 (SRP)	516	ML101830328
4.3.2 (SRP)	517	ML101830328
4.3.1 (SRP)	518	ML101830328
4.3.2.1.1.3 (SRP)	519	ML101830328
4.3.2.1.3 (SRP)	520	ML101830328

Table IV-1. Identification of Public Comments on May 2010 Draft GALL Report, Rev. 2, Originator, and ADAMS Accession Number		
Commenter Ref. No.	**Comment No.**	**ADAMS Accession No.**
4.3.2.1.4 (SRP)	521	ML101830328
4.3.2.1.5.3 (SRP)	522	ML101830328
4.3.3.1.1.2 (SRP)	523	ML101830328
Nuclear Energy Institute 6/30/2010		
VI.A-1	256	ML101830328
VI.A-2	257	ML101830328
VI.A-3	258	ML101830328
XI.E1-1	259	ML101830328
XI.E1-2	260	ML101830328
XI.E1-3	261	ML101830328
XI.E1-4	262	ML101830328
XI.E1-5	263	ML101830328
XI.E1-6	264	ML101830328
XI.E2-1	265	ML101830328
XI.E3-1	266	ML101830328
XI.E3-4	267	ML101830328
XI.E3-5	268	ML101830328
XI.E3-6	269	ML101830328
XI.E3-7	270	ML101830328
XI.E3-8	277	ML101830328
XI.E3-9	278	ML101830328
XI.E3-10	279	ML101830328
XI.E3-13	281	ML101830328
XI.E3-14	282	ML101830328
XI.E4-1	283	ML101830328
XI.E4-2	284	ML101830328
XI.E4-3	285	ML101830328
XI.E4-4	286	ML101830328
XI.E4-5	287	ML101830328
XI.E4-6	288	ML101830328
XI.E4-7	289	ML101830328
XI.E5-1	290	ML101830328

Table IV-1. Identification of Public Comments on May 2010 Draft GALL Report, Rev. 2, Originator, and ADAMS Accession Number		
Commenter Ref. No.	**Comment No.**	**ADAMS Accession No.**
XI.E5-2	291	ML101830328
XI.E5-3	292	ML101830328
XI.E5-4	293	ML101830328
XI.E6-1	294	ML101830328
XI.E6-2	295	ML101830328
XI.E6-3	296	ML101830328
XI.E6-4	297	ML101830328
SRP 2.1.3-1	241	ML101830328
SRP 2.1.3-2	242	ML101830328
SRP 2.5-1	243	ML101830328
SRP 2.5-2	244	ML101830328
SRP 2.5-3	245	ML101830328
SRP 2.5-4	246	ML101830328
SRP 3.0-1	247	ML101830328
SRP 3.0-2	248	ML101830328
SRP 3.0-3	249	ML101830328
SRP 3.0-4	250	ML101830328
SRP 3.0-5	251	ML101830328
SRP 3.0-14	252	ML101830328
SRP 3.0-16	253	ML101830328
SRP 3.6-1	254	ML101830328
SRP 3.6-2	255	ML101830328
Electric Power Research Institute BWRVIP 6/29/2010		
1	916	ML101830255
2	917	ML101830255
3	918	ML101830255
XI.M2-1	920	ML101830255
XI.M2-2	921	ML101830255
XI.M2-3	922	ML101830255
XI.M2-4	923	ML101830255
XI.M4-1	374	ML101830255

Table IV-1. Identification of Public Comments on May 2010 Draft GALL Report, Rev. 2, Originator, and ADAMS Accession Number		
Commenter Ref. No.	**Comment No.**	**ADAMS Accession No.**
XI.M4-2	375	ML101830255
XI.M4-3	376	ML101830255
XI.M6-1	377	ML101830255
XI.M7-1	378	ML101830255
XI.M7-2	379	ML101830255
XI.M8-1	380	ML101830255
XI.M8-2	381	ML101830255
XI.M8-3	382	ML101830255
XI.M8-4	383	ML101830255
XI.M9-1	384	ML101830255
XI.M9-2	385	ML101830255
XI.M9-3	386	ML101830255
XI.M9-4	387	ML101830255
XI.M9-5A	388	ML101830255
XI.M9-5B	1019	ML101830255
XI.M9-7B	1020	ML101830255
XI.M9-6	389	ML101830255
XI.M9-7A	390	ML101830255
XI.M9-8	391	ML101830255
XI.M9-9	392	ML101830255
XI.M9-10	393	ML101830255
XI.M9-11	394	ML101830255
XI.M9-12	395	ML101830255
XI.M9-13	396	ML101830255
XI.M9-14	397	ML101830255
XI.M9-15	398	ML101830255
XI.M9-16	399	ML101830255
XI.M9-17	400	ML101830255
XI.M9-18A	401	ML101830255
XI.M9-18B	1021	ML101830255
XI.M9-19A	402	ML101830255
XI.M9-19B	1022	ML101830255
XI.M9-19C	1023	ML101830255

Table IV-1. Identification of Public Comments on May 2010 Draft GALL Report, Rev. 2, Originator, and ADAMS Accession Number		
Commenter Ref. No.	**Comment No.**	**ADAMS Accession No.**
XI.M9-20	403	ML101830255
Pilgrim Watch 7/1/2010		
XI.M41-PW1	405	ML101880267
XI.M41-PW2	410	ML101880267
XI.M41-PW3	411	ML101880267
XI.M41-PW4	504	ML101880267
XI.M41-PW5	929	ML101880267
XI.M41-PW6	930	ML101880267
XI.M41-PW7	931	ML101880267
XI.M41-PW8	932	ML101880267
XI.M41-PW9	933	ML101880267
XI.M41-PW10	934	ML101880267
XI.M41-PW11	935	ML101880267
XI.M41-PW12	936	ML101880267
XI.M41-PW13	937	ML101880267
XI.M41-PW14	938	ML101880267
XI.M41-PW15	939	ML101880267
XI.M41-PW16	940	ML101880267
XI.M41-PW17	941	ML101880267
XI.M41-PW18	942	ML101880267
Supplemental Pilgrim Watch 7/1/2010		
P1 (Ray Shadis, New England Coalition)	1112	ML102420742
P2 (John H Fitzgerald, III)	1119	ML102420742
PW1 (John H Fitzgerald, III)	1123	ML102420742
P3 (John H Fitzgerald, III)	1125	ML102420742
PW4 (John H Fitzgerald, III)	1128	ML102420742
PW5 (John H Fitzgerald, III)	1126	ML102420742
PW5(2) (John H Fitzgerald, III)	1129	ML102420742
PW6 (John H Fitzgerald, III)	1143	ML102420742
P7 (John H Fitzgerald, III)	1146	ML102420742

Nuclear Energy Institute 7/1/2010		
1	943	ML101880269
2	944	ML101880269
3	863	ML101880269
4	864	ML101880269
5	945	ML101880269
6	866	ML101880269
7	867	ML101880269
8	868	ML101880269
9	869	ML101880269
10	870	ML101880269
11	871	ML101880269
12	872	ML101880269
13	873	ML101880269
14	874	ML101880269
15	876	ML101880269
16	877	ML101880269
17	946	ML101880269
18	879	ML101880269
19	880	ML101880269
20	947	ML101880269
21	881	ML101880269
22	882	ML101880269
23	883	ML101880269
24	884	ML101880269
25	885	ML101880269
26	886	ML101880269
27	887	ML101880269
28	888	ML101880269
29	948	ML101880269
30	949	ML101880269
31	950	ML101880269
32	951	ML101880269
33	952	ML101880269
34	953	ML101880269

Table IV-1. Identification of Public Comments on May 2010 Draft GALL Report, Rev. 2, Originator, and ADAMS Accession Number		
Commenter Ref. No.	**Comment No.**	**ADAMS Accession No.**
35	954	ML101880269
36	955	ML101880269
37	956	ML101880269
38	957	ML101880269
Comment 39 (SRP)	837	ML101880269
Comment 40 (SRP)	958	ML101880269
Comment 41 (SRP)	959	ML101880269
Comment 42 (SRP)	960	ML101880269
Comment 43 (SRP)	961	ML101880269
Comment 44 (SRP)	962	ML101880269
Comment 45 (SRP)	963	ML101880269
Comment 46 (SRP)	964	ML101880269
Comment 47 (SRP)	965	ML101880269
VII.K-x	434	ML101880269
VII.C1-x	505	ML101880269
VII.C1-x	430	ML101880269
VII.C2-x, VII.H2-x	437	ML101880269
VII.C1-x	438	ML101880269
V.E-x, VII.I-x, VIII.H-x	439	ML101880269
VII.C2-x, VII.H2-x, VIII.E-x	442	ML101880269
VII.C1-x	445	ML101880269
VII.C2-x	446	ML101880269
IV.E-x, V.F-x, VII.J-x, VIII.I-x	447	ML101880269
V.E-x, VII.I-x, VIII.H-x	451	ML101880269
V.E-x, VII.I-x, VIII.H-x	454	ML101880269
V.E-x, VII.I-x	457	ML101880269
VII.C1-x, VII.F2-x, VIII.G-x	459	ML101880269
III.B2-x	462	ML101880269
VII.J-x	463	ML101880269
VII.E5	506	ML101880269
IX.D	507	ML101880269
Nuclear Energy Institute 6/7/2010 (Comments on May 2010 draft XI.M41)		

Table IV-1. Identification of Public Comments on May 2010 Draft GALL Report, Rev. 2, Originator, and ADAMS Accession Number		
Commenter Ref. No.	**Comment No.**	**ADAMS Accession No.**
XI.M41-1	889	ML101610406
XI.M41-2	890	ML101610406
XI.M41-3	106	ML101610406
XI.M41-4	891	ML101610406
XI.M41-5	892	ML101610406
XI.M41-6	893	ML101610406
XI.M41-7	894	ML101610406
XI.M41-8	111	ML101610406
XI.M41-9	112	ML101610406
XI.M41-10	113	ML101610406
XI.M41-11	114	ML101610406
XI.M41-12	115	ML101610406
XI.M41-13	116	ML101610406
XI.M41-14	117	ML101610406
XI.M41-15	118	ML101610406
XI.M41-16	119	ML101610406
XI.M41-17	120	ML101610406
XI.M41-18	121	ML101610406
XI.M41-19	122	ML101610406
XI.M41-20	123	ML101610406
Nuclear Energy Institute 7/1/2010 (comments on June 18, 2010 XI.M41 draft)		
XI.M41-1	508	ML101880269
XI.M41-2	509	ML101880269
XI.M41-3	966	ML101880269
XI.M41-4	967	ML101880269
XI.M41-5	968	ML101880269
XI.M41-6	969	ML101880269
XI.M41-7	1191	ML101880269
XI.M41-8	1192	ML101880269
XI.M41-9	1193	ML101880269
XI.M41-10	475	ML101880269
XI.M41-11	1194	ML101880269

Table IV-1. Identification of Public Comments on May 2010 Draft GALL Report, Rev. 2, Originator, and ADAMS Accession Number		
Commenter Ref. No.	**Comment No.**	**ADAMS Accession No.**
XI.M41-12	1195	ML101880269
XI.M41-13	478	ML101880269
XI.M41-14	1196	ML101880269
XI.M41-15	1197	ML101880269
XI.M41-16	1198	ML101880269
XI.M41-17	1199	ML101880269
XI.M41-18	1200	ML101880269
XI.M41-19	970	ML101880269
XI.M41-20	1201	ML101880269
XI.M41-21	1202	ML101880269
XI.M41-22	487	ML101880269
XI.M41-23	488	ML101880269
XI.M41-24	489	ML101880269
XI.M41-25	490	ML101880269
XI.M41-26	491	ML101880269
Nuclear Energy Institute 8/30/2010 (supplemental comments on Aug 2010 XI.M41 draft ML102320585)		
XI.M41-3 (sup)	1154	ML102420732
XI.M41-23 (sup)	1085	ML102420732
XI.M41-28 (sup)	1087	ML102420732
Electric Power Research Institute PWR Internals 7/1/2010		
1	973	ML101880266
2	974	ML101880266
3	975	ML101880266
4	976	ML101880266
5	977	ML101880266
6	978	ML101880266
7	979	ML101880266
8	980	ML101880266
9	981	ML101880266
10	982	ML101880266
11	983	ML101880266

Table IV-1. Identification of Public Comments on May 2010 Draft GALL Report, Rev. 2, Originator, and ADAMS Accession Number		
Commenter Ref. No.	**Comment No.**	**ADAMS Accession No.**
12	984	ML101880266
13	985	ML101880266
14	986	ML101880266
15	987	ML101880266
16	988	ML101880266
17	989	ML101880266
18	990	ML101880266
19	991	ML101880266
20	992	ML101880266
21	993	ML101880266
22	994	ML101880266
23	995	ML101880266
24	996	ML101880266
25	997	ML101880266
26	998	ML101880266
27	999	ML101880266
28	1000	ML101880266
29	1001	ML101880266
30	1002	ML101880266
31	1003	ML101880266
32	1004	ML101880266
33	1005	ML101880266
34	1006	ML101880266
35	1007	ML101880266
36	1008	ML101880266
37	1009	ML101880266
38	1010	ML101880266
39	1011	ML101880266
40	1012	ML101880266
41	1013	ML101880266
42	1014	ML101880266
43	1015	ML101880266
44	1016	ML101880266

Table IV-1. Identification of Public Comments on May 2010 Draft GALL Report, Rev. 2, Originator, and ADAMS Accession Number		
Commenter Ref. No.	**Comment No.**	**ADAMS Accession No.**
PWR Owners Group		
XI.M31	492	ML101890552
XI.M31-3	493	ML101890552
XI.M31-4	494	ML101890552
XI.M31-5	495	ML101890552
XI.M31-7	496	ML101890552
XI.M31-10	497	ML101890552
XI.M31-REF	498	ML101890552
Yogen Garud 6/30/2010		
1	524	ML101880265
2	525	ML101880265
3	526	ML101880265
4	527	ML101880265
Paul Blanch 8/24/2010		
XI.M41-1(a)	1152	ML102371265
XI.M41-1(b)	1232	ML102371265
XI.M41-1(c)	1203	ML102371265
XI.M41-1(d)	1204	ML102371265
XI.M41-1(e)	1205	ML102371265
XI.M41-1(f)	1206	ML102371265
XI.M41-2(a)	1153	ML102371265
XI.M41-2(b)	1207	ML102371265
XI.M41-2(c)	1208	ML102371265
XI.M41-2(d)	1209	ML102371265
XI.M41-3(a)	1231	ML102371265
XI.M41-3(b)	1210	ML102371265
XI.M41-3(c)	1211	ML102371265
XI.M41-3(d)	1212	ML102371265
XI.M41-3(e)	1213	ML102371265
XI.M41-3(f)	1214	ML102371265
XI.M41-4(a)	1156	ML102371265

Table IV-1. Identification of Public Comments on May 2010 Draft GALL Report, Rev. 2, Originator, and ADAMS Accession Number		
Commenter Ref. No.	**Comment No.**	**ADAMS Accession No.**
XI.M41-4(b)	1215	ML102371265
XI.M41-4(c)	1216	ML102371265
XI.M41-5(a)	1159	ML102371265
XI.M41-5(b)	1217	ML102371265
XI.M41-5(c)	1218	ML102371265
XI.M41-6(a)	1161	ML102371265
XI.M41-6(b)	1219	ML102371265
XI.M41-6(c)	1220	ML102371265
XI.M41-7(a)	1221	ML102371265
XI.M41-7(b)	1163	ML102371265
XI.M41-8(a)	1222	ML102371265
XI.M41-8(b)	1164	ML102371265
XI.M41-8(c)	1223	ML102371265
XI.M41-9(a)	1165	ML102371265
XI.M41-9(b)	1229	ML102371265
XI.M41-10	1166	ML102371265
XI.M41-11	1167	ML102371265
XI.M41-12	1168	ML102371265
XI.M41-13	1169	ML102371265
XI.M41-14	1170	ML102371265
XI.M41-15	1171	ML102371265
XI.M41-16(a)	1172	ML102371265
XI.M41-16(b)	1224	ML102371265
XI.M41-17	1173	ML102371265
XI.M41-18	1174	ML102371265
XI.M41-19(a)	1175	ML102371265
XI.M41-19(b)	1225	ML102371265
XI.M41-20(a)	1176	ML102371265
XI.M41-20(b)	1226	ML102371265
XI.M41-21(a)	1177	ML102371265
XI.M41-21(b)	1227	ML102371265
XI.M41-22	1178	ML102371265
XI.M41-23	1179	ML102371265

Table IV-1. Identification of Public Comments on May 2010 Draft GALL Report, Rev. 2, Originator, and ADAMS Accession Number		
Commenter Ref. No.	**Comment No.**	**ADAMS Accession No.**
XI.M41-24	1180	ML102371265
Paul Blanch 8/30/2010		
Comment 1	1181	ML102420706
Comment 2	1182	ML102420706
Comment 3	1183	ML102420706
Comment 4	1184	ML102420706
Comment 5	1185	ML102420706
Comment 6	1186	ML102420706
Comment 7	1187	ML102420706
Comment 8	1188	ML102420706
Nuclear Energy Institute – Preliminary 8/6/2010		
Comment 1	1092	ML102180192
Comment 2	1095	ML102180192
Comment 3	1097	ML102180192
Comment 4	1099	ML102180192
Comment 5	1101	ML102180192
Structural Integrity Associates 8/20/10		
Comment 1	1155	ML102350027
Comment 2	1157	ML102350027
Comment 3	1158	ML102350027
Comment 4	1160	ML102350027
Comment 5	1162	ML102350027
Pilgrim Watch 8/24/10		
XI.M41-PW1	1079	ML102371274
XI.M41-PW2	1080	ML102371274
XI.M41-PW3	1081	ML102371274
XI.M41-PW4	1083	ML102371274
XI.M41-PW5	1084	ML102371274
XI.M41-PW6	1086	ML102371274
XI.M41-PW7	1088	ML102371274

Table IV-1. Identification of Public Comments on May 2010 Draft GALL Report, Rev. 2, Originator, and ADAMS Accession Number		
Commenter Ref. No.	**Comment No.**	**ADAMS Accession No.**
XI.M41-PW8	1089	ML102371274
XI.M41-PW8(2)	1090	ML102371274
XI.M41-PW9	1091	ML102371274
XI.M41-PW10	1093	ML102371274
XI.M41-PW11	1094	ML102371274
XI.M41-PW12	1096	ML102371274
XI.M41-PW13	1098	ML102371274
XI.M41-PW14	1100	ML102371274
XI.M41-PW15	1102	ML102371274
XI.M41-PW16	1103	ML102371274
XI.M41-PW17	1105	ML102371274
XI.M41-PW18	1106	ML102371274
XI.M41-PW19	1107	ML102371274
XI.M41-PW20	1108	ML102371274
XI.M41-PW21	1109	ML102371274
XI.M41-PW22	1110	ML102371274
XI.M41-PW23	1111	ML102371274
XI.M41-PW24	1113	ML102371274
XI.M41-PW25	1134	ML102371274
XI.M41-PW26	1115	ML102371274
XI.M41-PW27	1116	ML102371274
XI.M41-PW28	1117	ML102371274
XI.M41-PW29	1118	ML102371274
XI.M41-PW30	1120	ML102371274
XI.M41-PW31	1121	ML102371274
XI.M41-PW32	1122	ML102371274
XI.M41-PW33	1124	ML102371274
XI.M41-PW34	1190	ML102371274
XI.M41-PW35	1127	ML102371274
XI.M41-PW36	1130	ML102371274
XI.M41-PW37	1131	ML102371274
XI.M41-PW38	1132	ML102371274
XI.M41-PW39	1133	ML102371274

Table IV-1. Identification of Public Comments on May 2010 Draft GALL Report, Rev. 2, Originator, and ADAMS Accession Number		
Commenter Ref. No.	**Comment No.**	**ADAMS Accession No.**
XI.M41-PW40	1114	ML102371274
XI.M41-PW41	1135	ML102371274
XI.M41-PW42	1136	ML102371274
XI.M41-PW43	1137	ML102371274
XI.M41-PW44	1138	ML102371274
XI.M41-PW45	1139	ML102371274
XI.M41-PW46	1140	ML102371274
XI.M41-PW47	1141	ML102371274
XI.M41-PW48	1142	ML102371274
XI.M41-PW49	1144	ML102371274
XI.M41-PW50	1145	ML102371274
XI.M41-PW51	1147	ML102371274
XI.M41-PW52	1148	ML102371274
XI.M41-PW53	1149	ML102371274
XI.M41-PW54	1150	ML102371274
XI.M41-PW55	1151	ML102371274
Nuclear Energy Institute 8/20/10		
XI.M41-1	1051	ML102320585
XI.M41-2	1053	ML102320585
XI.M41-3	1054	ML102320585
XI.M41-4	1055	ML102320585
XI.M41-5	1056	ML102320585
XI.M41-6	1057	ML102320585
XI.M41-7	1058	ML102320585
XI.M41-8	1059	ML102320585
XI.M41-9	1060	ML102320585
XI.M41-10	1061	ML102320585
XI.M41-10(2)	1062	ML102320585
XI.M41-11	1063	ML102320585
XI.M41-12	1064	ML102320585
XI.M41-13	1065	ML102320585
XI.M41-14	1066	ML102320585

Table IV-1. Identification of Public Comments on May 2010 Draft GALL Report, Rev. 2, Originator, and ADAMS Accession Number		
Commenter Ref. No.	**Comment No.**	**ADAMS Accession No.**
XI.M41-15	1067	ML102320585
XI.M41-16	1068	ML102320585
XI.M41-17	1069	ML102320585
XI.M41-18	1070	ML102320585
XI.M41-19	1071	ML102320585
XI.M41-20	1072	ML102320585
XI.M41-21	1073	ML102320585
XI.M41-22	1074	ML102320585
XI.M41-23	1075	ML102320585
XI.M41-24	1076	ML102320585
XI.M41-25	1077	ML102320585
XI.M41-26	1078	ML102320585
Beyond Nuclear 7/2/2010		
XI.M41-1	1228	ML101930270
Structural Integrity Associates, Inc., Steve Biagiotti		
XI.M41	1230	ML102500311

Table IV-2. Analysis and Disposition of Public Comments on Chapter I, May 2010 Public Comment Draft GALL Report, Rev. 2

Comment Number	Location in Document and/or Commenter Reference No.	Public Comment	NRC Disposition	Technical Basis
N/A	Chapter I	There were no notable technical changes that resulted from public comments, only clarifications that are editorial in nature.	N/A	N/A

Table IV-3. Analysis and Disposition of Public Comments on Chapter II, May 2010 Public Comment Draft GALL Report, Rev. 2

Comment Number	Location in Document and Commenter Reference No.	Public Comment	NRC Disposition	Technical Basis
311	II.A3.CP-98 II.B4.CP-98 ML101830328, Comment 5	(DELETE) Chapter XI.S1, "ASME Section XI, Subsection IWE," and (KEEP) Chapter XI.S4, "10 CFR Part 50, Appendix J" IWE will not detect loss of leak tightness.	The staff disagrees with this comment. The GALL Report has not been changed.	Though XI.S4 (10 CFR Part 50, Appendix J) is the main AMP for measuring leak rate from the containment components, AMP XI.S1 (ASME Section XI, Subsection IWE) is the ISI for pressure retaining components. ISI of penetration closures, and pressure retaining bolting is performed for ensuring leak-tightness.
298	II.A1.CP-101 ML101830328, Comment 1	Chapter XI.S2, "ASME Section XI, Subsection IWL," (ADD) or Chapter XI.S6, "Structure Monitoring" Evidence of degradation due to this aging effect can also be identified under Structure Monitoring.	The staff agrees with this comment and associated changes to the GALL Report have been made.	Evidence of degradation due to this aging effect can also be identified under XI.S6 (Structures Monitoring). Element 3, Parameters Monitored, includes monitoring concrete for cracking. GALL Report AMP column was revised to add XI.S6.
306	II.A1.CP-98 IIA2.CP-98 II.B1.2.CP-63 II.B2.1.CP-63 II.B2.2.CP-63 ML101830328, Comment 4	4. Borated water spills and water ponding on the concrete floor are <u>not</u> common and when detected are cleaned up or diverted to a sump in a timely manner. (1) Spills are not common. (2) To be consistent with II.B3.2.CP-98.	The staff disagrees with this comment. The GALL Report has not been changed.	OE indicates that the borated water leakage in PWR containments are common. No changes required for II.A1.CP-98 and II.A2.CP-98.
299	II.A2.CP-71 II.B3.1.CP-71 ML101830328,	Chapter XI.S6, "Structures Monitoring," (ADD) or Chapter XI.S2, "ASME Section XI, Subsection IWL" Evidence of degradation due to this aging	The staff agrees with this comment and associated changes to the GALL Report	XI.S2 (ASME Section XI, Subsection IWL) can be used for monitoring containment basemats. GALL Report AMP column was

Table IV-3. Analysis and Disposition of Public Comments on Chapter II, May 2010 Public Comment Draft GALL Report, Rev. 2

Comment Number	Location in Document and Commenter Reference No.	Public Comment	NRC Disposition	Technical Basis
	Comment 2	effect may be identified under IWL.	have been made.	revised to add XI.S2.
301	II.A2.CP-69 II.B1.2.CP-105 II.B2.2.CP-105 II.B3.1.CP-69 II.B3.2.CP-105 ML101830328, Comment 3	Chapter XI.S2, "ASME Section XI, Subsection IWL," (ADD) or Chapter XI.S6, "Structure Monitoring" Evidence of degradation due to this aging effect can also be identified under Structure Monitoring.	The staff agrees with this comment and associated changes to the GALL Report have been made.	Evidence of degradation due to this aging effect can also be identified under XI.S6, "Structures Monitoring."
313	II.A3.CP-152 II.B4.CP-152 III.A4.TP-301 ML101830328, Comment 6	Chapter XI.S8, "Protective Coating Monitoring and Maintenance" (ADD) or plant specific program in response to GL 98 - 04 for those plants not crediting coatings for loss of material. All plants have developed plant specific program in response to GL 98 - 04 to monitor and maintain condition of containment coatings.	The staff disagrees with this comment. The GALL Report has not been changed.	The plant-specific program needs to be revised (updated) when the industry standard is revised and approved by NRC
316	II.A3.CP-150 II.B4.CP-150 ML101830328, Comment 7	(DELETE) Structural (REPLACE WITH) Pressure - retaining bolting in Structures and Component column Chapter XI.S1, "ASME Section XI, Subsection IWE" applies to containment pressure - retaining bolting only.	The staff agrees with this comment and associated changes to the GALL Report have been made.	Agree that XI.S1 (ASME Section XI, Subsection IWE) applies to pressure-retaining bolting only.
318	II.A3.CP-148 II.A3.CP-150 ML101830328, Comment 8	(DELETE) Structural (REPLACE WITH) Pressure - retaining bolting in the Structures and Component column. Chapter XI.S1, "ASME Section XI, Subsection IWE" applies to containment pressure - retaining bolting only.	The staff agrees with this comment and associated changes to the GALL Report have been made.	Agree that XI.S1 (ASME Section XI, Subsection IWE) applies to pressure-retaining bolting only.

Table IV-3. Analysis and Disposition of Public Comments on Chapter II, May 2010 Public Comment Draft GALL Report, Rev. 2

Comment Number	Location in Document and Commenter Reference No.	Public Comment	NRC Disposition	Technical Basis
319	II.A3.CP-36 II.B4.CP-36 ML101830328, Comment 10	Chapter XI.S1, “ASME Section XI, Subsection IWE” and, Chapter XI.S4, “10 CFR Part 50, Appendix J” (Note: IWE examination category E-F, surface examination of dissimilar metal welds, specified in 1992 edition of ASME Code is recommended) Examination category E-F does no longer exist on latest edition of the ASME Code. If augmentation to code requirements is necessary they should be addressed in the program of Chapter XI.S1, “ASME Section XI, Subsection IWE.”	The staff agrees with this comment and associated changes to the GALL Report have been made.	Agree that category E-F does not exist in ASME Code 2004 edition. Element 3 of AMP XI.S1 (ASME Section XI, Subsection IWE) is augmented to include category E-F for inaccessible areas, such as at the vent-line bellows, use of Type A or Type B testing is acceptable.

Table IV-4. Analysis and Disposition of Public Comments on Chapter III, May 2010 Public Comment Draft GALL Report, Rev. 2

Comment Number	Location in Document and Commenter Reference No.	Public Comment	NRC Disposition	Technical Basis
321	III.A1.TP-114 III.A2.TP-114 III.A3.TP-114 III.A4.TP-114 III.A5.TP-114 ML101830328, Comment 11	Plant-specific aging management program. (DELETE) The implementation of 10 CFR 50.55a and ASME Section XI, Subsection IWL would not be able to identify the reduction of strength and modulus of elasticity due to elevated temperature. Thus, for any portions of concrete containment that exceed specified temperature limits, further evaluations are warranted. (KEEP) Subsection CC-3400 of ASME Section III, Division 2, specifies the concrete temperature limits for normal operation or any other long-term period. The temperatures shall not exceed 150°F except for local areas, such as around penetrations, which are not allowed to exceed 200°F. If significant equipment loads are supported by concrete at temperatures exceeding 150°F, an evaluation of the ability to withstand the postulated design loads is to be made. Higher temperatures than given above may be allowed in the concrete if tests and/or calculations are provided to evaluate the reduction in strength and modulus of elasticity and these reductions are applied to the design calculations. IWL does not apply to Group I Structures	The staff agrees with this comment and associated changes to the GALL Report have been made.	IWL does not apply to Group I Structures.
326	III.A1.TP-300 III.A2.TP-300 III.A3.TP-300 III.A4.TP-300	Delete these line items. These line items are not supported by OE and should be removed or limited to the specific type of bolting material and sizes where cracking has been found on NSSS supports. It is not warranted	The staff disagrees with this comment. AMR line was not deleted; however, AMP XI.S6 was	ASTM A325, ASTM F1852, and ASTM A 490 bolts are normally used for Civil-structures. There is no OE to suggest that these bolts could be susceptible to SCC.

Table IV-4. Analysis and Disposition of Public Comments on Chapter III, May 2010 Public Comment Draft GALL Report, Rev. 2

Comment Number	Location in Document and Commenter Reference No.	Public Comment	NRC Disposition	Technical Basis
	III.A5.TP-300 III.A7.TP-300 III.A8.TP-300 III.A9.TP-300 III.B2.TP-300 III.B3.TP-300 III.B4.TP-300 III.B5.TP-300 ML101830328, Comment 12	to generically extend the limited material specific OE (which may be partially caused by the type of lubricant) to all bolts of 150 ksi and over regardless of material and lubricant.	revised to address this comment.	Maximum tensile stress allowed is less than 110 KSI. Maintained the line as it was, however, AMP XI.S6 was revised to recommend use of RCSC guidance for these bolts.
338	III.A1.TP-287 III.A2.TP-287 III.A3.TP-287 III.A4.TP-287 III.A5.TP-287 III.A7.TP-287 III.A8.TP-287 III.A9.TP-287 III.B2.TP-287 III.B3.TP-287 III.B4.TP-287 III.B5.TP-287 ML101830328, Comment 13	Delete these line items. These line items are covered under III.A1.TP-248 and III.A1.TP-274.	The staff agrees with this comment and associated changes to the GALL Report have been made.	For loss of material aging effect, high-strength structural bolting is considered part of steel bolting.

Table IV-4. Analysis and Disposition of Public Comments on Chapter III, May 2010 Public Comment Draft GALL Report, Rev. 2

Comment Number	Location in Document and Commenter Reference No.	Public Comment	NRC Disposition	Technical Basis
350	III.A5.TP-34 ML101830328, Comment 14	Delete this line item. The aging effect for the block walls are adequately covered under line item III.A5.T-12.	The staff disagrees with this comment. The GALL Report has not been changed.	Exposure and aging effects are different for T-12 and TP-34.
351	III.A6.TP-223 ML101830328, Comment 15	(ADD) Chapter XI.S6, "Structure Monitoring Program" or (KEEP) Chapter XI.S7, "RG 1.127, Inspection of Water-Control Structures Associated with Nuclear Power Plants" or the FERC / US Army Corp of Engineers dam inspections and maintenance programs. To maintain option of evaluating wood components under Structures Monitoring.	The staff disagrees with this comment. The GALL Report has not been changed.	As wooden piles and sheeting are parts of water control structures, RG 1.127 is the correct guidance. Applicants have latitude to merge AMP XI.S7 (RG 1.127, Inspection of Water-Control Structures Associated with Nuclear Power Plants) with AMP XI.S6 (Structures Monitoring).
353	III.B1..1.TP-232 III.B1.2.TP-232 III.B1.3.TP-232 ML101830328, Comment 16	Chapter XI.M2, "Water Chemistry," (DELETE) for BWR water, (KEEP) and Chapter XI.S3, "ASME Section XI, Subsection IWF" It is self explanatory without referencing to BWR since these line items apply to BWR.	The staff agrees with this comment and associated changes to the GALL Report have been made.	These items apply to BWRs.
356 363	III.B2.TP-41 III.B3.TP-41 ML101830328, Comment 17	Delete these line items. This material does not apply to this group (III.B2 and III.B3).	The staff agrees with this comment and associated changes to the GALL Report have been made.	This is a duplicate of III.B2.TP-300 and III.B3.TP-300.
462	III.B2.-x ML101880269, Comment III.B2	GALL addresses stainless steel embedded in concrete (VII.J-17 & VIII.I-11). An approved precedent exists for adding this material, environment, aging effect, and program combination to the GALL Report. As shown in	The staff disagrees with this comment. The GALL Report has not been changed.	This item was identified in January 2010. NRC staff rejected it based on recent buried piping experience. Also, aluminum alloys are not stable at high pH and

Table IV-4. Analysis and Disposition of Public Comments on Chapter III, May 2010 Public Comment Draft GALL Report, Rev. 2

Comment Number	Location in Document and Commenter Reference No.	Public Comment	NRC Disposition	Technical Basis
		Browns Ferry SER page 3-322, the staff accepted the position that aluminum alloy embedded or encased in concrete has no aging effect that requires aging management. Aluminum has an excellent resistance to corrosion. On a surface freshly abraded and then exposed to air, the oxide film is only 5 to 10 nanometer thick but is highly effective in protecting the aluminum from corrosion (Hollingsworth and Hunsicker 1979). Aluminum that is embedded/encased within concrete, loss of material is not considered an applicable aging effect. The concrete would first have to be degraded by other aging effects, which reduce the protective cover and potentially allow for the intrusion of aggressive ions causing a reduction in concrete pH. Aging management of concrete aging effects will manage the corrosion of the embedded/encased aluminum protective oxide layer. Concrete structures and components are designed in accordance with ACI standards and constructed using materials conforming to ACI and ASTM standards which provide fo[r] a good quality, dense, well cured, and low permeability concrete. Cracking is controlled through arrangement and distribution of reinforcing bars.		corrode at high rate in high pH environment.

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Comment Number	Location in Document and Commenter Reference No.	Public Comment	NRC Disposition	Technical Basis
863	IV.A1-6 ML101880269, Comment 3	Referring to AMR Item IV.A1.RP-227: (DELETE) Yes, plant specific or integrated surveillance program, (ADD) No The use of an AMP consistent with GALL should not require further evaluation.	The staff disagrees with this comment. The GALL Report has not been changed.	The Reactor Vessel Surveillance Program requires further evaluation because it is plant-specific, depending upon matters such as the composition of the limiting materials, availability of surveillance capsules, and projected neutron fluence. In accordance with 10 CFR Part 50, Appendix H, an applicant submits its proposed withdrawal schedule for approval prior to implementation. Thus, further staff evaluation is required for license renewal.
864	IV.A2-5 ML101880269, Comment 4	Referring to AMR Item IV.A2.RP-228: (DELETE) Yes, plant specific or integrated surveillance program,(ADD) No The use of an AMP consistent with GALL should not require further evaluation.	The staff disagrees with this comment. The GALL Report has not been changed.	The Reactor Vessel Surveillance Program requires further evaluation because it is plant-specific depending upon matters such as the composition of the limiting materials, availability of surveillance capsules, and projected neutron fluence. In accordance with 10 CFR Part 50, Appendix H, an applicant submits its proposed withdrawal schedule for approval prior to implementation. Thus, further staff evaluation is required for license renewal.

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Comment Number	Location in Document and Commenter Reference No.	Public Comment	NRC Disposition	Technical Basis
945	IV.A2-8 ML101880269, Comment 5	Referring to AMR Item IV.A2.RP-229: (DELETE) Yes, plant specific or integrated surveillance program,(ADD) No The use of an AMP consistent with GALL should not require further evaluation.	The staff disagrees with this comment. The GALL Report has not been changed.	The Reactor Vessel Surveillance Program requires further evaluation because it is plant-specific depending upon matters such as the composition of the limiting materials, availability of surveillance capsules, and projected neutron fluence. In accordance with 10 CFR Part 50, Appendix H, an applicant submits its proposed withdrawal schedule for approval prior to implementation. Thus, further staff evaluation is required for license renewal.
866	IV.B2-40 ML101880269, Comment 6	Referring to AMR Item IV.B2.RP-301: Delete reference to “no expansion components” In MRP-227 there are no expansion components associated with existing program components. This is a generic comment for other “existing program component” AMR lines that reference “no expansion components.”	The staff disagrees with this comment. The GALL Report has not been changed.	The “no expansion components” for items with existing program components is necessary because the line items are for multiple users, and all users do not know that the existing components do not have Expansion Components.
867	IV.B2 ML101880269, Comment 7	Revise AMR lines that reference AMP XI.M16 based on the aging effects identified by MRP-227 Table 3-3 and the management of relevant mechanisms by MRP-227 Table 4-3 (primary components), MRP-227 Table 4-6 (expansion components), and MRP-227 Table	The staff disagrees with this comment. The GALL Report has not been changed.	Since Table 3-3 identifies all the aging effects that have been screened in, all items will be retained. The applicant’s AMP must be capable of managing all the aging effects that were

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Comment Number	Location in Document and Commenter Reference No.	Public Comment	NRC Disposition	Technical Basis
		4-9 (existing program components). Consistency of AMR lines with MRP-227 Table 4-3 (primary components), MRP-227 Table 4-6 (expansion components), and MRP-227 Table 4-9 (existing program components).		screened in by the MRP-227 analyses.
868	IV.B2-11 ML101880269, Comment 8	Referring to AMR Item IV.B2.RP-268: This AMR line is not required and should be deleted. "Reactor vessel internal components (inaccessible locations)" are and should be handled programmatically by the AMP XI.M16A, "PWR Vessel Internals.". The NRC staff review of MRP-227 should address this issue and provide guidance in the SE that is to be issued.	The staff disagrees with this comment. The GALL Report has not been changed.	This comment requests that line items that identify inaccessible locations in reactor vessel internals be eliminated and should be handled programmatically by AMP XI.M16A (PWR Vessel Internals) or the staff's safety evaluation for MRP-227. Since MRP-227 does not assess each component that has an inaccessible location, the line items are being maintained for completeness.
869	IV.B2-12 ML101880269, Comment 9	Referring to AMR Item IV.B2.RP-269: This AMR line is not required and should be deleted. "Reactor vessel internal components (inaccessible locations)" are and should be handled programmatically by the AMP XI.M16A, "PWR Vessel Internals.". The NRC staff review of MRP-227 should address this issue and provide guidance in the SE that is to be issued.	The staff disagrees with this comment. The GALL Report has not been changed.	This comment requests that line items that identify inaccessible locations in reactor vessel internals be eliminated and should be handled programmatically by AMP XI.M16A (PWR Vessel Internals) or the staff's safety evaluation for MRP-227. Since MRP-227 does not assess each component that has an inaccessible location, the line items are being maintained for completeness.
870	IV.B3-15	Referring to AMR Item IV.B3.RP-309:	The staff disagrees	This comment requests that line

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Comment Number	Location in Document and Commenter Reference No.	Public Comment	NRC Disposition	Technical Basis
	ML101880269, Comment 10	This AMR line is not required and should be deleted. “Reactor vessel internal components (inaccessible locations)” are and should be handled programmatically by the AMP XI.M16A, “PWR Vessel Internals”. The NRC staff review of MRP-227 should address this issue and provide guidance in the SE that is to be issued.	with this comment. The GALL Report has not been changed.	items that identify inaccessible locations in reactor vessel internals be eliminated and should be handled programmatically by AMP XI.M16A (PWR Vessel Internals) or the staff’s safety evaluation for MRP-227. Since MRP-227 does not assess each component that has an inaccessible location, the line items are being maintained for completeness.
871	IV.B3-16 ML101880269, Comment 11	Referring to AMR Item IV.B3.RP-311: This AMR line is not required and should be deleted. “Reactor vessel internal components (inaccessible locations)” are and should be handled programmatically by the AMP XI.M16A, “PWR Vessel Internals”. The NRC staff review of MRP-227 should address this issue and provide guidance in the SE that is to be issued.	The staff disagrees with this comment. The GALL Report has not been changed.	This comment requests that line items that identify inaccessible locations in reactor vessel internals be eliminated and should be handled programmatically by AMP XI.M16A (PWR Vessel Internals) or the staff’s safety evaluation for MRP-227. Since MRP-227 does not assess each component that has an inaccessible location, the line items are being maintained for completeness.
872	IV.B4-11 ML101880269, Comment 12	Referring to AMR Item IV.B4.RP-238: This AMR line is not required and should be deleted. “Reactor vessel internal components (inaccessible locations)” are and should be handled programmatically by the AMP XI.M16A, “PWR Vessel Internals.”. The NRC staff review of MRP-227 should	The staff disagrees with this comment. The GALL Report has not been changed.	This comment requests that line items that identify inaccessible locations in reactor vessel internals be eliminated and should be handled programmatically by AMP XI.M16A (PWR Vessel Internals) or the staff’s safety evaluation for MRP-227. Since MRP-227 does

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Comment Number	Location in Document and Commenter Reference No.	Public Comment	NRC Disposition	Technical Basis
		address this issue and provide guidance in the SE that is to be issued.		not assess each component that has an inaccessible location, the line items are being maintained for completeness.
873	IV.B4-12 ML101880269, Comment 13	Referring to AMR Item IV.B4.RP-239: This AMR line is not required and should be deleted. "Reactor vessel internal components (inaccessible locations)" are and should be handled programmatically by the AMP XI.M16A, "PWR Vessel Internals." The NRC staff review of MRP-227 should address this issue and provide guidance in the SE that is to be issued.	The staff disagrees with this comment. The GALL Report has not been changed.	This comment requests that line items that identify inaccessible locations in reactor vessel internals be eliminated and should be handled programmatically by AMP XI.M16A (PWR Vessel Internals) or the staff's safety evaluation for MRP-227. Since MRP-227 does not assess each component that has an inaccessible location, the line items are being maintained for completeness.
874	IV.C1-3 ML101880269, Comment 14	Referring to AMR Item IV.C1.RP-43: The environment should be "Air <u>with reactor coolant leakage</u>." See AMR line IV.C1.RP-42 on page IV.C1-3 directly beneath.	The staff disagrees with this comment. The GALL Report has not been changed.	Both RP-42 and RP-43 are results for steel or stainless steel closure bolting in BWR reactor coolant pressure boundary systems. For RP-42, the aging effect is loss of material due to general (steel only) pitting or crevice corrosion. For RP-43, the aging effect is loss of preload due to thermal effects, gasket creep and self-loosening. Since coolant leakage has a more significant effect on loss of material (RP-42) than on loss of preload (RP-43), it is not necessary to include "with reactor coolant

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Comment Number	Location in Document and Commenter Reference No.	Public Comment	NRC Disposition	Technical Basis
				leakage" as part of the environment description for RP-43.
876	IV.C2-7 ML101880269, Comment 15	Add a new AMR line [related to IV.C1.RP-231] for "Pressurizer relief tank: tank shell and heads; flanges; nozzles" that are outside of ASME Section XI ISI boundaries. It is suggested that the AMPs used be XI.M2, "Water Chemistry," and XI.M32, "One-Time Inspection." [Editor's Note: See original document for the recommended new AMR line that goes with this comment.] The pressurizer spray head is also a non-ASME Section XI component that is managed by the same AMPs (see page IV.C2-8, AMR line IV.C2.RP-41) for the same aging effect.	The staff agrees with this comment and associated changes to the GALL Report have been made.	AMR Item IV.C2.RP-383 was added to the GALL Report in response to this comment. The staff has previously found the combination of the "Water Chemistry" and "One-Time Inspection" programs adequate for aging management of the pressurizer spray head, which is also a non-ASME Section XI component with similar material, environment and aging effect.
877	IV.D1-3 ML101880269, Comment 16	Referring to AMR Item IV.D1.RP-367: The AMR line is missing the plant-specific AMP referenced in SRP Section 3.1.2.2.11. Revise the AMP to XI.M2, "Water Chemistry" (ADD) and plant-specific aging management program to address SG divider plate cracking. The AMR line is inconsistent with the SRP requirement in Section 3.1.2.2.11.	The staff agrees with this comment and associated changes to the GALL Report have been made.	AMR item IV.D1.RP-367 in the April 2010 draft of the GALL Report was revised in response to this comment by adding a discussion of the further evaluation into the AMP column. The AMR item was inconsistent with the SRP-LR requirement in Section 3.1.2.2.11. The recommended change eliminates that inconsistency.
946	IV.D1-7 ML101880269,	Referring to AMR Item IV.D1.R-44: The AMPs refer to "secondary water" when the environment is "Reactor coolant." This is	The staff agrees with this comment and associated changes	AMR item IV.D1.R-44 was revised in response to this comment by deleting the phrase "for PWR

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Comment Number	Location in Document and Commenter Reference No.	Public Comment	NRC Disposition	Technical Basis
	Comment 17	considered to be a typographical error. However, it should be coordinated with Comment 1. [Editor's Note: Comment 1 is assigned Comment Number 943 in NUREG-1950.]	to the GALL Report have been made.	secondary water." This was coordinated with a general change related to description of the "Water Chemistry" program in the GALL Report tables. This is a correction of wording. There was no change of technical intent. Since there was no change in technical intent, IV.D1.R-44 is not listed in NUREG-1950 Table II-7 as a changed record. Therefore, this comment does not appear in tables II or III.
879	IV.D1-8 ML101880269, Comment 18	Referring to AMR Item written "IV.D1-RP-XXX" in the April 2010 draft of the GALL Report: This line is a duplicate of IV.D1.RP-372 on page IV.D1-3. See Item IV.D1.RP-372 on page IV.D1-3.	The staff agrees with this comment and associated changes to the GALL Report have been made.	The deleted item was a typographic error. It was redundant to RP-372 and was not intended to be included in the April draft of the GALL Report. This comment 879 is shown in Table II-3 as a comment affecting IV.D1-RP-372; the deleted record is not shown because it has been deleted from the earlier draft.
447	IV, V, VII, VIII ML101880269, Comment IV.E-x, V.F-x, VII.J-x, VIII.I-x	[The comment recommends adding a new AMR line in GALL Tables IV.E, V.F, VII.J, and VIII.I, for nickel-alloy piping, piping components, and piping elements in an environment of air with borated water leakage, and showing an AERM of "None" and AMP of "None."] The American Welding Society (AWS) "Welding Handbook," (Seventh Edition,	The staff agrees with this comment and associated changes to the GALL Report have been made.	New AMR items IV.E.RP-378, V.F.EP-115, VII.J.AP-260 and VIII.I.SP-148 were added with the recommended MEAP combination. The GALL Report includes stainless steel material in air with borated water leakage as "None-None." Nickel-alloy material is just as impervious to borated water

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		Volume 4, 1982, Library of Congress) identifies that nickel chromium alloy materials that are alloyed with iron, molybdenum, tungsten, cobalt or copper in various combinations have improved corrosion resistance. The Staff's evaluation in the Beaver Valley SER concluded that nickel-alloy components exposed to an external air with borated water leakage environment are resistant to the phenomena of corrosion and oxidation.		environment. Also, the staff has previously accepted in SERs that nickel alloy in air with borated water leakage environment has no aging effects requiring management.
973	IV.B2 ML101880266, Comment 1	Typographical. Table IV B2, Item IV.B2.RP-272, Column 6. Move the first semi-colon (after the word "toughness") to the location after the word "embrittlement." See Item IV.B2.RP-354, Item IV.B2.RP-274, and other items with the same series of Degradation Effects/Mechanisms.	The staff agrees with this comment and associated changes to the GALL Report have been made.	This was an administrative correction. There was no change in technical intent. Item IV.B2.RP-272 is shown in NUREG-1950 Table II-7 as a record affected by this comment.
974	IV.B2 ML101880266, Comment 2	Typographical. Table IV B2, Item IV.B2.RP-301, Column 2. Change "V.B2-40 (R-112)" to "IV.B2-40 (R-112)."	The staff agrees with this comment and associated changes to the GALL Report have been made.	This was an administrative correction. There was no change in technical intent. Item IV.B2.RP-301 is shown in NUREG-1950 Table II-7 as a record affected by this comment.
975	IV.B2 ML101880266, Comment 3	Technical. Table IV B2, Items IV.B2.RP-301, IV.B2.RP-299, IV.B2.RP-284, IV.B2.RP-355, IV.B2.RP-356, IV.B2.RP-285, IV.B2.RP-289, IV.B2.RP-288, and IV.B2.RP-346, Column 7. Eliminate the reference to "no Expansion components" since there are never any	The staff disagrees with this comment. The GALL Report has not been changed.	The "no expansion components" for these items is necessary because the line items are for multiple users and the existing wording provides clarification that existing components do not have

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Comment Number	Location in Document and Commenter Reference No.	Public Comment	NRC Disposition	Technical Basis
		Expansion Components associated with Existing Program Components.		Expansion Program Components.
976	IV.B2 ML101880266, Comment 4	Technical. Table IV B2, Item IV.B2.RP-300, Column 6. Write the Mechanism/Effect as simply “Loss of preload.”	The staff disagrees with this comment. The GALL Report has not been changed.	Table 3-3 of MRP-227 indicates that internal hold-down springs are primary components that are subject to wear. The wear results from loss of preload when inadequate preload remains. For completeness, both aging effects are identified.
977	IV.B2 ML101880266, Comment 5	Technical. Table IV B2, Items IV.B2.RP-301 and IV.B2.RP-299. We recommend that Item IV.B2.RP-301 be eliminated, with only Item IV.B2.RP-299 retained. Although Table 3-3 (Page 3-24) of MRP-227 shows an “X” for both SCC and wear, Table 4-9 (Page 4-69) of MRP-227 shows only “Loss of material (Wear)” as the Effect (Mechanism) for which the Existing Section XI visual examination program is credited.	The staff disagrees with this comment. The GALL Report has not been changed.	Since Table 3-3 of MRP-227 identifies SCC and wear as aging effects, both items IV.B2.RP-301 and -299 will be retained.
978	IV.B2 ML101880266, Comment 6	Technical. Table IV B2, Items IV.B2.RP-272, IV.B2.RP-274, and IV.B2.RP-287. We recommend that these three items be eliminated, with only Items IV.B2.RP271, IV.B2.RP-273, and IV.B2.RP286 retained. Although Table 3-3 (Page 3-23) of MRP-227 also shows “P” for IE, VS, and ISR/IC, Table 4-3 (Page 4-25) of MRP-227 shows only Cracking (IASCC and Fatigue), and the examination requirements only apply to those	The staff disagrees with this comment. The GALL Report has not been changed.	Since Table 3-3 of MRP-227 identifies all of these aging effects have been screened in, all items will be retained. Element 3 of XI.M16A, “PWR Vessel Internals” indicates irradiation embrittlement, thermal embrittlement and void swelling are managed by visual examination to monitor cracking. Therefore, no change to AMR

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		two Effects (Mechanisms).		items IV.B2.RP-272, -274 and -287 is necessary.
979	IV.B2 ML101880266, Comment 7	Typographical. Table IV B2, Items IV.B2.RP-275 and IV.B2.RP-354, Column 3. Change “Baffle-to-former assembly: barrel-edge bolts (all plants with baffle-edge bolts” to “Baffle-to-former assembly: baffle-edge bolts (all plants with baffle-edge bolts” for both items.	The staff agrees with this comment and associated changes to the GALL Report have been made.	This was an administrative correction. There was no change in technical intent. Items IV.B2.RP-275 and IV.B2.RP-354 are shown in NUREG-1950 Table II-7 and Table II-3, respectively, as a record affected by this comment.
980	IV.B2 ML101880266, Comment 8	Technical. Table IV B2, Item IV.B2.RP-354. We recommend that this item be eliminated with only Item IV.B2.RP-275 retained. Although Table 3-3 (Page 3-23) of MRP-227 also shows “P” for IE, VS, and ISR/IC, Table 4-3 (Page 4-25) of MRP-227 shows only Cracking (IASCC and Fatigue), and the examination requirements only apply to those two Effects (Mechanisms).	The staff disagrees with this comment. The GALL Report has not been changed.	Since Table 3-3 of MRP-227 identifies all these aging effects have been screened in, all items will be retained. Element 3 of XI.M16A, “PWR Vessel Internals” indicates irradiation embrittlement, thermal embrittlement and void swelling are managed by visual examination to monitor cracking. Therefore, no change to AMR item IV.B2.RP-354 is necessary.
981	IV.B2 ML101880266, Comment 9	Technical. Table IV B2, Items IV.B2.RP-298, IV.B2.RP-297, IV.B2.RP-291, IV.B2.RP-293, IV.B2.RP-290, and IV.B2.RP-292. First, in Columns 2 and 3 for Items IV.B2.RP-298 and IV.B2.RP-297, change “weld” to “welds” and “cast austenitic stainless steel” to “stainless steel,” since the concern is all of the CRGT lower flange welds and Table 3-3 (Page 3-23) of MRP-227 erroneously lists the items as “Lower Flanges” made of CF8, rather	The staff partially agrees with this comment (first part), but disagrees with the remainder of the comment. However, the comment did result in a revision to the document for clarification.	First: Staff agrees with this comment and made changes accordingly. This change corrects a wording issue. No change of technical intent. This results in a change to AMR items IV.B2.RP-298 and IV.B2.RP-297. Second: Staff disagrees with this comment. Since Table 3-3 of MRP-227 identifies all these aging

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		than 304 SS Lower Flange Welds. Second, we recommend that Item IV.B2.RP-297 be eliminated, retaining only Item IV.B2.RP-298. Although Table 3-3 (Page 3-23) of MRP-227 also shows “P” for TE and IE, Table 4-3 (Page 4-24) of MRP-227 shows only Cracking (SCC and Fatigue), and the examination requirements only apply to those two Effects (Mechanisms). Third, we recommend that Item IV.B2.RP-290 be eliminated, retaining only Item IV.B2.RP-291. Although Table 3-3 (Page 3-24) of MRP-227 shows “E” for both IASCC and IE, Table 4-6 (Page 4-34) of MRP-227 shows only IASCC, and the examination requirements only apply to this Effect (Mechanism). Fourth, we recommend that Item IV.B2.RP-292 be eliminated, retaining only Item IV.B2.RP-293. Although Table 3-3 (Page 3-23) of MRP-227 shows “E” for both Fatigue and IE, Table 4-6 (Page 4-34) of MRP-227 shows only Cracking (Fatigue), and the examination requirements only apply to this Effect (Mechanism).		effects have been screened in, all items will be retained. Element 3 of XI.M16A, “PWR Vessel Internals” indicates irradiation embrittlement, thermal embrittlement and void swelling are managed by visual examination to monitor cracking. Therefore, no change to IV.B2.RP-297 is necessary. Third: Staff disagrees with this comment. Since Table 3-3 of MRP-227 identifies all these aging effects have been screened in, all items will be retained. Element 3 of AMP XI.M16A, “PWR Vessel Internals” indicates irradiation embrittlement, thermal embrittlement and void swelling are managed by visual examination to monitor cracking. Therefore, no change to IV.B2.RP-290 is necessary. Fourth: Staff disagrees with this comment. Since Table 3-3 of MRP-227 identifies all these aging effects have been screened in, all items will be retained. Element 3 of AMP XI.M16A indicates irradiation embrittlement, thermal embrittlement and void swelling are managed by visual

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				examination to monitor cracking. Therefore, no change to IV.B2.RP-292 is necessary.
982	IV.B2 ML101880266, Comment 10	Typographical. Table IV B2, Item IV.B2.RP-355, Column 7. Change “Existngn” to “Existing.”	The staff agrees with this comment and associated changes to the GALL Report have been made.	This change corrects a typographic error. Item IV.B2.RP-355 in Table II-3 is shown as affected by this comment; however, other subsequent changes deleted the wording affected by this comment.
983	IV.B2 ML101880266, Comment 11	Technical. Table IV B2, Items IV.B2.RP-276, IV.B2.RP-278, IV.B2.RP-280, IV.B2.RP-281, IV.B2.RP-282, IV.B2.RP-294, and IV.B2.RP-295. First, we recommend that IV.B2.RP-276 be identified only with SCC, as shown in Table 4-3 (Page 4-24) of MRP-227, since Table 3-3 (Page 3-24) of MRP-227 shows a “P” for SCC and a “E” for IASCC and the “P” classification governs. However, the EVT-1 inspection does not distinguish between cracking mechanisms. Second, there is no problem with Item IV.B2.RP-278. However, there is a discrepancy between Table 3-3 (Page 3-24) of MRP-227 and Table 4-6 (Page 4-33) of MRP-227 with respect to the Expansion Components for the upper core barrel flange weld (IV.B2.RP-276). The item listed as “Core Barrel Axial Welds” in Table 3-3 should be listed as “Lower Core Barrel Flange Weld.”	The staff partially agrees with this comment. The comment resulted in a revision to the document for clarification.	First: No change was made. Both mechanisms must be evaluated as a result of the proposed examination. Therefore, no change to the line items is necessary. Second: Changed AMR items IV.B2.RP-280 and IV.B2.RP-281 to “Lower Core Barrel Flange Weld.” Changed AMR itemIV.B2.RP-282 to “Core barrel assembly: core barrel flange,” and added fatigue as an aging mechanism. These changes are necessary due to the error in Table 3-3 of MRP-227. IV.B2.RP-282 cannot replace IV.B2.RP-281 and IV.B2.RP-280 because they are different components. Third: The staff agrees with the statement. However, no additional change is necessary because in

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		Then, Items IV.B2.RP-280 and IV.B2.RP-281 should be eliminated. Item IV.B2.RP-282 takes their place, except that Column 6 should read "Cracking due to SCC and fatigue." Third, Item IV.B2.RP-345 is correct, in that loss of material due to wear is being managed for the core barrel flange by Existing Program elements. However, we recommend that a new item be added – perhaps IV.B2.RP-280 - that identifies the Core Barrel Assembly core barrel flange as an Expansion Component (see Table 4-6 on Page 4-33 of MRP-227) that shows cracking due to SCC and fatigue as an Expansion Component linked to Item IV.B2.RP-276, similar to Item IV.B2.RP-278 and the corrected Item IV.B2.RP-282. Fourth, we recommend that Item IV.B2.RP-295 be eliminated, retaining only Item IV.B2.RP-294. Although Table 3-3 (Page 3-24) of MRP-227 shows "E" for both IASCC and IE, Table 4-6 (Page 4-33) of MRP-227 shows only Cracking (IASCC), and the examination requirements only apply to this Effect (Mechanism).		response to the second item in this comment, the staff changed AMR item IV.B2.RP-282 identification to Core barrel assembly: Core barrel flange. AMR item IV.B2.RP-282 is identified as an expansion component with its primary component as AMR item IV.B2.RP-276. Fourth: Changed AMR items IV.B2.RP-280 and IV.B2.RP-281 to "Lower Core Barrel Flange Weld." Changed AMR item IV.B2.RP-282 to "Core barrel assembly: core barrel flange," and added fatigue as an aging mechanism. These changes are necessary due to the error in Table 3-3 of MRP-227. AMR item IV.B2.RP-282 cannot replace items IV.B2.RP-281 and IV.B2.RP-280 because they are different components.
984	IV.B2 ML101880266, Comment 12	Typographical. Table IV B2. Occasionally in Column 3, "Lower internals assembly" is spelled incorrectly as "Lower internal assembly."	The staff agrees with this comment and associated changes to the GALL Report have been made.	This change corrects a typographic error. This change was made with a generic (word replacement) methodology; individual changed records are not indicated for this typographic correction. It is not in Table II or III.

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Comment Number	Location in Document and Commenter Reference No.	Public Comment	NRC Disposition	Technical Basis
985	IV.B2 ML101880266, Comment 13	Technical. Table IV B2, Items IV.B2.RP-289 and IV.B2.RP-288. Item IV.B2.RP-289 is correct. However, Column 6 of Item IV.B2.RP-288 should not mention IE, since the Existing Program elements will be unable to detect the degradation, even though IE is cited as "X" in Table 3-3 (Page 3-24) of MRP-227.	The staff disagrees with this comment. The GALL Report has not been changed.	No change was made in response to this comment. Since Table 3-3 screened in IASCC, wear, fatigue and irradiation embrittlement as aging effects/mechanisms for lower core plates and XL lower core plates, all these aging effects/mechanisms must be indentified and no change to AMR item IV.B2.RP-288 is necessary. Since Element 3 of XI.M16A, PWR Vessel Internals" indicates irradiation embrittlement, thermal embrittlement and void swelling are managed by visual examination to monitor cracking, no change to AMR item IV.B2.RP-288 is necessary.
986	IV.B2 ML101880266, Comment 14	Technical. First, Section IV.B.2, first sentence. The rod control cluster assemblies (RCCAs) were not in the scope of the Westinghouse reactor internals study. Any reference to rod control cluster assemblies should be removed. Also, following the first paragraph of Section IV.B.2, we recommend that this new paragraph be added: "Aging related degradation in the reactor internals is managed through an integrated program. Specific inspection requirements are	The staff partially agrees with this comment and associated changes to the GALL Report have been made.	First: The staff agreed with the comment and made changes accordingly. Reference to RCCAs was removed from the text in GALL IV.B2 because RCCAs are not in scope for license renewal. Since this was a change in the text, not the AMR tables, this comment number is not listed in Tables II-3 or II-7. Second: The change with regard to clarification of the component was made in the text of GALL Chapter

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Comment Number	Location in Document and Commenter Reference No.	Public Comment	NRC Disposition	Technical Basis
		listed in this section. Degradation due to changes in material properties (e.g., loss of fracture toughness) were considered in the determination of inspection recommendations and are managed by the requirement to use appropriately degraded properties in the evaluation of identified defects. These requirements are detailed in the aging management programs." Note that this recommendation is accompanied by the suggested removal of multiple entries from the following table that do not directly correspond to the suggested recommendations in the MRP-227 tables. Second, Section IV.B.3, first sentence. Only the CEA shrouds were in the scope of the CE (Combustion Engineering) reactor internals study. The section "control element assembly (CEA) shroud assemblies" should read "control element assembly (CEA) shrouds." It is not clear what the reference to "shroud assembly" means. Also, following the first paragraph of Section IV.B.3, we recommend that this new paragraph be added: "Aging related degradation in the reactor internals is managed through an integrated program. Specific inspection requirements are listed in this section. Degradation due to changes in material properties (e.g., loss of fracture toughness) were considered in the		IV.B3. It was not a change of technical intent and is not listed in Tables II-3 or II-7. The requested change to add an additional paragraph and remove certain AMR items was not made. Since Table 3-3 of MRP-227 identifies all these aging effects have been screened in, all items will be retained. Element 3 of AMP XI.M16A, "PWR Vessel Internals" indicates irradiation embrittlement, thermal embrittlement and void swelling are managed by visual examination to monitor cracking. Therefore, the additional recommended paragraph in IV.B2 and IV.B3 are not necessary. However, a paragraph similar to the one recommended has been added to AMP XI.M16A (PWR Vessel Internals

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Comment Number	Location in Document and Commenter Reference No.	Public Comment	NRC Disposition	Technical Basis
		determination of inspection recommendations and are managed by the requirement to use appropriately degraded properties in the evaluation of identified defects. These requirements are detailed in the aging management programs." Note that this recommendation is accompanied by the suggested removal of multiple entries from the following table that do not directly correspond to the suggested recommendations in the MRP-227 tables.		
987	IV.B3 ML101880266, Comment 15	Technical. Table IV B3, Items IV.B3.RP-314, IV.B3.RP-315, IV.B3.RP-316, IV.B3.RP-317, IV.B3.RP-320, IV.B3.RP-321, IV.B3.RP-330, IV.B3.RP-331, and IV.B3.RP-358. First, we recommend that Item IV.B3.RP-315 be eliminated, with Item IV.B3.RP-314 retained. Although Table 3-2 (Page 3-22) of MRP-227 shows "P" for IE, VS, and ISR/IC, in addition to the "P" for IASCC, Table 4-2 (Page 4-20) of MRP-227 identifies only the two cracking mechanisms (IASCC and Fatigue), and the examination requirements apply only to those two Effects (Mechanisms). Second, we recommend that Item IV.B3.RP-317 be eliminated with Item IV.B3.RP-316 retained. However, the information in Column 3 of Item IV.B3.RP-317 should be moved to Column 3 of Item IV.B3.RP-316 (so that the > 3 dpa exposures apply to IASCC), and "and fatigue" needs to be added to Column 6 of	The staff partially agrees with this comment. The GALL Report has been changed as described in the Technical Basis for this comment.	First: Fatigue was added to AMR item IV.B3.RP-314, as discussed in this comment. Disagree with eliminating AMR item IV.B3.RP-315. Since Table 3-3 identifies that all these aging effects/mechanism have been screened in, all these aging effects/mechanisms will be retained. Element 3 of XI.M16A, "PWR Vessel Internals" indicates irradiation embrittlement, thermal embrittlement and void swelling are managed by visual examination to monitor cracking. Therefore, no change to AMR item IV.B3.RP-315 is necessary. Second: Disagree with eliminating AMR item IV.B3.RP-317 because Table 3-3 screens in loss of fracture toughness due to neutron

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Comment Number	Location in Document and Commenter Reference No.	Public Comment	NRC Disposition	Technical Basis
		Item IV.B3.RP-316. Third, Items IV.B3.RP-320 and IV.B3.RP-321 are not Expansion components and instead are Existing Program components. Fourth, we recommend that Item IV.B3.RP-331 be eliminated, retaining only Item IV.B3.RP-330. Although Table 3-2 (Page 3-23) of MRP-227 shows “E” for IE, in addition to the “E” for IASCC and Fatigue, Table 4-5 (Page 4-31) of MRP-227 identifies only the two cracking mechanisms (IASCC and Fatigue), and the examination requirements apply only to those two Effects (Mechanisms). Fifth, we recommend that Item IV.B3.RP-358 be eliminated. Although Table 3-2 (Page 3-22) of MRP-227 shows “E” for IASCC, in addition to “P” for IE and VS, the latter two designations control, and Item IV.B3.RP- 318 provides the aging management requirements.		irradiation embrittlement and loss of preload due to stress relaxation for this component. Recommended changes to column 3 is acceptable because it is consistent with MRP-227. However fatigue was not added to AMR item IV.B3.RP-316 because Table 3-2 of MRP-227 does not identify fatigue as a screened in mechanism for this item. Third: Agree. To accommodate the changes recommended by this comment, the following changes were incorporated into GALL: (a) Deleted AMR item IV.B3.RP-321. (b) Added loss of preload to AMR item IV.B3.RP-319. (c) Changed AMR item IV.B3.RP-319 to “Existing Program” components. (d) Changed AMR item IV.B3.RP-320 to “Existing Program” components. (e) Deleted AMR item IV.B3.RP-320 as an expansion component in item IV.B3.RP-314. (f) Deleted AMR item IV.B3.RP-321 as an expansion component in item IV.B3.RP-315. These changes are acceptable because they are consistent with MRP-227

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Comment Number	Location in Document and Commenter Reference No.	Public Comment	NRC Disposition	Technical Basis
				Fourth: Disagree. Since Table 3-3 identifies that all these aging effects have been screened in, all aging effects/mechanisms will be retained. Element 3 of AMP XI.M16A indicates irradiation embrittlement, thermal embrittlement and void swelling are managed by visual examination to monitor cracking. Therefore, no change to AMR item IV.B3.RP-331 is necessary. Fifth: Disagree. Since Table 3-3 identifies that all these aging effects have been screened in, all aging effects/mechanisms will be retained. Element 3 of AMP XI.M16A indicates irradiation embrittlement, thermal embrittlement and void swelling are managed by visual examination to monitor cracking. Therefore, no change to AMR item IV.B3.RP-358 is necessary.
988	IV.B3 ML101880266, Comment 16	Technical. Table IV B3, Item IV.B3.RP-319. Column 7 should be changed so that the words “Primary components (identified in the Structure and Components column) existing program” is replaced by the words “Existing program components (identified in the Structure and Components column). Also,	The staff partially agrees with this comment and the document was reworded for clarity.	Changed “Primary component to “Existing Program” component. This is consistent with MRP-227. Disagree with eliminating “No expansion component.” The “no expansion components” for item IV.B3.RP-319 is necessary

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		eliminate the reference to "no Expansion components" since there are never any Expansion Components associated with Existing Program Components.		because the line item is for multiple users and all users do not know that existing components do not have Expansion Program Components.
989	IV.B3 ML101880266, Comment 17	Technical. Table IV B3, Item IV.B3.RP-318. We recommend that loss of fracture toughness due to IE be eliminated from Column 6, since the AMP elements are intended only to detect the effects of void swelling.	The staff disagrees with this comment. The GALL Report has not been changed.	No change was made in response to this comment. Since Table 3-2 of MRP-227 indicates that for "Former Plates (Bolted)" and "Shroud Plates (Bolted)" loss of fracture toughness due to irradiation embrittlement, and void swelling are aging effects/mechanisms that are screened, no change to AMR item IV.B3.RP-318 is necessary.
990	IV.B3 ML101880266, Comment 18	Technical. Table IV B3, Item IV.B3.RP-359. We recommend that loss of fracture toughness due to IE be eliminated from Column 6, since the AMP elements are intended only to detect the effects of void swelling.	The staff disagrees with this comment. The GALL Report has not been changed.	No change was made in response to this comment. Since Table 3-2 of MRP-227 indicates that for "Shroud Plates (welded)" and "Former Plates (welded)" irradiation embrittlement is screened in, this aging effect will not be deleted and the recommended change is not necessary.
991	IV.B3 ML101880266, Comment 19	Typographical. Table IV B3, Items IV.B3.RP-342 and IV.B3.RP-366. Change "Core shroud assemblies" in Column 3 to "Lower Support Structure" and change "stee" in Column 4 to	The staff agrees with this comment and associated changes to the GALL Report	This change is consistent with Table 3.2 in MRP-227. Item IV.B3.RP-342 and Item IV.B3.RP-366 in Table II-3 are shown as

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Comment Number	Location in Document and Commenter Reference No.	Public Comment	NRC Disposition	Technical Basis
		"steel."	have been made.	affected by this comment.
992	IV.B3 ML101880266, Comment 20	Technical. Table IV B3, Items IV.B3.RP-342 and IV.B3.RP-366. Eliminate the reference to SCC and IASCC in Column 6 for Item IV.B3.RP-342 and eliminate Item IV.B3.RP-366 entirely. Although Table 3-2 (Page 3-21) of MRP-227 shows "X" for SCC and IASCC, and "P" for Fatigue and IE, Table 4-2 (Page 4-23) of MRP-227 lists only cracking from fatigue. However, the EVT-1 inspection does not distinguish between cracking mechanisms.	The staff disagrees with this comment. The GALL Report has not been changed.	No change was made in response to this comment. Since Table 3-2 of MRP-227 indicates these aging effects need management, they need to be included in GALL as aging management review AMR items. Therefore, IV.B3.RP-366 should not be eliminated.
993	IV.B3 ML101880266, Comment 21	Typographical. Table IV B3, Item IV.B3.RP-322. Identify in Column 3 that the component of interest is the "core shroud plate-former plate weld" and correct the last part of Column 3 to read "…within six inches of central flange and horizontal stiffeners."	The staff agrees with this comment and associated changes to the GALL Report have been made.	This is a needed clarification. Item IV.B3.RP-322 in Table II-3 is shown as affected by this comment.
994	IV.B3 ML101880266, Comment 22	Technical. Table IV B3, Items IV.B3.RP-324, IV.B3.RP-360, and Item IV.B3.RP-361. We recommend the elimination of Item IV.B3.RP-360, retaining only Item IV.B3.RP-324. Although Table 3-2 (Page 3-22) of MRP-227 shows "P" for both IASCC and IE, Table 4-2 (Page 4-20) of MRP-227 lists only cracking from IASCC, and the AMP elements are applicable only to that effect. For the same reason, we recommend that Item IV.B3.RP-361 be eliminated.	The staff disagrees with this comment. The GALL Report has not been changed.	No change was made in response to this comment. Since Table 3-2 of MRP-227 indicates these aging effects need management, they need to be included in GALL as aging management review AMR items. Therefore, item IV.B3.RP-361 should not be eliminated.

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Comment Number	Location in Document and Commenter Reference No.	Public Comment	NRC Disposition	Technical Basis
995	IV.B3 ML101880266, Comment 23	Technical. Table IV B3, Items IV.B3.RP-327, IV.B3.RP-328, IV.B3.RP-329, IV.B3.RP-335, IV.B3.RP-362, IV.B3.RP-363, and IV.B3.RP-364. First, although Table 3-2 (Page 3-21) of MRP-227 shows "P" for Fatigue and "E" for SCC, the lower core barrel flange weld is a Primary Component. Table 4-2 (Page 4-22) only designates cracking due to fatigue. Therefore, Column 7 should be changed from "Existing" to "Primary" and Column 6 should only reference "Cracking due to fatigue." Second, Column 3 of Item IV.B3.RP-335 should identify applicability to all plants except those assembled with full-height shroud plates. Third, we recommend that Item IV.B3.RP-362 be eliminated, since those welds are already included in Item IV.B3.RP-329, and only SCC is included in Table 4-5 (Page 4-30) of MRP-227. Fourth, we recommend that Items IV.B3.RP-363 and IV.B3.RP-364 be eliminated. The welds are not subject to TE, although the core support columns are listed in Table 3-2 (Page 3-21) of MRP-227 as cast austenitic stainless steel, and the examination methods specified in Table 4-5 (Page 4-31) of MRP-227 are not applicable to IE.	The staff partially agrees with this comment and the document was reworded for clarity.	First: Agree to change "Existing" to "Primary" and removed "(for Primary component see AMR item IV.B3.RP-327). Also removed item IV.B3.RP-328 as "Expansion Component" reference in item IV.B3.RP-327. Disagree to eliminate SCC as an aging effect/mechanism because Table 3-2 of MRP-227 indicates SCC is an aging effect/mechanism for lower core barrel flange weld. Second: Agree. Clarification of applicability that is described in Table 4-5 of MRP-227. Third: Disagree. AMR item IV.B3.RP-329 is for cracking due to SCC. Item IV.B3.RP-362 is for loss of fracture toughness due to neutron irradiation embrittlement. Since both of these aging effects are identified in Table 3-2 of MRP-227 for "Lower Cylinder Welds," irradiation embrittlement is an aging effect for the component described in AMR item IV.B3.RP-362. Therefore, item IV.B3.RP-362 can't be eliminated. Staff added "lower cylinder welds and" to column 3 in item IV.B3.RP-329 because items IV.B3.RP-362 and -

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Comment Number	Location in Document and Commenter Reference No.	Public Comment	NRC Disposition	Technical Basis
				329 are identified in this comment as the same components. Fourth: Disagree. Table 3-2 in MRP-227 indicates that for “Core Support Columns” with CF8 material loss of fracture toughness due to thermal and irradiation embrittlement is a screened in as an aging effect/mechanism. Therefore, thermal embrittlement can’t be eliminated from IV.B3.RP-364. Table 3-2 in MRP-227 indicates that for “Core Support Columns” with stainless steel material loss of fracture toughness due to neutron irradiation embrittlement is screened in as an aging effect. To be consistent with Table 3-2, welds will be deleted from the identification in AMR items IV.B3.RP-363 and -364. Since Table 3-2 of MRP-227 indicates these aging effects need management, they need to be included in GALL as aging management review AMR items. Therefore, items IV.B3.RP-363 and -364 should not be eliminated.
996	IV.B3 ML101880266, Comment 24	Typographical. Table IV B3, Items IV.B3.RP-357, IV.B3.RP-336, and IV.B3.RP-334. Eliminate the reference to “no Expansion	The staff disagrees with this comment. The GALL Report	No change was made in response to this comment. The “no expansion components” for these

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		components" since there are never any Expansion Components associated with Existing Program Components.	has not been changed.	items is necessary because the line items are for multiple users and all users do not know that existing components do not have Expansion Program Components.
997	IV.B3 ML101880266, Comment 25	Technical. Table IV B3, Item IV.B3.RP-336. In Column 6, eliminate reference to IE or VS. Even though Table 3-2 (Page 3-21) of MRP-227 shows "X" for IE and ISR/IC, in addition to the "X" for IASCC and Fatigue, Table 4-8 (Page 4-68) of MRP-227 identifies only the three cracking mechanisms (SCC, IASCC and Fatigue), and the examination requirements apply only to those three effects (mechanisms).	The staff disagrees with this comment. The GALL Report has not been changed.	No change was made in response to this comment. Since Table 3-2 in MRP-227 for fuel alignment pins with A286 material indicates that wear, loss of preload due to stress relaxation and loss of fracture toughness due to irradiation embrittlement are screened in; but, change in dimension resulting from void swelling is screened out, AMR item IV.B3.RP-336 was revised to be consistent with this table. Also, since irradiation embrittlement has been screened in, it will not be eliminated from item IV.B3.RP-336.
998	IV.B3 ML101880266, Comment 26	Technical. Table IV B3, Item IV.B3.RP-337. We recommend that this entry be deleted, since it appears to be a repeat of IV.B3.RP-342 and IV.B3.RP-366.	The staff agrees with this comment and associated changes to the GALL Report have been made.	Change was made in accordance with the comment. AMR item IV.B3.RP-342 was the same as item IV.B2.RP-337. AMR IV.B3.RP-337 was deleted in response to this comment. It is not in Tables II or III.
999	IV.B4 ML101880266,	Table IV B4. First, NUREG-1801, Revision 1 (2005) lists	The staff disagrees with this comment.	The comment was not implemented as requested.

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	Comment 27	the following requirement under AMP in Table IV B4: “Upon completion of these programs, but not less than 24 months before entering the period of extended operation, submit an inspection plan for reactor internals to the NRC for review and approval.” However, the NUREG-1801, Revision 2, draft has removed this submittal of an inspection plan requirement. Please clarify whether this requirement will be withdrawn for all PWR plants that have previously made this commitment in their license renewal applications and/or FSAR. In other words, if these PWR plants fulfill the implementation requirements listed in the current MRP-227 Revision 0, Section 7, no inspection plan or AMP will be required to be submitted to NRC. Second, the NUREG-1801, Revision 2 draft has removed “XI.M13 THERMAL AGING AND NEUTRON IRRADIATION EMBRITTLEMENT OF CAST AUSTENITIC STAINLESS STEEL (CASS)” that was in NUREG-1801, Revision 1 (2005). The current draft has added the following statement under Section XI.M12 “THERMAL AGING EMBRITTLEMENT OF CAST AUSTENITIC STAINLESS STEEL (CASS)”: “Aging management of CASS reactor internal components of pressurized water reactors (PWRs) are discussed in AMP XI.M16 and for	However, the comment did result in a revision to the document for clarification.	However, clarifying changes were made in response to this comment. GALL Chapters IV.B2, IV.B3, and IV.B4 were revised to state that an applicant will submit an inspection plan for reactor internals to the NRC for review and approval with the application for license renewal. In addition, XI.M16A, “PWR Vessel Internals” was revised to state that an integrated program is implemented by the applicant through an inspection plan that is submitted to the NRC for review and approval with the application for license renewal. These changes provide clarification of additional documentation that the staff has determined is needed to review aging management of PWR reactor vessel internals during the period of extended operation. The alternative for aging management of CASS reactor internal components will be evaluated in the staff review of MRP-227. Items IV.B3.RP-339, IV.B3.RP-340, IV.B3.RP-309, IV.B3.RP-311, IV.B3.RP-306, and IV.B3.RP-307

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Comment Number	Location in Document and Commenter Reference No.	Public Comment	NRC Disposition	Technical Basis
		boiling water reactor (BWR) CASS reactor internal components in AMP XI.M9." By removing Section XI.M13 from the Rev. 2 draft, NRC has also removed the following alternative disposition method afforded in GALL Rev. 1 (2005) Section XI.M13, under "4. Detection of Aging Effects:" for reactor vessel internal CASS components that have a neutron fluence of greater than 10^{17} n/cm^2 (E>1 MeV) or are determined to be susceptible to thermal embrittlement: 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 ksi) to preclude fracture, then supplemental inspection of the component is not required. Failure to meet this criterion requires continued use of the supplemental inspection program. The above alternative disposition method is not listed in GALL Rev. 2 draft Section XI.M16. Can PWR plants continue to use the above alternative disposition method in GALL Rev. 1 Section M.13 for the CASS components in the reactor internals? We understand the purpose of including Items IV.B3.RP-339, IV.B3.RP-340, IV.B3.RP-309,		were included for completeness.

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Comment Number	Location in Document and Commenter Reference No.	Public Comment	NRC Disposition	Technical Basis
		IV.B3.RP-311, IV.B3.RP-306, and IV.B3.RP-307 for completeness.		
1000	IV.B4 ML101880266, Comment 28	Typographical. Table IV B4, Item IV.B4.RP-245. Add “IV.B4, RP-248” in the AMP column.	The staff agrees with this comment and associated changes to the GALL Report have been made.	The change corrects a typographic issue. RP-248 refers to RP-245; so, RP-245 should also refer to RP-248. Item IV.B4.RP-245 in Table II-7 is shown as affected by this comment.
1001	IV.B4 ML101880266, Comment 29	Typographical. Table IV B4, IV.B4.RP-241. Delete “(c)...” in the Structure & Component column and delete “SCC” in the Aging Effect column.	The staff agrees with this comment and associated changes to the GALL Report have been made.	The “(c)” component in AMR item IV.B4.RP-241 is “Internal baffle-to-baffle bolts.” Table 3-1 in MRP-227 indicates “Internal baffle-to-baffle bolts” are “expansion components” and the applicable aging effects are wear, fatigue irradiation embrittlement and loss of preload due to stress relaxation. Since “internal baffle-to-baffle bolts” were deleted from AMR item IV.B4.RP-241, they were added to item IV.B4.RP-243 which identifies loss of fracture toughness due to neutron irradiation embrittlement; loss of preload due to stress relaxation; and loss of material due to wear as aging effects/mechanisms. Since AMR item IV.B4.RP-243 doesn’t identify fatigue as an aging effect/mechanism, the staff added

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				a new line item for “internal baffle-to-baffle bolts with cracking due to fatigue as an aging effect/mechanism and added the new line item as a reference expansion component to item IV.B4.RP-241.
1002	IV.B4 ML101880266, Comment 30	Typographical. Table IV B4, Item IV.B4.RP-240. Delete “(c)...” in the Structure & Component column.	The staff agrees with this comment and associated changes to the GALL Report have been made.	The “(c)” component in AMR item IV.B4.RP-240 is “Internal baffle-to-baffle bolts.” Since this is the same component discussed in EPRI Comment 29 (Comment Number 1001), its disposition is the same as EPRI Comment 29 (Comment Number 1001).
1003	IV.B4 ML101880266, Comment 31	Typographical. Table IV B4, Item IV.B4.RP-244. Delete “SCC” in the Aging Effect column.	The staff agrees with this comment and associated changes to the GALL Report have been made.	Table 3-1 in MRP-227 indicates SCC is not an aging effect for these components. Item IV.B4.RP-244 in Table II-7 is shown as affected by this comment.
1004	IV.B4 ML101880266, Comment 32	Typographical. Table IV B4, Item IV.B4.RP-248. Add “IV.B4.RP-247” to the AMP column.	The staff agrees with this comment and associated changes to the GALL Report have been made.	This is a clarification of and cross reference to expansion components consistent with MRP-227. Item IV.B4.RP-248 in Table II-7 is shown as affected by this comment.
1005	IV.B4 ML101880266, Comment 33	Typographical. Table IV B4, Item IV.B4.RP-252. Delete “nickel alloy” in the Material column.	The staff agrees with this comment and associated changes to the GALL Report	This is a clarification of applicable materials consistent with MRP-227. Item IV.B4.RP-252 in Table II-7 is shown as affected by this

Table IV-5. Analysis and Disposition of Public Comments on Chapter IV, May 2010 Public Comment Draft GALL Report, Rev. 2

Comment Number	Location in Document and Commenter Reference No.	Public Comment	NRC Disposition	Technical Basis
			have been made.	change.
1006	IV.B4 ML101880266, Comment 34	Typographical. Table IV B4, Item IV.B4.RP-251. Delete “nickel alloy” in the Material column.	The staff agrees with this comment and associated changes to the GALL Report have been made.	This is a clarification of applicable materials consistent with MRP-227. Item IV.B4.RP-252 in Table II-7 is shown as affected by this comment.
1007	IV.B4 ML101880266, Comment 35	Typographical. Table IV B4, Item IV.B4.RP-256. Add “IV.B34.RP-248” to the AMP column.	The staff agrees with this comment and associated changes to the GALL Report have been made.	This is a correction of an administrative error. RP-248 refers to RP-256; so RP-256 needs to refer to RP-248. Item IV.B4.RP-256 in Table II-7 is shown as affected by this comment.
1008	IV.B4 ML101880266, Comment 36	Typographical. Table IV B4, Item IV.B4.RP-258. Delete “IV.B4.RP-260” in the AMP column.	The staff agrees with this comment and associated changes to the GALL Report have been made.	This corrects an administrative error. RP-258 should refer to RP-242, but not RP-260. Item IV.B4.RP-258 in Table II-7 is shown as affected by this comment.
1009	IV.B4 ML101880266, Comment 37	Typographical. Table IV B4, Item IV.B4.RP-254. Add “IV.B4.RP-248” to the AMP column.	The staff agrees with this comment and associated changes to the GALL Report have been made.	This corrects an administrative error. RP-248 refers to RP-254; so RP-254 should refer to RP-248. Item IV.B4.RP-254 in Table II-7 is shown as affected by this comment.
1010	IV.B4 ML101880266, Comment 38	Typographical. Table IV B4, Item IV.B4.RP-246. Add “IV.B4.RP-248” to the AMP column.	The staff agrees with this comment and associated changes to the GALL Report have been made.	The change corrects an administrative error. RP-248 refers to RP-246; so RP-246 also should refer to RP-248. Item IV.B4.RP-246 in Table II-7 is shown as

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Comment Number	Location in Document and Commenter Reference No.	Public Comment	NRC Disposition	Technical Basis
				affected by this comment.
1011	IV.B4 ML101880266, Comment 39	Typographical. Table IV B4, Item IV.B4.RP-260. Delete “IV.B4.RP-258” in the AMP column.	The staff agrees with this comment and associated changes to the GALL Report have been made.	The change corrects an administrative error. RP-258 does not refer to RP-260; so, RP-260 should not refer to RP-258. The correct reference for RP-260 is RP-259, only. Item IV.B4.RP-260 in Table II-7 is shown as affected by this comment.
1012	IV.B4 ML101880266, Comment 40	Typographical. Table IV B4, Item IV.B4.RP-262. Delete “Stainless-Steel” in the Material column.	The staff agrees with this comment and associated changes to the GALL Report have been made.	The change clarifies the applicable material for this component in accordance with MRP-227. Item IV.B4.RP-262 in Table II-7 is shown as affected by this comment.
1013	IV.B4 ML101880266, Comment 41	Typographical. Table IV B4, Item IV.B4.RP-240. Delete “(c)...” in the Structure & Component column.	The staff agrees with this comment and associated changes to the GALL Report have been made.	The “(c)” component in IV.B4.RP-240 is “Internal baffle-to-baffle bolts.” Since this is the same component discussed in EPRI Comment 29 (NUREG 1950, Comment Number 1001), its disposition is the same as EPRI Comment 29 (NUREG 1950, Comment Number 1001).
1014	IV.B4 ML101880266, Comment 42	Typographical. Table IV B4, Item IV.B4.RP-241. Delete “(c)...” in the Structure & Component column and delete “SCC” in the Aging Effect column.	The staff agrees with this comment and associated changes to the GALL Report have been made.	The “(c)” component in IV.B4.RP-241 is “Internal baffle-to-baffle bolts.” Since this is the same component discussed in EPRI Comment 29 (NUREG 1950, Comment Number 1001), its

Table IV-5. Analysis and Disposition of Public Comments on Chapter IV, May 2010 Public Comment Draft GALL Report, Rev. 2

Comment Number	Location in Document and Commenter Reference No.	Public Comment	NRC Disposition	Technical Basis
				disposition is the same as EPRI Comment 29 (NUREG 1950, Comment Number 1001).
1015	IV.B4 ML101880266, Comment 43	Typographical. Table IV B4, Item IV.B4.RP-245. Add “IV.B4.RP-248” to the AMP column.	The staff agrees with this comment and associated changes to the GALL Report have been made.	The change corrects an administrative error. Since RP-248 refers to RP-245, RP-245 should refer to RP-248. Item IV.B4.RP-245 in Table II-7 is shown as affected by this comment.
1016	IV.B4 ML101880266, Comment 44	Technical. Table IV B4, Item IV.B4.RP-53. Add “Ductility, reduction in fracture toughness” to the Mechanism column and AMP column. This is a TLAA from BAW-2248A, Section 2.4, along with fatigue.	The staff agrees with this comment and associated changes to the GALL Report have been made.	This is an aging effect/mechanism identified for Babcock & Wilcox internals in BAW-2248A. Since AMR item IV.B4.RP-53 is for cumulative fatigue damage due to fatigue, the staff added a new line item, IV.B4.RP-376, for this aging effect/ mechanism. The new AMR item requires further evaluation as a TLAA.

Table IV-6. Analysis and Disposition of Public Comments on Chapter V, May 2010 Public Comment Draft GALL Report, Rev. 2

Comment Number	Location in Document and Commenter Reference No.	Comment	NRC Disposition	Technical Basis
880	V.B-3 ML101880269, Comment 19	Referring to AMR Item V.B.EP-103: (DELETE) Chapter XI.M1, "ASME Section XI Inservice Inspection, Subsections IWB, IWC, and IWD" for ASME Code components or (KEEP) Chapter XI.M36, "External Surfaces Monitoring of Mechanical Components" for non-ASME Code components There is a lack of operating experience to support aging effects associated with the described material-environment and ISI is not adequate to manage component external surfaces. This is a generic comment applicable to Chapters VII and VIII.	The staff agrees with this comment and associated changes to the GALL Report have been made.	Recommended AMP has been changed to XI.M36, "External Surfaces Monitoring of Mechanical Components," for both ASME code stainless steel components and non-code stainless steel components exposed to outdoor air that may contain halides. This change is acceptable because AMP XI.M36 has been revised to include management of cracking on the external surface of stainless steel components exposed to outdoor air that may contain halides. Conforming, generic changes related to this comment affected AMR lines with item numbers EP-103, AP-209, and SP-118 in the GALL Report Chapters V, VII and VIII.
881	V.B-3 ML101880269, Comment 21	Referring to AMR Items V.B.EP-103 and V.B.EP-107: A new AMR line item is needed for the situation where the evaluated environmental conditions (as addressed in the corresponding SRP sections) have been determined to be benign to stainless steel. [Editor's Note: Refer to original document (ML101880269) for recommended AMR line	The staff disagrees with this comment. The GALL Report has not been changed.	If the further evaluation determines that the outside air does not contain halides, then the applicant should designate that there is no aging effect and no AMP is required, and include a plant-specific note in the LRA.

Table IV-6. Analysis and Disposition of Public Comments on Chapter V, May 2010 Public Comment Draft GALL Report, Rev. 2

Comment Number	Location in Document and Commenter Reference No.	Comment	NRC Disposition	Technical Basis
		related to this comment.] If the evaluation performed to address FER [Further Evaluation Recommendation] 3.2.2.2.6 determines that the conditions described are not applicable then a corresponding AMR line is required. This is a generic comment applicable to Chapters VII and VIII		
882	V.B-9 ML101880269, Comment 22	Referring to AMR Item V.B.EP-111: Revise the material to be consistent with GALL Rev.1 Steel (with (ADD- or without) coating or wrapping) AMP XI.M41 manages loss of material for steel piping with or without coatings/wrappings. This is a generic comment applicable to Chapters VII and VIII	The staff disagrees with this comment. The GALL Report has not been changed.	AMP XI.M41 recommends that steel pipe exposed to a soil environment be wrapped. If the buried steel pipe is not wrapped, then it should be identified as an exception in the LRA and appropriate plant specific notes and plant-specific evaluation should be provided.
947	V.B-3 ML101880269, Comment 20	Referring to AMR Item V.B.EP-107 (DELETE) Chapter XI.M1, “ASME Section XI Inservice Inspection, Subsections IWB, IWC, and IWD” for ASME Code components or (KEEP) Chapter XI.M36, “External Surfaces Monitoring of Mechanical Components” for non-ASME Code components There is a lack of operating experience to support aging effects associated with the described material-environment and ISI is not adequate to manage component external	The staff agrees with this comment and associated changes to the GALL Report have been made.	Recommended AMP has been changed to XI.M36, “External Surfaces Monitoring of Mechanical Components,” for both ASME code stainless steel components and non-code stainless steel components exposed to outdoor air that may contain halides. This is acceptable because AMP XI.M36 has been revised to include management of loss of material on the external surface of

Table IV-6. Analysis and Disposition of Public Comments on Chapter V, May 2010 Public Comment Draft GALL Report, Rev. 2

Comment Number	Location in Document and Commenter Reference No.	Comment	NRC Disposition	Technical Basis
		surfaces. This is a generic comment applicable to Chapters VII and VIII.		stainless steel components exposed to outdoor air that may contain halides. Conforming, generic changes related to this comment affected AMR items in Chapters V, VII, and VIII.
439	V.E, VII.I, VIII.H ML101880269, Comment V.E-x, VII.I-x, VIII.H	[The comment recommends adding a new AMR line in GALL Tables V.E, VII.I, and VIII.H, for aluminum piping, piping components, and piping elements in an environment of air - outdoor, with an AERM of loss of material due to pitting and crevice corrosion managed by AMP XI.M36, “External Surfaces Monitoring of Mechanical Components.”] Consistent with GALL Rev 1 for aluminum in an air-outdoor environment for Supports (aluminum, air-outdoor) III.B2-7	The staff agrees with this comment and associated changes to the GALL Report have been made.	GALL Report includes steel, stainless steel and copper alloy piping, piping components and piping elements in air outdoor environment, therefore, aluminum should be also added. Both electrical and structures component chapters VI and III include aluminum material components in an air-outdoor environment. AMP XI.M36 was revised to include all metallic components. New AMR items V.E.EP-114, VII.I.AP-256, VIII.H.SP-147 were added as a result of this comment.
451	V.E, VII.I, VIII.H ML101880269, Comment V.E-x, VII.I-x, VIII.H-x	[The comment recommends adding new AMR lines in GALL Tables IV.E, VII.I, and VIII.H, for copper-alloy and nickel-alloy bolting in an environment of air – indoors (external), with an AERM of loss of preload due to thermal effects, gasket creep, and self-loosening managed by AMP XI.M18, “Bolting Integrity.”] GALL addresses loss of preload for steel closure bolting in an air-indoor (external)	The staff agrees with this comment and associated changes to the GALL Report have been made.	GALL Report addresses steel and stainless steel material; however, loss of pre-load would also be an applicable aging effect for copper alloy and nickel-alloy materials. New AMR items V.E.EP-116, VII.I.AP-261 and VIII.H.SP-149 were added for copper alloy bolting. New items V.E.EP-117,

Table IV-6. Analysis and Disposition of Public Comments on Chapter V, May 2010 Public Comment Draft GALL Report, Rev. 2

Comment Number	Location in Document and Commenter Reference No.	Comment	NRC Disposition	Technical Basis
		environment (V.E-5, VII.I-5 and VIII. H-5) but does not address nickel alloy, or copper alloy bolting. GALL AMP XI.M18 provides for management of loss of pre-load, so this program can also be applied here.		VII.I.AP-262, and VIII.H.SP-150 were added for nickel-alloy bolting. The environment was specified as “any environment” because loss of preload can potentially occur in any environment.
454	V.E, VII.I, VIII.H ML101880269, Comment V.E-x, VII.I-x, VIII.H-x	[The comment recommends adding new AMR lines in GALL Tables IV.E, VII.I, and VIII.H, for carbon steel or stainless steel bolting in an environment of air – outdoor (external), with an AERM of loss of preload due to thermal effects, gasket creep, and self-loosening managed by AMP XI.M18, “Bolting Integrity.”] GALL addresses loss of preload for steel closure bolting in an air-indoor (external) environment (V.E-5, VII.I-5 and VIII. H-5) but does not address stainless steel bolting or an air-outdoor (external) environment. GALL AMP XI.M18 provides for management of loss of pre-load, so this program can also be applied here.	The staff agrees with this comment and associated changes to the GALL Report have been made.	Loss of pre-load is an aging effect that is not dependent on the external environment or the specific bolting material. Gasket creep and self-loosening can occur in bolted connections in any air environment. AMP XI.M18, “Bolting Integrity” includes provisions for managing this aging effect. New AMR items V.E.EP-118, VII.I.AP-263 and VIII.H.SP-151 were added for steel or stainless steel bolting in an environment of Air – outdoor (External).
457	V.E, VII.I ML101880269, Comment V.E-x, VII.I-x	[The comment recommends adding new AMR lines in GALL Tables V.E and VII.I for nickel alloy, steel or stainless steel bolting in various environments (air with borated water leakage, raw water, treated borated water, fuel oil), with an AERM of loss of preload due to thermal effects, gasket creep, and self-loosening managed by AMP XI.M18, “Bolting Integrity.”] GALL addresses loss of preload for steel	The staff agrees with this comment and associated changes to the GALL Report have been made.	Loss of pre-load is an aging effect that is not dependent on the external environment. Gasket creep and self-loosening can occur in bolted connections in any environment. The staff has previously found AMP XI.M18 to be acceptable for managing loss of preload for various bolting materials in liquid environments

Table IV-6. Analysis and Disposition of Public Comments on Chapter V, May 2010 Public Comment Draft GALL Report, Rev. 2

Comment Number	Location in Document and Commenter Reference No.	Comment	NRC Disposition	Technical Basis
		closure bolting in an air-indoor (external) environment (V.E-5, VII.I-5 and VIII. H-5) but does not address other materials and environments. GALL AMP XI.M18 provides for management of loss of pre-load, so this program can also be applied here.		such as raw water, treated borated water, fuel oil, or treated water. New AMR items V.E.EP-119, V.E.EP-120, V.E.EP-121, V.E.EP-122; and VII.I.AP-264, VII.I.AP-265, VII.I.AP-266, VII.I.AP-267 were added for steel or stainless steel bolting in environments of raw water, treated borated water, fuel oil, or treated water, respectively.

Table IV-7. Analysis and Disposition of Public Comments on Chapter VI, May 2010 Public Comment Draft GALL Report, Rev. 2

Comment Number	Location in Document and Commenter Reference No.	Comment	NRC Disposition	Technical Basis
256	VI.A ML101830328, Comment VI.A-1	Page VI A-1, System, Structures and Components, Paragraph 2: Remove proposed new third sentence beginning "As specified in…" Revise to remove reference, start at "The electrical distribution…" VI.A-1: This section also addresses components that are relied upon to meet the station blackout (SBO) requirements for restoration of offsite power. The offsite power system relied upon in the plant-specific current licensing basis for compliance with 10 CFR 50.63, that is used to connect the plant to the offsite power source, is included in the SBO restoration equipment scope. ~~As specified in U.S. Nuclear Regulatory Commission (NRC) RG (RG) 1.60, "Monitoring the Effectiveness of Maintenance at Nuclear Power Plants,"~~ <u>The</u> electrical distribution equipment out to the first inter-tie with the offsite distribution system (i.e., equipment in the switchyard) should be included within the SBO restoration equipment scope. This path typically includes the ~~switchyard circuit breakers~~ <u>the first inter-tie devices</u> that connect to the offsite system power transformers (startup transformers), the transformers themselves, the intervening overhead or underground circuits between circuit breaker and transformer and transformer and onsite electrical distribution system (including bus ducts or cables), and	The staff partially agrees with this comment and some changes to the GALL Report have been made.	This comment is editorial in nature. LR-ISG-2008-01 referencing RG 1.160 (maintenance rule) was withdrawn and should not be used as a reference in GALL VI. (it is not in table II since it is editorial.) RG 1.160 has retained that the circuit breakers that connect to the offsite system are typically in scope.

Table IV-7. Analysis and Disposition of Public Comments on Chapter VI, May 2010 Public Comment Draft GALL Report, Rev. 2

Comment Number	Location in Document and Commenter Reference No.	Comment	NRC Disposition	Technical Basis
		associated control circuits and structures. However, the staff's review is based on the plant-specific current licensing basis, regulatory requirements, and offsite power design configurations		
257	VI.A ML101830328, Comment VI.A-2	Page VI A-1, System Interfaces, Paragraph 1: Remove proposed change. Make it consistent with Section 3. VI.A-2 Electrical cables and connections functionally interface with all plant systems that rely on electric power or instrumentation and control. Electrical cables and connections also interface with and are supported by structural commodities (e.g., cable trays, conduit, cable trenches, cable troughs, duct banks, cable vaults, and manholes) that are reviewed, as appropriate, in the Systems, Structures, and Components section.	The staff agrees with this comment and associated changes to the GALL Report have been made.	No technical basis is required to incorporate this change as it is editorial in nature.
258	VI.A ML101830328, Comment VI.A-3	Reference paragraphs in VI.A-1. Make changes to account for removing the old SBO language. VI.A-3: This section also addresses components that are relied upon to meet the station blackout (SBO) requirements for restoration of offsite power. The offsite power system relied upon in the plant-specific current licensing basis for compliance with 10 CFR 50.63, that is used to connect the plant to the offsite power source, is included in the	The staff partially agrees with this comment and some changes to the GALL Report have been made.	No technical basis is required to incorporate this change as it is editorial in nature. This comment is editorial in nature. LR-ISG-2008-01 referencing RG 1.160 (maintenance rule) was withdrawn and should not be used as a reference in GALL VI. However, the staff's review is based on the plant-specific current licensing basis, regulatory requirements,

Table IV-7. Analysis and Disposition of Public Comments on Chapter VI, May 2010 Public Comment Draft GALL Report, Rev. 2

Comment Number	Location in Document and Commenter Reference No.	Comment	NRC Disposition	Technical Basis
		SBO restoration equipment scope~~. As specified in U.S. Nuclear Regulatory Commission (NRC) RG (RG) 1.60, "Monitoring the Effectiveness of Maintenance at Nuclear Power Plants,"~~ The electrical distribution equipment out to the first inter-tie with the offsite distribution system (i.e., equipment in the switchyard) should be included within the SBO restoration equipment scope. This path typically includes the ~~switchyard circuit breakers~~ the first inter-tie devices that connect to the offsite system power transformers (startup transformers), the transformers themselves, the intervening overhead or underground circuits between circuit breaker and transformer and transformer and onsite electrical distribution system (including bus ducts or cables), and associated control circuits and structures.		and offsite power design configurations. Have retained that the circuit breakers that connect to the offsite system are typically in scope.

Table IV-8. Analysis and Disposition of Public Comments on Chapter VII, May 2010 Public Comment Draft GALL Report, Rev. 2

Comment Number	Location in Document and Commenter Reference No.	Comment	NRC Disposition	Technical Basis
883	VII.A2 ML101880269 Comment 23	Include other neutron absorbing materials. Materials: Boral, boron steel, (ADD) carborundum, metamic Inclusion of other neutron absorbing materials is consistent with LR-ISG-2009-01 and AMP XI.M40	The staff does not agree with this comment and the GALL Report has not been changed.	This AMR item presents the information in accordance with the Interim Staff Guidance ISG-2009-01. The addition of the materials is considered beyond the scope of the ISG.
884	VII.A2 ML101880269 Comment 24	Include other neutron absorbing materials. Materials: Boral, boron steel, (ADD) carborundum, metamic Inclusion of other neutron absorbing materials is consistent with LR-ISG-2009-01 and AMP XI.M40	The staff does not agree with this comment and the GALL Report has not been changed.	This AMR item presents the information in accordance with the Interim Staff Guidance ISG-2009-01. The addition of the materials is considered beyond the scope of the ISG.
505	VII.C1 ML101880269, Comment VII.C1-X	[The comment recommends adding new AMR lines for GALL Table VII.C1 for asbestos cement or reinforced concrete piping, piping components and piping elements in a raw water environment with an aging effect of Cracking/settling, Loss of material/abrasion, cavitation, aggressive chemical attack, or leaching, changes in material properties due to aggressive chemical attack, managed by Chapter XI.M20, "Open-Cycle Cooling Water System."] Reinforced concrete and asbestos cement pipe/components are mechanical components in raw water [that] have the same aging effects as structural concrete. An approved precedent exists for adding this material,	The staff agrees with this comment and associated changes to the GALL Report have been made.	Reinforced concrete, asbestos cement pipe was added to the GALL Report in soil environment for external surface (see VII.C1.AP-157); therefore, the internal environment of raw water should be added as a new line. Also, AMP XI.M20 was revised to include these aging effects.

Table IV-8. Analysis and Disposition of Public Comments on Chapter VII, May 2010 Public Comment Draft GALL Report, Rev. 2

Comment Number	Location in Document and Commenter Reference No.	Comment	NRC Disposition	Technical Basis
		environment, aging effect, and program combination to the GALL Report. As shown in Harris SER page 3-560, the staff accepted the position that cracking, loss of material and changes in material properties for reinforced concrete and asbestos cement pipe/components in a raw water environment can be managed with the Open Cycle Cooling Water AMP (XI.M20). AMP XI.M20 was developed to provide for proper management of the aging effects for this MEAP combination. Ref: ASTM C296, Standard Specification for Asbestos-Cement Pipe		
430	VII.C1 ML101880269 Comment VII.C1-X	[The comment recommends adding new AMR lines for GALL Table VII.C1 for asbestos cement or reinforced concrete piping, piping components and piping elements in an air-outdoor environment with an aging effect of Cracking/settling, Loss of material/abrasion, cavitation, aggressive chemical attack, and leaching, changes in material properties due to aggressive chemical attack, managed by Chapter XI.M36, "External Surfaces Monitoring of Mechanical Components."] Reinforced concrete and asbestos cement pipe/components are mechanical components in an outdoor air environment [that] have the same aging effects as structural concrete. An approved precedent exists for adding this material, environment, aging effect, and	The staff agrees with this comment and associated changes to the GALL Report have been made.	Reinforced concrete, asbestos cement pipe was added to the GALL Report in soil environment for external surface (see AMR item VII.C1.AP-157); should be added to an air-outdoor environment due to weather conditions. Revised AMP XI.M36, as it does not address these materials or aging effects.

Table IV-8. Analysis and Disposition of Public Comments on Chapter VII, May 2010 Public Comment Draft GALL Report, Rev. 2

Comment Number	Location in Document and Commenter Reference No.	Comment	NRC Disposition	Technical Basis
		program combination to the GALL Report. As shown in Harris SER page 3-560, the staff accepted the position that cracking, loss of material and changes in material properties for reinforced concrete and asbestos cement pipe/components in an outdoor air environment can be managed with the External Surfaces AMP (XI.M36). AMP XI.M36 was developed to provide for proper management of the aging effects for this MEAP combination. Ref: ASTM C296, Standard Specification for Asbestos-Cement Pipe		
438	VII.C1 ML101880269 Comment VII.C1-x	[This comment recommends adding new AMR lines in GALL Table VII.C1 for asbestos cement or reinforced concrete piping, piping components and piping elements in a soil environment with an aging effect of Cracking/settling, Loss of material/aggressive chemical attack, and leaching, Changes in material properties due to aggressive chemical attack managed by Chapter XI.M34, "Buried Piping and Tanks Inspection."] Reinforced concrete and asbestos cement pipe/components are mechanical components buried in a soil environment [that] have the same aging effects as structural concrete. An approved precedent exists for adding this material, environment, and aging effect combination to the GALL Report. As shown in	The staff disagrees with this comment. The GALL Report has not been changed.	Already included in the GALL Report. See item VII.C1.AP-157. AMP XI.M34 was deleted and replaced by AMP XI.M41.

Table IV-8. Analysis and Disposition of Public Comments on Chapter VII, May 2010 Public Comment Draft GALL Report, Rev. 2

Comment Number	Location in Document and Commenter Reference No.	Comment	NRC Disposition	Technical Basis
		Harris SER page 3-560, the staff accepted the position that cracking, loss of material and changes in material properties are appropriate aging effects for reinforced concrete and asbestos cement pipe/components buried in a soil environment. AMP XI.M34 was developed to provide for proper management of the aging effects for this MEAP combination. This program provides an acceptable means of managing aging of these components. The implementation of this program provides reasonable assurance that the component's intended functions will be maintained within the CLB for the period of extended operation. Ref: ASTM C296, Standard Specification for Asbestos-Cement Pipe		
445	VII.C1 ML101880269 Comment VII.C!-x	[This comment recommends adding new AMR lines in GALL Table VII.C1 for HDPE piping, piping components and piping elements in a soil environment with no aging effect and no AMP.] HDPE in a soil environment is not expected to age. Carbon black is added to HDPE for protection from ultraviolet exposure and ultraviolet exposure is not an issue for buried HDPE pipe. Piping system design temperatures are well below the oxidation induction temperature requirement of 220C.	The staff disagrees with this comment. The GALL Report has not been changed.	The staff acknowledges that some data exist which indicate that HDPE pipe is resistant to the absorption of water. Based on this data the staff also acknowledges that the risk of piping degradation due to water absorption, e.g. blistering and associated color changes appears low. The staff further acknowledges that test data associated with slow crack growth in some HDPE formulations are favorable. The staff notes, however, that these are relatively

Table IV-8. Analysis and Disposition of Public Comments on Chapter VII, May 2010 Public Comment Draft GALL Report, Rev. 2

Comment Number	Location in Document and Commenter Reference No.	Comment	NRC Disposition	Technical Basis
		Slow crack growth is the predominant failure mode for HDPE. This failure mode is addressed by material testing required by ASTM D-3350, Standard Specification for Polyethylene Plastics Pipe and Fittings Materials. PENT Testing performed under ASTM D-3350 measures resistance of HDPE to slow crack growth and test results can be correlated to material service life. HDPE materials used in nuclear safety class applications are required to as a minimum meet ASTM classification 445574C. PENT testing for materials assures that slow crack growth is not a failure mode during the design life of the piping. Slow crack growth occurs at a very slow rate and this condition cannot be observed by field inspection. HDPE does not absorb water according to Plastic Pipe Institute technical report PPI TR-19, Chemical Resistance of Thermoplastic Piping Materials based on testing performed at temperatures up to 140 degrees F. HDPE is not subject to water absorption and subsequent osmotic blistering that can occur with other polymeric materials. There is no color change in response to water absorption with HDPE.		short term test data and that little long term nuclear industry operating experience with HDPE exists. Based on the lack of long term field experience with these materials in the nuclear industry, the staff cannot conclude the absence of aging effects for HDPE exposed to soil. As a result of this conclusion, the staff has included recommendations for aging management for HDPE exposed to soil in AMP XI.M41 and in AMR items AP-239 and AP-175.
459	VII.C1, VIII.F2, VIII.G ML101880269 Comment	[This comment recommends adding new AMR items in GALL Tables VII.C1, VII.F2, and VIII.G for PVC piping, piping components and piping elements in an air-indoor controlled	The staff agrees with this comment and associated changes to the GALL Report	The staff has accepted this position in Vogtle SER Section 3.3.2.3.23, where it states that there is no indication in the

Table IV-8. Analysis and Disposition of Public Comments on Chapter VII, May 2010 Public Comment Draft GALL Report, Rev. 2

Comment Number	Location in Document and Commenter Reference No.	Comment	NRC Disposition	Technical Basis
	VII.C1-x, VII.F2-x, VIII.G	environment or condensation (internal) with no aging effect and no AMP.] As identified in “Engineering Materials Handbook – Engineering Plastics,” PVC is unaffected by water, concentrated alkalis, non-oxidizing acids, oils, ozone, sunlight, or humidity changes. Unlike metals, thermoplastics do not display corrosion rates, and rather than depend on an oxide layer for protection, they depend on chemical resistance to the environments to which they are exposed. Plastic is an impervious material and once selected for the environment will not have any significant age related degradation. No age related industry experience has been identified for plastic material in air-indoor or condensation (internal) environments. The staff’s review in the TMI SER (NUREG-1928) found that air-indoor environments on PVC materials will not result in aging effects that will be of concern during the period of extended operation.	have been made.	industry that PVC or thermoplastics exposed to an internal indoor air environment have any aging effects requiring management. The generally low operating temperatures and historically good chemical resistance data for PVC components, combined with a lack of historic negative operating experience, indicate that PVC is not likely to experience any degradation from the nonaggressive indoor air. PVC materials do not display corrosion rates as metals do, but rather rely on chemical resistance to the environments to which they are exposed. Therefore, based on industry experience and the assumption of proper design and application of the material, the staff finds that PVC piping components exposed to an indoor air environment exhibit no aging effects requiring management for the period of extended operation. Because the aging effect is none, and the recommended AMP is none, the changes were

Table IV-8. Analysis and Disposition of Public Comments on Chapter VII, May 2010 Public Comment Draft GALL Report, Rev. 2

Comment Number	Location in Document and Commenter Reference No.	Comment	NRC Disposition	Technical Basis
				implemented with the following items. VII.J.AP-268 and -269, and VIII.I.SP-152 and -153.
885	VII.C1 ML101880269 Comment 25	In addition to concrete and concrete cylinder piping, need to add a MEAP for asbestos cement piping. See new MEAP comments.	The staff agrees with this comment and associated changes to the GALL Report have been made.	AMR items VII.C1.AP-157 and VII.C1.AP-155 were added for asbestos cement piping because it has been added to the AMP XI.M41.
886	VII.C1 ML101880269 Comment 26	A new GALL line is needed to address cracking of fiberglass piping in a raw water environment that is managed by AMP XI.M38 Internal Surfaces. Complimentary MEAP for Open cycle cooling water fiberglass piping in a soil environment.	The staff agrees with this comment and associated changes to the GALL Report have been made.	An MEAP, VII.C1.AP-176, was added to the GALL Report for fiberglass piping exposed to a soil environment. An additional MEAP, VII.C1-AP-238, was added to the GALL Report to account for the internal environment of open cycle cooling water. However, for VII.C1.AP-238, open-cycle cooling water system, AMP XI.M20 is credited.
887	VII.C1 ML101880269 Comment 27	A new GALL line is needed to address cracking of HDPE piping in a raw water environment that is managed by AMP XI.M38 Internal Surfaces. Complimentary MEAP for Open cycle cooling water HDPE piping in a soil environment.	The staff agrees with this comment and associated changes to the GALL Report have been made.	An MEAP, VII.C1.AP-175, was added to the GALL Report for HDPE piping exposed to a soil environment. An additional MEAP, VII.C1.AP-239, was added for the internal environment of open cycle cooling water. However, for VII.C1.AP-239, open-cycle cooling water system, AMP XI.M20 is credited.

Table IV-8. Analysis and Disposition of Public Comments on Chapter VII, May 2010 Public Comment Draft GALL Report, Rev. 2

Comment Number	Location in Document and Commenter Reference No.	Comment	NRC Disposition	Technical Basis
888	VII.C1 ML101880269 Comment 28	Revise the material to read copper alloy to be consistent with other copper alloy lines: Material: copper <u>alloy</u>	The staff agrees with this comment and associated changes to the GALL Report have been made.	The GALL Report referred to copper instead of copper alloy, and this has been corrected, VII.C1.AP-174.
437	VII.C2, VII.H2 ML101880269 Comment VII.C2-x, VII.H2-x	[This comment recommends adding new AMR lines in GALL Tables VII.C2 and VII.H2 for aluminum piping, piping components and piping elements in a closed-cycle cooling water environment with an aging effect of Loss of material due to pitting and crevice corrosion managed by Chapter XI.M21A2, “Closed Treated Water Systems.”] Closed-cycle cooling water environment is similar to treated water environments in GALL Rev. 2. GALL Rev 2 Chapter IX definitions acknowledge that closed-cycle cooling water is a subset of second category of treated water. Aluminum is subject to crevice corrosion due to the dependence of Al_2O_3 film oxide for protection (Ref. Corrosion Engineering by Fontana). Aluminum is also prone to pitting in treated water systems (Metals Handbook)	The staff agrees with this comment and associated changes to the GALL Report have been made.	GALL Report includes stainless steel, steel and copper alloy piping with the same aging effects and AMP. Aluminum piping also should be included. The same AE/AM is included for aluminum material in treated water environment, and therefore, is valid for closed-cycle cooling water environment. VII.C2.AP-254 and VII.H2.AP-255 were added.
442	VII.C2, VII.H2, VIII.E ML101880269 Comment VII.C2-x, VII.H2-x, VIII.E-	[This comment recommends adding new AMR lines in GALL Tables VII.C2, VII.H2, and VIII.E for aluminum piping, piping components and piping elements in a treated water environment with an aging effect of Loss of material due to pitting and crevice corrosion	The staff agrees with this comment and associated changes to the GALL Report have been made.	GALL Report includes this MEAP combination in several systems; therefore, this MEAP combination can be added to VII.C2, and VII.H2. There is already an existing AMR item, VIII.E (see item

Table IV-8. Analysis and Disposition of Public Comments on Chapter VII, May 2010 Public Comment Draft GALL Report, Rev. 2

Comment Number	Location in Document and Commenter Reference No.	Comment	NRC Disposition	Technical Basis
	x	managed by Chapter XI.M2, “Water Chemistry” and XI.M32, “One-Time Inspection.”] Consistent with GALL Rev. 1 for BWR treated water environments: - Piping (aluminum, treated water) VII.E4-4 - Piping (aluminum, treated water) VII.E3-7		VIII.E.SP-90).
446	VII.C2 ML101880269 Comment VII.C2-x	[This comment recommends adding new AMR lines in GALL Table VII.C2 for elastomer seals and components in a closed cycle cooling water environment with an aging effect of hardening and loss of strength due to elastomer degradation managed by Chapter XI.M38, “Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components.”] Consistent with GALL Rev 1 for elastomers in: - Treated water (Spent Fuel Pool Cooling & Cleanup) VII.A4-1 - Raw water (Open Cycle Cooling Water) VII.C1-1 In general if the temperature is above 95F, then thermal aging may be considered significant.	The staff agrees with this comment and associated changes to the GALL Report have been made.	Elastomers are included in the GALL Report for treated water, and raw water environment, and therefore; were added for closed-cycle cooling water. AMP XI.M38 is acceptable to be used for closed-cycle cooling water environment.
948	VII.D ML101880269	A new GALL line is needed to address loss of material due to general, pitting, and crevice corrosion for copper alloy piping/tubing in a	The staff agrees with this comment and associated changes	Item VII.D.AP-240 was added which relies on AMP M24.

Table IV-8. Analysis and Disposition of Public Comments on Chapter VII, May 2010 Public Comment Draft GALL Report, Rev. 2

Comment Number	Location in Document and Commenter Reference No.	Comment	NRC Disposition	Technical Basis
	Comment 29	condensation environment that is managed by XI.M24 Compressed Air Monitoring A new GALL line is needed to address copper alloy piping/tubing in compressed air systems	to the GALL Report have been made.	
949	VII.F1 ML101880269 Comment 30	The AMP for this GALL line should be XI.M36 External Surfaces AMP to agree with the material environment combination being managed: that is air-indoor, uncontrolled (external) AMP XI.M38 (internal surfaces) is inconsistent with the environment managed (external surfaces). This is a generic comment for Sections V, VII, and VIII when an external environment is specified to be managed by AMP XI.M38 Internal Surfaces AMP.	The staff agrees with this comment and associated changes to the GALL Report have been made.	The incorrect AMP was specified for aging effects on an external surface. VII.F1.AP-113 was changed.
950	VII.F1 ML101880269 Comment 31	The AMP for this GALL line should be XI.M36 External Surfaces AMP to agree with the material environment combination being managed: that is air-indoor, uncontrolled (internal/external) AMP XI.M38 (internal surfaces) is inconsistent with the environment managed (external surfaces). This is a generic comment for Sections V, VII, and VIII when an internal/external environment is specified to be managed. AMP XI.M36 (External Surfaces AMP) can manage the internal and external surfaces (see element 1).	The staff agrees with this comment and associated changes to the GALL Report have been made.	AMP XI.M36 states that if the internal and external surfaces have the same environment, then AMP XI.M36 can be credited for managing the effects of aging for both the internal and external surfaces. AMP XI.M38 does not have a similar statement. VII.F1.AP-102 was changed.
951	VII.F1	Add (internal) to the environment for this GALL line to agree with the AMP XI.M38	The staff agrees with this comment and	To be consistent with the AMP XI.M38, internal has been added to

Table IV-8. Analysis and Disposition of Public Comments on Chapter VII, May 2010 Public Comment Draft GALL Report, Rev. 2

Comment Number	Location in Document and Commenter Reference No.	Comment	NRC Disposition	Technical Basis
	ML101880269 Comment 32	(Internal Surfaces AMP): Condensation (internal) Add (internal) to the environment for this GALL line to agree with the AMP XI.M38 (Internal Surfaces AMP). This is a generic comment for Sections V, VII, and VIII when an condensation environment is specified to be managed by AMP XI.M38 Internal Surfaces AMP. See GALL VII.F1.A-08 for consistency.	associated changes to the GALL Report have been made.	the AMR item. This was a generic change made in AMR items where AMP XI.M38 is credited to manage aging in an environment of condensation.
463	VII.J ML101880269 Comment VII.J-x	[This comment recommends adding new AMR lines in GALL Table VII.J for aluminum piping, piping components and piping elements in a concrete environment with no aging effect and no AMP.] GALL addresses stainless steel embedded in concrete (VII.J-17 & VIII.I-11). An approved precedent exists for adding this material, environment, aging effect, and program combination to the GALL Report. As shown in Browns Ferry SER page 3-322, the staff accepted the position that aluminum alloy embedded or encased in concrete has no aging effect that requires aging management. Aluminum has an excellent resistance to corrosion. On a surface freshly abraded and then exposed to air, the oxide film is only 5 to 10 nanometer thick but is highly effective in protecting the aluminum from corrosion (Hollingsworth and Hunsicker 1979).	The staff disagrees with this comment. The GALL Report has not been changed.	Recent operating experience does not confirm this conclusion. Also, aluminum alloys are not stable at a high pH and corrode at a high rate in a high pH environment.

Table IV-8. Analysis and Disposition of Public Comments on Chapter VII, May 2010 Public Comment Draft GALL Report, Rev. 2

Comment Number	Location in Document and Commenter Reference No.	Comment	NRC Disposition	Technical Basis
		Aluminum that is embedded/encased within concrete, loss of material is not considered an applicable aging effect. The concrete would first have to be degraded by other aging effects, which reduce the protective cover and potentially allow for the intrusion of aggressive ions causing a reduction in concrete pH. Aging management of concrete aging effects will manage the corrosion of the embedded/encased aluminum protective oxide layer. Concrete structures and components are designed in accordance with ACI standards and constructed using materials conforming to ACI and ASTM standards which provide fo[r] a good quality, dense, well cured, and low permeability concrete. Cracking is controlled through arrangement and distribution of reinforcing bars.		
434	VII.K ML101880269 Comment VII.K-x	[This comment recommends adding new AMR lines in GALL Table VII.K for Copper alloy, stainless steel, or steel piping, piping components and piping elements in a potable water environment with an aging effect of Loss of material due to general (steel only), pitting and crevice corrosion managed by Chapter XI.M38, “Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components.”] Potable water is water treated for drinking or	The staff agrees with this comment and associated changes to the GALL Report have been made.	Potable water is water that is treated for drinking purposes. Potable water system is a non-safety related system in scope for 10 CFR 54.4(a)(2) and is considered a sub-set of raw water . An approved precedent exists for adding this material, environment, aging effect and program combination to the GALL Report. As shown in DAEC (Duane Arnold Energy Center) SER Section

Table IV-8. Analysis and Disposition of Public Comments on Chapter VII, May 2010 Public Comment Draft GALL Report, Rev. 2

Comment Number	Location in Document and Commenter Reference No.	Comment	NRC Disposition	Technical Basis
		other personnel uses. This additional AMR line-item is created to consider the aging of steel, stainless steel or copper alloy piping components in a potable water environment. Aging of stainless steel or copper alloy in a potable water environment is consistent with aging in other treated water environments such as demineralized water. The aging effect is also consistent with several recent industry precedents for aging of stainless steel or copper alloys in a potable water environment. AMP XI.M38 was developed to provide for proper management of the aging effects for this MEAP combination. This program provides an acceptable means of managing aging of these components. The implementation of this program provides reasonable assurance that the component's intended functions will be maintained within the CLB for the period of extended operation.		3.3.2.1.20, the staff has accepted XI.M38, Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components to manage the aging effect of loss of material for these materials in this environment. AMP XI.M38 is revised to include all metallic materials in the scope of the AMP. This comment affects lines VII.E5.AP-270 and VII.E5.AP-271.
506	VII ML101880269, Comment VII.E5	This comment recommends adding a new section for waste water systems and 10 new AMR Line items in GALL Table VII.E5. New lines are proposed to be added to NUREG-1801 for aging management review of waste water systems. AMP XI.M38, "Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components", is proposed for inspections of internal surfaces of metal components that are not covered by other aging management	The staff agrees with this comment and associated changes to the GALL Report have been made.	The staff has noted that applicants have historically attempted to use the Open Cycle Cooling Water AMP and associated AMR items to manage aging of components which are exposed to raw water but which do not meet the strict definition of open cycle cooling water. The staff has also noted that many of the components for which the Open Cycle Cooling

Table IV-8. Analysis and Disposition of Public Comments on Chapter VII, May 2010 Public Comment Draft GALL Report, Rev. 2

Comment Number	Location in Document and Commenter Reference No.	Comment	NRC Disposition	Technical Basis
		programs. Glass is managed consistent with existing GALL lines for glass in raw water in the Common Miscellaneous Material/Environment section of GALL.		Water AMP were applied could be described as components in waste water systems. In order to promote both accuracy and efficiency in evaluating license renewal applications, the staff has modified the AMP “Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components” (XI.M38) to include any water system other than open cycle cooling water, treated water and fire water. The staff has also created AMR items to be consistent with AMP XI.M38.

Table IV-9. Analysis and Disposition of Public Comments on Chapter VIII, May 2010 Public Comment Draft GALL Report, Rev. 2

Comment Number	Location in Document and Commenter Reference No.	Comment/Proposed Change and Rationale	NRC Disposition	Technical Basis
952	VIII.E ML101880269 Comment 33	Delete “buried” from the component name. ~~Buried~~ piping, piping components, piping elements, tanks Delete buried to be consistent with the other Structure/Component names for piping components in a soil environment.	The staff disagrees with this comment. The GALL Report has not been changed.	The term “buried” is required to distinguish it from underground piping and tanks that are contained in vaults or troughs.
953	VIII.I ML101880269 Comment 34	Line GALL VIII.I.SP-67 duplicates line VIII.I.SP-105. Delete one of the lines. Editorial correction.	The staff agrees with this comment and associated changes to the GALL Report have been made.	The AMR items were identical and SP-67 was deleted.
954	VIII.I ML101880269 Comment 35	Line GALL VIII.I.SP-69 duplicates line VIII.I.SP-112. Editorial correction.	The staff agrees with this comment and associated changes to the GALL Report have been made.	The AMR items were identical and SP-112 was deleted.

Table IV-10. Analysis and Disposition of Public Comments on Chapter IX, May 2010 Public Comment Draft GALL Report, Rev. 2

Comment Number	Location in Document and Commenter Reference No.	Comment	NRC Disposition	Technical Basis
955	IX.G ML101880269 Comment 36	Revise this definition consistent with the resolution of the scope of the buried components AMP. Recommend deleting the buried component definition as it describes an environmental condition. Also recommend deleting limited-access and below grade components consistent with the AMP M41 scope definition – the environment for these components will be “air - indoor.” Revise this definition consistent with the resolution of the scope of the buried components AMP.	The staff agrees with this comment and associated changes to the GALL Report have been made.	There was no previous definition for underground piping and tanks.
956	IX.G ML101880269 Comment 37	Expand this definition to include other neutron absorbers (metamic & carborundumsteel) Consistency with LR-ISG-2009-01	The staff disagrees with this comment. The GALL Report has not been changed.	The staff does not agree with this comment. According to the ISG other neutron absorbers are not explicitly mentioned in the AMP. The licensee is left to identify any absorbers that need to be included. Therefore, since these materials are not explicitly called out in the AMP, there does not need to be a definition for them.
957	IX.G ML101880269 Comment 38	Based on GALL Rev 2 AMR line usage, the second part of the treated water definition will apply primary or secondary chemistry controls to HVAC systems, aux boiler, or diesel cooling systems that are currently managed by closed cycle cooling water programs. For PWR Auxiliary Systems and Steam and Power Conversion Systems, either expand the	The staff disagrees with this comment. The GALL Report has not been changed.	The title of the “Closed Cycle Cooling Water” program was changed to the “Closed Treated Water Systems” so the program could be expanded to cover all treated water system.

Table IV-10. Analysis and Disposition of Public Comments on Chapter IX, May 2010 Public Comment Draft GALL Report, Rev. 2

Comment Number	Location in Document and Commenter Reference No.	Comment	NRC Disposition	Technical Basis
		treated water AMR lines which are managed by AMP XI.M21 (Treated Water AMP) or create a secondary water (condensate/feedwater) environment and associated PWR AMR lines that rely on secondary water chemistry. Resolve inconsistent usage of PWR secondary water AMP XI.M2 for Auxiliary Systems (HVAC systems, Aux boilers, diesel cooling). Depending on the resolution create additional GALL AMR lines for treated water rather than closed cycle environments for systems with demineralized water and demineralized water with corrosion inhibitors.		
507	IX.D ML101880269 Comment IX.D	Definitions: Potable Water - (new) Water that is treated for dinking or other personnel uses. Raw Water - (revised) Raw, untreated fresh, salt, or ground water. Water for use in open-cycle cooling water systems. ~~Floor drains and reactor buildings and auxiliary building sumps may be exposed to a variety of untreated water that is thus classified as raw water, for the determination of aging effects.~~ ~~Raw water may contain contaminants, including oil and boric acid, depending on the location, as well as originally treated water that is not monitored by a chemistry program.~~ Waste Water - (new) Radioactive, potentially radioactive, or non-radioactive waters that are	The staff partially agrees with this comment and associated changes to the GALL Report have been made.	A separate definition of potable water was not added because no AMR Items refer to it, however it was added as a sub-set of raw water. The definition of raw water was revised to include only water used in open-cycle cooling water systems. The definition of waste water was added to include radioactive, potentially radioactive, or non-radioactive waters that are collected from equipment and floor drains. This was included in the raw water definition in the GALL

Table IV-10. Analysis and Disposition of Public Comments on Chapter IX, May 2010 Public Comment Draft GALL Report, Rev. 2

Comment Number	Location in Document and Commenter Reference No.	Comment	NRC Disposition	Technical Basis
		collected from equipment and floor drains. Waste waters may contain contaminants, including oil and boric acid, depending on location, as well as originally treated water that is not monitored by a chemistry program		Report, Revision 1.

Table IV-11. Analysis and Disposition of Public Comments on Chapter X TLAAs, May 2010 Public Comment Draft GALL Report, Rev. 2

Comment Number	Location in Document and Commenter Reference No.	Comment	NRC Disposition	Technical Basis
133	X.M1 ML101830328 Comment X.M1-1	Change the title to match the SCOPE of the program and Sections II through VIII of GALL. Cumulative fatigue damage exists for far more than the reactor coolant pressure boundary components as stated in the AMP. Containment, supports, steam generator secondary sides, reactor internals, ESF, Aux and S&P all have cumulative fatigue damage entries in the GALL AMR tables.	The staff agrees with this comment and associated changes to the GALL Report have been made.	Fatigue damage exists for far more than the reactor coolant pressure boundary components.
134	X.M1 ML101830328 Comment X.M1-2	Remove word “structural” and “reactor coolant system” from multiple locations so as not to unnecessarily restrict the program scope.	The staff agrees with this comment and associated changes to the GALL Report have been made.	Scope includes more than reactor coolant system. Scope of program defines what is included.
135	X.M1 ML101830328 Comment X.M1-3	The discussion of using NUREG/CR-6909 needs to be specific, not only in this program but also in other portions of GALL Rev 2 and NUREG-1800 Rev 2. RG 1.207 and NUREG/CR-6909 do not allow use of the nickel-alloy Fen from 6909 with a CUF calculated from the existing ASME stainless steel curve. Assuming the staff wants to maintain this requirement, any discussion of this should be very specific. Suggest that rather than trying to summarize it here, just reference NUREGs 5704 and 6583 and 6909.	The staff agrees with this comment and associated changes to the GALL Report have been made.	RG 1.207 and NUREG/CR-6909 do not allow use of the nickel-alloy F_{en} from 6909 with a CUF calculated from the existing ASME stainless steel curve. Revised to very specifically identify how F_{en} is to be calculated for carbon and low-alloy steels, stainless steel, and nickel-alloy materials.
136	X.M1 ML101830328 Comment X.M1-4	The last paragraph of the program description is unnecessary. The GALL report wouldn’t contain detailed description of a program that wasn’t acceptable.	The staff agrees with this comment and associated changes to the GALL Report	The GALL Report would not contain a detailed description of a program that was not acceptable.

Table IV-11. Analysis and Disposition of Public Comments on Chapter X TLAAs, May 2010 Public Comment Draft GALL Report, Rev. 2

Comment Number	Location in Document and Commenter Reference No.	Comment	NRC Disposition	Technical Basis
	Program Description		have been made.	
137	X.M1 ML101830328 Comment X.M1-5	As the scope now applies to more than the RCS, separate the RCS environmental fatigue to a second paragraph in the SCOPE. Include some of the words from DETECTION OF AGING EFFECTS as they fit better here.	The staff agrees with this comment and associated changes to the GALL Report have been made.	Scope applies to more than reactor coolant system. Also moving the sentence about sample set from detection of aging effects to scope of work ties in with the sample set used in the scope of work element. Revised to state, "For the purposes of monitoring and tracking, applicants should include, for a set of sample reactor coolant system components, fatigue usage calculations that consider the effects of the reactor water environment. This sample set should include the locations identified in NUREG/CR-6260 and additional plant-specific component locations in the reactor coolant pressure boundary if they may be more limiting than those considered in NUREG/CR-6260."
138	X.M1 ML101830328 Comment X.M1-6	In Detection of Aging Effects need to delete the discussion of monitoring specific locations. Add some of it in the scope as discussed above. Note that this should be an option, as it is in PARAMETERS MONITORED/INSPECTED, not a requirement. Most plants just count cycles rather than monitor specific locations.	The staff agrees with this comment and associated changes to the GALL Report have been made.	Most plants just count cycles rather than monitor specific locations.

Table IV-11. Analysis and Disposition of Public Comments on Chapter X TLAAs, May 2010 Public Comment Draft GALL Report, Rev. 2

Comment Number	Location in Document and Commenter Reference No.	Comment	NRC Disposition	Technical Basis
139	X.M1 ML101830328 Comment X.M1-7	Need to reword MONITORING AND TRENDING, ACCEPTANCE CRITERIA, and CORRECTIVE ACTIONS to be more concise and not to mention the RCS pressure boundary.	The staff agrees with this comment and associated changes to the GALL Report have been made.	Scope includes more than reactor coolant system, therefore the elements need to be revised accordingly.
140	X.M1 ML101830328 Comment X.M1-8	In Program Description recommend add the following in the First paragraph - at end: "The program also verifies that the severity of the monitored transients are bounded by the design transient definition for which they are classified." To provide additional clarity on transients.	The staff agrees with this comment and associated changes to the GALL Report have been made.	This change provides clarification and does not change the technical intent of the AMP. Therefore, no technical basis if needed.
142	X.M1 ML101830328 Comment X.M1-10	Scope of program, add: The scope includes those components that have been identified to have a fatigue TLAA.	The staff agrees with this comment and associated changes to the GALL Report have been made.	Provides clarification and makes it consistent with SRP-LR Appendix A.1.2.3.1 and does not change the technical intent of the AMP. Therefore, no technical basis if needed.
143	X.M1 ML101830328 Comment X.M1-11	Preventive Actions: For clarity change to: "The program prevents the fatigue TLAAs from becoming invalid by assuring that the fatigue usage resulting from actual operational transients does not exceed the Code design limit of 1.0, including environmental effects where applicable. This could be caused by the numbers of actual plant transients exceeding the numbers used in the fatigue analyses or by the actual transient severity exceeding the bounds of the design transient definitions. However, in either of these cases, if the	The staff agrees with this comment and associated changes to the GALL Report have been made.	This change provides clarification and does not change the technical intent of the AMP. Therefore, no technical basis is needed.

Table IV-11. Analysis and Disposition of Public Comments on Chapter X TLAAs, May 2010 Public Comment Draft GALL Report, Rev. 2

Comment Number	Location in Document and Commenter Reference No.	Comment	NRC Disposition	Technical Basis
		analysis is revised to account for the increased number or severity of transients such that the CUF value remains below 1.0, the program remains effective."		
895	X.M1 ML101830328 Comment X.M1-9	Recommend adding the following in Program Description in the last paragraph to provide clarification on the use of Fen. "The environmentally-adjusted Cumulative Usage Factor is calculated by multiplying the Cumulative Usage Factor (CUF) by an environmental correction factor, Fen. The environmental correction factor for carbon or low-alloy steel may be computed using the equations from either NUREG/CR-6583 or NUREG/CR-6909, applied to CUF value determined using the applicable ASME Section III fatigue curve. The environmental correction factor for austenitic stainless steel may be computed using the equation from NUREG/CR-5704 in conjunction with the CUF value determined using the ASME Section III fatigue curve. Alternatively, the environmental correction factor for austenitic stainless steel may be determined using the equation from NUREG/CR-6909 in conjunction with the CUF value determined using either the NUREG/CR-6909 fatigue curve or the ASME Section III fatigue curve. The environmental correction factor for nickel-based alloys may be computed using the equation from NUREG/CR-6909 in conjunction with the CUF	The staff agrees with this comment and alternative changes to the GALL Report have been made.	The program description has been revised in an alternative manner to clarify how to determine the environmental effects on fatigue for various materials. This change clarifies which NUREG to use for different materials.

Table IV-11. Analysis and Disposition of Public Comments on Chapter X TLAAs, May 2010 Public Comment Draft GALL Report, Rev. 2

Comment Number	Location in Document and Commenter Reference No.	Comment	NRC Disposition	Technical Basis
		value determined using the NUREG/CR-6909 stainless steel fatigue curve."		

Table IV-12. Analysis and Disposition of Public Comments on Chapter XI Mechanical AMPs, May 2010 Public Comment Draft GALL Report, Rev. 2

Comment Number	Location in Document and Commenter Reference No.	Comment	NRC Disposition	Technical Basis
132	Chapter XI ML101610407, Comment 1	Document Title: NUREG-1801 Rev2 Comments: A specific “numbered” sub section should be added to AMP descriptions that defines a nominal implementation schedule of the AMP. Citing a standard or standards upon which the applicant can (and NRC for that matter) can derive a schedule can lead to ambiguity when validating completion of commitment. A nominal implementation schedule should indicate. The minimum number of times the AMP should be executed in the period of extended operation. The earliest and latest time the applicant can initiate the first implementation and the minimum and maximum interval of time between implementations during the extended period of operations. Example: Under normal conditions and results of previous implementations (if applicable) meet expectations. The AMP should be implemented 4 times during the period of extended operations. The AMP should not be executed within the first 2 years of extended operation and the interval between implementations should not be less than 3 years or exceed 4 years. Likewise any applicant proposing a Plant Specific or GALL AMP with modifications must describe an implementation schedule that is “auditable” with the assumption that	The staff disagrees with this comment. The GALL Report has not been changed.	Element 4, Detection of Aging Effects, in each AMP identifies the frequency of testing or inspection, along with the Codes or standards as applicable. For example, in the electrical AMPs, in XI.E1, power cables are tested at least once every six (6) years, which provides 3-4 data points in 20 years, with the first test being completed prior to the period of extended operation. In mechanical AMPs, the testing frequency in most cases is dictated by the (1) ISI program, (2) staff-approved BWRVIP documents, (3) National Fire Protection Association (NFPA) requirements, (4) plant surveillance or maintenance programs, or (5) very specifically prescribed in the AMP. In structural AMPs, the frequency is defined in the ASME Codes or Maintenance Rule requirements. Therefore, the staff finds that the implementation schedule is adequately defined in the individual AMPs in element 4, detection of aging effects.

Table IV-12. Analysis and Disposition of Public Comments on Chapter XI Mechanical AMPs, May 2010 Public Comment Draft GALL Report, Rev. 2

Comment Number	Location in Document and Commenter Reference No.	Comment	NRC Disposition	Technical Basis
		positive and expected results occur for each implementation.		
158	XI.M11B ML101830328 Comment XI.M11B-1	Removed discussion of the water chemistry guidelines and just referred to the GALL water chemistry program in Program Description.	The staff agrees with this comment and associated changes to the GALL Report have been made.	There was no change of technical intent. This change consolidates identification of specific Water Chemistry Guidelines in one GALL Report, XI.M2, “Water Chemistry.”
159	XI.M11B ML101830328 Comment XI.M11B-2	Change element 2 to match element 2 in other condition monitoring programs. In particular delete the reference to the EPRI document and just refer to XI.M2.	The staff agrees with this comment and associated changes to the GALL Report have been made.	There was no change of technical intent. This change consolidates identification of specific Water Chemistry Guidelines in the GALL Report, XI.M2, “Water Chemistry.”
160	XI.M11B ML101830328 Comment XI.M11B-3	Element 3 needs revised because PWSCC and BAC never apply to the same component. PWSCC applies to nickel-alloy components and BAC applies to steel components.	The staff agrees with this comment and associated changes to the GALL Report have been made.	Wording was revised to clarify that PWSCC applies to nickel-alloy components and BAC applies to steel components. PWSCC causes cracking in nickel-alloy components, but is not a degradation mechanism applicable for steel components. Boric Acid Corrosion is an aging effect primarily applicable for steel components.
161	XI.M11B ML101830328 Comment XI.M11B-4	The discussion of Water Chemistry in Element 10 sounds like this program includes maintaining water chemistry. That discussion should be altered to make it clear that XI.M2 maintains water chemistry.	The staff agrees with this comment and associated changes to the GALL Report have been made.	This was a clarification, not a change of technical intent. Therefore, no technical basis is needed.
162	XI.M12	See the comments on XI.M9. CF3, CF3A,	The staff agrees with	Clarified to distinguish between

Table IV-12. Analysis and Disposition of Public Comments on Chapter XI Mechanical AMPs, May 2010 Public Comment Draft GALL Report, Rev. 2

Comment Number	Location in Document and Commenter Reference No.	Comment	NRC Disposition	Technical Basis
	ML101830328, Comment XI.M12-1	CF8, CF8A should be considered low-molybdenum steels.	this comment and associated changes to the GALL Report have been made.	low molybdenum and high-molybdenum cast stainless steels.
163	XI.M12 ML101830328 Comment XI.M12-2	PREVENTIVE ACTIONS should be the same as other condition monitoring programs.	The staff agrees with this comment and associated changes to the GALL Report have been made.	Revised to make this element consistent with other AMPs
164	XI.M12 ML101830328 Comment XI.M12-3	Suggest that the paragraph added to M09 about detection of reduction in fracture toughness also be added to Element 3 of this program. Element 3 Parameters Monitored/Inspected, NEI comment XI.M12-3 in packet #4 suggests that the following paragraph be added at the end of this element: "*The program does not directly monitor for loss of fracture toughness that is induced by thermal aging; instead, the impact of loss of fracture toughness on component integrity is indirectly managed by using visual or volumetric examination techniques to monitor for cracking in the components* and by applying applicable reduced fracture toughness properties in the flaw evaluations if cracking is detected in the components and is extensive enough to warrant a supplemental flaw growth or flaw tolerance evaluation under the applicable BWRVIP guidelines or ASME	The staff partially agrees with this comment and associated changes to the GALL Report have been made.	Element 3 revised to incorporate portion of the comment [in italics].

Table IV-12. Analysis and Disposition of Public Comments on Chapter XI Mechanical AMPs, May 2010 Public Comment Draft GALL Report, Rev. 2

Comment Number	Location in Document and Commenter Reference No.	Comment	NRC Disposition	Technical Basis
		Code, Section XI requirements."		
165	XI.M16A ML101830328 Comment XI.M16A-1	The program description seems to be overly detailed and descriptive for a general description when it could more easily just refer to MRP-227 for most of the items. Some items are also repeated in the 10 elements where this detail is appropriate.	The staff agrees with this comment and associated changes to the GALL Report have been made.	The information deleted in response to this comment is also contained in MRP-227, which is the basis document for this AMP. There was no change of technical intent.
166	XI.M16A ML101830328 Comment XI.M16A-2	In element 2 preventive actions there is a discussion of applicability limitations for MRP-227. These should not be in preventive actions but in scope section.	The staff agrees with this comment and associated changes to the GALL Report have been made.	The Preventive Actions program element was revised to move the information about applicability limitations to the Scope of Program. This was not a change of technical intent. Information was moved from the Preventive Actions program element to a more appropriate program element.
167	XI.M16A ML101830328 Comment XI.M16A-3	In element 1, 3 and 4 there are sentences that state there is an administrative action item for the applicant to fill in the type of plant and vendor. This is not used for any other GALL programs and not sure why this needs to be written this way. The applicant will develop their program based on the GALL program requirements depending on the make and vintage of his plant.	The staff disagrees with this comment. The GALL Report has not been changed.	Since the MRP-227 internals AMP is dependent upon type of plant and the design vendor, the additional administrative information in Elements 1, 3, and 4 are necessary for staff review of this program.
168	XI.M17 ML101830328 Comment XI.M17-1	The flow- accelerated corrosion (FAC) program is limited to Rev. 2 or 3 rather than "Rev. 2 or later" as recommended by NEI. This will create exceptions to later versions. Credit for NRC staff review of later versions	The staff disagrees with this comment. The GALL Report has not been	The staff cannot give open ended approval to future revisions of industry standards that have not been reviewed in some manner by the staff to ensure their technical

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Comment Number	Location in Document and Commenter Reference No.	Comment	NRC Disposition	Technical Basis
		and acceptance in a safety evaluation report could eliminate exception.	changed.	integrity. It is necessary to specify the edition of the NSAC document reviewed by the staff for license renewal because new revisions have not been reviewed for generic acceptance for use in license renewal. However, a preface was added to GALL Report, Chapter XI to identify circumstances under which later revisions of industry documents may be referenced in a license renewal application.
169	XI.M17 ML101830328 Comment XI.M17-2	Element 4 states wall thickness measurements are performed every outage. This may not be true in the future as piping replacements reduce the amount and frequency of inspections.	The staff agrees with this comment and associated changes to the GALL Report have been made.	The NSAC does not call out an exact frequency and lets the licensee determine the frequency needed.
524	XI.M17 ML101880265 Comment 1	This comment addresses the “scope of program” element of the GALL AMP XI.M17. The term carbon steel “lines” seems restrictive and not clearly defined in either the GALL Report (NUREG 1801) or the SRP document (NUREG 1800). Considering the context of remainder elements in this AMP and the intended aging (FAC) covered by the AMP the reviewer suggests that the text be revised to include the following:	The staff disagrees with this comment. The GALL Report has not been changed.	SG tube supports and internals are not part of FAC program. UT is not possible inside a SG.

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		"The FAC program is to assure the structural integrity of all carbon steel lines and piping components containing high-energy fluids (two-phase as well as single-phase) is maintained. Valve bodies and other components such as the steam generator tube supports and internals required for the functionality of the high energy systems are also covered by the program."		
525	XI.M17 ML101880265 Comment 2	This comment addresses the "detection of aging effects" element of the GALL AMP XI.M17. For better clarity the following changes to the text are suggested: "A representative sample of components is selected for wall thickness measurements based on the most susceptible locations, every refueling outage. The extent and schedule of the inspections should ensure detection of wall thinning before the loss of intended function."	The staff disagrees with this comment. The GALL Report has not been changed.	"Should" is not appropriate guidance. Saying the inspections ensure... removes the ambiguity of "should."
526	XI.M17 ML101880265 Comment 3	This comment and concern deal with the "monitoring and trending" element of the GALL AMP XI.M17. In this element the GALL Report states: "CHECWORKS is acceptable because it provides a bounding analysis for FAC. The analysis is bounding because in general the predicted wear rates and component thicknesses are conservative when compared to actual field measurements."	The staff agrees with this comment and associated changes to the GALL Report have been made.	It is recognized that CHECWORKS is not always conservative in predicting component thickness. Therefore when measurements show the predictions to be non-conservative the model must be re-calibrated using the latest field data.

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		The concern is that the analysis may not necessarily be bounding in every case and the conservatism "in general" may not be sufficient to prevent possible impairment prior to next scheduled inspection. The bounding and conservatism aspects are both subject to (a) input (parameters) assumptions being matched (or not being exceeded) in the service conditions and (b) the uncertainty resulting from these conditions as well as from the model [Ref. 1]. This concern is also supported by (a) the observed spread in comparing the predictions versus observations [Ref. 2], (b) the lack of bounding value of prediction where actual service failures have occurred [Ref. 2], and (c) no explicit accounting for the input and modeling uncertainty in the suggested analysis method. Therefore, as a minimum, the proper accounting of the uncertainty on predicted wear rates and thicknesses needs to be part of the monitoring and trending activity. References: 1. Garud, Y. S., "Techniques for Improved Reliability of Wall Thinning Estimation," Paper No. PVP2006-ICPVT-11-93414, 2006 ASME Pressure Vessel and Piping Conference, ASME, NY (July 2006). 2. Garud, Y. S., "Issues and Advances in the Assessment of Flow Accelerated Corrosion," Paper No. 203160, presented at the 14th		

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Comment Number	Location in Document and Commenter Reference No.	Comment	NRC Disposition	Technical Basis
		International Conference on Environmental Degradation of Materials in Nuclear Power Systems, Virginia Beach, Virginia, (August 2009).		
527	XI.M17 ML101880265 Comment 4	This comment and concern deal with the “operating experience” (OE) element of the GALL AMP XI.M17. The OE section needs to cover more recent occurrences such as the feedwater heater rupture at Point Beach 1 [Ref. 3], the feedwater heater leaks at Pilgrim and Susquehanna [Ref. 3], the double-ended guillotine break of 8-inch line at Callaway [Ref. 4]. The OE should also include the [latent] rupture event, discussed in Ref. 2, even though it is from a fossil unit, because of its direct relevance and commonality of conditions with nuclear systems. It should be noted that even if one accepts the possible administrative errors (such as missing the list of components to be inspected) as a contributing factor to service events, the comparison of actual (observed) wear rate versus model prediction (from these events) are still valid and demonstrate the need to account for uncertainty [Ref. 2]. Other lessons of likely importance suggested by more recent field observations and assessment [Ref. 2] include (a) some cautionary note about “partial” replacements with high-Cr parts in an otherwise susceptible carbon steel line, and (b) the FAC potential for	The staff agrees with this comment and associated changes to the GALL Report have been made.	In recognition of the operating experience described by the commenter, the staff enhanced XI.M17 reference list and modified the corrective action element to include “ when susceptible components are replaced with resistant materials, such as high Cr materials, the downstream components should be monitored closely to mitigate any increased wear.”

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Comment Number	Location in Document and Commenter Reference No.	Comment	NRC Disposition	Technical Basis
		locations with higher and lower temperature ranges than the previously presumed susceptibility range. References: 2. Garud, Y. S, “Issues and Advances in the Assessment of Flow Accelerated Corrosion,” Paper No. 203160, presented at the 14th International Conference on Environmental Degradation of Materials in Nuclear Power Systems, Virginia Beach, Virginia, (August 2009). 3. USNRC, “Rupture of the Shell Side of a Feedwater Heater at the Point Beach Nuclear Plant,” Information Notice (IN) 99-19, June 23, 1999. 4. Union Electric, “Manual Reactor Trip Due To Heater Drain System Pipe Rupture Caused By Flow Accelerated Corrosion, LER 1999-003-01,” ULNRC-4233, Union Electric Co., Callaway Unit 1, May 1 (2000). [Also, as Event Notification 36015, August 1999].		
170	XI.M18 ML101830328 Comment XI.M18-1	Revise first paragraph of Program Description for clarity.	The staff agrees with this comment and associated changes to the GALL Report have been made.	This is not a technical change. The format for listing relevant references was revised for clarity. Therefore, no technical basis is needed.
171	XI.M18 ML101830328	Currently the Program Description says this program doesn’t apply to structural bolts and the SCOPE says this program doesn’t apply	The staff agrees with this comment and associated changes	The Program Description and the Scope of Program are revised to state in both places that the

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	Comment XI.M18-2	to the Reactor Vessel closure studs. Both exceptions should be listed both places.	to the GALL Report have been made.	program does not apply to structural bolting or to reactor head closure stud bolting. AMP XI.M18 has been revised so that it applies only to closure bolting, not to structural bolting. AMP XI.M3 applies for the reactor head closure stud bolting. This change is consistent with the scope of AMP XI.M18, as revised. Reactor head closure studs (XI.M3) and AMPs affecting structural bolting (XI.S1, S3, S6, S7, and XI.M23) should be identified in both the program description and the Scope of Program element to maintain consistency. The staff has added to the commenter's proposed changes in order to maintain consistency between the program description and the scope.
172	XI.M18 ML101830328 Comment 3	The third sentence in the first paragraph is redundant to the next paragraph. Suggest this sentence be deleted.	The staff agrees with this comment and associated changes to the GALL Report have been made.	The program description was rewritten. The comment requested removal of redundant information, which is not a technical change. Rewriting of the Program Description in response to an earlier comment also included consideration of this comment.
173	XI.M18	In the third paragraph of the program description need to include, XI.S6, Structures	The staff agrees with this comment and	AMPs XI.S6 and XI.S7 were revised to explicitly include aging

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	ML101830328 Comment XI.M18-4	Monitoring and XI. S7, RG 1.127, Inspection of Water-Control Structures Associated with Nuclear Power Plants which both manage structural bolting.	associated changes to the GALL Report have been made.	management of structural bolting associated with structures managed by those AMPs. This change in AMP XI.M18 is consistent with those revisions. XI.S6 and XI.S7 have been updated to manage structural bolting and should be included in the described paragraph in order to provide a complete and accurate statement.
174	XI.M18 ML101830328 Comment XI.M18-5	In elements 3 and 4, high strength bolts are described. In element 2, preventive actions, state that use of high strength bolts is avoided. Reference to high strength bolting should be removed as it is only an issue for structural bolting which has been removed.	The staff disagrees with this comment. The GALL Report has not been changed.	Although aging management of structural bolting has been relocated to other AMPs, the possibility exists that for some systems high-strength closure bolting could be used. Discussion of high-strength bolts, “if used,” as stated in the Parameters Monitored/Inspected program element should remain in AMP XI.M18 to account for any possible high-strength bolts that fall within the scope of this program.
175	XI.M18 ML101830328 Comment XI.M18-6	Elements 1, 3, 4, 6 and 7. The main change is that all the structural bolting has been pulled out of the Bolting Integrity program and inserted in IWE, IWF, Structures Monitoring, and RG 1.127. Although removing structural bolting from the Bolting Integrity program would simplify Bolting Integrity (a little bit), it	The staff disagrees with this comment. The GALL Report has not been changed.	Management of structural bolting is more appropriately managed by structural AMPs. Experience has shown that a majority of submitted LRAs propose managing structural bolting through other than XI.M18 AMPs, which sometimes are

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		would unnecessarily complicate these others AMPS.		described as supplementing the preventive actions in AMP XI.M18.
1038	XI.M19 ML101830328 Comment XI.M19-1	Maintaining water chemistry should be left to the Water Chemistry Program, XI.M2, as it was in other programs. Revise PREVENTIVE ACTIONS accordingly.	The staff agrees with this comment and associated changes to the GALL Report have been made.	This is a clarification to more clearly state that water chemistry is managed by the Water Chemistry Program. It is not a change of technical intent.
1039	XIM19 ML101830328 Comment XI.M19-2	Program Element 2, Preventive Actions, lists chemical cleaning as a secondary side maintenance activity. Recommend to remove chemical cleaning since it is not done routinely since it is very expensive and can cause harm to tube materials if not done properly. Recommend to leave in sludge lancing as a secondary side maintenance activity. Recommend to state that secondary chemistry programs may be enhanced to add chemicals or adjust chemistry as needed to minimize deposition onto tubes (i.e., adding a dispersant such as polyacrylic acid [PAA]) as a preventive action.	The staff agrees with this comment and associated changes to the GALL Report have been made.	The text is intended to provide examples of secondary side maintenance activities so deleting reference to chemical cleaning is acceptable. However, it is (and other cleaning activities are) still an option under this AMP although not specifically listed. Regarding adding the sentence on water chemistry programs limiting the amount of deposits on the tubes, a similar statement was included; however, use of a specific dispersant was not included to allow a plant to make this determination based on its operating experience.
896	XI.M2 ML101830328 Comment XI.M2-1	Program Description – Do not delete the “or later revisions” wording that was added during Revision 1 of the GALL. The references to BWRVIP-190, EPRI 1014986, Rev. 6 & 1016555, Rev. 7 are good changes and it acknowledges the most current industry	The staff disagrees with this comment. The GALL Report has not been changed.	The staff cannot give open ended approval to future revisions of industry standards that have not been reviewed in some manner by the staff to ensure their technical integrity. However, a preface was

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		guidance to right now, but these documents are revised every few years based on industry experience and plants implement the most current guidance. Therefore if you remove the “or later revisions” wording, the GALL will quickly become out of date. Suggest adding “(reviewed and accepted by the NRC in a safety evaluation report)” to allow versions reviewed during inspections that confirm the adequacy of the later versions and could eliminate exception.		added to GALL Report, Chapter XI to identify circumstances under which later revisions of industry documents may be referenced in a license renewal application.
897	XI.M2 ML101830328 Comment XI.M2-2	Program Description, Elements1, 2 & 3 - Delete the specific parameters that are to be monitored and just reference the EPRI water chemistry guidelines. In several cases this causes contradictions to the guidelines and results in exceptions to the program. Examples: (1) Element 3 indicates that hydrogen peroxide is monitored to mitigate degradation of structural materials. However this contradicts the guidance in BWRVIP-190. Rapid decomposition of hydrogen peroxide makes reliable data difficult to obtain and BWRVIP-190 Section 6.3.3, “Water Chemistry Guidelines for Power Operation,” does not address monitoring for hydrogen peroxide. Noble metal chemical application and hydrogen addition are generally used to mitigate occurrence of IGSCC of structural	The staff agrees with this comment and associated changes to the GALL Report have been made.	The information is contained in the reference Water Chemistry Guidelines. It does not need to be repeated in the AMP.

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		materials by suppressing the formation of hydrogen peroxide. The hydrogen addition generally accomplishes an Electrochemical Corrosion Potential (ECP) value less than -230mV, SHE (Standard Hydrogen Electrode). By maintaining a low ECP less than -230mV, SHE, the reactor water chemistry minimizes the effects from hydrogen peroxide below the threshold that prompted the issue raised in NUREG 1801. In addition the ISI program investigates structural degradation in potentially affected locations and provides condition monitoring of the reactor vessel, reactor internal components and ASME Class 1 pressure retaining components in accordance with ASME Section XI, Subsection IWB. Indications and relevant conditions detected during examinations are evaluated in accordance with ASME Section XI Articles IWB-3000, for Class 1. (2) Element 3 indicates that dissolved oxygen is monitored; however BWRVIP-190 acknowledges the difficulty with monitoring dissolved oxygen and sets limits for conductivity, chlorides, sulfates and total organic carbon (TOC) as an alternate method for ensuring component integrity. (3) Program Description, Elements1, 2, 3 indicates that water quality (pH and conductivity) is maintained in accordance with established guidance. However, BWRVIP-		

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		190, Section 8.3.4.5, indicates pH measurement accuracy in most BWR streams is unreliable because of the dependence of the instrument reading on ionic strength of the sample solution. In addition, the monitoring of pH is not discussed in BWRVIP-190, Appendix E for condensate storage tank, demineralized water storage tank, or torus water.		
920	XI.M2 ML101830255 Comment XI.M2-1	Some locations within NUREG-1800 and NUREG-1801 cite BWRVIP-29 or BWRVIP-130. These references should be replaced by BWRVIP-190 or, wherever possible, simply refer to the "EPRI BWR Water Chemistry Guidelines." BWRVIP-190 is the current version of the EPRI BWR Water Chemistry Guidelines. This version represents the present state of industry knowledge regarding management of BWR water chemistry. As a minimum, all references to water chemistry guidance in NUREG-1801 should be revised to cite BWRVIP-190. However, the EPRI BWR Water Chemistry Guidelines are periodically revised to incorporate recent operating experience and to address new and improved mitigation techniques (e.g., online noblechem™[)]. Based on NEI 03-08, owners are required to update their programs to the latest needed and mandatory guidance contained in these guidelines. Therefore,	The staff agrees with this comment and associated changes to the GALL Report have been made.	Reference to BWRVIP-190 is appropriate because this is the most recent BWR Water Chemistry Guideline accepted by the staff for license renewal.

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		when possible, reference should be made to the “EPRI BWR Water Chemistry Guidelines.” Otherwise, the reference citations for the EPRI BWR Water Chemistry Guidelines will become out of date relatively soon.		
921	XI.M2 ML101830255 Comment XI.M2-2	In the context of BWR chemistry, “primary water” should be changed to “reactor water.” Applicable Section: Program Description Reactor water is the descriptive term used in BWRVIP-190.	The staff agrees with this comment and associated changes to the GALL Report have been made.	The term “reactor water” is more appropriate than “primary water,” because BWRs do not have primary and secondary coolant loops.
922	XI.M2 ML101830255 Comment XI.M2-3	The parameters monitored / inspected discussion should be simplified for BWRs to state that control parameters for reactor water include chloride, sulfate, conductivity, and ECP. These are the parameters important for aging management of the vessel and reactor internals. Where applicable, oxygen concentrations are also monitored to ensure that they remain in an acceptable range to address both FAC and SCC concerns. Other parameters are either used as diagnostic parameters only, or are associated with operations issues, not license renewal aging management. BWRVIP-190 lists chloride, sulfate, conductivity, and ECP as the control parameters for reactor water chemistry. These controls are focused on mitigation of corrosion and SCC of the reactor internals, vessel	The staff agrees with this comment and associated changes to the GALL Report have been made.	The staff agreed with this comment; however, changes made in response to Comment XI.M2-2 (Comment No. 897) eliminated the wording suggested by this comment. So, no additional change was made in response to this comment.

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		components, and the reactor recirculation system. In addition, oxygen concentration is monitored for some specific system locations to ensure that low oxygen does not contribute to FAC of carbon steel components. Limits on iron and copper are associated with fuel clad performance concerns. Fuel is not within the scope of license renewal. As a result, these parameters should not be included in section XI.M2.		
923	XI.M2 ML101830255 Comment XI.M2-4	BWRVIP-62 (and the associated NRC Safety Evaluation – ML100850009) should be referenced within XI.M2 since this document provides a technical basis for BWRVIP Inspection program modification associated with chemistry-based mitigation. BWRVIP-62 represents an important aspect of aging management for BWR vessel and internals components by providing a technical basis for inspection program modifications for plants implementing hydrogen water chemistry and noble metal catalyst application. Although a “-A” version of BWRVIP-62 has not been published at this date, BWRVIP-62 has received a safety evaluation from NRC (ML100850009). BWRVIP-62 and the associated NRC Safety Evaluation can and should be referenced in Section XI.M2.	The staff disagrees with this comment. The GALL Report has not been changed.	This document is highly referenced and cited in the EPRI BWR Chemistry reports. There is no need to call out this report again.
943	XI.M2	The AMR tables inconsistently refer to XI.M2	The staff agrees with	This is a wording simplification and

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	ML101880269 Comment 1	as: - Chapter XI.M2, “Water Chemistry” - Chapter XI.M2, “Water Chemistry” for BWR water - Chapter XI.M2, “Water Chemistry” for PWR primary water - Chapter XI.M2, “Water Chemistry” for PWR secondary water Revise the AMR tables to simply refer to Chapter XI.M2, “Water Chemistry.” AMP XI.M2 applies to all the environments for which a qualifier was added. Therefore, the qualifier is redundant.	this comment and associated changes to the GALL Report have been made.	is not a change of technical intent. Therefore, it is not shown as a notable technical change in Table II-21.
944	XI.M2 ML101880269 Comment 2	The AMR Tables inconsistently add Chapter XI.M32, “One-Time Inspection” to the Chapter XI.M2, “Water Chemistry” AMP. For example, see page V.A-5, Items V.A.EP-41 and V.A.E-12 and page VIII.A-3, items VIII.A.SP-44, VIII.A.SP-46, and VIII.A.SP-43 Revise the AMR tables to consistently apply the grouped programs. See AMP combination throughout the GALL.	The staff agrees with this comment and associated changes to the GALL Report have been made.	The change eliminates an inconsistency in the AMPs recommended to manage certain material, environment and aging effect combinations. However, it is noted that for PWRs the Water Chemistry program without the one-time inspection provides adequate aging management in a treated borated water environment.
1037	XI.M2 ML101830328 Comment XI.M2-3	Element 7 – Remove the “root” in root cause identified. In many cases the root cause of the unacceptable chemistry results may not be able to be identified. The more important investigation should be to determine if the excursion affected the components. In	The staff agrees with this comment and associated changes to the GALL Report have been made.	The change would have the licensee determine the cause of the results and the corrective actions program would determine if the root cause would need to be determined. The staff finds this

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		addition the individual corrective action processes should determine if root cause identification is required.		application of the corrective action program acceptable.
1035	XI.M22 ML101830328 Comment XI.M22-1	[In Detection of Aging Effects:] Five years is not a frequency. Inserted “once every” before “5 years”.	The staff agrees with this comment and associated changes to the GALL Report have been made.	The original wording was not correct; 5 years is a period, not a frequency. The AMP text was revised to say, "... with a minimum frequency of once every 5 years...." This is not a change of technical intent and, as result, does not show as a notable technical change in Table II-21.
179	XI.M24 ML101830328 Comment XI.M24-1	Program Description and Element 3, 4 and 5 - Specifying leak testing and compressor cycle time as an aspect of aging management is inappropriate since the presence of leakage confirms that aging effects have not been appropriately managed. In addition, leakage testing will normally detect the failure of isolation valve leak by and seal failures that are not passive components. Confirming the presence of moisture and contaminants along with visual inspections will confirm the effectiveness of aging management.	The staff agrees with this comment and associated changes to the GALL Report have been made.	The comment that recommends removing the references to pressure decay leak testing is acceptable because (1) the pressure decay leak testing is mainly intended to indicate performance degradation of active components and (2) visual examinations and control of moisture in the system, including pressure dew point monitoring, provide reasonable assurance of adequate aging management.
180	XI.M24 ML101830328 Comment XI.M24-2	In element 3 erosion is not an aging effect in GALL for air systems such that there is no need for inspection.	The staff agrees with this comment and associated changes to the GALL Report have been made.	The comment that recommends removing the reference to “erosion” is acceptable because operating experience indicates corrosion is the major mechanism

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				that causes the aging effect of loss of material in the compressed air system.
181	XI.M24 ML101830328 Comment XI.M24-3	In element 3 the use of the word “all” is unclear and implies that every component be examined. Recommend rewording to delete “all” and include “when available” to ensure components are inspected when opened for access.	The staff partially agrees with this comment and associated changes to the GALL Report have been made.	Agree with removing “all.” “All” is understood unless words are present to superficially look at less than all. Accessible is sufficient. NRC interpretation of accessible is ALL surfaces that are accessible. However, the comment that recommends adding “when available” is not acceptable because (1) the inspections described in the GALL AMP include both periodic inspections and opportunistic inspections and (2) the wording “when available” may be interpreted as the recommendation of performing only opportunistic inspections. Reworded from “”Inspections of all accessible internal surfaces are performed...” to “Periodic and opportunistic inspections of accessible internal surfaces are performed..” to ensure components are inspected when opened for access.
182	XI.M26 ML101830328	Element 1 - states that the program manages the effects of loss of material and cracking, however Increased hardness, shrinkage, and	The staff agrees with this comment and associated changes	This is consistent with AMR item VII.G.A-91.

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	XI.M26-1	loss of strength are also addressed for elastomer penetration seals in line item VII.G.A-91. Need to add these aging effects	to the GALL Report have been made.	
183	XI.M26 ML101830328 XI.M26-2	Elements 3 and 4 - Since inspections of penetration seals are performed in accordance with NRC-approved fire protection program as added by the revision, it is not necessary to specify the quantity of each seal type since this value will be defined by the site specific NRC approved program. This would be consistent with the other changes in the program in element 4 that added that the frequency of the inspection will be in accordance with an NRC approved fire protection program. The quantity of seal type to be inspected is specified in this NRC approved program and does not need to be defined.	The staff disagrees with this comment. The GALL Report has not been changed.	The quantity of each seal type may not be identified in all site-specific NRC approved fire protection programs. Additionally, the recommendation of inspecting not less than 10% of each type of seal, ensures that at a minimum, 100% of each type of seal will have been inspected by the end of the period of extended operation.
184	XI.M26 ML101830328 XI.M26-3	Element 4 - Though the option is available to use a different frequency, consider removing 6 month frequency since it was removed from Element 3 as requested earlier. Inspections of the system are in accordance with NRC-approved fire protection program.	The staff disagrees with this comment. The GALL Report has not been changed.	The functional test frequency may not be defined in all site-specific NRC-approved fire protection program; therefore, a recommendation of a "6 month frequency" provides a minimum frequency, and the option of a frequency in accordance with NRC-approved fire protection program has been provided.
185	XI.M26 ML101830328	Element 6 – Typo, remove second "of degradation."	The staff agrees with this comment and	Corrected typographical error. Since this is not a notable

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	XI.M26-4		associated changes to the GALL Report have been made.	technical change, this comment is not referenced in Table II-21.
1036	XI.M3 ML101830328 Comment XI.M3-1	Suggest rewording PREVENTIVE ACTIONS to make each action a bullet, rather than 2 bullets and 2 actions in the text.	The staff agrees with this comment and associated changes to the GALL Report have been made.	The wording was reformatted in accordance with the comment. This is a formatting change only. It does not change the technical intent. Since this is not a notable technical change, this comment is not referenced in Table II-21.
186	XI.M30 ML101830328 Comment XI.M30-1	Element 1 and Element 3 - state that the program is focused on managing the loss of material due to general, pitting, and MIC. Issue: The program also manages the aging mechanisms of crevice corrosion and fouling that leads to corrosion. See items VII.H1.AP.105 and VII.H2.AP-105 as examples.	The staff agrees with this comment and associated changes to the GALL Report have been made.	The AMP is credited with managing loss of material due to all of the corrosion mechanisms: general, pitting, crevice, MIC, and fouling that leads to corrosion. This is consistent with items VII.H1.AP-105 and VII.H2.AP-105.
187	XI.M30 ML101830328 Comment XI.M30-2	Element 4 - only allows for periodic multilevel tank sampling. Issue: There are numerous fuel oil tanks that do not have the capability to be sampled using multilevel sampling techniques due to their design (e.g., no top access). Recommend allowing alternate sampling techniques that provide an equivalent conservative sample. For example, a single point tank drain at the lowest point on the tank sample would be considered a more conservative sample. This program samples for water, sediment, and particulate	The staff agrees with this comment, with modifications and associated changes to the GALL Report have been made.	Different designs should be reviewed on a case-by-case basis to ensure they are either equivalent or more conservative to multi-level sampling. For tank designs that do not allow for multi-level sampling, the staff has determined that a representative sample taken from the bottom of the tank provides an acceptable alternative to multi-level sampling. Precedents for accepting tank

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		contamination. Water, sediment, and particulate tend to settle towards the bottom of the tank making a true bottom sample more conservative. Previously for Oyster Creek and TMI bottom samples were considered an exception to the program which were accepted by the NRC. This change would eliminate the need to make this an exception.		bottom samples as an alternative to multi-level sampling are documented in Oyster Creek and TMI, Unit 1, license renewal SERs.
188	XI.M30 ML101830328 Comment XI.M30-3	Element 4 - identifies the requirements for tank inspections prior to the period of extended operation. It requires each tank to be drained and cleaned, and the internal surfaces visually inspected (if physically possible) and volumetrically inspected. Issue: The requirement for volumetric inspection should only apply if degradation is found during visual inspection. If a visual internal inspection cannot be performed, then, a volumetric examination (from the outside looking in) must be performed in lieu of that visual.	The staff agrees with this comment and associated changes to the GALL Report have been made.	Volumetric examination should be needed only if visual inspection indicates that loss of material may be occurring on the inner surface of the tank A volumetric inspection should be performed to further assess the situation if the visual inspection provided indications of degradation, or, if a visual inspection is not physically possible. If visual inspection does not find any indication of interior surface degradation or damage, then loss of material will not be occurring from the inside surface of the tank. The potential for loss of material from the outside surface of the tank is addressed separately in AMP XI.M41, Buried and Underground Piping and Tanks, if the tank is buried or underground and is addressed by

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				a visual examination if the exterior tank surface is accessible for visual inspection.
189	XI.M31 ML101830328 Comment XI.M31-1	In element 5b consistent with RG 1.99 when two or more credible surveillance capsules are available then embrittlement may be projected using position 2. Suggest rewording.	The staff agrees with this comment and associated changes to the GALL Report have been made.	Clarification is provided that the intention of this paragraph is to be consistent with Regulatory Position 2 in NRC RG 1.99, Revision 2. Monitoring and Trending was revised to say, “When two or more credible surveillance data sets are available, the extent of reactor vessel neutron embrittlement for the period of operation may be projected according to Regulatory Position 2 in NRC RG 1.99, Rev. 2, based on best fit of the surveillance data.” The change in wording is consistent with the wording used in Regulatory Position 2 in NRC RG 1.99, Revision 2.
492	XI.M31 ML101890552 Comment XI.M31	Program Description 1. Reword the first sentence in the first paragraph to correct the citation to ASTM with the current title by replacing “American Society for Testing and Materials (ASTM) E 185 Standard” with “ASTM International Standard Practice E 185-82.” 2. Reword the third sentence in the first paragraph to add “(current version)” after “10	The staff partially agrees with this comment and associated changes to the GALL Report have been made.	Comment 1: The change provides a more complete identification of the reference standard. Comment 2: The change provides clarification that reference is to the currently approved version of Appendix H. Comments 3 and 4: These are grammar and wording

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		CFR Part 50, Appendix H." The objective of this change is to enable an automatic update to the GALL to include the new provisions going into Appendix H within the next year or two. 3. Reword the first sentence of the second paragraph as follows: "The objective of the reactor vessel material surveillance program is to provide sufficient..." 4. Reword the second sentence of the third paragraph as follows: "The data from this surveillance program are used to monitor neutron irradiation embrittlement and are used..." (data is plural in this context) 5. Reword the last sentence of the third paragraph as follows: "It is recommended that untested... be maintained for possible future insertion or testing."		clarifications. There was no change in technical intent. Comment 5: The word "possible" was added to allow for future possibility that future insertion may not occur. The word "recommended" was not added because the change would weaken the current emphasis of the sentence.
493	XI.M31 ML101890552 Comment XI.M31-3	3. Parameters Monitored/Inspected: Reword the second and third sentences as follows: "The program uses neutron dosimeters to benchmark the neutron fluence calculations. Low melting point elements or eutectic alloys may be used as a check on peak specimen irradiation temperature."	The staff agrees with this comment and associated changes to the GALL Report have been made.	The proposed wording change provided a more precise description and did not result in a change of technical intent. Therefore, no technical basis is needed.
494	XI.M31 ML101890552 Comment XI.M31-4	4. Detection of Aging Effects: 1. Reword the first sentence of the second paragraph as follows: "... shall have at least one capsule with... fluence equal to or	The staff partially agrees with this comment and the document was reworded for clarity.	Comments 1 through 5 were implemented as requested. For comments 1 through 5, the wording changes did not affect the technical intend of the AMP

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		exceeding the 60-year...” 2. Delete the last sentence of the second paragraph; the meaning of “meaningful.. fluence” is explained adequately in the preceding sentence. 3. Reword the first sentence of the third paragraph as follows: “It is recommended that the program retain additional capsules within the reactor vessel to support additional testing if, for example, the data from the required surveillance capsule turn out to be invalid or in preparation for operation beyond 60 years.” 4. Delete the second sentence of the third paragraph: “These additional capsules may be managed in a similar way for future use.” 5. Reword the last sentence of the third paragraph as follows (delete 'the'): “... untested capsules in storage for future reinsertion and/or testing.” 6. Replace the fourth and fifth paragraphs with the following: “It is recommended that all previously tested samples be retained for possible future use (unless already discarded before August 31, 2000). It is recommended that all surveillance capsules that were removed from the reactor vessel be retained for possible future use (unless already discarded before August 31, 2000).” Rationale for change: To retain the tested specimens and removed capsules must be		recommendations. No changes were made in response to comments 6 through 9. For comments 6 through 9, the staff did not find the wording changes to be acceptable because they affected the technical intent of the staff's recommendations for the Detection of Aging Effect in this AMP.

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		stated as a “recommendation” to be consistent with prior NRC guidance. This does not change the requirement to submit changes to the NRC for approval of withdrawal schedule changes. 7. Reword the seventh paragraph as follows: “If all surveillance capsules have been removed, a licensee may manage aging of the vessel using either an alternative surveillance program or an alternative neutron fluence monitoring program as described in the following:” 8. Reword point (a) of the seventh paragraph as follows: (a) An Alternative Surveillance Program This program may consist of (1) capsules from an integrated surveillance program, (2) reconstitution of specimens from tested capsules, (3) capsules made using available relevant archive materials, or (4) some combination of the three previous options. This program could be a plant-specific program or an integrated surveillance program. 9. Reword the eighth paragraph, third sentence as follows:” If the reactor vessel exposure conditions (neutron flux, irradiation temperature, etc.) are altered, then the basis for the projection to 60 or more years is reviewed and, if deemed significantly different, modifications need to be made to the vessel		

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		integrity projections. Rationale: There is no way to evaluate the effects of likely changes to neutron spectrum on vessel embrittlement nor is there a conceivable change to core design that would change neutron spectrum enough to have an effect on vessel embrittlement. There are few options to change the reactor vessel surveillance program other than to recommend a reinserted surveillance capsule. The last sentence (submittal to and review by NRC of changes) will cover that aspect on a case-by-case basis.		
495	XI.M31 ML101890552 Comment XI.M31-5	Monitoring and Trending 1. In the second paragraph, change “(10 CFR 50.61 and 10 CFR 50.61a)” to “(10 CFR 50.61 or 10 CFR 50.61 a)” to clarify that it is not necessary to perform the PTS TLAA using both rules. 2. In the second paragraph, point (b), first sentence, replace “must” with “may,” or add the detailed provisions from RG 1.99, Revision 2 and from 10 CFR 50.61 with regard to application of surveillance data. Revision 1 of this document stated it as “may.”	The staff agrees with this comment and associated changes to the GALL Report have been made.	Changes are consistent with requirements of 10 CFR 50.61 and 10 CFR 50.61a, and with RG 1.99.
496	XI.M31 ML101890552 Comment XI.M31-7	Corrective Actions Under (b), replace “neutron spectrum” with “neutron fluence” because fluence can be effectively monitored and, because it is tied directly to the vessel integrity TLAAs, the	The staff partially agrees with this comment and associated changes to the GALL Report	This comment, as written, is not applicable because there is no mention of neutron spectrum in Element 7, Corrective Actions. However, the staff believes the

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		need for monitoring can be unambiguously established.	have been made.	comment was intended to apply to Element 10, Operating Experience. In Element 10, “neutron spectrum” has been changed to “neutron fluence” because fluence is tied directly to vessel integrity through TLAAs and can be more unambiguously monitored and managed than “neutron spectrum.”
497	XI.M31 ML101890552 Comment XI.M31-10	Element 10. Operating Experience: In the second paragraph, add after “…Appendix G of...” “…10 CFR Part 50 using Appendix K of...” to give reference to the current ASME Code “equivalent margins analysis” procedure.	The staff disagrees with this comment. The GALL Report has not been changed.	This comment, as written, was not applicable because the Operating Experience discussion does not include mention of Appendix G. The staff also reviewed Element 7, Corrective Actions, which is related to this comment. The staff determined that a change in Element 7 is not needed because Appendix G of 10 CFR Part 50 does not endorse Appendix K. The discussion in Corrective Actions requires applicant's to meet regulatory requirements.
498	XI.M31 ML101890552 Comment XI.M31-REF	Check the dates of the first, second and fifth references.	The staff agrees with this comment and associated changes to the GALL Report have been made.	Dates on the references were changed based on reference date standardization as determined by the staff.
190	XI.M32 ML101830328	Element 4 – This section still does not define the terms qualified and equivalent such that	The staff agrees with this comment and	The Detection of Aging effects program element was revised to

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	Comment XI.M32-1	the inspections specified in this program would have to be performed by ASME qualified inspectors using ASME procedures even on non code components. Definitions similar to those proposed in XI.M36 External Surfaces and M38 could be applied in this program such as qualified in accordance with site procedures and programs for the type of examination being performed.	associated changes to the GALL Report have been made.	clarify that use of code-qualified inspectors and code inspection techniques are not expected for non-code qualified components. The staff does not expect an applicant to use ASME Code qualified inspectors and Code inspection techniques on non-Code components or structures. The staff has found qualification in accordance with site procedures and programs to be acceptable.
191	XI.M35 ML101830328 Comment XI.M35-1	"Vibratory loading" is used to describe an aging mechanism managed by this program in elements 1, 4 and 5. In Chapter IX.F, the definition of fatigue cites "Vibration is generally induced by external equipment operation." By definition, aging induced by external equipment operation is not an aging mechanism but a design issue that will be identified early in plant life and corrected as discussed in recent OE discussions with NEI and the NRC staff and as presented in this program. There is no basis for the claim that this is an aging mechanism since it is not related to the age of the equipment but the impact of external operation. Comment also applies to aging management review tables citing vibratory loading which should also be eliminated. Recommend change to vibration fatigue if this must be retained as an aging	The staff partially agrees with this comment and some changes to the GALL Report have been made.	The staff believes this aging mechanism needs to be maintained and agreed to change wording of the AMP to say, "...cracking ... due to stress corrosion or cyclical (including thermal, mechanical, and vibration fatigue) loading." Based on its review of operating experience, the staff has determined that vibration fatigue is an example of cyclical loading mechanisms that can cause age-related cracking of small bore piping.

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		mechanism.		
192	XI.M35 ML101830328 Comment XI.M35-2	In element 1 and description there are statements regarding program applicability to plants that have performed design changes to mitigate cracking from vibration. Was the intent of this to have a periodic plant specific program if the design changes have not eliminated the vibration issue such that cracking has reoccurred, and if design changes have been implemented without additional cracking that XI.M35 is to be used? If any other cracking other than vibratory has occurred XI.M35 is not to be used. See recommended changes to add clarification.	The staff partially agrees with this comment. Therefore, the comment did result in a revision to the document for clarification.	The staff partially accepted the comment, but did not agree in total. The staff modified the Program Description to clarify issues related to effective design changes and one-time vs. periodic inspections. Wording changes provide clarification that it is the staff's intention to permit use of the program for systems that have experienced cracking and have implemented effective design changes, but it is not the staff's intention to limit credit for effective design changes only to those that eliminate cracking due to vibration fatigue loading.
193	XI.M35 ML101830328 Comment XI.M35-3	In element 4 provide clarification of extent of opportunistic destructive testing to perform in event of a significant piping replacement that replaces or eliminates numerous welds.	The staff agrees with this comment and associated changes to the GALL Report have been made.	Element 4, Detection of Aging Effects, was revised to state that an appropriate sampling approach can be used for destructive testing if multiple welds are removed. The staff has previously accepted appropriate sampling as adequate to demonstrate effectiveness of AMPs.
194	XI.M35 ML101830328 Comment	In element 5 be clear that the cracking identified by One-Time Inspection or OE will undergo root cause analysis and that the	The staff partially agrees with this comment and	The staff partially accepted the comment. No change was made in Element 5, Monitoring and

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	XI.M35-4	need for periodic inspections going forward should only apply to the piping configurations that are determined to be susceptible to that cause. A certain piping loop may have vibration issues that other piping in the program are confirmed not to have.	associated changes to the GALL Report have been made.	Trending, in response to this comment. However, the Program Description was revised to provide clarification. The staff determined that clarification requested by this comment was adequately addressed by changes made in the Program Description in response to earlier comments.
197	XI.M36 ML101830328 Comment XI.M36-4	Element 6 - uses an acceptance criteria of “unchanged” for polymeric materials. Use of this criteria would result in rejection for even very minor changes in color, hardness and flexibility which are subjective examinations. Suggest using a criteria that any changes in these properties will be evaluated for continued service in the corrective action program to allow a proper and documented review of the condition.	The staff agrees with this comment and associated changes to the GALL Report have been made.	Program revised so that for flexible materials, physical changes are evaluated for continued service.
971	XI.M36 ML101830328 Comment XI.M36-1	Element 1 - Scope discusses cracking of stainless steel as an aging effect in polymeric components. Appears to be in wrong place. Also wrong aging effects are listed for polymers in some cases.	The staff agrees with this comment and associated changes to the GALL Report have been made.	The incorrect aging effect was listed for polymeric components and polymers .Cracking of stainless steel as an aging effect for polymers was deleted. The correct aging effect for polymers was given.
972	XI.M36 ML101830328 Comment XI.M36-2	Element 4 - repeats requirements on qualifications and inspections that are not needed. Add requirements for the inspections of normally inaccessible and underground	The staff agrees with this comment and associated changes to the GALL Report	The requirements for qualification and inspections are repeated. No requirements for inspections of normally inaccessible and

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		components to ensure they are appropriately identified when appropriate.	have been made.	underground components were given. The sections repeated should be deleted and the requirements not included should be included.
198	XI.M38 ML101830328 Comment XI.M38-1	In the program description the last paragraph is not clear on the limitations of use of the program when failures have occurred. Recommend that section be reworded to clarify that repetitive failures would require use of a plant specific program.	The staff agrees with this comment and associated changes to the GALL Report have been made.	The reference to “repetitive failures” needs to be revised to make the meaning clear. The staff has modified the AMP content to more clearly describe situations where the AMP is appropriate, and when a plant-specific program is warranted. The paragraph was re-written to address the comment and aligns with wording used in AMP XI.M35 for similar situations.
898	XI.M39 ML101830328 Comment XI.M39-1	Delete references to SCC which has no basis if water is not present. This program ensures the lack of significant moisture that could cause cracking. No known OE exists of this occurring in an oil environment. Minor text changes also provided for clarification in that this program monitors for impurities.	The staff agrees with this comment and associated changes to the GALL Report have been made.	The AMP focuses on ensuring that significant moisture is not present in the system. In the absence of moisture, SCC is not anticipated to occur in an oil environment. A search of operating experience has not identified incidences of SCC in these systems. Future incidences of Cracking due to SCC that are identified will be addressed by the “corrective actions” and “operating experience” program elements.
149	XI.M4	The PREVENTIVE ACTIONS element varies	The staff agrees with	Provides consistent words for all

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	ML101830328 Comment XI.M4-1	widely among several condition monitoring programs (XI.M4, XI.M7, XI.M8, XI.M9, XI.M11B, etc.) that have no preventive actions, including the discussion of preventive actions in the Water Chemistry program. This wording should be consistent for all the involved programs. See below for suggested best wording. Correct corespray to core spray in Program Description.	this comment and associated changes to the GALL Report have been made.	condition monitoring programs that recommend maintenance of water chemistry.
374	XI.M4 ML101830255 Comment XI.M4-1	The preventive actions section discussion for water chemistry should simply refer to program XI.M2. Specific reference to a version of the EPRI BWR Water Chemistry Guidelines and discussion regarding control parameter tables should be limited to XI.M2 and not be repeated in XI.M4.	The staff agrees with this comment and associated changes to the GALL Report have been made.	AMP XI.M2 is for water chemistry and only a reference to it is necessary in AMP XI.M4. Since this is not a notable technical change, this comment is not shown in Table II-21.
375	XI.M4 ML101830255 Comment XI.M4-2	The detection of aging affects section incorrectly states that the enhanced visual examination method is capable of achieving 1 mil wire resolution. It should state 1/2 mil wire resolution. Section 3.1.2 of BWRVIP-48-A defines Enhanced VT-1 as a method capable of achieving 1/2 mil wire resolution.	The staff agrees with this comment and associated changes to the GALL Report have been made.	Corrected to reflect NRC approved BWRVIP-48A definition.
376	XI.M4 ML101830255 Comment XI.M4-3	All references to the NRC approved version of BWRVIP reports should be "-A." For example, "BWRVIP-48-A," rather than "BWRVIP-48A." This occurs not only throughout the body of the program text, but also for other BWRVIP	The staff agrees with this comment and associated changes to the GALL Report have been made.	Conformance with BWRVIP reports. This is a generic to all AMPs that reference BWRVIPs that have an "A" associated in document number.

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		reports cited in the references section (e.g., BWRVIP-59 and BWRVIP-60).		
200	XI.M40 ML101830328 Comment XI.M40-1	Element 4 - This program as written specifies an inspection frequency of 10 years minimum. License amendments that have approved the use of newer materials may specify different frequencies. To prevent conflicts in testing frequencies the option of following approved SER requirements should be allowed.	The staff disagrees with this comment. The GALL Report has not been changed.	In the issuance for comments on the draft GALL (75 FR 27838 dated May 18, 2010) it was noted that because the staff has previously sought and received public comments on draft AMP XI.M40, the staff is not seeking further comments on this AMP as part of this Federal Register Notice (FRN). AMP XI.M40 and related AMR items are considered final by the staff based on the earlier review and public comments. If a different inspection frequency has been approved by the staff in a plant-specific SER, it should be noted as an exception to the recommendation of the GALL Report.
201	XI.M40 ML101830328 Comment XI.M40-2	Element 3 - if Boral was to experience a loss of material, it would not result in shrinkage. Loss of material in Boral is conceptually similar to selective leaching, in that the B-10 would be selectively removed and the Boral sheet/coupon would simply become less dense without a change in dimension. Changes in dimensions are not typically shrinkage but increases in thickness as a result of the Al cladding separating from the	The staff agrees with this comment and associated changes to the GALL Report have been made.	Element 3 was revised to delete shrinkage as an applicable aging effect. For Boral, changes in dimension typically are an increase in thickness due to swelling, not shrinkage due to loss of material.

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		inner Al-B alloy. The way it reads now, "…exposure to wet pool environment may cause shrinkage resulting in a loss of material…" is somewhat inaccurate for Boral. Suggest deleting shrinkage.		
202	XI.M40 ML101830328 Comment XI.M40-3	References - add IE [i.e., IN] Notice 2009-26, "Degradation of Neutron-Absorbing Materials in the Spent Fuel Pool"	The staff agrees with this comment and associated changes to the GALL Report have been made.	Included IN2009-26 in the list of references. The reference is related to the topic of this AMP and is appropriate to be included.
889	XI.M41 ML101610406 Comment XI.M41-1	Program Description & applicable elements: Recommend deleting "underground" and "limited access" environments. "Underground" and "limited access" environments are defined as components exposed to air and located where access is limited. Detection of aging effects for limited access components exposed to air environments is managed by AMP XI.M36 External Surfaces Monitoring of Mechanical Components (see element 4). Clarification has been added to M36. Also, the definition of change in material properties needs to be added to GALL Chapter IX.	The staff partially agrees with this comment and the associated changes to the GALL Report have been made.	The External Surfaces Monitoring of Mechanical Components is the more relevant AMP for limited access type environments. However, based on the recent operating experience associated with underground piping, the staff believes that an aging management program as described in XI.M41 is necessary to manage the aging of underground piping. The staff considered amending AMP XI.M36 along the lines of XI.M41 to adequately address underground piping. The staff rejected this concept due to the complementary nature of the buried and underground piping programs. Underground piping will, therefore, be retained under AMP XI.M41.

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890	XI.M41 ML101610406 Comment XI.M41-2	Element 1 - Recommend deleting the sentence identifying typical systems. The buried piping and tanks program manages aging of components in a soil environment. Identification of systems for this type of AMP is not consistent with other GALL AMPs	The staff disagrees with this comment. The GALL Report has not been changed.	The SRP-LR states that the systems addressed by an AMP should be included in Element 1 of the AMP. Based on this direction, the staff disagrees with the comment. The sentence addressed by the comment remains unchanged.
106	XI.M41 ML101610406 Comment XI.M41-3	Element 1- the last sentence states that aging of bolting associated with piping systems within the scope of this program are also managed by this program. However there are no line items for bolting that credit this AMP. Recommend adding steel bolting line items for loss of material (managed by Buried Piping and Tanks) and loss of preload (managed by Bolting Integrity AMP) in a soil environment in GALL Chapter VIII.H and VII.I, External Surfaces of Miscellaneous Components and Bolting.	The staff agrees with this comment and associated changes to the GALL Report have been made.	AMR items VII.I.AP-241, VII.I.AP-243, VIII.H.SP-141, and VIII.H.SP-143 were added for steel and stainless steel bolting in a soil environment and managed by AMP XI.M41.
891	XI.M41 ML101610406 Comment XI.M41-4	Element 2 item 2a –Need to define or give examples of materials that are considered super austenitic stainless steels.	The staff agrees with this comment and associated changes to the GALL Report have been made .	These materials are super austenitic stainless steel. Regular stainless steel has at least 50 percent iron, while super austenitic stainless steel may not have 50 percent iron. The staff has added the words, “such as AL6XN or 254SMO,” to the GALL Report to provide examples of super austenitic stainless steels.

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892	XI.M41 ML101610406 Comment XI.M41-5	Element 2 item 2b – Recommend limiting the use of coatings to susceptible metallic piping consistent within the scope of NACE Standard Practice SP0169-2007 (submerged or underground metallic piping). Plants not consistent with the requirement of Table 1 of NACE Standard Practice SP0169-2007 must provide a plant specific justification for an alternative coating. The size of particles in structural backfill and the potential coating impact varies and depends on the type of coating used and backfill placement/compaction. Recommend deleting 49 CFR 195.252 and revising to allow structural backfill consistent with plant specific specifications. Structural backfill for opportunistic and directed inspections should have 30% or less of its particles retained on a ¾ inch sieve or demonstrate that the backfill material and placement/compaction methods will not result in exposure of piping metallic surfaces. Also see addition backfill considerations in comment 19.	NRC staff disagrees with this comment. However, the comment did result in a revision to the document for clarification.	Coating will be required for steel, copper alloys, and aluminum piping and tanks or an exception must be taken to the AMP. The staff is aware of damage to coating by the improper use of backfill and has not changed this recommendation. The concept of coating has been modified to utilize SP0169 or section 3.4 of NACE RP0285-2002 for coatings of buried pipe (when required). To improve the clarity of the document, the issue of backfill quality is now addressed in footnotes 5 and 6 of table 2a. These footnotes state that backfill must be consistent with SP0169-2007 section 5.2.3. The footnotes additionally state the staff considers backfill that is located within 6 inches of the pipe that meets ASTM D 448-08 size number 67 or 10 (depending on the footnote) to meet the objectives of SP0169-2007. The footnotes also states that backfill not meeting these requirements is acceptable if inspection reveal that the backfill has not degraded the coating.

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				The commenter's proposal to use backfill meeting ASTM D1557 where not more than 30% of the backfill material (by mass) is retained on a ¾ inch screen was not adopted for two reasons, first ASTM D1557 is a laboratory test method for determining soil compaction characteristics; its use is not appropriate for specifying backfill size distributions which will not degrade pipe coatings, and second, because this standard does not contain a maximum particle size. It is known that large stones, which would be permitted in the proposal, can damage coatings. The staff's selection of ASTM D448-08 size number 67 or 10 is based on the fact that ASTM D448-08 is an appropriate standard for use in specifying the size of backfill and the fact that size numbers 67 and 10 have been used by other government entities in specifying backfill for similar applications. The staff acknowledges, however, that at some plants, the backfill used may not meet these criteria. The staff recognizes that removal of such

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				backfill carries with it the risk of causing damage to the pipe. As a result, the staff included an exception to the backfill requirements such that backfill not meeting the requirements is acceptable if inspections indicate that the backfill is not causing damage to pipe coatings.
893	XI.M41 ML101610406 Comment XI.M41-6	Element 2 item 2c – If the environment is limited to a soil environment, this item is not required (see comment XI.M41 – 1 and XI.M41 - 5). Delete the requirement to maintain justification for lack of coating on materials on site – this is required by NEI 95-10 for license renewal documentation.	NRC staff partially agrees with this comment and the document was reworded for clarity.	It is the staff's position that underground piping and buried piping are to be addressed in this AMP. This portion of the AMP has been restructured for other reasons, however, this AMP will continue to address both underground and buried pipe. The staff views the requirement to maintain on site justification for lack of coating on materials to be significant. Irrespective of the requirements of NEI 95-10, the staff considers this statement worthy of retention.
894	XI.M41 ML101610406 Comment XI.M41-7	Element 2 item 2d – This section appears to require cathodic protection of all buried steel, copper, and aluminum components consistent with the referenced NACE standards with no exceptions. The 2007 and 2002 editions of	The staff disagrees with this comment. No changes to the GALL Report have been made.	It is the staff's position that preventive actions such as the use of coatings, installation of cathodic protection, and use of appropriate backfill, are an essential part of a

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		the referenced NACE standards were not available when cathodic protection systems for existing operating plants were built. As written, this would require an applicant to backfit existing cathodic protection system designs to be consistent with NACE Standard Practice SP0169-2007 or Recommended Practice RP0285-2002 or take exception to the requirement. Recommend revising this section to focus on installed cathodic protection systems. Steel, copper, and aluminum components not cathodically protected are inspected by paragraph 4.c.		comprehensive program for managing the aging of the external surfaces of buried and underground piping and tanks. If, during the aging management review process, an applicant determines that in-scope buried piping and tanks do not conform to the preventive actions described, the staff would expect that the applicant would either commit to take action to establish such preventive actions prior to the period of extended operation or take an exception to the AMP and provide a thorough technical justification for the exception.
111	XI.M41 ML101610406 Comment XI.M41-8	Element 3 – For metallic components, loss of material due to all forms of corrosion and potentially, cracking due to SCC are addressed by this AMP. However, other MEAP line items such as polymeric and cementitious materials also credit this AMP. Examples: VII.C1.AP-175 & 176 credit this AMP for cracking, blistering, change in color due to water absorption and VII.C1.AP-177 & 178 credit this AMP for cracking, spalling, corrosion of rebar due to exposure of rebar.	The staff agrees with this comment and associated changes to the GALL Report have been made.	AMP XI.M41 addresses change in material properties. The acceptance criteria element addresses cracking or blistering of non-metallic piping, and cracking and spalling of cementitious or concrete piping.
112	XI.M41 ML101610406 Comment	Element 3 – Clarify this element to indicate that the measurement of pipe-to-soil potential and the cathodic protection current are	The staff disagrees with this comment. The GALL Report	The monitoring of parameters such as pipe-to-soil potential and the cathodic protection current is

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	XI.M41-9	applicable to steel, copper, and aluminum components that are cathodically protected.	has not been changed.	consistent with the staff's position that preventive actions, including the use of cathodic protection, are an essential part of a comprehensive program for managing the aging of the external surfaces of buried and underground piping and tanks.
113	XI.M41 ML101610406 Comment XI.M41-10	Element 4 item c(i) – The requirement for a minimum of 5% of the length of all piping can require extensive excavation for some plants creating a condition that would damage more piping than it would provide evidence of the piping condition. Recommend replacing the 5% length requirement with locations that consider the NEI 09-14 industry initiative. Six locations are proposed as follows: - At least three high risk locations determined by the NEI 09-14 methods for piping within the scope of license renewal - At least three additional locations where the potential for pipe degradation is highest based on considerations noted in item c.iv. Also in the introduction to item c. delete reference to paragraphs 2b and 2c to clarify applicability of this element to piping that is inherently resistant to corrosion and is not cathodically protected.	The NRC staff agrees with this comment and associated changes to the GALL Report have been made.	The staff acknowledges that all excavations carry some risk of damaging the pipe they are exposing. The staff must, however, balance that risk with the need to investigate coating deterioration and subsequent corrosion of piping which may be either localized or general in nature. To accomplish this goal, considerable piping must be inspected. While 10 CFR 54 stipulates that all aging of passive components must be managed, the staff notes that some buried piping is more significant to plant shutdown, personnel safety, and environmental protection than others are. To that end, the staff has modified the requirement for inspections to concentrate on the most significant piping. Inspection requirements for the most significant piping have increased

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				from the previous version of this AMP. Inspections for the least significant piping have been reduced from the previous version. The net result is also expected to provide aging management for all buried and underground piping. In addition, the number of inspections is dependent upon the preventive measures applied to the piping or tanks.
114	XI.M41 ML101610406 Packet 1, Comment XI.M41-11	Element 4 item c(v) and item e(iii) – Delete the requirement for not allowing individual inspections of shared piping to be credited for more than one unit. This is inconsistent with portions of the ASME Section XI code that allow credit for similar or shared components. Selection of excavations is driven by where the risk of degradation is greatest and is not based on shared systems.	The staff disagrees with this comment. The GALL Report has not been changed.	The staff acknowledges that some codes allow for crediting a single inspection for multiple units. However, the staff has established an inspection criterion which is adequate but not excessive. Crediting a single inspection for more than one unit is likely to result in less than sufficient inspections. This item remains unchanged.
115	XI.M41 ML101610406 Comment XI.M41-12	Element 4 item vi – Revise to identify volumetric examination of wall thickness and identify ultrasonic examination as an example of a volumetric examination. Field eddy current techniques are being developed that can also be used for thickness measurements.	The NRC staff agrees with this comment and associated changes to the GALL Report have been made.	The staff has added Element 4 item b.x.B to indicate that internal inspections using volumetric examination methods which have been qualified by the applicant and approved by the staff are an acceptable substitute for the visual examinations listed in Table 4.

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116	XI.M41 ML101610406 Comment XI.M41-13	Element 4 item e. - The introduction of this item requires two inspections of cathodically protected piping. Item e(v) also requires two inspections of cathodically protected pipe and is redundant to the introduction. Recommend deleting item e(v). Consistent with NACE Standard Practice SP0169-2007, pipe to soil potentials should be used where possible. Piping system congestion or other considerations may result in unreliable data.	The staff disagrees with this comment. The GALL Report has not been changed.	The requirements for inspection of cathodically protected piping have been revised to provide greater specificity. It may not be possible to obtain accurate pipe-to-soil measurements in all cases. It is the intent of the staff that, to be consistent with this AMP, pipe to soil potentials be conducted for all buried aluminum, copper, or steel pipe. It is also the intent of the staff that, if an applicant believes that it is not possible to conduct such a survey, an exception be taken to the AMP and that sufficient justification be provided to support such a position.
117	XI.M41 ML101610406 Comment XI.M41-14	Element 4 Item g - Clarify applicability of this element to tanks that are not coated (coating and backfill characterized by paragraph 2b) and not cathodically protected.	The NRC staff agrees with this comment and associated changes to the GALL Report have been made.	The staff has reorganized the AMP to provide greater clarity regarding inspection of buried and underground tanks. Inspection of buried tanks is now addressed in paragraph 4.d. Inspection of underground tanks is now addressed in paragraph 4.e. Reorganization of the AMP permitted improvement in both the clarity and detail of inspection descriptions.
118	XI.M41	Element 4 item i – Revise the introduction to this item to be consistent with element 4 item	The staff disagrees with this comment.	This section of the AMP has been revised such that the comment

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	ML101610406 Comment XI.M41-15	c, item e, and item g.	The GALL Report has not been changed.	may be moot. Irrespective of the revision to the AMP, the difference in wording between element 4 item i and element 4 items c, e, and g is intentional. This difference reflects the concept that the electrical measurements associated with element 4 item i are made repeatedly throughout the 10 year period prior to entry into the period of extended operation as compared to visual inspections which are made only once during this period.
119	XI.M41 ML101610406 Comment XI.M41-16	Element 4 Items g thru j – If this environment applicable to this program is limited to buried components (soil environment), item i should be combined with item g due to identical inspection requirements for "each tank." Item h should also be combined with item j due to identical inspection requirements for "each tank." The Buried Pipes and Tanks AMP should only apply to the buried portion of tanks for those tanks that are only partially buried in a soil environment. Portions of partially buried tanks exposed to an air environment and not in contact with a soil environment should be managed by AMP XI.M36 External Surfaces Monitoring of Mechanical Components.	The staff disagrees with this comment. The GALL Report has not been changed.	Given that the staff has determined it is necessary to retain the "underground" portion of this AMP, the staff considers the portion of the comment addressed only to buried environments to be moot. The staff has revised the inspection criteria for tanks to address this comment. The staff is unaware of a significant number of partially buried tanks. As a result the AMPs are limited to buried tanks, (this AMP) and above ground tanks (AMP XI.M29). Partially buried tanks should be addressed under this (AMP XI.M41) AMP. Should an applicant

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				not wish to be consistent with this AMP, an exception may be taken and justification provided.
120	XI.M41 ML101610406 Comment XI.M41-17	Element 4 Items k & l (new) – Recommend adding inspection requirements for polymeric and cementitious buried components.	The NRC staff agrees with this comment and associated changes to the GALL Report have been made.	Element 4, detection of aging effects, includes inspection requirements for polymeric and cementitious materials.
121	XI.M41 ML101610406 Comment XI.M41-18	Element 4 item m (revised from k). – Doubling of the sample size seems excessive when conditions found and cause evaluations could determine that there is no need to expand the sample this significantly. Recommend increasing the sample (up to doubling) in accordance with root cause evaluations. Similarly, if significant indication are found in the expanded sample, cause evaluations may provide justification for not performing a 100% inspection of all buried piping.	The NRC staff partially agrees with this comment and the document was reworded for clarity.	Some revisions have been made to this item based on this comment. Recent operating experience indicates that a significant increase in sample size in response to an adverse inspection result is necessary to adequately manage aging. The doubling of sample size has been retained. The scope of piping subject to subsequent inspection has been clarified for situations in which the cause of the adverse inspection result is not applicable to all buried or underground piping
122	XI.M41 ML101610406 Comment XI.M41-19	Element 4 item m (revised from k) – Considering the presence of any coarse material within 6 inches of the pipe or tank as significant and requiring additional inspections should be replaced with consideration of conditions that would damage the coating.	The NRC staff partially agrees with this comment and the document was reworded for clarity.	The commenter's proposal to use backfill meeting ASTM D1557 where not more than 30% of the backfill material (by mass) is retained on a ¾ inch screen was not adopted for two reasons, first

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		Demonstration that backfill will not damage the pipe was previously provided in element 2.b and is based on site specific considerations and specifications. Damage due to backfill and its impact on the condition of the coating is considered as one of the risk factors in element 4.c.iv. that is used to select inspection locations. Typical site specifications for structural backfill require backfill to be well graded, dense, and consisting of sound durable material capable of achieving the required degree of compaction. Typical compaction characteristics such as those in ASTM D1557 apply to soils that have 30% or less by mass of their particles retained on a 3/4inch sieve.		ASTM D1557 is a laboratory test method for determining soil compaction characteristics; its use is not appropriate for specifying backfill size distributions which will not degrade pipe coatings, and second, because this standard does not contain a maximum particle size. It is known that large stones, which would be permitted in the proposal, can damage coatings. The staff's selection of ASTM D448-08 size number 67 or 10 is based on the fact that ASTM D448-08 is an appropriate standard for use in specifying the size of backfill and the fact that size numbers 67 and 10 have been used by other government entities in specifying backfill for similar applications. The staff acknowledges, however, that at some plants, the backfill used may not meet these criteria. The staff recognizes that removal of such backfill carries with it the risk of causing damage to the pipe. As a result, the staff included an exception to the backfill requirements such that backfill not meeting the requirements is acceptable if inspections indicate

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				that the backfill is not causing damage to pipe coatings. To improve the clarity of the document, the issue of backfill quality is now addressed in footnotes 5 and 6 of table 2a. These footnotes state that backfill must be consistent with SP0169-2007 section 5.2.3. The footnotes additionally state the staff considers backfill that is located within 6 inches of the pipe that meets ASTM D 448-08 size number 67 or 10 (depending on the footnote) to meet the objectives of SP0169-2007. The footnotes also state that backfill not meeting these requirements is acceptable if inspection reveal that the backfill has not degraded the coating.
123	XI.M41 ML101610406 Comment XI.M41-20	Element 6 – Revised coating damage acceptance criteria consistent with element 4 item m (revised from k) to require repair of any coating damage that directly exposes the piping or tank to the soil environment. Requiring repair of any coating degradation is overly restrictive. Minor coating degradation can occur that does not cause aging effects that result in loss of intended function of the	The staff partially disagrees with this comment. The GALL Report has not been changed.	In the absence of a properly functioning cathodic protection system, any degradation of coating will eventually lead to degradation of the coated pipe. Also in the absence of a properly functioning cathodic protection system, coatings sufficiently damaged so as to expose the pipe to the

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		piping or tank.		environment are currently causing pipe degradation. In the presence of cathodic protection systems, coating damage makes it more difficult to maintain proper function of the system. Based on these criteria, the staff finds no justification for the reburial of damaged coating, especially coating damaged so as to directly expose the pipe, is justified. The requirement to repair damaged coating has been retained. However, provisions were added for a NACE qualified individual to determine whether the damage is insignificant.
508	XI.M41 ML101880269, Comment XI.M41-1	Program Description, Element 2 item b (Table 2b), Element 4 item c (Table 4b), and element 4 item e. (Table 4d) - Recommend deleting “underground” environment and associated sections in element 2 and element 4. “Underground” environment is defined as below grade, but contained within a tunnel or vault such that they are in contact with air and are located where access for inspection is restricted. Detection of aging effects for underground components exposed to air environments is managed by AMP XI.M36 External Surfaces Monitoring of Mechanical Components (see environments is managed	The staff partially agrees with this comment and the associated changes to the GALL Report have been made.	The staff concurs with this comment to the extent that the External Surfaces Monitoring of Mechanical Components (AMP XI.M36) does address piping where access is limited. The staff also notes that this program is primarily designed to address systems which are readily observable at least periodically and which do not have a history of adverse industry operating experience. Given the lack of recent adverse operating

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		by AMP XI.M36 External Surfaces Monitoring of Mechanical Components (see element 4) which requires that surfaces that are not readily visible during plant operations are inspected when they are made accessible and at such intervals that would ensure the components intended function is maintained. The external surfaces program is the appropriate program due to the relatively benign environment of air. XI.M41 is not appropriate since it is primarily directed at components in a soil environment and the corresponding inspections are overly restrictive and the preventive actions regarding coating, cathodic protection and backfill are not appropriate. Clarification to be added to XI.M36 that requires the identification of the underground components, their materials, coatings and inspection amount and frequencies to ensure intended functions are maintained. NOTE: Due to the changes required to incorporate this comment it is not shown in AMP markup		experience associated with limited access piping, the staff agrees with the comment regarding the applicability of AMP XI.M36 to limited access piping and has removed it from this AMP. The staff position is to leave underground piping in this AMP. There is currently ample operating experience to indicate that the management of aging of underground piping merits a detailed program such as is outlined in AMP XI.M41, Buried and Underground Piping and Tanks. While it is possible to move this material to the External Surfaces Monitoring Program, the staff sees no technical merits in so doing. Additional, the staff notes that the subject of buried and underground piping is often discussed simultaneously. The staff believes that, in light of these joint discussions, having a single AMP which addresses both subjects is beneficial.
509	XI.M41 ML101880269, Comment XI.M41-2	Program Description – 3rd paragraph: Add XI.M30 Fuel Oil Chemistry to the list of AMPs that manage aging inside the pipe/tank.	The staff agrees with this comment and the associated changes to the GALL Report	Because XI.M30 Fuel Oil Chemistry is used to manage aging inside of piping and tanks, it has been added to the list of aging

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			have been made.	management programs in the Program Description.
966	XI.M41 ML101880269, Comment XI.M41-3	Element 1. Recommend deleting the sentence identifying typical systems. The buried piping and tanks program manages aging of components in a soil environment. Identification of systems for this type of AMP is unnecessary and not consistent with other GALL AMPs. Also delete the sentence: “Any system may contain buried and underground piping and tanks” as it does not contribute to an understanding of the scope of the AMP and is redundant to the first sentence of the paragraph.	The staff partially agrees with this comment. Some changes have been made to the GALL Report.	The SRP for this element indicates that such a list of typical systems should be included; the list is, therefore retained to maintain consistency with the SRP. The precise intention of the comment is unclear.“The buried piping and tanks program manages aging of components in a soil environment.” Since this program addresses both buried and underground piping, as opposed to just buried piping, no changes will be made relative to this comment. The staff concurs with the comment that the sentence “Any system may contain buried and underground piping and tanks” adds little to this section. The sentence has been removed
967	XI.M41 ML101880269, Comment XI.M41-4	Element 1 The last sentence states that aging of bolting associated with piping systems within the scope of this program is also managed by this program. However there are no line items for bolting that credit this AMP. Recommend adding steel bolting line items for loss of	The staff agrees with this comment and the associated changes to the GALL Report have been made.	Bolting exposed to a soil environment has been added to the AMP. A statement has been added indicating that corrosion of bolting within the scope of this AMP is addressed by this AMP while other bolting aging effects

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		material (managed by Buried Piping and Tanks) and loss of preload (managed by Bolting Integrity AMP) in a soil environment in GALL Chapter VIII.H and VII.I, External Surfaces of Miscellaneous Components and Bolting.		are managed by the Bolting Integrity program. AMR items VII.I.Ap-241, VII.I.AP-243, VIII.H.SP-141, and VIII.H.SP-143 were added for steel and stainless steel bolting in a soil environment and managed by AMP XI.M41.
968	XI.M41 ML101880269, Comment XI.M41-5	Element 2 Table 2a and Element 4 Table 4a and associated notes: HDPE should be listed in Element 2 item a as a material that does not require aging management in a soil environment and be deleted from the tables and associated footnotes in Element 2 and Element 4. Cracking can be caused by chemical aging. PE molecular chains may be broken down by temperature plus exposure to ozone, ultraviolet radiation, or oxidative chemicals. Carbon black is added to HDPE for protection from ultraviolet radiation. Ultraviolet radiation exposure is not an issue for buried HDPE pipe. Piping system design temperatures are well below the oxidation induction temperature requirement of 220C. Slow crack growth is the predominant failure mode for HDPE. This failure mode is addressed by material testing required by ASTM D-3350, Standard Specification for Polyethylene Plastics Pipe and Fittings Materials. PENT Testing performed under	The staff disagrees with this comment and the GALL Report has not been changed.	The staff's position is that there is not sufficient operating experience to make this determination. The staff acknowledges that significant research has been conducted indicating that HDPE has the potential, at some point in the future, of being considered a material, when exposed to soil, for which aging management is not required. The staff also notes that sufficient operating experience, under the conditions applicable to nuclear power plant installations, is not yet available to make such a determination.

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		ASTM D-3350 measures resistance of HDPE to slow crack growth and test results can be correlated to material service life. HDPE materials used in nuclear safety class applications are required to as a minimum meet ASTM classification 445574C. PENT testing for materials assures that slow crack growth is not a failure mode during the design life of the piping. Crack growth occurs at a very slow rate and this condition cannot be observed by field inspection. HDPE does not absorb water according to Plastic Pipe Institute technical report PPI TR-19, Chemical Resistance of Thermoplastic Piping Materials based on testing performed at temperatures up to 140 degrees F. HDPE is not subject to water absorption and subsequent osmotic blistering that can occur with other polymeric materials. There is no color change in response to water absorption with HDPE.		
969	XI.M41 ML101880269, Comment XI.M41-6	Element 2 Table 2a footnote 2 and Table 2b footnote 2 – Revise footnote2 to reference Table 1 of NACE Standard Practice SP0169-2007. For consistency with Table 2b footnote 2, also include the following sentence in Table 2a footnote2: "Other coatings may be used if justification is provided in the LRA."	NRC staff partially agrees with this comment and the document has been reworded for clarity.	The staff's position is that the reference to Table 1 of the NACE SP0169-2007 and Section 3.4 of RP0285-2002 are the correct references.
1191	XI.M41	Element 2 Table 2a footnote 4 – Revise this	The staff disagrees	The staff notes that the NACE

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	ML101880269, Comment XI.M41-7	footnote to be consistent with the referenced NACE standards for operation and maintenance of the cathodic protection system and maintenance rule performance monitoring considerations. Specifically the effectiveness of the cathodic protection system should be monitored by: - Inspection of applicable impressed current protection facilities to minimize in-service failures once per refueling cycle. - Functional check of impressed current sources for evidence of proper functioning (e.g., current output, normal power consumption, or signal indicating normal power operation) once every two months. - Evaluation, as applicable, of isolating fittings, continuity bonds, and casing isolation once per refueling cycle	with this comment. The GALL Report has not been changed.	standard includes many more aspects than the three listed in the comment. By including these items in the AMP it may introduce some confusion as to the applicability of other aspects of the NACE standard in AMP. Furthermore, the staff notes that the comment is not consistent with the NACE standard in the intervals at which some testing is to be performed. These recommendations come directly from Section 10 of SP0169-2007.
1192	XI.M41 ML101880269, Comment XI.M41-8	Element 2 Table 2a footnote 6 - The size of particles in structural backfill and the potential coating impact varies and depends on the type of coating used and backfill/placement/compaction. Recommend deleting 49 CFR 195.252 (applicable to petroleum or anhydrous ammonia pipelines) and revising to allow structural backfill consistent with backfill and compaction methods that existed when the plants were constructed. Typical site specifications for structural backfill require backfill to be well graded, dense, and consisting of sound	The staff partially agrees with this comment and the document was reworded for clarity.	The staff agrees that the use of 49 CFR 195.252 is inappropriate here. Since the NACE Standards SP0169-2007 and RP0285-2002 contain similar language, they have been referenced instead. The staff notes that the use of ASTM D1557 as a standard for the selection or evaluation of backfill material is not appropriate on two counts. First, ASTM D1557 is a standard which addresses the measurement of compaction

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		durable material capable of achieving the required degree of compaction. Typical compaction characteristics such as those in ASTM D1557 apply to soils that have 30% or less by mass of their particles retained on a ¾ inch sieve. Typical structural backfill for opportunistic and directed inspections should have 30% or less of its particles retained on a ¾ inch sieve or demonstrate that the backfill material and placement/compaction methods will not result in exposure of piping metallic surfaces. Piping systems without backfill documentation or that cannot demonstrate backfill and associated placement/compaction will minimize expose of piping metallic surfaces shall be considered as candidates for inspection locations. Backfill installed after buried component inspections shall have the maximum aggregate size or other material within six inches of the pipe with 30% or less of its particles retained on a ¾ inch sieve. Backfill requirements do not apply to piping systems that are backfilled with a cementitious material (e.g., fillcrete) that provides a passivating layer. NOTE: Due to the changes required to incorporate this comment it is not shown in AMP markup		characteristics of soil in the laboratory. It does not determine the adequacy of an aggregate size distribution for a specific task. The size distribution listed in the comment (30% or less retained on a ¾ inch sieve, is merely the size distribution for which the test method is valid. Second. ASTM D1557 does not specify a maximum acceptable aggregate size. Given that large aggregate is potentially the most damaging to coatings, to be of value, any standard applied must address the largest particles. Although there is no universal standard for aggregate size distributions used around coated pipe, a significant number of government agencies use ASTM D448-08, Standard Classification for Sizes of Aggregate for Road and Bridge Construction, size 67 or somewhat finer aggregate. ASTM D1557 size 67 is consistent with the objectives of the staff.
1193	XI.M41 ML101880269, Comment	Element 2 Table 2a footnote7 - The size of particles in structural backfill and the potential impact on polymer materials varies and	The staff agrees with the comment and the associated changes	The staff has modified the AMP to use more appropriate recommendations for backfill.

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	XI.M41-9	depends on the type of material used for the piping system and the backfill/placement/compaction methods. Recommend adding an additional line on Table 2a for HDPE material to be consistent with Table 4a. Backfill requirements for other polymeric materials such as Fiberglass Reinforced Plastic (FRP) or similar thermoplastic materials should be consistent with revisions proposed to footnote 6.	to the GALL Report have been made.	Modifications to footnote 7 of Table 2a (now footnote 6), given other changes to the Table, are warranted. In considering backfill specifications used by other government entities, the staff found no instances where the permitted backfill used around polymeric pipes was as coarse as backfill used around metallic pipes. The staff, therefore, disagrees with the proposal to make the backfill requirement for polymeric piping other than HDPE consistent with the new footnote 5. The staff does, however, concur that the previous specification (no larger than grains of sand) was not a standard size distribution for aggregate. This has been changed to ASTM D 448-08 size number 10.
475	XI.M41 ML101880269, Comment XI.M41-10	Element 2 Table 2a and Table 2b and Element 4 Table 4a and Table 4b – Revise cement material to identify cementitious materials (asbestos cement, reinforced concrete, etc.)	The staff agrees with this comment and the associated changes to the GALL Report have been made.	The correct technical term is "cementitious."
1194	XI.M41 ML101880269, Comment XI.M41-11	Element 3 – Revise the last sentence to indicate that cathodic protection system parameters apply to steel, copper, or aluminum materials in a soil environment.	The staff agrees with this comment and the associated changes to the GALL Report have been made.	The NACE SP0169-2007 recommends cathodic protection for steel, aluminum, and copper alloy piping.

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1195	XI.M41 ML101880269, Comment XI.M41-12	Element 4 item b.vi and item c.vi – This requirement should be deleted. Not crediting shared/common piping systems for multiple unit sites will penalize multiple unit sites with additional inspections that are not required by a single unit site. For example, 14,000 feet of buried FRP common fire protection piping (1% of length for other polymer piping) at a 3 unit site will require 420 feet of pipe to be inspected rather than 140 feet at a single unit site.	The staff disagrees with this comment. The GALL Report has not been changed.	The staff's position is that double counting is not acceptable. The staff believes that the level of preventive actions and inspection identified in this AMP is sufficient to provide reasonable assurance that the safety functions of structures, systems and components are maintained and that the environment is not degraded. The staff determined that there would not be reasonable assurance that the safety functions of structures, systems, and components are maintained in the event of a further reduction in these requirements, as would occur by “double counting” an inspection on shared piping.
478	XI.M41 ML101880269, Comment XI.M41-13	Element 4 item b.viii – Revise this requirement allow volumetric techniques that are accepted by the industry as qualified techniques for detection of degradation.	The staff agrees with this comment and the associated changes to the GALL Report have been made.	The staff has added Element 4 item b.ix.B to indicate that internal inspections using volumetric examination methods which have been qualified by the applicant and approved by the staff are an acceptable substitute for the visual examinations listed in Table 4. Given that guided wave ultrasonics do not currently meet the criteria in Element 4 item b.ix.B, and that guided wave ultrasonics serve an

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				important function in identifying locations which merit further inspection, the staff has not changed the text of Element 4 item b.viii.
1196	XI.M41 ML101880269, Comment XI.M41-14	Element 4 – Item ix (new) – Retain the requirement from the prior draft that allows for the substitution of volumetric techniques from the inside of the piping in lieu of visual examinations. Volumetric exams provide a very accurate indication of piping condition and would allow detection of degradation in areas not excavated for visual exams. This will be consistent with the volumetric internal inspection instead of excavation for an external inspection of buried tanks.	The staff agrees with this comment and the associated changes to the GALL Report have been made.	Volumetric techniques from inside of piping and tanks are commonly used to determine the condition of piping and tanks.
1197	XI.M41 ML101880269, Comment XI.M41-15	Element 4 Table 4a and Table 4d – The percentage of linear length of piping required for inspection is excessive for ASME Code Class 3 pipe, hazardous material pipe, and other piping categories. Inspection of these pipe categories should be consistent with the industry Buried Pipe Initiative NEI 09-14. Direct or indirect inspection methods should be used and are based on providing reasonable assurance of the integrity of 100% of the high risk buried piping (where risk is determined by methods consistent with NEI 09-14). Minimum inspection quantities would apply if there is no high risk piping identified for a buried pipe material. NOTE: Due to the	The staff agrees with this comment and the associated changes to the GALL Report have been made.	In some cases, the amount of inspection was excessive and the requirements have been revised accordingly. The staff has revised the number of inspections required for consistency with the AMP based on a number of criteria. In some instances inspections are based on the percentage of pipe of a given class. In other instances a given number of inspections are required. Alternatives to visual inspections which are fully capable of detecting piping degradation are also provided.

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		changes required to incorporate this comment it is not shown in AMP markup.		
1198	XI.M41 ML101880269, Comment XI.M41-16	Element 4 – Table 4a footnote 2 – Numerical visual inspection requirements specified by Table 4a footnote 2 are overly prescriptive and do not consider: - Sample requirements of element 4 item b.iii. will focus inspections on piping segments based on the susceptibility to degradation - Graded approach to inspection locations based on the safety significance of ASME Code Class pipe or the environmental impacts of Hazardous Material Pipe. - Other than the degradation susceptibility considerations noted in element 4 item b.iii, aging of a specific material of piping in a soil environment is not expected to yield different aging results. Based on these considerations, recommend that the numerical visual inspection requirements of Table 4a footnote 2 be revised to: - Specify minimum inspection requirements - Substitute ASME Code Class Pipe or Hazardous Material Pipe inspections for Other Pipe category inspections	The staff agrees with this comment and the associated changes to the GALL Report have been made.	The inspection requirements have been established taking into consideration material type, preventive actions, and class of piping. Revised inspection requirements are based on material type, preventive actions present and whether the piping is Code Class/safety related or hazmat piping. The “other” category has been eliminated as leaks from this category of piping will not affect the safe operation of the plant or impact the environment. Alternatives are provided for fire mains based on the “as new” requirements for this piping contained in NFPA 24.
1199	XI.M41 ML101880269, Comment	Element 4 – Table 4a footnote 3 and footnote 4 also Table 4b footnote 2 and footnote 3 – Clarify each footnote to define “radioactive”	The staff agrees with this comment and the associated changes	The Table 4a footnotes 3 and 4 have been modified to be consistent with NEI 07-07.

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	XI.M41-17	consistent with NEI 07-07 (Groundwater Protection Initiative). Treat radioactive systems with a tritium concentration of >20,000 pico-curies/liter as Hazardous Materials for purposes of the Buried Piping and Tanks AMP.	to the GALL Report have been made.	Footnote 5 of Table 4a and footnote 4 of Table 2b now read "Haz Mat pipe is pipe which, during normal operation, contains material which, if released, could be detrimental to the environment. This includes chemical substances such as diesel fuel and radioisotopes. To be considered Haz Mat, concentration of radioisotope within the pipe during normal operation must exceed established standards such as EPA drinking water standard. In the absence of such standards, the concentration of the radioisotope must exceed the greater of background or reliable level of detection. For tritium, the EPA drinking water standard (20,000 pCi/L) is used."
1200	XI.M41 ML101880269, Comment XI.M41-18	Element 4 – Table 4a footnote 6 – Revise operation and maintenance requirements of the cathodic protection system to be consistent with NACE SP 0169-2007 section 10. Federal requirements (40 CFR 280 Subpart C) for underground storage tanks (UST) also have similar requirements. Documentation may not be available to prove that the cathodic protection system has been operating 90% of the time since the pipe was	The staff disagrees with this comment. The GALL Report has not been changed.	While cathodic protection is very effective in mitigating future corrosion, its use does not repair damage done by past corrosion. The 90% availability criterion contained in this footnote is, therefore, an important indicator of the most probable current condition of the pipe. The staff has chosen to retain the 90%

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		originally installed even though the system has been adequately protecting the piping. Operation and maintenance performance of the cathodic protection system should be determined based on the recommend changes to Table 2a footnote4.		availability criterion but has also added an intermediate criterion for piping where cathodic protection is provided but its past availability is less than 90%. Listed inspections for this category are lower than for systems where cathodic protection is absent and higher than for piping with 90% cathodic protection availability.
970	XI.M41 ML101880269, Comment XI.M41-19	Element 4 Table 4a footnote 6 - Replace the requirement for 90% operability since the pipe was originally installed or was visually inspected with a reference to the proposed revision to element 2 Table 2a footnote 4.	The staff disagrees with this comment. The GALL Report has not been changed.	The use of cathodic protection cannot reverse loss of material before cathodic protection was applied or for periods when the cathodic protection system is not operable for extended periods of time.
1201	XI.M41 ML101880269, Comment XI.M41-20	Element 4 item c.iv. and Table 2b footnote 1 – Revise consistent with comment XI.M41 – 16. Also, volumetric inspection requirements, as applicable, for AMPs that manage internal environments should be used to manage aging of internal surfaces. Recommend revising Table 4b footnote 1 to require volumetric inspections to detect internal corrosion consistent with AMPs that manage aging of internal environments.	The staff disagrees with this comment. The GALL Report has not been changed.	AMPs to manage internal loss of material are in existence for components in scope for license renewal. There is ample operating experience to indicate that, for underground piping, the augmentation of AMPs which address corrosion due to internal environments is necessary to adequately manage aging.
1202	XI.M41 ML101880269, Comment	Element 4 item d.v. and item e.iv. – If the tank is volumetrically inspected internally, the required number of inspection locations of the	The staff disagrees with this comment. The GALL Report	The term “90/90” as is commonly used by the staff indicates that for a given group of components a

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	XI.M41-21	tank surface area should be limited to 22 rather than requiring 90% of the surface of the tank. Inspecting 22 locations will provide a 90/90 assurance level (reference NUREG 1475 Table T-8).	has not been changed.	sufficient sample has been taken to provide a 90% probability that a defective component will be identified by the sample based on a requirement that 90% of the components are not degraded. If statistics are to be applied to the case of a tank from which leakage should not occur, the staff believes the appropriate value for the "permissible number of defects" should be the acceptable size of a hole divided by the area of the tank (both values being expressed in similar units of area). The required percentage of good components should be one divided by this number. It may be seen that this number will be much greater than 90%. Since the statistical calculation for tanks varies with both the allowable hole size and the size of the tank, the staff has chosen to employ a non statistical test sample which does not vary with the acceptable size of the leak or the size of the tank.
487	XI.M41 ML101880269, Comment XI.M41-22	Element 4 item f – This item is redundant to element 6 (acceptance criteria) and element 7 (corrective actions) and should be deleted after incorporation of applicable requirements.	NRC staff partially agrees with this comment and the document was	Some of the acceptance criteria were not in the proper AMP element and have been moved to the proper location.

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		Recommend including each adverse finding as noted below: - Item f.i. – Entering of cathodic protection system adverse indications into the corrective action program should be incorporated into element 6 item a. Through-wall leakage, wall thickness less than minimum, or degraded coating that exposes the piping material surface will require evaluation and sample size to be increased. This requirement should be included as element 6 item g. Repair or replacement corrective actions for through-wall leakage, wall thickness less than minimum, or coating degradation that exposes the piping material surface should be incorporated into element 7. Backfill requirements have been recommended to be covered by Table 2a footnote 6. - Item f.ii – Include repair or replacement requirements in element 7 corrective actions. Through-wall leakage, wall thickness less than minimum, or coating degradation that exposes the piping material surface will require repair or replacement. - Item f.iii. – Evaluation of the degradation and expansion of the sample size are recommended to be incorporated into element 6 item g. - Item f.iv. - Evaluation of the degradation and expansion of the sample size are recommended to be incorporated into element	reworded for clarity.	

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		6 item g. Doubling of the sample size may not be possible in many cases and in some cases doubling may not be enough.		
488	XI.M41 ML101880269, Comment XI.M41-23	Element 5 – The first sentence of element 5 requires trending to determine the condition of the coating system and the effectiveness of the cathodic protection system. Trending of visual inspection results to estimate remaining life is redundant to element 6 requirements to determine wall thickness in the affected area and determine if the minimum wall thickness will be maintained. Recommend deleting remaining life calculations since element 6 requires minimum wall evaluations.	The staff agrees with this comment and the associated changes to the GALL Report have been made.	Element 5 has been revised to read: “For piping and tanks protected by cathodic protection systems, potential difference and current measurements are trended to identify changes in the effectiveness of the systems and/or.”
489	XI.M41 ML101880269, Comment XI.M41-24	Element 6 item b. - Revise coating damage acceptance criteria to require repair of any coating damage that directly exposes the piping or tank to the soil environment. Requiring repair of any coating degradation is overly restrictive. Minor coating degradation can occur that does not cause aging effects that result in loss of intended function of the piping or tank.	The staff agrees with this comment and the associated changes to the GALL Report have been made.	Coating damage that does not expose bare metal can be dispositioned by the corrective action program. Element 6, item b has been revised to permit the evaluation of coating damage by a NACE certified inspector.
490	XI.M41 ML101880269, Comment XI.M41-25	Element 6 item f – Backfill requirements are now specified in element 2. Recommend deleting item f from element 6 acceptance criteria since backfill requirements are site specific and depend on the type of coating used and backfill/placement/compaction.	NRC staff partially agrees with this comment and the document was reworded for clarity.	An acceptance criterion is required for the backfill. The staff agrees that backfill requirements are addressed in Element 2 and that they are specific to the pipe and coating employed. Alternatively, backfill is an issue which requires

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				an acceptance criterion. Therefore, the staff has revised Element 6 item f to refer to the backfill specifications in Element 2.
491	XI.M41 ML101880269, Comment XI.M41-26	Element 10 – Operating experience associated with item d (rupture related to Tropical Storm Fay) is an event driven failure, is not age related, and should be deleted from the operating experience list. Item e (February 2009 CST leak), item g (diesel leak), and item h (June 2009) CST leak should be revised to identify the age related failure and its associated cause (e.g., coating degradation) or be deleted from the operating experience list. Corrective action descriptions add little value to the OE discussion. OE listed without identifying causes is also of questionable value.	The staff agrees with this comment and the associated changes to the GALL Report have been made.	Event-driven failures are not included in the management of aging. The operating experience items listed in the comment have been deleted.
405	XI.M41 ML101880267 Comment XI.M41-PW1	This is a comprehensive program designed to manage the aging of the external surfaces of buried and underground piping and tanks PW1.While corrosion from the outer surface of buried pipes may be the dominant failure mechanism, there have been failures from the inside (supply water system e.g.) which simply are not covered by other programs which deal almost exclusively with maintaining water chemistry. It makes no sense of excluding internal corrosion and verification of the effectiveness of alternate programs	The staff disagrees with this comment. The GALL Report has not been changed.	This AMP is not intended to manage aging from the inside of the piping or tank. There are other programs that address degradation from the inside of the buried piping, as identified in the Program Description. An example of this type of program is the Open-Cycle Cooling Water Program. Many of the buried piping systems are redundant, having dual trains, and if one train has to be taken out of service for repairs, the other train

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		It addresses piping and tanks composed of any material, including metallic, polymeric and cementitious materials. This program manages aging through preventive, mitigative and inspection activities. It manages all applicable aging effects such as loss of material, cracking, and changes in material properties.		is capable of accomplishing the intended function which is what is required to meet the license renewal rule. The staff has structured the GALL AMPs such that the external surfaces of buried and underground piping and tanks are covered by this AMP and the internal surfaces are covered by other AMPs as identified in the Program Description. There are no cases in which only the external surface of a buried or underground pipe or tank is addressed by an AMP and the corresponding internal surface is not. The staff has, however, modified the language used in this paragraph of the AMP to acknowledge that this AMP is used to augment the internal inspection of some buried and underground piping and tanks.
410	XI.M41 ML101880267 Comment XI.M41-PW2	It addresses piping and tanks composed of any material, including metallic, polymeric and cementitious materials. This program manages aging through preventive, mitigative and inspection activities. It manages all applicable aging effects such as loss of material, cracking, and changes in material properties. Depending on the material, preventive and	The staff agrees with this comment and the associated changes to the GALL Report have been made.	The term, “corrosion resistant coatings” has been changed to reflect the terminology used in NACE SP0169-2007 (external coatings for external corrosion control). The term, external coating for external corrosion control is now being used in accordance with NACE SP0169-2007.

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		mitigative techniques include: the material itself, corrosion resistant coatings, PW2. “Corrosion resistant coatings” is incorrect. Coatings do not corrode, they deteriorate, whereupon water has access to the underlying metal and corrosion can start and the application of cathodic protection. Also, depending on the material, inspection activities include electrochemical verification of the effectiveness of cathodic protection, non-destructive evaluation of pipe or tank wall thicknesses, and visual inspections of the pipe or tank from the exterior as permitted by opportunistic or directed excavations.		
411	XI.M41 ML101880267 Comment XI.M41-PW3	Although this program considers the fluid inside the pipe or tank, and certain aspects of the program may be carried out from the inside of the pipe or tank, this program is designed to address only the degradation occurring on the outside of the pipe or tank. Aging of the inside of the pipe or tank is managed by another program (e.g., Open Cycle Cooling Water (AMP XI.M20), Treated Water (XIM.21A), Internal Inspection of Miscellaneous Piping and Ducts XI.MXX) or Water Chemistry (XI.M2). Additionally, this program does not address selective leaching. The selective leaching program (Chapter XI.M33) is applied in addition to this program for applicable materials and environments. The terms “buried and underground are fully	The staff agrees with this comment and the associated changes to the GALL Report have been made.	The NRC staff has decided to include underground piping in this AMP.

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		defined in Chapter IX of the GALL Report. Briefly, buried piping and tanks are in direct contact with soil or concrete (e.g., a wall penetration). Underground piping and tanks are below grade, but are contained within a tunnel or vault such that they are in contact with air and are located where access for inspection is restricted. PW3: I think it is essential to include underground piping - the deterioration evident in the tunnels in Indian Point is pretty bad and recent experience at EVY's AOG [advanced off-gas] piping		
504	XI.M41 ML101880267 Comment XI.M41-PW4	Evaluation and Technical Basis 1. Scope of Program: This program is used to manage the effects of aging for buried and underground piping and tanks constructed of any material including metallic, polymeric and cementitious materials. The program addresses aging effects such as loss of material, cracking, and changes in material properties. Any system may contain buried and underground piping or tanks. Typical systems include service water piping and components, condensate storage transfer lines, fuel oil and lubricating oil lines, fire protection piping and piping components (fire hydrants), and storage tanks. The aging of bolting associated with piping systems within the scope of this program is also managed by	The staff disagrees with this comment. The GALL Report has not been changed.	The systems listed in the "Scope of Program" section of this AMP are those that "typically" contain buried piping within the scope of license renewal. Although the augmented offgas (AOG) system at many boiling water reactor (BWR) sites contains buried piping, this piping is not typically within the scope of license renewal. Consistent with 10 CFR 54.4, buried piping associated with the traditionally nonsafety-related AOG system would only be included within the scope of license renewal if it were determined that the failure of this piping could prevent a safety-

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		this program. PW4 : add piping related to AOG system		related system or component from performing its design function. This is typically not the case.
929	XI.M41 ML101880267 Comment XI.M41-PW5	Cathodic protection is in accordance with NACE SP0169-2007 or RP0285-2002. Attempts to demonstrate that cathodic protection is not required as discussed in Sections 1.2 and 3 of SP0169-2007 will not be considered. PW5: What does that mean? Does it mean that it will not be considered?	The staff agrees with this comment and the associated changes to the GALL Report have been made.	It is the staff's position that preventive actions such as the use of coatings, installation of cathodic protection, and use of appropriate backfill, are an essential part of a comprehensive program for managing the aging of the external surfaces of buried and underground piping and tanks. If, during the aging management review process, an applicant determines that in-scope buried piping and tanks do not conform to the prevent actions described, the staff would expect that the applicant would either commit to take action to establish such preventive actions prior to the period of extended operation or take an exception to the AMP and provide a thorough technical justification for the exception.
930	XI.M41 ML101880267 Comment XI.M41-PW6	Backfill is consistent with 49 CFR 195.252. Maximum size of aggregate or other material within 6 inches of pipe is ½ inch in diameter or less. PW6: There seems to be a conflict between 6	The staff disagrees with this comment and the GALL Report has not been changed.	The topic of this comment is now addressed in footnotes 5 and 6 of table 2a. The staff has removed reference to 49 CFR 195.252 in favor of ASTM D 448-08 size

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		and 7. Sand is a lot finer than 1/2 inch. Crushed concrete of 1/2 inch diameter (?) can be quite jagged and do much damage while river bottom pebbles may be harmless. Also absent from the discussion on backfill material was the degree to which the material retained moisture Corrosion cells develop on a piece of metal exposed to different electrolytes and it is a particularly common problem on underground structures 27. Potential differences develop, for example, on a long continuous pipeline that passes through different types of soils. One portion of the line might be laid in sandy loam while another lie in clay. Substantial natural pipeline currents ("long-line currents") may occur, which leads to corrosion cells as called "long line cells." In soils of low resistivity where such currents exit from the pipeline, causing the metal at the exit points is lost by anodic dissolution (corrosion). Anodes and cathodes may be miles apart. Particle size for backfill within 6 inches of the pipe must not exceed that of sand grains		number 67 (metallic piping) or 10 (polymeric piping. The staff believes that the use of standard ASTM size distributions for backfill to be more appropriate than either "grains of sand" as proposed by the commenter, or 49 CFR 195.252. There is ample evidence of coated metallic piping performing satisfactorily when buried in backfill which is more coarse than grains of sand. The use of sand size backfill is therefore considered unnecessary.
931	XI.M41 ML101880267 Comment XI.M41-PW7	3. Parameters Monitored/Inspected: The aging effects addressed by this AMP are loss of material due to all forms of corrosion and, potentially, cracking due to SCC. Two parameters are monitored to detect and manage these aging effects: visual appearance of the exterior of the piping or	The staff disagrees with this comment and the GALL Report has not been changed.	Operating experience indicates that general, pitting, crevice, and MIC can be detected using visual inspection. If SCC is suspected, surface or volumetric examination may be required. The use of the term "all forms of corrosion" was

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		tank; and wall thickness of the piping or tank, generally as determined by a non-destructive examination technique such as ultrasonic testing (UT). Two additional parameters, the pipe-to-soil potential and the cathodic protection current, are monitored to determine the effectiveness of cathodic protection systems and, thereby, the effectiveness of corrosion mitigation. PW7: This paragraph is downright primitive. “All forms of corrosion” is pretty broad. But again, monitoring/inspection is limited to visual and UT. One cannot detect cracking with these two methods. Pipe to soil potential surveys should be done independent of active CP as a means to detect “hot spots” on buried pipe.		intentionally used specifically for its breadth. A variety of UT techniques including angle beam and phased array are fully capable of detecting cracks and are routinely used for that purpose. The use of potential surveys independent of cathodic protection is not required because the necessary connections to the pipe may or may not be present. If the necessary connections are present, a potential survey may be used by an applicant as a means to determine appropriate sites for inspections.
932	XI.M41 ML101880267 Comment XI.M41-PW8	4. Detection of Aging Effects: Methods and frequencies used for the detection of aging effects vary with the material and environment of the buried and underground piping and tanks. These methods and frequencies are outlined below. a. Opportunistic Inspections i. All buried and underground piping and tanks, regardless of their material of construction are opportunistically inspected by visual means whenever they become accessible for any reason. PW8: Opportunistic means that there has	The staff partially agrees with this comment and associated changes to the GALL Report have been made.	The performance of an opportunistic inspection by an applicant does not imply the presence of a leak. Opportunistic inspections are performed whenever piping or tanks are uncovered for any reason. The AMP has given minimum requirements for how much piping must be inspected. While visual inspections are not quantitative, they are highly effective in determining the presence or absence of corrosion

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		been a leak that needs to be repaired. Visual inspection is “stone age technology” There has to be a decision of how much more pipe to excavate and at least conduct some quantitative examinations.		or coating damage.
933	XI.M41 ML101880267 Comment XI.M41-PW9	ii. Directed inspections as indicated in Table 4a will be conducted during each 10 year period beginning 10 years prior to the entry into the period of extended operation. PW9: What evidence is there to justify a 10 year interval. This is the crux. One simply cannot squeeze all these situations into the same shoe box.	The staff agrees with this comment and the associated changes to the GALL Report have been made.	The operating history of the buried piping and tanks gives an indication whether or not the 10-year interval is adequate for a particular piping system or tank. If the operating experience indicates that more frequent inspections are required, or if the direct inspections identify problems, then more frequent inspections will be conducted. The 10-year inspection interval was selected to be consistent with the 10-year inservice inspection interval of Section XI of the ASME Code. Modifications to that interval may be necessary based on the operating history of a particular piping system or tank
934	XI.M41 ML101880267 Comment XI.M41-PW10	iii. Inspection locations are selected based on susceptibility to degradation. Issues such as coating type, coating condition, cathodic protection efficacy, backfill characteristics and soil resistivity are considered PW10: If in fact there are various degrees of	The staff agrees with this comment and the associated changes to the GALL Report have been made.	The operating history of the buried piping and tanks gives an indication whether or not the 10-year interval is adequate for a particular piping system or tank. If the operating experience indicates that more frequent inspection are

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		susceptibility should there not also be varying degrees of inspection frequencies?		required, or if the direct inspections identify problems, then more frequent inspections will be conducted. Varying degrees of susceptibility are addressed in the AMP by the extent of inspection rather than by the inspection interval. A change to both may be necessary based on operating experience.
935	XI.M41 ML101880267 Comment XI.M41-PW11	vi. At multi-unit sites, individual inspections of shared piping may not be credited for more than one unit. PW11: What is this? Is it the pipe that is corroding or the Unit?	The staff disagrees with this comment and the GALL Report has not been changed.	This refers to a site where there is more than one nuclear power plant. An inspection of piping that is shared by more than one nuclear power plant may not be credited by more than the one nuclear power plant.
936	XI.M41 ML101880267 Comment XI.M41-PW12	iii. Inspection locations are selected based on susceptibility to degradation. Issues such as coating type, coating condition, exact external environment, and flow characteristics within the pipe, are considered PW12: It is good to see consideration of internal corrosion, but it seems to me the document in not consistent	The staff disagrees with this comment and the GALL Report has not been changed.	The statement to which the comment refers: “Inspection locations are selected based on susceptibility to degradation. Issues such as coating type, coating condition, exact external environment, and flow characteristics within the pipe, are considered” does not necessarily imply a discussion of internal corrosion. Consideration of the material in the pipe may address its corrosivity or, alternatively, may address the significance of a leak

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				should one occur.
937	XI.M41 ML101880267 Comment XI.M41-PW13	iv. Underground pipes are inspected visually to detect external corrosion and by UT to detect internal corrosion. PW13: That's another muddle: UT detects both internal and external corrosion – Separation is tricky but can be done.	The staff disagrees with this comment and the GALL Report has not been changed.	The ultimate goal in this case is determining wall thickness and nothing more.
938	XI.M41 ML101880267 Comment XI.M41-PW14	v. Opportunistic examinations may be credited toward these direct examinations if the location selection criteria in iii, above are met vi. At multi-unit sites, individual inspections of shared piping may not be credited for more than one unit. PW14: This makes no sense.	The staff disagrees with this comment and the GALL Report has not been changed.	This refers to a site where there is more than one nuclear power plant. An inspection of piping that is shared by more than one nuclear power plant may not be credited by more than the one nuclear power plant. This comment refers to a prohibition at multi unit site of conducting a single inspection on shared piping and counting it for two inspections, one at each unit. This comment was addressed in comment No. 935.
939	XI.M41 ML101880267 Comment XI.M41-PW15	1. Numerical values under the visual inspection heading indicate the percentage in linear feet of piping of the category indicated which is to be inspected using visual and ultrasonic techniques, i.e., if stainless steel piping is present in each of the three categories of piping a minimum of 3 inspections are conducted, one for each piping category. One or more inspections are	The staff agrees with this comment and the associated changes to the GALL Report have been made.	These figures represent the best engineering judgment of the staff regarding the sample size required to provide reasonable assurance that the intended function of the underground piping will be maintained. These figures are not statistically based.

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		conducted to inspect at least 2% of the code class piping; one or more inspections are conducted to inspect at least 2% of the Haz Mat piping; and one or more inspections are conducted to inspect at least 1% of the “other” piping. Alternatively, the entire length of stainless steel piping present in all three piping categories may be considered to be code class piping and inspected accordingly, i.e., one or more inspections are conducted to inspect at least 2% of the total length of stainless steel piping present. All piping which is visually inspected to detect external corrosion is ultrasonically inspected to detect internal corrosion. UT inspection intervals will not exceed one foot. Particular attention is paid to elbows and the adjacent piping. PW15: Where do these numbers come from? Is there any evidence that 2% is statistically the correct number? Provide rationale in footnote.		
940	XI.M41 ML101880267 Comment XI.M41-PW16	viii. Opportunistic examinations may be credited toward these direct examinations PW16: Opportunistic examinations should not be credited toward anything, rather they should be used to indicate and classify targeted examination.	The staff disagrees with this comment and the GALL Report has not been changed.	Opportunistic examinations that meet the requirements for direct examinations may be credited toward the direct examinations. In the case of underground piping, the staff expects little variation in the external environment and, therefore, in the rate of external corrosion. An opportunistic exam, therefore, fulfills all the staff’s

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				objectives for a directed exam and may be credited as such.
941	XI.M41 ML101880267 Comment XI.M41-PW17	iv. Examinations may be conducted from the external surface of the tank using visual techniques or from the internal surface of the tank using volumetric techniques. If the tank is inspected from the external surface a minimum 25% coverage is required. This area must include at least some of both the top and bottom of the tank. If the tank is inspected internally by UT, at least 1 measurement is required per square foot of tank surface. If the tank is inspected internally by another volumetric technique, at least 90% of the surface of the tank must be inspected PW17: A UT measurement covers about 0.5 square inches of surface area. There are 144 square inches in a square foot. Hence, one measurement per square foot covers about 100/288 percent of surface area.	The staff agrees with this comment and the associated changes to the GALL Report have been made.	Sufficient inspection has to be conducted to ensure that adequate wall thickness is present to meet design requirements.
942	XI.M41 ML101880267 Comment XI.M41-PW18 (NRC renamed second Comment PW15 due to duplication)	b. For coated piping or tanks, there should be no evidence of coating degradation. PW15: (should be PW18) During the teleconference call, it was recommended that “no evidence of coating degradation” be determined by a “NACE certified inspector” – inspector’s judgment calls vary all over the map, absent specific criteria by NRC this is not an acceptable way to provide reasonable assurance.	The staff disagrees with this comment and the GALL Report has not been changed.	The inspector must be qualified to conduct the inspection. NACE certified inspectors are trained to provide consistent reliable information concerning the integrity of coating systems. The use of trained personnel to make such determinations represents the best available technology to evaluate the extent and significance of

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				coating degradation.
1051	XI.M41 ML102320585, Comment XI.M41-1	Program Description, Element 2 item b (Table 2b), Element 4 item c (Table 4b), and element 4 item e. (Table 4d) - Recommend deleting “underground” environment and associated sections in element 2 and element 4. “Underground” environment is defined as below grade, but contained within a tunnel or vault such that they are in contact with air and are located where access for inspection is restricted. Detection of aging effects for underground components exposed to air environments is managed by AMP XI.M36 External Surfaces Monitoring of Mechanical Components (see element 4) which requires that surfaces that are not readily visible during plant operations are inspected when they are made accessible and at such intervals that would ensure the components intended function is maintained. The external surfaces program is the appropriate program due to the relatively benign environment of air. XI.M41 is not appropriate since it is primarily directed at components in a soil environment and the corresponding inspections are overly restrictive and the preventive actions regarding coating, cathodic protection and backfill are not appropriate. Clarification to be added to XI.M36 that requires the identification of the underground components, their materials, coatings and inspection	The staff disagrees with this comment and the GALL Report has not been changed.	Due to recent operating experience the decision was made to include “underground” in this AMP. In addition, buried and underground piping are often discussed together.

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		amount and frequencies to ensure intended functions are maintained. NOTE: Due to the changes required to incorporate this comment it is not shown in AMP markup. Add sentence to describe that the aging management of buried fire protection components are managed by system flow and pressure testing in accordance with XI.M27 such that the need for notes in Element 2 item a.ii., Element 4 item b.ix, Element 4 item c.ix, Element 6 item g in regards to this testing are not needed.		
1053	XI.M41 ML102320585, Comment XI.M41-2	Element 2 Table 2a and Element 4 Table 4a and associated notes – HDPE should be listed in Element 2 item a as a material that does not require aging management in a soil environment and be deleted from the tables and associated footnotes in Element 2 and Element 4. Cracking can be caused by chemical aging. PE molecular chains may be broken down by temperature plus exposure to ozone, ultraviolet radiation, or oxidative chemicals. Carbon black is added to HDPE for protection from ultraviolet radiation. Ultraviolet radiation exposure is not an issue for buried HDPE pipe. Piping system design temperatures are well below the oxidation induction temperature requirement of 220C.	The staff disagrees with this comment and the GALL Report has not been changed.	There is not enough operating experience with HDPE piping to conclude that HDPE piping does not require an aging management program and will not be subject to slow crack growth. There is not sufficient operating experience to make this determination. The staff acknowledges that significant research has been conducted indicating that HDPE has the potential, at some point in the future, of being considered a material, when exposed to soil, for which aging management is not required. The staff also notes that sufficient operating experience, under the conditions applicable to

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		Slow crack growth is the predominant failure mode for HDPE. This failure mode is addressed by material testing required by ASTM D-3350, *Standard Specification for Polyethylene Plastics Pipe and Fittings Materials*. PENT Testing performed under ASTM D-3350 measures resistance of HDPE to slow crack growth and test results can be correlated to material service life. HDPE materials used in nuclear safety class applications are required to as a minimum meet ASTM classification 445574C. PENT testing for materials assures that slow crack growth is not a failure mode during the design life of the piping. Crack growth occurs at a very slow rate and this condition cannot be observed by field inspection. HDPE does not absorb water according to Plastic Pipe Institute technical report PPI TR-19, *Chemical Resistance of Thermoplastic Piping Materials* based on testing performed at temperatures up to 140 degrees F. HDPE is not subject to water absorption and subsequent osmotic blistering that can occur with other polymeric materials. There is no color change in response to water absorption with HDPE.		nuclear power plant installations, is not yet available to make such a determination.
1054	XI.M41 ML102320585, Comment XI.M41-3	Element 2 item a.ii., Element 4 item b.ix, Element 4 item c.ix, Element 6 item g. – Delete this item. This item is redundant to periodic NFPA 25 flow testing of fire mains as	The staff disagrees with this comment and the GALL Report has not been	In light of recent operating experience with buried piping, the interval for inspection must be frequent enough to avoid loss of

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		described in AMP XI.M27, Fire Water Systems. The NFPA 25 flow and pressure testing is performed at plant-specific intervals determined by engineering evaluation of the fire protection piping to ensure that degradation will be detected before the loss of intended function. NFPA (2008) section 7.3.1 requires that underground and exposed piping shall be flow tested to determine the internal condition of the piping at minimum 5 year intervals. Change made to Program description to eliminate need for these additional notes.	changed.	performance prior to the next inspection. The performance is trended using the jockey pumps. Changes in inspection intervals will be considered depending on the trending.
1055	XI.M41 ML102320585, Comment XI.M41-4	Element 2 Table 2a footnote 2 – For consistency with Table 2b footnote2, also include the following sentence in Table 2a footnote 2: “Other coatings may be used if justification is provided in the LRA.”	The staff disagrees with this comment and the GALL Report has not been changed.	Table 2a addresses buried piping and coatings used with cathodic protection. Table 2b does not.
1056	XI.M41 ML102320585, Comment XI.M41-5	Element 2 Table 2a footnote 4 – Revise this footnote to specify that “operation and maintenance” of the cathodic protection system is in accordance with NACE SP0169-2007 section 10. Revise the third sentence of the footnote to indicate that cathodic protection equipment need not be 10 CFR 50 Appendix B qualified or within the scope of license renewal. Parts “a” and “b” of footnote 4 should be clarified to indicate that either is acceptable for not providing cathodic protection.	The staff partially agrees with this comment and the document was reworded for clarity.	The staff disagrees with use of NACE SP0169-2007 Section 10 because it permits intervals greater than one year. The document was reworded to delete Parts “a” or “b” .Clarification added that the cathodic protection equipment need not be qualified per 10 CFR 50 Appendix B.

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1057	XI.M41 ML102320585, Comment XI.M41-6	Element 2 Table 2a footnote 5 and 6 – Revise this footnote to clarify that for purposes of initial and subsequent inspections, backfill not meeting this standard is acceptable if inspections of piping within the scope of license renewal do not reveal evidence of mechanical damage to pipe coatings due to backfill. Add similar note for footnote 6.	The staff agrees with this comment and the associated changes to the GALL Report have been made.	If no damage to the coatings or pipe during the initial and subsequent inspections is observed, then the backfill not meeting the standard is acceptable. A similar note has been added to footnote 6.
1058	XI.M41 ML102320585, Comment XI.M41-7	Element 2 Table 2a footnote 9 – Add a new footnote to read: “AWWA C-105 provides a standard for determining if the ductile iron should be coated and/or CP-protected (primarily based upon soil conditions)." DIPRA and NBS studies point to > 95% of all soils being compatible with and non-corrosive to ductile iron.	The staff disagrees with this comment and the GALL Report has not been changed.	SP0169-2007 specifically addresses ductile iron piping. Other than fire protection piping, there is a limited amount of ductile iron piping used in nuclear power plants.
1059	XI.M41 ML102320585, Comment XI.M41-8	Element 2 Table 2b footnote 3 – Delete footnote 3 and the requirement for providing coatings for stainless steel and aluminum underground piping. Stainless steel and aluminum piping are highly corrosion resistant materials in an air environment and not typically coated. The aging evaluation process would evaluate the aggressive nature of the environment to identify aging and the appropriate aging management requirements. Coatings are not the only solution for managing aging due to an aggressive environment. Periodic inspections as noted in element 4.c. or other preventive	The staff agrees with this comment and the associated changes to the GALL Report have been made.	It is unlikely that stainless steel or aluminum piping will be exposed to high concentrations of chlorides or very low pH or very high pH that would necessitate the use of coatings for stainless steel or aluminum piping.

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		measures (e.g., stopping the source of the leak/aggressive environment) could be used to detect and manage aging.		
1060	XI.M41 ML102320585, Comment XI.M41-9	Element 4 item b.iv. – Revise to read "visual inspections may be supplemented". Surface and/or volumetric examinations should be optional if significant indications are observed and the decision is made to repair or replace the piping based on the visual indications. Recommend significant indications be defined as aging resulting in pitting or surface corrosion.	The staff partially agrees with this comment and the document was reworded for clarity.	The staff agrees that surface and/or volumetric examinations should be optional if the piping is replaced but does not agree if the piping is repaired.
1061	XI.M41 ML102320585, Comment XI.M41-10	Element 4 item b.vi and item c.vi – This requirement should be deleted. Not crediting shared/common piping systems for multiple unit sites will penalize multiple unit sites with additional inspections that are not required by a single unit site and provides no significant additional assurance of the integrity of the coating based on the common systems, materials and environments including soil conditions. For example, 14,000 feet of buried FRP common fire protection piping (1% of length for other polymer piping) at a 3 unit site will require 420 feet of pipe to be inspected rather than 140 feet at a single unit site.	The staff disagrees with this comment and the GALL Report has not been changed.	The staff does not think that the inspections are overly extensive. The staff also does not think that fire protection piping is a good example.
1062	XI.M41 ML102320585, Comment XI.M41-10(2)	Element 4 item b.x and item c.x.. – Revise this item to allow either hydrostatic testing (option A) or internal inspections (option B) to be used in lieu of the inspections noted in Table	The staff partially agrees with this comment and the document was	Pressure testing is required to ensure that the piping can perform its intended function until the next inspection. Other fluids may be

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		4a. Both methods will provide evidence of a loss of pressure boundary function. Delete need for staff approval. NRC will have opportunity to review the qualified method credited during audits. Delete word precisely since it is undefined. In addition 49 CFR 195 is a transportation pipeline standard that requires test pressures well above system operating pressures that may not be achievable for these systems. It also requires use of water or gas test mediums which would not be possible for fuel oil lines. Recommend pressure or inservice leak testing using ASME requirements.	reworded for clarity.	considered for pressure testing, but fuel oil should not be used. AMP M41 was revised to allow either option.
1063	XI.M41 ML102320585, Comment XI.M41-11	Element 4 Table 4a footnote 2 and Table 4c footnote 2 – Delete the reference to NACE SP0169-2007 through footnote 2 and just reference element 2 Table 2a. Element 2 Table 2a and its associated footnotes identifies the coating, backfill, and cathodic protection preventive measures acceptable to the staff. Identifying applicability of backfill, coating and cathodic protection preventive measures to both NACE SP0169-2007 and Table 2a is confusing and redundant. Note that several of the element 2 table 2a footnotes also allow the use of NACE RP0285-2002.	The staff agrees with this comment and the associated changes to the GALL Report have been made.	The reference to SP0169-2007 has been removed because it is redundant. Reference to RP0285-2002 has been added to element 2 table 2a footnotes.
1064	XI.M41	Element 4 Table 4a footnote 2 item C & D and	The staff agrees with	Five years of operation of a

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	ML102320585, Comment XI.M41-12	Table 4c footnote 2 item C & D – Revise these items to specify cathodic protection system 90% operation is based on the previous five years of operation or the time since the piping was last inspected. Monitoring/trending required by element 5 that is associated with five years worth of cathodic protection system operation at 90% should also provide an indication of the effectiveness of the system and/or coatings. Also, plant records might not be available to support 90% operation for the piping under consideration was installed.	this comment and the associated changes to the GALL Report have been made.	cathodic protection system should provide the effectiveness of the system and/or coating. If the cathodic protection system is installed less than 5 years from entering the period of extended operation, then an exception to this program will be required.
1065	XI.M41 ML102320585, Comment XI.M41-13	Element 4 Table 4a footnote 2 item D and Table 4c footnote 2 item D – Correct a typo to delete "at" in the second sentence so that it reads: "…operated in accordance with NACE SP0169-2007 for at less than 90%...".	The staff agrees with this comment and the associated changes to the GALL Report have been made.	No technical basis is required to incorporate this change (typographical error) as it is editorial in nature.
1066	XI.M41 ML102320585, Comment XI.M41-14	Element 4 Table 4a footnote 2 item F – This preventive action category is confusing with criteria C, D and E in direct contradiction to each other. Is the intent of item F to specify coatings, backfill, and cathodic protection are not provided?	The staff disagrees with this comment and the GALL Report has not been changed.	The intent is if preventive actions cannot be classified as criteria C, D, or E, then they are classified as F.
1067	XI.M41 ML102320585, Comment XI.M41-15	Element 4 Table 4a footnote 3.b and 3.c. and Table 4b footnote 2.b and 2.c.– Editorial changes	The staff agrees with this comment and the associated changes to the GALL Report have been made.	No technical basis is required to incorporate this change as it is editorial in nature.

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1068	XI.M41 ML102320585, Comment XI.M41-16	Element 4 Table 4a footnote 5 and Table 4b footnote 4 – Revise to read "Hazmat pipe normally contains…."	The staff agrees with this comment and the associated changes to the GALL Report have been made.	No technical basis is required to incorporate this change as it is editorial in nature.
1069	XI.M41 ML102320585, Comment XI.M41-17	Element 4 Table 4a footnote 6. – Editorial changes	The staff agrees with this comment and the associated changes to the GALL Report have been made.	No technical basis is required to incorporate this change as it is editorial in nature.
1070	XI.M41 ML102320585, Comment XI.M41-18	Element 4 item c.iv – Delete volumetric examinations to detect internal corrosion. Internal aging management is performed by another AMP and is not part of the Buried and Underground Piping and Tanks AMP.	The staff agrees with this comment and the associated changes to the GALL Report have been made.	This program is concerned with the exterior of the piping. Other programs are in place for the interior of the piping.
1071	XI.M41 ML102320585, Comment XI.M41-19	Element 4 item c.vii and item e.vi.– Delete this item. How can manual examinations be performed if the piping/tank is restricted access?	The staff agrees with this comment and the associated changes to the GALL Report have been made.	Manual examinations cannot be performed if the piping/tank is restricted access.
1072	XI.M41 ML102320585, Comment XI.M41-20	Element 4 Table 4b footnote 2. – Delete excavations this footnote applies to underground pipe not buried pipe.	The staff agrees with this comment and the associated changes to the GALL Report have been made.	No technical basis is required to incorporate this change as it is editorial in nature.
1073	XI.M41 ML102320585, Comment	Element 4 Table 4c footnote 4 & 5 and Table 4d footnote 3 & 4 – Delete pipe this footnote applies to HDPE tanks.	The staff agrees with this comment and the associated changes to the GALL Report	No technical basis is required to incorporate this change as it is editorial in nature.

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	XI.M41-21		have been made.	
1074	XI.M41 ML102320585, Comment XI.M41-22	Element 4 item d.iv. and item e.iv. – If the tank is volumetrically inspected internally, the required number of inspection locations of the tank surface area should be limited to 22 rather than requiring 90% of the surface of the tank. Inspecting 22 locations will provide a 90/90 assurance level (reference NUREG 1475 Table T-8). Inspection of 90% provides no significant additional assurance level and has no basis.	The staff disagrees with this comment. The GALL Report has not been changed.	Ninety percent is based on engineering judgment and is not statistically based.
1075	XI.M41 ML102320585, Comment XI.M41-23	Element 4 item f.iv. – Delete the requirement for doubling of the sample size and revise item f.iii. to require an evaluation of the degradation to determine extent and size of the expansion sample. Doubling of the sample size with no basis could likely result in unnecessary inspections depending on the cause of the degradation, may not be possible in many cases and in some cases doubling may not be enough.	The staff disagrees with this comment. The GALL Report has not been changed.	Doubling of the sample size is considered acceptable by the staff.
1076	XI.M41 ML102320585, Comment XI.M41-24	Element 6 item b – Currently the only inspector certification related to visual inspection of buried pipe coatings is NACE CIP (Coating Inspector Program Level III). There are no qualifications for buried piping coating inspections at this time. Recommend revising this item to include an equivalent qualified coatings inspector.	The staff disagrees with this comment. The GALL Report has not been changed.	The NACE CIP III includes pipeline coatings.

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1077	XI.M41 ML102320585, Comment XI.M41-25	Element 4 item iii - Added that inspection locations should be selected based on risk instead of susceptibility to degradation to maintain some consistency with the Industry Initiative 09-14.	The staff agrees with this comment and the associated changes to the GALL Report have been made.	The staff agrees that risk is the appropriate term.
1078	XI.M41 ML102320585, Comment XI.M41-26	Table 4b inspections are excessive when compared to the inspections in 4a for hazmat piping. For example in 4b for steel 5% is required for hazmat underground and only 2% is required for buried coated hazmat steel piping in table 4a. The potential for corrosion of these components in an air environment is significantly less than soil if both are coated and there is no basis for the percentages shown for steel and copper and aluminum hazmat. Recommend deleting the Hazmat Column and let inspections for code class cover all piping without percentages. There is no basis for percentages. When the piping is contained in a vault or tunnel the risk is much lower for it to get in to the environment than buried components.	The staff agrees with this comment and the associated changes to the GALL Report have been made.	The staff agrees that 5 percent and 2 percent may be excessive and has changed Table 4b to 2 percent and 1 percent.
1155	XI.M41 ML102350027, Comment 1	Page 1, Section 1. Scope - Does the scope include non-essential systems like culverts, storm drains, sewer, potable water? NEI 09-14 does. We have handled the buried pipe data for more than a dozen nuclear sites. A two unit site can typically have 35-45 miles of total buried pipe, These non-essential systems can account for up to half the total buried pipe mileage (15-20 miles). Based on	The staff disagrees with this comment. The GALL Report has not been changed.	If an applicant feels that the GALL Report imposes unreasonable inspection requirements, an exception to the GALL Report can be proposed. The scope of the GALL report is governed by 10 CFR 54 and not NEI 09-14. Only buried piping within scope of the

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		the inspection requirements presented in Section 4, is it the intent of the NRC to require the excavation and inspection of 2-10% (10,000 ft or more) of these systems?		Rule is addressed by AMP M41.
1157	XI.M41 ML102350027, Comment 2	Page 12, Section 2(e). Direct Inspection Underground Tanks - UG Tanks can include double wall designs. How can the OD be inspected on the inner tank? Could leak monitoring in the annular space be an approved approach?	The staff agrees with this comment and the associated changes to the GALL Report have been made.	The OD of a double wall designed tank cannot be inspected from the ID. Leak monitoring is an approved approach.
1158	XI.M41 ML102350027, Comment 3	Page 12, Section 4(b)(x)(B)(2)(C, D, E) – What is meant by “backfill in accordance with SP0169”? This standard does not provide criteria for backfill.	The staff disagrees with this comment. The GALL Report has not been changed.	SP0169-2007 gives general requirements for backfill in Paragraph 5.2.3.
1160	XI.M41 ML102350027, Comment 4	Page 13, Section 5. Monitoring and Trending - NACE SP0285 does not have the word “trend” in the document yet this section says to follow the approach in this standard. This standard covers CP design, operation and maintenance activities. Similarly, SP0169 does not address trending.	The staff disagrees with this comment. The GALL Report has not been changed.	While the standard does not specifically use the term “trend,” changes in cathodic protection current requirements are tracked, which is a form of trending.
1162	XI.M41 ML102350027, Comment 5	Page 14, Section 10. Operating Experience - It would be helpful if you also included in each case whether or not the site had an operational CP system.	The staff disagrees with this comment. The GALL Report has not been changed.	At this time, the use of cathodic protection is not specifically required to be reported.
1079	XI.M41 ML102371274,	Program Description - While corrosion from the outer surface of buried pipes may be the	The staff disagrees with this comment.	This AMP is designed to provide reasonable assurance that aging

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	Comment XI.M41-PW1	dominant failure mechanism, there have been failures from the inside (supply water system e.g., which simply are not adequately covered by other programs listed in paragraph. It makes no sense of excluding internal corrosion and verification of the effectiveness of alternate programs	The GALL Report has not been changed.	of the external surfaces of buried or underground piping or tanks are adequately managed. Other AMPs, as indicated in this program element, have demonstrated adequacy in providing reasonable assurance that aging of the internal surfaces of piping systems or tanks, whether buried, underground, are adequately managed.
1080	XI.M41 ML102371274, Comment XI.M41-PW2	Program Description Opportunistic inspections should not be credited towards anything, rather they should be used to indicate and classify targeted examination. Absent from list are that there are no required, as there should be, inspections to establish the baseline conditions needed to evaluate the effectiveness of the program in the future.	The staff disagrees with this comment. The GALL Report has not been changed.	Opportunistic examinations are conducted whenever a pipe or tank is exposed for any reason. Additional information related to opportunistic inspections may be found in paragraph 4.a.i. An opportunistic inspection may replace a directed inspection only when the conditions of paragraph 4.b.v are met. Under these conditions, opportunistic inspections provide precisely the same information about the condition of piping as does a directed inspection. Under these conditions, the staff finds no reason not to permit these inspections to be credited toward the overall inspection program Aging management programs are

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				designed to manage aging during the period of extended operation. This AMP provides for obtaining baseline information by indicating that an inspection is to be performed during the 10 years preceding the entry into the period of extended operation. This inspection, consisting of that portion of piping that is deemed to be of highest risk if degradation is discovered, provides reasonable assurance that the condition of buried or underground piping or tanks is adequate upon the plant's entry into the period of extended operation. In the event that degradation is discovered, this inspection also provides information on coating degradation and corrosion rates that may be used in planning future inspections. Given the potential for damage to piping and tanks from excavation, a 100% inspection is not justified without specific information regarding the presence of degradation.
1081	XI.M41 ML102371274, Comment	Program Description - (1) The water chemistry program is a mitigation program and does not provide detection for aging effects. More	The staff disagrees with this comment. The GALL Report	(1) This AMP is designed to address the external surfaces of buried or underground piping or

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	XI.M41-PW3	frequent complete inspections as part of the overall program are the only effective assurance that defects created by aging components will be uncovered. Tritium leaks at reactors across the country belie the effectiveness of water chemistry alone to prevent leaks. (2) More broadly, the NRC Groundwater Contamination (Tritium) at Nuclear Plants-Task Force – Final Report, Sept 1, 200[6] studied radioactive leaks from a variety of sources. The LLTF stated in the Executive Summary ii, that, “The task force did identify that under the existing regulatory requirements the potential exists for unplanned and unmonitored releases of radioactive liquids to migrate offsite into the public domain undetected.”	has not been changed.	tanks. It contains both preventive actions and an inspection program. Effective aging management is obtained through the effective use of preventive actions, supplemented as necessary by inspections. The water chemistry program is designed to address corrosion from the interior of piping or tanks, whether buried or underground or not. It does not affect degradation of the external surfaces of buried or underground piping or tanks, as it is not pertinent to the discussion of this AMP. (2) The staff is aware of the groundwater contamination report and this finding. It is the intent of this AMP, as well as others that address degradation from the internal surfaces of piping, tanks, or structures, to manage the aging of these systems, structures, and components and to provide reasonable assurance that, within the current regulatory structure, their intended function is maintained during the period of extended operation.
1083	XI.M41	Program Description	The staff disagrees	The term “inaccessible” could refer

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	ML102371274, Comment XI.M41-PW4	The terms “buried” and “underground” are fully defined in Chapter IX of the GALL Report. Briefly, buried piping and tanks are in direct contact with soil or concrete (e.g., a wall penetration). Underground piping and tanks are below grade, but are contained within a tunnel or vault such that they are in contact with air and are located where access for inspection is restricted: “Inaccessible Piping & Tanks ” would be a better term	with this comment. The GALL Report has not been changed.	not only to buried or underground piping or tanks but also to piping or tanks within a building to which access is difficult. The environment for these piping or tanks is sufficiently different so as to warrant a different aging management program.
1084	XI.M41 ML102371274, Comment XI.M41-PW5	Scope of Program - Add piping related to AOG system	The staff disagrees with this comment. The GALL Report has not been changed.	Systems, structures, and components which are in scope for license renewal are defined in 10 CFR 54.4. Precisely which systems, structures, and components are within the scope of license renewal varies from plant to plant based on a plant-specific scoping and screening process. Depending on the plant, some portions of the AOG piping may or may not be in scope. Given the potential for AOG piping to be in scope at some plants and out at others, it is not appropriate to specifically mention AOG piping in the AMP.
1086	XI.M41 ML102371274, Comment	Preventive Actions - “Periodic flow tests” should not provide a “pass.” It cannot detect leakage. Periodic is too loose, need specificity - what precisely does “periodic” mean in terms	The staff disagrees with this comment. The GALL Report has not been	Additional information concerning periodic flow testing is contained in paragraph 4.b.ix. This paragraph provides the test interval and limits

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	XI.M41-PW6	of months/years? Moreover a flow test can indicate that there is not a breach in the piping at the time of the test but it does not indicate the level of corrosion/degradation in the material, wall thickness etc or whether there will be a breach the day after the flow test.	changed.	flow testing to fire mains installed in accordance with NFPA Standard 24. It should be noted that this standard permits some leakage from brand new fire mains. While flow testing will not detect small leaks, it will ensure that the intended function of fire mains, delivering sufficient water to fight fires, is maintained. It is also noted that leakage from fire mains presents no environmental hazard. The frequency at which the flow tests are performed is sufficient to ensure that adequate water flow is maintained even if a leak were to develop between two tests. Additionally, pressure is maintained in fire main systems through the use of a jockey pump. Changes in jockey pump activity are monitored by applicants and would initiate an investigation regarding the cause for the change.
1088	XI.M41 ML102371274, Comment XI.M41-PW7	Preventive Actions “Table 2a, Preventive Actions for Buried Piping and Tanks:” (1) Change to “Preventive Actions for Inaccessible Piping & Tanks	The staff disagrees with this comment. The GALL Report has not been changed.	(1) Please see the staff response to comment 1083. (2) Please see the staff response to comment 1080. (3) The staff finds this discussion of monitoring wells to be outside

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		(2) Add Baseline Inspection (3) Also need detection capability-monitoring wells in sufficient number and placed according standard design practices, requires among other things recent subsurface hydro-geo analysis of site[1] [1] A well designed monitoring well system could pick up a leak relatively quickly - approximately within weeks or months after the initiation of a leak, depending on the rates of groundwater flow and other factors. Groundwater monitoring networks are widely used to detect leaks at a variety of nuclear and non-nuclear sites. Well-established protocols exist for proper design of monitoring networks including well and screen placement, sampling frequency and selection of sampled contaminants Sampling the wells is usually done about four times a year		the scope of this AMP. 10 CFR 54.29(a)(1) requires managing the effects of aging during the period of extended operation. Paragraph A.1.2.3.4 of the SRP-LR states that, prior to the loss of the intended function of a component or structure, aging effects responsible for that loss should be detected. Since monitoring wells serve only to identify a prior loss of intended function of piping and tanks, their inclusion in the AMP is inappropriate. Although the inclusion of monitoring wells is not appropriate in this AMP, the staff is aware of the use of monitoring wells and continues to evaluate their use.
1089	XI.M41 ML102371274, Comment XI.M41-PW8	Preventive Actions (1) Titanium needs to be included in preventive measures. Titanium alloys, like other metals, are subject to corrosion in certain environments. The primary forms of corrosion that have been observed on these alloys include general corrosion, crevice corrosion, anodic pitting, hydrogen damage, and SCC.	The staff disagrees with this comment. The GALL Report has not been changed.	(1) The staff acknowledges that certain environments may be corrosive to titanium. These environments are not, however, those that will be encountered by buried pipe at nuclear power plants. Preventive actions are not required for buried titanium pipe.
1090	XI.M41 ML102371274,	Preventive Actions NUREG/CR 6876 (Brookhaven) titanium	The staff disagrees with this comment.	The staff acknowledges that sufficient operating experience is

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	Comment XI.M41-PW8(2)	subject fouling/biofouling. Why coat titanium? Titanium's corrosion resistance is compromised by exposure to halides such as chlorides or fluorides. Residual chlorides lead to SCC while fluorides readily attack the natural oxide that protects titanium from atmospheric corrosion. In addition, due to titanium's extremely passive nature, when titanium components are in contact with more electrochemically active materials such as aluminum, zinc or copper, where the materials meet there is such a galvanic charge generated due to the dissimilar metal junction, galvanic corrosion is wildly accelerated beyond what either metal by itself would experience. http://www.finishing.com/Library/titanium.html (2) Polymer: High Density Polyethylene & High Density Polypropylene: We have been advised that there should be reluctance to use polymeric piping in hot service and there is a pressure limitation that depends (like in steel pipe) on the wall thickness; it should never be used either of the materials in organic service (buried diesel or fuel oil lines) even though organic fluids are routinely transported in polyethylene or polypropylene totes; and that there is reason for concern about long term embrittlement (and eventual cracking) if used in buried structures. Another type of problem with buried polymeric pipe is the fact that	The GALL Report has not been changed.	not yet available to address all aspects of the performance of buried or underground piping or tanks. As a result, this AMP includes inspections for these materials. (2) Additionally, particular attention is paid to the compatibility of polymeric piping and tanks and the fluids they contain during the AMR review process. Under these conditions, the staff believes that it is possible to provide reasonable assurance that the intended function of polymeric piping can be maintained during the period of extended operation. (3) The staff is aware of the use of cathodic protection systems for the protection of some reinforced concrete structures, especially those exposed to significant concentrations of chloride containing salts. In these instances, the cathodic protection systems are utilized to prevent or retard the corrosion of the rebar in the concrete. For this approach to be successful, the rebar must all be electrically connected. Buried concrete and cementitious piping

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		when digging becomes necessary the polymeric pipe is cut that much more easily. If polymeric pipe(not really plastic pipe) are used for repairs, there are problems in the mating of steel pipes to polymeric ones. Bottom line, we are advised that there is not enough experience available to guarantee an additional 20 years of service. (3) Cementitious or Concrete requires cathodic protection: The following summarizes the international development of cathodic protection of steel in concrete. The technology was developed in Europe and the USA for applications to buried prestressed concrete water pipelines (Refs. 1 & 2) and in California to deal with deicing salt attack of reinforced concrete bridge decks, and has been widely applied throughout North America for that purpose. It has been used and further developed in the UK to deal with a variety of problems ranging from buildings with cast in chlorides to bridge substructures contaminated with deicing salts and to marine structures and tunnels. It is also widely used on buildings and car parks in UK and Northern Europe. In the Middle East, severe corrosion problems caused by high levels of salinity in soils as well as marine conditions have lead to many large projects being carried out. It has also been used extensively in the Far East including Australia, Japan and Hong Kong. http://www.azom.com/details.asp?articleID=1		in nuclear power plants are not normally exposed to the level of chlorides that would necessitate cathodic protection. Additionally, in most instances, the reinforcing steel in these pipes and tanks is not electrically connected, making the use of cathodic protection technically unfeasible. (4) The staff is unaware of an alloy called monel bronze. The staff is familiar with monel, which is an alloy of nickel and copper and with bronze which is generally an alloy of copper and tin. Both alloys could be considered copper in tables 2 and 4. Should monel be buried, which the staff views as unlikely, an applicant may wish to propose alternate protection and inspections.

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		316. There are numerous articles on line. (4) What about components within scope NOT made of materials listed, such as monel bronze?		
1091	XI.M41 ML102371274, Comment XI.M41-PW9	Preventive Actions 4. Cathodic protection is in accordance with NACE SP0169-2007 or NACE RP0285- 2002. The system monitoring interval discussed in section 10.3 of NACE SP0169- 2007 may not be extended beyond one year. The equipment used to implement cathodic protection need not be 10 CFR 50 Appendix B qualified. [Emphasis added]": Omit "The equipment used to implement cathodic protection need not be 10 CFR 50 Appendix B qualified." Rationale: Unless the rectifier (or any piece of equipment) was explicitly mentioned in the tech specs, its failure would be entered into the corrective action program but would not enter a limiting condition for operation with a deadline for fixing or shutting down	The staff disagrees with this comment. The GALL Report has not been changed.	Cathodic protection equipment serves an aging management function but does not have an immediate effect on the safe operation of the plant and is not safety-related. The staff has established reliability criteria for cathodic protection equipment as part of this AMP. The sentence in question has been retained in the AMP.
1093	XI.M41 ML102371274, Comment XI.M41-PW10	Preventive Actions <u>Cathodic protection need not be provided if</u>: No exceptions, require as was original plan in Gall XI M-28 before NRC caved to bogus objections raised by NEI that retrofitting cathodic protection could be dangerous and then provided M34 as an alternative[2]	The staff disagrees with this comment. The GALL Report has not been changed.	The alternatives to the provision of cathodic protection are based on soil resistivities, above which corrosion occurs very slowly, if at all, and provisions within SP0169-2007, which describe conditions for which cathodic protection is not required for buried steel, copper,

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		Gall XI M-28, focuses on adding cathodic protection. Pertinent portions of it say: Scope of Program: “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.” Preventive Actions: “A cathodic protection system is used to mitigate corrosion where pinholes in the coating allow the piping or components to be in contact with the aggressive soil environment. The cathodic protection imposes a current from an anode onto the pipe or tank to stop from corrosion from occurring at defects of the coating.” Detection of Aging Effects: “Coatings and wrappings 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 wrappings during service will result in the requirement for more current from the cathodic protection rectifier in order to maintain the proper cathodic protection 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		and aluminum piping.

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		the locations where degradation has occurred." Acceptance Criteria: "In accordance with accepted industry practice, per NACE Standard RP-0285-95 and NACE RP-0169-96, the assessment of the condition of the coating and cathodic protection system is to be conducted on an annual basis and compared to predetermined values." Corrective Actions: The site corrective action program, QA procedures, site review and approval process, and the administrative controls are implemented in accordance with the requirements of 10 CFR Part 50, Appendix B. As discussed in the appendix of this report, the staff finds the requirements of 10 CFR Part 50, Appendix B acceptable to address the corrective actions, confirmation process and administrative controls." Operating experience: "Corrosion pits from the outside diameter have been discovered in buried piping with far less than 60 years of operation. Buried pipe that is coated and cathodically protected is unaffected after 60 years of service. Accordingly, operating experience from application of the NACE standards on non-nuclear systems demonstrates the effectiveness of this program." [2] See: TRANSCRIPT ADJUDICATORY HEARING PILGRIM NUCLEAR POWER		

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		STATION'S LICENSE RENEWAL APPLCIATION, April 10, 2008, pgs., 769-770; available NRC Electronic Reading Room (www.nrc.gov); ADAMS accession number "ML081070329"		
1094	XI.M41 ML102371274, Comment XI.M41-PW11	Preventive Actions a. Soil resistivities > 20,000 ohm cm. If this condition is met, inspections in Table 4a are conducted in accordance with Table 4a footnote 2 item C.: (1) What does NACE SP0169-2007 say? We need a copy of the document. (2) Not knowing, it seems to need qualification regarding if area backfilled, excavated or soil conditions are known to have changed-Entergy's BPTIMP, pg.,11 made this notation	The staff agrees with this comment. The GALL Report has been changed.	AMP M41 has been revised to eliminate the provision related to Soil resistivities > 20,000 ohm cm. (1) NACE SP0169-2007 is a copyrighted publication that is the property of NACE International. The standard may not be distributed by the NRC. The standard is available for purchase by the general public from NACE International. In accordance with the availability notice for NUREG-1801, "Copies of industry codes and standards used in a substantive manner in the NRC regulatory process are maintained at the NRC Library, Two White Flint North, 11545 Rockville Pike, Rockville, MD 20852-2738, for use by the public." A set of hard copy NACE standards is available for members of the public to read by appointment. (2) The staff agrees that it is possible for soil resistivities to change, especially if excavations

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				are conducted in the vicinity of a pipe. Under those circumstances, the staff would expect that an applicant would evaluate the possibility that the soil resistivity had changed and retest if necessary.
1096	XI.M41 ML102371274, Comment XI.M41-PW12	Preventive Actions b. Corrosion rates, based on at least 5 years of data, which indicate that minimum design wall thickness for the buried pipe or tank will not be reached within the period of extended operation. The corrosion rates may be based on measurements taken from actual uncoated pipe or may be approximated for coated piping, which is assumed to contain flaws in the coating, from bare metal coupons of similar material exposed, on site, to soil of similar conditions (e.g., resistivity, ionic content, moisture content, etc). Multiple corrosion measurements are necessary when a length of pipe passes through varying soil types. If this condition is met, inspections in Table 4a are conducted in accordance with Table 4a footnote 2 item D. [Emphasis added]: Omit this exception. The probability of corrosion is not constant with time and therefore cannot be characterized with a number and entered as such into a "Rule", like, if we established a rate based on 5 years	The staff disagrees with this comment, however some changes to the GALL Report have been made.	The staff has removed this section from the AMP Removal of this section was based on the complexity of administering it. The staff does not agree with the commenter's rationale for requesting the removal of this section. For a given material in a given soil, measured corrosion rates are quite useful in predicting component life. Due to the fact that corrosion rates generally decrease with age, the linear projection of measured corrosion rates almost always under predicts component life. The staff finds the commenter's reference to the "bath tub curve" as a model for corrosion failures not applicable. The bath tub curve is used to predict failures of electronic components, which have high failure rates upon startup and at end of life.

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		of data, we can predict the rate going forward. First, the corrosion rate is NOT constant with time. Therefore, the probability would have to be adjusted with age, or the risk becomes a function of age. The so-called “Bath-tub curve of degradation” needs to be considered – as the component ages the rate sharply increases- the corrosion rate is not constant over time.		Corrosion of metals in soils do not have either a high initial failure rate or a sharp increase in failure at the end of their expected lives.
1098	XI.M41 ML102371274, Comment XI.M41-PW13	Preventive Actions (i) Re particle size backfill? What does SP0169-2007 section 5.2.3 say- is max size ½ inch as in previous draft? Crushed concrete of 1/2 inch diameter or less can be quite jagged and do much damage while river bottom pebbles may be harmless. Therefore the type of material as to its smoothness is relevant. Also absent from the discussion on backfill material was the degree to which the material retained moisture. (ii) Omit exception “Backfill not meeting this standard is acceptable if the inspections conducted in program element 4 of this AMP do not reveal evidence of mechanical damage to pipe coatings due to the backfill:” Program element 4 does not provide assurance- see comments below on #4.	The staff disagrees with this comment. The GALL Report has not been changed.	SP0169-2007 discusses the concept that the trench and the backfill must be free of large objects and that the pipe coating must not be damaged during installation. ASTM D 448-08 discusses aggregate size distributions. The size distribution cited in the AMP is based on numerous specifications for the burial of pipe. Backfill moisture retention will affect soil resistivity which is specifically considered in the AMP. The staff does not concur with this comment. The staff finds little value and potential harm in replacing backfill which has not been shown to cause damage to pipe coatings.
1100	XI.M41	Preventive Actions	The staff disagrees	ASTM D 448-08 discusses

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	ML102371274, Comment XI.M41-PW14	6. Aggregate size for backfill within 6 inches of the pipe must meet ASTM D 448-08 size number 10: Define – data base not available on line	with this comment. The GALL Report has not been changed.	aggregate size distributions. The size distribution cited in the AMP is based on numerous specifications for the burial of pipe. ASTM D 448-08 is a copyrighted publication that is the property of ASTM International. It may not be distributed by the NRC. It is available for purchase by the general public from ASTM International.
1102	XI.M41 ML102371274, Comment XI.M41-PW15	Preventive Actions 7. Backfill limits apply only if piping is coated: Omit exception – for example, abrasion ignored	The staff disagrees with this comment. The GALL Report has not been changed.	The staff does not concur with the comment. The staff finds no credible evidence to support the concept that backfill could wear through a metallic buried pipe that is not subject to corrosion.
1103	XI.M41 ML102371274, Comment XI.M41-PW16	Preventive Actions 8. Super austenitic stainless steel, e.g., Al6XN or 254 SMO. Superaustenitic stainless steels, such as alloy AL-6XN and 254SMO, exhibit great resistance to chloride pitting and crevice corrosion due to high molybdenum content (>6%) and nitrogen additions, and the higher nickel content ensures better resistance to stress-corrosion cracking versus the 300 series: Omit exception- stray currents ignored, for example Table 2b footnote 4 - Coating preventive	The staff disagrees with this comment. The GALL Report has not been changed.	Footnote 8 does not address an exception; it is merely a definition of super austenitic stainless steel. The staff presumes that the commenter is concerned that super austenitic stainless steels will be corroded by stray currents from cathodic protection systems. The staff notes that cathodic protection systems are designed as systems and take into account all piping and other sources of current, whether cathodically protected or not. The issue of

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		action - MIC may be issue for super austenitic steel AI6XN http://www.alleghenyludlum.com/Ludlum/documents/AL_6XN_SourceBook.pdf		corrosion of super austenitic stainless steel by stray currents is, therefore, of little concern. The staff agrees that it is conceivable that MIC will occur in super austenitic stainless steel but finds the risk associated with MIC to be sufficiently low so as not to merit the application of a coating.
1105	XI.M41 ML102371274, Comment XI.M41-PW17	Parameters Monitored/Inspected – (1) UT not work if piping is multi-layered such as having a CIP liner in the pipe paragraph needs to be qualified for conditions effective; (2) need to state how much of the component needs to be examined and precisely where on the component – some areas more susceptible to degradation – elbows, welds, high flow areas for example	The staff disagrees with this comment. The GALL Report has not been changed.	This program element addresses the aging effects considered by the AMP and the inspection techniques utilized to detect them. Specifics concerning how these techniques are used are contained in the Detection of Aging Effects program element. The commenter is referred to this program element concerning specifics for UT inspection. The staff notes that external UT inspections can detect loss of material in a pipe even when an internal liner is in place. The precise location of piping systems that are of highest risk is a plant-specific issue. Paragraphs 4.b.3 and 4.c.3 direct applicants to examine piping that is of highest risk. These paragraphs provide “for example” lists of issues to be considered. The issues raised in

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				the comment are relatively common issues associated with the term “flow characteristics” mentioned in the AMP.
1106	XI.M41 ML102371274, Comment XI.M41-PW18	Parameters Monitored/Inspected Pipe to soil potential? What about conduits/other containment for the piping if they are degraded, the pipe inside could be sitting in water, for example?	The staff disagrees with this comment. The GALL Report has not been changed.	The staff assumes that this comment refers to shielding. Issues related to shielding are addressed in the NACE standards.
1107	XI.M41 ML102371274, Comment XI.M41-PW19	Detection of Aging Effects Need to include additional variables such as age component, flow velocity (FAC), repair history	The staff disagrees with this comment. The GALL Report has not been changed.	Flow accelerated corrosion is addressed by GALL AMP XI.M17. Age of a component is irrelevant to its degradation. Degradation of the component is related to the corrosivity of the environment, the material of construction and the effectiveness of the preventive actions. Repair history may be of significance but only if the component that failed was replaced in kind each time it failed. The staff has not seen significant evidence to support this conclusion.
1108	XI.M41 ML102371274, Comment XI.M41-PW20	Detection of Aging Effects Opportunistic Inspections - (1) Opportunistic typically means that there has been a leak that needs to be repaired. Visual inspection is "stone age technology" There has to be a decision of how much more pipe to excavate	The staff disagrees with this comment. The GALL Report has not been changed.	(1) The staff disagrees with this comment. There is no connection between opportunistic inspections and leaks. Opportunistic inspections are conducted for a number of reasons, which may

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		and at least conduct some quantitative examinations. (2) What if pipe does not become accessible for any reason?		include activities such as maintenance on equipment which is located close to a buried pipe or tank. Information concerning the extent of inspections and quantitative examinations is provided in this program element of the AMP. (2) If a pipe is not made accessible for an opportunistic inspection, directed inspection in accordance with Tables 4a-d are conducted.
1109	XI.M41 ML102371274, Comment XI.M41-PW21	Detection of Aging Effects – (i) Directed Inspections for buried piping are conducted in accordance with Table 4a and its accompanying footnotes. See comments on Table 4a's footnotes	Not needed.	The staff notes this comment and will address specifics in technical bases for the commenter's comments on Table 4a footnotes.
1110	XI.M41 ML102371274, Comment XI.M41-PW22	Detection of Aging Effects Directed Inspections – Buried Pipe - What evidence is there to justify a 10 year interval? This is the crux. One simply cannot squeeze all these situations into the same shoe box. 10 years is too infrequent period – especially in license renewal when components may well be entering the "wear-out" stage (Region C) of the Bath Tub Curve of degradation. Inspection frequencies need to be based on age.	The staff disagrees with this comment. The GALL Report has not been changed.	The 10-year inspection interval is consistent with most inspections contained in ASME Code Section XI. As discussed in the staff response to Comment 1096, the use of the bath tub curve concept is inappropriate for passive components such as piping or tanks. For conditions that are less than optimal, the staff has chosen to increase the extent of inspection rather than the frequency of inspections. Increasing either

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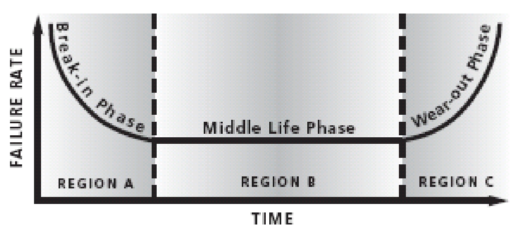
		Figure 1 The Bathtub Curve  Source: NASA, 2001.		extent or frequency will accomplish the same goal. The staff finds the commenter's reference to the "bath tub curve" as a model for corrosion failures not applicable. The bath tub curve is used to predict failures of electronic components, which have high failure rates upon startup and at end of life. Corrosion of metals in soils do not have either a high initial failure rate or a sharp increase in failure at the end of their expected lives.
1111	XI.M41 ML102371274, Comment XI.M41-PW23	Detection of Aging Effects (1) If in fact there are various degrees of susceptibility, there should also be varying degrees of inspection frequencies. (2) need a more precise and complete listing of locations more susceptible to degradation – absent from list, for example, are age component, flow rate, elbows, welds	The staff disagrees with this comment. The GALL Report has not been changed.	(1) See the staff response for comment 1110. The 10-year inspection interval is consistent with most inspections contained in ASME Code Section XI. As discussed in the staff response to comment 1110, the use of the bath tub curve concept is inappropriate for passive components such as piping or tanks. For conditions that are less than optimal, the staff has chosen to increase the extent of inspection rather than the frequency of inspections. Increasing either extent or frequency will accomplish the same goal.

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				(2) Please see the staff response for Comment 1105. The precise location of piping systems that are of highest risk is a plant-specific issue. Paragraphs 4.b.3 and 4.c.3 direct applicants to examine piping that is of highest risk. These paragraphs provide “for example” lists of issues to be considered. The issues raised in the comment are relatively common issues associated with the term “flow characteristics” mentioned in the AMP.
1113	XI.M41 ML102371274, Comment XI.M41-PW24	Detection of Aging Effects iv. Visual inspections are supplemented with surface and/or volumetric non-destructive testing (NDT) if significant indications are observed: “Significant” needs to be defined	The staff disagrees with this comment. The GALL Report has not been changed.	“Significant” is functionally described in paragraph 6b.
1134	XI.M41 ML102371274, Comment XI.M41-PW25	Detection of Aging Effects v. Opportunistic examinations may be credited toward these direct examinations if the location selection criteria in item iii, above, are met: Omit - not all factors related to corrosion listed in iii and no specification of length component requiring inspection- if, for example, they had an “opportunity” to inspect a 1 foot section of a pipe’s coating it does not mean that the	The staff disagrees with this comment. The GALL Report has not been changed.	Opportunistic inspections must meet the criteria for directed inspections. The minimum length of an inspection for a directed inspection is 10 feet. These locations are selected based on the highest risk piping. In other words, if an opportunistic inspection is credited for a directed inspection, the remaining piping is

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		remaining feet of the pipe are in the same condition		expected to be in a better condition than that which was inspected.
1115	XI.M41 ML102371274, Comment XI.M41-PW26	Detection of Aging Effects vi. At multi-unit sites, individual inspections of shared piping may be credited for only one unit: The issue is the quality and frequency of the inspection of the pipe not what unit the pipe(s) belong	The staff disagrees with this comment. The GALL Report has not been changed.	At sites which contain multiple nuclear power plants, some piping, such as fire mains, may be common to all units. This comment indicates that if an inspection is conducted on this shared piping, it may be credited to only one of the units.
1116	XI.M41 ML102371274, Comment XI.M41-PW27	Detection of Aging Effects vii. Visual inspections for polymeric materials are augmented with manual examinations to detect hardening, softening or other changes in material properties: This makes no sense. What does manual examination tell you about the embrittlement of the pipe.	The staff disagrees with this comment. The GALL Report has not been changed.	Manual examination is particularly valuable for changes in condition of elastomeric material. For hard polymeric material, manual examinations may give evidence of softening, swelling, or embrittlement (hardening) of the material.
1117	XI.M41 ML102371274, Comment XI.M41-PW28	Detection of Aging Effects Flow test [does] not tell degree degradation-wall thickness- it can detect hole at time of test not what will happen an hour or 5 months later. Flow tests will NOT test any leak unless it is >15% above the nominal flow through the pipe.	The staff disagrees with this comment. The GALL Report has not been changed.	Flow tests are limited to fire mains. The purpose of the flow test is to verify that the fire main is capable of delivering sufficient water at sufficient pressure to fight a fire. The frequency of these tests assures that maintenance of intended function is maintained between tests. Additionally, fire main pressure is maintained through the use of jockey pumps. Jockey pump activity is monitored

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				by the power plant. Changes in jockey pump activity will initiate an investigation as to the cause.
1118	XI.M41 ML102371274, Comment XI.M41-PW29	Detection of Aging Effects x. Inspection as indicated in (A), and (B) below may be performed in lieu of the inspections contained in Table 4a for either code class/safety significant or hazmat piping or both: “at least 25%” – specifics as to 25% need to be provided so that they are representative age component, configuration etc	The staff disagrees with this comment. The GALL Report has not been changed.	Please see the staff response for comment 1105. The precise location of piping systems that are of highest risk is a plant-specific issue. Paragraphs 4.b.3 and 4.c.3 direct applicants to examine piping that is of highest risk. These paragraphs provide “for example” lists of issues to be considered. The issues raised in the comment are relatively common issues associated with the term “flow characteristics” mentioned in the AMP.
1120	XI.M41 ML102371274, Comment XI.M41-PW30	Detection of Aging Effects Monel Bronze is used for some buried comments- is it covered by the program and more broadly what other materials may be not in list?	The staff disagrees with this comment. The GALL Report has not been changed.	Please see the staff response for comment 1090. The staff is unaware of an alloy called monel bronze. The staff is familiar with monel, which is an alloy of nickel and copper and with bronze which is generally an alloy of copper and tin. Both alloys could be considered copper in tables 2 and 4. Should monel be buried, which the staff views as unlikely, an applicant may wish to propose alternate protection and

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				inspections.
1121	XI.M41 ML102371274, Comment XI.M41-PW31	Detection of Aging Effects NACE SP0169-2007 needs to be provided in appendix – not available on line to non-member	The staff disagrees with this comment. The GALL Report has not been changed.	NACE SP0169-2007 is a copyrighted publication that is the property of NACE International. The standard may not be distributed by the NRC. The standard is available for purchase by the general public from NACE International. In accordance with the availability notice for NUREG-1801, “Copies of industry codes and standards used in a substantive manner in the NRC regulatory process are maintained at the NRC Library, Two White Flint North, 11545 Rockville Pike, Rockville, MD 20852-2738, for use by the public.” A set of hard copy NACE standards is available for members of the public to read by appointment.
1122	XI.M41 ML102371274, Comment XI.M41-PW32	Detection of Aging Effects Guidance has no enforcement – we need enforceable regulations	The staff disagrees with this comment. The GALL Report has not been changed.	The GALL Report is not a regulation. AMPs which are consistent with the GALL Report are considered by the staff to be acceptable means to manage aging. Applicants are free to propose alternatives to AMPs contained in the GALL Report.

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1124	XI.M41 ML102371274, Comment XI.M41-PW33	Detection of Aging Effects (3a-3c): On what basis can NRC assume that 10 feet inspected, for example, represents the conditions in the remainder of the component? It would make more sense to require more frequent and more comprehensive inspections. Specifically a 100 percent internal visual inspection of all underground pipes must be implemented. The inspection cycle should be such that pipes within scope are inspected every ten years. The Applicant should be required to break the testing interval down such that one sixth of all pipes are inspected during each refueling outage. (This assumes 18 month refueling outages, or six every ten years.) The Applicant should be required to inspect one sixth of the lineal piping, one sixth of the elbows and flanges at each outage, even if such inspections lengthen the outage time	The staff disagrees with this comment. The GALL Report has not been changed.	There is some risk associated with excavation of buried piping. The inspection of 100% of buried piping is not justified without specific evidence of that necessity. Paragraph 4.b.iii directs that inspections be conducted at locations of highest risk, thus, the pipe not inspected can be considered to be in better condition than that which was inspected.
1190	XI.M41 ML102371274, Comment XI.M41-PW34	Detection of Aging Effects (1) "To be considered hazmat, the concentration of radioisotopes within the pipe during normal operation must exceed established standards such as EPA drinking water standard" makes no sense. Some radioisotopes have long lives so that if the usually concentration during normal operations does not exceed established standards but the component is leaking undetected than the amount leaked could well	The GALL Report has not been changed.	The NRC is actively addressing the issue of leaks and spills into the groundwater. There have been two NRC Lesson Learned Task Forces in this area. There is a proposed change in the Generic Environmental Impact Statement for License Renewal of Nuclear Plants to address this item as part of the license renewal environmental review.

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		exceed established standards – the cumulative effect must be covered. (2) What about abnormal circumstances?		
1127	XI.M41 L102371274, Comment XI.M41-PW35	Detection of Aging Effects 6. Only 1 inspection is conducted even if both Code Class/safety related and hazmat pipe are present:” Only 1 inspection is insufficient – it appears NRC priorities are reversed – public safety should be the priority not industry convenience.	The staff disagrees with this comment. The GALL Report has not been changed.	Based on the material employed and/or the preventive measures in place, only minimal inspections are deemed necessary. The applicant is to conduct one inspection in either hazmat or code class/safety-related piping, whichever is of higher risk.
1130	XI.M41 ML102371274, Comment XI.M41-PW36	Detection of Aging Effects Direct Inspections – Underground Pipe - see comments Table 4b and accompanying footnotes	See subsequent comments.	Please see staff responses to subsequent comments.
1131	XI.M41 ML102371274, Comment XI.M41-PW37	Detection of Aging Effects i. Unless otherwise indicated, directed inspections as indicated in Table 4b will be conducted during each 10 year period beginning 10 years prior to the entry into the period of extended operation: 10 years too infrequent	The staff disagrees with this comment. The GALL Report has not been changed.	Please see staff response to comment PW22 (Comment 1110).The 10-year inspection interval is consistent with most inspections contained in ASME Code Section XI. As discussed in the staff response to comment 1096, the use of the bath tub curve concept is inappropriate for passive components such as piping or tanks. For conditions that are less than optimal, the staff has chosen to increase the extent of

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				inspection rather than the frequency of inspections. Increasing either extent or frequency will accomplish the same goal.
1132	XI.M41 ML102371274, Comment XI.M41-PW38	Detection of Aging Effects iii. Inspection locations are selected based on susceptibility to degradation. Characteristics such as coating type, coating condition, exact external environment, and flow characteristics within the pipe, are considered: More characteristics need to be listed – such as age, history repair	The staff disagrees with this comment. The GALL Report has not been changed.	Please see staff response to comment 1105. The precise location of piping systems that are of highest risk is a plant-specific issue. Paragraphs 4.b.3 and 4.c.3 direct applicants to examine piping that is of highest risk. These paragraphs provide “for example” lists of issues to be considered. The issues raised in the comment are relatively common issues associated with the term “flow characteristics” mentioned in the AMP.
1133	XI.M41 ML102371274, Comment XI.M41-PW39	Detection of Aging Effects iv. Underground pipes are inspected visually to detect external corrosion and by a volumetric technique such as UT to detect internal corrosion: UT detects both internal and external corrosion – separation is tricky but can be done.	The staff disagrees with this comment. The GALL Report has not been changed.	It is not the intent of the staff to utilize UT measurements to distinguish between internal and external corrosion. In this instance, underground piping is being visually and volumetrically examined from the external surface. The visual exam will detect external corrosion; the volumetric exam will determine remaining wall thickness. Based on the assumption of good

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				preventive actions, all loss of wall thickness should be due to internal corrosion.
1114	XI.M41 ML102371274, Comment XI.M41-PW40	Detection of Aging Effects v. Opportunistic examinations may be credited toward these direct examinations if the location selection criteria in item iii, above, are met: Omit- explained above	The staff disagrees with this comment. The GALL Report has not been changed.	Please see staff response to comment 1134. Opportunistic inspections must meet the criteria for directed inspections. The minimum length of an inspection for a directed inspection is 10 feet. These locations are selected based on the highest risk piping. In other words, if an opportunistic inspection is credited for a directed inspection, the remaining piping is expected to be in a better condition than that which was inspected.
1135	XI.M41 ML102371274, Comment XI.M41-PW41	Detection of Aging Effects vi. At multi-unit sites, individual inspections of shared piping may be credited for only one unit: This makes no sense. Is it the pipe or site?	The staff disagrees with this comment. The GALL Report has not been changed.	At sites which contain multiple nuclear power plants, some piping, such as fire mains, may be common to all units. This comment indicates that if an inspection is conducted on this shared piping, it may be credited to only one of the units.
1136	XI.M41 ML102371274, Comment XI.M41-PW42	Detection of Aging Effects vii. Visual inspections for polymeric materials are augmented with manual examinations to detect hardening, softening or other changes in material properties:	The staff disagrees with this comment. The GALL Report has not been changed.	Please see the staff response to comment 1116. Manual examination is particularly valuable for changes in condition of elastomeric material. For hard

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		This makes no sense. What does manual examination tell you about the embrittlement of the pipe		polymeric material, manual examinations may give evidence of softening, swelling, or embrittlement (hardening) of the material.
1137	XI.M41 ML102371274, Comment XI.M41-PW43	Detection of Aging Effects Flow test not tell degree degradation- wall thickness- it can detect hole at time of test not what will happen an hour or 5 months later. Piping integrity is the main issue and flow test does nothing to identify integrity.	The staff disagrees with this comment. The GALL Report has not been changed.	Please see the staff response to comment 1117. Flow tests are limited to fire mains. The purpose of the flow test is to verify that the fire main is capable of delivering sufficient water at sufficient pressure to fight a fire. The frequency of these tests assures that maintenance of intended function is maintained between tests. Additionally, fire main pressure is maintained through the use of jockey pumps. Jockey pump activity is monitored by the power plant. Changes in jockey pump activity will initiate an investigation as to the cause.
1138	XI.M41 ML102371274, Comment XI.M41-PW44	Detection of Aging Effects x. Inspection as indicated in (A), and (B) below may be performed in lieu of the inspections contained in Table 4a for either code class/safety significant or hazmat piping or both: “at least 25%” – specifics as to 25% need to be provided so that they are representative	The staff disagrees with this comment. The GALL Report has not been changed.	Please see the staff response to comment 1105. The precise location of piping systems that are of highest risk is a plant-specific issue. Paragraphs 4.b.3 and 4.c.3 direct applicants to examine piping that is of highest risk. These paragraphs provide “for

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		age component, configuration etc		example" lists of issues to be considered. The issues raised in the comment are relatively common issues associated with the term "flow characteristics" mentioned in the AMP.
1139	XI.M41 ML102371274, Comment XI.M41-PW45	Detection of Aging Effects Table 4b, Inspections of Underground Pipe - Where do these numbers come from? Is there any evidence that 2% is statistically the correct number? Provide rationale in footnote.	The staff disagrees with this comment. The GALL Report has not been changed.	The extent of inspections indicated in this table is not statistically based. The inspections indicated represent the staff's engineering judgment as to the extent of piping which must be inspected to provide reasonable assurance that the intended function of the piping system is maintained during the period of extended operation.
1140	XI.M41 ML102371274, Comment XI.M41-PW46	Detection of Aging Effects Directed Inspections – Buried Tanks - Tanks must include partially buried tanks such as SFP, CST and the drywell (it is a partially buried tank and the SFP is encased below in concrete); and see comments on Table 4C's footnotes	The staff disagrees with this comment. The GALL Report has not been changed.	Buried portions of tanks which are substantially buried are included in this program. Inaccessible portions of tanks which are substantially above ground are covered by the Above Ground Tanks AMP. Accessible portions of both of these types of tanks are covered by the external surfaces monitoring AMP. Structures such as the spent fuel pool and the drywell are not tanks. These structures are covered by the structures monitoring program. Condensate storage tanks are normally

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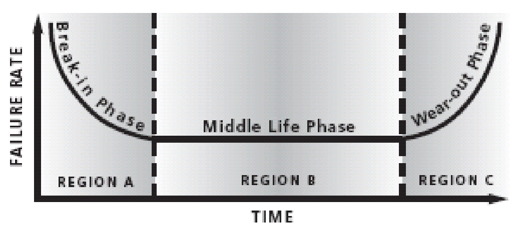
				considered above ground tanks.
1141	XI.M41 ML102371274, Comment XI.M41-PW47	Detection of Aging Effects What evidence is there to justify a 10 year interval. This is the crux. One simply cannot squeeze all these situations into the same shoe box. 10 years is too infrequent period – especially in license renewal when components may well be entering the “wear-out” stage (Region C) of the Bath Tub Curve of degradation. Figure 1 The Bathtub Curve  Source: NASA, 2001.	The staff disagrees with this comment. The GALL Report has not been changed.	Please see staff response to comment 1110. The 10-year inspection interval is consistent with most inspections contained in ASME Code Section XI. As discussed in the staff response to comment 12, the use of the bath tub curve concept is inappropriate for passive components such as piping or tanks. For conditions that are less than optimal, the staff has chosen to increase the extent of inspection rather than the frequency of inspections. Increasing either extent or frequency will accomplish the same goal. The staff finds the commenter’s reference to the “bath tub curve” as a model for corrosion failures not applicable. The bath tub curve is used to predict failures of electronic components, which have high failure rates upon startup and at end of life. Corrosion of metals in soils do not have either a high initial failure rate or a sharp increase in failure at the end of their expected lives.

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1142	XI.M41 ML102371274, Comment XI.M41-PW48	Detection of Aging Effects (1) UT can inspect both external and internal (2) inspecting 25% one time in 10 years inadequate; as suggested for buried piping, specifically a 100 percent external visual inspection of tanks within scope must be implemented. The inspection cycle should be such that the whole tank is inspected every ten years. The Applicant should be required to break the testing interval down such that one sixth of the tanks surface is inspected during each refueling outage. (This assumes 18 month refueling outages, or six every ten years.)	The staff partially disagrees with this comment. The GALL Report has not been changed.	(1) This AMP primarily addresses aging effects which occur on the external surfaces of buried or underground piping or tanks. If a tank is excavated and examined from the exterior, UT is not required to detect the presence of aging. Alternatively, if the tank is examined from the interior, UT is required to detect aging on the external surface of the tank. Aging of the interior of the tank is considered by a different AMP (which AMP is used depends on the contents of the tank). (2) There is some risk associated with excavation of buried tanks. The inspection of 100% of a buried tank is not justified without specific evidence of that necessity.
1144	XI.M41 ML102371274, comment XI.M41-PW49	Detection of Aging Effects v. Visual inspections for polymeric materials are augmented with manual examinations to detect hardening, softening or other changes in material properties: This makes no sense. What does manual examination tell you about the embrittlement.	The staff disagrees with this comment. The GALL Report has not been changed.	Please see staff response to comment 1116.Manual examination is particularly valuable for changes in condition of elastomeric material. For hard polymeric material, manual examinations may give evidence of softening, swelling, or embrittlement (hardening) of the material.

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1145	XI.M41 ML102371274, Comment XI.M41-PW50	Detection of Aging Effects vi. Opportunistic examinations may be credited toward these direct examinations: Opportunistic examinations should not be credited toward anything, rather they should be used to indicate and classify targeted examination.	The staff disagrees with this comment. The GALL Report has not been changed.	Please see staff response to comment 1080. Opportunistic examinations are conducted whenever a pipe or tank is exposed for any reason. Additional information related to opportunistic inspections may be found in paragraph 4.a.i. An opportunistic inspection may replace a directed inspection only when the conditions of paragraph 4.b.v are met. Under these conditions, opportunistic inspections provide precisely the same information about the condition of piping as does a directed inspection. Under these conditions, the staff finds no reason not to permit these inspections to be credited toward the overall inspection program.
1147	XI.M41 ML102371274, Comment XI.M41-PW51	Detection of Aging Effects NACE RP0285-2002-provide copy	The staff disagrees with this comment. The GALL Report has not been changed.	NACE RP0285-2002 is a copyrighted publication that is the property of NACE International. The standard may not be distributed by the NRC. The standard is available for purchase by the general public from NACE International. In accordance with the availability notice for NUREG-1801, “Copies of industry codes

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				and standards used in a substantive manner in the NRC regulatory process are maintained at the NRC Library, Two White Flint North, 11545 Rockville Pike, Rockville, MD 20852-2738, for use by the public." A set of hard copy NACE standards is available for members of the public to read by appointment.
1148	XI.M41 ML102371274, Comment XI.M41-PW52	Acceptance Criteria that "no evidence of coating degradation" be determined by a "NACE certified inspector" – inspector's judgment calls vary all over the map, absent specific criteria by NRC this is not an acceptable way to provide reasonable assurance.	The staff disagrees with this comment. The GALL Report has not been changed.	Inspectors trained to recognize and assess the severity of indications on coated pipe are in the best position to judge the condition of a pipe coating. The staff also notes that qualified inspectors are utilized for this purpose in assessing the condition of coatings on oil and gas transmission pipelines.
1149	XI.M41 ML102371274, Comment XI.M41-PW53	Acceptance Criteria The goal is to prevent leakage not wait until leaking to fix.	The staff disagrees with this comment. The GALL Report has not been changed.	Some damage to the connections of concrete and cementitious piping may occur during installation. Unless steel reinforcing material is exposed as a result of this damage, the extent of damage is not progressive. Therefore, if steel is not exposed and leakage is not occurring, the probability of a leak occurring at

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				the damaged location is no greater than a leak occurring at any other location. As a result, there is no need for further action regarding this type of damage.
1150	XI.M41 ML102371274, Comment XI.M41-PW54	Corrective Actions Looking at the list of outstanding corrective actions at reactors today that NRC has NOT looked at – what assurance is provided?	The staff disagrees with this comment. The GALL Report has not been changed.	The scope of the responses contained in this document is limited to the technical content of the AMP to which the comment pertains. This comment refers to plant-specific condition reports. A response to this comment would require an evaluation of all outstanding condition reports and a plant-by-plant determination as to whether these reports demonstrate a lack of assurance that aging is being adequately managed at each plant.
1151	XI.M41 ML102371274, Comment XI.M41-PW55	Operating Experience Operating experience demonstrates that what is needed are NRC regulations that are enforced; not voluntary industry initiatives and NRC “guidance.”	The staff disagrees with this comment. The GALL Report has not been changed.	The scope of the responses contained in this document is limited to the technical content of the AMP to which the comment pertains. This comment addresses the need for NRC regulations and comments on industry initiatives. This comment does not address the content of this AMP.
1232	XI.M41 ML102371265,	What is the regulatory authority of a NUREG?	No changes to the GALL Report have	The GALL Report contains AMPs which, in the opinion of the staff,

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	Comment XI.M41-1(b)		been made in response to this question.	represent one way to adequately manage aging for a given system, structure, or component constructed of one or more materials and exposed to a given environment. If an applicant proposes to manage aging of its components in a manner consistent with the GALL Report, the staff will consider the proposed approach acceptable. The use of the GALL Report is not required by regulation. Applicants may propose alternate approaches to manage aging. The staff will evaluate alternate proposals.
1203	XI.M41 ML102371265, Comment XI.M41-1(c)	Will this AMP be applicable for those plants that have received an extended license?	No changes to the GALL Report have been made in response to this question.	The scope of the responses contained in this document is limited to the technical content of the AMP to which the comment pertains. This comment requests a determination of how this AMP or the GALL Report as a whole will be applied. Such a response is beyond the scope of NUREG-1950.
1204	XI.M41 ML102371265, Comment XI.M41-1(d)	Brian Holian confirmed during this meeting this AMP will this be applicable to plants presently under review. Can the NRC take any enforcement action if a licensee fails to meet the guidance of this NUREG?	The staff agrees with this comment. However, no changes to the GALL Report have been made.	The scope of the responses contained in this document is limited to the technical content of the AMP to which the comment pertains. This comment requests a

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				determination of how this AMP or the GALL Report as a whole will be applied. Such a response is beyond the scope of NUREG-1950.
1205	XI.M41 ML102371265, Comment XI.M41-1(e)	Other sites such as Indian Point contain (3) 700# natural gas lines ranging in size from 26 to 30 inches in diameter. Are the natural gas pipes buried on the Indian Point site pipes covered by this proposed program?	No changes to the GALL Report have been made in response to this question.	This AMP covers only buried and underground piping which are in scope for license renewal. A determination of whether the natural gas pipes to which the commenter refers were within license renewal scope at a particular plant is beyond the scope of this document.
1206	XI.M41 ML102371265, Comment XI.M41-1(f)	Are there sites other than IP that have pipes containing hazardous materials not under the direct control of the licensee?	No changes to the GALL Report have been made in response to this question.	The scope of the responses contained in this document is limited to the technical content of the AMP to which the comment pertains. This comment requests information concerning plant-specific piping configurations. Such a response is beyond the scope of this document.
1152	XI.M41 ML102371265, Comment XI.M41-1(a)	This is a proposed revision to NUREG 1801 (GALL). This is a very positive step in that: 1. It covers pipes and tanks other than steel and includes all pipe and tank materials. 2. It covers tanks and pipes that may contain radioactive liquids in excess of EPA drinking	The staff agrees with this comment. However, no changes to the GALL Report have been made.	This comment is a statement of fact and there is no need for a technical basis to accept this comment.

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		water limits. 3. It covers buried portions of partially piping systems and partially buried tanks such as CST, Waste tanks, RWST's Spent Fuel Pools, fuel transfer canals, refueling cavities and containments and drywells.		
1153	XI.M41 ML102371265, Comment XI.M41-2(a)	Service Water Piping (1) Does this program apply to service water systems where the majority of the piping is buried [?]. (2) At lease two plants, in response to GL 89-13 have excluded the buried portions of the SW systems and the NRC has accepted these positions.	No changes to the GALL Report have been made in response to this question .	(1) This AMP is applicable to the external surfaces of buried and underground piping systems or buried portions thereof that are in scope for license renewal. (2) GL 89-13 and the Open-Cycle Cooling Water System AMP (XI.M20) address corrosion that occurs from the inside of piping meeting the definition of an open cycle cooling water system. This AMP primarily addresses degradation of the outside of buried or underground piping or tanks. Depending on plant configuration, issues related to GL 89-13 and the Open-Cycle Cooling Water System AMP may or may not be related to issues affecting this AMP.
1207	XI.M41 ML102371265, Comment XI.M41-2(b)	XI.M20 only requires inspection of "lined or coated" SW pipes. (See Seabrook LRA) Will this AMP supersede M20?	No changes to the GALL Report have been made in response to this	AMP XI.M20 addresses corrosion and other issues occurring on the inside of piping which may or may not be buried or underground. This

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			question.	AMP addresses degradation occurring primarily from the external surfaces of buried or underground piping or tanks. The areas of applicability of AMP XI.M20 and this AMP are essentially mutually exclusive. This AMP does not replace XI.M20.
1208	XI.M41 ML102371265, Comment XI.M41-2(c)	Review of responses and many LRAs, there are no requirements for internal and/or external inspections of the SW piping systems and branch lines. Which AMP assures the integrity of the SW systems in all nuclear plants?	, No changes to the GALL Report have been made in response to this question.	This AMP primarily addresses degradation occurring from the external surfaces of buried or underground piping or tanks. Service water piping will generally meet the definition of open cycle cooling water. It is addressed by GL 89-13 and under AMP XI.M20, “Open-Cycle Cooling Water System.” The external surfaces of buried or underground service water piping system are the subject of this AMP. To the extent that service water lines at a given plant are within the scope of license renewal, and screened in for aging management, the external surfaces of piping in that system are covered by AMP M41.
1209	XI.M41 ML102371265, Comment	What are the specific requirements for the inspections of buried SW systems that have experienced numerous internal corrosion failures and in some cases, required the	No changes to the GALL Report have been made in response to this	The scope of the responses contained in this document is limited to the technical content of the AMP to which the comment

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	XI.M41-2(d)	replacement of the majority of service water piping [?]	question.	pertains. This comment requests plant-specific information concerning inspection requirements.
1231	XI.M41 ML102371265, Comment XI.M41-3(a)	Why only external surfaces only? Many pipes have failed due to internal mechanisms, From my years at Millstone, Indian Point and Maine Yankee, Connecticut Yankee and recent tritium leaks at Vermont Yankee I recall numerous internal failures of piping systems within the scope of 10 CFR 54.4. or containing HAZMAT as defined within.	The staff disagrees with this comment. The GALL Report has not been changed.	The staff is also aware of failure of piping at several plants that were the result of loss of material from the internal surfaces of pipes which may or may not be in scope for license renewal. Furthermore, the program description of AMP XI.M41 identifies other AMPs that could be used to manage internal surfaces of buried piping.
1210	XI.M41 ML102371265, Comment XI.M41-3(b)	The environment and chemistry on the external surfaces remains fairly stable however the internal surfaces are exposed to a wide range of temperature and chemistry. (i.e., service water), potentially more destructive than the external environments.	The staff agrees with the comment, however no changes have been made to the GALL Report.	The staff substantially concurs with this comment. The staff also notes that this AMP primarily addresses degradation of the external surfaces of piping which, as the commenter indicates, are more stable and less destructive. Internal surfaces of pipes are addressed by other AMPs, such as Open-Cycle Cooling Water System (XI.M20).
1211	XI.M41 ML102371265, Comment XI.M41-3(c)	MIC is one form of severe internal corrosion that has internally degraded many nuclear piping systems yet this is not being addressed in this program.	The staff disagrees with this comment. No changes to the GALL Report have been made.	This AMP primarily addressed the external surfaces of piping. The subject of MIC, as it relates to the internal surfaces of pipes, is addressed by the Open-Cycle

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Comment Number	Location in Document and Commenter Reference No.	Comment	NRC Disposition	Technical Basis
				Cooling Water System, Closed Treated Water Systems, and Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components aging management programs.
1212	XI.M41 ML102371265, Comment XI.M41-3(d)	There have been numerous reported failures of internal coatings of nuclear plant systems and internal erosion and cracking.	The staff agrees with this comment. The GALL Report has not been changed.	This AMP primarily addressed the external surfaces of piping. The subjects of coating failures, erosion, and cracking, as they relate to the internal surfaces of pipes, are addressed by the Open-Cycle Cooling Water System, Closed Treated Water Systems, and Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components aging management programs.
1213	XI.M41 ML102371265, Comment XI.M41-3(e)	Why are these failure mechanisms not addressed in this proposed program?	The GALL Report has not been changed in response to this question.	Failure mechanisms which occur from the inside of piping are not covered by this program because they are addressed in other programs which specifically cover degradation mechanisms which originate on the inside of piping or tanks.
1214	XI.M41 ML102371265, Comment XI.M41-3(f)	This program must be modified to address internal corrosion which is the most common failure mechanisms	The staff disagrees with this comment. No changes to the GALL Report have	The staff believes that internal corrosion issues are adequately addressed by other AMPs and does not intend to address these

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			been made.	issues in this AMP.
1156	XI.M41 ML102371265, Comment XI.M41-4(a)	Is cathodic protection required by any NRC regulation?	No changes to the GALL Report have been made in response to this question.	Cathodic protection is not required by NRC regulations.
1215	XI.M41 ML102371265, Comment XI.M41-4(b)	Will the NRC require CP for buried pipes?	No changes to the GALL Report have been made in response to this question.	It is the staff's position that preventive actions such as the use of coatings, installation of cathodic protection, and use of appropriate backfill, are an essential part of a comprehensive program for managing the aging of the external surfaces of buried and underground piping and tanks. If, during the aging management review process, an applicant determines that in-scope buried piping and tanks do not conform to the preventive actions described, the staff would expect that the applicant would either commit to take action to establish such preventive actions prior to the period of extended operation or take an exception to the AMP and provide a thorough technical justification for the exception.
1216	XI.M41	How does the NRC plan to verify that present	No changes to the	Backfill quality will be determined

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	ML102371265, Comment XI.M41-4(c)	backfill meets the requirements of this proposed AMP? See RCA report for Indian Point pipe failure of February 2009 where the cause was attributed to backfill.	GALL Report have been made in response to this question.	by applicants through records or investigations and reported to the NRC. The staff is aware of issues associated with deteriorated coating attributed to backfill at Indian Point.
1159	XI.M41 ML102371265, Comment XI.M41-5(a)	Term not defined. Does this mean the pipes will only be inspected after failure?	The staff disagrees with this comment. No changes to the GALL Report have been made.	The term “opportunistic inspection” is functionally defined in paragraph 4.a.i, “All buried and underground piping and tanks, regardless of their material of construction are inspected by visual means whenever they become accessible for any reason.” This functional definition is <u>not</u> tied to just leaks or failures. Opportunistic inspections are conducted whenever a pipe or tank is uncovered for an activity such as maintenance on that pipe or any adjacent buried structure or component.
1217	XI.M41 ML102371265, Comment XI.M41-5(b)	Are there other "Opportunistic" opportunities other than actual pipe failures or leaks?	The GALL Report has not been changed in response to this question.	In answer to this question, the term “opportunistic inspection” is functionally defined in paragraph 4.a.i; “All buried and underground piping and tanks, regardless of their material of construction are inspected by visual means whenever they become accessible for any reason.” This functional definition is not tied to leaks.

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				Opportunistic inspections are conducted whenever a pipe or tank is uncovered for an activity such as maintenance on that pipe or any adjacent buried structure or component.
1218	XI.M41 ML102371265, Comment XI.M41-5(c)	This provides the appearance to mislead the public.	The staff disagrees with this comment. No changes to the GALL Report have been made.	The staff believes opportunistic excavations as defined by this AMP will provide an effective approach. “Opportunistic inspection” is functionally defined in paragraph 4.a.i; “All buried and underground piping and tanks, regardless of their material of construction are inspected by visual means whenever they become accessible for any reason.” This functional definition is not tied to leaks. Opportunistic inspections are conducted whenever a pipe or tank is uncovered for an activity such as maintenance on that pipe or any adjacent buried structure or component.
1161	XI.M41 ML102371265, Comment XI.M41-6(a)	Do any of these programs assure the actual integrity of the pipes and tanks?	The GALL Report has not been changed . in response to this question	The staff believes that each GALL AMP provides a reasonable assurance that the intended function of the system, structure, or component will be maintained during the period of extended

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				operation.
1219	XI.M41 ML102371265, Comment XI.M41-6(b)	If M41 replaces M20, please clearly state this.	The staff disagrees with this comment. No changes to the GALL Report have been made.	AMP XI.M41 does NOT replace AMP XI.M20 “Open-Cycle Cooling Water System.”
1220	XI.M41 ML102371265, Comment XI.M41-6(c)	These programs appear to be intended to reduce corrosion rather than detect degradation.	The staff disagrees with this comment. No changes to the GALL Report have been made.	This AMP contains both preventive actions and an inspection program. Both are considered important aspects of maintaining the intended functions of buried or underground piping or tanks.
1221	XI.M41 ML102371265, Comment XI.M41-7(a)	It is assumed that the definition will include pipes and tanks that are not completely buried, For example some piping systems are above ground however the buried pipes will be inspected.	The staff disagrees with this comment. The GALL Report has not been changed.	The buried portion of an in-scope run of piping which is buried in some locations and above ground in other locations is covered by this AMP. The external surfaces of the above ground sections of pipe are covered by the External Surfaces Monitoring of Mechanical Components AMP.
1163	XI.M41 ML102371265, Comment XI.M41-7(b)	It is assumed the same will apply to partially buried tanks, including the CST, RWST, Waste Tanks, SFP, Drywell and containments which are tanks partially buried, within the scope of 10 CFR 54.4, and contain levels of activity in excess of EPA drinking water limits.	The staff disagrees with this comment. The GALL Report has not been changed.	The buried portion of an in-scope run of piping which is buried in some locations and above ground in other locations is covered by this AMP. The external surfaces of the above ground sections of pipe are covered by the External Surfaces Monitoring of Mechanical

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Comment Number	Location in Document and Commenter Reference No.	Comment	NRC Disposition	Technical Basis
				Components AMP.
1222	XI.M41 ML102371265, Comment XI.M41-8(a)	Many tanks such as CST and the RWST are in contact with sand, concrete, or soil but are only partially buried. It is not clear if these tanks are within the scope of this proposed program.	The staff agrees with this comment and associated changes to the GALL Report have been made.	The definition for buried and underground in Chapter IX have been clarified to include partially buried tanks and piping.
1164	XI.M41 ML102371265, Comment XI.M41-8(b)	Many internal failures of tanks have been reported over the past 30 years. How would these failures be detected by this proposed program? (VY CST and the CY RWST have experienced internal failures)	The staff agrees with this comment. However, no changes to the GALL Report have been made.	This program primarily addresses degradation of tanks occurring from the outside of tanks. Degradation of the internal surfaces of tanks is addressed by other AMPs.
1223	XI.M41 ML102371265, Comment XI.M41-8(c)	The spent fuel pool and the contaminants are "tanks" meeting the requirements of the above definition in that it is encased in concrete and/or soil and at many reactors, is below the surface of the ground. The same is true for the Spent Fuel Pool.	The staff disagrees with this comment. No changes to the GALL Report have been made.	The Spent Fuel Pool (concrete and liner) is considered a structure and is covered by the structures monitoring program and not XI.M41.
1165	XI.M41 ML102371265, Comment XI.M41-9(a)	How does the NRC expect the licensee to inspect "bolting" of valves and flanges of buried pipes without any periodic external visual inspections? A logical conclusion is that it is likely that external bolting of buried pipes will never be inspected during the entire 60 years of plant operation.	The staff disagrees with this comment. The GALL Report has not been changed.	While bolting is covered by this program, there is little operating experience to indicate that its inspection is of high priority. The staff believes that some inspections of bolting are likely to occur and that these will be sufficient to detect whether bolting degradation is an issue at a particular plant.
1229	XI.M41	How is piping integrity assured in the event of	No changes to the	This comment only addresses fire

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	ML102371265, Comment XI.M41-9(b)	a common mode event such as a earthquake?	GALL Report have been made in response to this question.	mains. The integrity of fire mains is not assumed in the event of an earthquake. Fire mains are generally not seismically qualified piping. Section 3.2.1 paragraph f.vi of RG 1.189 addresses means by which fire fighting capability is assured following an earthquake. This section of the RG contains provisions that, in certain areas of the plant, two standpipes and hose connections whose piping has been seismically analyzed be provided. Additionally, this section states that water for these standpipes and hose connections is provided through a cross connect to seismically analyzed service water piping. As a result, it is not necessary for this AMP to contain provisions designed specifically to address the integrity of fire mains following an earthquake.
1166	XI.M41 ML102371265, Comment XI.M41-10	My concern is the structural integrity of these pipes. Please explain how any flow test verifies the integrity of these pipes?	The staff agrees with this comment. However, no changes to the GALL Report have been made.	Flow tests are limited to fire mains. These mains are installed in accordance with NFPA standard 24. This standard permits some leakage from new fire main systems. Flow tests are conducted with sufficient frequency so that

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				sufficient degradation to render a fire main unable to deliver water at the required volume and pressure will not occur between two consecutive tests. Additionally, pressure is maintained in a fire main system through the use of jockey pumps. The activity of these pumps is monitored by applicants for license renewal. Changes in the activity of the jockey pumps that may indicate degradation of fire main piping is investigated.
1167	XI.M41 ML102371265, Comment XI.M41-11	How will the NRC assure that these backfill and cathodic protections measures are implemented or verified? Will the NRC require any type of physical verification?	The GALL Report has not been changed in response to this question.	Information concerning backfill and cathodic protection are obtained by the applicant and can be verified through inspections conducted by NRC regional inspectors at the time the plant enters the period of extended operation
1168	XI.M41 ML102371265, Comment XI.M41-12	Does this infer that all metallic pipes have or are required to have cathodic protection unless the following conditions are met? Will the NRC require cathodic protection be added to protect these pipes?	. The GALL Report has not been changed in response to this question.	It is the staff's position that preventive actions such as the use of coatings, installation of cathodic protection, and use of appropriate backfill, are an essential part of a comprehensive program for managing the aging of the external surfaces of buried and underground piping and tanks. If, during the aging management review process, an applicant

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				determines that in-scope buried piping and tanks do not conform to the prevent actions described, the staff would expect that the applicant would either commit to take action to establish such preventive actions prior to the period of extended operation or take an exception to the AMP and provide a thorough technical justification for the exception.
1169	XI.M41 ML102371265, Comment XI.M41-13	Are the presently operating plants in compliance with this standard? If not will they be required to backfit or verified to meet these requirements? See IP-2 RCA for CST line failure of February 2009.	The staff disagrees with this comment. The GALL Report has not been changed.	The scope of the responses contained in this document is limited to the technical content of the AMP to which the comment pertains. This comment requests a determination of how this AMP or the GALL Report as a whole will be applied. The staff is aware of this failure.
1170	XI.M41 ML102371265, Comment XI.M41-14	Are there any preventive measures for internal corrosion control such as epoxy or concrete. If the pipes are lined are there any requirements to inspect the integrity of the internal lining or coatings?	The staff disagrees with this comment. The GALL Report has not been changed.	This AMP primarily addresses degradation that occurs from the external surfaces of buried or underground piping or tanks. AMPs that address the internal surfaces of piping or tanks may contain preventive measures, such as internal lining or coatings.
1171	XI.M41	Other materials such as monel, bronze, etc.	The staff disagrees	Paragraph 1 of the Program

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	ML102371265, Comment XI.M41-15	are commonly used in nuclear plants. Are these materials covered by this program?	with this comment. The GALL Report has not been changed.	Description states that the program “addresses piping and tanks composed of any material.” Bronze is generally a copper tin alloy and is classified as copper. Monel is a nickel copper alloy. It may be classified as a copper alloy or may be addressed separately by the applicant.
1172	XI.M41 ML102371265, Comment XI.M41-16(a)	What if they never become accessible for any reason? Is this OK? [Staff note: This comment refers to the opportunistic inspections section of the document and specifically to the statement “whenever they become accessible for any reason”.]	The GALL Report has not been changed in response to this question.	If opportunistic inspections do not occur, sufficient inspections must then be conducted as directed inspections as outlined in Tables 4 a-d.
1224	XI.M41 ML102371265, Comment XI.M41-16(b)	Wall thickness and integrity must be periodically verified.	The staff disagrees with this comment. The GALL Report has not been changed.	If opportunistic inspections do not occur, sufficient inspections must then be conducted as directed inspections as outlined in Tables 4 a-d. The staff’s position is that visual examinations are supplemented with surface and volumetric non-destructive tests if significant conditions are observed.
1173	XI.M41 ML102371265, Comment XI.M41-17	This is very confusing. If a service water system contains 10,000 feet of buried pipes, how many feet of pipe will be excavated and inspected? Will every branch line be inspected?	The GALL Report has not been changed in response to this question.	The answer to this comment is plant-specific. It depends on the material of the service water system (generally assumed to be steel), whether the service water

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				system is classified as hazmat or code class/safety-related, the presence of other hazmat or code class/safety-related piping and the risk associated with the service water piping. It is possible that no inspections of the service water piping would be conducted. It is also possible that 10% of the service water piping would be inspected.
1174	XI.M41 ML102371265, Comment XI.M41-18	#5. Hazmat pipe: Insert "and tanks" [Staff note: The section of the document to which this comment refers to is Table 4a, which is titled "Inspections of Buried Pipe].	The staff disagrees with this comment. The GALL Report has not been changed.	The section of the AMP to which this comment refers addresses only buried pipe.
1175	XI.M41 ML102371265, Comment XI.M41-19(a)	As I understand this technology it is an unproven method to assure the structural integrity of buried pipes.	The staff disagrees with this comment. The GALL Report has not been changed.	The staff encourages the use of guided wave ultrasonic inspection as a screening tool. It is useful in identifying areas of buried pipe that require further inspection. At the present time, guided wave may not be substituted for other inspection techniques, such as traditional UT to determine remaining pipe wall thickness.
1225	XI.M41 ML102371265, Comment XI.M41-19(b)	The word "encouraged" is meaningless is a regulatory environment and obligates a licensee to nothing.	The staff disagrees with this comment. The GALL Report has not been	The use of the word "encouraged" in this instance indicates that the staff wishes to express its approval of the use of guided wave as a

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			changed.	screening tool but does not wish to impose a requirement for an applicant to do so.
1176	XI.M41 ML102371265, Comment XI.M41-20(a)	A flow test is not able to detect either internal or external degradation of pipes.	The staff disagrees with this comment. The GALL Report has not been changed.	Flow tests are limited to fire mains. These mains are installed in accordance with NFPA standard 24. This standard permits some leakage from new fire main systems. Flow tests are conducted sufficiently frequently so that sufficient degradation to render a fire main unable to deliver water at the required volume and pressure will not occur between two consecutive tests. Additionally, pressure is maintained in a fire main system through the use of jockey pumps. The activity of these pumps is monitored by licensees. Changes in the activity of the jockey pumps that may indicate degradation of fire main piping is investigated.
1226	XI.M41 ML102371265, Comment XI.M41-20(b)	A fire main could experience severe degradation not detected by a flow test and fail as a result of an earthquake when it is most likely needed.	The staff disagrees with this comment. The GALL Report has not been changed.	Flow tests are limited to fire mains. These mains are installed in accordance with NFPA standard 24. This standard permits some leakage from new fire main systems. Flow tests are conducted sufficiently frequently so that sufficient degradation to

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				render a fire main unable to deliver water at the required volume and pressure will not occur between two consecutive tests. Additionally, pressure is maintained in a fire main system through the use of jockey pumps. The activity of these pumps is monitored by licensees. Changes in the activity of the jockey pumps that may indicate degradation of fire main piping is investigated. The integrity of fire mains is not assumed in the event of an earthquake. Fire mains are generally not seismically qualified piping. Section 3.2.1 paragraph f.vi of RG 1.189 addresses means by which fire fighting capability is assured following an earthquake. This section of the RG contains provisions that, in certain areas of the plant, two standpipes and hose connections whose piping has been seismically analyzed be provided. Additionally, this section states that water for these standpipes and hose connections is provided through a cross connect to seismically analyzed service water piping. As a result, it is not necessary for this AMP to

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				contain provisions designed specifically to address the integrity of fire mains following an earthquake.
1177	XI.M41 ML102371265, Comment XI.M41-21(a)	Subpart H of 49 CFR 196 [Staff note; Incorrect reference] for corrosion control and other applicable parts of 49 CFR 195 must be included.	The staff disagrees with this comment. The GALL Report has not been changed.	The staff notes that there are some differences in oil and hazardous materials transmission pipelines and those found in nuclear power plants. The staff referenced 49 CFR 195 subpart E, for the specific purpose of identifying the procedures used to conduct a hydrostatic test. The staff has chosen to use other references which it deems more applicable to buried and underground piping and tanks found in nuclear power plants to address other elements of aging management. The staff finds it unnecessary to reference 49 CFR 195 subpart H or any part of 49 CFR 195 other than subpart E.
1227	XI.M41 ML102371265, Comment XI.M41-21(b)	49 CFR 195 only applies to steel pipes. Will this testing apply to all pipes?	The staff disagrees with this comment. The GALL Report has not been changed.	The purpose of citing 49 CFR 195 subpart E is for the conduct of hydrostatic tests. It is unlikely that the staff would object to the use of this standard for materials other than steel.
1178	XI.M41	Need a very clear definition for "buried tanks"	The staff disagrees	GALL Report Chapter IX has a

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	ML102371265, Comment XI.M41-22		with this comment. The GALL Report has not been changed.	new definition for buried tanks and piping.
1179	XI.M41 ML102371265, Comment XI.M41-23	A comprehensive listing of pipe failures due to internal corrosion and degradation should also be provided. Provide a listing of only external corrosion failures leads to a inference that pipes do not degrade [due] to internal mechanisms.	The staff disagrees with this comment. The GALL Report has not been changed.	This AMP primarily addresses external degradation of buried or underground piping or tanks. A listing of operating experience associated with internal degradation in this AMP would be outside the scope of the AMP.
1180	XI.M41 ML102371265, Comment XI.M41-24	Is it possible to obtain a copy of these standards from the NRC?	The GALL Report has not been changed in response to this question..	NACE Standard Practice SP0169-2007 is a copyrighted document belonging to NACE International. It may not be distributed by the NRC. It is available for purchase by the general public from NACE International. The remaining standards indicated by the commenter are all copyrighted documents belonging to the respective organizations. None may be distributed by the NRC. All are available for purchase by the general public from the appropriate organization. In accordance with the availability notice for NUREG-1801, “Copies of industry codes and standards used in a substantive manner in the NRC regulatory process are maintained

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				at the NRC Library, Two White Flint North, 11545 Rockville Pike, Rockville, MD 20852-2738, for use by the public." A set of hard copy NACE standards is available for members of the public to read by appointment.
1181	XI.M41 ML102420706, Comment 1	During the August 24, 2009 meeting discussing the proposed revision to AMP M41 it was very troubling to hear the NRC state that it was not reasonable to require nuclear plants to excavate buried pipes (and tanks) due to possible damage to the pipes due to "backhoe" digging. This statement was made at least three times during the meeting. Please keep in mind that the primary mission of the NRC is to provide adequate protection to the public. Unless the NRC has documented the fact that the risk to the general public is greater due to potential pipe damage from excavation, it is totally inappropriate for the NRC to put forward these apparently unsupported statements. If these statements are supported, please provide a reference.	The staff disagrees with this comment. The GALL Report has not been changed.	While the staff stated that it is possible to damage piping during excavation, it still requires that a certain percentage of the piping be excavated for inspection. The staff notes that the Department of Transportation has published data (extract at ML102500311) regarding significant pipeline damage by cause. The data indicates that the single largest cause (25%) of the incidents was due to excavation damage. While these are non-nuclear situations, the data provides representative information.
1182	XI.M41 ML102420706, Comment 2	In the Program Description of the proposed revision to XI.M41 the intent and the objectives of the program should be clearly stated. Words such as the follow should be	The staff disagrees with this comment. The GALL Report has not been	The staff notes that 10 CFR Part 54 already states that there must be reasonable assurance that systems, structures and

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		considered in the program description. " The purpose of this program is to provide reasonable assurance that all piping and portions of tanks that are not normally accessible (buried, partially buried, or otherwise inaccessible) within the scope of 10 CFR 54.4 or contain radioactive material in excess of EPA drinking water limits, maintain the ability to perform their designated functions and to preclude the release of radioactive material to the surrounding soil and the environment."	changed.	components maintain their intended function.
1183	XI.M41 ML102420706, Comment 3	Also the Program Description clearly states that this program is to manage the aging of external surfaces augmented by other AMPs such as AMP such as XI.M.20 and XI.M.38. These AMPs do not apply to buried pipes and XI.M20 applies to lined pipes. (See Seabrook LRA). At least two plants in responses to GL 89-13 specifically exclude buried pipes and the NRC has not questioned this total lack of internal inspections.	The staff disagrees with this comment. The GALL Report has not been changed.	This program applies to the external surfaces of buried piping and tanks. There are other programs that cover the interior of buried piping and tanks.
1184	XI.M41 ML102420706, Comment 4	The NRC words "opportunistic" and "encouraged" are totally inappropriate for a document intended as a regulatory basis for the protection of the public. As a professional engineer with more than 40 years experience maintaining and designing nuclear power plants the word "opportunistic" means run the system until it fails such as the pipe rupture event at Indian Point in February 2009.	The staff disagrees with this comment. The GALL Report has not been changed.	(1) The term “opportunistic inspection” is functionally defined in paragraph 4.a.i, “All buried and underground piping and tanks, regardless of their material of construction are inspected by visual means whenever they become accessible for any reason.” This functional definition

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		Opportunistic maintenance programs have totally failed to prevent failures such as the Davis Besse degradation, collapsing piping systems, bridges, elevators, levies and I would never use such a program to assure the safety and/of reliability of my car. (I am sure Dave Pelton wouldn't either)		is not tied to leaks. Opportunistic inspections are conducted whenever a pipe or tank is uncovered for an activity such as maintenance on that pipe or any adjacent buried structure or component.
1185	XI.M41 ML102420706, Comment 5	The proposed AMP has a very strong inference that buried pipes and tanks are protected by active cathodic protection (NACE SP0169-2007 or NACE RP0285- 2002) systems and that "backfill" is in accordance with SP0169-2007. Will the NRC require licensees to verify compliance with these standards and verify that cathodic protections systems are installed on all systems within the scope of this AMP?	The staff disagrees with this comment. The GALL Report has not been changed.	(1) Cathodic protection is not required by NRC regulations. (2) It is the staff's position that preventive actions such as the use of cathodic protection is an essential part of a comprehensive program for managing the aging of the external surfaces of buried and underground piping and tanks. If, during the aging management review process, an applicant determines that in-scope buried piping and tanks do not conform to the preventive actions described, the staff would expect that the applicant would either commit to take action to establish such preventive actions prior to the period of extended operation or take an exception to the AMP and provide a thorough technical justification for the exception. (3) Backfill quality will be

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				determined by applicants through records or investigations and reported to the NRC. The staff is aware of issues associated with deteriorated coating attributed to backfill at Indian Point.
1186	XI.M41 ML102420706, Comment 6	The AMP seems to endorse 49 CFR 195 Subpart E but it appears portions of Subpart F and H could add additional assurance to protect the health and safety of the public.	The staff disagrees with this comment. The GALL Report has not been changed.	This AMP does not endorse 49 CFR 195; rather it uses it as a reference. The 10 CFR Part 54 deals with ensuring that systems, structures, and components will be able to perform their intended functions during the period or extended operation.
1187	XI.M41 ML102420706, Comment 7	The word "may" is not a appropriate for a document used for regulatory basis and should (must) be changed to either "shall" or "will." What is the justification for 25% inspection?	The staff disagrees with this comment. The GALL Report has not been changed.	The AMP is an acceptable way of managing aging of passive components and is not a requirement, so shall or will is not appropriate. The 25% is based on engineering judgment and is not statistically based.
1188	XI.M41 ML102420706, Comment 8	Finally, a large percentage of buried pipe and tank failures are the result of internal failure due to corrosion, erosion or other mechanical failures and must be addressed by this AMP without the use of words such as "opportunistic, encouraged, may, etc."	The staff disagrees with this comment. The GALL Report has not been changed.	This program applies to the external surfaces of buried piping and tanks. There are other programs that cover the interior of buried piping and tanks.
1112	XI.M41 ML102420742,	(2) Entergy Vermont Yankee’s Root Cause Report makes it clear that the failure of the underground AOG piping which recently	The staff disagrees with this comment. The GALL Report	This program applies to the external surfaces of buried piping and tanks. There are other

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	Comment XI.M41-P1 (Ray Shadis New England Coalition)	released radiological contaminated water to the open environment was not the result of external corrosion. In fact, the RCR states, the leaks were not the result of corrosion at all (internal or external) but flow-driven, mechanical (not corrosion-assisted) internal erosion – <u>pipe thinning</u>. If this is really the case, then the unidentified programs which “manage aging of internal surfaces” need more than augmentation by an improved program that is limited to <u>external</u> surfaces. If the high public interest in the leaks at Vermont Yankee provided any contributing motive for the NRC piping and tanks initiative, then the initiative, according to the Entergy VY RCR is entirely unresponsive. The VY License Renewal ASLB is now reconvened on remand from the Commission. NRC Staff has the opportunity and the obligation to bring the matter of Entergy’s piping AMP failure before the ASLB. [Root Cause Evaluation Report CR-VTY-2010-00069 says, at page 11-14, A and B Recombiner Steam Trap Drain Lines Leaks:…. The failed piping segment(s) cannot be removed for inspection due to their inaccessible location. However, the visual inspections performed, and review of the operating parameters of the steam trap drain lines result in the reasonable conclusion that the failure occurred due to mechanical erosion. Mechanical erosion is caused by accelerated	has not been changed.	programs that cover the interior of buried piping and tanks.

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		flows, droplet impingement, and two phase flow. Mechanical erosion is more likely to occur immediately downstream of changes in flow direction, such as elbows, where increased flow turbulence occurs….Mechanical erosion differs from FAC, which is a chemical induced corrosion/erosion phenomenon.		
1119	XI.M41 ML102420742, Comment XI.M41-P2 (John H Fitzgerald, III)	(2) Table 2a indicates the writers are unfamiliar with the corrosion of buried stainless steel (SS) facilities. While Stainless Steel (SS) may perform well in loose or fairly well aerated soils, it will corrode like carbon steel in tight or mucky soils. This is because in the absence of oxygen, the protective oxide film will not form on SS. I have encountered this in various places. The writers compound the matter by coating the structures (footnote 3) and then omitting cathodic protection (CP) - more on this late). Left bare, the SS will usually undergo general corrosion over the entire surface, usually leading to eventual failure. When coated, but without CP, pitting corrosion occurs at breaks (holidays) in the coating. This leads to fairly rapid corrosion and failure. The DOT regulations for gas and flammable liquid pipelines, and the EPA regulations for buried storage tanks, prohibit the use of coating without CP. Nothing less should be accepted for nuclear plants.	The staff disagrees with this comment. The GALL Report has not been changed.	In most cases, stainless steel and aluminum will not suffer severe corrosion in soils unless there are elevated levels of chlorides or if the pH is very low or very high. The need for coating and cathodic protection of stainless steel and aluminum will be determined on a case by case basis.

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		Table 2a also includes aluminum. Aluminum is a very poor material for buried use, and we see practically no use of it for that purpose today. Aluminum is a highly active metal and is anodic to just about any other metal to which it might be connected. CP can be used on aluminum, but great care must be taken. CP causes a rise in pH in the soil around the protected structure, and with a little too much CP, the pH can rise above 8.0, and [in] that range aluminum will corrode rapidly even under CP.		
1123	XI.M41 ML102420742, Comment XI.M41-PW1 (John H Fitzgerald, III)	5) Foot note 4a states that CP need not be provided in soils of resistivity greater than 20,000 ohm cm. This thinking dates back to the 1950s at which time it was believed that in soils of resistivity greater than 10,000 ohm cm corrosion failures were infrequent enough that it was less expensive to fix leaks than to protect the pipelines. That thinking was soon put to rest and by 1960, it was standard practice to provide coating and CP for steel pipelines. Footnote 4a also applies to carbon steel, and now is 60 years out of date.	The staff agrees with this comment and associated changes to the GALL Report have been made.	Although it is common practice to coat all steel piping and cathodic protect the coated steel piping in oil and gas pipelines, it is not the same for piping used in nuclear power plants. However, note 4a has been deleted from the GALL Report.
1125	XI.M41 ML102420742, Comment XI.M41-PW3 (John H	Comment 13a – Footnote 5 implies that selected backfill is adequate corrosion control for buried facilities. It is not. Even if the backfill is completely uniform it soon assumes the corrosiveness of the surrounding soil. Also, one has little control over some future	The staff disagrees with this comment. The GALL Report has not been changed.	Using select backfill free of foreign particles such as rocks and sticks will cause less damage to coated piping and will reduce the possibility of future corrosion of the

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	Fitzgerald, III)	excavation that may disturb the backfill in one area and replace it with a different backfill; this creates a lack of backfill uniformity, a situation that leads to corrosion.		piping.
1128	XI.M41 ML102420742, Comment XI.M41-PW4 (John H Fitzgerald, III)	It is curious that in various places, the document calls for backfill for non-metallic facilities to be consistent with certain sections of NACE SP0169. This document deals specifically with metallic structures- see the second reference on page 15. Similar references are made to SP0285; this document deals with CP for underground tanks and CP is not applicable to non-metallic facilities. Some nonmetallic facilities, particularly fiberglass tanks require pea gravel for backfill, so some consideration must be given to backfill.	The staff partially agrees with this comment and the document was reworded for clarity.	The document has been reworded to state that some non-metallic facilities such as fiberglass may require pea gravel for backfill.
1126	XI.M41 ML102420742, Comment XI.M41-PW5 (John H Fitzgerald, III)	Apply throughout document: (1) “To be considered hazmat, the concentration of radioisotopes within the pipe during normal operation must exceed established standards such as EPA drinking water standard” makes no sense. The definition is a snapshot of what is in the component at a particular time – it does not account for lower concentrations that leak and over time can be significant. It wrongly ignores the cumulative effect of leakage.	The staff disagrees with this comment. The GALL Report has not been changed.	The staff is using the EPA definition for hazmat and is recommending the inspection percentage for hazmat piping as it stands.
1129	XI.M41 ML102420742,	(2) “In the absence of such standards, the concentration of radioisotope must exceed the	The staff disagrees with this comment.	The purpose of this AMP is to manage the effects of aging for the

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	Comment XI.M41-PW5(2) (John H Fitzgerald, III)	greater of background or reliable level of detection." Games are typically played with so called background – such as using the national average - not based on a site specific and site pre-operational determined number. As for "reliable level of detection" Liquid Release Task Force Recommendations Implementation Status as of November 19, 20073 stated at 2 that, "The Staff is revising RG 1.21 to incorporate the LLFT recommendation that "The NRC should revise radioactive effluent release program guidance to upgrade the capability and scope of in-plant monitoring system, to include additional monitoring locations and the capability to detect lower radionuclides (i.e., low energy gamma, weak beta emitters, and alpha particle." [Emphasis added] (3) How are "normal" and "abnormal" defined? (4) It would make sense to sort the components within scope that fall under this program into those that do/could contain radioactive liquids from those that do/could not.	The GALL Report has not been changed.	external surfaces of buried and underground piping and tanks. It is not intended to be a groundwater monitoring program, which is addressed by other programs outside of the GALL Report.
1143	XI.M41 ML102420742, Comment XI.M41-PW6 (John H Fitzgerald, III)	Comment John Fitzgerald: Selection of locations to inspect appear to depend on a subjective assessment of likely corrosive conditions. I should think the nuclear industry would like to up be to date on how to find the best places to excavate for external inspection on buried pipe. This procedure, known as	The staff disagrees with this comment. The GALL Report has not been changed.	While the industry is working on developing external corrosion direct assessment techniques, the techniques are not developed sufficiently to be included in this edition of the GALL Report.

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		External Corrosion Direct Assessment (ECDA) and also Internal Corrosion Direct Assessment (ICDA) is practiced in the pipeline industry under the DOT rules for pipeline integrity. These assessments are based on detailed assessments of conditions, electrical and other measurements to locate corroding areas, and the excavations are based on these data. Experience has shown these procedures to be very accurate. To date, these practices have been used only on transmission lines, but similar rules are now coming out for distribution piping. Distribution piping has many resemblances to the piping in generating stations.		
1146	XI.M41 ML102420742, Comment XI.M41-PW7 (John H Fitzgerald, III)	Comment John Fitzgerald: I have not studied the XI.M41 document in detail … My review so far indicates to me that this document needs a lot of work to make it consistent with current corrosion control technology.	The staff disagrees with this comment. The GALL Report has not been changed.	This is a new AMP and the NRC staff believes that in subsequent revisions to the GALL Report this AMP will be refined.
1154	XI.M41 ML102420732, Comment XI.M41-3 (sup)	A frequency of every six months is excessive for determining the capability of the system to provide proper pressure and flows. This flow test along with additional NFPA and XI.M27 testing and continuous system pressure monitoring using jockey fire pump operation would detect a significant loss of pressure boundary without flow testing at the specified frequency. Recommend revising 6 month flow testing frequency to a maximum of once every	The staff partially agrees with the comment, and some changes have been made to the GALL Report.	In light of recent operating experience with buried piping, the interval for inspection must be frequent enough to avoid loss of performance prior to the next inspection. The performance is trended using the jockey pumps. Changes in inspection intervals will be considered depending on the trending. The performance of fire

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		two years which significantly exceeds existing NFPA requirements. In addition, a change should be made to the Program description to eliminate need for these additional notes.		main flow testing was changed from once every 6 months, to once per year.
1085	XI.M41 ML102420732, Comment XI.M41-23 (sup)	Element 4 item d.iv. and item e.iv. – If the tank is volumetrically inspected internally, the required number of inspection locations of the tank surface area should be in accordance with API standard 1631 which specifies an exam where the internal tank cylinder wall shall be initially divided in 3 foot square (9 ft^2) sections. Tank ends (heads) shall be divided into four equal quadrants and each quadrant then divided into 3 foot square (9 ft^2) sections. Any remaining areas less than 3 ft by 3 ft in size shall be considered to be additional sections. Any sections with thickness readings of 75% or less of the original metal thickness shall be subdivided into 9 subsections and require additional gauging at the center of each subsection.	The staff disagrees with this comment. The GALL Report has not been changed.	These tanks are not regulated by the American Petroleum Institute. This standard will be considered for future revisions to this document.
1087	XI.M41 ML102420732, Comment XI.M41-28 (sup)	Element 1, Scope of Program - For some plants, buried pipe is encased in concrete or backfilled in controlled low strength material (CLSM)/flowable fill (a flowable, self-leveling and self-compacting cementitious material used in place of traditional compacted fill) with trade name such as Fillcrete. CLSM has been found to be beneficial in reducing corrosion (compared to typical compacted fill) when pipes are completely embedded in CLSM.	The staff partially agrees with this comment. The GALL Report has been changed.	The staff has created specific inspection criteria and guidelines for prioritization of piping fully encased in controlled low strength material. These guidelines may be found in paragraphs 4.b.iii and footnote 10 to table 4a. The staff concurs with the

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		The reduced permeability of CLSM can reduce the ingress of chlorides, and the microstructure of CLSM can improve corrosion resistance through changes in the pH and resistivity of the pore solution. CLSM provides more protection against corrosion initiation and propagation when metallic structures are completely embedded in CLSM compared to compacted sand. The above results included in a study presented in *Development of a Recommended Practice for Use of Controlled Low-Strength Material in Highway Construction.* Report 597 (2008), indicated that corrosion activity for steel pipe coupons completely embedded in CLSM was significantly lower (i.e. negligible) than that embedded in sand. This study can be found at http://onlinepubs.trb.org/onlinepubs/nchrp/nchrp_rpt_597.pdf. NUREG-1801 line items VII.J.AP-3 and 19 show no aging effects for carbon or stainless steel exposed to concrete. These factors present a strong argument for insignificant corrosion susceptibility and lack of need for excavation. Add that piping encased in concrete or CLSM (flowable fill) is not in scope of the program.		commenter that the corrosion rate of steel piping encased in controlled low strength material is substantially less than that expected for direct buried piping. As a result the staff has reduced the priority of this type of piping in determining which pipe should be selected for inspection and has reduced the number of inspections recommended for this type of pipe. The staff does not concur with the commenter that the probability of corrosion of this type of pipe is sufficiently low so to not require aging management. Steel rebar and other steel components encased in concrete experience significant corrosion rates when the concrete is exposed to moisture containing moderate concentrations of chlorides and sulfates. It was not the staff's intent that NUREG-1801 item VII.J.AP-3 (steel pipe in an environment of concrete) be used for moist or buried concrete. It was the staff's intent that this item be used for piping encased in concrete within buildings where the concrete was dry.

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1092	XI.M41 ML102180192, Comment 1	**Discussion:** A graded approach to aging management of buried piping is proposed that considers the following: – 100% inspection of high risk piping (where risk is determined by methods consistent with NEI 09-14) within the scope of license renewal by direct or indirect inspection methods and – Direct aging management inspections based on material-environment High risk piping inspections will be augmented as appropriate with non-high risk piping based on direct inspections of each material type and maintaining a minimum number of direct inspections during each 10 year interval. Prior to entry into the period of extended operation, at least one direct inspection of each material type will be performed. During each 10 year inspection interval a minimum of two direct inspections will be performed. Adverse indications observed during indirect inspections will be investigated by the corrective action process. The corrective action process will evaluate sample expansions based on adverse condition such as through wall leakage or wall thickness less than minimum.	The staff disagrees with this comment. The GALL Report has not been changed.	While the industry is working on developing NEI 09-04, the techniques are not developed sufficiently to be included in this revision of the GALL Report.

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1095	XI.M41 ML102180192, Comment 2	**Scope of Inspection** – 100% of the high risk buried piping (where risk is determined by methods consistent with NEI 09-14) within the scope of license renewal will be inspected by direct or indirect inspection methods. – Prior to entry into the period of extended operation, direct inspections will be performed on at least one of each buried pipe material at the site (aluminum, copper, steel, stainless steel, polymer, and cementitious). – During each 10 year inspection interval, a minimum of two direct inspections (high risk and/or non-high risk piping) per site will be performed during each 10 year inspection period. Excavation locations for non-high risk piping will be based on degradation susceptibility considerations (e.g., prior inspection results, cathodic protection, coatings, and soil conditions). – Underground piping is managed by the external surfaces monitoring of mechanical components program (Chapter XI. M36).	The staff disagrees with this comment. The GALL Report has not been changed.	While the industry is working on developing external corrosion direct assessment techniques, the techniques are not developed sufficiently to be included in this revision of the GALL Report. As has been stated before, underground piping will continue to be included in this program.
1097	XI.M41 ML102180192, Comment 3	**Preventive Measures** – Cathodic protection, coatings, and backfill are preventive measures and should be addressed in program Element 2. An annual NACE survey will be performed for systems within the scope of license renewal that are	The staff disagrees with this comment. The GALL Report has not been changed.	This is already addressed in Element 2.

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		cathodically protected.		
1099	XI.M41 ML102180192, Comment 4	**Detection of Aging Effects** – Direct or indirect inspection methods can be used for high risk piping – All buried piping is opportunistically inspected by visual means whenever it becomes accessible.	The staff disagrees with this comment. The GALL Report has not been changed.	This is already addressed in Element 3.
1101	XI.M41 ML102180192, Comment 5	**Monitoring and Trending** – Directed inspections will be conducted during each 10 year period beginning 10 years prior to the entry into the period of extended operation. – Direct inspections are not required in the last 10 year period (year 50 to 60) if no there has been no minimum wall failures in the prior 10 year inspection interval.	The staff disagrees with this comment. The GALL Report has not been changed.	The period of extended operation is 20 years, and it is anticipated that many applicants will apply for an additional period of extended operation. In this case, an additional inspection will be required during the last 10 years of the first period of extended operation.
1230	XI.M41 ML102500311	In response to Mr Blanch's concern over data supporting that excavation is more significant than external corrosion, I would suggest you consider the DOT statistics provided at: http://primis.phmsa.dot.gov/comm/reports/safety/SigPSIDet_1990_2009_US.html?nocache=1072#_all. Excavation damage exceeds corrosion damage (both internal & external combined) on average in all pipeline markets. Interestingly enough, 1st party damage (i.e., the owner digging	The staff acknowledges receipt of this comment. The GALL Report has not been changed.	This comment provides additional data but did not result in a change the GALL Report.

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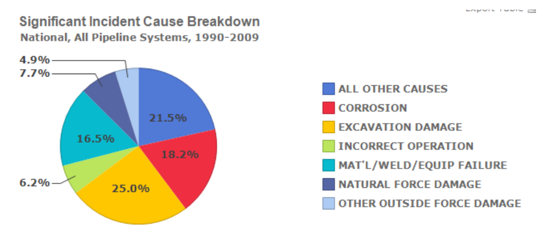
		their own line) is a greater percentage than almost all causes other than corrosion or miscellaneous. 		
150	XI.M6 ML101830328 Comment XI.M6-1	Remove extra wording in Scope. There is no (b) option in the new wording.	The staff agrees with this comment and associated changes to the GALL Report have been made.	No technical basis is required to incorporate this change (typographical error) as it is editorial in nature.
151	XI.M6 ML101830328 Comment XI.M6-2	Typo – Element 4 change blend to bend and program description change corrosion to corrosion	The staff agrees with this comment and associated changes to the GALL Report have been made.	No technical basis is required to incorporate this change (typographical error) as it is editorial in nature.
152	XI.M6 ML101830328 Comment XI.M6-3	Add “reviewed and accepted by the NRC in a safety evaluation report” after later revisions to match earlier changes to allow the use of later revisions.	The staff disagrees with this comment. The GALL Report has not been changed.	The staff has developed an option that addresses later revisions approved for use on a generic basis (via ISG, RG, topical report review incorporation into 10 CFR) and use of exceptions for plant-specific precedents that will provide a high degree of confidence so that follow-on applications can take advantage of

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				that precedent. Added as a preamble to GALL Report Chapter XI.
377	XI.M6 ML101830255 Comment XI.M6-1	This program is not generically applicable to the domestic BWR fleet and should be removed from the GALL Report. In regards to thermal fatigue of the CRD return line nozzle, BWRVIP-74-A states: “The CRD return line nozzles in nearly all domestic plants which had them were capped, thus eliminating the concern for those components.” If not all, the large majority of domestic BWR/3-6s have eliminated flow through their CRD return line nozzles by capping the nozzle, installation of a blind flange, or other method. NRC staff can verify this information for many BWRs through review of license renewal applications. For the BWR/2 units (i.e. Nine Mile Point Unit 1 and Oyster Creek Generating Station), the CRD return line nozzle has not been capped. NMP Unit 1 credited the ISI program in lieu of XI.M6 because the CRD return line nozzle thermal sleeve design at NMP Unit 1 makes the nozzle less susceptible to thermal fatigue cracking than the original designs used in other BWRs. Only Oyster Creek Generating Station has not capped the CRD return line nozzle and also credited XI.M6 in a license renewal application. However, the Oyster	The staff disagrees with this comment. The GALL Report has not been changed.	The staff will retain AMP XI.M6 (BWR CRDRL Nozzle) to make it available to any applicant where it is applicable as the entire BWR fleet has not implemented plant modifications to eliminate concerns about these components.

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		Creek Generating Station LRA indicates that exception is taken to the PT examination requirements of NUREG-0619, with UT examination used instead. Based on the above, cracking due to thermal fatigue cycling of the CRD return line nozzle is no longer a generic issue requiring aging management by the BWR fleet. Further, XI.M6 is not generally applicable to the domestic BWR fleet and should be removed from NUREG-1801 so that applicants need not address this program in license renewal submittals. SCC of nickel-alloy welds associated with CRD return line remains an aging management concern. However, SCC can be managed through program XI.M7, “BWR Stress Corrosion Cracking.” Table TBD [editorial comment, as shown in ML1018302551 submitted by, EPRI on 6/29/2010, Table TBD is Table A-3: Comments on Section XI.M6 of May 2010 Draft NUREG-1801: “Control Rod Drive Return Line Nozzle”] below provides EPRI BWRVIP comments regarding XI.M7, “BWR Stress Corrosion Cracking” program description.		
153	XI.M7 ML101830328 Comment	It seems odd that the ASME Code isn’t referred to when discussing the inspections to be performed in elements 1, 3, or 4. Then suddenly, the results are trended per the	The staff disagrees with this comment. The GALL Report has not been	The ASME Code does not address scope of aging management, parameters monitored, or detection of aging effects. GL88-01 and

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	XI.M7-1	Code in element 5, have acceptance criteria per the code in element 6, and corrective action per the code in element 7. Shouldn't the inspections required by the code be mentioned earlier on? (Mark-up not provided)	changed as a direct result of this comment.	NUREG-0313 address these. However, Elements 5, 6, 7 were revised to better describe that ASME code is for piping only, the management of other components follows the appropriate BWRVIP.
154	XI.M7 ML101830328 Comment XI.M7-2	Again, the PREVENTIVE ACTIONS section should be consistent with other condition monitoring AMPs. (See comment on AMP XI.M4.)	The staff agrees with this comment and associated changes to the GALL Report have been made.	Element 2 was revised to make it consistent with other GALL AMPs.
378	XI.M7 ML101830255 Comment XI.M7-1	The preventive actions section discussion for water chemistry should simply refer to program XI.M2. Applicable Sections: Preventive Actions Specific reference to a version of the EPRI BWR Water Chemistry Guidelines and discussion regarding control parameter tables should be limited to XI.M2 and not be repeated in XI.M7.	The staff agrees with this comment and associated changes to the GALL Report have been made.	Change to read: "The BWR Vessel ID Attachment Welds Program is a condition monitoring program and has no preventive actions. Maintaining high water purity reduces susceptibility to SCC or IGSCC. Reactor coolant water chemistry is monitored and maintained in accordance with the Water Chemistry Program. The program description, evaluation, and technical basis of water chemistry are presented in Section XI.M2, "Water Chemistry." Makes it consistent with XI.M4.
379	XI.M7 ML101830255 Comment XI.M7-2	All references to the NRC approved version of BWRVIP reports should be "-A." For example, "BWRVIP-75-A," rather than "BWRVIP-75A." This occurs not only throughout the body of	The staff agrees with this comment and associated changes to the GALL Report	Conforms with BWRVIP numbering practice.

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		the program text, but also for BWRVIP reports cited in the references section.	have been made.	
380	XI.M8 ML101830255 Comment XI.M8-1	The program scope should be revised to include the CRD housing and incore-monitoring housing (ICMH) penetrations. These components are addressed by BWRVIP-47-A*. Also; NUREG-1801 item IV.A1.RP-370 should be revised to show the aging management program to be XI.M8, “BWR Penetrations” and XI.M2, “Water Chemistry.” The staff should also clarify the components addressed by this line item. Reference to the component locations should be to incore monitoring housings (ICMH) and CRD stub tubes, which are BWR vessel penetrations. Finally, It is unclear what the staff “intends by jet pump nozzles.” It is assumed that the staff is referring to jet pump instrument line penetrations and not the jet pump recirculation line nozzles which are full penetration welded nozzles. The inspection approach and conclusions for the CRD housing penetrations and ICMH penetrations mirror those for instrument penetrations addressed in BWRVIP-49-A. These are ASME Class 1 pressure-retaining components. XI.M8 addresses pressure vessel	The staff agrees with this comment and associated changes to the GALL Report have been made.	Incore monitoring housings and CRD stub tubes are addressed in BWRVIP-47-A and should be included in the scope of this AMP. GALL Report, Rev. 1 predecessor (IV.A1-5(R-69)) was correct and addressed “jet pump instrument” penetrations. This was inadvertently dropped when the GALL Report, Rev. 2 AMR item was created.

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		penetrations. XI.M8 acknowledges that BWRVIP guidance (e.g., BWRV1P-49-A and BWRVIP-74-A) conclude that penetration locations do not require augmentation of the ASME Section XI inspection requirements. Additionally, these pressure boundary components are not, and should not be, managed by the XI.M9 BWR Reactor Internals" program. Supporting References: BWRVIP-74-A BWRVIP-47-A* BWRVIP-49-A EPRI 1018111 * Note: BWRVIP-47-A also addresses non-pressure retaining locations.		
381	XI.M8 ML101830255 Comment XI.M8-2	The discussion related to ASME Section XI examination categories in the detection of aging effects section could be misinterpreted and should be simplified to eliminate reference to the specific categories (e.g., B-D, B-F, B-P). This content is somewhat confusing for a program focused on BWR penetrations since categories B-D, B-F, and B-J are not applicable to the components crediting this program. It is suggested that this superfluous content be removed.	The staff agrees with this comment and associated changes to the GALL Report have been made.	Categories B-D, B-F, and B-J are not applicable to the components crediting this program. Removed reference to these categories, instead revised to state, "These Examination Categories include volumetric examination methods (ultrasonic testing or radiography testing), surface examination methods (liquid penetrant testing or magnetic particle testing for ferritic components), and VT-2 visual examination methods.

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Comment Number	Location in Document and Commenter Reference No.	Comment	NRC Disposition	Technical Basis
382	XI.M8 ML101830255 Comment XI.M8-3	The corrective actions section should not reference BWRVIP repair design criteria. Although BWRVIP repair design criteria provide criteria for repairs, aging management strategies for repairs are provided by the repair designer, not the BWRVIP. For pressure retaining components, repairs must meet the requirements of the ASME B&PVC. Also see general comments contained in the main body of the comment letter transmitting these comments.	The staff disagrees with this comment. The GALL Report has not been changed.	Disagree with eliminating BWRVIP; however, AMP was revised for clarity to state that repairs in accordance with ASME Code are acceptable.
383	XI.M8 ML101830255 Comment XI.M8-4	All references to the NRC approved version of BWRVIP reports should be "-A." For example, "BWRVIP-49-A," rather than "BWRVIP-49A." This occurs not only throughout the body of the program text, but also for BWRVIP reports cited in the references section.	The staff agrees with this comment and associated changes to the GALL Report have been made.	Conform with BWRVIP numbering practices.
155	XI.M9 ML101830328 Comment XI.M9-1	General Comment on Program - The BWR Vessel Internals Program, as defined in Rev. 1 of GALL, described the BWRVIP including inspection and flaw evaluation of vessel internals components in conformance with the guidelines of applicable and staff-approved boiling water reactor vessel and internals project (BWRVIP) documents. The staff proposed changes to this program for GALL, Rev.2, add component aging management guidelines that are outside the guidance of the BWRVIP. Specifically, the changes proposed by the	The staff disagrees with this comment. The GALL Report has not been changed.	The staff agrees that the changes to the AMP are outside the guidance of the BWRVIP, but believes that they are necessary for BWR internals. The BWRVIP-234 will be integrated via ISG following its approval. When industry provides guidance on management of neutron embrittlement of X-750, the staff will review for appropriateness of

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Comment Number	Location in Document and Commenter Reference No.	Comment	NRC Disposition	Technical Basis
		staff add aging management guidelines for two MEAP combinations; (1) the guidance for CASS internals components exposed to reactor coolant and neutron flux formerly addressed in GALL, Rev. 1, XI.M13, Thermal Aging and Neutron Irradiation Embrittlement of Cast Austenitic Stainless Steel (CASS) ; and (2) guidance for X-750 alloy, and precipitation-hardened (PH) martensitic stainless steel internals components exposed to reactor coolant and neutron flux that (according to the draft GALL master item RP-182) appear to be the subject of a new (but unidentified) ISG. BWRVIP-234, Thermal Aging and Neutron Embrittlement Evaluation of Cast Austenitic Stainless Steels for BWR Internals, was issued in December 2009, and (presumably) is under staff review. This BWRVIP document would include the GALL, Rev. 1, XI.M13 guidance within the BWRVIP program, but BWRVIP-234 has not been accepted by the staff and is not mentioned in the staff proposed changes to XI.M9. Until, the BWRVIP-234 is accepted, XI.M13 should remain a separate GALL program. The guidance for X-750 alloy, and precipitation-hardened (PH) martensitic stainless steel internals components exposed to reactor coolant and neutron flux, should be established as a separate GALL program if		incorporation.

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		appropriate, but should not be added to XI.M9 unless it is eventually addressed by the BWRVIP. Suggest adding “in accordance with industry and NRC staff-approved guidance” in elements 3, 5 and 6 to allow use of BWRVIP guidance when developed that will eliminate and exception.		
156	XI.M9 ML101830328 Comment XI.M9-2	Typo for ‘ASME’ in element 4.	The staff agrees with this comment and associated changes to the GALL Report have been made.	No technical basis is required to incorporate this change (typographical error) as it is editorial in nature.
157	XI.M9 ML101830328 Comment XI.M9-3	In the Program Description, for many BWRs, the actual Mb [i.e., Mo] content is not given on the CMTRs. It was not the practice to sample for Mb, especially in the early years of nuclear construction, unless Mb was specified as an additive. Consequently, there is no way to verify the measured Mb. It is safe to assume that Mb was not added to material unless required. Therefore, CF3, CF3A, CF8, CF8A can be assumed to be low-molybdenum steels without testing. This is consistent with EPRI guidance in TR 100976. See suggested revisions below. (pgs. 26-27 of ML101830328)	The staff agrees with this comment and associated changes to the GALL Report have been made.	NRC does not require Mo verification.
384	XI.M9 ML101830255 Comment XI.M9-1	The program discussion should be clarified to indicate that the BWRVIP program manages not only cracking due to SCC or IASCC, but also cracking due to fatigue (e.g., steam dryer	The staff agrees with this comment and associated changes to the GALL Report	Cracking due to fatigue is added to make the AMP consistent with the AMR item IV.B1.RP-155. Added new line for loss of material due to

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		assembly) and loss of material (e.g., wear of jet pump wedges). AMR line Item IV.B1.RP-155 lists cracking due to flow induced vibration (fatigue) as applicable to steam dryers. Wear occurs in some BWR reactor internals components, for example jet pump wedge surfaces.	have been made.	wear because it is a valid aging effect for jet pump wedge surfaces, which are in scope of AMP XI.M9
385	XI.M9 ML101830255 Comment XI.M9-2	Martensitic stainless steel and precipitation hardened martensitic stainless steel materials have been added to XI.M9, “BWR Reactor Internals.” Additionally, these materials have been added as aging management review items for BWR reactor internals. These materials should not be included in NUREG-1800 and NUREG- 1801 for BWR reactor internals since they are not known by the BWRVIP to be in use in the domestic BWR fleet in passive and long-lived reactor internals applications. Applicable Sections: Program Description Scope Parameters Monitored / Inspected Operating Experience IV.B1.RP-182 The BWRVIP is unaware of the application of these martensitic stainless steel materials in the domestic BWR fleet. As a result, the related discussion in NUREG-1801, Section	The staff disagrees with this comment. The GALL Report has not been changed.	This is included in an AMP for potential future use in repair or replacement activities for domestic BWR fleet. There is no burden on applicants by having these materials listed in the GALL Report.

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		XI.M9 and the associated aging management review items is not appropriate for inclusion in NUREG-1800 or NUREG-1801. There are a number of source references available to the staff as bases: - Revision 1 of the BWR Issue Management Tables (EPRI 1018111) is a non-proprietary report available to the staff. Table A-2 in Appendix A of this report contains a listing of BWR reactor internals and associated materials of construction. Neither martensitic stainless steels nor precipitation hardened martensitic stainless steels are Included. The materials listing in this document is based on a review of BWRVIP reports and available license renewal documentation. - The BWRVIP has submitted numerous inspection and evaluation guideline documents to the staff for review and approval. These documents can be reviewed by the staff to confirm that martensitic materials are not in use within the BWR fleet. - A majority of domestic BWR units have submitted license renewal applications to NRC, including all major design types (BWR/2s through BWR/6s). To date, martensitic stainless steel has not been identified as material of construction for a BWR reactor internals application. Supporting References: EPRI 1018111		

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Comment Number	Location in Document and Commenter Reference No.	Comment	NRC Disposition	Technical Basis
386	XI.M9 ML101830255 Comment XI.M9-3	BWRVIP repair design criteria listed in the, program scope section should be removed. Although BWRVIP repair design criteria provide criteria for repairs, aging management strategies for repairs are provided by the repair designer, not the BWRVIP and repair design criteria should not be credited by XI.M9. As discussed previously, citation of repair design criteria as supporting references is acceptable.	The staff disagrees with this comment. The GALL Report has not been changed.	Although staff does not agree with the comment, the AMP was revised to clarify in element 1 that "Although BWRVIP repair design criteria provide criteria for repairs, aging management strategies for repairs are provided by the repair designer, not the BWRVIP."
387	XI.M9 ML101830255 Comment XI.M9-4	BWRVIP-07 and BWRVIP-63 have been superseded by BWRVIP-76-A and should be removed from the program scope discussion and references section. BWRVIP-76-A is the current reference. BWRVIP-76-A has been published and a non proprietary version provided to NRC.	The staff agrees with this comment and associated changes to the GALL Report have been made.	Revised to reflect most recently approved BWRVIP.
388	XI.M9 ML101830255 Comment XI.M9-5A	NRC should reference BWRVIP-183 as the applicable guidance for aging management of top guide grid structures. Otherwise, the BWRVIP has the following comments on the top guide grid structure content in XI.M9. The program scope section discussing top guide grid beam inspections: a) Is not clear regarding the surfaces to be inspected. Inspections are limited to more susceptible portions of the grid beam and are dependent on top guide vintage. The top guide grid inspection program	The staff disagrees with this comment. The GALL Report has not been changed.	BWRVIP-183 has not yet been approved by the staff and is not appropriate to reference in total at this time. XI.M9, "BWR Vessel Internals" will be revised to include some information from the BWRVIP "Basis" discussion. If and when BWRVIP-183 is approved by the staff, the provisions of BWRVIP-183 will be integrated into the AMP as appropriate. The staff does not define specific locations for inspections. The AMP

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		requirements summarized in XI.M9 appear to be associated with a specific plant design rather than the entire BWR fleet. Re-inspection frequency and scope are warranted based on differences in susceptibility of the various designs currently in service. The BWRVIP recommends that NRC cite BWRVIP-183, with acknowledgement of outstanding NRC RAIs, as the most direct method for communicating the top guide grid structure inspection program. Otherwise, the BWRVIP recommends clarifications to XI.M9 as follows: a. BWRVIP-183 prescribes the examination area to include: BWR/2-5 — Inspect the bottom 2 inches (50.8 mm) of the interior side surfaces of the grid beam cells and locations at the intersections of the grid beams near the slotted notch where a sharp corner exists. Inspection of the bottom edge of the grid beams is not required. BWR/6 — Inspect rim areas containing the weld and heat affected zone (HAZ) from the top surface of the top guide and two cells in the same plane/axis as the weld. The regions of the grid beam cells to be inspected are the bottom 2 inches (50.8 mm) of the interior side surfaces. Inspection of the bottom edge of the grid cells is not required. Supporting References:		does describe a neutron fluence criteria for applicants to use to determine locations needing inspection

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Comment Number	Location in Document and Commenter Reference No.	Comment	NRC Disposition	Technical Basis
		BWRVIP-183		
389	XI.M9 ML101830255 Comment XI.M9-6	The program description includes discussion of screening criteria for CASS. This content was previously addressed in revision 1 of the GALL Report as a separate program, XI.M13. This discussion should clarify that the screening criteria described is NRC-based criteria and not a part of the BWRVIP program. This discussion implies that the BWRVIP program includes screening criteria for CASS consistent with the May 19, 2000 correspondence from NRC (Grimes) to NEI (Walters). The BWRVIP program does not include these screening criteria as basis for inspection of CASS reactor internals. To address this concern for BWR reactor internals, the BWRVIP performed a screening of CASS reactor internals to identify those castings which meet the screening criteria for augmented examination based not only on casting chemical properties, but also on fluence and component loading. Based on this review, no castings require augmented examination for 60-year service lives. The technical report containing this screening, BWRVIP-234 has been submitted to the staff for information only.	The staff disagrees with this comment. The GALL Report has not been changed.	The screening criteria are needed in addition to BWRVIP. BWRVIP needs to be supplemented for aging of CASS materials.
390	XI.M9 ML101830255	The parameters monitored / inspected section contains a paragraph addressing	The staff disagrees with this comment. The GALL Report	Will retain discussion about loss of fracture toughness due to void

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Comment Number	Location in Document and Commenter Reference No.	Comment	NRC Disposition	Technical Basis
	Comment XI.M9-7A	management of CASS reactor internals. a. This paragraph includes wording implying that BWR CASS reactor internals may be subject to void swelling effects. This wording should be removed. a. Operating temperatures and fluence exposure for CASS materials are not conducive to void nucleation and growth. This conclusion is supported by expert panel studies of aging mechanisms, EPRI 1016486 and NUREG/CR-6928. Supporting References.: EPRI 1016486, EPRI Materials Degradation Matrix — Revision 1. NUREG/CR-6923, Expert Panel Report on Proactive Materials Degradation Assessment EPRI 1018111, BWR Issue Management Tables — Revision 1 [Note: EPRI 1016486 and 1018111 are non-proprietary and available to the NRC staff for review.]	has not been changed.	swelling, as it is true.
391	XI.M9 ML101830255 Comment XI.M9-8	Wording in the detection of aging effects section implies that augmented inspection of limiting CASS locations is recommended regardless of the results of screening. The BWRVIP disagrees. Unless special circumstances apply, augmented examination of CASS is not required. Applicable Sections:	The staff agrees with this comment and associated changes to the GALL Report have been made.	Element 4, 3rd paragraph, 2nd sentence to be modified “should” change to “may” as supplemental inspection only needed if screening criteria is exceeded. BWRVIP 234 has not been reviewed by the staff. Following NRC review, if supplemental

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Comment Number	Location in Document and Commenter Reference No.	Comment	NRC Disposition	Technical Basis
		Detection of Aging Effects IV.B1.RP-219 IV.B1.RP-220 BWRVIP-234 documents the results of an EPRI BWRVIP study of CASS reactor internal components. This evaluation concludes that all the BWR CASS reactor internals components have ferrite levels below the level for which thermal aging embrittlement is a concern. Although the end-of-life fluence for the orificed fuel support and the jet pump assembly castings exceed the threshold, toughness data for irradiated austenitic stainless steels show that that these components will have sufficient fracture toughness at the end of license renewal period so that augmented inspection is not required. The report concludes that augmented inspections are not required for the BWR CASS reactor internals. BWRVIP-234 has been submitted to the staff for information only.		inspection is required, the ISG process will be used. Although these changes were made, they did not alter the technical intent and are not viewed by the staff as a notable technical change.
392	XI.M9 ML101830255 Comment XI.M9-9	The acceptance criteria section describes flaw evaluation criteria for CASS reactor internals that come from ASME Code, specifically IWB-3640. The staff should consider removing this language. ASME Section XI, Subsection IWB-3640 addresses flaw tolerance assessment for austenitic pressure retaining piping. These	The staff disagrees with this comment. The GALL Report has not been changed.	ASME Section XI, Section C is non-mandatory. The staff does not accept non-mandatory appendices.

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		requirements are not appropriate for reactor internals components. Further, the 14% ferrite restriction is considered to be overly restrictive. ASME Section XI, Section C-4000 allows evaluation of CASS similar to wrought materials if ferrite is less than 20%. Depending on the plant vintage and component being evaluated, the casting may or may not be considered an ASME Code component. Therefore, application of pressure retaining piping criteria to all reactor internals castings is not appropriate. Based on the screening assessment documented in BWRVIP-234 and on the foregoing points, the BWRVIP maintains that specific acceptance criteria for CASS BWR reactor internals components is not warranted in the GALL Report.		
393	XI.M9 ML101830255 Comment XI.M9-10	NUREG-1801 AMR item IV.B1-RP-200 describes loss of fracture toughness due to thermal aging / irradiation embrittlement for X-750 BWR reactor internals. This line Item should be revised to include only irradiation embrittlement. Some X-750 reactor internals components will be exposed to significant EOL neutron fluence and some irradiation embrittlement could occur. To address both irradiation effects and other concerns, the BWRVIP is initiating a new testing program for	The staff agrees with this comment and associated changes to the GALL Report have been made.	The staff agrees with the basis provided by the BWRVIP and agrees to delete thermal aging from this item.

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Comment Number	Location in Document and Commenter Reference No.	Comment	NRC Disposition	Technical Basis
		alloy X-750 materials. If necessary, program requirements for X-750 will be revised based on the results of this test program. X- 750 jet pump beams are managed by BWRVIP-41 and BWRVIP-138. Management of repair hardware is addressed by the repair vendor. However, regarding thermal aging, the BWRVIP is not aware of any data that would support the assertion that X-750 is susceptible to loss of fracture toughness due to thermal aging, Supporting basis documents include the NUREG/CR-6923, “Expert Panel Report on Proactive Materials Degradation Assessment” and EPRI 1016486, “Materials Degradation Matrix, Revision 1.” The expert assessments documented in these reports do not identify thermal aging and loss of fracture toughness as specific concerns for BWR reactor internals components. (Note: EPRI 1016486 is non-proprietary and available to the NRC staff for review.]		
394	XI.M9 ML101830255 Comment XI.M9-11	The preventive actions section discussion for water chemistry should simply refer to program XI.M2. Specific reference to a version of the EPRI BWR Water Chemistry Guidelines and discussion regarding control parameter tables should be limited to XI.M2 and need not be repeated in XI.M9.	The staff agrees with this comment and associated changes to the GALL Report have been made.	Change makes the element wording consistent with other GALL AMPs. The staff does not view this as a notable technical change.
395	XI.M9	The monitoring and trending section omits	The staff agrees with	These are valid BWRVIPs for this

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Comment Number	Location in Document and Commenter Reference No.	Comment	NRC Disposition	Technical Basis
	ML101830255 Comment XI.M9-12	BWRVIP-80-A and BWRVIP-99-A. BWRVIP-80-A provides CGR curves for shroud vertical welds. BWRVIP-99-A provides CGR curves for irradiated stainless steels.	this comment and associated changes to the GALL Report have been made.	GALL AMP.
396	XI.M9 ML101830255 Comment XI.M9-13	The last sentence of the first para. in the detection of aging effects section may be misleading and should be changed to: “BWRVIP program requirements provide for inspection of BWR reactor internals to manage loss of material and cracking using appropriate examination techniques, such as visual examinations (e.g., EVT-1, VT- 1) and volumetric examinations (e.g., UT).” As written, the sentence implies that only non-ASME Code BWR reactor internals are inspected per BWRVIP guidance and that only cracking is detectable by BWRVIP examinations. This is misleading. BWRVIP examination requirements apply to many BWR reactor internals components, regardless of ASME Code classification and are also capable of detecting loss of material (e.g., wear) as applicable to the component.	The staff agrees with this comment and associated changes to the GALL Report have been made.	Deleted “non-ASME Code” and replace with “BWR” as staff agrees that BWRVIP examinations can apply to BWR internals regardless of Code categorization.
397	XI.M9 ML101830255 Comment XI.M9-14	The operating experience section discussion for core plate should be clarified to note that inspections of the core plate assembly itself are not required. Only core plate bolts or core plate retaining wedges require inspection. There are not BWRVIP program inspection requirements for creviced regions beneath the	The staff agrees with this comment and associated changes to the GALL Report have been made.	Clarified that inspections of the core plate assembly is not required, but of the core plate bolts or retaining wedges as appropriate.

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		core plate. BWRVIP-06R1-A and BWRVIP-25 address the safety significance and inspection requirements for the core plate assembly. Only inspection of core plate bolts (for plants without retaining wedges) or inspection of the retaining wedges is required.		
398	XI.M9 ML101830255 Comment XI.M9-15	The operating experience section sentence addressing dry tubes should delete “CRD” immediately preceding “dry tubes.” Reference to “CRD dry tubes” is misleading. Dry tubes are associated with incore-monitoring, not CRD.	The staff agrees with this comment and associated changes to the GALL Report have been made.	Dry tubes are associated with incore-monitoring, not CRD.
399	XI.M9 ML101830255 Comment XI.M9-16	Notable BWR reactor internals operating experience missing from the operating experience discussion section are listed at right. Core spray pipe cracking. (in addition to core spray sparger cracking) X-750 jet pump hold down beam cracking. Shroud support cracking.	The staff agrees with this comment and associated changes to the GALL Report have been made.	BWRVIP-18 addresses core spray pipe cracking. Cracking was also observed in X-750 material in jet pump hold-down beam.
400	XI.M9 ML101830255 Comment XI.M9-17	BWRVIP-29 has been superseded by BWRVIP-190 and should be removed from the references list. BWRVIP-190 is the current version of the EPRI BWR Water Chemistry Guidelines. This version represents the present state of industry knowledge regarding management of BWR water chemistry. As a minimum, all	The staff disagrees with this comment. The GALL Report has not been changed.	A specific revision or year of guideline needs to be referenced. The staff cannot provide approval to any later revision of the water chemistry standards. Staff has provided guidelines for use of later revisions of industry standards in a preamble to GALL Report, Chapter

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		references to water chemistry guidance in NUREG-1801 should be revised to cite BWRVIP-190. However, the EPRI BWR Water Chemistry Guidelines are periodically revised to incorporate recent operating experience and to address new and improved mitigation techniques (e.g., online noblechem^{TM}[)]. Based on NEI 03-08, owners are required to update their programs to the latest needed and mandatory guidance contained in these guidelines. Therefore, when possible, reference should cite the “EPRI BWR Water Chemistry Guidelines.” Otherwise, the reference citations for the EPRI BWR Water Chemistry Guidelines will become out of date relatively soon.		XI.
401	XI.M9 ML101830255 Comment XI.M9-18A	IV.B1.R-94 addresses nickel-alloy access hole cover components (welded). This line item should: a) Include stainless steel materials of construction and, BWRVIP-180 provides aging management requirements for access hole covers. BWRVIP-180 has been provided to NRC. a) Stainless steels are commonly used in access hole cover designs. See EPRI 1018111, BWR Issue Management Tables, Revision 1.	The staff agrees with this comment and associated changes to the GALL Report have been made.	Stainless steels are also used in access hole cover designs.
402	XI.M9 ML101830255	IV.B1.R-95 addresses nickel-alloy mechanical access hole cover components. This line Item	The staff agrees with this comment and	EPRI 1018111, “BWR Issue Management Tables – Revision 1”

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	Comment XI.M9-19A	should: a) Also include stainless steel materials of construction, a) EPRI 1018111, "BWR Issue Management Tables – Revision 1" identifies XM-19 nitrogen strengthened stainless steel as an applicable material for replacement access hole cover materials.	associated changes to the GALL Report have been made.	identifies XM-19 nitrogen strengthened stainless steel as an applicable material for replacement access hole cover materials.
403	XI.M9 ML101830255 Comment XI.M9-20	All references to the NRC approved version of BWRVIP reports should be "-A." For example, "BWRVIP-47-A," rather than "BWRVIP-47A." This occurs not only throughout the body of the program text, but also for BWRVIP reports cited in the references section.	The staff agrees with this comment and associated changes to the GALL Report have been made.	This change will make AMP XI.M9 conform to BWRVIP numbering practices, although this is not viewed as a notable technical change and is not documented in Table II-21.
777	XI.M9 ML101830328 Comment XI.M9-4	The statement about not actually monitoring reduction in fracture toughness that was added to Element 3 is good. I suggest it should also be included in the program description.	The staff disagrees with this comment. The GALL Report has not been changed.	No need for redundancy. Element 3 is an appropriate location to discuss.
778	XI.M9 ML101830328 Comment XI.M9-5	In SCOPE related to top guides. Every BWR will exceed the fluence threshold prior to the PEO. Most BWRs exceed this threshold in the 4th or 5th fuel cycle. Eliminate the paragraph for those plants that haven't reached the threshold and make the first paragraph the only option.	The staff agrees with this comment and associated changes to the GALL Report have been made.	Most BWRs exceed this threshold in the 4th or 5th fuel cycle.
779	XI.M9 ML101830328 Comment	Make the PREVENTIVE ACTIONS section read like all the other condition monitoring programs. See comments on XI.M4.	The staff agrees with this comment and associated changes	Makes it consistent with other GALL AMPs. This change provides clarification and does not change

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	XI.M9-6		to the GALL Report have been made.	the technical intent of the AMP. Therefore, no technical basis if needed.
780	XI.M9 ML101830328 Comment XI.M9-7	The footnote in Element 3 about using different ASME code versions is different than the footnote in other AMPs. Use the same footnote in all AMPs unless there is a different meaning intended.	The staff agrees with this comment and associated changes to the GALL Report have been made.	Makes it consistent with other GALL AMPs. This change provides clarification and does not change the technical intent of the AMP. Therefore, no technical basis if needed
1019	XI.M9 ML101830255 Comment XI.M9-5B	NRC should reference BWRVIP-183 as the applicable guidance for aging management of top guide grid structures. Otherwise, the BWRVIP has the following comments on the top guide grid structure content in XI.M9. The program scope section discussing top guide grid beam inspections: b) Is not clear regarding inspection scope and re-inspection frequency. Re-inspection is dependent on top guide vintage. A single inspection frequency is not warranted for all top guide grid designs. The top guide grid inspection program requirements summarized in XI.M9 appear to be associated with a specific plant design rather than the entire BWR fleet. Re-inspection frequency and scope are warranted based on differences in susceptibility of the various designs currently in service. The BWRVIP recommends that NRC cite BWRVIP-183, with acknowledgement of	The staff agrees with this comment and associated changes to the GALL Report have been made.	Information from the BWRVIP "Basis" will be inserted into the AMP as the re-inspection scope and frequency are appropriate for the circumstances.

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		outstanding NRC RAIs, as the most direct method for communicating the top guide grid structure inspection program. Otherwise, the BWRVIP recommends clarifications to XI.M9 as follows: b. BWRVIP-183 prescribes re-inspection scope and frequency as follows: BWR/2-5 - Inspect 10% of the grid beam cells containing CRDs/blades every twelve years with at least 5% to be performed within six years. BWR/6 - Inspect the rim areas containing the weld and heat affected zone (HAZ) from the top surface of the top guide and two cells in the same plane/axis as the weld every six years. Supporting References: BWRVIP-183		
1020	XI.M9 ML101830255 Comment XI.M9-7B	The parameters monitored / inspected section contains a paragraph addressing management of CASS reactor internals. b. Wording related to inspection of CASS should be clarified: “...The impact of loss of fracture toughness on component integrity can be managed by ASME Section XI inspections that monitor for cracking in the components...” b. BWRVIP program inspections are not focused on detection of loss of fracture toughness, but are acknowledged to be	The staff agrees with this comment and associated changes to the GALL Report have been made.	No technical basis is required to incorporate this change (sentence split for clarity) as it is editorial in nature.

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Comment Number	Location in Document and Commenter Reference No.	Comment	NRC Disposition	Technical Basis
		capable of detecting significant cracking of CASS components. Presently, only visual inspection is possible. • Further, BWRVIP inspection and evaluation guidelines do not explicitly require augmented inspection of CASS components. ASME Section XI inspection requirements are considered adequate. Supporting References.: EPRI 1016486, EPRI Materials Degradation Matrix — Revision 1. NUREG/CR-6923, Expert Panel Report on Proactive Materials Degradation Assessment EPRI 1018111, BWR Issue Management Tables — Revision 1 [Note: EPRI 1016486 and 1018111 are non-proprietary and available to the NRC staff for review.]		
1021	XI.M9 ML101830255 Comment XI.M9-18B	IV.B1.R-94 addresses nickel-alloy access hole cover components (welded). This in item should: b) Should specify aging management consistent with BWRVIP guidance contained in BWRVIP-180, which allows for either UT examination or EVT-1 visual examination on intervals depending on both inspection technique and chemistry regime (NWC vs. HWC/ NMCA). BWRVIP-180 provides aging management requirements for access hole covers.	The staff disagrees with this comment. The GALL Report has not been changed.	BWRVIP-180 is under staff review. Following staff review and approval of BWRVIP-180, it will be incorporated via ISG into the GALL.

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Comment Number	Location in Document and Commenter Reference No.	Comment	NRC Disposition	Technical Basis
		BWRVIP-180 has been provided to NRC. b) BWRVIP-180 specifies examination requirements for all access hole cover designs. Inspection techniques include both Enhanced visual (EVT-1) and volumetric (UT) examination of welds. Application of inspection techniques is dependent on access hole cover design and on operating chemistry regime. Longer re-inspection intervals are allowed for plants operating under hydrogen water chemistry technologies, than for plants operating under normal water chemistry. This approach is described in BWRVIP-180. This guidance has been approved by the BWRVIP Executive Committee and is being implemented by the BWRVIP membership. However, the aging management program requirement included in the GALL Report is not consistent with the BWRVIP program. It should also be noted that BWRVIP-180 addresses not only aging management for nickel-alloy materials, but also addresses SCC susceptible stainless steel locations. The GALL Report guidance should also acknowledge this BWRVIP program inspection requirement.		
1022	XI.M9 ML101830255 Comment XI.M9-19B	IV.B1.R-95 addresses nickel-alloy mechanical access hole cover components. This line Item should: b) Clarify that the line item includes mechanically repaired access hole covers	The staff disagrees with this comment. The GALL Report has not been changed.	The AMR item for R-95 addresses mechanical covers and mechanical repairs. The item for R-94 covers welds and weld repairs.

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		(including the repaired welds) and, b) BWRVIP-180 specifies VT-1 examination of the mechanical repair hardware as adequate aging management for the access hole cover assembly. Enhanced visual and volumetric examination of welds repaired by mechanical means no longer require inspection. This approach is described in BWRVIP-180 and is consistent with the approach used for mechanical repairs associated with other BWR internals assemblies. Therefore, this line item addresses not only the mechanical repair components, but also the repaired welds.		
1023	XI.M9 ML101830255 Comment XI.M9-19C	IV.B1.R-95 addresses nickel-alloy mechanical access hole cover components. This line Item should: c) Include aging management consistent with BWRVIP guidance contained in BWRVIP-180. c) The AMP specified is XI.M2, “Water Chemistry” and XI.M1, “ASME Section XI Inservice Inspection, Subsections IWB, IWC, and IWD” for Class 1 Components.” ASME Section XI required inspections would include only a VT-3 visual examination of accessible surfaces once each 10-year interval. The BWRVIP requirement defined in BWRVIP-180 is a VT-1 of the access hole cover top surface on 8-year intervals. The program recommended by the BWRVIP Is XI.M2 and XI.M9, “BWR Reactor Internals,” with modifications to XI.M9 to address access hole	The staff disagrees with this comment. The GALL Report has not been changed.	BWRVIP-180 is under staff review. Following staff review and approval of BWRVIP-180, it will be incorporated via ISG into the GALL Report.

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		cover management consistent with BWRVIP-180.		
1228	XI.M41 ML101930270, Comment XI.M41-1	[This comment states that ductile iron pipe should not be excluded from AMP XI.M41.] According to studies reviewed by Beyond Nuclear, polyethylene coating used in conjunction with cathodic protection is determined to be the most effective age management and cost-effective control method for external corrosion of buried ductile'iron pipes which are clearly within the scope of passive structures that require adequate Age Management Programs. However, the most effective AMP for external corrosion of buried pipe systems is to abandon all buried and below-grade applications for replacement with above grade, stainless steel and vaulted systems. Therefore, the NRC should not provide an exemption from AMP for buried pipe systems fabricated of ductile iron.	The staff agrees with this comment and associated changes to the GALL Report have been made.	The staff concurs with the commenter that ductile iron buried pipe should be addressed by AMP XI.M41 and that bare ductile iron pipe is subject to corrosion at rates similar to steel pipe. The staff also notes that, due to the additional wall thickness which is normally present in cast pipes, the life expectancy of a ductile iron pipe may exceed a similar steel pipe. Notwithstanding this potential difference in wall thickness, the definition for "steel" contained in chapter 9 of the GALL Report includes carbon steel, low alloy steel and cast irons, including ductile iron. As a result of this definition, a given pipe will be subject to the same AMP XI.M41 aging management (preventive actions and inspections) irrespective of whether it is constructed from steel or ductile iron. This statement does not, however, imply that either a steel pipe or a ductile iron pipe in an in scope drain system, for example, will receive the same level of aging

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				management as an ASME Code Class 3 pipe of similar material.

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Comment Number	Location in Document and Commenter Reference No.	Comment	NRC Disposition	Technical Basis
208	XI.S1 ML101830328 Comment XI.S1-6	References: References [EPRI NP-5067, EPRI NP-5769 and EPRI TR 104213] do not apply to this program.	The staff disagrees with this comment. The GALL Report has not been changed.	The referenced EPRI reports are useful for the high-strength bolting, if applicable.
899	XI.S1 ML101830328 Comment XI.S1-1	Program Description: (1) GL 98-04 and XI.S1 ASME Section XI, Subsection IWE are appropriate for maintaining and monitoring coatings inside containment. (2) This increase in scope which in Element 4 requires “surface examination, in addition to visual examination to detect cracking ..” is not supported by two OEs cited; one OE on bellows addresses stainless steel cracking as result of contamination and the other OE addresses which is torus cracking apparently due to a design issue “lack of an HPCI turbine exhaust pipe sparger.” The industry OE does not show cracking of penetration sleeves, associated steel components and bellows due to cyclic loads to be a problem which would warrant an augmented requirement for a supplemental surface examination. The proposed new requirement is above and beyond the requirement of ASME Code Section XI, IWE and 10CFR50.55a. We believe ASME Section XI-IWE and 10CFR 50, Appendix J provide adequate requirement for inspection of penetration components. We recommend that this new requirement be eliminated or at the most limited to bellows for	The staff agrees with this comment and associated changes to the GALL Report have been made.	Limited to Examination Category E-F (1992E & A) for dissimilar metal welds and vent line bellows. Allowed the use of Appendix J for vent line bellows.

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Comment Number	Location in Document and Commenter Reference No.	Comment	NRC Disposition	Technical Basis
		cyclic loads and possibly stainless steel and dissimilar metal welds for SCC. Carbon steel penetration sleeves, closures and fluid heads should not be subject to augmented supplemental surface examinations.		
900	XI.S1 ML101830328 Comment XI.S1-2	Element 1: GL 98-04 and XI.S1 ASME Section XI, Subsection IWE are appropriate for maintaining and monitoring coatings inside containment.	The staff disagrees with this comment. The GALL Report has not been changed.	The coatings program in XI.S1 is related to subsection IWE examination of coatings to prevent corrosion. The use of AMP XI.S8 (Protective Coating Monitoring and Maintenance Program) serves a different purpose, to ensure coating integrity and ECCS operability.
901	XI.S1 ML101830328 Comment XI.S1-3	Element 2: The above EPRI and NUREG bolting recommendations as listed, appear to be design and installation and maintenance procedural recommendations more than Aging Management Program changes. A change of bolting material, torque, tension or lubricant selections for a specific application would likely require a design change. OE does not show degradation and failure of IWE bolting, except for the limited specific OE on large HS bolts of specific limited application bolting material for NSSS IWE supports. Other changes do not appear necessary or warranted by industry experience and OE.	The staff disagrees with this comment. The GALL Report has not been changed.	High-strength bolting is also used for pressure-retaining components in containments. A provision of preventive actions for other structural bolting recommended using Research Council on Structural Connections (RCSC) publication.
902	XI.S1 ML101830328	Element 4: This increase in scope which requires “surface examination, in addition to	The staff agrees with this comment and	Limited to bellows for cyclic loads and possibly stainless steel and

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	Comment XI.S1-4	visual examination to detect cracking ..” is not supported by two OEs cited; one OE on bellows addresses stainless steel cracking as result of contamination and the other OE addresses which is torus cracking apparently due to a design issue “lack of an HPCI turbine exhaust pipe sparger.” The industry OE does not show cracking of penetration sleeves, associated steel components and bellows due to cyclic loads to be a problem which would warrant an augmented requirement for a supplemental surface examination. The proposed new requirement is above and beyond the requirement of ASME Code Section XI, IWE and 10CFR50.55a. We believe ASME Section XI-IWE and 10CFR 50, Appendix J provide adequate requirement for inspection of penetration components. We recommend that this new requirement be removed or at the most limited to bellows for cyclic loads and possibly stainless steel and dissimilar metal welds for SCC. Carbon steel penetration sleeves, closures and fluid heads should not be subject to augmented supplemental surface examinations.	associated changes to the GALL Report have been made.	dissimilar metal welds for SCC and allows the option of Appendix J testing.
903	XI.S1 ML101830328 Comment XI.S1-5	Element 10: [In the operating experience element, degradation of threaded bolting and fasteners in closures for the reactor coolant pressure boundary from boric acid corrosion, SCC, and fatigue loading.] This discussion is not relevant to this program.	The staff disagrees with this comment. The GALL Report has not been changed.	Since the AMP includes bolting in scope of program, the bolting operating experience is relevant.

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Comment Number	Location in Document and Commenter Reference No.	Comment	NRC Disposition	Technical Basis
210	XI.S3 ML101830328 Comment XI.S3-2	Element 3: Not all high strength bolts are susceptible to SCC.	The staff agrees with this comment and associated changes to the GALL Report have been made.	The provision should apply to high-strength bolts which have been shown to have susceptibility to SCC.
904	XI.S3 ML101830328 Comment XI.S3-1	Element 2: This program is a condition monitoring program and should not provide preventive actions.	The staff disagrees with this comment. The GALL Report has not been changed.	High-strength bolting is used for NSSS and piping support components, where these preventive actions are applicable. A provision of preventive actions for other structural bolting recommended using RCSC publication.
906	XI.S3 ML101830328 Comment XI.S3-3	Element 4: Cracking of high strength bolts is not supported by the OE cited for structural bolts. Existing OE is for certain material, size, torque and lubricant applications only and should not be generically applied to all high strength bolts of 150 ksi or more. The Operating Experience cited in NUREG 1801 stated “SCC has occurred in high strength bolts used for nuclear steam supply system component supports (EPRI NP-5769).” The above is cited as operating experience in XI.M18, XI.S1, XI.S3, XI.S6, and XI.S7. The OE cited in NUREG 1801 is NP-5769 (issued in 1988) and was found only in certain specific materials and specifically for NSSS component supports and should not be generically applied to all structural high strength bolts. In certain cases the failures	The staff agrees with this comment and associated changes to the GALL Report have been made.	For structural bolting used in American Institute of Steel Construction (AISC) structures, RCSC discusses certain precautionary measures. A provision of preventive actions for other structural bolting (ASTM A325, ASTM A490) is recommended using RCSC publication.

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		noted were attributed contributing factors including use of molybdenum disulfide thread lubricant which is considered a corrosive environment and is not used in structural steel installations. While EPRI NP-5769 Volume 1, Table 11-1 does list A490 bolts for ductile failures and failure due improper torque, and one instance of a special 4140 material with 200 ksi minimum yield where the A490 specification was used for heat treatment requirements (not an A490 structural bolt) where SCC was noted and associated with a high preload and borated water environment. No SCC failures were noted for commonly used materials in Structural Steel bolting including A307, A325 or A490 bolts in a structural steel application. Industry documents including NUREG-1339 have not identified any determination specifically as to the ASTM A-490 material's susceptibility to SCC, but rather a determination of the yield stress level at which generic materials should be considered for the possibility of SCC vulnerability. In order for SCC to occur in high strength bolting, three parameters must exist; (1) a corrosive environment, (2) a susceptible material, and (3) high sustained tensile stresses. The absence of any one of these three parameters eliminates the material's susceptibility to SCC. High Strength Structural Bolts including A490 bolts are not subject to high-sustained preload		

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Comment Number	Location in Document and Commenter Reference No.	Comment	NRC Disposition	Technical Basis
		stress and lubricants containing contaminants, such as MoS_2, are not approved for use. Therefore, SCC is not considered an applicable aging effect requiring management. The structural bolting will continue to be visually inspected for loss of preload due to self loosening and loss of material due to corrosion and also visually monitor the associated structural steel and connections for loss of material or other adverse conditions. The high strength bolts used for structural applications are A325 or A490 Bolts. A325 bolts have a minimum yield of 92 ksi (unlikely to have an actual yield of 150 ksi or more), and A490 bolts have a minimum yield of 130 ksi (potential that some A490 may reach actual yield of 150 ksi or more). Most structural bolts are 1” or less in diameter, however bolts in large girders or supporting large equipment may be over 1” diameter. Test reports are not generally traceable to installation locations. The AISC “Guide to Design for Bolted and Riveted Joints” Second Edition published in 2001 addresses this concern in section 4.8 and concludes that the tests indicate that black (not galvanized) A490 bolts can be used without problems from “brittle” failures (failures due to hydrogen stress cracking or SCC) in most environments. It was concluded		

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Comment Number	Location in Document and Commenter Reference No.	Comment	NRC Disposition	Technical Basis
		that galvanized A490 bolts should not be used in structures. This same section also concluded that black and galvanized A325 bolts behave satisfactorily with regard to hydrogen stress and SCC in most corrosive environments. AISC publications do not recommend or require volumetric or surface examinations of installed structural bolts for SCC. This new requirement is above and beyond the requirement of ASME Code Section XI, IWF. We recommend that this new requirement be removed or at the most limited to the specific bolting material types identified in the OE cited on NSSS supports. Volumetric or surface examinations for cracking of high strength bolts should not be generically imposed for all bolts with actual yield strength of 150 ksi or more and greater than 1" diameter. Structural high strength bolts, including A325 and A490 bolts do not have a history of SCC in most environments.		
907	XI.S5 ML101830328 Comment XI.S5-1	Comment element 4: Industry guidance found in NUREG-1522, NEI 96-03, and ACI 349 recommend a 5 to 10 year frequency. Program inspection frequency should be addressed as a part of Maintenance Rule implementation. Industry guidance NUREG-1522, "Assessment of Inservice Conditions of Safety-Related Nuclear Plant Structures, and NEI 96-03, "INDUSTRY GUIDELINE FOR	The staff disagrees with this comment. The GALL Report has not been changed.	The staff's review of recent applications indicate instances where the applicants have taken a very liberal approach in frequency of structure inspections. In one instance, the applicant was inspecting a structure once in 30 years. Masonry walls are relatively weak structures compared to steel

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		MONITORING THE CONDITION OF STRUCTURES AT NUCLEAR POWER PLANTS" recommends a 5 to 10 year frequency. ACI 349 provides guidance for inspecting some structures at greater than a 5 year frequency. Plants have established their maintenance rule program including inspection frequency based on Maintenance Rule in accordance with 10CFR 50.65, "Requirements for monitoring the effectiveness of maintenance at nuclear power plants." 10CFR 50.65, "MR," does not require 5 year inspection frequency for all the structures. The frequencies of the inspections are established based on risk-informed evaluation process relative to their significant to public health and safety. As such, some structures have inspection frequency between 5 to 10 years. And, some structures based in their site specific OE are inspected even more frequent than every 5 years. Some structures are already in 5 year inspection frequency. For example, Inspection of Water Control Structures governed by RG 1.127 are already conducted on a 5 year or more frequently if conditions warrant as required by RG 1.127. Concrete Containment IWL inspections are also generally performed at a 5 year frequency. We recommend that this new requirement be removed. Imposing 5 year inspection		and concrete structures. Cracking of grout and masonry blocks is due to natural and man-made environmental effects. The staff considers a 5-year interval as a reasonable compromise for the in-scope masonry walls. However, Element 4 language has been changed to provide certain latitude, and now states, "In general, masonry walls should be inspected every 5 years, with provisions for more frequent inspections in areas where significant loss of material or cracking is observed to ensure there is no loss of intended function between inspections."

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		frequency to all structures and masonry walls seems to be extreme measure without any bases. The inspection frequency should be established based on service and condition assessment of each structure in accordance with Maintenance Rule 10CFR 50.65. That could vary from 5 to 10 years.		
214	XI.S6 ML101830328 Comment XI.S6-2	Element 2: This program is a condition monitoring program and should not provide preventive actions.	The staff disagrees with this comment. The GALL Report has not been changed.	For the high-strength bolting associated with NSSS supports (XI.S3-IWF) and components supports (could be Structures Monitoring Program), in installing the replacement bolts, these precautionary measures are relevant.
908	XI.S6 ML101830328 Comment XI.S6-1	Program Description and Elements 3 and 4: Cracking of high strength bolts is not supported by the OE cited for structural bolts. Existing OE is for certain material, size, torque and lubricant applications only and should not be generically applied to all high strength bolts of 150 ksi or more. The Operating Experience cited in NUREG 1801 stated “SCC has occurred in high strength bolts used for nuclear steam supply system component supports (EPRI NP-5769).” The above is cited as operating experience in XI.M18, XI.S1, XI.S3, XI.S6, and XI.S7. The OE cited in NUREG 1801 is NP-5769 (issued in 1988) and was found only in certain specific materials and specifically for NSSS	The staff disagrees with this comment. The GALL Report has not been changed.	As there are a few places inside and outside the containments where the high-strength bolts have been used, the staff keeps the preventive measures. However, where structural bolting consists of ASTM A325, ASTM F1852, and/or ASTM A-490 bolts, the staff recommends the use of RCSC discussion related to preventive measures.

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		component supports and should not be generically applied to all structural high strength bolts. In certain cases the failures noted were attributed contributing factors including use of molybdenum disulfide thread lubricant which is considered a corrosive environment and is not used in structural steel installations. While EPRI NP-5769 Volume 1, Table 11-1 does list A490 bolts for ductile failures and failure due improper torque, and one instance of a special 4140 material with 200 ksi minimum yield where the A490 specification was used for heat treatment requirements (not an A490 structural bolt) where SCC was noted and associated with a high preload and borated water environment. No SCC failures were noted for commonly used materials in Structural Steel bolting including A307, A325 or A490 bolts in a structural steel application. Industry documents including NUREG-1339 have not identified any determination specifically as to the ASTM A-490 material's susceptibility to SCC, but rather a determination of the yield stress level at which generic materials should be considered for the possibility of SCC vulnerability. In order for SCC to occur in high strength bolting, three parameters must exist; (1) a corrosive environment, (2) a susceptible material, and (3) high sustained tensile stresses. The absence of any one of these three parameters		

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		eliminates the material's susceptibility to SCC. High Strength Structural Bolts including A490 bolts are not subject to high-sustained preload stress and lubricants containing contaminants, such as MoS_2, are not approved for use. Therefore, SCC is not considered an applicable aging effect requiring management. The structural bolting will continue to be visually inspected for loss of preload due to self loosening and loss of material due to corrosion and also visually monitor the associated structural steel and connections for loss of material or other adverse conditions. The high strength bolts used for structural applications are A325 or A490 Bolts. A325 bolts have a minimum yield of 92 ksi (unlikely to have an actual yield of 150 ksi or more), and A490 bolts have a minimum yield of 130 ksi (potential that some A490 may reach actual yield of 150 ksi or more). Most structural bolts are 1" or less in diameter, however bolts in large girders or supporting large equipment may be over 1" diameter. Test reports are not generally traceable to installation locations. The AISC "Guide to Design for Bolted and Riveted Joints" Second Edition published in 2001 addresses this concern in section 4.8 and concludes that the tests indicate that black (not galvanized) A490 bolts can be used		

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		without problems from “brittle” failures (failures due to hydrogen stress cracking or SCC) in most environments. It was concluded that galvanized A490 bolts should not be used in structures. This same section also concluded that black and galvanized A325 bolts behave satisfactorily with regard to hydrogen stress and SCC in most corrosive environments. AISC publications do not recommend or require volumetric or surface examinations of installed structural bolts for SCC. We recommend that this new requirement be removed or at the most limited to the specific bolting material types identified in the OE cited on NSSS supports. Volumetric or surface examinations for cracking of high strength bolts should not be generically imposed for all bolts with actual yield strength of 150 ksi or more and greater than 1” diameter. Structural high strength bolts, including A325 and A490 bolts do not have a history of SCC in most environments.		
909	XI.S6 ML101830328 Comment XI.S6-3	Element 4: a) Industry guidance found in NUREG-1522, NEI 96-03, and ACI 349 recommend a 5 to 10 year frequency. Program inspection frequency should be addressed as a part of Maintenance Rule implementation. Industry guidance NUREG-1522, “Assessment of Inservice Conditions of Safety-Related Nuclear Plant Structures, and	The staff disagrees with this comment. The GALL Report has not been changed.	a) The revised guidance allows latitude for inspection frequency for certain in-scope structures. b) The AMP guidance is not a requirement. However, the staff has noticed a variety of ways by which the Structures Monitoring Program based on the

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Comment Number	Location in Document and Commenter Reference No.	Comment	NRC Disposition	Technical Basis
		NEI 96-03, "INDUSTRY GUIDELINE FOR MONITORING THE CONDITION OF STRUCTURES AT NUCLEAR POWER PLANTS" recommends a 5 to 10 year frequency. ACI 349 provides guidance for inspecting some structures at greater than a 5 year frequency. Plants have established their maintenance rule program including inspection frequency based on Maintenance Rule in accordance with 10 CFR 50.65, "Requirements for monitoring the effectiveness of maintenance at nuclear power plants." 10 CFR 50.65, "MR," does not require 5 year inspection frequency for all the structures. The frequencies of the inspections are established based on risk-informed evaluation process relative to their significant to public health and safety. As such, some structures have inspection frequency between 5 to 10 years. And, some structures based in their site specific OE are inspected even more frequent than every 5 years. Some structures are already in 5 year inspection frequency. For example, Inspection of Water Control Structures governed by RG 1.127 are already conducted on a 5 year or more frequently if conditions warrant as required by RG 1.127. Concrete Containment IWL inspections are also generally performed at a 5 year frequency. We recommend that this new requirement be		Maintenance Rule has been implemented. For license renewal, the staff is basing the guidance on a reasonable industry standard.

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		removed. Imposing 5 year inspection frequency to all structures and masonry walls seems to be extreme measure without any bases. The inspection frequency should be established based on service and condition assessment of each structure in accordance with Maintenance Rule 10 CFR 50.65. That could vary from 5 to 10 years. b) The ACI 349.3R provides more restrictive qualifications requirements of personnel than the current commitments of most plants under their current licenses. Qualifications that are similar to the guidelines of ACI 349.3 R should also be acceptable as they have been under the current license basis. We recommend that this new requirement be removed.		
910	XI.S7 ML101830328 Comment XI.S7-1	The bolting [EPRI NP-5067, EPRI NP-5769 and EPRI TR 104213] references do not apply to this program.	The staff disagrees with this comment. The GALL Report has not been changed.	The use of the referenced EPRI reports will be very limited, but cannot be ruled out, if applicable.
911	XI.S7 ML101830328 Comment XI.S7-2	This program is a condition monitoring program and should not provide preventive actions.	The staff disagrees with this comment. The GALL Report has not been changed.	If applicable, preventive measures are appropriate in this element.
912	XI.S7 ML101830328 Comment XI.S7-3	Cracking of high strength bolts is not supported by the OE cited for structural bolts. Existing OE is for certain material, size, torque and lubricant applications only and should not	The staff disagrees with this comment. The GALL Report has not been	As per the recommendation, high-strength bolt related provisions in elements 2 and 3 are to be used only if applicable, based on OE.

Table IV-13. Analysis and Disposition of Public Comments on Chapter XI Structural AMPs, May 2010 Public Comment Draft GALL Report, Rev. 2

Comment Number	Location in Document and Commenter Reference No.	Comment	NRC Disposition	Technical Basis
		be generically applied to all high strength bolts of 150 ksi or more. The Operating Experience cited in NUREG 1801 stated “SCC has occurred in high strength bolts used for nuclear steam supply system component supports (EPRI NP-5769).” The above is cited as operating experience in XI.M18, XI.S1, XI.S3, XI.S6, and XI.S7. The OE cited in NUREG 1801 is NP-5769 (issued in 1988) and was found only in certain specific materials and specifically for NSSS component supports and should not be generically applied to all structural high strength bolts. In certain cases the failures noted were attributed contributing factors including use of molybdenum disulfide thread lubricant which is considered a corrosive environment and is not used in structural steel installations. While EPRI NP-5769 Volume 1, Table 11-1 does list A490 bolts for ductile failures and failure due improper torque, and one instance of a special 4140 material with 200 ksi minimum yield where the A490 specification was used for heat treatment requirements (not an A490 structural bolt) where SCC was noted and associated with a high preload and borated water environment. No SCC failures were noted for commonly used materials in Structural Steel bolting including A307, A325 or A490 bolts in a structural steel application. Industry documents including NUREG-1339	changed.	For other structural bolting, that includes ASTM A490 bolts, the guidance for preventive measures are in RCSC publication referenced in this AMP.

Table IV-13. Analysis and Disposition of Public Comments on Chapter XI Structural AMPs, May 2010 Public Comment Draft GALL Report, Rev. 2

Comment Number	Location in Document and Commenter Reference No.	Comment	NRC Disposition	Technical Basis
		have not identified any determination specifically as to the ASTM A-490 material's susceptibility to SCC, but rather a determination of the yield stress level at which generic materials should be considered for the possibility of SCC vulnerability. In order for SCC to occur in high strength bolting, three parameters must exist; (1) a corrosive environment, (2) a susceptible material, and (3) high sustained tensile stresses. The absence of any one of these three parameters eliminates the material's susceptibility to SCC. High Strength Structural Bolts including A490 bolts are not subject to high-sustained preload stress and lubricants containing contaminants, such as MoS_2, are not approved for use. Therefore, SCC is not considered an applicable aging effect requiring management. The structural bolting will continue to be visually inspected for loss of preload due to self loosening and loss of material due to corrosion and also visually monitor the associated structural steel and connections for loss of material or other adverse conditions. The high strength bolts used for structural applications are A325 or A490 Bolts. A325 bolts have a minimum yield of 92 ksi (unlikely to have an actual yield of 150 ksi or more), and A490 bolts have a minimum yield of 130 ksi (potential that some A490 may reach actual yield of 150 ksi or more). Most		

Table IV-13. Analysis and Disposition of Public Comments on Chapter XI Structural AMPs, May 2010 Public Comment Draft GALL Report, Rev. 2

Comment Number	Location in Document and Commenter Reference No.	Comment	NRC Disposition	Technical Basis
		structural bolts are 1” or less in diameter, however bolts in large girders or supporting large equipment may be over 1” diameter. Test reports are not generally traceable to installation locations. The AISC “Guide to Design for Bolted and Riveted Joints” Second Edition published in 2001 addresses this concern in section 4.8 and concludes that the tests indicate that black (not galvanized) A490 bolts can be used without problems from “brittle” failures (failures due to hydrogen stress cracking or SCC) in most environments. It was concluded that galvanized A490 bolts should not be used in structures. This same section also concluded that black and galvanized A325 bolts behave satisfactorily with regard to hydrogen stress and SCC in most corrosive environments. AISC publications do not recommend or require volumetric or surface examinations of installed structural bolts for SCC. We recommend that this new requirement be removed or at the most limited to the specific bolting material types identified in the OE cited on NSSS supports. Volumetric or surface examinations for cracking of high strength bolts should not be generically imposed for all bolts with actual yield strength of 150 ksi or more and greater than 1” diameter. Structural high strength bolts,		

Table IV-13. Analysis and Disposition of Public Comments on Chapter XI Structural AMPs, May 2010 Public Comment Draft GALL Report, Rev. 2

Comment Number	Location in Document and Commenter Reference No.	Comment	NRC Disposition	Technical Basis
		including A325 and A490 bolts do not have a history of SCC in most environments.		
913	XI.S8 ML101830328 Comment XI.S8-1	Program Description and Elements 1, 3, and 10: A coatings program developed to previously approved, and adopted by current licensing basis to in accordance with RG 1.54 Rev. 0 should also meet the aging management program requirements and should be acceptable here as well. Reg. Guide 1.54, Rev 0 is the current licensing basis at a number of plants. The new requirement, compliance with Reg. Guide 1.54 Rev 1 (and later), requires an expanded coating program, and the Rev 2 document (soon to be issued) will require expanded resources including an ASTM qualified "Coating Specialist" at each site. Rev 2 also requires full compliance to ASTM standards that were recently written to support new power plants. We believe the ASTM Committee D33 had no intention that these would be a back fit applied to existing licensed power plants. New ASTM standards have not been reviewed for gaps against ANSI requirements. The current licensing basis commitments are considered appropriate to detect and address coatings condition. We recommend revising this new requirement to state a coating program developed to the previously approved RG 1.54 Rev. 0 and improved in response to GL 98-04 and	The staff disagrees with this comment. The GALL Report has not been changed.	The later standards are appropriate to remain in GALL. The later standards reflect current practices for monitoring and maintaining containment protective coatings. Degradation of the protective coatings can potentially impair safety significant plant systems.

Table IV-13. Analysis and Disposition of Public Comments on Chapter XI Structural AMPs, May 2010 Public Comment Draft GALL Report, Rev. 2

Comment Number	Location in Document and Commenter Reference No.	Comment	NRC Disposition	Technical Basis
		implemented per the Maintenance Rule meets the current licensing basis and should be acceptable in GALL Rev. 2. Otherwise, for license renewal this new requirement will force the licensee to take exception to GALL.		

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Comment Number	Location in Document and Commenter Reference No.	Comment	NRC Disposition	Technical Basis
259	XI.E1 ML101830328 Comment XI.E1-1	Page XI E1-1, Program Description, Paragraph 3: Move the 3rd paragraph to the 1st paragraph. Also, spell out the acronym “AMP.” Consistency with the format of XI.E2 - XI.E4.	The staff agrees with this comment and associated changes to the GALL Report have been made.	Changes incorporated to maintain format consistency within this AMP and with the other electrical AMPs.
260	XI.E1 ML101830328 Comment XI.E1-2	Page XI E1-1, Program Description, Paragraph 2: 7th line: revise “or moisture specification over the specified life (if applicable) of the cables or connection…” to read “or moisture conditions for the cables or connection…” Also make connection plural (i.e. should read connections). Sentence is now consistent with the last sentence in Element 3.	The staff agrees with this comment and associated changes to the GALL Report have been made.	The text in the Program Description was revised for clarity to “...most limiting condition for temperature, radiation, or moisture for the insulation material of cables or connections” and for consistency with the last sentence of Element 3.
261	XI.E1 ML101830328 Comment XI.E1-3	Page XI E1-1, Program Description, Paragraph 2: Last line: revise “plant specific industry operating experience.” to read “plant specific and industry operating experience.” This was also as submitted in our NEI letter to the NRC concerning this topic.	The staff agrees with this comment and associated changes to the GALL Report have been made.	No technical basis is required to incorporate this change (typographical error) as it is editorial in nature.
262	XI.E1 ML101830328 Comment XI.E1-4	Page XI E1-2, Parameters Monitored/Inspected (Element 3), Paragraph 1: line three, change “signs of…” to “indicating we may have…”	The staff partially agrees with this comment and the GALL Report was reworded for clarity.	Staff partially agreed with the comment and the proposed wording was revised for clarity: changed “signs of...” to “indicating signs of...”
263	XI.E1 ML101830328, Comment XI.E1-5	Page XI E1-2, Parameters Monitored/Inspected (Element 3), Paragraph 1: Delete the word “all.” This word would change this effort from reasonable assurance	The staff agrees with this comment and associated changes to the GALL Report	Deleted the word “all” as inclusion of this word would change effort from reasonable assurance to an absolute assurance that would

Table IV-14. Analysis and Disposition of Public Comments on Chapter XI Electrical AMPs, May 2010 Public Comment Draft GALL Report, Rev. 2

Comment Number	Location in Document and Commenter Reference No.	Comment	NRC Disposition	Technical Basis
		to an absolute assurance that would require more than just a visual inspection.	have been made.	require more than just a visual inspection.
264	XI.E1 ML101830328 Comment XI.E1-6	Page XI E1-3, Operating Experience (Element 10), Paragraph 1: line two, the list of environments should read “temperature, radiation, or moisture” [missing commas]	The staff agrees with this comment and associated changes to the GALL Report have been made.	No technical basis is required to incorporate this comment to add the missing commas as it is editorial (typographical error) in nature. The list of environments now reads “…temperature, radiation, or moisture...”
265	XI.E2 ML101830328 Comment XI.E2-1	Page XI E2-1, Program Description, Paragraph 2: Make the first 2 sentences a stand-alone paragraph. Consistent with XI.E1. Or, conversely, make XI.E1 one long paragraph like XI.E2. The change shown is with the paragraph split.	The staff agrees with this comment and associated changes to the GALL Report have been made.	Paragraph was split to be consistent with the 1st two paragraphs of AMP XI.E1 and to maintain consistency within the electrical AMPs.
266	XI.E3 ML101830328 Comment XI.E3-1	Page XI E3-1, Program Description, Paragraph 2: second line, “be” at the end of the line should be “and are”	The staff agrees with this comment and associated changes to the GALL Report have been made.	No technical basis is required to incorporate this comment as this change provides clarification and is editorial (typographical change) in nature.
267	XI.E3 ML101830328 Comment XI.E3-4	Page XI E3-2, Preventive Actions (Element 2), Paragraph 1: change fourth line “conduit ends and…” to “conduit ends in…” [Comments XI.E3-2 and XI.E3-3 were not provided.]	The staff disagrees with this comment. The GALL Report has not been changed.	Staff needs to ensure that both cables in conduits and manholes are free of water. Current operating experience shows that cable failures have occurred because of moisture condensation and potential rain water collection in conduit systems.

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Comment Number	Location in Document and Commenter Reference No.	Comment	NRC Disposition	Technical Basis
268	XI.E3 ML101830328, Comment XI.E3-5	Page XI E3-2, Parameters Monitored/Inspected (Element 3), Paragraph 1: Current change discusses inspection first, then testing. Suggest reversing the order. Cable testing is the primary method for assessing aging of cable insulation.	The staff disagrees with this comment. The GALL Report has not been changed.	This element includes both testing and inspection in the AMPs recommended by the staff.
269	XI.E3 ML101830328 Comment XI.E3-6	Page XI E3-2, Detection of Aging Effects (Element 4), Paragraph 1: First sentence relative to verifying dewatering system operation prior to known or predicted flood events should be deleted. The verification is neither an aging preventive nor an aging detection mechanism. Infrequent submergence (rain and drain) is not a stressor for cable insulation degradation.	The staff disagrees with this comment. However, the comment did result in a change to the GALL Report.	Current NRC inspections have identified that ensuring operability of dewatering devices prior to any known or predicted flooding events is key to prevent potential cable submergence. However, the existing first paragraph in Element 4 was moved to Element 2.
270	XI.E3 ML101830328 Comment XI.E3-7	Page XI E3-2, Detection of Aging Effects (Element 4), Paragraph 1: Second sentence sets maximum frequency at annually, or more frequent based on operating experience. Suggest maximum frequency remain at 2 years.	The staff disagrees with this comment. However, the comment did result in a change to the GALL Report.	Current NRC Reactor Oversight Process inspections have identified that a 2-year inspection frequency is not adequate to prevent cable submergence. A more frequent inspection is required based on operating experience but inspection must be performed at least annually. Note: paragraph 1 of Element 4 was moved and now is paragraph 2 of Element 2 (see Comment 269).
277	XI.E3 ML101830328 Comment	Page XI E3-2, Detection of Aging Effects (Element 4), Paragraph 1: Third sentence, suggest manhole inspections not be required	The staff disagrees with this comment. The GALL Report	This is consistent with NRC Reactor Oversight Process baseline inspection activity. As

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Comment Number	Location in Document and Commenter Reference No.	Comment	NRC Disposition	Technical Basis
	XI.E3-8	if dewatering equipment is functioning. Sump trouble alarms will provide indications of water accumulation. Sump levels ensure cable is not immersed or submerged. Note that Structures Monitoring Program would not be changed regardless of mechanism for dewatering.	has not been changed.	stated in the proposed revision to element 4, the staff expects that the licensee's inspection activity should include direct observation that cables are not wetted or submerged, that cables/splices and cable support structures are intact, and that dewatering/drainage systems (i.e., sump pumps) and associated alarms operate properly. If water is found during inspection (i.e., cable exposed to significant moisture), corrective actions are taken to keep the cable dry and tests performed to assess cable degradation.
278	XI.E3 ML101830328 Comment XI.E3-9	Page XI E3-2, Detection of Aging Effects (Element 4), Paragraph 2: First sentence sets test frequency at once every 3 refueling cycles. Suggest test frequency remain at every 10 years, adjusted for test results as determined through the corrective action process. Or at least use every 6 years instead of every 3R.	The staff partially agrees with this comment. However, the comment did result in a change to the GALL Report.	Staff will revise the testing frequency to every 6 years instead of every 3 refueling cycles. Inspection frequency based on Operating Experience but not to exceed 6 years. More frequent testing is required to monitor the cable performance.
279	XI.E3 ML101830328 Comment XI.E3-10	Page XI E3-2, Detection of Aging Effects (Element 4), Paragraph 1: Move to Element 2 and make frequency commensurate with plant operating experience or corrective action program.	The staff partially agrees with this comment in its entirety. However, the comment did result in a revision to	Staff agreed to move Paragraph 1 of Element 4 to Element 2 as suggested to maintain consistency within this AMP and with the electrical AMPs relative to Element Description and Requirements.

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Comment Number	Location in Document and Commenter Reference No.	Comment	NRC Disposition	Technical Basis
			the GALL Report for clarification.	
281	XI.E3 ML101830328 Comment XI.E3-13	Page XI E3-3, Operating Experience (Element 10), Paragraph 1: First sentence, remove the word “most”	The staff agrees with this comment and associated changes to the GALL Report have been made.	Have removed term “most” and the listing of insulation materials (EPR, HMWPE, and XPLE).
282	XI.E3 ML101830328 Comment XI.E3-14	Page XI E3-4, Operating Experience (Element 10), Paragraph 2 & 3: The paragraphs beginning “The NRC…” and “Therefore…” should be deleted. The information is background/historical information about the process rather than operating experience	The staff disagrees with this comment. The GALL Report has not been changed.	These two paragraphs should not be deleted as they are consistent with NRC review of the current operating experience and cable performance assessment.
283	XI.E4 ML101830328 Comment XI.E4-1	Page XI E4-1, Program Description, Paragraph 2: should clarify the details for the MEB types. Some of this information is specific to a manufacturer, and does not apply to all. The bus being insulated is not applicable to all manufacturers and applications because this is just one way the BIL rating of the bus can be achieved during the design of the bus. For example, corona is not applicable to 480 VAC MEB applications.	The staff agrees with this comment and associated changes to the GALL Report have been made.	Paragraph was revised to address comment and provide clarification of the different types of metal enclosed bus; sentence applying to only some MEBs was deleted.
284	XI.E4 ML101830328 Comment XI.E4-2	Page XI E4-1, Program Description, Paragraph 3: Delete second sentence. First two sentences are redundant	The staff agrees with this comment and associated changes to the GALL Report have been made.	Redundant sentence was deleted. No technical basis is required to incorporate this comment as it is editorial in nature.
285	XI.E4	Page XI E4-1, Program Description,	The staff does not	Revised “is...” to “should be....” No

Table IV-14. Analysis and Disposition of Public Comments on Chapter XI Electrical AMPs, May 2010 Public Comment Draft GALL Report, Rev. 2

Comment Number	Location in Document and Commenter Reference No.	Comment	NRC Disposition	Technical Basis
	ML101830328 Comment XI.E4-3	Paragraph 5: Second sentence change “is…” to “will be….” It is presumed part of program implementation as opposed to part of the LRA Appendices A and/or B.	agree with this comment. However, the comment did result in a change to the GALL Report.	technical basis is required as this change is primarily editorial in nature. Additionally, the Program Description for AMP XI.E6 was revised to be consistent with this wording.
286	XI.E4 ML101830328 Comment XI.E4-4	Page XI E4-2, Detection of Aging Effects (Element 4), Paragraph 2: third sentence, change “part of AMPs documentation” to “part of the AMPs site documentation”	The staff agrees with this comment and associated changes to the GALL Report have been made.	It is acceptable to document the technical basis in onsite documentation instead of LRA.
287	XI.E4 ML101830328 Comment XI.E4-5	Page XI E4-2, Detection of Aging Effects (Element 4), Paragraph 1: Last sentence: revise to read “Accessible elastomers (e.g., gaskets, boots, and sealants) are inspected for degradation including cracking, crazing, shrinkage, discoloration, weathering, hardening and loss of strength.” Note: Corresponding line item in Table VI.A also warrants change. Consistent with elastomer degradation criteria shown in Table IX.F and the term “Hardening and loss of strength” shown in Table IX.E. Proposed wording is also more appropriate for this electrical application.	The staff disagrees with this comment. The GALL Report has not been changed.	The staff wants to ensure that all possible degradations of elastomers, such as surface cracking, crazing, scuffing, dimensional change (e.g., ballooning and necking), shrinkage, discoloration, hardening and loss of strength, are listed during inspection of accessible elastomers.
288	XI.E4 ML101830328 Comment XI.E4-6	Page XI E4-3, Acceptance Criteria (Element 6), Paragraph 1: Acceptance criteria for gaskets is inconsistent with that shown in Element 4. Revise Element 6 consistent with proposal to Element 4. Inconsistency between	The staff agrees with this comment and associated changes to the GALL Report have been made.	Elements 4 and 6 were verified for consistency within the AMP. Additionally, the corresponding AMR item in Table VI.A warranted change and was revised

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Comment Number	Location in Document and Commenter Reference No.	Comment	NRC Disposition	Technical Basis
		elements. Or, simply make Element 4 read identical to Element 6. Note: Corresponding line item in Table VI.A may also warrant change.		accordingly for consistency with Elements 4 and 6. These changes were incorporated for consistency within GALL VI for AMR Item LP-29.
289	XI.E4 ML101830328 Comment XI.E4-7	Page XI E4-3, Corrective Actions (Element 7), Paragraph 1: 1st sentence: revise the word “required” to read “taken.” Typo-consistent with Element 7 in XI.E3.	The staff agrees with this comment and associated changes to the GALL Report have been made.	Change (revised the word “required” to “taken”) incorporated to ensure consistency of this AMP with Element 7 of AMP XI.E3.
290	XI.E5 ML101830328 Comment XI.E5-1	Page XI E5-1, Program Description, Paragraph 1: Consider adding new purpose statement similar to the following as the 1st paragraph, “The purpose of the aging management program (AMP) described herein is to provide reasonable assurance that the intended functions of the metallic clamps of fuse holders located outside of active devices and susceptible to aging effects are maintained consistent with the current licensing basis through the period of extended operation.” Or, use a reasonable facsimile. Consistency with the format of XI.E1 -XI.E4.	The staff partially agrees with this comment and the GALL Report was reworded for clarity.	A new Purpose Statement was added as the 1st paragraph in the Program Description to maintain consistency with format established in AMPs XI.E1 through XI.E4.
291	XI.E5 ML101830328 Comment XI.E5-2	Page XI E5-1, Scope of Program (Element 1), Paragraph 1: 1st sentence: add “electrical transients” between thermal cycling and frequent manipulation. Consistent with corresponding line item in Table VI.A and Element 3.	The staff agrees with this comment and associated changes to the GALL Report have been made.	Change (added “electrical transients” between “thermal cycling and frequent manipulation”) was incorporated to maintain consistency with corresponding AMR line item in GALL Table VI.A.

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Comment Number	Location in Document and Commenter Reference No.	Comment	NRC Disposition	Technical Basis
292	XI.E5 ML101830328 Comment XI.E5-3	Page XI E5-2, Parameters Monitored/Inspected (Element 3), Paragraph 1: Paragraph should begin "The metallic…"	The staff agrees with this comment and associated changes to the GALL Report have been made.	No technical basis is required to incorporate this change (typographical error) as it is editorial in nature.
293	XI.E5 ML101830328 Comment XI.E5-4	Page XI E5-2, Corrective Actions (Element 7), Paragraph 1: 1st sentence: revise the word "required" to read "taken." Typo-consistent with Element 7 in XI.E3.	The staff agrees with this comment and associated changes to the GALL Report have been made.	Revised to be consistent with Element 7 in AMPs XI.E3 and XI.E4.
294	XI.E6 ML101830328 Comment XI.E6-1	Page XI E6-1, Program Description, Paragraph 1: Consider adding new purpose statement similar to the following as the 1st paragraph "The purpose of the aging management program (AMP) described herein is to provide reasonable assurance that the intended functions of the metallic parts of cable connections located outside of active devices and susceptible to age-related degradation resulting in increased resistance of connection due to thermal cycling, ohmic heating, electrical transients, vibration, chemical contamination, corrosion, or oxidation are maintained consistent with the current licensing basis through the period of extended operation." Or, use a reasonable facsimile. Consistency with the format of XI.E1 -XI.E4.	The staff partially agrees with this comment and the GALL Report was reworded for clarity.	A new Purpose Statement was added to maintain consistency with the format established in AMPs XI.E1 through XI.E4. In addition, it includes a 10 CFR 50.49 reference.
295	XI.E6 ML101830328	Page XI E6-2, Parameters Monitored/Inspected (Element 3), Paragraph	The staff disagrees with this comment.	The connections may not be all bolted connections, as there may

Table IV-14. Analysis and Disposition of Public Comments on Chapter XI Electrical AMPs, May 2010 Public Comment Draft GALL Report, Rev. 2

Comment Number	Location in Document and Commenter Reference No.	Comment	NRC Disposition	Technical Basis
	Comment XI.E6-2	1: 2nd to last sentence: delete “connection type” from parameters monitored. Inconsistent with Element 3 of Final LR-ISG-2007-02 dated Dec 15, 2009. Also, the circuit application dictates the type of connection installed. Implementation of this AMP should be dictated by environmental stressors (which is the basis for all electrical AMPs) not the type of connection. If this is intended to indicate bolted connections, the addition in the first sentence is recommended.	The GALL Report has not been changed.	be other types of connections to consider when determining and documenting the technical basis for the representative sample selection.
296	XI.E6 ML101830328 Comment XI.E6-3	Page XI E6-2, Parameters Monitored/Inspected (Element 3), Paragraph 1: Connection type should be deleted. This is not a contributor to stressors.	The staff disagrees with this comment. The GALL Report has not been changed.	They may not be all bolted connections, as there may be other types of connections to consider. See Comment 295.
297	XI.E6 ML101830328 Comment XI.E6-4	Page XI E6-3, Detection of Aging Effects (Element 4), Paragraph 1: last line, change “part of AMPs documentation” to “part of the AMPs site documentation”	The staff agrees with this comment and associated changes to the GALL Report have been made.	It is acceptable to document the technical basis in onsite documentation instead of LRA.

Table IV-15. Analysis and Disposition of Public Comments on General BWR Vessel Internals Aging Management Programs, May 2010 Public Comment Draft GALL Report, Rev. 2

Comment Number	Location in Document and Public ID No.	Comment	NRC Disposition	Technical Basis
916	ML101830255 Comment 1	NRC license renewal guidance documents should identify the BWRVIP as an issue program addressed by the NEI 03-08 materials initiative and should employ a flexible approach that recognizes periodic revisions and updates to the BWRVIP program, Further, it is not necessary for all of the documents supporting the NEI 03-08 materials management programs be submitted to the NRC for review and approval. Providing credit for the NEI 03-08 initiative within the SRP-LR and GALL Report is an efficient use of NRC and industry resources. Under the NEI 03-08 materials initiative, utility compliance is required, implemented via site procedures, covered under 10 CFR 50 Appendix B, and thus is subject [to] NRC oversight. All deviations from “mandatory” or “needed” NEI 03-08 guidance are required to be reported to the NRC.	The staff agrees with this comment and associated changes to the GALL Report have been made.	The staff agrees that NEI 03-08 is a basic document. However, the NRC Staff has a regular review process for BWRVIP documents and will also utilize this process for license renewal. No changes are necessary for the GALL or SRP-LR.
917	ML101830255 Comment 2	The BWRVIP is an active program. Program guidance and implementation requirements are based on relevant current operating experience, substantial field inspection data, and up to date research data. New program documents are routinely published and existing guidance documents are periodically revised as appropriate. When appropriate to address emergent issues, interim guidance is issued to member utilities. Therefore, it should be recognized that it is not feasible for the SRP-LR and GALL Reports to be kept up to	The staff agrees with this comment and associated changes to the GALL Report have been made.	The staff will continue to use the Interim Staff guidance (ISG) process for interim updates to the license renewal guidance documents. Updated industry guidance can be incorporated via an ISG. No changes are necessary for the GALL or SRP-LR. An alternative approach is being adopted (preamble to Chapter XI) that will allow use of later revisions of industry guidance that have

Table IV-15. Analysis and Disposition of Public Comments on General BWR Vessel Internals Aging Management Programs, May 2010 Public Comment Draft GALL Report, Rev. 2

Comment Number	Location in Document and Public ID No.	Comment	NRC Disposition	Technical Basis
		date with the EPRI BWRVIP program. Further, member utilities are required to implement new guidance as a part of the NEI 03-08 initiative, Discrepancies between member utility BWRVIP program implementation and the program documents and requirements cited in the SRP-LR and GALL Report will necessarily result. When discrepancies occur, industry and NRC resources are unnecessarily expended on reconciliation of the differences. Instead, the BWRVIP maintains that license renewal guidance related to program implementation should focus on describing program elements and the related means of NRC oversight. Toward this objective, the BWRVIP recommends the following for implementation in the SRP-LR and GALL Report: - It is appropriate to cite BWRVIP Inspection and Evaluation Guidelines that are submitted to the NRC for review and approval as effective aging management programs. However, where cited, the SRP-LR and GALL Report should stipulate “or latest NRC approved version.” - Inspection and Evaluation Guidelines submitted to the staff for review and approval, but which are not yet approved, can and should be cited in the SRP-LR and GALL Report. This is consistent with other documents which are not directly approved by the staff, but		been approved by the staff for generic use (via ISG, regulatory guide, topical report review, incorporation into 10 CFR). If only plant specific precedent exists for use, then applicants may request to use the later revision by taking an exception to the GALL Report and reference the precedent which provides high degree of confidence the exception will be acceptable. The BWRVIP program provides design criteria. When accepted by the NRC they are incorporated into the GALL. The GALL has been revised to reflect that actual plant procedures to implement the BWRVIP repair and design criteria are plant specific.

Table IV-15. Analysis and Disposition of Public Comments on General BWR Vessel Internals Aging Management Programs, May 2010 Public Comment Draft GALL Report, Rev. 2

Comment Number	Location in Document and Public ID No.	Comment	NRC Disposition	Technical Basis
		have been cited as bases for aging management. - Water chemistry guidelines, although not submitted to the staff for review and approval, are addressed by the NEI 03-08 materials initiative, Compliance with water chemistry action levels is considered "needed" under the initiative and implemented by site procedures. Compliance is verified by Institute of Nuclear Power Operations during review visits. - Other BWRVIP reports can be cited as supporting references, but should not be specifically credited for aging management in the SRP-LR or GALL Report. These include repair design criteria, crack growth rate evaluations, and other technical basis documents.		
918	ML101830255 Comment 3	Aging management review line items and summary items included in the SRP-LR and GALL Report should address components and materials known to be typically used in the U.S. BWR fleet in passive and long-lived applications. In many cases, aging management review items in sections IV.AI and IV.B1 of the GALL Report include component and material combinations not typical of the domestic BWR fleet. EPRI Report 1018111, "BWRVIP-167NP, Revision 1: BWR Vessel and Internals Project: Boiling Water Reactor Issue Management Tables" is a non-proprietary, publically available document developed by the BWRVIP that can	The staff disagrees with this comment. The GALL Report has not been changed.	While some of the GALL line items may not reflect current domestic fleet components and materials, the information will be retained in the GALL for potential future use by domestic applicants. Applicants are not affected by having this information retained in the GALL.

Table IV-15. Analysis and Disposition of Public Comments on General BWR Vessel Internals Aging Management Programs, May 2010 Public Comment Draft GALL Report, Rev. 2

Comment Number	Location in Document and Public ID No.	Comment	NRC Disposition	Technical Basis
		be used by NRC staff to identify typical component and material combinations for BWR reactor vessel and reactor internals components.		

Table IV-16. Analysis and Disposition of Chapter 1 Public Comments on May 2010 Public Comment Draft SRP-LR, Rev. 2

Comment Number	Location in Document and Public ID No.	Comment	NRC Disposition	Technical Basis
N/A	N/A	There were no public comments on Chapter 1 of the SRP-LR	N/A	N/A

Table IV-17. Analysis and Disposition of Chapter 2 Public Comments on May 2010 Public Comment Draft SRP-LR, Rev. 2

Comment Number	Location in Document and Commenter Reference No.	Comment	NRC Disposition	Technical Basis
241	2.1 ML101830328 Comment 2.1.3-1	Page 2.1-9, Paragraph 5, grammatical: Remove proposed change in last sentence, and change existing word “included” to “considered.”	The staff disagrees with this comment. The SRP-LR has not been changed.	Wording is consistent with RG 1.155 and SBO ISG 2.
242	2.1 ML101830328 Comment 2.1.3-2	Page 2.1-9, Paragraph 5: Add new final sentence “However, the staff review is based on the plant-specific current licensing basis, regulatory requirements, and offsite power design configurations.” This is similar to Section 2.5.2.1.1.	The staff agrees with this comment and associated changes to the SRP-LR have been made.	Consistent with 10 CFR 54.30. Also, consistent with addition made in SRP 2.5.2.1.1 and GALL Report, Chapter VI.
243	2.5 ML101830328 Comment 2.5-1	Page 2.5-3, Section 2.5.2.1.1: third bullet; Components Within the Scope of SBO (10 CFR 50.63) Add new final sentence “However, the staff review is based on the plant-specific current licensing basis, regulatory requirements, and offsite power design configurations.”	The staff agrees with this comment and associated changes to the SRP-LR have been made.	Consistent with 10 CFR 54.30. Also, consistent with addition made in SRP 2.5.2.1.1 and GALL Report, Chapter VI.
244	2.5 ML101830328 Comment 2.5-2	Page 2.5-3, Section 2.5.2.1.1, “Components Within the Scope of SBO (10 CFR 50.63), third bullet, third sentence, change wording from “circuit breakers” to “inter-tie devices” to keep the same terminology as the previous added sentence.	The staff disagrees with this comment.	Wording should be consistent within SRP 2.5.2.1.1. The third sentence was not changed. Replaced “inter-tie devices” with “circuit breakers” in the second sentence. Changes are consistent with wording in the GALL Report, Chapter VI.
245	2.5 ML101830328 Comment 2.5-3	Page 2.5-3 and 2.5-4, Section 2.5.3, Review Procedures, 3rd paragraph, The last paragraph on page 2.5-3 that is cont. to the top of page 2.5-4 needs to be revised to clarify TLAAs associated with EQ	The staff disagrees with this comment. The SRP-LR has not been changed.	Kept wording consistent with 10 CFR 50.49.

Table IV-17. Analysis and Disposition of Chapter 2 Public Comments on May 2010 Public Comment Draft SRP-LR, Rev. 2

Comment Number	Location in Document and Commenter Reference No.	Comment	NRC Disposition	Technical Basis
		qualifications. Roger to provide proposed markup, [which follows:] Page 2.5-3 and 2.5-4, Section 2.5.3 The scope of 10 CFR 50.49 electric equipment to be included within 10 CFR 54.4(a)(3) is that “long-lived” (qualified life of 40 years or greater) equipment already identified by licensees under 10 CFR 50.49(b), which specifies certain electric equipment important to safety. Licensees may rely upon their listing of environmental qualification equipment, as required by 10 CFR 50.49(d), for purposes of satisfying 10 CFR 54.4(a)(3) with respect to equipment within the scope of 10 CFR 50.49 (60 FR 22466). However, the License Renewal Rule has a requirement (10 CFR 54.21(c)) on the evaluation of TLAAs, including environmental qualification (10 CFR 50.49) analyses or calculations. Environmental qualification ~~equipment is~~ analyses are not limited to analyses for “passive” equipment. The applicant may identify environmental qualification ~~equipment~~ analyses separately for TLAA evaluation and not include ~~such~~ the equipment covered by such analyses as subject to an AMR under 10 CFR 54.21(a)(1). The environmental qualification ~~equipment~~ analyses identified for TLAA evaluation would include the “passive” environmental qualification equipment that is not subject to an AMR because it is subject to replacement based on a qualified life. The TLAA evaluation		

Table IV-17. Analysis and Disposition of Chapter 2 Public Comments on May 2010 Public Comment Draft SRP-LR, Rev. 2

Comment Number	Location in Document and Commenter Reference No.	Comment	NRC Disposition	Technical Basis
		would ensure that the environmental qualification ~~equipment~~ analyses would ~~be~~ show the qualified equipment to be functional for the period of extended operation. The staff reviews the applicant's environmental qualification TLAA evaluation separately following the guidance in Section 4.4.		
246	2.5 ML101830328 Comment 2.5-4	Page 2.5-4, Section 2.5.3.1, "Components within the Scope of License Renewal," paragraph 1; First and Second lines use "component types/commodity groups" instead of "components" Page 2.5-4, Section 2.5.3.1 In this step, the staff determines whether the applicant has properly identified the ~~components~~ component types/commodity groups that are WSLR. The Rule requires that the LRA identify and list ~~components~~ component types/commodity groups that are WSLR and are subject to an AMR. Whereas, in the past, LRAs have included a table of components that are WSLR, generally that information need not be submitted with future LRAs. Although that information will be available at plant sites for inspection, the reviewer must determine through sampling of one line diagrams, and review of UFSAR and other plant documents, what portion of the components are WSLR. The reviewer must check to see if any components exist that the staff believes are within the scope but are not identified by the applicant as being subject to	The staff disagrees with this comment. The SRP-LR has not been changed.	The terminology used is consistent with 10 CFR 54.4

Table IV-17. Analysis and Disposition of Chapter 2 Public Comments on May 2010 Public Comment Draft SRP-LR, Rev. 2

Comment Number	Location in Document and Commenter Reference No.	Comment	NRC Disposition	Technical Basis
		AMR (any request that the applicant provide justification for omitting those components that are “passive” and “long lived”).		

Table IV-18. Analysis and Disposition of Chapter 3 Public Comments on May 2010 Public Comment Draft SRP-LR, Rev. 2

Comment Number	Location in Document and Commenter Reference No.	Comment	NRC Disposition	Technical Basis
247	3.0 ML101830328 Comment 3.0-1	Page 3.0-1, Section 3.0.1, "Background on the Types of Reviews," Paragraph 1, second line "with" should be replaced by "within"	The staff agrees with this comment and associated changes to the SRP-LR have been made.	No technical basis is required to incorporate this change as it is editorial in nature.
248	3.0 ML101830328 Comment 3.0-2	Page 3.0-11, Table 3.0-1, "FSAR Supplement for Aging Management of Applicable Systems," Paragraph 3 (XI.E6), fifth line: add a space between "that" and "period"	The staff agrees with this comment and associated changes to the SRP-LR have been made.	No technical basis is required to incorporate this change (typographical error) as it is editorial in nature.
249	3.0 ML101830328 Comment 3.0-3	Page 3.0-14, Table 3.0-1, Paragraph 4 (XI.E3), first line: "call" should be "calls"	The staff agrees with this comment and associated changes to the SRP-LR have been made.	No technical basis is required to incorporate this change (typographical error) as it is editorial in nature.
250	3.0 ML101830328 Comment 3.0-4	Page 3.0-14, Table 3.0-1, Paragraph 4 (XI.E3): The frequency for this program is at least once every 5 years. The value used in GALL is 3R instead of 5 years. Neither is acceptable, but they should be consistent. The frequency of at least once every 10 years should be used with the statement that the licensee must justify this frequency. As a minimum the value of 6 years should be used. The frequency of the manhole inspections should be changed to every 2 years or reflect that annually this is a sample similar to the regional inspections for Part 50.	The staff partially agrees with this comment and the SRP-LR was reworded for clarity.	Ten years was based on historical data. However, GL 2007-01 provides data on cable failures that justify the increase in frequency. This is based on plant-specific operating experience. Change to 6 years is consistent with wording in AMP XI.E3 (Inaccessible Power Cables Not Subject to 10 CFR 50.49 Environmental Qualification Requirements.). Frequency of manhole inspections should be every year and NOT on a sampling basis. Require 100% inspection every year. NRC flooding procedure is broader and

Table IV-18. Analysis and Disposition of Chapter 3 Public Comments on May 2010 Public Comment Draft SRP-LR, Rev. 2

Comment Number	Location in Document and Commenter Reference No.	Comment	NRC Disposition	Technical Basis
				is on a sampling basis. Wording is consistent with AMP XI.E3.
251	3.0 ML101830328 Comment 3.0-5	Page 3.0-16, Table 3.0-1, Paragraph 1 (XI.E2): Revise the 1st paragraph to read: "The program calls for the review of calibration results or findings of surveillance tests on electrical cables and connections used in circuits with sensitive, high-voltage, low-level current signals, such as radiation monitoring and nuclear instrumentation, to 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, severe aging degradation may be detected prior to the loss of the cable and connection intended function. The review of calibration results or findings of surveillance tests is performed once every 10 years." This paragraph is confusing and technically incorrect. Normal instrument loop calibration results or surveillance tests do not provide sufficient indication to determine severe aging degradation on electrical cables and connections used in circuits with sensitive, high-voltage, low-level current signals, such as radiation monitoring and nuclear instrumentation prior to a loss of function. New paragraph as written is consistent with Element 4 of NUREG-1801, XI.E2.	The staff agrees with this comment and associated changes to the SRP-LR have been made.	No technical basis is required to incorporate this clarification change as it is editorial in nature.
252	3.0	Page 3.0-14, Table 3.0-1,The program call for	The staff partially	All changes incorporated are

Table IV-18. Analysis and Disposition of Chapter 3 Public Comments on May 2010 Public Comment Draft SRP-LR, Rev. 2

Comment Number	Location in Document and Commenter Reference No.	Comment	NRC Disposition	Technical Basis
	ML101830328 Comment 3.0-14	inaccessible or underground power (greater than or equal to 480 volts) cables exposed to significant moisture to be tested at least once every (remove 5 and replace with 6) six (6) years to provide an indication of the condition of the conductor insulation. The specific type of test performed is determined prior to the initial test, and is to be a proven test for detecting deterioration of the insulation system due to wetting. The applicant can assess the condition of the cable insulation with reasonable confidence using one or more of the following techniques: Dielectric Loss (Dissipation Factor/Power Factor), AC Voltage Withstand, Partial Discharge, Step Voltage, Time Domain Reflectometry, Insulation Resistance and Polarization Index, Line Resonance Analysis or other testing that is state-of-the-art at the time the tests are performed. Periodic exposure to moisture for more than a few days at a time is not significant for power cables that are designed for these conditions (e.g., continuous wetting or submergence are not significant for submarine cables). In addition, inspection for water collection is established and performed based on plant-specific operating experience with water accumulation in the manholes (i.e., operation of dewatering devices should be inspected and operation verified prior to any known or predicted flooding events). However, the inspection frequency is at least (remove annual) ~~annual~~ (and replace with	agrees with this comment and has revised the SRP-LR for clarification.	consistent with AMP XI.E3 and require 100% (NOT on a sampling basis) inspection every year consistent with the NRC Inspection Procedure frequency.

Table IV-18. Analysis and Disposition of Chapter 3 Public Comments on May 2010 Public Comment Draft SRP-LR, Rev. 2

Comment Number	Location in Document and Commenter Reference No.	Comment	NRC Disposition	Technical Basis
		once every two (2) years) once every two (2) years.		
253	3.0 ML101830328 Comment 3.0-16	Page 3.0-16, Table 3.0-1, The program calls for the review of calibration results or findings of surveillance tests on electrical cables and connections used in circuits with sensitive, high-voltage, low-level current signals, such as radiation monitoring and nuclear instrumentation, (remove) to be calibrated as part of the instrumentation loop calibration at the normal calibration frequency (end of removal) (add) to provide an indication of the existence of aging effects based on acceptance criteria related to instrumentation circuit performance.(end of addition)(remove) This calibration provides sufficient indication of the need for corrective actions based on acceptance criteria related to instrumentation loop performance.(end of removal) (add) By reviewing the results obtained during normal calibration or surveillance, severe aging degradation may be detected prior to the loss of the cable and connection intended function.(end of addition) The review of calibration results (add) or findings of surveillance tests (end of addition) is performed once every 10 years. In cases where cables are not part of calibration or surveillance program, a proven cable test (such as insulation resistance tests, time domain reflectometry tests, or other tests judged to be effective) for detecting	The staff agrees with this comment and associated changes to the SRP-LR have been made.	No technical basis is required to incorporate this clarification change as it is editorial in nature. (See Comment 251.)

Table IV-18. Analysis and Disposition of Chapter 3 Public Comments on May 2010 Public Comment Draft SRP-LR, Rev. 2

Comment Number	Location in Document and Commenter Reference No.	Comment	NRC Disposition	Technical Basis
		deterioration of the insulation system are performed. The test frequency is based on engineering evaluation and is at least once every 10 years.		
358	3.0 ML101830328, Comment 18	SRP, Table 3.0-1, The ASME Section XI, Subsection IWE program consists of periodic visual, surface, and volumetric inspection of pressure-retaining components of steel and concrete containments for signs of degradation, assessment of damage, and corrective actions. The program also includes aging management for the potential loss of material due to corrosion in the inaccessible areas of the boiling water reactor (BWR) Mark I steel containment, (DELETE) and surface examination for the detection of cracking of structural bolting (end of deletion). This program is in accordance with ASME Section XI, Subsection IWE, (DELETE) 20014 (end of deletion) (ADD) 2004 (end of addition) edition, including the 2002 and 2003 Addenda. IWE addresses pressure retaining bolting.	The staff partially disagrees with this comment. Some changes to the SRP-LR have been made.	AMP XI.S1, addresses both pressure retaining and structural bolting. ASME Code Edition corrections have been made.
360	3.0 ML101830328, Comment 19	[Revise SRP, Table 3.0-1, XI.M26, Fire Protection as shown below to delete reference to the diesel-driven fire pump:] The program includes fire barrier ~~and diesel-driven fire pump~~ inspections. The fire barrier inspection program requires periodic visual inspection of fire barrier penetration seals, fire barrier walls, ceilings, and floors, and periodic visual inspection and functional tests of fire	The staff agrees with this comment and associated changes to the SRP-LR have been made.	The scope of XI.M26 was revised to delete inspection and performance testing of the diesel-driven fire pump. The change is consistent with the scope of the XI.M26, Fire Protection, as revised in GALL Report, Revision 2.

Table IV-18. Analysis and Disposition of Chapter 3 Public Comments on May 2010 Public Comment Draft SRP-LR, Rev. 2

Comment Number	Location in Document and Commenter Reference No.	Comment	NRC Disposition	Technical Basis
		rated doors to ensure that their operability is maintained. ~~The diesel-driven fire pump inspection program requires that the pump be periodically tested to ensure that the fuel supply line can perform the intended function.~~ The program also includes periodic inspection and test of halon/carbon dioxide fire suppression systems.		
361	Table 3.0-1 ML101830328, Comment 20	The program evaluates the effectiveness of the maintenance monitoring program and the effects of past and future usage on the structural reliability of cranes and hoists. (DELETE) The number and magnitude of lifts made by the hoist or crane are also reviewed. (KEEP) Rails and girders are visually inspected on a routine basis for degradation; functional tests are performed to assure their integrity. These cranes must also comply with the maintenance rule requirements provided in 10 CFR 50.65. To match the scope of XI.M23 Inspection of Overhead Heavy Load and Light Load Handling Related to Refueling) Handling Systems.	The staff disagrees with this comment. The SRP-LR has not been changed.	It is necessary to review the number and magnitude of lifts because this information is needed for TLAA purposes to ensure that the number of lifts remain below the design number.
837	3.1 ML101880269 Comment 39	SRP Section 3.1.2.2.3: Based on Comments 3, 4, and 5 this section should be eliminated. [Comments 3, 4, and 5 refer to comment numbers 863, 864 and 945, respectively of NUREG-1950.] The use of an AMP consistent with GALL should not require further evaluation.	The staff disagrees with this comment. The SRP-LR has not been changed.	The staff disagreed with comments 3, 4, and 5, to which this comment refers; therefore this comment is not applicable. Refer to NUREG-1950 comment numbers 863, 864, and 945 for technical basis.
958	3.1	SRP Section 3.1.2.2.9: Based on	The staff disagrees	The staff disagreed with comments

Table IV-18. Analysis and Disposition of Chapter 3 Public Comments on May 2010 Public Comment Draft SRP-LR, Rev. 2

Comment Number	Location in Document and Commenter Reference No.	Comment	NRC Disposition	Technical Basis
	ML101880269 Comment 40	Comments 6, 8, and 10, this section should be eliminated. [Comments 6, 8, and 10 refer to comment numbers 866, 868, and 870, respectively.] The NRC staff review of MRP-227 should address this issue and provide guidance in the SE that is to be issued.	with this comment. The SRP-LR has not been changed.	6, 8, and 10, to which this comment refers; therefore this comment is not applicable. Refer to NUREG-1950 comment numbers 866, 868, and 870 for technical basis.
959	3.1 ML101880269 Comment 41	SRP Section 3.1.2.2.10: Based on Comments 7, 9, and 11, this section should be eliminated. [Comments 7, 9, and 11 refer to comments 867, 869, and 871, respectively.] The NRC staff review of MRP-227 should address this issue and provide guidance in the SE that is to be issued.	The staff disagrees with this comment. The SRP-LR has not been changed.	The staff disagreed with comments 7, 9, and 11, to which this comment refers; therefore this comment is not applicable. Refer to NUREG-1950 comment numbers 867, 869 and 871 for technical basis. .
960	3.1 ML101880269 Comment 42	SRP Section 3.1.3.2.9: Delete this section. There are no further evaluation required (FER) items that refer to this section. It is a duplicate of Section 3.1.2.2.9.	The staff disagrees with this comment. The SRP-LR has not been changed.	SRP Section 3.1.3.2.9 is a companion section for SRP Section 3.1.2.2.9. Section 3.1.2.2.9 provides the further evaluation recommendation; Section 3.1.3.2.9 provides guidance for the staff reviewer. Consequently, Section 3.1.3.2.9 should not be deleted. The FER items refer to the further evaluation recommendation, not the reviewer guidance. Therefore, no change is needed.
961	3.1 ML101880269	SRP Section 3.1.3.2.10: Delete this section. There are no FER items that refer to this	The staff disagrees with this comment. The SRP-LR has not	SRP subsection 3.1.3.2.10 is a companion section for SRP subsection 3.1.2.2.10. Section

Table IV-18. Analysis and Disposition of Chapter 3 Public Comments on May 2010 Public Comment Draft SRP-LR, Rev. 2

Comment Number	Location in Document and Commenter Reference No.	Comment	NRC Disposition	Technical Basis
	Comment 43	section. It is a duplicate of Section 3.1.2.2.10.	been changed	3.1.2.2.10 provides the further evaluation requirement (FER); subsection 3.1.3.2.10 provides guidance for the staff reviewer. Consequently, subsection 3.1.3.2.10 should not be deleted. The FER items refer to the further evaluation requirement, not the reviewer guidance. Therefore, no change is needed.
962	Table 3.1-21 ML101880269 Comment 44	SRP Table 3.1-21: See Comments 3, 4, 5, and 21. (strikethrough)Yes, plant-specific (See subsection 3.1.2.2.3.2),(strikethrough)(underline)No [Comments 3, 4, 5, and 21 refer to comment numbers 863, 864, 945,and 881, respectively.] The use of an AMP consistent with GALL should not require further evaluation.	The staff disagrees with this comment. The SRP has not been changed.	The staff disagreed with comments 3, 4, 5, and 21 to which this comment refers; therefore this comment is not applicable. Refer to NUREG-1950 comment numbers 863, 864, 945, and 881 for technical basis.
963	Table 3.1-25 ML101880269 Comment 45	SRP Table 3.1-25: See Comment 13. To accommodate the “Pressurizer relief tank: tank shell and heads; flanges; nozzles” managed by “Chapter XI.M2, “Water Chemistry,” and Chapter XI.M32, “One-Time Inspection,” add “IV.C2.RP-XXX” to the Rev2 Item Column. The pressurizer spray head is also a non-ASME Section XI component that is managed by the same AMPs (see page IV.C2-8, AMR line IV.C2.RP-41) for the same aging effect.	The staff agrees with this comment and associated changes to the SRP-LR have been made.	A new AMR item (IV.C2.RP-383) has been added for non-ASME pressurizer components. The combination of the Water Chemistry and One-Time Inspection programs has previously been found adequate to manage this material, environment and aging effect combination for non-ASME components.
964	3.2 ML101880269,	SRP Section 3.2.3.2.6: Delete this section. There are no FER items that refer to this	The staff disagrees with this comment.	SRP subsection 3.2.3.2.6 is a companion section for SRP

Table IV-18. Analysis and Disposition of Chapter 3 Public Comments on May 2010 Public Comment Draft SRP-LR, Rev. 2

Comment Number	Location in Document and Commenter Reference No.	Comment	NRC Disposition	Technical Basis
	Comment 46	section. It is a duplicate of Section 3.2.2.2.6.	The SRP-LR has not been changed	subsection 3.2.2.2.6. Subsection 3.2.2.2.6 provides the further evaluation requirement; subsection 3.2.3.2.6 provides guidance for the staff reviewer. Consequently, subsection 3.2.3.2.6 cannot be deleted. The further evaluation recommendation (FER) items refer to the further evaluation recommendation, not the reviewer guidance. Therefore, no change is needed.
965	3.2 ML101880269, Comment 47	SRP Table 3.2-12: See Comments 18, 19, and 20. [Comments 18, 19, and 20 refer to comment numbers 879, 880, and 947, respectively in NUREG-1950.] Revise the roll up line as follows: [see original document for the table within the table that goes with this comment] [Referring to AMR Items V.B.EP-103, V.C.EP-103, V.D1.EP-103, V.D2.EP-103: (ADD) Reference to V.B.EP-XXX (DELETE) Chapter XI.M1, “ASME Section XI Inservice Inspection, Subsections IWB, IWC, and IWD” for ASME Code components or (KEEP) Chapter XI.M36, “External Surfaces Monitoring of Mechanical Components” for non-ASME Code components (ADD) or None] There is a lack of operating experience to support aging effects associated with the described material-environment and ISI is not	The staff agrees with this comment and associated changes to the SRP-LR have been made.	The staff agreed with Comments 18, 19, and 20 related to the GALL Report, as documented in NUREG-1950 comments number 879, 880, and 947, respectively. Conforming changes were made in the SRP. Refer to comments number 879, 880, and 947 for the technical basis for changes in the GALL Report.

Table IV-18. Analysis and Disposition of Chapter 3 Public Comments on May 2010 Public Comment Draft SRP-LR, Rev. 2

Comment Number	Location in Document and Commenter Reference No.	Comment	NRC Disposition	Technical Basis
		adequate to manage component external surfaces. This is a generic comment applicable to Chapters VII and VIII. If the evaluation performed to address FER 3.2.2.2.6 determines that the conditions described are not applicable then a corresponding AMR line is required.		
362	Table 3.5-1 Item 22 ML101830328 Comment 21	DELETE) Structural (KEEP) Pressure - retaining bolting, Steel elements: downcomer pipes Chapter XI.S1, "ASME Section XI, Subsection IWE" applies to containment pressure - retaining bolting only.	The staff disagrees with this comment. The SRP-LR has not been changed	Structural bolting associated with downcomers and vent headers in BWR Mk I containments may not be pressure boundary bolting. However, they should be examined.
363	Table 3.5-1 Item 58 ML101830328 Comment 22	III.B1.1.TP-41 (DELETE) III.B2.TP-41 (DELETE) III.B3.TP-41	The staff agrees with this comment and associated changes to the GALL Report have been made.	This is a duplicate of III.B2.TP-41 and III.B3.TP-41.
364	Table 3.5-1 Item 65 ML101830328 Comment 23	Delete this line item. The aging effect for the block walls are adequately covered under line item III.A5.T-12.	The staff disagrees with this comment. The SRP-LR has not been changed	The aging effects in TP-34 are different than those in T-12.
365	Table 3.5-1 Item 77 ML101830328 Comment 24	1. (DELETE) High-strength structural bolting, (KEEP) Support members; welds; bolted connections; support anchorage to building structure 2. (DELETE) III.A1.TP-287, III.A2.TP-287,	The staff partially agrees with this comment; however, the SRP-LR has not been changed.	High-strength structural bolting is only called out separately for aging effect of cracking. For all other aging effects, there is no need to identify high-strength structural

Table IV-18. Analysis and Disposition of Chapter 3 Public Comments on May 2010 Public Comment Draft SRP-LR, Rev. 2

Comment Number	Location in Document and Commenter Reference No.	Comment	NRC Disposition	Technical Basis
		III.A3.TP-287, III.A4.TP-287, III.A5.TP-287, III.A7.TP-287, III.A8.TP-287, III.A9.TP-287, III.B2.TP-287, III.B3.TP-287, III.B4.TP-287, and III.B5.TP-287 1 & 2) These line items are covered under III.A1.TP-248 and III.A1.TP-274.		bolting from any other structural bolting. TP-287 was deleted because it did not address cracking. TP-248 and TP-274 address other aging effects.
366	Table 3.5-1 Item 76 ML101830328 Comment 25	Delete these line items. These line items are not supported by OE and should be removed or limited to the specific type of bolting material and sizes where cracking has been found on NSSS supports. It is not warranted to generically extend the limited material specific OE (which may be partially caused by the type of lubricant) to all bolts of 150 ksi and over regardless of material and lubricant.	The staff partially agrees with this comment and some changes have been made to the SRP-LR.	Item 76 in the SRP-LR draft for comment became Item 69 in SRP-LR Final. A note was added stating ASTM A325, F1852, and A490 bolts are not prone to SCC.
254	3.6 ML101830328 Comment 3.6-1	Page 3.6-4, Section 3.6.3.2 (All): All of the subsections of 3.6.3.2 seem to be a repeat of Section 3.6.2.2. There are slight differences, but this is unnecessary repetition of information.	The staff disagrees with this comment. The SRP-LR has not been changed.	These are different sections of the SRP. The text is repeated because one section is the FE recommendation and the other is the associated staff evaluation paragraph.
255	3.6 ML101830328 Comment 3.6-2	Page 3.6-8, Table 3.6-1, “Summary of Aging Management Programs for the Electrical Components Evaluated in Chapter VI of the GALL Report” (All): Order of table entries appears random. Suggest alphabetical by Component but rather the intent is to keep commodity groups together.	The staff disagrees with this comment. The SRP-LR has not been changed.	The proposed change does not enhance technical value. Table order is consistent with GALL Report Table.

Table IV-19. Analysis and Disposition of Chapter 4 Public Comments on May 2010 Public Comment Draft SRP-LR, Rev. 2

Comment Number	Location in Document and Commenter Reference No.	Comment	NRC Disposition	Technical Basis
511	4.2.2.1.1.2 ML101830328	In several places, ft-lb were changed to joules, such as replacing “50 ft-lb” with “68 joules (50 ft-lb).” As ft-lb is more common usage than joules, shouldn’t this say “50 ft-lb (68 joules)”? This would then be consistent with the format in 10 CFR 50, Appendix G.	The staff agrees with this comment and associated changes to the SRP-LR have been made.	No technical basis is required to incorporate this clarification change as it is editorial in nature. Not a technical issue.
512	4.2.2.1.4.1 ML101830328	Minor wording changes only. 10 CFR 54.21(c)(1)(iii) An applicant for renewal of a license should address this issue by noting that it will be handled through a re-application under 10 CFR 50.55a(a)(3). An applicant for ~~a~~ license ~~to operate such~~ renewal <u>of</u> a BWR may provide justification to extend this relief into the period of extended operation in accordance with BWRVIP-74-A (Ref 8), which is the revised and NRC approved version of BWRVIP-74 (Ref. 9). The staff’s review of BWRVIP-74 (Ref. 9) is contained in an October 18, 2001 letter to C. Terry, BWRVIP Chairman (Ref. 10). ~~Section A.4.5 of Report BWRVIP-74-A indicates that~~ Appendix E of the staff’s final safety evaluation report (FSER) (Ref. 10) conservatively evaluated BWR RPV’s to ~~have~~ 64 effective full power years (EFPY), which is 10 EFPY greater than the maximum of what is realistically expected for the end of the license renewal period. Since this is a generic analysis, a licensee relying on BWRVIP-74-A should provide plant-specific information to demonstrate that at the end of the renewal period, the circumferential beltline weld	The staff partially agrees with this comment and some changes to the SRP-LR have been made.	No technical basis is required to incorporate this clarification change as it is editorial in nature. Not a technical issue.

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		materials meet the limiting conditional failure probability for circumferential welds specified in Appendix E of the FSER (Ref. 10) and that operator training and procedures are utilized during the license renewal term to limit the frequency for cold over-pressure events to the amount specified in the NRC FSER (Ref. 10).		
513	4.2.3.1.1 ML101830328	Put the discussion of neutron fluence after 4.2.3.1.1 and before 4.2.1.1.1/4.2.3.1.1.2/4.2.3.1.1.3 as it applies to all three subsections.	The staff disagrees with this comment. The SRP-LR has not been changed.	Subsections 4.2.3.1.1.1 and 4.2.3.1.1.2 contain discussions of neutron fluence that are understandable as written. The discussion in subsection 4.2.3.1.1.3 does not contain a discussion of neutron fluence because the subsection recommends that applicants demonstrate that the effects will be adequately managed for the period of extended operation on a case-by-case basis.
514	4.2.3.1.1.2 ML101830328	The second half of this section is confusing. Many plants have surveillance data that shows a larger drop in USE than that predicted by RG 1.99 Revision 2, Position 1. RG 1.99 Position 2 allows the adjustment of the predicted USE based on the plant's surveillance data. Only plants without adequate surveillance data to make the adjustment could have larger reductions in USE than that predicted by RG 1.99. In the BWRVIP Integrated Surveillance Program, there is no BWR in this condition. Suggest	The staff disagrees with this comment. The SRP-LR has not been changed.	Applicants must demonstrate that the projected percent reduction in Charpy USE for their beltline materials is less than that specified for the limiting materials in BWRVIP-74-A and the projected reduction in Charpy USE for their surveillance materials are less than or equal the values projected using NRC RG 1.99, Revision 2. These are two different analyses and both are required to

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		rewording the last part of the paragraph as shown below. For Boiling Water Reactors, the staff confirms that the beltline materials are evaluated in accordance with Renewal Applicant Action Item 10 in the staff's SER, for BWRVIP-74 (Letter to C. Terry dated October 18, 2001) (Ref. 10). Action Item 10: To demonstrate that the beltline materials meet the Charpy USE criteria specified in Appendix B of BWRVIP-74-A or the NRC FSER (Ref. 10), the applicant demonstrates that the <u>projected</u> percent reduction in Charpy USE for their beltline materials is less than that specified for the limiting BWR/3-6 plates and the <u>limiting</u> non-Linde 80 submerged arc welds. ~~and that the percent reduction in Charpy USE for their surveillance weld and plate are less than or equal to the values projected using the methodology in NRC RG 1.99, Revision 2.~~ If there should be a BWR with more embrittlement than RG 1.99 Position 1 and not enough credible surveillance data to correct it (say someone drops out of the ISP for some reason); the real question is what action would the staff require in this case?		demonstrate the applicant's Charpy USE meets the criteria in BWRVIP-74. Staff will review this on a case-by-case basis.
515	4.2.3.1.3 ML101830328	Put the discussion of neutron fluence after 4.2.3.1.3 and before 4.2.1.3.1/4.3.2.1.4.2/4.2.1.3.3 as it applies to all three subsections. Does every plant use ¾ T to determine P-T	The staff disagrees with this comment. The SRP-LR has not been changed.	Subsections 4.2.3.1.3.1 and 4.2.3.1.3.2 contain discussions of neutron fluence that are understandable as written. The discussion in subsection 4.2.3.1.3.3 does not contain a

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		limits? If not, this should just say ¼ T.		discussion of neutron fluence because the subsection recommends that applicants demonstrate that the effects will be adequately managed for the period of extended operation. Since some plants use both 1/4T and 3/4T to determine P-T limits, 3/4T can't be eliminated.
516	4.2.3.1.3.1 ML101830328	The ~~documented results of the~~ projected neutron fluence for the ¼T and ¾ T locations at the end of the period of extended operation ~~they~~ are bounded by the neutron fluences used to develop the existing P-T limit analysis.	The staff agrees with this comment. Associated changes to the SRP-LR have been made.	No technical basis is required to incorporate this clarification change as it is editorial in nature. Not a technical issue.
517	4.3.2 ML101830328	Subpart 2 describes the stress reduction factors as "maximum allowable." However, there are not min/max values for the factors listed in Table 4.3-1. Consider clarifying as shown below. 2. Implicit fatigue-based maximum allowable stress calculations for piping components designed to USAS ANSI B31.1 (Ref. 2) requirements, and ASME Code Class 2 and 3 components designed to ASME Section III design requirements that are similar to the guidance in ANSI B31.1. ANSI B31.1 applies only to piping and does not call for an explicit fatigue analysis. It specifies allowable stress levels based on the number of anticipated full thermal range transient cycles. The specific ~~maximum~~	The staff disagrees with this comment. The SRP-LR has not been changed.	Table 4.3-1 is self-explanatory in that it provides stress range reduction factors depending on the number of equivalent full temperature cycles.

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		~~allowable~~ stress range reductions factors due to full thermal cycles are listed in Table 4.3-1.		
518	4.3.1 ML101830328	Most metallurgists and fatigue experts would disagree that a CUF of 1.0 assumes there is a crack. Suggested rewording below. A CUF below ~~above~~ a value of one provides assurance that no ~~assumes that a small, but analyzable~~ crack has been formed. A CUF above a value of one allows for the possibility that a crack may form, and that if ~~If undetected or~~ left untreated, the crack could ~~will~~ propagate exponentially under fatigue loading and eventually lead to coolant leakage in reactor pressure boundary components, or even general structural failure.	The staff agrees with this comment. Associated changes to the SRP-LR have been made.	Most metallurgists and fatigue experts agree that a CUF>1.0 is the number when crack may form, and therefore, a limit of CUF≤1.0 should be maintained.
519	4.3.2.1.1.3 ML101830328	Don't limit GALL X.M1 to the RCS pressure boundary. There are lots of non-RCS pressure boundary items (containment buildings, supports, PWR secondary side items, etc.) that are identified in GALL Sections II through VIII that have cycles that need monitoring with this program. SRP-LR Section 4.3.1 acknowledges this.	The staff agrees with this comment. Associated changes to the SRP-LR have been made.	GALL X.M1 title has been changed to "Fatigue Monitoring," and reference to RCS pressure boundary components only has been removed. The staff agrees that more components than RCS pressure boundary have cycles that need monitoring.
520	4.3.2.1.3 ML101830328	The last paragraph is not clear. It seems to imply that the nickel-alloy Fens from RG 1.207 can be used with the existing ASME fatigue curves. This is not what RG 1.207 (or NUREG\CR-6909 says). This paragraph should be clarified. Note that 4.3.3.1.3 does not allow this.	The staff agrees with this comment. Associated changes to the SRP-LR have been made.	This paragraph has been revised to provide guidance and options for Fen calculations for carbon and low-alloy steels, stainless steel, and nickel-alloy components.

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521	4.3.2.1.4 ML101830328	There is no 4.3.2.1.4, the report goes from 4.3.2.1.3 to 4.3.2.1.5.	The staff agrees with this comment. Associated changes to the SRP-LR have been made.	Subsection 4.3.2.1.4 has been added. Provides clarity and ensures consistency. The revised information in the elements is used to provide consistency within each AMP for that element. Appropriate information is moved from one element to another to ensure that the element is consistent with the revised section A.1.2.3
522	4.3.2.1.5.3 ML101830328	Why isn't GALL X.M1 an acceptable basis for accepting flaw growth and fracture mechanics analyses? Seems like an explanation is in order. Note that section 4.3.3.1.5.3 re-iterates this statement while section 4.3.3.1.1.3 seems to contradict it.	The staff disagrees with this comment. The SRP-LR has not been changed.	GALL X.M1 monitors and tracks the number of critical thermal and pressure transients for the selected components and ensures the fatigue usage remaining within the allowable limit, thus minimizing fatigue cracking of metal components caused by anticipated cyclic strains in the material. The program is not used as a basis to accept flaw growth and fracture mechanics analyses. As a corrective action, to maintain CUF$\leq$1.0, an applicant may choose the option of performing fracture mechanics analyses, or repair or replace the component.
523	4.3.3.1.1.2 ML101830328	"Adequate" needs definition. Suggest rewording to eliminate it. The operating transient experience <u>is reviewed to ensure that</u> ~~and a list of~~ the	The staff agrees with this comment. Associated changes to the SRP-LR have	Clarification was not technical in nature. Sentence has been reworded to ensure that transients used for any re-analysis meets or exceeds the number of transients

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		increased number of ~~assumed~~ transients <u>used for any re-analysis meets or exceeds the number of transients</u> projected to the end of the period of extended operation ~~are reviewed to ensure that the transient projection is adequate~~. The revised CUF calculations ~~based on the projected number of assumed transients~~ are reviewed to ensure that the CUF remains less than or equal to one at the end of the period of extended operation. For consistency purposes, the review also includes an assessment of the TLAA information against relevant design basis information and CLB information (including applicable cycle-counting requirements in technical specifications).	been made.	projected to the end of the period of extended operation.
130	4.3 ML101660084, Comment 1	In Table 4.1-3 of NUREG-1800, Rev. 2, ductility reduction of fracture toughness for the reactor vessel internals has been identified as a plant-specific time-limited aging analysis (TLAA). However, all operating reactors in the U.S. have been designed with no explicit embrittlement analysis based on the plant life for reactor core internals. Loss of fracture toughness due to radiation embrittlement was not considered in the design of light water reactor (LWR) core internal components constructed of austenitic stainless steels (SSs). These steels have [been] used extensively in LWRs as structural alloys in the internal components of reactor pressure vessels because of their relatively high strength, ductility, and fracture toughness.	The staff disagrees with this comment. The SRP-LR has not been changed.	Ductility, reduction of fracture toughness is a TLAA for austenitic stainless steel material in plants with Babcock & Wilcox (B&W) designed PWR reactor vessel internals, and BWR reactor vessel internals with core shroud repair hardware and LPCI (reference: Dresden and Quad Cities License Renewal Application, Section 4.2.4), because they have analyses that meet the TLAA criteria of 10 CFR 54.3. Operating PWR or BWR plants with other types of reactor vessel internals have not identified reduction of fracture toughness in austenitic

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		Fracture of these steels occurs by stable tearing at stresses well above the yield stress, and tearing instabilities require extensive plastic deformation. However, exposure to neutron irradiation for extended periods degrades their fracture properties. For example, at a neutron dose of 5-8 dpa the fracture toughness of SSs can decrease from a J_{Ic} value well above 200 kJ/m^2 to as low as 7.5 kJ/m^2 (or stress intensity factor $\mathbf{K_{Jc}}$ of 38 MPa $m^{1/2}$ or 34.5 ksi in. $^{1/2}$). Furthermore, while the initial aging effect is loss of ductility and toughness, unstable crack extension is the eventual aging effect if a crack is present and the local applied stress intensity exceeds the reduced fracture toughness. The decrease in fracture toughness of austenitic SSs with neutron exposure has been documented in several industry and NRC reports. The current evaluation of the structural and functional integrity of the reactor vessel internals assumes that the irradiated materials will retain sufficient ductility to rule out the likelihood of unstable crack extension when the local applied stress intensity exceeds a $\mathbf{K_{Jc}}$ value of 38 MPa $m^{1/2}$ (34.5 ksi in.$^{1/2}$). The total neutron fluence for some vessel internal components that are highly stressed or have a high fatigue usage is likely to exceed 4 dpa within the 60-year life. As		stainless steels as a TLAA because they do not have analyses that meet the TLAA criteria of 10 CFR 54.3. Although reduction of fracture toughness in austenitic stainless steels resulting from neutron irradiation is not a TLAA for all reactor vessel internals, it is evaluated in MRP-227, Rev.0 for PWRs, and in several BWRVIP reports for BWRs. MRP-227, which is being reviewed by the staff, is the basis for GALL AMP XI.M16A and GALL AMR line items for PWR reactor vessel internals. The BWRVIP reports are the basis for GALL AMP XI.M9 and GALL AMR line items for BWR reactor vessel internals. According to MRP-227 for PWR internals and BWRVIP-76 for BWR core shroud internals, loss of fracture toughness induced by neutron irradiation embrittlement is not directly monitored; instead, the impact of loss of fracture toughness on component integrity is indirectly managed by using visual or volumetric examination techniques to monitor for cracking in the components and by applying

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		discussed in comment 2 [Comment 131 of NUREG 1950], the cumulative fatigue usage in air (i.e., without considering the effects of neutron irradiation and coolant environment on fatigue life) is typically above 0.5 for upper and lower core plate in PWRs, and for the core shroud in BWRs it is above 0.35. To prevent unstable crack extension if a crack is present in these components, a TLAA to evaluate the ductility reduction of fracture toughness of highly stressed vessel internals should be performed. In reactor vessel design, since the material fracture toughness is based on an explicitly assumed 40-year plant life, pursuant to 10 CFR 54.21 (c)(1), the applicant should evaluate the ductility reduction of fracture toughness for the reactor vessel internals.		applicable reduced fracture toughness properties in the flaw evaluations if cracking is detected in the components and is extensive enough to warrant a supplemental flaw growth or flaw tolerance evaluation under the MRP-227 or BWRVIP-76 guidance or ASME Code, Section XI requirements. MRP-227 and BWRVIP-76 internals examination criteria are required in accordance with GALL AMP XI.M16A for PWRs and GALL AMP XI.M9 for BWRs. These AMPs and GALL line items will be sufficient to manage the aging effect of reduction of fracture toughness of austenitic stainless steels resulting from neutron irradiation during the period of extended operation, in accordance with 10 CFR 54.21(c)(1).
131	4.3 ML101660084, Comment 2	In NUREG-1800, Rev. 2, Section 4.3.1, item #3, environmental fatigue calculations are recommended only for ASME Code Class 1 reactor coolant pressure boundary components. Similarly, in NUREG-1801, Rev. 2, Tables IV B1 through IV B4, fatigue of the reactor vessel internal components is considered a time-limited aging analysis (TLAA) to be evaluated for the period of	The staff disagrees with this comment. The SRP-LR has not been changed.	The third party's comments pertain to expanding the scope of environmentally-assisted CUF calculations for LRAs to RVI components and core support structures (in addition to ASME Code Class 1 reactor vessel and piping locations). The third party quotes ASME

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		extended operation. However, the effects of coolant environment are not included in the evaluation. It is well known that unlike carbon and low-alloy steels, which show little or no environmental effects on fatigue crack initiation in low corrosion potential environments such as hydrogen water chemistry BWR or PWR environment, the fatigue life of austenitic stainless steels (SSs) can be decreased by a factor of up to 10 in these environments. Regulatory Guide (RG)-1.207 provides guidance for determining the acceptable fatigue life of ASME Class 1 components with consideration of the LWR environment. Fatigue evaluations for reactor vessel internal components performed by license renewal applicants, yield cumulative fatigue usage in air above 0.5 for upper and lower core plate in PWRs, and above 0.35 for BWR core shroud. The design and construction of the core support structures of new reactors comply with the requirements of ASME Section III, Subsection NG, "Core Support Structures," and NUREG-0800, "Standard Review Plan" (SRP) Section 3.9.3. In addition, the design criteria, loading conditions, and analyses that provide the bases for the design of reactor internals other than the core support structures also meet the guidelines of Subsection NG-3000 and are constructed not to affect the integrity of the core support		Section III Paragraph NG-2160 to support his position. Paragraph NG-2160 states that it is "the responsibility of the owner to select material suitable for the conditions in the design specification (NCA-3250), with specific attention being given to the effects of service conditions upon the properties of the material." The staff's guidance in Section 4.3.3.1.3 of NUREG-1800, Revision 2, *Standard Review Plan for Review of License Renewal Applications for Nuclear Power Plants* (SRP-LR), and previously in Sections 4.3.2.2 and 4.3.3.2 of SRP-LR, Revision 1, as made relative to recommending the performance of F_{en} environmental adjustments of the CUF values for ASME Section III Code Class 1 components, was incorporated into the SRP-LR to reflect the staff's resolution of technical metal fatigue assessment issues raised in Generic Safety Issue No. 190, *Fatigue Evaluation of Metal Components for 60-Year Plant Life* (GSI-190). The staff has determined that the

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		structures adversely (Subsection NG 1122). Subsection NG-3200 describes the requirements for the acceptability of a design by analysis, including an analysis for cyclic operation. The effect of service conditions such as neutron irradiation or the high-temperature coolant environment on fatigue life has to be included in the analysis. Subsection NG-2160 "Deterioration of Material in Service" states that it is the responsibility of the Owner to select material suitable for the conditions stated in the Design Specification (NCA-3250), with specific attention being given to the effects of service conditions upon the properties of the material. The fatigue evaluations that are being performed for reactor core internal components of operating reactors do not include the possible effects of irradiation on fatigue life. Information regarding the effects of irradiation on fatigue crack initiation is, at best, very limited. The only data on the effect of neutron irradiation on fatigue crack initiation and fatigue crack growth rate were obtained under the fast breeder reactor program. Most of the data are on fatigue crack growth rates, and were obtained on SSs irradiated in fast reactors (primarily EBR-II) at 370-450°C and tested at 427-593°C. For Type 304 and 316 SS irradiated at 405-410 °C to 1.2×10^{22} n/cm^2 (E>0.1 MeV), the crack growth rates at 427°C are up to a factor of 2 higher than		scope of the staff's technical concerns in GSI-190 and the scope of the staff's environmentally-assisted fatigue analysis studies in NUREG/CR-6260, *Application of NUREG/CR-5999 Interim Fatigue Curves to Selected Nuclear Power Plant Components*, was only for reactor coolant pressure boundary components, which are within the scope of ASME Section III Subsection NB design requirements. The staff does acknowledge that pursuant to 10 CFR 50.55a and ASME Section III Subsection NG requirements, licensees must perform CUF calculations of those RVI components that are defined as core support structures for their reactor vessel, unless an applicable provision in ASME Section III Subsection NG permits exemption of a given core support structure component from being analyzed under a CUF calculation. However, the scope of the current ASME Section III Subsection NG requirements does not include any mandated provisions to adjust the CUF calculations for core support

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		those for nonirradiated material at low ΔK values (less than 40 ksi in.$^{1/2}$). A similar behavior is observed for Type 316 weld. Limited fatigue strain-vs.-life (S-N) data on irradiated SSs shows moderate decrease in life in the low-cycle regime and superior fatigue life in the high-cycle regime. There is no fatigue S-N data on materials irradiated under LWR conditions and tested at LWR operating temperatures. Several studies have shown significant differences in the microstructure and microchemistry of materials irradiated in LWRs and fast reactors. Specifically, the effect of cavities and He bubbles in austenitic SSs irradiated at temperatures above 320°C to high neutron dose levels in PWRs. Since the possible effect of neutron irradiation on fatigue life is not considered in the current fatigue evaluations, if the known effect of LWR coolant environments on fatigue life is also ignored, the fatigue evaluations would be severely compromised. I would like to point out that SRP-LR (NUREG-1800, Rev.1) Section 4.3.1.1.1 states, "ASME Class 1 components, which include core support structures, are analyzed for metal fatigue. ASME Section III requires a fatigue analysis for Class 1 components that considers all transient loads based on the anticipated number of transients." Therefore, environmental effects should have been		structures by an environmental adjustment factor (F_{en}). The staff has not determined whether incorporation of environmental effects is necessary for RVI components, but will consider this item for future inclusion. The staff does acknowledge that a number of industry organizations are currently working on establishing protocols for evaluating the impact of environmental effects of the reactor coolant on the CUF values for RVI components and core support structures. These organizations include efforts by applicable ASME Code subcommittees on design requirements, and efforts by applicable committees in the EPRI BWRVIP and EPRI MPR. The staff's position is that it is not appropriate to address this comment as part of the revision 2 update of the GALL and SRP-LR. However, the staff will consider a technical update of the GALL and SRP-LR content related to this issue by using an ISG, if warranted.

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		included in the fatigue evaluation for reactor core internal components, in support of license renewal. I request the staff to reconsider the regulatory position to consider environmental effects only for Class 1 pressure boundary components and not for the reactor core support structures.		

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Comment Number	Location in Document and Public ID No.	Comment/Proposed Change and Rationale	NRC Disposition	Technical Basis
N/A	N/A	There were no public comments on the Appendices to the SRP-LR	N/A	N/A

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APPENDIX A: Crosswalk and Staff Technical Positions

A.1 GALL Report 2000-2005-2010 Crosswalk

GALL Rev. 2 contains item numbers (e.g., “IV.A1.R-04”) that have been assigned to each AMR line item. To assist in relating these line items to the AMR line items in GALL Rev. 1 and Rev. 0, the tables in this appendix have been provided.

For each system chapter in GALL Rev. 2 (Chapters II through VIII), these tables relate the item numbers in GALL Rev. 2 to those in GALL Revisions 1 and 0. For example, as shown in Table A-3, “Relationship of Reactor Vessel, Internals and Reactor Coolant (RCS) System IDs in GALL Report,” item IV.A1.R-04 in Rev. 2 (which is located in the reactor vessel subsystem in Chapter IV) relates to items A1.1-b, A1.2-a, and others in GALL Rev. 0 and to item R-04 in GALL Rev 1. All GALL Rev. 0 line items are related to one or more line items in GALL Rev. 1 and 2, except for those that are retired. However, not all GALL Rev. 1 and 2 items relate back to a GALL Rev. 0 line item (i.e., when a new item was added to GALL Rev. 1 and 2). In such cases, although there is no GALL Rev. 0 item number to relate to, the relationship table still contains a row for the new item. Items that are new in Rev. 2 have “none” in the Rev. 0 and Rev. 1 columns. For items that were new in Rev. 1, the GALL Rev. 0 column contains only a subsystem identifier, not a GALL Rev. 0 item number. For example, RP-25 is a new item in GALL Rev. 1. Table A-3 shows “RP-25” is related to “A1.” in GALL Rev. 0, indicating that RP-25 has been added in Rev. 1 of GALL and it can be found in subsystem A1, the reactor vessel subsystem in Chapter IV.

The sequence of the entries for new items to GALL Rev. 2, i.e., those that are listed at the beginning of each table with “none” in the first two columns, and for items in a given cell in the Rev.2 column is alphabetical order of structure; followed by alphabetical order of material, followed by alphabetical order of environment.

Table A-1. Relationship of Containment Structures IDs in GALL Report, Chapter II

Rev.0	Rev. 1	Rev. 2
None	None	II.B1.2.CP-114 II.B2.1.CP-114 II.B2.2.CP-114
None	None	II.A3.CP-148 II.B4.CP-148
None	None	II.A3.CP-150 II.B4.CP-150
None	None	II.A3.CP-152 II.B4.CP-152
None	None	II.B1.1.CP-44
A1.1-a	C-01	II.A1.CP-147 II.A1.CP-31
A1.1-b	C-02	II.A1.CP-102 II.A1.CP-32
A1.1-c	C-03	II.A1.CP-100 II.A1.CP-87
A1.1-d	C-04	II.A1.CP-33 II.A1.CP-67
A1.1-e	C-05	II.A1.CP-68 II.A1.CP-97
A1.1-f	C-37	II.A1.CP-101
A1.1-g	C-07	II.B3.2.C-07 II.B3.1.C-07 II.B2.2.C-07 II.B1.2.C-07 II.A2.C-07 II.A1.C-07
A1.1-h	C-08	II.A1.CP-34
A1.2-a	C-09	II.B3.2.CP-35 II.A2.CP-35 II.A1.CP-35 II.A1.CP-98 II.A2.CP-98 II.B3.2.CP-98
A1.3-a	C-10	II.B2.2.C-10 II.A1.C-10

Table A-1. Relationship of Containment Structures IDs in GALL Report, Chapter II

Rev.0	Rev. 1	Rev. 2
A1.3-b	C-11	II.B2.2.C-11 II.A1.C-11
A2.1-a	C-09	II.B3.2.CP-35 II.A2.CP-35 II.A1.CP-35 II.A1.CP-98 II.A2.CP-98 II.B3.2.CP-98
A2.2-a	C-28	II.A2.CP-51 II.A2.CP-70
A2.2-b	C-30	II.A2.CP-155 II.B3.1.CP-156 II.B3.1.CP-53 II.A2.CP-53
A2.2-c	C-25	II.B3.1.CP-71 II.A2.CP-71 II.B3.1.CP-72 II.A2.CP-72
A2.2-d	C-38	II.A2.CP-104 II.A2.CP-58
A2.2-e	C-43	II.A2.CP-74 II.B3.1.CP-74 II.B3.1.CP-75 II.A2.CP-75
A2.2-f	C-36	II.B3.1.CP-69 II.A2.CP-69
A2.2-g	C-07	II.B3.2.C-07 II.B3.1.C-07 II.B2.2.C-07 II.B1.2.C-07 II.A2.C-07 II.A1.C-07
A2.2-h	C-34	Retired
A3.1-a	C-12	II.B4.CP-36 II.A3.CP-36
A3.1-b	C-13	II.B4.C-13

Table A-1. Relationship of Containment Structures IDs in GALL Report, Chapter II

Rev.0	Rev. 1	Rev. 2
		II.A3.C-13
A3.1-c	C-14	II.B4.CP-37 II.A3.CP-37
A3.1-d	C-15	II.B4.CP-38 II.A3.CP-38
A3.2-a	C-16	II.B4.C-16 II.A3.C-16
A3.2-b	C-17	II.B4.CP-39 II.A3.CP-39
A3.3-a	C-18	II.B4.CP-40 II.A3.CP-40 II.B4.CP-41 II.A3.CP-41
B1.1.1-a	C-19	II.B1.1.CP-109 II.B3.1.CP-113 II.B3.1.CP-158 II.B3.1.CP-43 II.B1.1.CP-43 II.B1.1.CP-48
B1.1.1-b	C-20	II.B1.1.CP-49
B1.1.1-c	C-21	II.B1.1.C-21
B1.1.1-d	C-22	II.B1.1.CP-50
B1.1.1-e	C-23	II.B2.2.C-23 II.B2.1.C-23 II.B1.2.C-23 II.B1.1.C-23
B1.2.	C-41	II.B2.2.CP-79 II.B1.2.CP-79 II.B1.2.CP-80 II.B2.2.CP-80
B1.2.	C-35	II.B2.2.CP-57 II.B1.2.CP-57
B1.2.	C-06	II.B3.2.CP-105 II.B2.2.CP-105 II.B1.2.CP-105
B1.2.	C-07	II.B3.2.C-07

Table A-1. Relationship of Containment Structures IDs in GALL Report, Chapter II

Rev.0	Rev. 1	Rev. 2
		II.B3.1.C-07 II.B2.2.C-07 II.B1.2.C-07 II.A2.C-07 II.A1.C-07
B1.2.	C-39	II.B2.2.CP-59 II.B1.2.CP-59 II.B2.2.CP-99 II.B1.2.CP-99
B1.2.	C-23	II.B2.2.C-23 II.B2.1.C-23 II.B1.2.C-23 II.B1.1.C-23
B1.2.	C-26	II.B2.2.CP-106 II.B1.2.CP-106
B1.2.	C-46	II.B1.2.CP-117 II.B2.2.CP-117 II.B2.1.CP-117 II.B2.1.CP-46 II.B2.2.CP-46 II.B1.2.CP-46 II.B2.2.CP-63 II.B2.1.CP-63 II.B1.2.CP-63
B1.2.	C-31	II.B2.2.CP-110 II.B1.2.CP-110 II.B2.2.CP-54 II.B1.2.CP-54
B1.2.	C-49	II.B2.2.C-49 II.B1.2.C-49
B2.1.1-a	C-46	II.B1.2.CP-117 II.B2.2.CP-117 II.B2.1.CP-117 II.B2.1.CP-46 II.B2.2.CP-46 II.B1.2.CP-46 II.B2.2.CP-63

Table A-1. Relationship of Containment Structures IDs in GALL Report, Chapter II

Rev.0	Rev. 1	Rev. 2
		II.B2.1.CP-63 II.B1.2.CP-63
B2.1.1-b	C-44	II.B2.1.CP-107 II.B2.1.CP-142
B2.1.1-c	C-45	II.B2.1.C-45
B2.1.1-d	C-23	II.B2.2.C-23 II.B2.1.C-23 II.B1.2.C-23 II.B1.1.C-23
B2.2.1-a	C-31	II.B2.2.CP-110 II.B1.2.CP-110 II.B2.2.CP-54 II.B1.2.CP-54
B2.2.1-b	C-26	II.B2.2.CP-106 II.B1.2.CP-106
B2.2.1-c	C-39	II.B2.2.CP-59 II.B1.2.CP-59 II.B2.2.CP-99 II.B1.2.CP-99
B2.2.1-d	C-41	II.B2.2.CP-79 II.B1.2.CP-79 II.B1.2.CP-80 II.B2.2.CP-80
B2.2.1-e	C-06	II.B3.2.CP-105 II.B2.2.CP-105 II.B1.2.CP-105
B2.2.1-f	C-07	II.B3.2.C-07 II.B3.1.C-07 II.B2.2.C-07 II.B1.2.C-07 II.A2.C-07 II.A1.C-07
B2.2.1-g	C-35	II.B2.2.CP-57 II.B1.2.CP-57
B2.2.2-a	C-46	II.B1.2.CP-117 II.B2.2.CP-117

Table A-1. Relationship of Containment Structures IDs in GALL Report, Chapter II

Rev.0	Rev. 1	Rev. 2
		II.B2.1.CP-117 II.B2.1.CP-46 II.B2.2.CP-46 II.B1.2.CP-46 II.B2.2.CP-63 II.B2.1.CP-63 II.B1.2.CP-63
B2.2.2-b	C-49	II.B2.2.C-49 II.B1.2.C-49
B2.2.2-c	C-47	II.B2.2.CP-64
B2.2.2-d	C-48	II.B2.2.C-48
B2.2.2-e	C-23	II.B2.2.C-23 II.B2.1.C-23 II.B1.2.C-23 II.B1.1.C-23
B2.2.3-a	C-10	II.B2.2.C-10 II.A1.C-10
B2.2.3-b	C-11	II.B2.2.C-11 II.A1.C-11
B3.1.1-a	C-19	II.B1.1.CP-109 II.B3.1.CP-113 II.B3.1.CP-158 II.B3.1.CP-43 II.B1.1.CP-43 II.B1.1.CP-48
B3.1.1-b	C-24	II.B3.2.C-24 II.B3.1.C-24
B3.1.2-a	C-30	II.A2.CP-155 II.B3.1.CP-156 II.B3.1.CP-53 II.A2.CP-53
B3.1.2-b	C-25	II.B3.1.CP-71 II.A2.CP-71 II.B3.1.CP-72 II.A2.CP-72
B3.1.2-c	C-51	II.B3.1.CP-66

Table A-1. Relationship of Containment Structures IDs in GALL Report, Chapter II

Rev.0	Rev. 1	Rev. 2
		II.B3.1.CP-83
B3.1.2-d	C-43	II.A2.CP-74 II.B3.1.CP-74 II.B3.1.CP-75 II.A2.CP-75
B3.1.2-e	C-36	II.B3.1.CP-69 II.A2.CP-69
B3.1.2-f	C-07	II.B3.2.C-07 II.B3.1.C-07 II.B2.2.C-07 II.B1.2.C-07 II.A2.C-07 II.A1.C-07
B3.1.2-g	C-50	II.B3.1.CP-65
B3.1.2-g	C-50	II.B3.1.CP-65
B3.2.1-a	C-29	II.B3.2.CP-135 II.B3.2.CP-52
B3.2.1-b	C-32	II.B3.2.CP-122 II.B3.2.CP-55
B3.2.1-c	C-27	II.B3.2.CP-73 II.B3.2.CP-84
B3.2.1-d	C-40	II.B3.2.CP-121 II.B3.2.CP-60
B3.2.1-e	C-42	II.B3.2.CP-88 II.B3.2.CP-89
B3.2.1-f	C-06	II.B3.2.CP-105 II.B2.2.CP-105 II.B1.2.CP-105
B3.2.1-g	C-07	II.B3.2.C-07 II.B3.1.C-07 II.B2.2.C-07 II.B1.2.C-07 II.A2.C-07 II.A1.C-07
B3.2.1-h	C-33	II.B3.2.CP-108
B3.2.2-a	C-09	II.B3.2.CP-35

Table A-1. Relationship of Containment Structures IDs in GALL Report, Chapter II

Rev.0	Rev. 1	Rev. 2
		II.A2.CP-35 II.A1.CP-35 II.A1.CP-98 II.A2.CP-98 II.B3.2.CP-98
B3.2.2-b	C-24	II.B3.2.C-24 II.B3.1.C-24
B4.1-a	C-12	II.B4.CP-36 II.A3.CP-36
B4.1-b	C-13	II.B4.C-13 II.A3.C-13
B4.1-c	C-14	II.B4.CP-37 II.A3.CP-37
B4.1-d	C-15	II.B4.CP-38 II.A3.CP-38
B4.2-a	C-16	II.B4.C-16 II.A3.C-16
B4.2-b	C-17	II.B4.CP-39 II.A3.CP-39
B4.3-a	C-18	II.B4.CP-40 II.A3.CP-40 II.B4.CP-41 II.A3.CP-41

Table A-2. Relationship of Structures and Component Supports IDs in GALL Report, Chapter III

Rev. 0	Rev. 1	Rev. 2
None	None	III.A3.TP-219
None	None	III.A6.TP-221
None	None	III.A6.TP-223
None	None	III.B1.1.TP-226 III.B1.2.TP-226 III.B1.3.TP-226
None	None	III.B1.1.TP-229 III.B1.2.TP-229 III.B1.3.TP-229
None	None	III.B1.1.TP-232 III.B1.2.TP-232 III.B1.3.TP-232
None	None	III.B1.1.TP-235 III.B1.2.TP-235 III.B1.3.TP-235
None	None	III.A1.TP-248 III.A2.TP-248 III.A3.TP-248 III.A4.TP-248 III.A5.TP-248 III.A6.TP-248 III.A7.TP-248 III.A8.TP-248 III.A9.TP-248 III.B2.TP-248 III.B3.TP-248 III.B4.TP-248 III.B5.TP-248
None	None	III.A1.TP-261 III.A2.TP-261 III.A3.TP-261 III.A4.TP-261 III.A5.TP-261 III.A6.TP-261 III.A7.TP-261 III.A8.TP-261 III.A9.TP-261 III.B2.TP-261 III.B3.TP-261 III.B4.TP-261 III.B5.TP-261
None	None	III.A1.TP-274 III.A2.TP-274 III.A3.TP-274 III.A4.TP-274 III.A5.TP-274 III.A7.TP-274 III.A8.TP-274 III.A9.TP-274 III.B2.TP-274 III.B3.TP-274 III.B4.TP-274 III.B5.TP-274
None	None	III.A1.TP-300 III.A2.TP-300 III.A3.TP-300 III.A4.TP-300 III.A5.TP-300 III.A7.TP-300 III.A8.TP-300 III.A9.TP-300 III.B2.TP-300 III.B3.TP-300 III.B4.TP-300 III.B5.TP-300
None	None	III.A4.TP-301
None	None	III.A5.TP-34
A1.1-a	T-01	III.A9.TP-108 III.A8.TP-108 III.A5.TP-108 III.A7.TP-108 III.A3.TP-108 III.A2.TP-108 III.A1.TP-108 III.A9.TP-23

Table A-2. Relationship of Structures and Component Supports IDs in GALL Report, Chapter III		
Rev. 0	**Rev. 1**	**Rev. 2**
		III.A8.TP-23 III.A7.TP-23 III.A5.TP-23 III.A3.TP-23 III.A2.TP-23 III.A1.TP-23
A1.1-b	T-02	III.A9.TP-24 III.A8.TP-24 III.A7.TP-24 III.A5.TP-24 III.A3.TP-24 III.A2.TP-24 III.A1.TP-24 III.A9.TP-67 III.A8.TP-67 III.A7.TP-67 III.A5.TP-67 III.A3.TP-67 III.A1.TP-67 III.A2.TP-67
A1.1-c	T-03	III.A1.TP-204 III.A8.TP-204 III.A7.TP-204 III.A5.TP-204 III.A4.TP-204 III.A3.TP-204 III.A2.TP-204 III.A9.TP-204 III.A2.TP-25 III.A3.TP-25 III.A4.TP-25 III.A5.TP-25 III.A7.TP-25 III.A1.TP-25 III.A9.TP-25 III.A8.TP-25
A1.1-d	T-04	III.A9.TP-26 III.A7.TP-26

Table A-2. Relationship of Structures and Component Supports IDs in GALL Report, Chapter III		
Rev. 0	**Rev. 1**	**Rev. 2**
		III.A5.TP-26 III.A4.TP-26 III.A3.TP-26 III.A2.TP-26 III.A1.TP-26
A1.1-e	T-05	III.A9.TP-212 III.A8.TP-212 III.A7.TP-212 III.A5.TP-212 III.A3.TP-212 III.A2.TP-212 III.A1.TP-212 III.A9.TP-27 III.A8.TP-27 III.A7.TP-27 III.A5.TP-27 III.A3.TP-27 III.A2.TP-27 III.A1.TP-27
A1.1-f	T-06	III.A9.TP-28 III.A7.TP-28 III.A5.TP-28 III.A4.TP-28 III.A3.TP-28 III.A2.TP-28 III.A1.TP-28
A1.1-g	T-07	III.A9.TP-29 III.A8.TP-29 III.A7.TP-29 III.A5.TP-29 III.A3.TP-29 III.A2.TP-29 III.A1.TP-29
A1.1-h	T-08	III.A9.TP-30 III.A8.TP-30 III.A7.TP-30 III.A6.TP-30 III.A5.TP-30

Table A-2. Relationship of Structures and Component Supports IDs in GALL Report, Chapter III

Rev. 0	Rev. 1	Rev. 2
		III.A3.TP-30 III.A2.TP-30 III.A1.TP-30
A1.1-i	T-09	III.A9.TP-31 III.A8.TP-31 III.A7.TP-31 III.A6.TP-31 III.A5.TP-31 III.A3.TP-31 III.A2.TP-31 III.A1.TP-31
A1.1-j	T-10	III.A5.TP-114 III.A4.TP-114 III.A3.TP-114 III.A2.TP-114 III.A1.TP-114
A1.2-a	T-11	III.A8.TP-302 III.A7.TP-302 III.A5.TP-302 III.A4.TP-302 III.A3.TP-302 III.A2.TP-302 III.A1.TP-302
A1.3-a	T-12	III.A6.T-12 III.A5.T-12 III.A3.T-12 III.A2.T-12 III.A1.T-12
A2.1-a	T-01	III.A9.TP-108 III.A8.TP-108 III.A5.TP-108 III.A7.TP-108 III.A3.TP-108 III.A2.TP-108 III.A1.TP-108 III.A9.TP-23 III.A8.TP-23 III.A7.TP-23

Table A-2. Relationship of Structures and Component Supports IDs in GALL Report, Chapter III

Rev. 0	Rev. 1	Rev. 2
		III.A5.TP-23 III.A3.TP-23 III.A2.TP-23 III.A1.TP-23
A2.1-b	T-02	III.A9.TP-24 III.A8.TP-24 III.A7.TP-24 III.A5.TP-24 III.A3.TP-24 III.A2.TP-24 III.A1.TP-24 III.A9.TP-67 III.A8.TP-67 III.A7.TP-67 III.A5.TP-67 III.A3.TP-67 III.A1.TP-67 III.A2.TP-67
A2.1-c	T-03	III.A1.TP-204 III.A8.TP-204 III.A7.TP-204 III.A5.TP-204 III.A4.TP-204 III.A3.TP-204 III.A2.TP-204 III.A9.TP-204 III.A2.TP-25 III.A3.TP-25 III.A4.TP-25 III.A5.TP-25 III.A7.TP-25 III.A1.TP-25 III.A9.TP-25 III.A8.TP-25
A2.1-d	T-04	III.A9.TP-26 III.A7.TP-26 III.A5.TP-26 III.A4.TP-26

Table A-2. Relationship of Structures and Component Supports IDs in GALL Report, Chapter III		
Rev. 0	**Rev. 1**	**Rev. 2**
		III.A3.TP-26 III.A2.TP-26 III.A1.TP-26
A2.1-e	T-05	III.A9.TP-212 III.A8.TP-212 III.A7.TP-212 III.A5.TP-212 III.A3.TP-212 III.A2.TP-212 III.A1.TP-212 III.A9.TP-27 III.A8.TP-27 III.A7.TP-27 III.A5.TP-27 III.A3.TP-27 III.A2.TP-27 III.A1.TP-27
A2.1-f	T-06	III.A9.TP-28 III.A7.TP-28 III.A5.TP-28 III.A4.TP-28 III.A3.TP-28 III.A2.TP-28 III.A1.TP-28
A2.1-g	T-07	III.A9.TP-29 III.A8.TP-29 III.A7.TP-29 III.A5.TP-29 III.A3.TP-29 III.A2.TP-29 III.A1.TP-29
A2.1-h	T-08	III.A9.TP-30 III.A8.TP-30 III.A7.TP-30 III.A6.TP-30 III.A5.TP-30 III.A3.TP-30 III.A2.TP-30

Table A-2. Relationship of Structures and Component Supports IDs in GALL Report, Chapter III		
Rev. 0	**Rev. 1**	**Rev. 2**
		III.A1.TP-30
A2.1-i	T-09	III.A9.TP-31 III.A8.TP-31 III.A7.TP-31 III.A6.TP-31 III.A5.TP-31 III.A3.TP-31 III.A2.TP-31 III.A1.TP-31
A2.1-j	T-10	III.A5.TP-114 III.A4.TP-114 III.A3.TP-114 III.A2.TP-114 III.A1.TP-114
A2.2-a	T-11	III.A8.TP-302 III.A7.TP-302 III.A5.TP-302 III.A4.TP-302 III.A3.TP-302 III.A2.TP-302 III.A1.TP-302
A2.3-a	T-12	III.A6.T-12 III.A5.T-12 III.A3.T-12 III.A2.T-12 III.A1.T-12
A3.1-a	T-01	III.A9.TP-108 III.A8.TP-108 III.A5.TP-108 III.A7.TP-108 III.A3.TP-108 III.A2.TP-108 III.A1.TP-108 III.A9.TP-23 III.A8.TP-23 III.A7.TP-23 III.A5.TP-23 III.A3.TP-23

Table A-2. Relationship of Structures and Component Supports IDs in GALL Report, Chapter III

Rev. 0	Rev. 1	Rev. 2
		III.A2.TP-23 III.A1.TP-23
A3.1-b	T-02	III.A9.TP-24 III.A8.TP-24 III.A7.TP-24 III.A5.TP-24 III.A3.TP-24 III.A2.TP-24 III.A1.TP-24 III.A9.TP-67 III.A8.TP-67 III.A7.TP-67 III.A5.TP-67 III.A3.TP-67 III.A1.TP-67 III.A2.TP-67
A3.1-c	T-03	III.A1.TP-204 III.A8.TP-204 III.A7.TP-204 III.A5.TP-204 III.A4.TP-204 III.A3.TP-204 III.A2.TP-204 III.A9.TP-204 III.A2.TP-25 III.A3.TP-25 III.A4.TP-25 III.A5.TP-25 III.A7.TP-25 III.A1.TP-25 III.A9.TP-25 III.A8.TP-25
A3.1-d	T-04	III.A9.TP-26 III.A7.TP-26 III.A5.TP-26 III.A4.TP-26 III.A3.TP-26 III.A2.TP-26
		III.A1.TP-26
A3.1-e	T-05	III.A9.TP-212 III.A8.TP-212 III.A7.TP-212 III.A5.TP-212 III.A3.TP-212 III.A2.TP-212 III.A1.TP-212 III.A9.TP-27 III.A8.TP-27 III.A7.TP-27 III.A5.TP-27 III.A3.TP-27 III.A2.TP-27 III.A1.TP-27
A3.1-f	T-06	III.A9.TP-28 III.A7.TP-28 III.A5.TP-28 III.A4.TP-28 III.A3.TP-28 III.A2.TP-28 III.A1.TP-28
A3.1-g	T-07	III.A9.TP-29 III.A8.TP-29 III.A7.TP-29 III.A5.TP-29 III.A3.TP-29 III.A2.TP-29 III.A1.TP-29
A3.1-h	T-08	III.A9.TP-30 III.A8.TP-30 III.A7.TP-30 III.A6.TP-30 III.A5.TP-30 III.A3.TP-30 III.A2.TP-30 III.A1.TP-30
A3.1-i	T-09	III.A9.TP-31

Table A-2. Relationship of Structures and Component Supports IDs in GALL Report, Chapter III		
Rev. 0	**Rev. 1**	**Rev. 2**
		III.A8.TP-31 III.A7.TP-31 III.A6.TP-31 III.A5.TP-31 III.A3.TP-31 III.A2.TP-31 III.A1.TP-31
A3.1-j	T-10	III.A5.TP-114 III.A4.TP-114 III.A3.TP-114 III.A2.TP-114 III.A1.TP-114
A3.2-a	T-11	III.A8.TP-302 III.A7.TP-302 III.A5.TP-302 III.A4.TP-302 III.A3.TP-302 III.A2.TP-302 III.A1.TP-302
A3.3-a	T-12	III.A6.T-12 III.A5.T-12 III.A3.T-12 III.A2.T-12 III.A1.T-12
A4.1-a	T-06	III.A9.TP-28 III.A7.TP-28 III.A5.TP-28 III.A4.TP-28 III.A3.TP-28 III.A2.TP-28 III.A1.TP-28
A4.1-b	T-03	III.A1.TP-204 III.A8.TP-204 III.A7.TP-204 III.A5.TP-204 III.A4.TP-204 III.A3.TP-204 III.A2.TP-204

Table A-2. Relationship of Structures and Component Supports IDs in GALL Report, Chapter III		
Rev. 0	**Rev. 1**	**Rev. 2**
		III.A9.TP-204 III.A2.TP-25 III.A3.TP-25 III.A4.TP-25 III.A5.TP-25 III.A7.TP-25 III.A1.TP-25 III.A9.TP-25 III.A8.TP-25
A4.1-c	T-10	III.A5.TP-114 III.A4.TP-114 III.A3.TP-114 III.A2.TP-114 III.A1.TP-114
A4.1-d	T-04	III.A9.TP-26 III.A7.TP-26 III.A5.TP-26 III.A4.TP-26 III.A3.TP-26 III.A2.TP-26 III.A1.TP-26
A4.2-a	T-11	III.A8.TP-302 III.A7.TP-302 III.A5.TP-302 III.A4.TP-302 III.A3.TP-302 III.A2.TP-302 III.A1.TP-302
A4.2-b	T-13	III.A4.TP-35
A5.1-a	T-01	III.A9.TP-108 III.A8.TP-108 III.A5.TP-108 III.A7.TP-108 III.A3.TP-108 III.A2.TP-108 III.A1.TP-108 III.A9.TP-23 III.A8.TP-23

Table A-2. Relationship of Structures and Component Supports IDs in GALL Report, Chapter III		
Rev. 0	**Rev. 1**	**Rev. 2**
		III.A7.TP-23 III.A5.TP-23 III.A3.TP-23 III.A2.TP-23 III.A1.TP-23
A5.1-b	T-02	III.A9.TP-24 III.A8.TP-24 III.A7.TP-24 III.A5.TP-24 III.A3.TP-24 III.A2.TP-24 III.A1.TP-24 III.A9.TP-67 III.A8.TP-67 III.A7.TP-67 III.A5.TP-67 III.A3.TP-67 III.A1.TP-67 III.A2.TP-67
A5.1-c	T-03	III.A1.TP-204 III.A8.TP-204 III.A7.TP-204 III.A5.TP-204 III.A4.TP-204 III.A3.TP-204 III.A2.TP-204 III.A9.TP-204 III.A2.TP-25 III.A3.TP-25 III.A4.TP-25 III.A5.TP-25 III.A7.TP-25 III.A1.TP-25 III.A9.TP-25 III.A8.TP-25
A5.1-d	T-04	III.A9.TP-26 III.A7.TP-26 III.A5.TP-26

Table A-2. Relationship of Structures and Component Supports IDs in GALL Report, Chapter III		
Rev. 0	**Rev. 1**	**Rev. 2**
		III.A4.TP-26 III.A3.TP-26 III.A2.TP-26 III.A1.TP-26
A5.1-e	T-05	III.A9.TP-212 III.A8.TP-212 III.A7.TP-212 III.A5.TP-212 III.A3.TP-212 III.A2.TP-212 III.A1.TP-212 III.A9.TP-27 III.A8.TP-27 III.A7.TP-27 III.A5.TP-27 III.A3.TP-27 III.A2.TP-27 III.A1.TP-27
A5.1-f	T-06	III.A9.TP-28 III.A7.TP-28 III.A5.TP-28 III.A4.TP-28 III.A3.TP-28 III.A2.TP-28 III.A1.TP-28
A5.1-g	T-07	III.A9.TP-29 III.A8.TP-29 III.A7.TP-29 III.A5.TP-29 III.A3.TP-29 III.A2.TP-29 III.A1.TP-29
A5.1-h	T-08	III.A9.TP-30 III.A8.TP-30 III.A7.TP-30 III.A6.TP-30 III.A5.TP-30 III.A3.TP-30

Table A-2. Relationship of Structures and Component Supports IDs in GALL Report, Chapter III

Rev. 0	Rev. 1	Rev. 2
		III.A2.TP-30 III.A1.TP-30
A5.1-i	T-09	III.A9.TP-31 III.A8.TP-31 III.A7.TP-31 III.A6.TP-31 III.A5.TP-31 III.A3.TP-31 III.A2.TP-31 III.A1.TP-31
A5.1-j	T-10	III.A5.TP-114 III.A4.TP-114 III.A3.TP-114 III.A2.TP-114 III.A1.TP-114
A5.2-a	T-11	III.A8.TP-302 III.A7.TP-302 III.A5.TP-302 III.A4.TP-302 III.A3.TP-302 III.A2.TP-302 III.A1.TP-302
A5.2-b	T-14	III.A5.T-14
A5.3-a	T-12	III.A6.T-12 III.A5.T-12 III.A3.T-12 III.A2.T-12 III.A1.T-12
A6.1-a	T-15	III.A6.TP-110 III.A6.TP-36
A6.1-b	T-16	III.A6.TP-109 III.A6.TP-37
A6.1-c	T-17	III.A6.TP-220
A6.1-d	T-18	III.A6.TP-104 III.A6.TP-38
A6.1-e	T-19	III.A6.TP-107
A6.1-f	T-08	III.A9.TP-30 III.A8.TP-30 III.A7.TP-30 III.A6.TP-30 III.A5.TP-30 III.A3.TP-30 III.A2.TP-30 III.A1.TP-30
A6.1-g	T-09	III.A9.TP-31 III.A8.TP-31 III.A7.TP-31 III.A6.TP-31 III.A5.TP-31 III.A3.TP-31 III.A2.TP-31 III.A1.TP-31
A6.1-h	T-20	III.A6.T-20
A6.2-a	T-21	Retired
A6.3-a	T-12	III.A6.T-12 III.A5.T-12 III.A3.T-12 III.A2.T-12 III.A1.T-12
A6.4-a	T-22	III.A6.T-22
A6.	TP-7	III.A6.TP-7
A7.1-a	T-01	III.A9.TP-108 III.A8.TP-108 III.A5.TP-108 III.A7.TP-108 III.A3.TP-108 III.A2.TP-108 III.A1.TP-108 III.A9.TP-23 III.A8.TP-23 III.A7.TP-23 III.A5.TP-23 III.A3.TP-23

Table A-2. Relationship of Structures and Component Supports IDs in GALL Report, Chapter III

Rev. 0	Rev. 1	Rev. 2
		III.A2.TP-23 III.A1.TP-23
A7.1-b	T-02	III.A9.TP-24 III.A8.TP-24 III.A7.TP-24 III.A5.TP-24 III.A3.TP-24 III.A2.TP-24 III.A1.TP-24 III.A9.TP-67 III.A8.TP-67 III.A7.TP-67 III.A5.TP-67 III.A3.TP-67 III.A1.TP-67 III.A2.TP-67
A7.1-c	T-03	III.A1.TP-204 III.A8.TP-204 III.A7.TP-204 III.A5.TP-204 III.A4.TP-204 III.A3.TP-204 III.A2.TP-204 III.A9.TP-204 III.A2.TP-25 III.A3.TP-25 III.A4.TP-25 III.A5.TP-25 III.A7.TP-25 III.A1.TP-25 III.A9.TP-25 III.A8.TP-25
A7.1-d	T-04	III.A9.TP-26 III.A7.TP-26 III.A5.TP-26 III.A4.TP-26 III.A3.TP-26 III.A2.TP-26
		III.A1.TP-26
A7.1-e	T-05	III.A9.TP-212 III.A8.TP-212 III.A7.TP-212 III.A5.TP-212 III.A3.TP-212 III.A2.TP-212 III.A1.TP-212 III.A9.TP-27 III.A8.TP-27 III.A7.TP-27 III.A5.TP-27 III.A3.TP-27 III.A2.TP-27 III.A1.TP-27
A7.1-f	T-06	III.A9.TP-28 III.A7.TP-28 III.A5.TP-28 III.A4.TP-28 III.A3.TP-28 III.A2.TP-28 III.A1.TP-28
A7.1-g	T-07	III.A9.TP-29 III.A8.TP-29 III.A7.TP-29 III.A5.TP-29 III.A3.TP-29 III.A2.TP-29 III.A1.TP-29
A7.1-h	T-08	III.A9.TP-30 III.A8.TP-30 III.A7.TP-30 III.A6.TP-30 III.A5.TP-30 III.A3.TP-30 III.A2.TP-30 III.A1.TP-30
A7.1-i	T-09	III.A9.TP-31

Table A-2. Relationship of Structures and Component Supports IDs in GALL Report, Chapter III		
Rev. 0	**Rev. 1**	**Rev. 2**
		III.A8.TP-31 III.A7.TP-31 III.A6.TP-31 III.A5.TP-31 III.A3.TP-31 III.A2.TP-31 III.A1.TP-31
A7.2-a	T-11	III.A8.TP-302 III.A7.TP-302 III.A5.TP-302 III.A4.TP-302 III.A3.TP-302 III.A2.TP-302 III.A1.TP-302
A7.2-b	T-23	III.A8.T-23 III.A7.T-23
A8.1-a	T-01	III.A9.TP-108 III.A8.TP-108 III.A5.TP-108 III.A7.TP-108 III.A3.TP-108 III.A2.TP-108 III.A1.TP-108 III.A9.TP-23 III.A8.TP-23 III.A7.TP-23 III.A5.TP-23 III.A3.TP-23 III.A2.TP-23 III.A1.TP-23
A8.1-b	T-02	III.A9.TP-24 III.A8.TP-24 III.A7.TP-24 III.A5.TP-24 III.A3.TP-24 III.A2.TP-24 III.A1.TP-24 III.A9.TP-67

Table A-2. Relationship of Structures and Component Supports IDs in GALL Report, Chapter III		
Rev. 0	**Rev. 1**	**Rev. 2**
		III.A8.TP-67 III.A7.TP-67 III.A5.TP-67 III.A3.TP-67 III.A1.TP-67 III.A2.TP-67
A8.1-c	T-03	III.A1.TP-204 III.A8.TP-204 III.A7.TP-204 III.A5.TP-204 III.A4.TP-204 III.A3.TP-204 III.A2.TP-204 III.A9.TP-204 III.A2.TP-25 III.A3.TP-25 III.A4.TP-25 III.A5.TP-25 III.A7.TP-25 III.A1.TP-25 III.A9.TP-25 III.A8.TP-25
A8.1-d	T-05	III.A9.TP-212 III.A8.TP-212 III.A7.TP-212 III.A5.TP-212 III.A3.TP-212 III.A2.TP-212 III.A1.TP-212 III.A9.TP-27 III.A8.TP-27 III.A7.TP-27 III.A5.TP-27 III.A3.TP-27 III.A2.TP-27 III.A1.TP-27
A8.1-e	T-07	III.A9.TP-29 III.A8.TP-29

Table A-2. Relationship of Structures and Component Supports IDs in GALL Report, Chapter III

Rev. 0	Rev. 1	Rev. 2
		III.A7.TP-29 III.A5.TP-29 III.A3.TP-29 III.A2.TP-29 III.A1.TP-29
A8.1-f	T-08	III.A9.TP-30 III.A8.TP-30 III.A7.TP-30 III.A6.TP-30 III.A5.TP-30 III.A3.TP-30 III.A2.TP-30 III.A1.TP-30
A8.1-g	T-09	III.A9.TP-31 III.A8.TP-31 III.A7.TP-31 III.A6.TP-31 III.A5.TP-31 III.A3.TP-31 III.A2.TP-31 III.A1.TP-31
A8.2-a	T-11	III.A8.TP-302 III.A7.TP-302 III.A5.TP-302 III.A4.TP-302 III.A3.TP-302 III.A2.TP-302 III.A1.TP-302
A8.2-b	T-23	III.A8.T-23 III.A7.T-23
A9.1-a	T-01	III.A9.TP-108 III.A8.TP-108 III.A5.TP-108 III.A7.TP-108 III.A3.TP-108 III.A2.TP-108 III.A1.TP-108 III.A9.TP-23

Table A-2. Relationship of Structures and Component Supports IDs in GALL Report, Chapter III

Rev. 0	Rev. 1	Rev. 2
		III.A8.TP-23 III.A7.TP-23 III.A5.TP-23 III.A3.TP-23 III.A2.TP-23 III.A1.TP-23
A9.1-b	T-02	III.A9.TP-24 III.A8.TP-24 III.A7.TP-24 III.A5.TP-24 III.A3.TP-24 III.A2.TP-24 III.A1.TP-24 III.A9.TP-67 III.A8.TP-67 III.A7.TP-67 III.A5.TP-67 III.A3.TP-67 III.A1.TP-67 III.A2.TP-67
A9.1-c	T-03	III.A1.TP-204 III.A8.TP-204 III.A7.TP-204 III.A5.TP-204 III.A4.TP-204 III.A3.TP-204 III.A2.TP-204 III.A9.TP-204 III.A2.TP-25 III.A3.TP-25 III.A4.TP-25 III.A5.TP-25 III.A7.TP-25 III.A1.TP-25 III.A9.TP-25 III.A8.TP-25
A9.1-d	T-04	III.A9.TP-26 III.A7.TP-26

Table A-2. Relationship of Structures and Component Supports IDs in GALL Report, Chapter III		
Rev. 0	**Rev. 1**	**Rev. 2**
		III.A5.TP-26 III.A4.TP-26 III.A3.TP-26 III.A2.TP-26 III.A1.TP-26
A9.1-e	T-05	III.A9.TP-212 III.A8.TP-212 III.A7.TP-212 III.A5.TP-212 III.A3.TP-212 III.A2.TP-212 III.A1.TP-212 III.A9.TP-27 III.A8.TP-27 III.A7.TP-27 III.A5.TP-27 III.A3.TP-27 III.A2.TP-27 III.A1.TP-27
A9.1-f	T-06	III.A9.TP-28 III.A7.TP-28 III.A5.TP-28 III.A4.TP-28 III.A3.TP-28 III.A2.TP-28 III.A1.TP-28
A9.1-g	T-07	III.A9.TP-29 III.A8.TP-29 III.A7.TP-29 III.A5.TP-29 III.A3.TP-29 III.A2.TP-29 III.A1.TP-29
A9.1-h	T-08	III.A9.TP-30 III.A8.TP-30 III.A7.TP-30 III.A6.TP-30 III.A5.TP-30

Table A-2. Relationship of Structures and Component Supports IDs in GALL Report, Chapter III		
Rev. 0	**Rev. 1**	**Rev. 2**
		III.A3.TP-30 III.A2.TP-30 III.A1.TP-30
A9.1-i	T-09	III.A9.TP-31 III.A8.TP-31 III.A7.TP-31 III.A6.TP-31 III.A5.TP-31 III.A3.TP-31 III.A2.TP-31 III.A1.TP-31
B1.1	TP-9	Retired
B1.1	TP-10	III.B1.1.TP-10
B1.1.	TP-11	III.B1.1.TP-8
B1.1.	TP-3	III.B3.TP-3 III.B2.TP-3 III.B1.3.TP-3 III.B1-2.TP-3 III.B1.1.TP-3 III.B5.TP-3 III.B4.TP-3
B1.1.	TP-8	III.B1.1.TP-8
B1.1.	TP-5	III.B1.1.TP-8
B1.1.	TP-4	III.B5.TP-4 III.B4.TP-4 III.B3.TP-4 III.B2.TP-4 III.B1.3.TP-4 III.B1.2.TP-4 III.B1.1.TP-4
B1.1.1-a	T-24	III.B1.3.T-24 III.B1.2.T-24 III.B1.1.T-24
B1.1.1-b	T-25	III.B5.T-25 III.B4.T-25 III.B3.T-25 III.B2.T-25

Table A-2. Relationship of Structures and Component Supports IDs in GALL Report, Chapter III

Rev. 0	Rev. 1	Rev. 2
		III.B1.2.T-25 III.B1.1.T-25
B1.1.1-c	T-26	III.B1.3.T-26 III.B1.2.T-26 III.B1.1.T-26
B1.1.2-a	T-27	III.B1.1.TP-41
B1.1.3-a	T-28	III.B1.3.T-28 III.B1.2.T-28 III.B1.1.T-28
B1.1.4-a	T-29	III.B5.TP-42 III.B4.TP-42 III.B3.TP-42 III.B2.TP-42 III.B1.3.TP-42 III.B1.2.TP-42 III.B1.1.TP-42
B1.2.	TP-3	III.B3.TP-3 III.B2.TP-3 III.B1.3.TP-3 III.B1-2.TP-3 III.B1.1.TP-3 III.B5.TP-3 III.B4.TP-3
B1.2.	TP-5	III.B1.2.TP-8
B1.2.	TP-8	III.B1.2.TP-8
B1.2.	TP-4	III.B5.TP-4 III.B4.TP-4 III.B3.TP-4 III.B2.TP-4 III.B1.3.TP-4 III.B1.2.TP-4 III.B1.1.TP-4
B1.2.	TP-11	III.B1.2.TP-8
B1.2.1-a	T-24	III.B1.3.T-24 III.B1.2.T-24 III.B1.1.T-24

Table A-2. Relationship of Structures and Component Supports IDs in GALL Report, Chapter III

Rev. 0	Rev. 1	Rev. 2
B1.2.1-b	T-25	III.B5.T-25 III.B4.T-25 III.B3.T-25 III.B2.T-25 III.B1.2.T-25 III.B1.1.T-25
B1.2.1-c	T-26	III.B1.3.T-26 III.B1.2.T-26 III.B1.1.T-26
B1.2.2-a	T-28	III.B1.3.T-28 III.B1.2.T-28 III.B1.1.T-28
B1.2.3-a	T-29	III.B5.TP-42 III.B4.TP-42 III.B3.TP-42 III.B2.TP-42 III.B1.3.TP-42 III.B1.2.TP-42 III.B1.1.TP-42
B1.3.	TP-3	III.B3.TP-3 III.B2.TP-3 III.B1.3.TP-3 III.B1-2.TP-3 III.B1.1.TP-3 III.B5.TP-3 III.B4.TP-3
B1.3.	TP-4	III.B5.TP-4 III.B4.TP-4 III.B3.TP-4 III.B2.TP-4 III.B1.3.TP-4 III.B1.2.TP-4 III.B1.1.TP-4
B1.3.	TP-5	III.B1.3.TP-8
B1.3.	TP-11	III.B1.3.TP-8
B1.3.	TP-8	III.B1.3.TP-8
B1.3.1-a	T-24	III.B1.3.T-24

Table A-2. Relationship of Structures and Component Supports IDs in GALL Report, Chapter III		
Rev. 0	**Rev. 1**	**Rev. 2**
		III.B1.2.T-24 III.B1.1.T-24
B1.3.1-b	T-26	III.B1.3.T-26 III.B1.2.T-26 III.B1.1.T-26
B1.3.2-a	T-28	III.B1.3.T-28 III.B1.2.T-28 III.B1.1.T-28
B1.3.3-a	T-29	III.B5.TP-42 III.B4.TP-42 III.B3.TP-42 III.B2.TP-42 III.B1.3.TP-42 III.B1.2.TP-42 III.B1.1.TP-42
B2.	TP-4	III.B5.TP-4 III.B4.TP-4 III.B3.TP-4 III.B2.TP-4 III.B1.3.TP-4 III.B1.2.TP-4 III.B1.1.TP-4
B2.	TP-11	III.B2.TP-8
B2.	TP-2	III.B4.TP-47 III.B2.TP-47
B2.	TP-8	III.B2.TP-8
B2.	TP-6	III.B4.TP-6 III.B2.TP-6
B2.	TP-1	III.B2.TP-46 III.B4.TP-46
B2.	TP-5	III.B2.TP-8
B2.	TP-3	III.B3.TP-3 III.B2.TP-3 III.B1.3.TP-3 III.B1-2.TP-3 III.B1.1.TP-3

Table A-2. Relationship of Structures and Component Supports IDs in GALL Report, Chapter III		
Rev. 0	**Rev. 1**	**Rev. 2**
		III.B5.TP-3 III.B4.TP-3
B2.1-a	T-30	III.B5.TP-43 III.B4.TP-43 III.B3.TP-43 III.B2.TP-43
B2.1-b	T-25	III.B5.T-25 III.B4.T-25 III.B3.T-25 III.B2.T-25 III.B1.2.T-25 III.B1.1.T-25
B2.2-a	T-29	III.B5.TP-42 III.B4.TP-42 III.B3.TP-42 III.B2.TP-42 III.B1.3.TP-42 III.B1.2.TP-42 III.B1.1.TP-42
B3.	TP-8	III.B3.TP-8
B3.	TP-3	III.B3.TP-3 III.B2.TP-3 III.B1.3.TP-3 III.B1-2.TP-3 III.B1.1.TP-3 III.B5.TP-3 III.B4.TP-3
B3.	TP-4	III.B5.TP-4 III.B4.TP-4 III.B3.TP-4 III.B2.TP-4 III.B1.3.TP-4 III.B1.2.TP-4 III.B1.1.TP-4
B3.	TP-5	III.B3.TP-8
B3.	TP-11	III.B3.TP-8
B3.1-a	T-30	III.B5.TP-43

Table A-2. Relationship of Structures and Component Supports IDs in GALL Report, Chapter III

Rev. 0	Rev. 1	Rev. 2
		III.B4.TP-43 III.B3.TP-43 III.B2.TP-43
B3.1-b	T-25	III.B5.T-25 III.B4.T-25 III.B3.T-25 III.B2.T-25 III.B1.2.T-25 III.B1.1.T-25
B3.2-a	T-29	III.B5.TP-42 III.B4.TP-42 III.B3.TP-42 III.B2.TP-42 III.B1.3.TP-42 III.B1.2.TP-42 III.B1.1.TP-42
B4.	TP-1	III.B2.TP-46 III.B4.TP-46
B4.	TP-6	III.B4.TP-6 III.B2.TP-6
B4.	TP-2	III.B4.TP-47 III.B2.TP-47
B4.	TP-5	III.B4.TP-8
B4.	TP-3	III.B3.TP-3 III.B2.TP-3 III.B1.3.TP-3 III.B1-2.TP-3 III.B1.1.TP-3 III.B5.TP-3 III.B4.TP-3
B4.	TP-4	III.B5.TP-4 III.B4.TP-4 III.B3.TP-4 III.B2.TP-4 III.B1.3.TP-4 III.B1.2.TP-4 III.B1.1.TP-4

Table A-2. Relationship of Structures and Component Supports IDs in GALL Report, Chapter III

Rev. 0	Rev. 1	Rev. 2
B4.	TP-11	III.B4.TP-8
B4.	TP-8	III.B4.TP-8
B4.1-a	T-30	III.B5.TP-43 III.B4.TP-43 III.B3.TP-43 III.B2.TP-43
B4.1-b	T-25	III.B5.T-25 III.B4.T-25 III.B3.T-25 III.B2.T-25 III.B1.2.T-25 III.B1.1.T-25
B4.2-a	T-31	III.B4.TP-44
B4.3-a	T-29	III.B5.TP-42 III.B4.TP-42 III.B3.TP-42 III.B2.TP-42 III.B1.3.TP-42 III.B1.2.TP-42 III.B1.1.TP-42
B5.	TP-3	III.B3.TP-3 III.B2.TP-3 III.B1.3.TP-3 III.B1-2.TP-3 III.B1.1.TP-3 III.B5.TP-3 III.B4.TP-3
B5.	TP-4	III.B5.TP-4 III.B4.TP-4 III.B3.TP-4 III.B2.TP-4 III.B1.3.TP-4 III.B1.2.TP-4 III.B1.1.TP-4
B5.	TP-8	III.B5.TP-8
B5.	TP-5	III.B5.TP-8
B5.	TP-11	III.B5.TP-8

Table A-2. Relationship of Structures and Component Supports IDs in GALL Report, Chapter III		
Rev. 0	**Rev. 1**	**Rev. 2**
B5.1-a	T-30	III.B5.TP-43 III.B4.TP-43 III.B3.TP-43 III.B2.TP-43
B5.1-b	T-25	III.B5.T-25 III.B4.T-25 III.B3.T-25 III.B2.T-25 III.B1.2.T-25 III.B1.1.T-25
B5.2-a	T-29	III.B5.TP-42 III.B4.TP-42 III.B3.TP-42 III.B2.TP-42 III.B1.3.TP-42 III.B1.2.TP-42 III.B1.1.TP-42

Table A-3. Relationship of Reactor Vessel, Internals, and Reactor Coolant (RCS) System IDs in GALL Report, Chapter IV

Rev. 0	Rev. 1	Rev. 2
None	None	IV.D2.RP-162
None	None	IV.A1.RP-165
None	None	IV.C2.RP-166
None	None	IV.C2.RP-167
None	None	IV.B1.RP-182
None	None	IV.B1.RP-200
None	None	IV.A1.RP-201
None	None	IV.B4.RP-236
None	None	IV.B4.RP-237
None	None	IV.B4.RP-238
None	None	IV.B4.RP-239
None	None	IV.B2.RP-265
None	None	IV.B2.RP-267
None	None	IV.B2.RP-268
None	None	IV.B2.RP-269
None	None	IV.B2.RP-296
None	None	IV.B2.RP-297
None	None	IV.B2.RP-302
None	None	IV.B3.RP-306
None	None	IV.B3.RP-307
None	None	IV.B3.RP-309
None	None	IV.B3.RP-311
None	None	IV.B3.RP-313
None	None	IV.B3.RP-322
None	None	IV.B3.RP-323
None	None	IV.B3.RP-324
None	None	IV.B3.RP-325
None	None	IV.B3.RP-326
None	None	IV.B3.RP-331
None	None	IV.B3.RP-333
None	None	IV.B3.RP-338
		IV.B3.RP-342
		IV.B3.RP-343
		IV.B2.RP-345
		IV.B2.RP-346
None	None	IV.B4.RP-352
None	None	IV.B2.RP-354
None	None	IV.B2.RP-355
None	None	IV.B2.RP-356
None	None	IV.B3.RP-357
None	None	IV.B3.RP-358
None	None	IV.B3.RP-359
None	None	IV.B3.RP-360
None	None	IV.B3.RP-361
None	None	IV.B3.RP-362
None	None	IV.B3.RP-363
None	None	IV.B3.RP-364
None	None	IV.B3.RP-365
None	None	IV.B3.RP-366
None	None	IV.D1.RP-372
None	None	IV.B4.RP-375
None	None	IV.B4.RP-376
None	None	IV.B1.RP-377
None	None	IV.E.RP-378
None	None	IV.B1.RP-381
None	None	IV.C2.RP-383
None	None	IV.D1.RP-385
None	None	IV.B2.RP-386
None	None	IV.B2.RP-387
None	None	IV.B2.RP-388
None	None	IV.B3.RP-389
None	None	IV.B3.RP-390

Table A-3. Relationship of Reactor Vessel, Internals, and Reactor Coolant (RCS) System IDs in GALL Report, Chapter IV

Rev. 0	Rev. 1	Rev. 2
None	None	IV.B3.RP-391
A1.	RP-25	IV.A1.RP-157
A1.1-a	R-59	IV.A1.RP-50
A1.1-b	R-04	IV.A1.R-04
A1.1-c	R-60	IV.A1.RP-51
A1.1-d	R-61	IV.A1.R-61
A1.2-a	R-04	IV.A1.R-04
A1.2-b	R-04	IV.A1.R-04
A1.2-c	R-62	IV.A1.R-62
A1.2-d	R-63	IV.A1.RP-227
A1.2-e	R-64	IV.A1.R-64
A1.3-a	R-04	IV.A1.R-04
A1.3-b	R-65	IV.A1.R-65
A1.3-c	R-66	IV.A1.R-66
A1.3-d	R-04	IV.A1.R-04
A1.3-e	R-67	IV.A1.R-67
A1.4-a	R-68	IV.A1.R-68
A1.4-b	R-04	IV.A1.R-04
A1.5-a	R-69	IV.A1.RP-369 IV.A1.RP-371
A1.5-b	R-04	IV.A1.R-04
A1.6-a	R-04	IV.A1.R-04
A1.7-a	R-70	IV.A2.R-70 IV.A1.R-70
A2.	RP-28	IV.A2.RP-28
A2.	RP-13	IV.A2.RP-154
A2.1-a	R-17	IV.A2.R-17 IV.D2.R-17 IV.D1.R-17 IV.C2.R-17 IV.A2.RP-379 IV.C2.RP-380

Table A-3. Relationship of Reactor Vessel, Internals, and Reactor Coolant (RCS) System IDs in GALL Report, Chapter IV

Rev. 0	Rev. 1	Rev. 2
A2.1-b	R-219	IV.A2.R-219
A2.1-c	R-71	IV.A2.RP-52
A2.1-d	R-72	IV.A2.RP-53
A2.1-e	R-73	IV.A2.RP-54
A2.1-f	R-74	IV.A2.R-74
A2.2-a	R-75	IV.A2.RP-186
A2.2-b	R-76	IV.A2.RP-55
A2.2-c	R-219	IV.A2.R-219
A2.2-d	R-77	IV.A2.R-77
A2.2-e	R-78	IV.A2.R-78
A2.2-f	R-79	IV.A2.R-79
A2.2-g	R-80	IV.A2.R-80
A2.3-a	R-81	IV.A2.R-81
A2.3-b	R-82	IV.A2.RP-228
A2.3-c	R-219	IV.A2.R-219
A2.4-a	R-219	IV.A2.R-219
A2.4-b	R-83	IV.A2.RP-234
A2.5-a	R-84	IV.A2.R-84
A2.5-b	R-85	IV.A2.R-85
A2.5-c	R-86	IV.A2.RP-229
A2.5-d	R-219	IV.A2.R-219
A2.5-e	R-17	IV.A2.R-17 IV.D2.R-17 IV.D1.R-17 IV.C2.R-17 IV.A2.RP-379 IV.C2.RP-380
A2.5-f	R-87	IV.A2.R-87
A2.6-a	R-88	IV.A2.RP-57
A2.7-a	R-89	IV.A2.RP-59
A2.7-b	R-90	IV.A2.R-90
A2.8-a	R-70	IV.A2.R-70

Table A-3. Relationship of Reactor Vessel, Internals, and Reactor Coolant (RCS) System IDs in GALL Report, Chapter IV

Rev. 0	Rev. 1	Rev. 2
		IV.A1.R-70
A2.8-b	R-17	IV.A2.R-17 IV.D2.R-17 IV.D1.R-17 IV.C2.R-17 IV.A2.RP-379 IV.C2.RP-380
B1.	RP-26	IV.B1.RP-26
B1.	RP-18	IV.B1.RP-155
B1.1-a	R-92	IV.B1.R-92
B1.1-b	R-93	IV.B1.R-93
B1.1-c	R-53	IV.B4.R-53 IV.B1.R-53 IV.B2.RP-303 IV.B3.RP-339
B1.1-d	R-94	IV.B1.R-94
B1.1-e	R-95	IV.B1.R-95
B1.1-f	R-96	IV.B1.R-96
B1.1-g	R-97	IV.B1.R-97
B1.2-a	R-98	IV.B1.R-98
B1.2-b	R-53	IV.B4.R-53 IV.B1.R-53 IV.B2.RP-303 IV.B3.RP-339
B1.3-a	R-99	IV.B1.R-99
B1.3-b	R-53	IV.B4.R-53 IV.B1.R-53 IV.B2.RP-303 IV.B3.RP-339
B1.4-a	R-100	IV.B1.R-100
B1.4-b	R-53	IV.B4.R-53 IV.B1.R-53 IV.B2.RP-303 IV.B3.RP-339

Table A-3. Relationship of Reactor Vessel, Internals, and Reactor Coolant (RCS) System IDs in GALL Report, Chapter IV

Rev. 0	Rev. 1	Rev. 2
B1.4-c	R-101	IV.B1.RP-219
B1.4-d	R-102	Retired
B1.5-a	R-103	IV.B1.RP-220
B1.5-b	R-53	IV.B4.R-53 IV.B1.R-53 IV.B2.RP-303 IV.B3.RP-339
B1.5-c	R-104	IV.B1.R-104
B1.6-a	R-105	IV.B1.R-105
B1.6-b	R-53	IV.B4.R-53 IV.B1.R-53 IV.B2.RP-303 IV.B3.RP-339
B2.	RP-24	IV.B3.RP-24 IV.B2.RP-24 IV.B4.RP-24
B2.1-a	R-106	Retired
B2.1-b	R-107	Retired
B2.1-c	R-53	IV.B4.R-53 IV.B1.R-53 IV.B2.RP-303 IV.B3.RP-339
B2.1-d	R-108	IV.B2.RP-300
B2.1-e	R-109	Retired
B2.1-f	R-110	Retired
B2.1-g	R-111	Retired
B2.1-h	R-53	IV.B4.R-53 IV.B1.R-53 IV.B2.RP-303 IV.B3.RP-339
B2.1-i	R-112	IV.B2.RP-301
B2.1-j	R-113	Retired
B2.1-k	R-114	Retired

Table A-3. Relationship of Reactor Vessel, Internals, and Reactor Coolant (RCS) System IDs in GALL Report, Chapter IV

Rev. 0	Rev. 1	Rev. 2
B2.1-l	R-115	IV.B2.RP-299
B2.1-m	R-53	IV.B4.R-53 IV.B1.R-53 IV.B2.RP-303 IV.B3.RP-339
B2.2-a	R-116	Retired
B2.2-b	R-117	Retired
B2.2-c	R-53	IV.B4.R-53 IV.B1.R-53 IV.B2.RP-303 IV.B3.RP-339
B2.2-d	R-118	IV.B2.RP-298
B2.2-e	R-119	Retired
B2.2-f	R-53	IV.B4.R-53 IV.B1.R-53 IV.B2.RP-303 IV.B3.RP-339
B2.3-a	R-120	IV.B2.RP-276 IV.B2.RP-278 IV.B2.RP-280 IV.B2.RP-282
B2.3-b	R-121	Retired
B2.3-c	R-122	IV.B2.RP-281
B2.3-d	R-53	IV.B4.R-53 IV.B1.R-53 IV.B2.RP-303 IV.B3.RP-339
B2.4-a	R-123	Retired
B2.4-b	R-124	IV.B2.RP-270
B2.4-c	R-125	IV.B4.RP-241 IV.B4.RP-244 IV.B2.RP-271 IV.B2.RP-273
B2.4-d	R-126	Retired

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Rev. 0	Rev. 1	Rev. 2
B2.4-e	R-127	Retired
B2.4-f	R-128	IV.B4.RP-240 IV.B4.RP-243 IV.B2.RP-272 IV.B2.RP-274 IV.B2.RP-275
B2.4-g	R-53	IV.B4.R-53 IV.B1.R-53 IV.B2.RP-303 IV.B3.RP-339
B2.4-h	R-129	Retired
B2.5-a	R-130	IV.B2.RP-289
B2.5-b	R-131	Retired
B2.5-c	R-132	IV.B2.RP-288
B2.5-d	R-53	IV.B4.R-53 IV.B1.R-53 IV.B2.RP-303 IV.B3.RP-339
B2.5-e	R-133	IV.B2.RP-286
B2.5-f	R-134	Retired
B2.5-g	R-135	IV.B2.RP-287
B2.5-h	R-136	Retired
B2.5-i	R-137	IV.B2.RP-285
B2.5-j	R-53	IV.B4.R-53 IV.B1.R-53 IV.B2.RP-303 IV.B3.RP-339
B2.5-k	R-138	IV.B2.RP-291 IV.B2.RP-293 IV.B2.RP-294
B2.5-l	R-139	Retired
B2.5-m	R-140	IV.B2.RP-290 IV.B2.RP-292
B2.5-n	R-141	IV.B2.RP-295

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Rev. 0	Rev. 1	Rev. 2
B2.5-o	R-142	IV.B2.RP-382
B2.5-p	R-53	IV.B4.R-53 IV.B1.R-53 IV.B2.RP-303 IV.B3.RP-339
B2.6-a	R-143	IV.B2.RP-284
B2.6-b	R-144	Retired
B2.6-c	R-145	Retired
B3.	RP-24	IV.B3.RP-24 IV.B2.RP-24 IV.B4.RP-24
B3.1-a	R-146	Retired
B3.1-b	R-147	Retired
B3.1-c	R-148	Retired
B3.2-a	R-149	IV.B3.RP-312
B3.2-b	R-150	Retired
B3.2-c	R-151	Retired
B3.2-d	R-152	Retired
B3.2-e	R-153	Retired
B3.2-f	R-53	IV.B4.R-53 IV.B1.R-53 IV.B2.RP-303 IV.B3.RP-339
B3.2-g	R-154	Retired
B3.3-a	R-157	Retired
B3.3-a	R-155	IV.B3.RP-327 IV.B3.RP-328 IV.B3.RP-329
B3.3-b	R-158	Retired
B3.3-b	R-156	IV.B3.RP-332
B3.4-a	R-159	Retired
B3.4-b	R-160	Retired
B3.4-c	R-161	Retired

Table A-3. Relationship of Reactor Vessel, Internals, and Reactor Coolant (RCS) System IDs in GALL Report, Chapter IV

Rev. 0	Rev. 1	Rev. 2
B3.4-d	R-53	IV.B4.R-53 IV.B1.R-53 IV.B2.RP-303 IV.B3.RP-339
B3.4-e	R-162	IV.B3.RP-314 IV.B3.RP-316 IV.B3.RP-319 IV.B3.RP-320
B3.4-f	R-163	IV.B3.RP-318
B3.4-g	R-164	Retired
B3.4-h	R-165	IV.B3.RP-315 IV.B3.RP-317
B3.5-a	R-166	Retired
B3.5-b	R-167	IV.B3.RP-330 IV.B3.RP-334 IV.B3.RP-335
B3.5-c	R-168	Retired
B3.5-d	R-169	Retired
B3.5-e	R-170	IV.B3.RP-336 IV.B3.RP-382
B3.5-f	R-171	Retired
B3.5-g	R-53	IV.B4.R-53 IV.B1.R-53 IV.B2.RP-303 IV.B3.RP-339
B4.	RP-24	IV.B3.RP-24 IV.B2.RP-24 IV.B4.RP-24
B4.1-a	R-172	Retired
B4.1-b	R-173	Retired
B4.1-c	R-174	Retired
B4.1-d	R-53	IV.B4.R-53 IV.B1.R-53 IV.B2.RP-303

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Rev. 0	Rev. 1	Rev. 2
		IV.B3.RP-339
B4.2-a	R-175	Retired
B4.2-b	R-176	Retired
B4.2-c	R-177	Retired
B4.2-d	R-53	IV.B4.R-53 IV.B1.R-53 IV.B2.RP-303 IV.B3.RP-339
B4.2-e	R-178	Retired
B4.2-f	R-179	IV.B4.RP-382
B4.3-a	R-180	Retired
B4.3-b	R-181	Retired
B4.3-c	R-182	Retired
B4.3-d	R-183	IV.B4.RP-242 IV.B4.RP-258
B4.3-e	R-184	Retired
B4.3-f	R-53	IV.B4.R-53 IV.B1.R-53 IV.B2.RP-303 IV.B3.RP-339
B4.4-a	R-185	Retired
B4.4-b	R-186	Retired
B4.4-c	R-187	Retired
B4.4-d	R-188	IV.B4.RP-252
B4.4-e	R-53	IV.B4.R-53 IV.B1.R-53 IV.B2.RP-303 IV.B3.RP-339
B4.4-f	R-190	IV.B4.RP-251
B4.4-g	R-191	IV.B4.RP-253
B4.4-h	R-192	Retired
B4.5-a	R-193	Retired
B4.5-b	R-194	IV.B4.RP-245

Table A-3. Relationship of Reactor Vessel, Internals, and Reactor Coolant (RCS) System IDs in GALL Report, Chapter IV

Rev. 0	Rev. 1	Rev. 2
		IV.B4.RP-247
B4.5-c	R-195	Retired
B4.5-d	R-196	IV.B4.RP-246 IV.B4.RP-248 IV.B4.RP-249 IV.B4.RP-250
B4.5-e	R-197	Retired
B4.5-f	R-53	IV.B4.R-53 IV.B1.R-53 IV.B2.RP-303 IV.B3.RP-339
B4.5-g	R-125	IV.B4.RP-241 IV.B4.RP-244 IV.B2.RP-271 IV.B2.RP-273
B4.5-h	R-199	Retired
B4.5-i	R-128	IV.B4.RP-240 IV.B4.RP-243 IV.B2.RP-272 IV.B2.RP-274 IV.B2.RP-275
B4.5-j	R-201	Retired
B4.6-a	R-202	Retired
B4.6-b	R-203	IV.B4.RP-261 IV.B4.RP-262
B4.6-c	R-204	Retired
B4.6-d	R-205	IV.B4.RP-259 IV.B4.RP-260
B4.6-e	R-206	Retired
B4.6-f	R-53	IV.B4.R-53 IV.B1.R-53 IV.B2.RP-303 IV.B3.RP-339
B4.6-g	R-207	Retired

Table A-3. Relationship of Reactor Vessel, Internals, and Reactor Coolant (RCS) System IDs in GALL Report, Chapter IV

Rev. 0	Rev. 1	Rev. 2
B4.6-h	R-208	Retired
B4.7-a	R-209	Retired
B4.7-b	R-210	IV.B4.RP-254 IV.B4.RP-256
B4.7-c	R-211	Retired
B4.7-d	R-212	Retired
B4.7-e	R-213	Retired
B4.8-a	R-214	Retired
B4.8-b	R-215	Retired
B4.8-c	R-216	Retired
C1.	RP-27	IV.C1.RP-158
C1.1-a	R-23	IV.C1.R-23
C1.1-b	R-220	IV.C1.R-220
C1.1-c	R-23	IV.C1.R-23
C1.1-d	R-220	IV.C1.R-220
C1.1-e	R-220	IV.C1.R-220
C1.1-e	R-220	IV.C1.R-220
C1.1-f	R-20	IV.C1.R-20
C1.1-f	R-21	IV.C1.R-21
C1.1-g	R-52	IV.C2.R-52 IV.C1.R-52
C1.1-h	R-220	IV.C1.R-220
C1.1-i	R-03	IV.C1.RP-230
C1.2-a	R-220	IV.C1.R-220
C1.2-b	R-20	IV.C1.R-20
C1.2-c	R-08	IV.C2.R-08 IV.C1.R-08
C1.2-d	R-29	Retired
C1.2-d	R-26	IV.C1.RP-42
C1.2-e	R-27	IV.C1.RP-43
C1.2-f	R-28	IV.C1.RP-44

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Rev. 0	Rev. 1	Rev. 2
C1.3-a	R-23	IV.C1.R-23
C1.3-b	R-08	IV.C2.R-08 IV.C1.R-08
C1.3-c	R-20	IV.C1.R-20
C1.3-d	R-220	IV.C1.R-220
C1.3-e	R-26	IV.C1.RP-42
C1.3-e	R-29	Retired
C1.3-f	R-27	IV.C1.RP-43
C1.3-g	R-28	IV.C1.RP-44
C1.4-a	R-15	IV.C1.R-15
C1.4-a	R-225	IV.C1.R-225
C1.4-b	R-16	IV.C1.RP-39
C2.	RP-12	IV.C2.RP-12
C2.	RP-31	IV.C2.RP-159
C2.	RP-23	IV.C2.RP-23
C2.	RP-11	IV.C2.RP-222
C2.	RP-10	IV.C2.RP-221
C2.	RP-22	IV.C2.RP-156
C2.1-a	R-223	IV.C2.R-223
C2.1-b	R-223	IV.C2.R-223
C2.1-c	R-56	IV.C2.R-56
C2.1-c	R-30	IV.C2.R-30
C2.1-d	R-17	IV.A2.R-17 IV.D2.R-17 IV.D1.R-17 IV.C2.R-17 IV.A2.RP-379 IV.C2.RP-380
C2.1-e	R-05	IV.C2.R-05
C2.1-f	R-52	IV.C2.R-52 IV.C1.R-52

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Rev. 0	Rev. 1	Rev. 2
C2.1-g	R-02	IV.C2.RP-235
C2.2-a	R-223	IV.C2.R-223
C2.2-b	R-223	IV.C2.R-223
C2.2-c	R-223	IV.C2.R-223
C2.2-d	R-17	IV.A2.R-17 IV.D2.R-17 IV.D1.R-17 IV.C2.R-17 IV.A2.RP-379 IV.C2.RP-380
C2.2-e	R-52	IV.C2.R-52 IV.C1.R-52
C2.2-f	R-07	IV.D1.RP-232 IV.C2.RP-344
C2.2-g	R-05	IV.C2.R-05
C2.2-h	R-02	IV.C2.RP-235
C2.3-a	R-223	IV.C2.R-223
C2.3-a	R-223	IV.C2.R-223
C2.3-b	R-09	IV.C2.R-09
C2.3-c	R-08	IV.C2.R-08 IV.C1.R-08
C2.3-d	R-18	IV.C2.R-18
C2.3-e	R-11	IV.C2.R-11
C2.3-f	R-17	IV.A2.R-17 IV.D2.R-17 IV.D1.R-17 IV.C2.R-17 IV.A2.RP-379 IV.C2.RP-380
C2.3-g	R-12	IV.C2.R-12
C2.4-a	R-223	IV.C2.R-223
C2.4-b	R-09	IV.C2.R-09
C2.4-c	R-08	IV.C2.R-08

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Rev. 0	Rev. 1	Rev. 2
		IV.C1.R-08
C2.4-d	R-18	IV.C2.R-18
C2.4-e	R-11	IV.C2.R-11
C2.4-f	R-17	IV.A2.R-17 IV.D2.R-17 IV.D1.R-17 IV.C2.R-17 IV.A2.RP-379 IV.C2.RP-380
C2.4-g	R-12	IV.C2.R-12
C2.5-a	R-223	IV.C2.R-223
C2.5-b	R-17	IV.A2.R-17 IV.D2.R-17 IV.D1.R-17 IV.C2.R-17 IV.A2.RP-379 IV.C2.RP-380
C2.5-c	R-25	IV.C2.R-25
C2.5-c	R-58	IV.C2.R-58
C2.5-d	R-223	IV.C2.R-223
C2.5-e	R-223	IV.C2.R-223
C2.5-f	R-223	IV.C2.R-223
C2.5-g	R-25	IV.C2.R-25
C2.5-g	R-58	IV.C2.R-58
C2.5-h	R-07	IV.D1.RP-232 IV.C2.RP-344
C2.5-i	R-05	IV.C2.R-05
C2.5-j	R-24	IV.C2.RP-40 IV.C2.RP-41
C2.5-k	R-06	IV.C2.RP-37
C2.5-l	R-52	IV.C2.R-52 IV.C1.R-52
C2.5-m	R-07	IV.D1.RP-232 IV.C2.RP-344

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Rev. 0	Rev. 1	Rev. 2
C2.5-m	R-06	IV.C2.RP-37
C2.5-n	R-11	IV.C2.R-11
C2.5-o	R-17	IV.A2.R-17 IV.D2.R-17 IV.D1.R-17 IV.C2.R-17 IV.A2.RP-379 IV.C2.RP-380
C2.5-p	R-12	IV.C2.R-12
C2.5-q	R-223	IV.C2.R-223
C2.5-r	R-217	IV.C2.R-217
C2.5-s	R-06	IV.C2.RP-37
C2.5-t	R-18	IV.C2.R-18
C2.5-u	R-17	IV.A2.R-17 IV.D2.R-17 IV.D1.R-17 IV.C2.R-17 IV.A2.RP-379 IV.C2.RP-380
C2.5-v	R-19	IV.C2.R-19
C2.5-w	R-18	IV.C2.R-18
C2.6-a	R-13	IV.C2.R-13
C2.6-b	R-17	IV.A2.R-17 IV.D2.R-17 IV.D1.R-17 IV.C2.R-17 IV.A2.RP-379 IV.C2.RP-380
C2.6-c	R-14	IV.C2.RP-231
D1.	RP-21	IV.D1.RP-367
D1.	RP-17	IV.D1.RP-17
D1.	RP-14	IV.D1.RP-384
D1.	RP-15	IV.D1.RP-225 IV.D1.RP-226

Table A-3. Relationship of Reactor Vessel, Internals, and Reactor Coolant (RCS) System IDs in GALL Report, Chapter IV

Rev. 0	Rev. 1	Rev. 2
D1.	RP-16	IV.D1.RP-161
D1.1-a	R-33	IV.D2.R-33 IV.D1.R-33
D1.1-b	R-33	IV.D2.R-33 IV.D1.R-33
D1.1-c	R-34	IV.D1.RP-368
D1.1-d	R-37	IV.D1.R-37
D1.1-e	R-39	IV.D1.R-39
D1.1-f	R-32	IV.D2.RP-46 IV.D1.RP-46
D1.1-g	R-17	IV.A2.R-17 IV.D2.R-17 IV.D1.R-17 IV.C2.R-17 IV.A2.RP-379 IV.C2.RP-380
D1.1-h	R-221	IV.D1.R-221
D1.1-i	R-01	IV.D2.RP-36 IV.D1.RP-36
D1.1-i	R-07	IV.D1.RP-232 IV.C2.RP-344
D1.1-j	R-01	IV.D2.RP-36 IV.D1.RP-36
D1.1-k	R-17	IV.A2.R-17 IV.D2.R-17 IV.D1.R-17 IV.C2.R-17 IV.A2.RP-379 IV.C2.RP-380
D1.1-l	R-10	IV.D1.R-10
D1.2-a	R-44	IV.D2.R-44 IV.D1.R-44
D1.2-b	R-47	IV.D2.R-47 IV.D1.R-47

Table A-3. Relationship of Reactor Vessel, Internals, and Reactor Coolant (RCS) System IDs in GALL Report, Chapter IV		
Rev. 0	**Rev. 1**	**Rev. 2**
D1.2-c	R-48	IV.D2.R-48 IV.D1.R-48
D1.2-d	R-46	IV.D2.R-46 IV.D1.R-46
D1.2-e	R-49	IV.D2.RP-233 IV.D1.RP-233
D1.2-f	R-50	IV.D1.R-50
D1.2-g	R-43	IV.D1.R-43
D1.2-h	R-41	IV.D1.RP-48
D1.2-i	R-40	IV.D2.R-40 IV.D1.R-40
D1.2-j	R-40	IV.D2.R-40 IV.D1.R-40
D1.2-k	R-42	IV.D2.R-42 IV.D1.R-42
D1.3-a	R-51	IV.D1.RP-49
D2.	R-226	IV.D2.R-226
D2.	R-42	IV.D2.R-42 IV.D1.R-42
D2.1-a	R-35	IV.D2.RP-47
D2.1-b	R-17	IV.A2.R-17 IV.D2.R-17 IV.D1.R-17 IV.C2.R-17 IV.A2.RP-379 IV.C2.RP-380
D2.1-c	R-222	IV.D2.R-222
D2.1-d	R-33	IV.D2.R-33 IV.D1.R-33
D2.1-e	R-224	IV.D2.RP-153
D2.1-f	R-38	IV.D2.R-38
D2.1-g	R-33	IV.D2.R-33 IV.D1.R-33

Table A-3. Relationship of Reactor Vessel, Internals, and Reactor Coolant (RCS) System IDs in GALL Report, Chapter IV		
Rev. 0	**Rev. 1**	**Rev. 2**
D2.1-h	R-01	IV.D2.RP-36 IV.D1.RP-36
D2.1-i	R-36	IV.D2.R-36
D2.1-j	R-17	IV.A2.R-17 IV.D2.R-17 IV.D1.R-17 IV.C2.R-17 IV.A2.RP-379 IV.C2.RP-380
D2.1-k	R-32	IV.D2.RP-46 IV.D1.RP-46
D2.1-l	R-31	IV.D2.R-31
D2.2-a	R-44	IV.D2.R-44 IV.D1.R-44
D2.2-b	R-47	IV.D2.R-47 IV.D1.R-47
D2.2-c	R-48	IV.D2.R-48 IV.D1.R-48
D2.2-d	R-49	IV.D2.RP-233 IV.D1.RP-233
D2.2-e	R-46	IV.D2.R-46 IV.D1.R-46
D2.2-f	R-40	IV.D2.R-40 IV.D1.R-40
D2.2-g	R-40	IV.D2.R-40 IV.D1.R-40
E.	RP-04	IV.E.RP-04
E.	RP-06	IV.E.RP-06
E.	RP-07	IV.E.RP-07
E.	RP-05	IV.E.RP-05
E.	RP-01	IV.E.RP-353
E.	RP-03	IV.E.RP-03

Table A-4. Relationship of Engineered Safety Features (ESF) System IDs in GALL Report, Chpt. V		
Rev. 0	**Rev. 1**	**Rev. 2**
None	None	V.B.EP-103 V.C.EP-103 V.D1.EP-103 V.D2.EP-103
None	None	V.B.EP-107 V.C.EP-107 V.D1.EP-107 V.D2.EP-107
None	None	V.E.EP-114
None	None	V.F.EP-115
None	None	V.E.EP-116
None	None	V.E.EP-117
None	None	V.E.EP-118
None	None	V.E.EP-119
None	None	V.E.EP-120
None	None	V.E.EP-121
None	None	V.E.EP-122
None	None	V.E.EP-123
None	None	V.F.EP-65
None	None	V.F.EP-66
None	None	V.F.EP-67
None	None	V.F.EP-68
None	None	V.F.EP-82
None	None	V.F.EP-87
A.	EP-39	V.A.EP-100
A.	EP-47	V.D2.EP-78 V.D1.EP-78 V.A.EP-78
A.	EP-43	V.A.EP-43
A.	EP-34	V.D2.EP-74 V.A.EP-74
A.	E-43	V.D1.E-43 V.A.E-43

Table A-4. Relationship of Engineered Safety Features (ESF) System IDs in GALL Report, Chpt. V		
Rev. 0	**Rev. 1**	**Rev. 2**
A.	EP-44	V.D2.EP-98 V.D1.EP-98 V.C.EP-98 V.A.EP-98
A.	EP-53	V.D1.EP-81 V.A.EP-81
A.	EP-33	V.D2.EP-95 V.D1.EP-95 V.C.EP-95 V.A.EP-95
A.	EP-13	V.D2.EP-94 V.D1.EP-94 V.A.EP-94
A.	EP-42	V.A.EP-42
A.	EP-50	V.D2.EP-79 V.D1.EP-79 V.A.EP-79
A.	EP-35	V.D2.EP-96 V.D1.EP-96 V.A.EP-96
A.	EP-45	V.D2.EP-76 V.D1.EP-76 V.A.EP-76
A.	EP-27	V.D2.EP-27 V.D1.EP-27 V.B.EP-27 V.A.EP-27
A.	EP-46	V.D2.EP-77 V.D1.EP-77 V.A.EP-77
A.	EP-41	V.D1.EP-41 V.A.EP-41
A.	EP-36	V.D2.EP-97 V.D1.EP-97 V.B.EP-97 V.A.EP-97

Table A-4. Relationship of Engineered Safety Features (ESF) System IDs in GALL Report, Chpt. V

Rev. 0	Rev. 1	Rev. 2
A.	EP-37	V.D2.EP-37 V.D1.EP-37 V.B.EP-37 V.A.EP-37
A.	EP-40	V.D2.EP-75 V.D1.EP-75 V.A.EP-75
A.1-a	E-12	V.D1.E-12 V.A.E-12
A.1-b	E-28	V.E.E-28 V.D1.E-28 V.A.E-28
A.1-c	E-12	V.D1.E-12 V.A.E-12
A.2-a	E-29	V.D2.E-29 V.A.E-29
A.2-a	E-26	V.D2.E-26 V.B.E-26 V.A.E-26
A.3-a	E-12	V.D1.E-12 V.A.E-12
A.3-b	E-28	V.E.E-28 V.D1.E-28 V.A.E-28
A.4-a	E-12	V.D1.E-12 V.A.E-12
A.4-b	E-28	V.E.E-28 V.D1.E-28 V.A.E-28
A.5-a	E-26	V.D2.E-26 V.B.E-26 V.A.E-26
A.5-a	E-29	V.D2.E-29 V.A.E-29
A.5-b	E-28	V.E.E-28 V.D1.E-28

Table A-4. Relationship of Engineered Safety Features (ESF) System IDs in GALL Report, Chpt. V

Rev. 0	Rev. 1	Rev. 2
		V.A.E-28
A.6-a	E-18	V.D2.EP-90 V.D1.EP-90 V.A.EP-90
A.6-a	E-20	V.D2.EP-91 V.D1.EP-91 V.A.EP-91
A.6-b	E-21	V.D2.E-21 V.D1.E-21 V.A.E-21
A.6-c	E-19	V.D2.EP-93 V.D1.EP-93 V.A.EP-93
A.6-c	E-17	V.D2.EP-92 V.D1.EP-92 V.A.EP-92
A.6-d	E-28	V.E.E-28 V.D1.E-28 V.A.E-28
B.	EP-36	V.D2.EP-97 V.D1.EP-97 V.B.EP-97 V.A.EP-97
B.	EP-37	V.D2.EP-37 V.D1.EP-37 V.B.EP-37 V.A.EP-37
B.	EP-27	V.D2.EP-27 V.D1.EP-27 V.B.EP-27 V.A.EP-27
B.	E-42	V.B.EP-111
B.	EP-54	V.D2.EP-54 V.D1.EP-54 V.B.EP-54
B.1-a	E-26	V.D2.E-26

Table A-4. Relationship of Engineered Safety Features (ESF) System IDs in GALL Report, Chpt. V

Rev. 0	Rev. 1	Rev. 2
		V.B.E-26 V.A.E-26
B.1-a	E-40	V.B.E-40
B.1-b	E-06	V.B.EP-58 V.B.EP-59
B.2-a	E-25	V.B.E-25
B.2-a	E-26	V.D2.E-26 V.B.E-26 V.A.E-26
B.2-b	E-06	V.B.EP-58 V.B.EP-59
C.	EP-33	V.D2.EP-95 V.D1.EP-95 V.C.EP-95 V.A.EP-95
C.	EP-48	V.C.EP-99
C.	EP-44	V.D2.EP-98 V.D1.EP-98 V.C.EP-98 V.A.EP-98
C.1-a	E-35	V.C.E-35
C.1-a	E-22	V.C.E-22
C.1-a	E-30	V.C.E-30
C.1-a	E-31	V.C.EP-62
C.1-b	E-34	V.C.E-34
C.1-b	E-33	V.C.EP-63
D1.	E-43	V.D1.E-43 V.A.E-43
D1.	EP-44	V.D2.EP-98 V.D1.EP-98 V.C.EP-98 V.A.EP-98
D1.	EP-31	V.D2.EP-72 V.D1.EP-72
D1.	EP-54	V.D2.EP-54

Table A-4. Relationship of Engineered Safety Features (ESF) System IDs in GALL Report, Chpt. V

Rev. 0	Rev. 1	Rev. 2
		V.D1.EP-54 V.B.EP-54
D1.	EP-50	V.D2.EP-79 V.D1.EP-79 V.A.EP-79
D1.	EP-45	V.D2.EP-76 V.D1.EP-76 V.A.EP-76
D1.	EP-52	V.D1.EP-52
D1.	EP-36	V.D2.EP-97 V.D1.EP-97 V.B.EP-97 V.A.EP-97
D1.	EP-40	V.D2.EP-75 V.D1.EP-75 V.A.EP-75
D1.	EP-27	V.D2.EP-27 V.D1.EP-27 V.B.EP-27 V.A.EP-27
D1.	EP-33	V.D2.EP-95 V.D1.EP-95 V.C.EP-95 V.A.EP-95
D1.	EP-46	V.D2.EP-77 V.D1.EP-77 V.A.EP-77
D1.	EP-37	V.D2.EP-37 V.D1.EP-37 V.B.EP-37 V.A.EP-37
D1.	EP-13	V.D2.EP-94 V.D1.EP-94 V.A.EP-94
D1.	EP-35	V.D2.EP-96 V.D1.EP-96

Table A-4. Relationship of Engineered Safety Features (ESF) System IDs in GALL Report, Chpt. V

Rev. 0	Rev. 1	Rev. 2
		V.A.EP-96
D1.	EP-41	V.D1.EP-41 V.A.EP-41
D1.	EP-53	V.D1.EP-81 V.A.EP-81
D1.	EP-49	V.D1.EP-49
D1.	EP-55	V.D1.EP-55
D1.	EP-51	V.D1.EP-80
D1.	EP-47	V.D2.EP-78 V.D1.EP-78 V.A.EP-78
D1.1-a	E-12	V.D1.E-12 V.A.E-12
D1.1-b	E-47	V.D1.E-47
D1.1-c	E-13	V.D1.E-13
D1.1-d	E-28	V.E.E-28 V.D1.E-28 V.A.E-28
D1.2-a	E-12	V.D1.E-12 V.A.E-12
D1.2-b	E-28	V.E.E-28 V.D1.E-28 V.A.E-28
D1.2-c	E-24	V.D1.E-24
D1.3-a	E-28	V.E.E-28 V.D1.E-28 V.A.E-28
D1.4-a	E-13	V.D1.E-13
D1.4-b	E-12	V.D1.E-12 V.A.E-12
D1.4-c	E-28	V.E.E-28 V.D1.E-28 V.A.E-28
D1.5-a	E-17	V.D2.EP-92

Table A-4. Relationship of Engineered Safety Features (ESF) System IDs in GALL Report, Chpt. V

Rev. 0	Rev. 1	Rev. 2
		V.D1.EP-92 V.A.EP-92
D1.5-a	E-19	V.D2.EP-93 V.D1.EP-93 V.A.EP-93
D1.5-b	E-28	V.E.E-28 V.D1.E-28 V.A.E-28
D1.6-a	E-19	V.D2.EP-93 V.D1.EP-93 V.A.EP-93
D1.6-a	E-17	V.D2.EP-92 V.D1.EP-92 V.A.EP-92
D1.6-b	E-18	V.D2.EP-90 V.D1.EP-90 V.A.EP-90
D1.6-b	E-20	V.D2.EP-91 V.D1.EP-91 V.A.EP-91
D1.6-c	E-21	V.D2.E-21 V.D1.E-21 V.A.E-21
D1.6-d	E-28	V.E.E-28 V.D1.E-28 V.A.E-28
D1.7-a	E-28	V.E.E-28 V.D1.E-28 V.A.E-28
D1.7-b	E-38	V.D1.E-38
D1.7-b	E-12	V.D1.E-12 V.A.E-12
D1.8-a	E-12	V.D1.E-12 V.A.E-12
D1.8-b	E-28	V.E.E-28 V.D1.E-28

Table A-4. Relationship of Engineered Safety Features (ESF) System IDs in GALL Report, Chpt. V		
Rev. 0	**Rev. 1**	**Rev. 2**
		V.A.E-28
D1.8-c	E-01	V.D1.E-01
D2.	EP-13	V.D2.EP-94 V.D1.EP-94 V.A.EP-94
D2.	EP-2	V.D1.EP-101
D2.	EP-45	V.D2.EP-76 V.D1.EP-76 V.A.EP-76
D2.	EP-36	V.D2.EP-97 V.D1.EP-97 V.B.EP-97 V.A.EP-97
D2.	EP-34	V.D2.EP-74 V.A.EP-74
D2.	EP-47	V.D2.EP-78 V.D1.EP-78 V.A.EP-78
D2.	EP-26	V.D2.EP-71
D2.	EP-37	V.D2.EP-37 V.D1.EP-37 V.B.EP-37 V.A.EP-37
D2.	EP-50	V.D2.EP-79 V.D1.EP-79 V.A.EP-79
D2.	EP-27	V.D2.EP-27 V.D1.EP-27 V.B.EP-27 V.A.EP-27
D2.	EP-44	V.D2.EP-98 V.D1.EP-98 V.C.EP-98 V.A.EP-98
D2.	EP-32	V.D2.EP-73
D2.	EP-35	V.D2.EP-96

Table A-4. Relationship of Engineered Safety Features (ESF) System IDs in GALL Report, Chpt. V		
Rev. 0	**Rev. 1**	**Rev. 2**
		V.D1.EP-96 V.A.EP-96
D2.	EP-54	V.D2.EP-54 V.D1.EP-54 V.B.EP-54
D2.	EP-40	V.D2.EP-75 V.D1.EP-75 V.A.EP-75
D2.	EP-31	V.D2.EP-72 V.D1.EP-72
D2.	EP-46	V.D2.EP-77 V.D1.EP-77 V.A.EP-77
D2.	EP-33	V.D2.EP-95 V.D1.EP-95 V.C.EP-95 V.A.EP-95
D2.1-a	E-08	V.D2.EP-60
D2.1-b	E-10	V.D2.E-10
D2.1-c	E-37	V.D2.E-37
D2.1-d	E-11	V.D2.E-11
D2.1-e	E-26	V.D2.E-26 V.B.E-26 V.A.E-26
D2.1-e	E-14	V.D2.EP-61
D2.1-e	E-27	V.D2.E-27
D2.1-f	E-07	V.D2.E-07
D2.2-a	E-08	V.D2.EP-60
D2.3-a	E-09	V.D2.E-09
D2.3-b	E-08	V.D2.EP-60
D2.3-c	E-37	V.D2.E-37
D2.4-a	E-20	V.D2.EP-91 V.D1.EP-91 V.A.EP-91
D2.4-a	E-18	V.D2.EP-90

Table A-4. Relationship of Engineered Safety Features (ESF) System IDs in GALL Report, Chpt. V		
Rev. 0	**Rev. 1**	**Rev. 2**
		V.D1.EP-90 V.A.EP-90
D2.4-b	E-21	V.D2.E-21 V.D1.E-21 V.A.E-21
D2.4-b	E-23	V.D2.E-23
D2.4-c	E-19	V.D2.EP-93 V.D1.EP-93 V.A.EP-93
D2.4-c	E-17	V.D2.EP-92 V.D1.EP-92 V.A.EP-92
D2.5-a	E-26	V.D2.E-26 V.B.E-26 V.A.E-26
D2.5-a	E-29	V.D2.E-29 V.A.E-29
D2.5-b	E-04	V.D2.EP-113
E.	E-41	V.E.E-41
E.	EP-38	V.E.EP-38
E.	EP-24	V.E.EP-69
E.	EP-1	V.E.EP-64
E.	EP-25	V.E.EP-70
E.	E-44	V.E.E-44
E.	E-45	V.E.E-45
E.1-a	E-28	V.E.E-28 V.D1.E-28 V.A.E-28
E.1-b	E-46	V.E.E-46
E.2-a	E-02	V.E.E-02
E.2-b	E-03	V.E.E-03
F.	EP-4	V.F.EP-4
F.	EP-3	V.F.EP-3
F.	EP-14	V.F.EP-14

Table A-4. Relationship of Engineered Safety Features (ESF) System IDs in GALL Report, Chpt. V		
Rev. 0	**Rev. 1**	**Rev. 2**
F.	EP-12	V.F.EP-12
F.	EP-5	V.F.EP-112
F.	EP-29	V.F.EP-29
F.	EP-30	V.F.EP-30
F.	EP-20	V.F.EP-20
F.	EP-9	V.F.EP-9
F.	EP-18	V.F.EP-18
F.	EP-7	V.F.EP-7
F.	EP-10	V.F.EP-10
F.	EP-16	V.F.EP-16
F.	EP-15	V.F.EP-15
F.	EP-28	V.F.EP-28
F.	EP-17	V.F.EP-17
F.	EP-19	V.F.EP-19
F.	EP-22	V.F.EP-22
None	None	V.B.EP-103 V.C.EP-103 V.D1.EP-103 V.D2.EP-103
None	None	V.B.EP-107 V.C.EP-107 V.D1.EP-107 V.D2.EP-107
None	None	V.E.EP-114
None	None	V.F.EP-115
None	None	V.E.EP-116
None	None	V.E.EP-117
None	None	V.E.EP-118
None	None	V.E.EP-119
None	None	V.E.EP-120
None	None	V.E.EP-121
None	None	V.E.EP-122
None	None	V.E.EP-123

Table A-4. Relationship of Engineered Safety Features (ESF) System IDs in GALL Report, Chpt. V

Rev. 0	Rev. 1	Rev. 2
None	None	V.F.EP-65
None	None	V.F.EP-66
None	None	V.F.EP-67
None	None	V.F.EP-68
None	None	V.F.EP-82
None	None	V.F.EP-87
A.	EP-39	V.A.EP-100
A.	EP-47	V.D2.EP-78 V.D1.EP-78 V.A.EP-78
A.	EP-43	V.A.EP-43
A.	EP-34	V.D2.EP-74 V.A.EP-74
A.	E-43	V.D1.E-43 V.A.E-43
A.	EP-44	V.D2.EP-98 V.D1.EP-98 V.C.EP-98 V.A.EP-98
A.	EP-53	V.D1.EP-81 V.A.EP-81
A.	EP-33	V.D2.EP-95 V.D1.EP-95 V.C.EP-95 V.A.EP-95
A.	EP-13	V.D2.EP-94 V.D1.EP-94 V.A.EP-94
A.	EP-42	V.A.EP-42
A.	EP-50	V.D2.EP-79 V.D1.EP-79 V.A.EP-79
A.	EP-35	V.D2.EP-96 V.D1.EP-96 V.A.EP-96

Table A-4. Relationship of Engineered Safety Features (ESF) System IDs in GALL Report, Chpt. V

Rev. 0	Rev. 1	Rev. 2
A.	EP-45	V.D2.EP-76 V.D1.EP-76 V.A.EP-76
A.	EP-27	V.D2.EP-27 V.D1.EP-27 V.B.EP-27 V.A.EP-27
A.	EP-46	V.D2.EP-77 V.D1.EP-77 V.A.EP-77
A.	EP-41	V.D1.EP-41 V.A.EP-41
A.	EP-36	V.D2.EP-97 V.D1.EP-97 V.B.EP-97 V.A.EP-97
A.	EP-37	V.D2.EP-37 V.D1.EP-37 V.B.EP-37 V.A.EP-37
A.	EP-40	V.D2.EP-75 V.D1.EP-75 V.A.EP-75
A.1-a	E-12	V.D1.E-12 V.A.E-12
A.1-b	E-28	V.E.E-28 V.D1.E-28 V.A.E-28
A.1-c	E-12	V.D1.E-12 V.A.E-12
A.2-a	E-29	V.D2.E-29 V.A.E-29
A.2-a	E-26	V.D2.E-26 V.B.E-26 V.A.E-26
A.3-a	E-12	V.D1.E-12

Table A-4. Relationship of Engineered Safety Features (ESF) System IDs in GALL Report, Chpt. V

Rev. 0	Rev. 1	Rev. 2
		V.A.E-12
A.3-b	E-28	V.E.E-28 V.D1.E-28 V.A.E-28
A.4-a	E-12	V.D1.E-12 V.A.E-12
A.4-b	E-28	V.E.E-28 V.D1.E-28 V.A.E-28
A.5-a	E-26	V.D2.E-26 V.B.E-26 V.A.E-26
A.5-a	E-29	V.D2.E-29 V.A.E-29
A.5-b	E-28	V.E.E-28 V.D1.E-28 V.A.E-28
A.6-a	E-18	V.D2.EP-90 V.D1.EP-90 V.A.EP-90
A.6-a	E-20	V.D2.EP-91 V.D1.EP-91 V.A.EP-91
A.6-b	E-21	V.D2.E-21 V.D1.E-21 V.A.E-21
A.6-c	E-19	V.D2.EP-93 V.D1.EP-93 V.A.EP-93
A.6-c	E-17	V.D2.EP-92 V.D1.EP-92 V.A.EP-92
A.6-d	E-28	V.E.E-28 V.D1.E-28 V.A.E-28
B.	EP-36	V.D2.EP-97

Table A-4. Relationship of Engineered Safety Features (ESF) System IDs in GALL Report, Chpt. V

Rev. 0	Rev. 1	Rev. 2
		V.D1.EP-97 V.B.EP-97 V.A.EP-97
B.	EP-37	V.D2.EP-37 V.D1.EP-37 V.B.EP-37 V.A.EP-37
B.	EP-27	V.D2.EP-27 V.D1.EP-27 V.B.EP-27 V.A.EP-27
B.	E-42	V.B.EP-111
B.	EP-54	V.D2.EP-54 V.D1.EP-54 V.B.EP-54
B.1-a	E-26	V.D2.E-26 V.B.E-26 V.A.E-26
B.1-a	E-40	V.B.E-40
B.1-b	E-06	V.B.EP-58 V.B.EP-59
B.2-a	E-25	V.B.E-25
B.2-a	E-26	V.D2.E-26 V.B.E-26 V.A.E-26
B.2-b	E-06	V.B.EP-58 V.B.EP-59
C.	EP-33	V.D2.EP-95 V.D1.EP-95 V.C.EP-95 V.A.EP-95
C.	EP-48	V.C.EP-99
C.	EP-44	V.D2.EP-98 V.D1.EP-98 V.C.EP-98 V.A.EP-98

Table A-4. Relationship of Engineered Safety Features (ESF) System IDs in GALL Report, Chpt. V

Rev. 0	Rev. 1	Rev. 2
C.1-a	E-35	V.C.E-35
C.1-a	E-22	V.C.E-22
C.1-a	E-30	V.C.E-30
C.1-a	E-31	V.C.EP-62
C.1-b	E-34	V.C.E-34
C.1-b	E-33	V.C.EP-63
D1.	E-43	V.D1.E-43 V.A.E-43
D1.	EP-44	V.D2.EP-98 V.D1.EP-98 V.C.EP-98 V.A.EP-98
D1.	EP-31	V.D2.EP-72 V.D1.EP-72
D1.	EP-54	V.D2.EP-54 V.D1.EP-54 V.B.EP-54
D1.	EP-50	V.D2.EP-79 V.D1.EP-79 V.A.EP-79
D1.	EP-45	V.D2.EP-76 V.D1.EP-76 V.A.EP-76
D1.	EP-52	V.D1.EP-52
D1.	EP-36	V.D2.EP-97 V.D1.EP-97 V.B.EP-97 V.A.EP-97
D1.	EP-40	V.D2.EP-75 V.D1.EP-75 V.A.EP-75
D1.	EP-27	V.D2.EP-27 V.D1.EP-27 V.B.EP-27 V.A.EP-27

Table A-4. Relationship of Engineered Safety Features (ESF) System IDs in GALL Report, Chpt. V

Rev. 0	Rev. 1	Rev. 2
D1.	EP-33	V.D2.EP-95 V.D1.EP-95 V.C.EP-95 V.A.EP-95
D1.	EP-46	V.D2.EP-77 V.D1.EP-77 V.A.EP-77
D1.	EP-37	V.D2.EP-37 V.D1.EP-37 V.B.EP-37 V.A.EP-37
D1.	EP-13	V.D2.EP-94 V.D1.EP-94 V.A.EP-94
D1.	EP-35	V.D2.EP-96 V.D1.EP-96 V.A.EP-96
D1.	EP-41	V.D1.EP-41 V.A.EP-41
D1.	EP-53	V.D1.EP-81 V.A.EP-81
D1.	EP-49	V.D1.EP-49
D1.	EP-55	V.D1.EP-55
D1.	EP-51	V.D1.EP-80
D1.	EP-47	V.D2.EP-78 V.D1.EP-78 V.A.EP-78
D1.1-a	E-12	V.D1.E-12 V.A.E-12
D1.1-b	E-47	V.D1.E-47
D1.1-c	E-13	V.D1.E-13
D1.1-d	E-28	V.E.E-28 V.D1.E-28 V.A.E-28
D1.2-a	E-12	V.D1.E-12

Table A-4. Relationship of Engineered Safety Features (ESF) System IDs in GALL Report, Chpt. V		
Rev. 0	**Rev. 1**	**Rev. 2**
		V.A.E-12
D1.2-b	E-28	V.E.E-28 V.D1.E-28 V.A.E-28
D1.2-c	E-24	V.D1.E-24
D1.3-a	E-28	V.E.E-28 V.D1.E-28 V.A.E-28
D1.4-a	E-13	V.D1.E-13
D1.4-b	E-12	V.D1.E-12 V.A.E-12
D1.4-c	E-28	V.E.E-28 V.D1.E-28 V.A.E-28
D1.5-a	E-17	V.D2.EP-92 V.D1.EP-92 V.A.EP-92
D1.5-a	E-19	V.D2.EP-93 V.D1.EP-93 V.A.EP-93
D1.5-b	E-28	V.E.E-28 V.D1.E-28 V.A.E-28
D1.6-a	E-19	V.D2.EP-93 V.D1.EP-93 V.A.EP-93
D1.6-a	E-17	V.D2.EP-92 V.D1.EP-92 V.A.EP-92
D1.6-b	E-18	V.D2.EP-90 V.D1.EP-90 V.A.EP-90
D1.6-b	E-20	V.D2.EP-91 V.D1.EP-91 V.A.EP-91

Table A-4. Relationship of Engineered Safety Features (ESF) System IDs in GALL Report, Chpt. V		
Rev. 0	**Rev. 1**	**Rev. 2**
D1.6-c	E-21	V.D2.E-21 V.D1.E-21 V.A.E-21
D1.6-d	E-28	V.E.E-28 V.D1.E-28 V.A.E-28
D1.7-a	E-28	V.E.E-28 V.D1.E-28 V.A.E-28
D1.7-b	E-38	V.D1.E-38
D1.7-b	E-12	V.D1.E-12 V.A.E-12
D1.8-a	E-12	V.D1.E-12 V.A.E-12
D1.8-b	E-28	V.E.E-28 V.D1.E-28 V.A.E-28
D1.8-c	E-01	V.D1.E-01
D2.	EP-13	V.D2.EP-94 V.D1.EP-94 V.A.EP-94
D2.	EP-2	V.D1.EP-101
D2.	EP-45	V.D2.EP-76 V.D1.EP-76 V.A.EP-76
D2.	EP-36	V.D2.EP-97 V.D1.EP-97 V.B.EP-97 V.A.EP-97
D2.	EP-34	V.D2.EP-74 V.A.EP-74
D2.	EP-47	V.D2.EP-78 V.D1.EP-78 V.A.EP-78
D2.	EP-26	V.D2.EP-71

Table A-4. Relationship of Engineered Safety Features (ESF) System IDs in GALL Report, Chpt. V

Rev. 0	Rev. 1	Rev. 2
D2.	EP-37	V.D2.EP-37 V.D1.EP-37 V.B.EP-37 V.A.EP-37
D2.	EP-50	V.D2.EP-79 V.D1.EP-79 V.A.EP-79
D2.	EP-27	V.D2.EP-27 V.D1.EP-27 V.B.EP-27 V.A.EP-27
D2.	EP-44	V.D2.EP-98 V.D1.EP-98 V.C.EP-98 V.A.EP-98
D2.	EP-32	V.D2.EP-73
D2.	EP-35	V.D2.EP-96 V.D1.EP-96 V.A.EP-96
D2.	EP-54	V.D2.EP-54 V.D1.EP-54 V.B.EP-54
D2.	EP-40	V.D2.EP-75 V.D1.EP-75 V.A.EP-75
D2.	EP-31	V.D2.EP-72 V.D1.EP-72
D2.	EP-46	V.D2.EP-77 V.D1.EP-77 V.A.EP-77
D2.	EP-33	V.D2.EP-95 V.D1.EP-95 V.C.EP-95 V.A.EP-95
D2.1-a	E-08	V.D2.EP-60
D2.1-b	E-10	V.D2.E-10

Table A-4. Relationship of Engineered Safety Features (ESF) System IDs in GALL Report, Chpt. V

Rev. 0	Rev. 1	Rev. 2
D2.1-c	E-37	V.D2.E-37
D2.1-d	E-11	V.D2.E-11
D2.1-e	E-26	V.D2.E-26 V.B.E-26 V.A.E-26
D2.1-e	E-14	V.D2.EP-61
D2.1-e	E-27	V.D2.E-27
D2.1-f	E-07	V.D2.E-07
D2.2-a	E-08	V.D2.EP-60
D2.3-a	E-09	V.D2.E-09
D2.3-b	E-08	V.D2.EP-60
D2.3-c	E-37	V.D2.E-37
D2.4-a	E-20	V.D2.EP-91 V.D1.EP-91 V.A.EP-91
D2.4-a	E-18	V.D2.EP-90 V.D1.EP-90 V.A.EP-90
D2.4-b	E-21	V.D2.E-21 V.D1.E-21 V.A.E-21
D2.4-b	E-23	V.D2.E-23
D2.4-c	E-19	V.D2.EP-93 V.D1.EP-93 V.A.EP-93
D2.4-c	E-17	V.D2.EP-92 V.D1.EP-92 V.A.EP-92
D2.5-a	E-26	V.D2.E-26 V.B.E-26 V.A.E-26
D2.5-a	E-29	V.D2.E-29 V.A.E-29
D2.5-b	E-04	V.D2.EP-113

Table A-4. Relationship of Engineered Safety Features (ESF) System IDs in GALL Report, Chpt. V

Rev. 0	Rev. 1	Rev. 2
E.	E-41	V.E.E-41
E.	EP-38	V.E.EP-38
E.	EP-24	V.E.EP-69
E.	EP-1	V.E.EP-64
E.	EP-25	V.E.EP-70
E.	E-44	V.E.E-44
E.	E-45	V.E.E-45
E.1-a	E-28	V.E.E-28 V.D1.E-28 V.A.E-28
E.1-b	E-46	V.E.E-46
E.2-a	E-02	V.E.E-02
E.2-b	E-03	V.E.E-03
F.	EP-4	V.F.EP-4
F.	EP-3	V.F.EP-3
F.	EP-14	V.F.EP-14
F.	EP-12	V.F.EP-12
F.	EP-5	V.F.EP-112
F.	EP-29	V.F.EP-29
F.	EP-30	V.F.EP-30
F.	EP-20	V.F.EP-20
F.	EP-9	V.F.EP-9
F.	EP-18	V.F.EP-18
F.	EP-7	V.F.EP-7
F.	EP-10	V.F.EP-10
F.	EP-16	V.F.EP-16
F.	EP-15	V.F.EP-15
F.	EP-28	V.F.EP-28
F.	EP-17	V.F.EP-17
F.	EP-19	V.F.EP-19
F.	EP-22	V.F.EP-22

Table A-5. Relationship of Electrical Components System IDs in GALL Report, Chapter VI		
Rev. 0	**Rev. 1**	**Rev. 2**
A.	LP-01	VI.A.LP-23 VI.A.LP-31
A.	LP-02	VI.A.LP-24
A.	LP-03	Retired
A.	LP-04	VI.A.LP-25
A.	LP-05	VI.A.LP-26
A.	LP-06	VI.A.LP-41 VI.A.LP-42 VI.A.LP-43 VI.A.LP-44
A.	LP-07	VI.A.LP-28
A.	LP-08	VI.A.LP-38 VI.A.LP-46 VI.A.LP-47 VI.A.LP-48
A.	LP-09	VI.A.LP-39
A.	LP-10	VI.A.LP-29
A.	LP-11	VI.A.LP-32
A.	LP-12	VI.A.LP-30
A.1-a	L-01	VI.A.LP-33
A.1-b	L-02	VI.A.LP-34
A.1-c	L-03	VI.A.LP-35
A.2-a	L-04	VI.A.LP-36
B.1-a	L-05	VI.B.L-05

Table A-6. Relationship of Auxiliary System IDs in GALL Report, Chpt. VII

Rev. 0	Rev. 1	Rev. 2
None	None	VII.E1.AP-119
None	None	VII.J.AP-123
None	None	VII.J.AP-134
None	None	VII.J.AP-135
None	None	VII.J.AP-144
None	None	VII.G.AP-149
None	None	VII.G.AP-150
None	None	VII.J.AP-151
None	None	VII.C1.AP-152
None	None	VII.C1.AP-153
None	None	VII.H2.AP-154
None	None	VII.C1.AP-155
None	None	VII.C1.AP-156
None	None	VII.C1.AP-157
None	None	VII.I.AP-159
None	None	VII.J.AP-160
None	None	VII.C1.AP-161
None	None	VII.H2.AP-162
None	None	VII.J.AP-166
None	None	VII.J.AP-167
None	None	VII.C1.AP-171
None	None	VII.C1.AP-172
None	None	VII.C1.AP-173
None	None	VII.C1.AP-174
None	None	VII.C1.AP-175
None	None	VII.C1.AP-176
None	None	VII.C1.AP-177
None	None	VII.C1.AP-178
None	None	VII.C1.AP-209 VII.C2.AP-209 VII.C3.AP-209 VII.D.AP-209 VII.E1.AP-209 VII.E4.AP-209 VII.F1.AP-209 VII.F2.AP-209 VII.F4.AP-209 VII.G.AP-209 VII.H1.AP-209 VII.H2.AP-209
None	None	VII.C1.AP-221 VII.C2.AP-221 VII.C3.AP-221 VII.D.AP-221 VII.E1.AP-221 VII.E4.AP-221 VII.F1.AP-221 VII.F2.AP-221 VII.F4.AP-221 VII.G.AP-221 VII.H1.AP-221 VII.H2.AP-221
None	None	VII.C1.AP-237
None	None	VII.C1.AP-238
None	None	VII.C1.AP-239
None	None	VII.D.AP-240
None	None	VII.I.AP-241
None	None	VII.I.AP-242
None	None	VII.I.AP-243
None	None	VII.I.AP-244
None	None	VII.C1.AP-248
None	None	VII.C1.AP-249
None	None	VII.C1.AP-250
None	None	VII.C1.AP-251
None	None	VII.C1.AP-252
None	None	VII.C1.AP-253
None	None	VII.C2.AP-254

Table A-6. Relationship of Auxiliary System IDs in GALL Report, Chpt. VII		
Rev. 0	**Rev. 1**	**Rev. 2**
None	None	VII.H2.AP-255
None	None	VII.I.AP-256
None	None	VII.C2.AP-257
None	None	VII.H2.AP-258
None	None	VII.C2.AP-259
None	None	VII.J.AP-260
None	None	VII.I.AP-261
None	None	VII.I.AP-262
None	None	VII.I.AP-263
None	None	VII.I.AP-264
None	None	VII.I.AP-265
None	None	VII.I.AP-266
None	None	VII.I.AP-267
None	None	VII.J.AP-268
None	None	VII.J.AP-269
None	None	VII.E5.AP-270
None	None	VII.E5.AP-271
None	None	VII.E5.AP-272
None	None	VII.E5.AP-273
None	None	VII.E5.AP-274
None	None	VII.E5.AP-275
None	None	VII.E5.AP-276
None	None	VII.J.AP-277
None	None	VII.E5.AP-278
None	None	VII.E5.AP-279
None	None	VII.E5.AP-280
None	None	VII.E5.AP-281
None	None	VII.J.AP-96
None	None	VII.J.AP-97
None	None	VII.J.AP-98
None	None	VII.I.AP-284

Table A-6. Relationship of Auxiliary System IDs in GALL Report, Chpt. VII		
Rev. 0	**Rev. 1**	**Rev. 2**
A1.1-a	A-94	VII.A1.A-94
A2.	AP-79	VII.E1.AP-79 VII.A3.AP-79 VII.A2.AP-79
A2.1-a	A-86	VII.A2.A-86
A2.1-a	A-87	VII.A2.A-87
A2.1-b	A-89	VII.A2.AP-236
A2.1-b	A-88	VII.A2.AP-235
A2.1-c	A-97	VII.A2.A-97
A2.1-c	A-96	VII.A2.A-96
A3.	AP-43	VII.E3.AP-43 VII.E1.AP-43 VII.C2.AP-43 VII.A4.AP-43 VII.A3.AP-43 VII.H2.AP-43 VII.H1.AP-43 VII.F4.AP-43 VII.F3.AP-43 VII.F2.AP-43 VII.F1.AP-43 VII.E4.AP-43
A3.	AP-79	VII.E1.AP-79 VII.A3.AP-79 VII.A2.AP-79
A3.	AP-31	VII.G.AP-31 VII.F4.AP-31 VII.F2.AP-31 VII.F1.AP-31 VII.E4.AP-31 VII.E3.AP-31 VII.E1.AP-31 VII.C2.AP-31 VII.A4.AP-31 VII.A3.AP-31
A3.	AP-1	VII.E1.AP-1

Table A-6. Relationship of Auxiliary System IDs in GALL Report, Chpt. VII

Rev. 0	Rev. 1	Rev. 2
		VII.A3.AP-1
A3.	AP-12	VII.H2.AP-199 VII.H1.AP-199 VII.F4.AP-199 VII.F3.AP-199 VII.F2.AP-199 VII.F1.AP-199 VII.E4.AP-199 VII.E3.AP-199 VII.E1.AP-199 VII.C2.AP-199 VII.A4.AP-199 VII.A3.AP-199
A3.1-a	A-79	VII.I.A-79 VII.E1.A-79 VII.A3.A-79
A3.2-a	A-39	VII.A3.AP-107
A3.2-a	A-15	VII.A3.AP-100
A3.2-b	A-79	VII.I.A-79 VII.E1.A-79 VII.A3.A-79
A3.2-c	A-79	VII.I.A-79 VII.E1.A-79 VII.A3.A-79
A3.2-d	A-15	VII.A3.AP-100
A3.3-a	A-15	VII.A3.AP-100
A3.3-a	A-39	VII.A3.AP-107
A3.3-b	A-56	VII.A3.A-56
A3.3-c	A-79	VII.I.A-79 VII.E1.A-79 VII.A3.A-79
A3.3-d	A-15	VII.A3.AP-100
A3.4-a	A-63	VII.F4.AP-189 VII.F3.AP-189 VII.F2.AP-189 VII.F1.AP-189

Table A-6. Relationship of Auxiliary System IDs in GALL Report, Chpt. VII

Rev. 0	Rev. 1	Rev. 2
		VII.E4.AP-189 VII.E3.AP-189 VII.E1.AP-189 VII.C2.AP-189 VII.A4.AP-189 VII.A3.AP-189
A3.4-b	A-79	VII.I.A-79 VII.E1.A-79 VII.A3.A-79
A3.5-a	A-15	VII.A3.AP-100
A3.5-a	A-39	VII.A3.AP-107
A3.5-b	A-79	VII.I.A-79 VII.E1.A-79 VII.A3.A-79
A3.5-c	A-15	VII.A3.AP-100
A3.6-a	A-79	VII.I.A-79 VII.E1.A-79 VII.A3.A-79
A4.	AP-31	VII.G.AP-31 VII.F4.AP-31 VII.F2.AP-31 VII.F1.AP-31 VII.E4.AP-31 VII.E3.AP-31 VII.E1.AP-31 VII.C2.AP-31 VII.A4.AP-31 VII.A3.AP-31
A4.	AP-12	VII.H2.AP-199 VII.H1.AP-199 VII.F4.AP-199 VII.F3.AP-199 VII.F2.AP-199 VII.F1.AP-199 VII.E4.AP-199 VII.E3.AP-199 VII.E1.AP-199

Table A-6. Relationship of Auxiliary System IDs in GALL Report, Chpt. VII		
Rev. 0	**Rev. 1**	**Rev. 2**
		VII.C2.AP-199 VII.A4.AP-199 VII.A3.AP-199
A4.	AP-38	VII.E4.AP-130 VII.E3.AP-130 VII.A4.AP-130
A4.	AP-62	VII.E3.AP-139 VII.A4.AP-139
A4.	AP-32	VII.E4.AP-32 VII.E3.AP-32 VII.C2.AP-32 VII.A4.AP-32
A4.	AP-64	VII.E4.AP-140 VII.E3.AP-140 VII.A4.AP-140
A4.	AP-43	VII.E3.AP-43 VII.E1.AP-43 VII.C2.AP-43 VII.A4.AP-43 VII.A3.AP-43 VII.H2.AP-43 VII.H1.AP-43 VII.F4.AP-43 VII.F3.AP-43 VII.F2.AP-43 VII.F1.AP-43 VII.E4.AP-43
A4.1-a	A-58	VII.E4.AP-110 VII.E3.AP-110 VII.A4.AP-110
A4.2-a	A-16	VII.A4.AP-101
A4.2-a	A-40	VII.A4.AP-108
A4.2-b	A-16	VII.A4.AP-101
A4.3-a	A-16	VII.A4.AP-101
A4.3-a	A-40	VII.A4.AP-108
A4.3-b	A-16	VII.A4.AP-101
A4.4-a	A-63	VII.F4.AP-189 VII.F3.AP-189 VII.F2.AP-189 VII.F1.AP-189 VII.E4.AP-189 VII.E3.AP-189 VII.E1.AP-189 VII.C2.AP-189 VII.A4.AP-189 VII.A3.AP-189
A4.4-b	A-70	VII.A4.AP-111
A4.5-a	A-40	VII.A4.AP-108
A4.5-a	A-16	VII.A4.AP-101
A4.5-b	A-16	VII.A4.AP-101
A4.6-a	A-58	VII.E4.AP-110 VII.E3.AP-110 VII.A4.AP-110
B.1-a	A-06	VII.B.A-06
B.1-b	A-07	VII.B.A-07
B.2-a	A-05	VII.B.A-05
C1.	AP-59	VII.H2.AP-138 VII.G.AP-138 VII.E4.AP-138 VII.E1.AP-138 VII.C2.AP-138 VII.C1.AP-138
C1.	AP-61	VII.H2.AP-187 VII.G.AP-187 VII.C3.AP-187 VII.C1.AP-187
C1.	AP-47	VII.H2.AP-133 VII.G.AP-133 VII.E4.AP-133 VII.E1.AP-133 VII.C2.AP-133 VII.C1.AP-133

Table A-6. Relationship of Auxiliary System IDs in GALL Report, Chpt. VII		
Rev. 0	**Rev. 1**	**Rev. 2**
C1.	AP-56	VII.H2.AP-137 VII.H1.AP-137 VII.G.AP-137 VII.C3.AP-137 VII.C1.AP-137
C1.	AP-75	VII.C1.AP-75
C1.	AP-76	VII.C1.AP-76
C1.	AP-30	VII.H2.AP-127 VII.G.AP-127 VII.F4.AP-127 VII.F3.AP-127 VII.F2.AP-127 VII.F1.AP-127 VII.E4.AP-127 VII.E1.AP-127 VII.C2.AP-127 VII.C1.AP-127
C1.	AP-53	VII.C3.AP-206 VII.C1.AP-206
C1.1-a	A-38	VII.H2.AP-194 VII.C3.AP-194 VII.C1.AP-194
C1.1-a	A-44	VII.C1.AP-196
C1.1-a	A-54	VII.C1.A-54
C1.1-a	A-47	VII.H2.A-47 VII.G.A-47 VII.C3.A-47 VII.C1.A-47
C1.1-b	A-01	VII.H1.AP-198 VII.G.AP-198 VII.C3.AP-198 VII.C1.AP-198
C1.1-c	A-02	VII.H1.A-02 VII.G.A-02 VII.C3.A-02 VII.C1.A-02 VII.H2.A-02

Table A-6. Relationship of Auxiliary System IDs in GALL Report, Chpt. VII		
Rev. 0	**Rev. 1**	**Rev. 2**
C1.2-a	A-44	VII.C1.AP-196
C1.2-a	A-38	VII.H2.AP-194 VII.C3.AP-194 VII.C1.AP-194
C1.2-a	A-47	VII.H2.A-47 VII.G.A-47 VII.C3.A-47 VII.C1.A-47
C1.2-a	A-54	VII.C1.A-54
C1.3-a	A-66	VII.C1.A-66
C1.3-a	A-65	VII.C1.AP-179
C1.3-a	A-64	VII.C1.AP-183
C1.3-b	A-72	VII.C1.A-72
C1.4-a	A-54	VII.C1.A-54
C1.5-a	A-51	VII.H2.A-51 VII.G.A-51 VII.C3.A-51 VII.C1.A-51
C1.5-a	A-38	VII.H2.AP-194 VII.C3.AP-194 VII.C1.AP-194
C1.6-a	A-38	VII.H2.AP-194 VII.C3.AP-194 VII.C1.AP-194
C1.6-a	A-54	VII.C1.A-54
C2.	AP-59	VII.H2.AP-138 VII.G.AP-138 VII.E4.AP-138 VII.E1.AP-138 VII.C2.AP-138 VII.C1.AP-138
C2.	AP-31	VII.G.AP-31 VII.F4.AP-31 VII.F2.AP-31 VII.F1.AP-31 VII.E4.AP-31

Table A-6. Relationship of Auxiliary System IDs in GALL Report, Chpt. VII		
Rev. 0	**Rev. 1**	**Rev. 2**
		VII.E3.AP-31 VII.E1.AP-31 VII.C2.AP-31 VII.A4.AP-31 VII.A3.AP-31
C2.	AP-30	VII.H2.AP-127 VII.G.AP-127 VII.F4.AP-127 VII.F3.AP-127 VII.F2.AP-127 VII.F1.AP-127 VII.E4.AP-127 VII.E1.AP-127 VII.C2.AP-127 VII.C1.AP-127
C2.	AP-80	VII.F3.AP-205 VII.F2.AP-205 VII.F1.AP-205 VII.C2.AP-205
C2.	AP-12	VII.H2.AP-199 VII.H1.AP-199 VII.F4.AP-199 VII.F3.AP-199 VII.F2.AP-199 VII.F1.AP-199 VII.E4.AP-199 VII.E3.AP-199 VII.E1.AP-199 VII.C2.AP-199 VII.A4.AP-199 VII.A3.AP-199
C2.	AP-63	VII.E4.AP-188 VII.E3.AP-188 VII.C2.AP-188
C2.	AP-60	VII.E4.AP-186 VII.E3.AP-186 VII.C2.AP-186
C2.	AP-47	VII.H2.AP-133

Table A-6. Relationship of Auxiliary System IDs in GALL Report, Chpt. VII		
Rev. 0	**Rev. 1**	**Rev. 2**
		VII.G.AP-133 VII.E4.AP-133 VII.E1.AP-133 VII.C2.AP-133 VII.C1.AP-133
C2.	A-63	VII.F4.AP-189 VII.F3.AP-189 VII.F2.AP-189 VII.F1.AP-189 VII.E4.AP-189 VII.E3.AP-189 VII.E1.AP-189 VII.C2.AP-189 VII.A4.AP-189 VII.A3.AP-189
C2.	AP-32	VII.E4.AP-32 VII.E3.AP-32 VII.C2.AP-32 VII.A4.AP-32
C2.	AP-43	VII.E3.AP-43 VII.E1.AP-43 VII.C2.AP-43 VII.A4.AP-43 VII.A3.AP-43 VII.H2.AP-43 VII.H1.AP-43 VII.F4.AP-43 VII.F3.AP-43 VII.F2.AP-43 VII.F1.AP-43 VII.E4.AP-43
C2.1-a	A-25	VII.H2.AP-202 VII.F4.AP-202 VII.F3.AP-202 VII.F2.AP-202 VII.F1.AP-202 VII.C2.AP-202
C2.2-a	A-25	VII.H2.AP-202

Table A-6. Relationship of Auxiliary System IDs in GALL Report, Chpt. VII		
Rev. 0	**Rev. 1**	**Rev. 2**
		VII.F4.AP-202 VII.F3.AP-202 VII.F2.AP-202 VII.F1.AP-202 VII.C2.AP-202
C2.2-a	A-52	VII.C2.A-52
C2.3-a	A-25	VII.H2.AP-202 VII.F4.AP-202 VII.F3.AP-202 VII.F2.AP-202 VII.F1.AP-202 VII.C2.AP-202
C2.3-a	A-50	VII.F3.A-50 VII.C2.A-50
C2.4-a	A-25	VII.H2.AP-202 VII.F4.AP-202 VII.F3.AP-202 VII.F2.AP-202 VII.F1.AP-202 VII.C2.AP-202
C2.5-a	A-25	VII.H2.AP-202 VII.F4.AP-202 VII.F3.AP-202 VII.F2.AP-202 VII.F1.AP-202 VII.C2.AP-202
C3.	A-01	VII.H1.AP-198 VII.G.AP-198 VII.C3.AP-198 VII.C1.AP-198
C3.	AP-53	VII.C3.AP-206 VII.C1.AP-206
C3.	AP-56	VII.H2.AP-137 VII.H1.AP-137 VII.G.AP-137 VII.C3.AP-137 VII.C1.AP-137

Table A-6. Relationship of Auxiliary System IDs in GALL Report, Chpt. VII		
Rev. 0	**Rev. 1**	**Rev. 2**
C3.	A-02	VII.H1.A-02 VII.G.A-02 VII.C3.A-02 VII.C1.A-02 VII.H2.A-02
C3.	A-51	VII.H2.A-51 VII.G.A-51 VII.C3.A-51 VII.C1.A-51
C3.	AP-61	VII.H2.AP-187 VII.G.AP-187 VII.C3.AP-187 VII.C1.AP-187
C3.1-a	A-47	VII.H2.A-47 VII.G.A-47 VII.C3.A-47 VII.C1.A-47
C3.1-a	A-43	VII.C3.AP-195
C3.1-a	A-38	VII.H2.AP-194 VII.C3.AP-194 VII.C1.AP-194
C3.2-a	A-43	VII.C3.AP-195
C3.2-a	A-47	VII.H2.A-47 VII.G.A-47 VII.C3.A-47 VII.C1.A-47
C3.2-a	A-38	VII.H2.AP-194 VII.C3.AP-194 VII.C1.AP-194
C3.2-a	A-53	VII.C3.A-53
C3.3-a	A-38	VII.H2.AP-194 VII.C3.AP-194 VII.C1.AP-194
D.	AP-81	VII.D.AP-81
D.1-a	A-80	VII.D.A-80
D.1-a	A-26	VII.D.A-26

Table A-6. Relationship of Auxiliary System IDs in GALL Report, Chpt. VII

Rev. 0	Rev. 1	Rev. 2
D.2-a	A-80	VII.D.A-80
D.2-a	A-26	VII.D.A-26
D.2-a	A-103	VII.D.AP-121
D.3-a	A-80	VII.D.A-80
D.3-a	A-26	VII.D.A-26
D.4-a	A-26	VII.D.A-26
D.4-a	A-80	VII.D.A-80
D.5-a	A-26	VII.D.A-26
D.5-a	A-80	VII.D.A-80
D.6-a	A-26	VII.D.A-26
D.6-a	A-80	VII.D.A-80
E1.	AP-43	VII.E3.AP-43 VII.E1.AP-43 VII.C2.AP-43 VII.A4.AP-43 VII.A3.AP-43 VII.H2.AP-43 VII.H1.AP-43 VII.F4.AP-43 VII.F3.AP-43 VII.F2.AP-43 VII.F1.AP-43 VII.E4.AP-43
E1.	AP-59	VII.H2.AP-138 VII.G.AP-138 VII.E4.AP-138 VII.E1.AP-138 VII.C2.AP-138 VII.C1.AP-138
E1.	AP-65	VII.F3.AP-65 VII.F1.AP-65 VII.E1.AP-65
E1.	AP-12	VII.H2.AP-199 VII.H1.AP-199 VII.F4.AP-199 VII.F3.AP-199 VII.F2.AP-199 VII.F1.AP-199 VII.E4.AP-199 VII.E3.AP-199 VII.E1.AP-199 VII.C2.AP-199 VII.A4.AP-199 VII.A3.AP-199
E1.	AP-82	VII.E1.AP-82
E1.	AP-47	VII.H2.AP-133 VII.G.AP-133 VII.E4.AP-133 VII.E1.AP-133 VII.C2.AP-133 VII.C1.AP-133
E1.	AP-31	VII.G.AP-31 VII.F4.AP-31 VII.F2.AP-31 VII.F1.AP-31 VII.E4.AP-31 VII.E3.AP-31 VII.E1.AP-31 VII.C2.AP-31 VII.A4.AP-31 VII.A3.AP-31
E1.	AP-34	VII.F3.AP-203 VII.F1.AP-203 VII.E1.AP-203
E1.	AP-30	VII.H2.AP-127 VII.G.AP-127 VII.F4.AP-127 VII.F3.AP-127 VII.F2.AP-127 VII.F1.AP-127 VII.E4.AP-127 VII.E1.AP-127 VII.C2.AP-127 VII.C1.AP-127

Table A-6. Relationship of Auxiliary System IDs in GALL Report, Chpt. VII		
Rev. 0	**Rev. 1**	**Rev. 2**
E1.	AP-1	VII.E1.AP-1 VII.A3.AP-1
E1.	AP-85	VII.E1.AP-85
E1.	AP-79	VII.E1.AP-79 VII.A3.AP-79 VII.A2.AP-79
E1.10-a	A-79	VII.I.A-79 VII.E1.A-79 VII.A3.A-79
E1.1-a	A-34	VII.E3.A-34 VII.E1.A-34
E1.1-a	A-57	VII.E1.A-57
E1.1-b	A-79	VII.I.A-79 VII.E1.A-79 VII.A3.A-79
E1.2-a	A-79	VII.I.A-79 VII.E1.A-79 VII.A3.A-79
E1.3-a	A-34	VII.E3.A-34 VII.E1.A-34
E1.3-a	A-57	VII.E1.A-57
E1.3-b	A-79	VII.I.A-79 VII.E1.A-79 VII.A3.A-79
E1.4-a	A-79	VII.I.A-79 VII.E1.A-79 VII.A3.A-79
E1.5-a	A-104	VII.E1.AP-122
E1.5-a	A-76	VII.E1.AP-114 VII.E1.AP-115
E1.5-b	A-79	VII.I.A-79 VII.E1.A-79 VII.A3.A-79
E1.6-a	A-79	VII.I.A-79 VII.E1.A-79

Table A-6. Relationship of Auxiliary System IDs in GALL Report, Chpt. VII		
Rev. 0	**Rev. 1**	**Rev. 2**
		VII.A3.A-79
E1.7-a	A-57	VII.E1.A-57
E1.7-a	A-34	VII.E3.A-34 VII.E1.A-34
E1.7-b	A-79	VII.I.A-79 VII.E1.A-79 VII.A3.A-79
E1.7-c	A-84	VII.E1.AP-118
E1.8-a	A-57	VII.E1.A-57
E1.8-a	A-34	VII.E3.A-34 VII.E1.A-34
E1.8-a	A-100	VII.E1.A-100
E1.8-b	A-69	VII.E1.A-69
E1.8-c	A-63	VII.F4.AP-189 VII.F3.AP-189 VII.F2.AP-189 VII.F1.AP-189 VII.E4.AP-189 VII.E3.AP-189 VII.E1.AP-189 VII.C2.AP-189 VII.A4.AP-189 VII.A3.AP-189
E1.8-d	A-79	VII.I.A-79 VII.E1.A-79 VII.A3.A-79
E1.9-a	A-79	VII.I.A-79 VII.E1.A-79 VII.A3.A-79
E1.10-a	A-79	VII.I.A-79 VII.E1.A-79 VII.A3.A-79
E2.	AP-73	VII.E2.AP-141
E2.1-a	A-59	VII.E2.AP-181
E2.2-a	A-59	VII.E2.AP-181

Table A-6. Relationship of Auxiliary System IDs in GALL Report, Chpt. VII

Rev. 0	Rev. 1	Rev. 2
E2.3-a	A-59	VII.E2.AP-181
E2.4-a	A-59	VII.E2.AP-181
E3.	A-63	VII.F4.AP-189 VII.F3.AP-189 VII.F2.AP-189 VII.F1.AP-189 VII.E4.AP-189 VII.E3.AP-189 VII.E1.AP-189 VII.C2.AP-189 VII.A4.AP-189 VII.A3.AP-189
E3.	A-58	VII.E4.AP-110 VII.E3.AP-110 VII.A4.AP-110
E3.	AP-43	VII.E3.AP-43 VII.E1.AP-43 VII.C2.AP-43 VII.A4.AP-43 VII.A3.AP-43 VII.H2.AP-43 VII.H1.AP-43 VII.F4.AP-43 VII.F3.AP-43 VII.F2.AP-43 VII.F1.AP-43 VII.E4.AP-43
E3.	AP-12	VII.H2.AP-199 VII.H1.AP-199 VII.F4.AP-199 VII.F3.AP-199 VII.F2.AP-199 VII.F1.AP-199 VII.E4.AP-199 VII.E3.AP-199 VII.E1.AP-199 VII.C2.AP-199 VII.A4.AP-199

Table A-6. Relationship of Auxiliary System IDs in GALL Report, Chpt. VII

Rev. 0	Rev. 1	Rev. 2
		VII.A3.AP-199
E3.	AP-32	VII.E4.AP-32 VII.E3.AP-32 VII.C2.AP-32 VII.A4.AP-32
E3.	AP-31	VII.G.AP-31 VII.F4.AP-31 VII.F2.AP-31 VII.F1.AP-31 VII.E4.AP-31 VII.E3.AP-31 VII.E1.AP-31 VII.C2.AP-31 VII.A4.AP-31 VII.A3.AP-31
E3.	AP-38	VII.E4.AP-130 VII.E3.AP-130 VII.A4.AP-130
E3.	AP-60	VII.E4.AP-186 VII.E3.AP-186 VII.C2.AP-186
E3.	A-35	VII.E4.AP-106 VII.E3.AP-106
E3.	AP-63	VII.E4.AP-188 VII.E3.AP-188 VII.C2.AP-188
E3.	AP-64	VII.E4.AP-140 VII.E3.AP-140 VII.A4.AP-140
E3.	AP-62	VII.E3.AP-139 VII.A4.AP-139
E3.1-a	A-60	VII.E3.AP-283
E3.1-b	A-62	VII.E4.A-62 VII.E3.A-62
E3.2-a	A-60	VII.E3.AP-283
E3.2-b	A-62	VII.E4.A-62

Table A-6. Relationship of Auxiliary System IDs in GALL Report, Chpt. VII		
Rev. 0	**Rev. 1**	**Rev. 2**
		VII.E3.A-62
E3.2-c	A-34	VII.E3.A-34 VII.E1.A-34
E3.3-d	A-85	VII.E3.AP-120
E3.4-a	A-68	VII.E3.AP-192
E3.4-a	A-71	VII.E3.AP-112
E3.4-b	A-67	VII.E4.AP-191 VII.E3.AP-191
E4.	AP-59	VII.H2.AP-138 VII.G.AP-138 VII.E4.AP-138 VII.E1.AP-138 VII.C2.AP-138 VII.C1.AP-138
E4.	AP-43	VII.E3.AP-43 VII.E1.AP-43 VII.C2.AP-43 VII.A4.AP-43 VII.A3.AP-43 VII.H2.AP-43 VII.H1.AP-43 VII.F4.AP-43 VII.F3.AP-43 VII.F2.AP-43 VII.F1.AP-43 VII.E4.AP-43
E4.	AP-38	VII.E4.AP-130 VII.E3.AP-130 VII.A4.AP-130
E4.	AP-31	VII.G.AP-31 VII.F4.AP-31 VII.F2.AP-31 VII.F1.AP-31 VII.E4.AP-31 VII.E3.AP-31 VII.E1.AP-31 VII.C2.AP-31

Table A-6. Relationship of Auxiliary System IDs in GALL Report, Chpt. VII		
Rev. 0	**Rev. 1**	**Rev. 2**
		VII.A4.AP-31 VII.A3.AP-31
E4.	AP-64	VII.E4.AP-140 VII.E3.AP-140 VII.A4.AP-140
E4.	AP-63	VII.E4.AP-188 VII.E3.AP-188 VII.C2.AP-188
E4.	AP-47	VII.H2.AP-133 VII.G.AP-133 VII.E4.AP-133 VII.E1.AP-133 VII.C2.AP-133 VII.C1.AP-133
E4.	AP-32	VII.E4.AP-32 VII.E3.AP-32 VII.C2.AP-32 VII.A4.AP-32
E4.	AP-30	VII.H2.AP-127 VII.G.AP-127 VII.F4.AP-127 VII.F3.AP-127 VII.F2.AP-127 VII.F1.AP-127 VII.E4.AP-127 VII.E1.AP-127 VII.C2.AP-127 VII.C1.AP-127
E4.	AP-12	VII.H2.AP-199 VII.H1.AP-199 VII.F4.AP-199 VII.F3.AP-199 VII.F2.AP-199 VII.F1.AP-199 VII.E4.AP-199 VII.E3.AP-199 VII.E1.AP-199 VII.C2.AP-199

Table A-6. Relationship of Auxiliary System IDs in GALL Report, Chpt. VII		
Rev. 0	**Rev. 1**	**Rev. 2**
		VII.A4.AP-199 VII.A3.AP-199
E4.	AP-60	VII.E4.AP-186 VII.E3.AP-186 VII.C2.AP-186
E4.1-a	A-35	VII.E4.AP-106 VII.E3.AP-106
E4.1-a	A-58	VII.E4.AP-110 VII.E3.AP-110 VII.A4.AP-110
E4.1-b	A-62	VII.E4.A-62 VII.E3.A-62
E4.1-c	A-61	VII.E4.A-61
E4.2-a	A-35	VII.E4.AP-106 VII.E3.AP-106
E4.3-a	A-61	VII.E4.A-61
E4.4-a	A-67	VII.E4.AP-191 VII.E3.AP-191
E4.4-a	A-63	VII.F4.AP-189 VII.F3.AP-189 VII.F2.AP-189 VII.F1.AP-189 VII.E4.AP-189 VII.E3.AP-189 VII.E1.AP-189 VII.C2.AP-189 VII.A4.AP-189 VII.A3.AP-189
F1.	AP-43	VII.E3.AP-43 VII.E1.AP-43 VII.C2.AP-43 VII.A4.AP-43 VII.A3.AP-43 VII.H2.AP-43 VII.H1.AP-43 VII.F4.AP-43 VII.F3.AP-43

Table A-6. Relationship of Auxiliary System IDs in GALL Report, Chpt. VII		
Rev. 0	**Rev. 1**	**Rev. 2**
		VII.F2.AP-43 VII.F1.AP-43 VII.E4.AP-43
F1.	AP-12	VII.H2.AP-199 VII.H1.AP-199 VII.F4.AP-199 VII.F3.AP-199 VII.F2.AP-199 VII.F1.AP-199 VII.E4.AP-199 VII.E3.AP-199 VII.E1.AP-199 VII.C2.AP-199 VII.A4.AP-199 VII.A3.AP-199
F1.	AP-65	VII.F3.AP-65 VII.F1.AP-65 VII.E1.AP-65
F1.	AP-34	VII.F3.AP-203 VII.F1.AP-203 VII.E1.AP-203
F1.	AP-80	VII.F3.AP-205 VII.F2.AP-205 VII.F1.AP-205 VII.C2.AP-205
F1.	AP-77	VII.F4.AP-204 VII.F3.AP-204 VII.F2.AP-204 VII.F1.AP-204
F1.	AP-30	VII.H2.AP-127 VII.G.AP-127 VII.F4.AP-127 VII.F3.AP-127 VII.F2.AP-127 VII.F1.AP-127 VII.E4.AP-127 VII.E1.AP-127 VII.C2.AP-127

Table A-6. Relationship of Auxiliary System IDs in GALL Report, Chpt. VII

Rev. 0	Rev. 1	Rev. 2
		VII.C1.AP-127
F1.	AP-74	VII.F4.AP-142 VII.F3.AP-142 VII.F2.AP-142 VII.F1.AP-142
F1.	A-63	VII.F4.AP-189 VII.F3.AP-189 VII.F2.AP-189 VII.F1.AP-189 VII.E4.AP-189 VII.E3.AP-189 VII.E1.AP-189 VII.C2.AP-189 VII.A4.AP-189 VII.A3.AP-189
F1.	AP-31	VII.G.AP-31 VII.F4.AP-31 VII.F2.AP-31 VII.F1.AP-31 VII.E4.AP-31 VII.E3.AP-31 VII.E1.AP-31 VII.C2.AP-31 VII.A4.AP-31 VII.A3.AP-31
F1.	AP-41	VII.F2.AP-41 VII.H2.AP-41 VII.G.AP-41 VII.F4.AP-41 VII.F3.AP-41 VII.F1.AP-41
F1.1-a	A-105	VII.I.A-105 VII.F4.A-105 VII.F3.A-105 VII.F2.A-105 VII.F1.A-105
F1.1-a	A-08	VII.F4.A-08 VII.F3.A-08

Table A-6. Relationship of Auxiliary System IDs in GALL Report, Chpt. VII

Rev. 0	Rev. 1	Rev. 2
		VII.F2.A-08 VII.F1.A-08
F1.1-a	A-10	VII.F4.A-10 VII.F3.A-10 VII.F2.A-10 VII.F1.A-10
F1.1-b	A-17	VII.F4.AP-102 VII.F3.AP-102 VII.F2.AP-102 VII.F1.AP-102
F1.1-c	A-18	VII.F4.AP-103 VII.F3.AP-103 VII.F2.AP-103 VII.F1.AP-103
F1.1-c	A-73	VII.F4.AP-113 VII.F3.AP-113 VII.F2.AP-113 VII.F1.AP-113
F1.2-a	A-46	VII.F4.AP-109 VII.F3.AP-109 VII.F2.AP-109 VII.F1.AP-109
F1.3-a	A-25	VII.H2.AP-202 VII.F4.AP-202 VII.F3.AP-202 VII.F2.AP-202 VII.F1.AP-202 VII.C2.AP-202
F1.4-a	A-09	VII.F3.AP-99 VII.F2.AP-99 VII.F1.AP-99
F1.4-a	A-08	VII.F4.A-08 VII.F3.A-08 VII.F2.A-08 VII.F1.A-08
F1.4-a	A-10	VII.F4.A-10 VII.F3.A-10

Table A-6. Relationship of Auxiliary System IDs in GALL Report, Chpt. VII		
Rev. 0	**Rev. 1**	**Rev. 2**
		VII.F2.A-10 VII.F1.A-10
F1.4-b	A-17	VII.F4.AP-102 VII.F3.AP-102 VII.F2.AP-102 VII.F1.AP-102
F2.	AP-12	VII.H2.AP-199 VII.H1.AP-199 VII.F4.AP-199 VII.F3.AP-199 VII.F2.AP-199 VII.F1.AP-199 VII.E4.AP-199 VII.E3.AP-199 VII.E1.AP-199 VII.C2.AP-199 VII.A4.AP-199 VII.A3.AP-199
F2.	AP-77	VII.F4.AP-204 VII.F3.AP-204 VII.F2.AP-204 VII.F1.AP-204
F2.	AP-30	VII.H2.AP-127 VII.G.AP-127 VII.F4.AP-127 VII.F3.AP-127 VII.F2.AP-127 VII.F1.AP-127 VII.E4.AP-127 VII.E1.AP-127 VII.C2.AP-127 VII.C1.AP-127
F2.	AP-43	VII.E3.AP-43 VII.E1.AP-43 VII.C2.AP-43 VII.A4.AP-43 VII.A3.AP-43 VII.H2.AP-43

Table A-6. Relationship of Auxiliary System IDs in GALL Report, Chpt. VII		
Rev. 0	**Rev. 1**	**Rev. 2**
		VII.H1.AP-43 VII.F4.AP-43 VII.F3.AP-43 VII.F2.AP-43 VII.F1.AP-43 VII.E4.AP-43
F2.	AP-80	VII.F3.AP-205 VII.F2.AP-205 VII.F1.AP-205 VII.C2.AP-205
F2.	A-63	VII.F4.AP-189 VII.F3.AP-189 VII.F2.AP-189 VII.F1.AP-189 VII.E4.AP-189 VII.E3.AP-189 VII.E1.AP-189 VII.C2.AP-189 VII.A4.AP-189 VII.A3.AP-189
F2.	AP-74	VII.F4.AP-142 VII.F3.AP-142 VII.F2.AP-142 VII.F1.AP-142
F2.	AP-41	VII.F2.AP-41 VII.H2.AP-41 VII.G.AP-41 VII.F4.AP-41 VII.F3.AP-41 VII.F1.AP-41
F2.	AP-31	VII.G.AP-31 VII.F4.AP-31 VII.F2.AP-31 VII.F1.AP-31 VII.E4.AP-31 VII.E3.AP-31 VII.E1.AP-31 VII.C2.AP-31

Table A-6. Relationship of Auxiliary System IDs in GALL Report, Chpt. VII

Rev. 0	Rev. 1	Rev. 2
		VII.A4.AP-31 VII.A3.AP-31
F2.1-a	A-10	VII.F4.A-10 VII.F3.A-10 VII.F2.A-10 VII.F1.A-10
F2.1-a	A-08	VII.F4.A-08 VII.F3.A-08 VII.F2.A-08 VII.F1.A-08
F2.1-a	A-105	VII.I.A-105 VII.F4.A-105 VII.F3.A-105 VII.F2.A-105 VII.F1.A-105
F2.1-b	A-17	VII.F4.AP-102 VII.F3.AP-102 VII.F2.AP-102 VII.F1.AP-102
F2.1-c	A-18	VII.F4.AP-103 VII.F3.AP-103 VII.F2.AP-103 VII.F1.AP-103
F2.1-c	A-73	VII.F4.AP-113 VII.F3.AP-113 VII.F2.AP-113 VII.F1.AP-113
F2.2-a	A-46	VII.F4.AP-109 VII.F3.AP-109 VII.F2.AP-109 VII.F1.AP-109
F2.3-a	A-25	VII.H2.AP-202 VII.F4.AP-202 VII.F3.AP-202 VII.F2.AP-202 VII.F1.AP-202 VII.C2.AP-202

Table A-6. Relationship of Auxiliary System IDs in GALL Report, Chpt. VII

Rev. 0	Rev. 1	Rev. 2
F2.4-a	A-08	VII.F4.A-08 VII.F3.A-08 VII.F2.A-08 VII.F1.A-08
F2.4-a	A-09	VII.F3.AP-99 VII.F2.AP-99 VII.F1.AP-99
F2.4-a	A-10	VII.F4.A-10 VII.F3.A-10 VII.F2.A-10 VII.F1.A-10
F2.4-b	A-17	VII.F4.AP-102 VII.F3.AP-102 VII.F2.AP-102 VII.F1.AP-102
F3.	AP-30	VII.H2.AP-127 VII.G.AP-127 VII.F4.AP-127 VII.F3.AP-127 VII.F2.AP-127 VII.F1.AP-127 VII.E4.AP-127 VII.E1.AP-127 VII.C2.AP-127 VII.C1.AP-127
F3.	AP-41	VII.F2.AP-41 VII.H2.AP-41 VII.G.AP-41 VII.F4.AP-41 VII.F3.AP-41 VII.F1.AP-41
F3.	AP-34	VII.F3.AP-203 VII.F1.AP-203 VII.E1.AP-203
F3.	A-50	VII.F3.A-50 VII.C2.A-50
F3.	AP-80	VII.F3.AP-205

Table A-6. Relationship of Auxiliary System IDs in GALL Report, Chpt. VII

Rev. 0	Rev. 1	Rev. 2
		VII.F2.AP-205 VII.F1.AP-205 VII.C2.AP-205
F3.	AP-74	VII.F4.AP-142 VII.F3.AP-142 VII.F2.AP-142 VII.F1.AP-142
F3.	A-63	VII.F4.AP-189 VII.F3.AP-189 VII.F2.AP-189 VII.F1.AP-189 VII.E4.AP-189 VII.E3.AP-189 VII.E1.AP-189 VII.C2.AP-189 VII.A4.AP-189 VII.A3.AP-189
F3.	AP-12	VII.H2.AP-199 VII.H1.AP-199 VII.F4.AP-199 VII.F3.AP-199 VII.F2.AP-199 VII.F1.AP-199 VII.E4.AP-199 VII.E3.AP-199 VII.E1.AP-199 VII.C2.AP-199 VII.A4.AP-199 VII.A3.AP-199
F3.	AP-65	VII.F3.AP-65 VII.F1.AP-65 VII.E1.AP-65
F3.	AP-77	VII.F4.AP-204 VII.F3.AP-204 VII.F2.AP-204 VII.F1.AP-204
F3.	AP-43	VII.E3.AP-43 VII.E1.AP-43

Table A-6. Relationship of Auxiliary System IDs in GALL Report, Chpt. VII

Rev. 0	Rev. 1	Rev. 2
		VII.C2.AP-43 VII.A4.AP-43 VII.A3.AP-43 VII.H2.AP-43 VII.H1.AP-43 VII.F4.AP-43 VII.F3.AP-43 VII.F2.AP-43 VII.F1.AP-43 VII.E4.AP-43
F3.1-a	A-08	VII.F4.A-08 VII.F3.A-08 VII.F2.A-08 VII.F1.A-08
F3.1-a	A-10	VII.F4.A-10 VII.F3.A-10 VII.F2.A-10 VII.F1.A-10
F3.1-a	A-105	VII.I.A-105 VII.F4.A-105 VII.F3.A-105 VII.F2.A-105 VII.F1.A-105
F3.1-b	A-17	VII.F4.AP-102 VII.F3.AP-102 VII.F2.AP-102 VII.F1.AP-102
F3.1-c	A-18	VII.F4.AP-103 VII.F3.AP-103 VII.F2.AP-103 VII.F1.AP-103
F3.1-c	A-73	VII.F4.AP-113 VII.F3.AP-113 VII.F2.AP-113 VII.F1.AP-113
F3.2-a	A-46	VII.F4.AP-109 VII.F3.AP-109

Table A-6. Relationship of Auxiliary System IDs in GALL Report, Chpt. VII		
Rev. 0	**Rev. 1**	**Rev. 2**
		VII.F2.AP-109 VII.F1.AP-109
F3.3-a	A-25	VII.H2.AP-202 VII.F4.AP-202 VII.F3.AP-202 VII.F2.AP-202 VII.F1.AP-202 VII.C2.AP-202
F3.4-a	A-08	VII.F4.A-08 VII.F3.A-08 VII.F2.A-08 VII.F1.A-08
F3.4-a	A-09	VII.F3.AP-99 VII.F2.AP-99 VII.F1.AP-99
F3.4-a	A-10	VII.F4.A-10 VII.F3.A-10 VII.F2.A-10 VII.F1.A-10
F3.4-b	A-17	VII.F4.AP-102 VII.F3.AP-102 VII.F2.AP-102 VII.F1.AP-102
F4.	AP-41	VII.F2.AP-41 VII.H2.AP-41 VII.G.AP-41 VII.F4.AP-41 VII.F3.AP-41 VII.F1.AP-41
F4.	A-63	VII.F4.AP-189 VII.F3.AP-189 VII.F2.AP-189 VII.F1.AP-189 VII.E4.AP-189 VII.E3.AP-189 VII.E1.AP-189 VII.C2.AP-189

Table A-6. Relationship of Auxiliary System IDs in GALL Report, Chpt. VII		
Rev. 0	**Rev. 1**	**Rev. 2**
		VII.A4.AP-189 VII.A3.AP-189
F4.	AP-12	VII.H2.AP-199 VII.H1.AP-199 VII.F4.AP-199 VII.F3.AP-199 VII.F2.AP-199 VII.F1.AP-199 VII.E4.AP-199 VII.E3.AP-199 VII.E1.AP-199 VII.C2.AP-199 VII.A4.AP-199 VII.A3.AP-199
F4.	AP-31	VII.G.AP-31 VII.F4.AP-31 VII.F2.AP-31 VII.F1.AP-31 VII.E4.AP-31 VII.E3.AP-31 VII.E1.AP-31 VII.C2.AP-31 VII.A4.AP-31 VII.A3.AP-31
F4.	AP-74	VII.F4.AP-142 VII.F3.AP-142 VII.F2.AP-142 VII.F1.AP-142
F4.	AP-77	VII.F4.AP-204 VII.F3.AP-204 VII.F2.AP-204 VII.F1.AP-204
F4.	AP-43	VII.E3.AP-43 VII.E1.AP-43 VII.C2.AP-43 VII.A4.AP-43 VII.A3.AP-43 VII.H2.AP-43

Table A-6. Relationship of Auxiliary System IDs in GALL Report, Chpt. VII

Rev. 0	Rev. 1	Rev. 2
		VII.H1.AP-43 VII.F4.AP-43 VII.F3.AP-43 VII.F2.AP-43 VII.F1.AP-43 VII.E4.AP-43
F4.	AP-30	VII.H2.AP-127 VII.G.AP-127 VII.F4.AP-127 VII.F3.AP-127 VII.F2.AP-127 VII.F1.AP-127 VII.E4.AP-127 VII.E1.AP-127 VII.C2.AP-127 VII.C1.AP-127
F4.1-a	A-08	VII.F4.A-08 VII.F3.A-08 VII.F2.A-08 VII.F1.A-08
F4.1-a	A-10	VII.F4.A-10 VII.F3.A-10 VII.F2.A-10 VII.F1.A-10
F4.1-a	A-105	VII.I.A-105 VII.F4.A-105 VII.F3.A-105 VII.F2.A-105 VII.F1.A-105
F4.1-b	A-17	VII.F4.AP-102 VII.F3.AP-102 VII.F2.AP-102 VII.F1.AP-102
F4.1-c	A-18	VII.F4.AP-103 VII.F3.AP-103 VII.F2.AP-103 VII.F1.AP-103

Table A-6. Relationship of Auxiliary System IDs in GALL Report, Chpt. VII

Rev. 0	Rev. 1	Rev. 2
F4.1-c	A-73	VII.F4.AP-113 VII.F3.AP-113 VII.F2.AP-113 VII.F1.AP-113
F4.2-a	A-46	VII.F4.AP-109 VII.F3.AP-109 VII.F2.AP-109 VII.F1.AP-109
F4.3-a	A-25	VII.H2.AP-202 VII.F4.AP-202 VII.F3.AP-202 VII.F2.AP-202 VII.F1.AP-202 VII.C2.AP-202
G.	AP-83	VII.G.AP-180
G.	AP-44	VII.H2.AP-132 VII.H1.AP-132 VII.G.AP-132
G.	AP-56	VII.H2.AP-137 VII.H1.AP-137 VII.G.AP-137 VII.C3.AP-137 VII.C1.AP-137
G.	AP-78	VII.G.AP-143
G.	AP-40	VII.H2.AP-40 VII.G.AP-40
G.	AP-54	VII.H2.AP-136 VII.H1.AP-136 VII.G.AP-136
G.	AP-41	VII.F2.AP-41 VII.H2.AP-41 VII.G.AP-41 VII.F4.AP-41 VII.F3.AP-41 VII.F1.AP-41
G.	A-51	VII.H2.A-51 VII.G.A-51

Table A-6. Relationship of Auxiliary System IDs in GALL Report, Chpt. VII

Rev. 0	Rev. 1	Rev. 2
		VII.C3.A-51 VII.C1.A-51
G.	A-23	VII.H2.A-23 VII.G.A-23
G.	AP-31	VII.G.AP-31 VII.F4.AP-31 VII.F2.AP-31 VII.F1.AP-31 VII.E4.AP-31 VII.E3.AP-31 VII.E1.AP-31 VII.C2.AP-31 VII.A4.AP-31 VII.A3.AP-31
G.	AP-30	VII.H2.AP-127 VII.G.AP-127 VII.F4.AP-127 VII.F3.AP-127 VII.F2.AP-127 VII.F1.AP-127 VII.E4.AP-127 VII.E1.AP-127 VII.C2.AP-127 VII.C1.AP-127
G.	AP-61	VII.H2.AP-187 VII.G.AP-187 VII.C3.AP-187 VII.C1.AP-187
G.	AP-59	VII.H2.AP-138 VII.G.AP-138 VII.E4.AP-138 VII.E1.AP-138 VII.C2.AP-138 VII.C1.AP-138
G.	A-02	VII.H1.A-02 VII.G.A-02 VII.C3.A-02 VII.C1.A-02

Table A-6. Relationship of Auxiliary System IDs in GALL Report, Chpt. VII

Rev. 0	Rev. 1	Rev. 2
		VII.H2.A-02
G.	A-01	VII.H1.AP-198 VII.G.AP-198 VII.C3.AP-198 VII.C1.AP-198
G.	AP-47	VII.H2.AP-133 VII.G.AP-133 VII.E4.AP-133 VII.E1.AP-133 VII.C2.AP-133 VII.C1.AP-133
G.1-a	A-19	VII.G.A-19
G.1-a	A-20	VII.G.A-20
G.1-b	A-92	VII.G.A-92
G.1-b	A-90	VII.G.A-90
G.1-c	A-93	VII.G.A-93
G.1-c	A-91	VII.G.A-91
G.1-d	A-22	VII.G.A-22
G.1-d	A-21	VII.G.A-21
G.2-a	A-19	VII.G.A-19
G.2-a	A-20	VII.G.A-20
G.2-b	A-90	VII.G.A-90
G.2-b	A-92	VII.G.A-92
G.2-c	A-93	VII.G.A-93
G.2-c	A-91	VII.G.A-91
G.2-d	A-21	VII.G.A-21
G.2-d	A-22	VII.G.A-22
G.3-a	A-20	VII.G.A-20
G.3-a	A-19	VII.G.A-19
G.3-b	A-92	VII.G.A-92
G.3-b	A-90	VII.G.A-90
G.3-c	A-91	VII.G.A-91
G.3-c	A-93	VII.G.A-93

Table A-6. Relationship of Auxiliary System IDs in GALL Report, Chpt. VII

Rev. 0	Rev. 1	Rev. 2
G.3-d	A-22	VII.G.A-22
G.3-d	A-21	VII.G.A-21
G.4-a	A-20	VII.G.A-20
G.4-a	A-19	VII.G.A-19
G.4-b	A-90	VII.G.A-90
G.4-b	A-92	VII.G.A-92
G.4-c	A-91	VII.G.A-91
G.4-c	A-93	VII.G.A-93
G.4-d	A-22	VII.G.A-22
G.4-d	A-21	VII.G.A-21
G.5-a	A-90	VII.G.A-90
G.5-b	A-91	VII.G.A-91
G.5-c	A-21	VII.G.A-21
G.6-a	A-55	VII.G.A-55
G.6-a	A-33	VII.G.A-33
G.6-b	A-45	VII.G.AP-197
G.6-b	A-33	VII.G.A-33
G.6-b	A-55	VII.G.A-55
G.6-b	A-47	VII.H2.A-47 VII.G.A-47 VII.C3.A-47 VII.C1.A-47
G.7-a	A-82	VII.G.AP-116
G.7-b	A-83	VII.G.AP-117
G.8-a	A-28	VII.G.AP-234
H1.	AP-56	VII.H2.AP-137 VII.H1.AP-137 VII.G.AP-137 VII.C3.AP-137 VII.C1.AP-137
H1.	AP-54	VII.H2.AP-136 VII.H1.AP-136 VII.G.AP-136

Table A-6. Relationship of Auxiliary System IDs in GALL Report, Chpt. VII

Rev. 0	Rev. 1	Rev. 2
H1.	AP-35	VII.H2.AP-129 VII.H1.AP-129
H1.	AP-44	VII.H2.AP-132 VII.H1.AP-132 VII.G.AP-132
H1.	AP-43	VII.E3.AP-43 VII.E1.AP-43 VII.C2.AP-43 VII.A4.AP-43 VII.A3.AP-43 VII.H2.AP-43 VII.H1.AP-43 VII.F4.AP-43 VII.F3.AP-43 VII.F2.AP-43 VII.F1.AP-43 VII.E4.AP-43
H1.	A-02	VII.H1.A-02 VII.G.A-02 VII.C3.A-02 VII.C1.A-02 VII.H2.A-02
H1.	AP-12	VII.H2.AP-199 VII.H1.AP-199 VII.F4.AP-199 VII.F3.AP-199 VII.F2.AP-199 VII.F1.AP-199 VII.E4.AP-199 VII.E3.AP-199 VII.E1.AP-199 VII.C2.AP-199 VII.A4.AP-199 VII.A3.AP-199
H1.1-a	A-24	VII.H1.A-24
H1.1-b	A-01	VII.H1.AP-198 VII.G.AP-198

Table A-6. Relationship of Auxiliary System IDs in GALL Report, Chpt. VII		
Rev. 0	**Rev. 1**	**Rev. 2**
		VII.C3.AP-198 VII.C1.AP-198
H1.2-a	A-24	VII.H1.A-24
H1.3-a	A-24	VII.H1.A-24
H1.4-a	A-30	VII.H2.AP-105 VII.H1.AP-105
H1.4-b	A-95	VII.H1.A-95
H2.	AP-55	VII.H2.AP-55
H2.	AP-59	VII.H2.AP-138 VII.G.AP-138 VII.E4.AP-138 VII.E1.AP-138 VII.C2.AP-138 VII.C1.AP-138
H2.	AP-61	VII.H2.AP-187 VII.G.AP-187 VII.C3.AP-187 VII.C1.AP-187
H2.	AP-39	VII.H2.AP-131
H2.	AP-40	VII.H2.AP-40 VII.G.AP-40
H2.	A-47	VII.H2.A-47 VII.G.A-47 VII.C3.A-47 VII.C1.A-47
H2.	A-02	VII.H1.A-02 VII.G.A-02 VII.C3.A-02 VII.C1.A-02 VII.H2.A-02
H2.	AP-47	VII.H2.AP-133 VII.G.AP-133 VII.E4.AP-133 VII.E1.AP-133 VII.C2.AP-133 VII.C1.AP-133

Table A-6. Relationship of Auxiliary System IDs in GALL Report, Chpt. VII		
Rev. 0	**Rev. 1**	**Rev. 2**
H2.	AP-56	VII.H2.AP-137 VII.H1.AP-137 VII.G.AP-137 VII.C3.AP-137 VII.C1.AP-137
H2.	AP-12	VII.H2.AP-199 VII.H1.AP-199 VII.F4.AP-199 VII.F3.AP-199 VII.F2.AP-199 VII.F1.AP-199 VII.E4.AP-199 VII.E3.AP-199 VII.E1.AP-199 VII.C2.AP-199 VII.A4.AP-199 VII.A3.AP-199
H2.	AP-33	VII.H2.AP-128
H2.	AP-54	VII.H2.AP-136 VII.H1.AP-136 VII.G.AP-136
H2.	AP-30	VII.H2.AP-127 VII.G.AP-127 VII.F4.AP-127 VII.F3.AP-127 VII.F2.AP-127 VII.F1.AP-127 VII.E4.AP-127 VII.E1.AP-127 VII.C2.AP-127 VII.C1.AP-127
H2.	A-51	VII.H2.A-51 VII.G.A-51 VII.C3.A-51 VII.C1.A-51
H2.	AP-35	VII.H2.AP-129 VII.H1.AP-129

Table A-6. Relationship of Auxiliary System IDs in GALL Report, Chpt. VII		
Rev. 0	**Rev. 1**	**Rev. 2**
H2.	AP-43	VII.E3.AP-43 VII.E1.AP-43 VII.C2.AP-43 VII.A4.AP-43 VII.A3.AP-43 VII.H2.AP-43 VII.H1.AP-43 VII.F4.AP-43 VII.F3.AP-43 VII.F2.AP-43 VII.F1.AP-43 VII.E4.AP-43
H2.	AP-44	VII.H2.AP-132 VII.H1.AP-132 VII.G.AP-132
H2.	AP-41	VII.F2.AP-41 VII.H2.AP-41 VII.G.AP-41 VII.F4.AP-41 VII.F3.AP-41 VII.F1.AP-41
H2.	AP-45	VII.H2.AP-193
H2.1-a	A-25	VII.H2.AP-202 VII.F4.AP-202 VII.F3.AP-202 VII.F2.AP-202 VII.F1.AP-202 VII.C2.AP-202
H2.1-b	A-38	VII.H2.AP-194 VII.C3.AP-194 VII.C1.AP-194
H2.2-a	A-23	VII.H2.A-23 VII.G.A-23
H2.3-a	A-23	VII.H2.A-23 VII.G.A-23
H2.4-a	A-27	VII.H2.AP-104
H2.5-a	A-30	VII.H2.AP-105

Table A-6. Relationship of Auxiliary System IDs in GALL Report, Chpt. VII		
Rev. 0	**Rev. 1**	**Rev. 2**
		VII.H1.AP-105
I.	AP-66	VII.I.AP-66
I.	AP-26	VII.I.AP-124
I.	AP-27	VII.I.AP-125
I.	A-105	VII.I.A-105 VII.F4.A-105 VII.F3.A-105 VII.F2.A-105 VII.F1.A-105
I.	AP-28	VII.I.AP-126
I.	A-102	VII.I.A-102
I.1-a	A-79	VII.I.A-79 VII.E1.A-79 VII.A3.A-79
I.1-b	A-77	VII.I.A-77
I.1-b	A-78	VII.I.A-78
I.1-b	A-81	VII.I.A-81
I.2-a	A-03	VII.I.A-03
I.2-b	A-04	VII.I.A-04
J.	AP-51	VII.J.AP-51
J.	AP-22	VII.J.AP-22
J.	AP-15	VII.J.AP-15
J.	AP-13	VII.J.AP-13
J.	AP-50	VII.J.AP-50
J.	AP-9	VII.J.AP-9
J.	AP-2	VII.J.AP-2
J.	AP-18	VII.J.AP-18
J.	AP-17	VII.J.AP-17
J.	AP-20	VII.J.AP-20
J.	AP-48	VII.J.AP-48
J.	AP-19	VII.J.AP-19
J.	AP-3	VII.J.AP-282
J.	AP-37	VII.J.AP-37

Table A-6. Relationship of Auxiliary System IDs in GALL Report, Chpt. VII		
Rev. 0	**Rev. 1**	**Rev. 2**
J.	AP-36	VII.J.AP-36
J.	AP-52	VII.J.AP-52
J.	AP-6	VII.J.AP-6
J.	AP-8	VII.J.AP-8
J.	AP-11	VII.J.AP-11
J.	AP-49	VII.J.AP-49
J.	AP-16	VII.J.AP-16
J.	AP-4	VII.J.AP-4
J.	AP-14	VII.J.AP-14

Table A-7. Relationship of Steam and Power Conversion (SPC) System IDs in GALL Report, Chpt VIII

Table A-7. Relationship of Steam and Power Conversion (SPC) System IDs in GALL Report, Chpt VIII

Rev. 0	Rev. 1	Rev. 2
None	None	VIII.I.SP-104
None	None	VIII.I.SP-108
None	None	VIII.BI.SP-110 VIII.B2.SP-110
None	None	VIII.I.SP-111
None	None	VIII.G.SP-113
None	None	VIII.G.SP-114
None	None	VIII.E.SP-115
None	None	VIII.G.SP-116
None	None	VIII.A.SP-118 VIII.B1.SP-118 VIII.B2.SP-118 VIII.C.SP-118 VIII.D1.SP-118 VIII.D2.SP-118 VIII.E.SP-118 VIII.F.SP-118 VIII.G.SP-118
None	None	VIII.A.SP-127 VIII.B1.SP-127 VIII.B2.SP-127 VIII.C.SP-127 VIII.D1.SP-127 VIII.D2.SP-127 VIII.E.SP-127 VIII.F.SP-127 VIII.G.SP-127
None	None	VIII.E.SP-137
None	None	VIII.E.SP-138
None	None	VIII.E.SP-139
None	None	VIII.E.SP-140
None	None	VIII.H.SP-141
None	None	VIII.H.SP-142
None	None	VIII.H.SP-143
None	None	VIII.H.SP-144
None	None	VIII.H.SP-147
		VIII.I.SP-148
None	None	VIII.H.SP-149
None	None	VIII.H.SP-150
None	None	VIII.H.SP-151
None	None	VIII.I.SP-152
None	None	VIII.I.SP-153
None	None	VIII.I.SP-67
None	None	VIII.I.SP-68
None	None	VIII.I.SP-69
None	None	VIII.I.SP-70
None	None	VIII.I.SP-86
None	None	VIII.I.SP-93
None	None	VIII.H.SP-161
A.	SP-25	VIII.G.SP-91 VIII.E.SP-91 VIII.D2.SP-91 VIII.D1.SP-91 VIII.A.SP-91
A.	SP-30	VIII.A.SP-30 VIII.G.SP-30 VIII.F.SP-30 VIII.E.SP-30
A.	SP-46	Retired
A.	S-23	VIII.G.S-23 VIII.F.S-23 VIII.E.S-23 VIII.A.S-23
A.	SP-45	VIII.B2.SP-98 VIII.A.SP-98
A.	SP-44	VIII.B1.SP-98
A.	SP-32	VIII.G.SP-92

Table A-7. Relationship of Steam and Power Conversion (SPC) System IDs in GALL Report, Chpt VIII

Rev. 0	Rev. 1	Rev. 2
		VIII.E.SP-92 VIII.D2.SP-92 VIII.D1.SP-92 VIII.A.SP-92
A.	SP-38	VIII.G.SP-95 VIII.E.SP-95 VIII.D2.SP-95 VIII.D1.SP-95 VIII.A.SP-95
A.	SP-64	VIII.G.SP-64 VIII.F.SP-64 VIII.E.SP-64 VIII.A.SP-64
A.	SP-27	VIII.G.SP-27 VIII.F.SP-27 VIII.E.SP-27 VIII.A.SP-27
A.	SP-31	VIII.G.SP-31 VIII.F.SP-31 VIII.E.SP-31 VIII.A.SP-31
A.	SP-28	VIII.G.SP-28 VIII.A.SP-28
A.	SP-43	VIII.B1.SP-155 VIII.A.SP-155
A.	SP-61	VIII.F.SP-101 VIII.A.SP-101
A.1-a	S-15	VIII.C.S-15 VIII.B2.S-15 VIII.B1.S-15 VIII.A.S-15
A.1-b	S-04	VIII.C.SP-71 VIII.A.SP-71
A.1-b	S-06	Retired
A.2-a	S-15	VIII.C.S-15 VIII.B2.S-15

Table A-7. Relationship of Steam and Power Conversion (SPC) System IDs in GALL Report, Chpt VIII

Rev. 0	Rev. 1	Rev. 2
		VIII.B1.S-15 VIII.A.S-15
A.2-b	S-04	VIII.C.SP-71 VIII.A.SP-71
A.2-b	S-06	Retired
B1.	SP-43	VIII.B1.SP-155 VIII.A.SP-155
B1.	SP-59	VIII.B1.SP-59
B1.	SP-17	VIII.G.SP-88 VIII.F.SP-88 VIII.E.SP-88 VIII.D1.SP-88 VIII.C.SP-88 VIII.B1.SP-88
B1.	SP-44	VIII.B1.SP-98
B1.	SP-16	VIII.G.SP-87 VIII.F.SP-87 VIII.E.SP-87 VIII.D2.SP-87 VIII.D1.SP-87 VIII.C.SP-87 VIII.B1.SP-87
B1.	S-10	VIII.G.SP-74 VIII.F.SP-74 VIII.D1.SP-74 VIII.B1.SP-74
B1.	SP-18	VIII.B1.SP-157
B1.	SP-60	VIII.G.SP-60 VIII.B1.SP-60
B1.1-a	S-07	VIII.B1.SP-71
B1.1-b	S-08	VIII.B2.S-08 VIII.B1.S-08
B1.1-c	S-15	VIII.C.S-15 VIII.B2.S-15 VIII.B1.S-15

Table A-7. Relationship of Steam and Power Conversion (SPC) System IDs in GALL Report, Chpt VIII

Rev. 0	Rev. 1	Rev. 2
		VIII.A.S-15
B1.2-a	S-07	VIII.B1.SP-71
B1.2-b	S-15	VIII.C.S-15 VIII.B2.S-15 VIII.B1.S-15 VIII.A.S-15
B2.	SP-45	VIII.B2.SP-98 VIII.A.SP-98
B2.	SP-46	Retired
B2.	S-09	VIII.E.SP-73 VIII.D2.SP-73 VIII.C.SP-73 VIII.B2.SP-73
B2.1-a	S-05	VIII.B2.SP-160
B2.1-b	S-15	VIII.C.S-15 VIII.B2.S-15 VIII.B1.S-15 VIII.A.S-15
B2.1-c	S-08	VIII.B2.S-08 VIII.B1.S-08
B2.2-a	S-15	VIII.C.S-15 VIII.B2.S-15 VIII.B1.S-15 VIII.A.S-15
B2.2-b	S-05	VIII.B2.SP-160
C.	S-10	VIII.G.SP-74 VIII.F.SP-74 VIII.D1.SP-74 VIII.B1.SP-74
C.	S-09	VIII.E.SP-73 VIII.D2.SP-73 VIII.C.SP-73 VIII.B2.SP-73
C.	SP-16	VIII.G.SP-87 VIII.F.SP-87
		VIII.E.SP-87 VIII.D2.SP-87 VIII.D1.SP-87 VIII.C.SP-87 VIII.B1.SP-87
C.	SP-17	VIII.G.SP-88 VIII.F.SP-88 VIII.E.SP-88 VIII.D1.SP-88 VIII.C.SP-88 VIII.B1.SP-88
C.1-a	S-15	VIII.C.S-15 VIII.B2.S-15 VIII.B1.S-15 VIII.A.S-15
C.1-b	S-04	VIII.C.SP-71 VIII.A.SP-71
C.1-b	S-06	Retired
C.2-a	S-15	VIII.C.S-15 VIII.B2.S-15 VIII.B1.S-15 VIII.A.S-15
C.2-b	S-04	VIII.C.SP-71 VIII.A.SP-71
C.2-b	S-06	Retired
D1.	SP-16	VIII.G.SP-87 VIII.F.SP-87 VIII.E.SP-87 VIII.D2.SP-87 VIII.D1.SP-87 VIII.C.SP-87 VIII.B1.SP-87
D1.	SP-25	VIII.G.SP-91 VIII.E.SP-91 VIII.D2.SP-91 VIII.D1.SP-91

Table A-7. Relationship of Steam and Power Conversion (SPC) System IDs in GALL Report, Chpt VIII

Rev. 0	Rev. 1	Rev. 2
		VIII.A.SP-91
D1.	SP-24	VIII.G.SP-90 VIII.F.SP-90 VIII.E.SP-90 VIII.D2.SP-90 VIII.D1.SP-90
D1.	SP-38	VIII.G.SP-95 VIII.E.SP-95 VIII.D2.SP-95 VIII.D1.SP-95 VIII.A.SP-95
D1.	SP-17	VIII.G.SP-88 VIII.F.SP-88 VIII.E.SP-88 VIII.D1.SP-88 VIII.C.SP-88 VIII.B1.SP-88
D1.	SP-32	VIII.G.SP-92 VIII.E.SP-92 VIII.D2.SP-92 VIII.D1.SP-92 VIII.A.SP-92
D1.1-a	S-16	VIII.G.S-16 VIII.F.S-16 VIII.E.S-16 VIII.D2.S-16 VIII.D1.S-16
D1.1-b	S-11	VIII.G.S-11 VIII.D2.S-11 VIII.D1.S-11
D1.1-c	S-10	VIII.G.SP-74 VIII.F.SP-74 VIII.D1.SP-74 VIII.B1.SP-74
D1.2-a	S-16	VIII.G.S-16 VIII.F.S-16

Table A-7. Relationship of Steam and Power Conversion (SPC) System IDs in GALL Report, Chpt VIII

Rev. 0	Rev. 1	Rev. 2
		VIII.E.S-16 VIII.D2.S-16 VIII.D1.S-16
D1.2-b	S-10	VIII.G.SP-74 VIII.F.SP-74 VIII.D1.SP-74 VIII.B1.SP-74
D1.3-a	S-10	VIII.G.SP-74 VIII.F.SP-74 VIII.D1.SP-74 VIII.B1.SP-74
D1.3-b	S-16	VIII.G.S-16 VIII.F.S-16 VIII.E.S-16 VIII.D2.S-16 VIII.D1.S-16
D2.	SP-16	VIII.G.SP-87 VIII.F.SP-87 VIII.E.SP-87 VIII.D2.SP-87 VIII.D1.SP-87 VIII.C.SP-87 VIII.B1.SP-87
D2.	SP-38	VIII.G.SP-95 VIII.E.SP-95 VIII.D2.SP-95 VIII.D1.SP-95 VIII.A.SP-95
D2.	SP-25	VIII.G.SP-91 VIII.E.SP-91 VIII.D2.SP-91 VIII.D1.SP-91 VIII.A.SP-91
D2.	SP-32	VIII.G.SP-92 VIII.E.SP-92 VIII.D2.SP-92 VIII.D1.SP-92

Table A-7. Relationship of Steam and Power Conversion (SPC) System IDs in GALL Report, Chpt VIII		
Rev. 0	**Rev. 1**	**Rev. 2**
		VIII.A.SP-92
D2.	SP-24	VIII.G.SP-90 VIII.F.SP-90 VIII.E.SP-90 VIII.D2.SP-90 VIII.D1.SP-90
D2.1-a	S-16	VIII.G.S-16 VIII.F.S-16 VIII.E.S-16 VIII.D2.S-16 VIII.D1.S-16
D2.1-b	S-09	VIII.E.SP-73 VIII.D2.SP-73 VIII.C.SP-73 VIII.B2.SP-73
D2.1-c	S-11	VIII.G.S-11 VIII.D2.S-11 VIII.D1.S-11
D2.2-a	S-16	VIII.G.S-16 VIII.F.S-16 VIII.E.S-16 VIII.D2.S-16 VIII.D1.S-16
D2.2-b	S-09	VIII.E.SP-73 VIII.D2.SP-73 VIII.C.SP-73 VIII.B2.SP-73
D2.3-a	S-16	VIII.G.S-16 VIII.F.S-16 VIII.E.S-16 VIII.D2.S-16 VIII.D1.S-16
D2.3-b	S-09	VIII.E.SP-73 VIII.D2.SP-73 VIII.C.SP-73 VIII.B2.SP-73

Table A-7. Relationship of Steam and Power Conversion (SPC) System IDs in GALL Report, Chpt VIII		
Rev. 0	**Rev. 1**	**Rev. 2**
E.	SP-29	VIII.G.SP-29 VIII.F.SP-29 VIII.E.SP-29
E.	SP-38	VIII.G.SP-95 VIII.E.SP-95 VIII.D2.SP-95 VIII.D1.SP-95 VIII.A.SP-95
E.	SP-56	VIII.G.SP-56 VIII.F.SP-56 VIII.E.SP-56
E.	SP-39	VIII.G.SP-39 VIII.F.SP-39 VIII.E.SP-39
E.	SP-17	VIII.G.SP-88 VIII.F.SP-88 VIII.E.SP-88 VIII.D1.SP-88 VIII.C.SP-88 VIII.B1.SP-88
E.	SP-40	VIII.F.SP-96 VIII.E.SP-96
E.	SP-55	VIII.G.SP-55 VIII.F.SP-55 VIII.E.SP-55
E.	SP-19	Retired
E.	SP-36	VIII.G.SP-36 VIII.F.SP-36 VIII.E.SP-36
E.	SP-30	VIII.A.SP-30 VIII.G.SP-30 VIII.F.SP-30 VIII.E.SP-30
E.	SP-25	VIII.G.SP-91 VIII.E.SP-91 VIII.D2.SP-91

Table A-7. Relationship of Steam and Power Conversion (SPC) System IDs in GALL Report, Chpt VIII		
Rev. 0	**Rev. 1**	**Rev. 2**
		VIII.D1.SP-91 VIII.A.SP-91
E.	SP-27	VIII.G.SP-27 VIII.F.SP-27 VIII.E.SP-27 VIII.A.SP-27
E.	SP-24	VIII.G.SP-90 VIII.F.SP-90 VIII.E.SP-90 VIII.D2.SP-90 VIII.D1.SP-90
E.	SP-54	VIII.G.SP-54 VIII.F.SP-54 VIII.E.SP-54
E.	SP-26	VIII.G.SP-26 VIII.E.SP-26
E.	SP-32	VIII.G.SP-92 VIII.E.SP-92 VIII.D2.SP-92 VIII.D1.SP-92 VIII.A.SP-92
E.	SP-31	VIII.G.SP-31 VIII.F.SP-31 VIII.E.SP-31 VIII.A.SP-31
E.	SP-41	VIII.G.SP-41 VIII.F.SP-41 VIII.E.SP-41
E.	SP-37	VIII.G.SP-94 VIII.E.SP-94
E.	SP-57	VIII.E.SP-57
E.	SP-8	VIII.G.SP-8 VIII.F.SP-8 VIII.E.SP-8
E.	SP-16	VIII.G.SP-87 VIII.F.SP-87

Table A-7. Relationship of Steam and Power Conversion (SPC) System IDs in GALL Report, Chpt VIII		
Rev. 0	**Rev. 1**	**Rev. 2**
		VIII.E.SP-87 VIII.D2.SP-87 VIII.D1.SP-87 VIII.C.SP-87 VIII.B1.SP-87
E.	SP-58	VIII.G.SP-100 VIII.F.SP-100 VIII.E.SP-100
E.	SP-42	VIII.E.SP-97
E.1-a	S-16	VIII.G.S-16 VIII.F.S-16 VIII.E.S-16 VIII.D2.S-16 VIII.D1.S-16
E.1-b	S-10	VIII.G.SP-74 VIII.F.SP-74 VIII.D1.SP-74 VIII.B1.SP-74
E.1-b	S-09	VIII.E.SP-73 VIII.D2.SP-73 VIII.C.SP-73 VIII.B2.SP-73
E.2-a	S-16	VIII.G.S-16 VIII.F.S-16 VIII.E.S-16 VIII.D2.S-16 VIII.D1.S-16
E.2-b	S-09	VIII.E.SP-73 VIII.D2.SP-73 VIII.C.SP-73 VIII.B2.SP-73
E.2-b	S-10	VIII.G.SP-74 VIII.F.SP-74 VIII.D1.SP-74 VIII.B1.SP-74
E.3-a	S-10	VIII.G.SP-74

Table A-7. Relationship of Steam and Power Conversion (SPC) System IDs in GALL Report, Chpt VIII		
Rev. 0	**Rev. 1**	**Rev. 2**
		VIII.F.SP-74 VIII.D1.SP-74 VIII.B1.SP-74
E.3-a	S-09	VIII.E.SP-73 VIII.D2.SP-73 VIII.C.SP-73 VIII.B2.SP-73
E.4-a	S-22	VIII.F.SP-81 VIII.E.SP-81
E.4-a	S-21	VIII.E.SP-80
E.4-a	S-19	VIII.F.SP-78 VIII.E.SP-78
E.4-a	S-18	VIII.E.SP-77
E.4-b	S-24	VIII.G.SP-146 VIII.F.SP-146 VIII.E.SP-146
E.4-b	S-26	VIII.G.SP-117 VIII.F.SP-117 VIII.E.SP-117
E.4-c	S-28	VIII.G.S-28 VIII.F.S-28 VIII.E.S-28
E.4-d	S-21	VIII.E.SP-80
E.4-d	S-22	VIII.F.SP-81 VIII.E.SP-81
E.4-d	S-19	VIII.F.SP-78 VIII.E.SP-78
E.4-d	S-18	VIII.E.SP-77
E.4-e	SP-64	VIII.G.SP-64 VIII.F.SP-64 VIII.E.SP-64 VIII.A.SP-64
E.4-e	S-25	VIII.G.S-25 VIII.F.S-25 VIII.E.S-25

Table A-7. Relationship of Steam and Power Conversion (SPC) System IDs in GALL Report, Chpt VIII		
Rev. 0	**Rev. 1**	**Rev. 2**
E.4-e	S-23	VIII.G.S-23 VIII.F.S-23 VIII.E.S-23 VIII.A.S-23
E.5-a	S-09	VIII.E.SP-73 VIII.D2.SP-73 VIII.C.SP-73 VIII.B2.SP-73
E.5-a	S-13	VIII.E.SP-75 VIII.G.SP-75
E.5-a	S-10	VIII.G.SP-74 VIII.F.SP-74 VIII.D1.SP-74 VIII.B1.SP-74
E.5-b	S-13	VIII.E.SP-75 VIII.G.SP-75
E.5-c	S-31	VIII.E.S-31 VIII.G.S-31
E.5-d	S-01	VIII.G.SP-145 VIII.E.SP-145
E.6-a	S-10	VIII.G.SP-74 VIII.F.SP-74 VIII.D1.SP-74 VIII.B1.SP-74
E.6-a	S-09	VIII.E.SP-73 VIII.D2.SP-73 VIII.C.SP-73 VIII.B2.SP-73
F.	SP-61	VIII.F.SP-101 VIII.A.SP-101
F.	SP-17	VIII.G.SP-88 VIII.F.SP-88 VIII.E.SP-88 VIII.D1.SP-88 VIII.C.SP-88 VIII.B1.SP-88

Table A-7. Relationship of Steam and Power Conversion (SPC) System IDs in GALL Report, Chpt VIII		
Rev. 0	**Rev. 1**	**Rev. 2**
F.	SP-27	VIII.G.SP-27 VIII.F.SP-27 VIII.E.SP-27 VIII.A.SP-27
F.	SP-30	VIII.A.SP-30 VIII.G.SP-30 VIII.F.SP-30 VIII.E.SP-30
F.	SP-31	VIII.G.SP-31 VIII.F.SP-31 VIII.E.SP-31 VIII.A.SP-31
F.	SP-55	VIII.G.SP-55 VIII.F.SP-55 VIII.E.SP-55
F.	SP-29	VIII.G.SP-29 VIII.F.SP-29 VIII.E.SP-29
F.	SP-40	VIII.F.SP-96 VIII.E.SP-96
F.	SP-56	VIII.G.SP-56 VIII.F.SP-56 VIII.E.SP-56
F.	SP-41	VIII.G.SP-41 VIII.F.SP-41 VIII.E.SP-41
F.	SP-36	VIII.G.SP-36 VIII.F.SP-36 VIII.E.SP-36
F.	SP-54	VIII.G.SP-54 VIII.F.SP-54 VIII.E.SP-54
F.	SP-39	VIII.G.SP-39 VIII.F.SP-39 VIII.E.SP-39

Table A-7. Relationship of Steam and Power Conversion (SPC) System IDs in GALL Report, Chpt VIII		
Rev. 0	**Rev. 1**	**Rev. 2**
F.	SP-24	VIII.G.SP-90 VIII.F.SP-90 VIII.E.SP-90 VIII.D2.SP-90 VIII.D1.SP-90
F.	SP-8	VIII.G.SP-8 VIII.F.SP-8 VIII.E.SP-8
F.	SP-58	VIII.G.SP-100 VIII.F.SP-100 VIII.E.SP-100
F.	SP-16	VIII.G.SP-87 VIII.F.SP-87 VIII.E.SP-87 VIII.D2.SP-87 VIII.D1.SP-87 VIII.C.SP-87 VIII.B1.SP-87
F.1-a	S-16	VIII.G.S-16 VIII.F.S-16 VIII.E.S-16 VIII.D2.S-16 VIII.D1.S-16
F.1-b	S-10	VIII.G.SP-74 VIII.F.SP-74 VIII.D1.SP-74 VIII.B1.SP-74
F.2-a	S-16	VIII.G.S-16 VIII.F.S-16 VIII.E.S-16 VIII.D2.S-16 VIII.D1.S-16
F.2-b	S-10	VIII.G.SP-74 VIII.F.SP-74 VIII.D1.SP-74 VIII.B1.SP-74

Table A-7. Relationship of Steam and Power Conversion (SPC) System IDs in GALL Report, Chpt VIII

Rev. 0	Rev. 1	Rev. 2
F.3-a	S-10	VIII.G.SP-74 VIII.F.SP-74 VIII.D1.SP-74 VIII.B1.SP-74
F.4-a	S-39	VIII.F.SP-85
F.4-a	S-22	VIII.F.SP-81 VIII.E.SP-81
F.4-a	S-19	VIII.F.SP-78 VIII.E.SP-78
F.4-b	S-24	VIII.G.SP-146 VIII.F.SP-146 VIII.E.SP-146
F.4-b	S-26	VIII.G.SP-117 VIII.F.SP-117 VIII.E.SP-117
F.4-c	S-28	VIII.G.S-28 VIII.F.S-28 VIII.E.S-28
F.4-d	S-19	VIII.F.SP-78 VIII.E.SP-78
F.4-d	S-22	VIII.F.SP-81 VIII.E.SP-81
F.4-e	S-23	VIII.G.S-23 VIII.F.S-23 VIII.E.S-23 VIII.A.S-23
F.4-e	S-25	VIII.G.S-25 VIII.F.S-25 VIII.E.S-25
F.4-e	SP-64	VIII.G.SP-64 VIII.F.SP-64 VIII.E.SP-64 VIII.A.SP-64
G.	SP-32	VIII.G.SP-92

Table A-7. Relationship of Steam and Power Conversion (SPC) System IDs in GALL Report, Chpt VIII

Rev. 0	Rev. 1	Rev. 2
		VIII.E.SP-92 VIII.D2.SP-92 VIII.D1.SP-92 VIII.A.SP-92
G.	SP-29	VIII.G.SP-29 VIII.F.SP-29 VIII.E.SP-29
G.	SP-31	VIII.G.SP-31 VIII.F.SP-31 VIII.E.SP-31 VIII.A.SP-31
G.	SP-36	VIII.G.SP-36 VIII.F.SP-36 VIII.E.SP-36
G.	SP-38	VIII.G.SP-95 VIII.E.SP-95 VIII.D2.SP-95 VIII.D1.SP-95 VIII.A.SP-95
G.	SP-60	VIII.G.SP-60 VIII.B1.SP-60
G.	SP-55	VIII.G.SP-55 VIII.F.SP-55 VIII.E.SP-55
G.	SP-56	VIII.G.SP-56 VIII.F.SP-56 VIII.E.SP-56
G.	SP-30	VIII.A.SP-30 VIII.G.SP-30 VIII.F.SP-30 VIII.E.SP-30
G.	SP-58	VIII.G.SP-100 VIII.F.SP-100 VIII.E.SP-100
G.	SP-37	VIII.G.SP-94 VIII.E.SP-94

Table A-7. Relationship of Steam and Power Conversion (SPC) System IDs in GALL Report, Chpt VIII

Rev. 0	Rev. 1	Rev. 2
G.	SP-25	VIII.G.SP-91 VIII.E.SP-91 VIII.D2.SP-91 VIII.D1.SP-91 VIII.A.SP-91
G.	SP-53	VIII.G.SP-99
G.	SP-54	VIII.G.SP-54 VIII.F.SP-54 VIII.E.SP-54
G.	SP-39	VIII.G.SP-39 VIII.F.SP-39 VIII.E.SP-39
G.	SP-27	VIII.G.SP-27 VIII.F.SP-27 VIII.E.SP-27 VIII.A.SP-27
G.	SP-16	VIII.G.SP-87 VIII.F.SP-87 VIII.E.SP-87 VIII.D2.SP-87 VIII.D1.SP-87 VIII.C.SP-87 VIII.B1.SP-87
G.	SP-63	VIII.G.SP-103
G.	SP-17	VIII.G.SP-88 VIII.F.SP-88 VIII.E.SP-88 VIII.D1.SP-88 VIII.C.SP-88 VIII.B1.SP-88
G.	SP-41	VIII.G.SP-41 VIII.F.SP-41 VIII.E.SP-41
G.	SP-8	VIII.G.SP-8 VIII.F.SP-8 VIII.E.SP-8

Table A-7. Relationship of Steam and Power Conversion (SPC) System IDs in GALL Report, Chpt VIII

Rev. 0	Rev. 1	Rev. 2
G.	SP-62	VIII.G.SP-102
G.	SP-28	VIII.G.SP-28 VIII.A.SP-28
G.	SP-26	VIII.G.SP-26 VIII.E.SP-26
G.	SP-24	VIII.G.SP-90 VIII.F.SP-90 VIII.E.SP-90 VIII.D2.SP-90 VIII.D1.SP-90
G.1-a	S-16	VIII.G.S-16 VIII.F.S-16 VIII.E.S-16 VIII.D2.S-16 VIII.D1.S-16
G.1-b	S-11	VIII.G.S-11 VIII.D2.S-11 VIII.D1.S-11
G.1-c	S-10	VIII.G.SP-74 VIII.F.SP-74 VIII.D1.SP-74 VIII.B1.SP-74
G.1-d	S-12	VIII.G.SP-136
G.1-e	S-01	VIII.G.SP-145 VIII.E.SP-145
G.2-a	S-10	VIII.G.SP-74 VIII.F.SP-74 VIII.D1.SP-74 VIII.B1.SP-74
G.3-a	S-10	VIII.G.SP-74 VIII.F.SP-74 VIII.D1.SP-74 VIII.B1.SP-74
G.4-a	S-10	VIII.G.SP-74 VIII.F.SP-74

Table A-7. Relationship of Steam and Power Conversion (SPC) System IDs in GALL Report, Chpt VIII

Rev. 0	Rev. 1	Rev. 2
		VIII.D1.SP-74 VIII.B1.SP-74
G.4-a	S-13	VIII.E.SP-75 VIII.G.SP-75
G.4-b	S-13	VIII.E.SP-75 VIII.G.SP-75
G.4-c	S-31	VIII.E.S-31 VIII.G.S-31
G.4-d	S-01	VIII.G.SP-145 VIII.E.SP-145
G.5-a	S-26	VIII.G.SP-117 VIII.F.SP-117 VIII.E.SP-117
G.5-a	S-24	VIII.G.SP-146 VIII.F.SP-146 VIII.E.SP-146
G.5-b	S-27	VIII.G.S-27
G.5-b	S-28	VIII.G.S-28 VIII.F.S-28 VIII.E.S-28
G.5-c	S-23	VIII.G.S-23 VIII.F.S-23 VIII.E.S-23 VIII.A.S-23
G.5-c	S-25	VIII.G.S-25 VIII.F.S-25 VIII.E.S-25
G.5-c	SP-64	VIII.G.SP-64 VIII.F.SP-64 VIII.E.SP-64 VIII.A.SP-64
G.5-d	S-17	VIII.G.SP-76
G.5-d	S-20	VIII.G.SP-79

Table A-7. Relationship of Steam and Power Conversion (SPC) System IDs in GALL Report, Chpt VIII

Rev. 0	Rev. 1	Rev. 2
H.	S-40	VIII.H.S-40
H.	S-32	VIII.H.SP-82
H.	S-33	VIII.H.SP-83
H.	S-34	VIII.H.SP-84
H.1-a	S-30	VIII.H.S-30
H.1-b	S-42	VIII.H.S-42
H.1-b	S-41	VIII.H.S-41
H.1-b	S-29	VIII.H.S-29
H.2-a	S-02	VIII.H.S-02
H.2-b	S-03	VIII.H.S-03
I.	SP-35	VIII.I.SP-35
I.	SP-10	VIII.I.SP-10
I.	SP-13	VIII.I.SP-13
I.	SP-6	VIII.I.SP-6
I.	SP-5	VIII.I.SP-5
I.	SP-23	VIII.I.SP-23
I.	SP-34	VIII.I.SP-34
I.	SP-15	VIII.I.SP-15
I.	SP-12	VIII.I.SP-12
I.	SP-11	VIII.I.SP-11
I.	SP-4	VIII.I.SP-4
I.	SP-33	VIII.I.SP-33
I.	SP-9	VIII.I.SP-9
I.	SP-2	VIII.I.SP-154
I.	SP-1	VIII.I.SP-1

A.2 Staff Technical Positions

Table A-8. Summary of Changes to the Updated License Renewal Documents as a Result of License Renewal Interim Staff Guidance (LR-ISG)

LR-ISG Number	Title	Summary	Affected Areas of the License Renewal Guidance Documents
LR-ISG-19B	Cracking of Nickel-Alloy Components in the Reactor Coolant Pressure Boundary	NRC staff deferred this issue to address it in the updated license renewal guidance documents. As such, an LR-ISG was not issued.	GALL Report Section XI.M11B
LR-ISG-23	Replacement Parts Necessary to Meet 10 CFR 50.48 (Fire Protection)	NRC staff withdrew this LR-ISG as documented by letter dated December 20, 2006 (ML062990314).	None
LR-ISG-2006-01	Plant-Specific Aging Management Program for Inaccessible Areas of Boiling Water Reactor Mark I Steel Containment Drywell Shell	The final LR-ISG was issued on November 16, 2006 (ML063210029), and a notice of availability was published in the *Federal Register* on November 24, 2006 (71 FR 67923).	GALL Report Section XI.S1 and Table II.B.1.2 SRP-LR Table 3.5-1
LR-ISG-2006-02	Staff Guidance on Acceptance Review for Environmental Reports for License Renewal Applications	This LR-ISG concerns environmental areas of the license renewal process; therefore, it does not pertain to the GALL Report and SRP-LR. Furthermore, it was withdrawn as noticed in the *Federal Register* on July 16, 2009 (74 FR 34597).	None
LR-ISG-2006-03	Staff Guidance For Preparing Severe Accident Mitigation Alternatives Analyses	This LR-ISG concerns environmental areas of the license renewal process; therefore, it does not pertain to the GALL Report and SRP-LR. The final LR-ISG was issued on August 2, 2007 (ML071640133), and a notice of availability was published in the *Federal Register* on August 14, 2007 (72 FR 45466).	None

Table A-8. Summary of Changes to the Updated License Renewal Documents as a Result of License Renewal Interim Staff Guidance (LR-ISG)

LR-ISG Number	Title	Summary	Affected Areas of the License Renewal Guidance Documents
LR-ISG-2007-01	License Renewal Interim Staff Guidance Process, Revision 1	This LR-ISG concerns the process for developing and implementing LR-ISGs; therefore, it does not pertain to the GALL Report and SRP-LR. The final LR-ISG was issued on August 7, 2009 (ML091950069), and a notice of availability was published in the *Federal Register* on August 17, 2009 (74 FR 41461).	None
LR-ISG-2007-02	Changes to Generic Aging Lessons Learned (GALL) Report Aging Management Program (AMP) XI.E6, "Electrical Cable Connections Not Subject to 10 CFR 50.49 Environmental Qualification Requirements"	The final LR-ISG was issued on December 15, 2009 (ML091940093), and a notice of availability was published in the *Federal Register* on December 23, 2009 (74 FR 68287).	GALL Report Section XI.E6.
LR-ISG-2008-01	Staff Guidance Regarding the Station Blackout Rule (10 CFR 50.63) Associated with License Renewal Applications	The LR-ISG was withdrawn as noticed in the *Federal Register* on July 13, 2009 (74 FR 33478).	None
LR-ISG-2009-01	Aging Management of Spent Fuel Pool Neutron-Absorbing Materials other than Boraflex	The final LR-ISG was issued on April 27, 2010 (ML100621321), and a notice of availability was published in the *Federal Register* on May 4, 2010 (75 FR 23821).	GALL Report Section XI.M40 and Table VII.A2 SRP-LR Section 3.3